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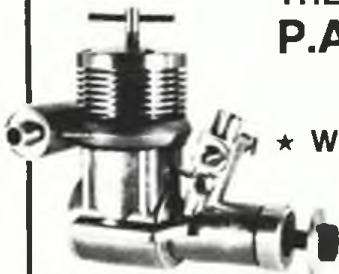
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# AERO MODELLER



p.90



p.102

**Editor** *Pete Freebrey*  
**Graphic Design** *Jenny Hine*  
**Advertisement Manager** *Jim Carrigan*  
**Group Editor** *Alec Gee*

**Cover:**  
It may be Bill Dennis' first indoor rubber powered scale model, but it can be clearly seen that it is not his first model. Full-size plans for Bill's Avro 'Avian' can be found in this issue. Inset, John Carter carefully watches his thermal sensor at the Aeromodeller Coupe camp.

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# HANGAR DOORS

## SMAE AGM

The SMAE Annual General Meeting was held on Saturday 23rd November at the Post House on the outskirts of Leicester. It was very encouraging to see a good turn out of clubs, with a number of people having to stand at the back of the room! The meeting went very smoothly - too smoothly, as there was only one new member to add to the council posts - that of Neil Lunam as Records Officer. All the other council positions remain as before with the posts filled by the existing officers - elected unopposed. Does this mean that everyone is happy with the administration, or are members too apathetic to bother? Let us hope that it is the former! No true aeromodeller could really be accused of being lazy - it is not that sort of hobby, but it would be nice to see a little more interest and possibly some 'new blood' from time to time.

The 'hot potato' at every AGM is always the discussion and adoption of the membership fees for the coming year. The level of fees has been kept the same for two years and it was hoped to be able to repeat this for one more year - this was not to be. Only days before the AGM, the SMAE were informed of a large increase in the insurance premium that could not be assimilated within the present fee structure.

This increase had been brought about by a larger than average number of insurance claims - so even if clubs had voted to revert to the previous system of individual club insurance, there would still have been an increase in premiums.

The meeting agreed that an increase in fees was unavoidable, although with strong reservations as to whether the accidents causing this could have been avoided. It was agreed that clubs should in future, bend every effort to enforce the safety rules that nearly all clubs have already written into their own club rules!

Accidents are not things that can be entirely catered for, as no one actually wishes to have one - BUT more care in our day-to-day flying can only produce better statistics in the future... the moral is there TAKE CARE, THINK AHEAD and FLY SAFELY.

The 1986 membership fees will be £6.50 for seniors and £4.00 for juniors. What did cause a fair bit of discussion was not

the fees themselves but the way the SMAE should allocate the monies to its budget for 1986.

There has been a movement within the Society over the last few years to limit funds available to activities within the SMAE that have anything to do with contests. This seems on the surface to be a dictatorial approach which may (and does) affect those members wishing to represent their country at World and Continental Championships. Indeed, there is a fair amount of 'sour grapes' from a very small minority whose attitude is "I can't go, so why should I pay for them..."

Although this attitude is only to be frowned upon, one must not ignore the fact that the vast majority of members in today's Society are Sports Flyers pure and simple, contests and all that go with them are foreign, and an

un-needed option. Less than 8% of the Society are active competitors.

The competition fraternity recognise the problem and are working in a number of ways that may create some form of 'self-help'. The final form of budget accepted by the AGM has to have a question mark hanging over the amount available for contest involvement. In an endeavour to encourage more 'passing interest' in competitions, the Contest Licence (£10 in 1984-5) has been done away with. This will undoubtedly mean an increase in competition entry fees - but it does mean that *anyone* can enter. Also in an attempt to make 'the books balance', the proposed Competition Newsletter will be a self financed option and NOT funded from the SMAE funds.

If you wish to be on the Compe-

tion Newsletter mailing list - you do, don't you? - please send £2.00 to SMAE Competition Newsletter, Kimberly House, Vaughan Road, Leicester.

The aim is for four 'mail shots' but this may be depend upon the bulk of information that has to be posted!

## Coupe surprise...

*Aeromodeller's* Coupe d'Hiver International found dry sunny weather sandwiched between damp dreary days at the beginning of December... unfortunately it blew half a gale! Winds of 20-25mph did rather inhibit the usual carefree atmosphere and although many entered, quite a few decided against flying!

A very pleasant surprise came only a couple of days before the event - in the form of an offer of a magnificent prize from Stanley



The SMAE had a host of glittering prizes and trophies to be presented at its annual prizegiving... seen here are only a very few of the recipients receiving their awards from Lady Betty Chacksfield: A. Sue Coy with the Women's Cup; B. Ken Binks, the Sld Allen Trophy, Taplin Trophy and the SMAE R/C Cup; C. Brian Marlin with picturesque Gutteridge Trophy, D. Dave Hipperson collected the Thurston Cup, the Caton Trophy, the Flight Cup and the Jubilee Cup, E. Bill College the CMA Cup and F. Anthony Ball, the Heather Cup and Frog Junior Trophy.

*Tools* of Sheffield. Having accepted the offer of a £100 'Handyman Tool Kit', it was decided to present this to the top junior at this year's Coupe Comp.

Mark Francis repeated his success in 1984 by just beating Anthony Ball to become top junior in 1985 - his family should now be able to leave all those small jobs around the house to Mark - he is certainly kitted out for them!

The Aeromodeller Trophy for 80gram models was won by Steve Philpott and the Boutillier Cup for 100 gram models by John Cooper.

### Well done...again

About this time last year, we reported on the successes scored by Royal Air Force 'Tornados' in bombing competitions held in the United States. Well, they've done it again...

For the second year running RAF 'Tornado' aircraft have triumphed in this major bombing and navigation competition. They captured first place in two of the three contests entered and also picked up second place in all three.

The John C Meyer Trophy for precision low-level bombing gave the RAF Team first and second places. The Curtis Le May Trophy for high and low-level bombing also produced a first and second place.

The competitions for bombing accuracy and accurate timekeeping involved day and night sorties, each lasting over six hours and covering distances in excess of 2400 miles.

Well done the RAF. How about three out three in 1986...

### Caw...Caw...

Wharfedale and District Aeromodelling Club do have something to crow about. Their list of successes at last year's British Nationals was pretty good! A first in Novice Stunt, first in 1/2A Combat and a first in 1/2A Team Race - this was backed up by two second places and three third places...

They believe they can claim the title of 'Best Control Line Club in England'. We think that with this record they are probably right...unless you can prove otherwise. Any takers? Write to Aeromodeller if you think otherwise...

Wharfedale are running at least three events this year: The Wharfedale 1000, Class 'A' Combat and a Mini Goodyear event - they are looking for sponsors. So...if you can't beat 'em; join 'em and help by adding to the sponsorship of one of their events. All offers to Jeff Smith, 43, Denton Avenue, Leeds LS8

11E or phone him on 0532 663432.

### Hurricane Half Century

The earliest potentially air-worthy specimen is being rebuilt to fly again in a joint venture between The Shuttleworth Collection and The Imperial War Museum.

The prototype of the Hawker Hurricane single-seat fighter of World War II, K5083, flew for the first time on 6 November 1935.

The Hurricane outnumbered the Spitfire by about three to two in the Battle of Britain and although it was not so fast as the Spitfire, its better manoeuvrability largely compensated for its lack of level forward speed. Some Hurricanes were converted for catapult operation from ships at sea.

Today only two Hurricanes fly. Both are Mark IIs on the strength of the Royal Air Force Battle of Britain Memorial Flight, based at RAF Coningsby in Lincolnshire. However, behind the public scene, an early Mark I, built in Canada by the Canadian Car and Foundry Company, is to be restored to fly again in a joint venture between a private organisation and a national museum: The Shuttleworth Collection and The Imperial War Museum, at the outstation at Duxford, near Cambridge, where the rebuild will take place.

This Hurricane Z7015, is the only Mark I that will fly again any-



Above, a pleasant surprise for top Junior at Aeromodeller's Coupe d'Hiver event in December... Mark Francis was presented with his magnificent kit of tools by MAP Publisher Tony Dowdeswell. 'The Handyman Tool Kit' was very kindly donated by Stanley Tools of Sheffield.

where in the world. Taken on the strength of the RAF's No 13 Maintenance Unit, the machine was despatched to General Aircraft Ltd where it is believed the conversion to a Sea Hurricane was carried out.

After World War II, Z7015 was used by Loughborough College as an instructional airframe to give students practical experience, but later was transferred to The Shuttleworth

Collection at Old Warden Aerodrome, where it stood for several years as a 'gate guardian'.

After several years of uncertainty about the Hurricane's future, today Z7015 is now the subject of a new agreement that will ensure its return to flying condition. It will be retained as a Sea Hurricane and will be the world's only surviving example to fly again.

## What's On

**12 January**  
SLAITHWAITE LOW CEILING INDOOR MEETING  
Comps. EZB, HLG, PND, Scale. Venue: Colne Valley Leisure Centre, Slaithwaite. Contact: Dennis Davitt. Tel: 0532 675433

**26 January**  
SOUTHERN AREA INDOOR MEETING.  
Comps. Peanut, Open Rubber, CO<sub>2</sub>, HLG, EZB. All Balsa Machine SAM35, Earl Stahl. Venue: H.M.S. Daedalus, Lee-on-Solent. Contact: Malcolm Leach. Tel: Emsworth (Hants) 5364. Also Fly-For-Fun. Entry £1.25 (per comp or F-F-F), under 16 free. Anyone going must inform Malcolm Leach at least one week before. Flying from 1pm to 6pm.

**29 January - 5 February**  
MODEL EXTRAVAGANZA EXHIBITION AND COMPETITION  
Venue: Bury Art Gallery, Moss St., Bury, Lancs. Contact: Colin Billingham. Tel: 061-761 4021. All sorts of models - Entry Adults 60p, Children and Senior Citizens 40p. On Saturday 8th February there will be a modellers swap meet and auction at the same venue. Phone/write for full details.

**2 February**  
CRAWLEY INDOOR MEETING  
Venue: Crawley Leisure Centre. Contact: JAW Doiding. Tel: Crawley 510272

**9 February**  
SLAITHWAITE LOW CEILING INDOOR MEETING  
Comps. EZB, HLG, PND, Scale. Venue: Colne Valley Leisure Centre, Slaithwaite. Contact: Bernard Hunt. Tel: 0484 862353

**30 March**  
SOUTHERN AREA INDOOR ALL SCALE DAY.  
Comps. Peanut, Open Rubber, Open CO<sub>2</sub>, SAM 35, Earl Stahl. Venue: H.M.S. Daedalus, Lee-on-Solent. Contact: Malcolm Leach. Tel: Emsworth (Hants) 5364. Also Fly-For-Fun. Entry £1.25 (per comp or F-F-F), under 16 free. Anyone going must inform Malcolm Leach at least one week before. Flying 1pm to 6pm.

**27 July**  
DREAMING SPIRES F/F SCALE - SILENT VINTAGE GALA  
Comps. Open Rubber (15in span plus), CO<sub>2</sub>, Power/Electric (max 1.5cc), Twin Rubber Scale and also Mass Launch. Vintage Wakefield, Lightweight, Lightweight Freewheel and Glider. Venue: Port Meadow, Oxford. Contact: C. Newman. Tel: 086 77 3020. Note: Absolutely no diesel/glow powered models permitted - other than those entered in the F/F Scale event

### SMAE SCALE COMPETITIONS 1986

				CONTACT
16th March	WORLD CHAMPIONSHIP TEAM TRIALS (control line scale only)	RAF Wyton	Control line only (FAI Class F4B)	Eric Coates 0329-832713
20th April	SPRING GALA	RAF Odiham	R/C light scale F/F scale	N Couling 0323-53116
27th April	INDOOR SCALE NATIONALS	Alumwell Centre Walsall	All indoor scale classes	D Sheppard 0272-697595
8th June		Amesbury	R/C International scale class only	E. Coates 0329-832713
6th July	SUMMER SCALE	RAF Abingdon	R/C International, C/L & F/F scale	E. Coates 0329-832713
13th-20th July	SCALE WORLD CHAMPIONSHIPS	Oslo	Control line (FAI Class F4B) Radio Control (FAI Class F4C)	E. Coates 0329-832713
23rd-25th Aug	R/C & C/L NATIONAL CHAMPIONSHIPS	RAF Barkston Heath	All scale classes	E. Coates 0329-832713
14th Sept	NORTHERN SCALE DAY	RAF Elvington	R/C International scale class	D Kerswell 0653-2580
21st Sept	SOUTHERN GALA	RAF Odiham	R/C International Scale class	N Couling 0323-53116

# PHOTO PRIZE

## Model News With Fliar Phil

### Wood for the Winner

100 Sheets of balsa, nearly 200 lengths of strip wood — some prize!

All you have to do is send Fliar Phil your photograph - good quality black and white or colour prints will do, with your name and address plus details of the model, its construction, etc., on the back. Post your entries to Aeromodeller Photo-Prize Feature, P.O. Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Herts HP2 4SS. Photos will be returned after publication.



With the New Year still in its infancy, perhaps a few 'Hopes for 1986' are appropriate! Fliar Phil hopes (don't we all) that we get a summer this year! He hopes (with all due regard for those splendid R/C fellows) there will be a Renaissance of Rubber powered models of ALL types. F.P. feels the signs are there! Lastly, he hopes you will keep sending him your photos! - like 'wot' you've done this month!

#### Photo 1

Inspired by Geoff Clarke's control line speed article in the July '85 *Aeromodeller*, Bryan Lack of Banbury, Oxon, built this 'Midge' speed model. Power: OS 'Max' 10 FSR. Weight: 9 oz - practice speeds around 90 mph. At the SMAE meeting at Piddington (Sept '85) it unfortunately turned in on take-off. Bryan gallantly put the blame on himself: "Inexperience - the Midge got ahead of the handle - fatal"! Bryan's probably 'done the ton' by now!

#### Photo 2

Model aircraft come in all sizes - and thanks to the ingenuity and imagination - all shapes! This fascinating model (*HB 25* power) is the creation of Mr V McCall of Cramlington, Northumberland. Quoting Mr McCall: "This model came about as the result of cutting the good parts of three damaged foam wings and gluing them together at weird angles". Weird it may be - excitingly different it certainly is. Good for you, Mr McCall!



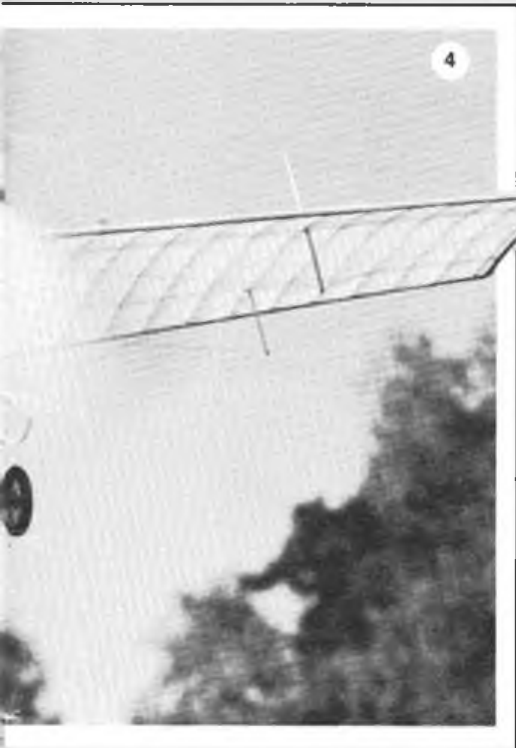
### Photo 3

Obviously Geoff Smith of Rugby, Warwickshire, is a kindly chappie, because he has taken us 'under his wing'! - the wing in this case being that of Geoff's 'Scram'. He also thoughtfully provided the following info: Power is from a *Webra* 61, converted to diesel, turning a 15in x 6in propeller. Wing flaps are now fitted. A fine model, photographed from a most unusual angle. F.P.'s thanks, Geoff.



### Photo 4 - Winner

This, friends, is surely how the real 'Antoinette 7' must have looked like coming in to land (if only we could have been there!). This inspired model (to Peanut scale) comes from George Tornkvist of Sollentuna, Sweden. Built from a scaled-down plan by American master-aeromodeller Bill Hannan. Weight: 6 grams, flies slowly and gracefully - AND collects this month's balsawood! Thanks for your kind regards George - Fliar Phil sends you his best wishes.

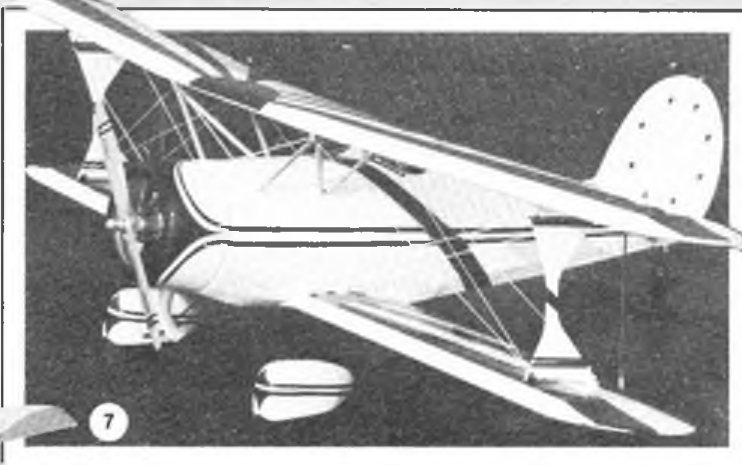


### Photo 5

No problem with this photo - just a friendly meeting with an old and trusty 'free-fighter', - Phil Smith's *Veron* 'Cardinal'. Photographed so you can enjoy those familiar lines. It comes from Dereck Woodward of Truro, Cornwall, who tells F.P. that it has a *Mills* .75 up front, and it is his second 'Cardinal' - he built his first in 1962! You can't keep a good plane down Dereck. Thanks for the memory!

### Photo 6

Another 'is it for real?' pic! An *Andrews* 'Aeromaster', from Steve Dunne of Eccleshill, Bradford. "Still the finest sport-biplane design around", says Steve. No wonder it is his 'pride 'n joy'. Power: *Webra* 60 'Blackhead', weight 7½lbs. Steve adds, "She flies like a pussy cat". F.P. thinks that must mean she's a purr-fect (!) performer! Many thanks for the photocopy of 'Fliar Phil's Model News' - *Aeromodeller* 1946. Steve!



### Photo 7

F.P. felt you would like to get real close to this fine 'Great Lakes Special' (from the Plans Handbook), although Dave Disney of Mickleover, Derby, also sent F.P. some delightful flying shots (they may be in a future 'Model News' Dave). All up weight: 8½lbs. Power: *Enya* 60. Dave started modelling again about two years ago - after a 25 year gap! Real nice to have you with us again Dave.

More eye-catching models caught by the camera's eye next month.

**Remember folks, this is YOUR feature and Fliar Phil needs YOUR photos to keep it going!**



# ASPIS!



## Build this attractive vintage style free flight model for 0.5cc engines by 'Pete' Fisher

Above, the smart lines of 'Aspis' have graced these pages several times in the last year - now is your chance to build your own musical dragon!

### Introduction

The 'Aspis' is named after a small musical dragon. It is a *Vintage Style* semi-scale free flight sports model, for leisurely flying, under all weather conditions. Three 'Aspis' models have been built and tested. All flew off the board, with no modifications required, giving pleasing and ultra stable flight characteristics. The first flights were on Jurby aerodrome, on 7th May 1985.

### Design and development

The 'Aspis' is the 319th model built by the designer. It is intended for use with a 'Dart' 0.5cc diesel, as per the prototypes, or any other small diesel or glow-plug engine of 0.3-0.8cc. Construction is straightforward and traditional; but incorporates an unusual and efficient elliptical type wing plan form; which greatly enhances the overall character of the design. The swept back leading edge helps to provide extra lateral stability without the excess dihedral, sometimes used on small free flight models. The final concept is developed from a long line of sports free flight models, designed for

Performance Kits, the last of which was the very successful P.K. 'Wasp Wings' of a similar size.

### Construction

**Fuselage:** Before commencing construction, cover the plan with a piece of wax paper, the inside wrappings of cereal packets are suitable, this stops the structure from sticking to it.

Build the two basic fuselage sides, made up of 1/8in x 1/8in longerons, uprights and diagonals, nose formers and wing gussets of 1/8th sheet, together with the tailplane gussets, directly over the plan. When the first side is finished, build the second over it, to ensure identical shapes.

Assemble the fuselage, over the plan view, starting with the six 1/8in x 1/8in spacers under the wing centre section. Check vertical alignment with a set-square. Draw in the tail section, fit the tail post and then the other spacers. Fit firewall B2 and bulkhead B1, then smear the entire inside of the engine bay with balsa cement from B2

forward; to act as additional fuel proofing.

Smear the engine bearers with cement and mount the engine with 8 B.A. nuts and bolts and washers, then securely cement the unit to the inside of the front 1/8in sheet nose formers. The engine cowling is steamed, shaped and smeared on the inside with cement and then having mounted a small free flight fuel tank, worked into position over B2. Carefully check down and side-thrust as per the plan.

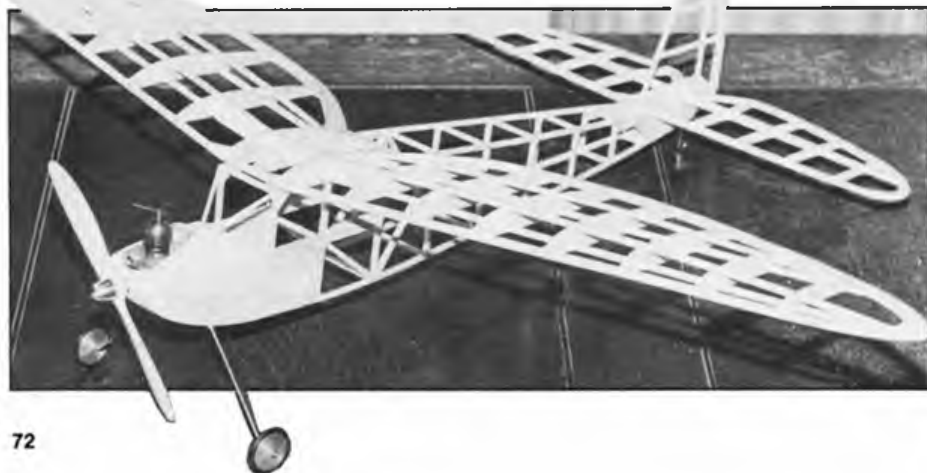
**Undercarriage:** Bend the undercarriage wire to shape over the full size drawing on the plan. Bind the upright sections of the wire to pieces of hard 1/8in x 1/4in balsa with strong carpet thread and cement securely in position. Finally fit the 1/8in undercarriage gussets at each corner, where the legs protrude from the base of the fuselage. The wheels are located by threading the axles to 8 B.A. Final 1/16in sheeting can now be fitted.

**Fin:** Build directly over the plan. Start with main 1/8in sq fin pillar, then formers F1-4, and finally the 1/8in sq leading edge and lateral members. The finished unit should be sanded to an airfoil section.

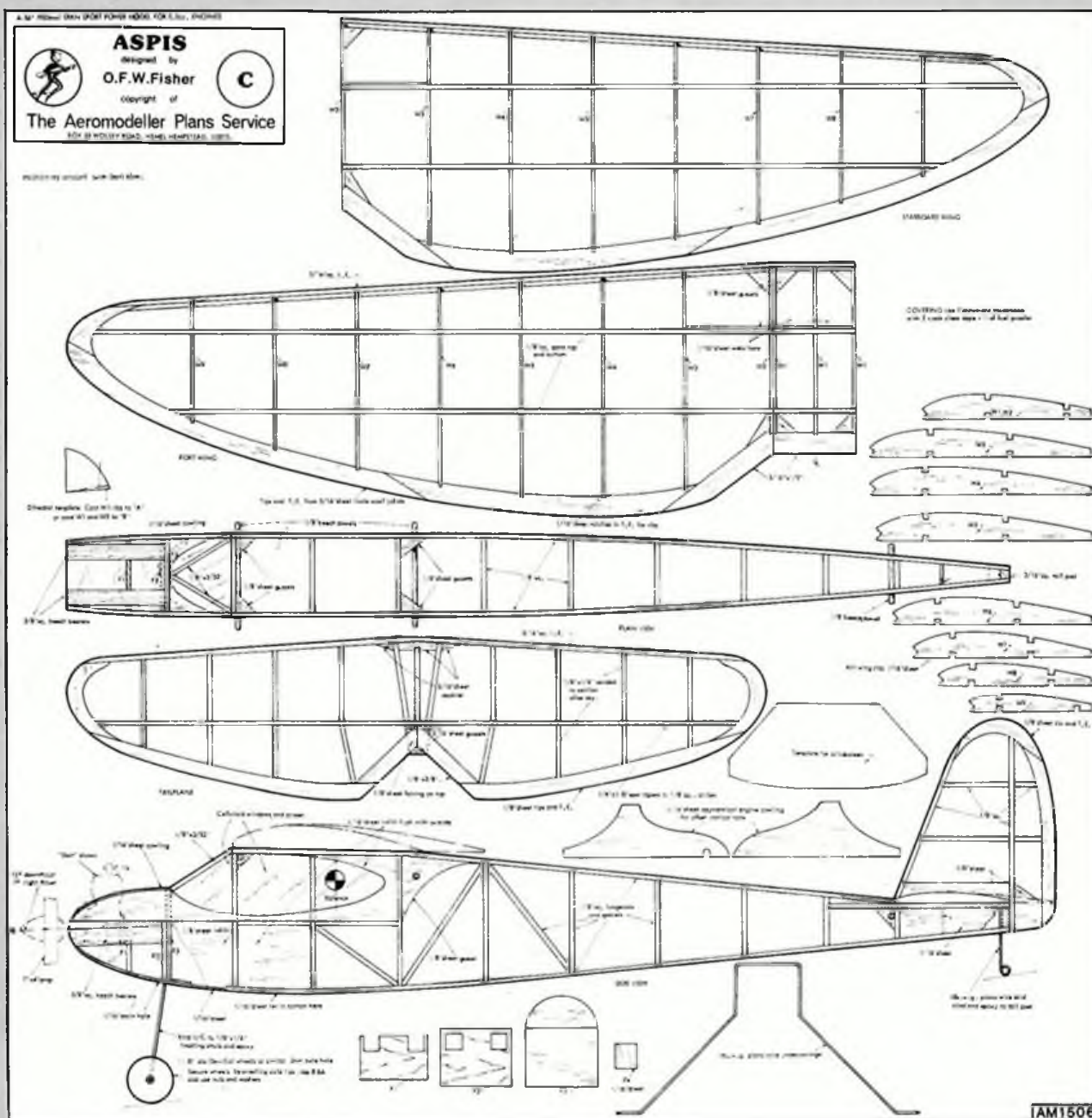
**Tailplane:** Shape the 1/4in x 1/8in mainspar, so that it tapers to 1/8in sq at the tips, and pin over the plan. Fit 3/16in sq leading edge and formers T1-3. The 1/4in x 1/8in tailplane ribs are shaped and sanded to blend with the mainspar and leading edge to form airfoil sections. Fit gussets and fairings. After covering, the fin is cemented in position, check alignment with a set-square.

**Wings:** Pin W1 4 over the plan, followed by the lower 1/8in sq main-spars. Fit the ribs R1-9, canting root rib R1 with the dihedral template shown on the plan. Fit leading edge and top main spars. Fit gussets. Having built the centre section, assemble the wing panels, checking the 2.4in dihedral at each tip. Fit the 1/16in sheet inter-spar webbing. The entire structure should be shaped to a smooth airfoil section, taking special care at the wing tips.

Below, prior to covering, 'Aspis' exhibits simplicity of construction - the only real areas to watch are those sheet parts of wing and tail trailing edges and tips...make sure these are accurately cut and all will be well.







**Covering and Finish:** Firstly sandpaper the airframe all over; then cover the model, a section at a time, taking care to cover the underside of the flying surfaces first, then overlapping the top covering, by about 1/8in. The prototypes were covered with heavy-weight *Modelspan*; followed by two coats of *H.M.G.* clear dope, and one of fuelproofer (all-up weight of prototype was 6 1/2oz).

### Flight testing

**Test Gliding:** Check that the balance point (CG) is in the position marked on the plan. On a calm day, hand launch the 'Aspis' from shoulder height, with wings level, towards a point on the ground about 100 yards away from you. If it dives, place a piece of 1/16in scrap balsa under the trailing edge of the tailplane. If it stalls,

place it under the leading edge. Trim for a long flat glide, with a slight left hand turn. Take care to launch into the wind.

**Powered Flight:** Use reduced power on initial flights. Trim for a slow left hand turn under power. Ensure that the engine run does not exceed 20 secs and check that your name and address is clearly displayed on the model.





# Making the most of **LIFT**

Understand what happens and why - with Dave Hipperson

**N**O MATTER how experienced we become at 'natural' thermal detection, because of the fluid unpredictability of the air in which we fly - particularly so close to the ground - it will probably never be possible for any of us to become infallible... Sometimes I think if we could actually see what some of this air we fly in was actually doing, we may well be put off trying to generalise about lift and sink at all and pack up and go home!

Theoretically it should be possible now to construct equipment to 'plot' thermals from the ground but I believe if ever such equipment were to appear it would be outlawed, so I am not going to spend time here on this. It is perhaps fortunate that even the modern contest modeller still seems more interested in improving his models and technique than taking that ultimate step with electronic hardware. So although electronic thermal detectors have a place and will be dealt with later, it is more the matter of successful thermal detection by 'feel' that I want to consider.

## What is lift

There are two main types - the lift created by the wind itself when it blows over obstructions and is diverted upwards and the lift generated by differentials in air temperature in which the air 'convects' up and down. There is of course some interaction between these two as well.

Lift can be encountered *over* stationary objects and obstructions to the flow of the wind of a variety of scales...from hedges, buildings and hills to complete mountain ranges (fig 1). Somewhere here is lift that might be useful to us but it has one particular limitation - it does not move downwind and a free flight model *does*, therefore it can be of little use or at least not for long.

However, one has to be aware of its existence as it can be very deceptive. When towing a glider for example - a ridge upwind of as little as 20ft can give the impression of a thermal as the model is towed through the updraught. Common land is particularly notorious for this effect, and quite a few aerodromes have escarpments off the end of runways where the land has been built up to

keep the runway flat. Syerston has a huge precipice into the river Trent along one side. It gives us all manner of trouble when the wind is from that direction.

At the Easter Meeting last year on Salisbury Plain, in a stiff breeze there appeared to be some standing ridge lift above the FAI launch line, probably induced by an upwind valley. Actually on this occasion it proved to be none too turbulent and models that flew straight into wind immediately after launch - such as power and straight trimmed Wakefields - were seen to actually benefit from it slightly, even though everything had eventually to fly through the corresponding sink patch downwind. Models trimmed to turn away quickly were in downdraughts immediately and so lost out. Of course for gliders on tow it was just very confusing.

A third type of lift *can* occur in the early morning of hot summer days when large areas close to the ground will appear to be more buoyant and visibly inhibit the sinking of a gliding model. This is often a layer perhaps only 50ft thick. It is not actually lift as much as *dense* damp air. It can happen in the evening too but more rarely.

As the sun rises and becomes stronger, such a layer is quickly evaporated off into stronger individual patches of lift and conditions become erratic and the usual pattern of thermal/sink/thermal establishes itself. Such conditions as these are most usual over flat ground and in super stable conditions in hot weather and very low drift.

## Heat Differentials

At ground level there can be no vertical movement of the air, so it must follow that the closer to the ground we are the slower must be any vertical movement. Hence the thermal lift we seek will start as a slowly rising patch, generated in the same way as the full blown cumulus type thermal but on a smaller and more gentle *scale*.

As in the early morning case referred to before, such lift often begins as a stable layer of air breaking away from the surface - only at much higher altitudes do these patches form proper thermals and accelerate upwards at many feet per second.

How and when these patches break away depends on temperature of course but also can be initiated by the interplay of ground level turbulence such as hedges, cars, even people but more of that later. Let us presume in one way or another we have a parcel of air moving up, or better still a column (fig 2). As it rises it creates a vacant space...into which more air has to be sucked to avoid a vacuum.

Thus we feel wind speed changes before, during and after the passage of thermal type lift. It is such speed fluctuations in the wind that form the basis of most thermal detection.

Such conditions as described above exist to a greater or lesser extent in *all* weathers - hot or cold. Remember thermal lift exists because of differentials in air temperature and differentials exist hot or cold, day or night.

Of course the effects are more clearly *felt*

Fig 1

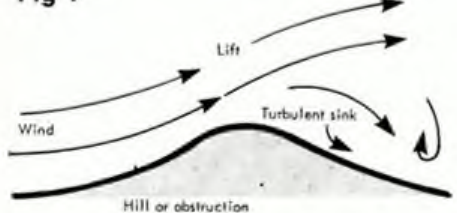
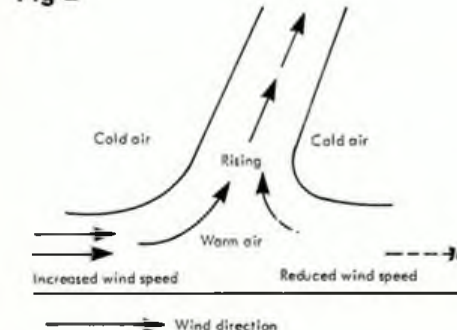


Fig 2



on hot sunny days because bursts of direct sun can heat reflective parts of the ground quickly and transmit changes of temperature to patches of the air over that ground just as quickly. Cold wintery overcast skies will dampen the effect drastically but it never goes away altogether. *Never give up!*

### Variable factors

We are searching for rising air into which to launch our models - here are two problems. One, to determine what and where the rising air is and the other to launch the model into it. Hence your detection system and to an extent the lift you are looking for will have to vary depending on what you are flying.

It is agreed that it is easiest for the rubber flier as he is able to launch instantly - once wound-up - and hence be most sure of contacting the air selected. Power fliers have a more difficult task... Not only does the motor have to be started, the din from that then usually dulls the thermal picking senses more than somewhat but at the end of the climb it is unlikely to be anywhere near the air that was selected on the ground (fig 3).

Glider fliers have a mixed advantage - obviously they can feel the model on the line - circle towing having accentuated this facility - but they are rather cut-off from the benefits of standing and simply feeling the air once they are towing, so much of their thinking has to be done in advance.

Your technique will also have to reflect where you fly just as much as what you fly. Moreover if you travel around to various contests it is important that you are quick to recognize the different properties of the various locations. Aerodromes in general tend to produce steadier slower thermals than say common land. Chobham, Beaulieu and Ashdown produce real 'boomers' until quite late in the evening (I have lost far fewer models since I started flying regularly on aerodromes).

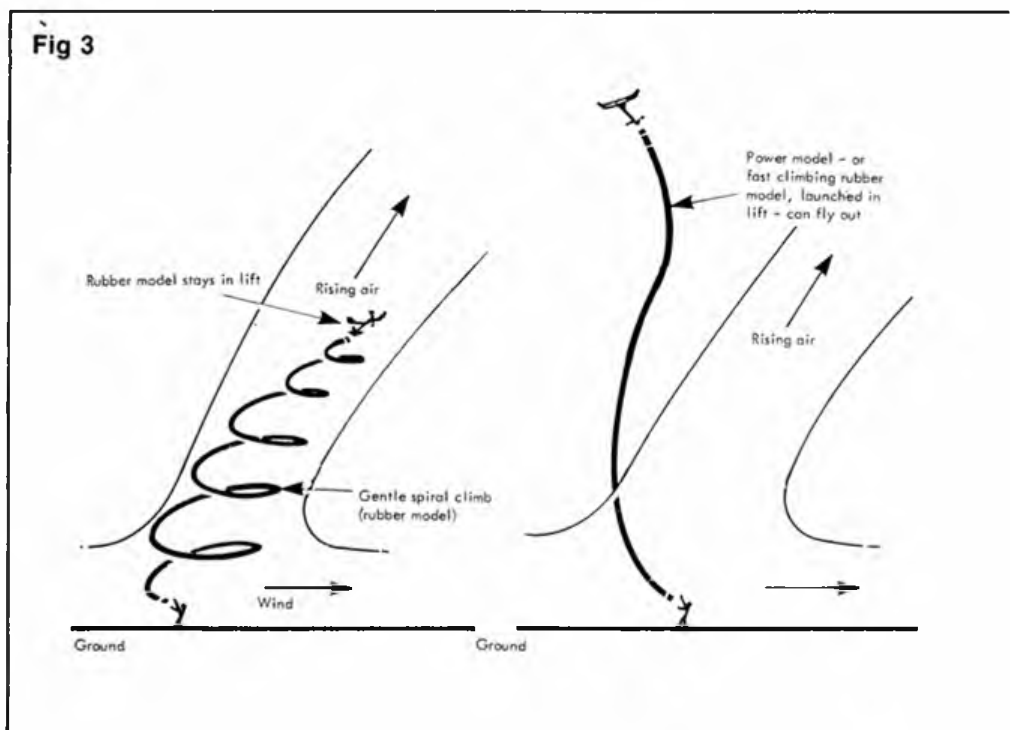
Look at the thermals around at last years Club Champs, we never see anything like that on an aerodrome. Of course gentle less violent lift is really to be preferred, so aerodromes are better in most cases.

Much of the strong lift on commons can be attributed to the reflective qualities of sandy stretches and the cumulative effect of local ground induced turbulence getting the thermal lift started (fig 4). Of course aerodromes can also have variations in surface details to initiate lift as well.

In stable conditions on an aerodrome quite a small contour or surface change can actually be enough to initiate a patch of lift. It may turbulate the air flow just enough to de-stabilize some warm air and up it goes.

Remember that some surfaces radiate heat better than others. Roads, runways and hard smooth earth can be very useful particularly in the evening when the ambient temperature level may have dropped and the radiated heat from these surfaces begins to have a very real effect. Evening flights taken straight down a runway can often benefit.

Even without sun, the effects of runways can be significant. During last year's FAI day at the Nats while it was actually drizzling I watched two gliders drop gently from towline height then hold altitude for some time as they glided over a runway then dropped again quickly the other side. Twice I watched this happen and then walked out and flew over the grass like an idiot!



On difficult days it is useful to remember this especially when getting desperate before an evening flyoff! Even a crowd of people can start a bump. On numerous occasions flying late in a flyoff I have caught lift that I am sure was at least broken away, if not actually created by my opponents chasing their models downwind.

I am sure that is what happened when Phil Owens won the Open Glider flyoff at the '83 Nats. He flew last, over the top of hoards of people running about on the runway and contacted the only real lift of the evening.

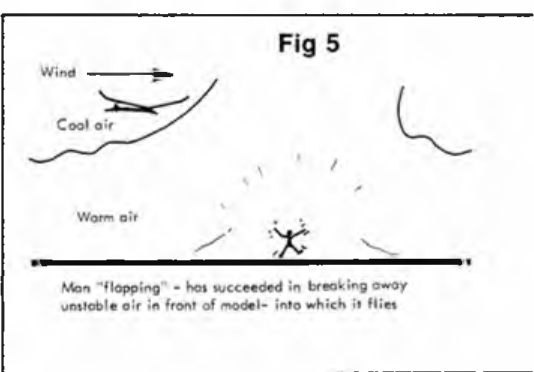
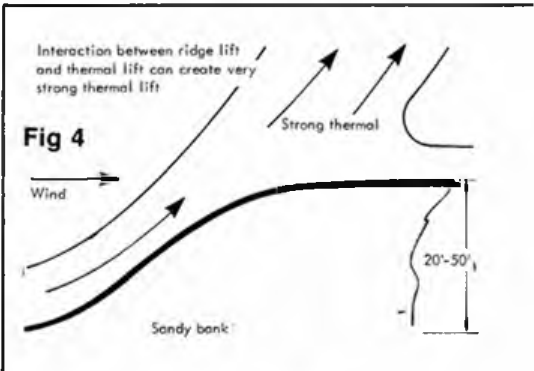
It has become quite popular in the last few years to 'flap' under models if they don't seem to be doing well. This has the added attraction of allowing you to let off steam - its certainly better than stamping on the model. However flapping usually only succeeds in breaking off some air that was about to 'go' anyway. When you do it, it should be done a little in front of the model (Fig 5).

If you can get a crowd together then you have every chance of actually creating a thermal by body warmth and this can be effective in any weather - particularly cold - as long as it is calm enough to allow your group to keep up with the model. It is usually difficult enough to find a timekeeper, let alone a crowd of thermal generators so you will probably be on your own on this one...

### Turbulence

It is vital that when trying to read thermals you avoid turbulence and if you cannot actually avoid it, then learn to tell the difference between what are turbulent lulls between gusts and what are thermals (when you have learnt this you can tell me). Low level turbulence will always lead your lift picking judgement astray and in extreme cases like the first day of last year's Nats for instance, you will find it difficult to make the models fly well if at all.

What is more, turbulence will often destroy thermals that are being generated. This was also the case at last years Nats Mini day when not one of the ten comp flights I made - most of which were in lift on

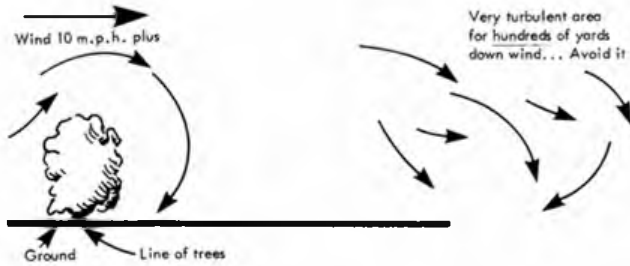


launch - were still in lift at the end of the flight. This is most unusual. Models will normally centre in 'tube' type thermal lift. Only very strong patches or very great turbulence, as in this case, will push them out or destroy the thermal altogether.

Always be on the look out for obstructions upwind. Lines of trees are a favourite and a killer (Fig 6). A classic example being the ill fated *Aeromodeller* Coupe d'Hiver at Old Warden and to a slightly lesser extent the year before at Halton and of course the SAM Vintage Wakefield event so badly effected at Warwick in '84.

In calm of course this does not matter but immediately a breeze springs up, the upwind terrain becomes critical. The windier it is, the more space you will require upwind absolutely flat if you hope to be able

Fig 6



to feel for lift. Often it is not possible to choose where you fly from, because of either the shape of the site or a launch line restriction. I am afraid it often becomes a lottery in such conditions.

### The Weather

This too effects how you pick lift. Let us first look at the case that should be the norm for a British Summer. Moderate breeze, 1/3 cloud, long sunny intervals. In these conditions the best indicators are lulls in the wind speed and increases in air temperature. When these are slight you may find sensing them difficult but practice improves the technique very quickly.

The reason the lulls are such a good indication is that the vertical movement of the thermal produces a 'fill in'. That is to say that as a thermal approaches the front of the thermal's in-fill counteracts some of the wind strength and you sense a lull. Then as the thermal passes over, the in-fill at the back corresponds to the direction of the wind and you feel puffs... then a stronger wind speed than before the thermal approached. This then dies back to the ambient level as the thermal passes (fig 2).

The actual air temperature rises are usually slight indeed and only noticeable because the corresponding wind reduction reduces the chill factor on your skin. This of course being true in most European conditions and would only change were the air temperature to exceed your blood temperature. Then you feel a warm wind and it can confuse to say the least - or it did in Yugoslavia last year...

It is important to 'feel' such conditions before you fly. I often have a trim flight, more to look at the air and try out my thermal picking, than to check the model. A HLG or small slow climbing rubber model (C d'H) is an ideal choice for both this and practice at other times.

So, when thermal spotting in typical summer weather the lulls are good indications but the end of the lull is even better. This takes a little determination at first. It is too easy to fly too soon and if the thermal has not reached you yet, it is disastrous.

It is safer to fly a little late than early but of course much of this will depend on your trim and the class of model you fly. I have found however that thermal lift will more often draw a model into itself from behind than allow the model to penetrate from in front if it has been launched too early (figs 7 and 8).

### Other conditions...

Either side of this typical weather we have the extremes... Better or rather, less critical exist under overcast solid skies. The sun is

blanketed and cannot suddenly warm the ground. What is more, the cloud itself acts as a partial stabiliser of vertical air movement. There are never very strong thermals under solid overcast - wind or calm.

In 'gentle' conditions such as these, lulls will still show the lift but there can come a time when even lulls are impossible to detect if it is nearly calm. You are probably approaching a still air situation here and any vertical air movement will be slight. It is then that such tactics as flying over runways can pay off.

Conversely clear skies are *lethal* except in very cold anti-cyclonic winter conditions. Clear blue skies in the height of Summer spell disaster. The lift is usually small, strong and surrounded by downdraughts. Here the sun can warm all the ground and bubbles of air break upwards erratically.

Moreover when lift does occur it is not so likely to be of the tube shape but more often a series of bubbles. Once gone, these are often very difficult to reach; neither are they supportive for very long as they are not being fed from underneath. The model will eventually glide back down through and out the bottom into the turbulent air beneath (fig 9).

Add a high wind and turbulence to this scenario and conditions are approaching their worst. You either drop a flight or lose a model - encouraging isn't it?

Another tricky factor is water. Moist air usually behaves rather more slowly what ever it is doing... which is useful. However standing water on the ground, over which you are flying, can effect lift erratically. I have found that the same place and at the same time of day can change its lift generation properties out of all recognition if there are large pools of water over it.

Water absorbs radiated heat from the sun and hence wet areas will tend to generate less lift potentially than dry areas and cool any warm air travelling over them. If your site is covered with puddles and it is a sunny day, expect trouble.

Wet grass is similarly a poor surface over which to fly but tends to be less erratic, probably because it is usually found in larger areas than puddles on runways or peri-tracks. I believe we might have had an example of this wet ground problem from what I hear of last year's Poitou meeting in France, where there had been a great deal of rain at the start of the contest. Many, Bob White the famous US rubber flyer included, had flights that looked set in thermals that suddenly decayed, dumping the models very quickly. Conversely at the World Champs in Yugoslavia where the site was drying out continually during the week the conditions became more and more stable as the days wore on. Difficult for other reasons but not erratic.

### Electronic systems

These are no cure all. Pole mounted thermistors read small air temperature fluctuations - not necessarily lift. Pole mounted anemometers show wind speed. Combine these two and we are getting somewhere but the data has to be *translated* very carefully, with 'feel' as well. It can all be quite a test of the concentration. Dials and such like have to be interpreted and patterns compared.

I rather like the system I saw Zeri using at the World Champs that used an audible tone changing in pitch to signal hot and cold/wind and calm - it leaves the eyes free for watching other signs. To make life easier inputs from thermistors and anemometers can be linked to a clockwork drum recorder somewhat like one sees on barographs. This way a trace of the wind speed and air temperature together are drawn and a 'shape' that occurred when perhaps other models were flown successfully - can be used as the signal to launch when it re-occurs.

The drum recorder system really is essential, as no longer do you have to remember how the air felt nor remember what the dials said - you have a trace to compare. It is then a relatively simple matter to duplicate this system so that information can be taken from a little distance upwind as well. You begin to get a second dimension to the trace.

Of course such equipment takes a long time to build and perfect and you will always be more flexible if you can do without it. It must be said however that Doring and the very successful Israeli Wakefield flyer Ben Itzak, have proved their worth.

I get by fairly well with a single anemometer and thermistor set-up but I can read the lift better than it can in all but very windy weather. In strong winds the

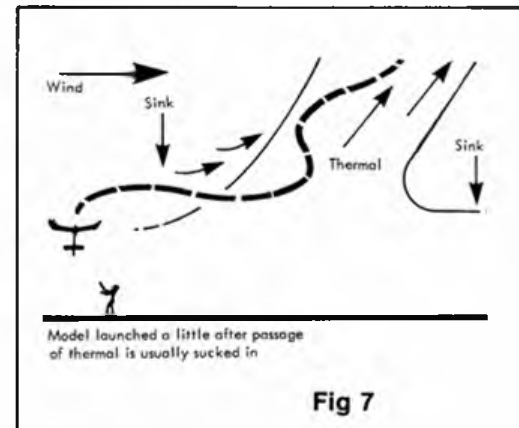


Fig 7

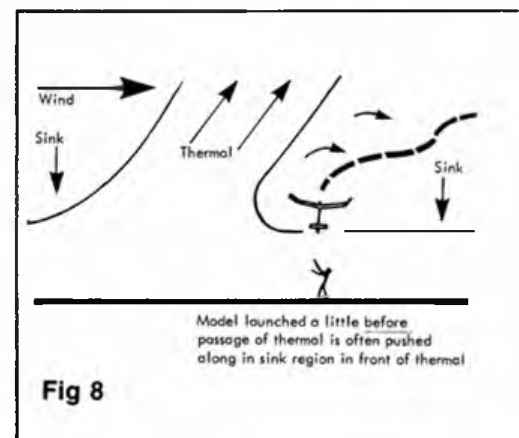
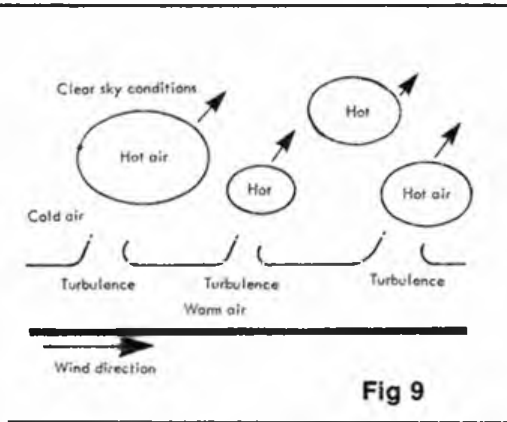


Fig 8



functions. If you require a direction indicator for critical launches, station another streamer - shorter will do - directly up wind.

### Bubble machines

These are less popular now than they used to be a few years ago. In overcast conditions they can be very useful but in sunshine, particularly strong hot sunshine - the bubbles have the annoying habit of heating up and themselves becoming lighter and rising, suggesting there is lift when there is not!

### Piggy-backing

This is the most difficult form of lift spotting of all, although it looks the easiest and probably for this reason is often criticised as unsporting. It is certainly the most annoying to get wrong!

If you are going to try and fly under another model *and* into its lift, you have to be downwind of it far enough to:

a have time to study it, to make sure that it is *actually in lift*

b position yourself so that you can launch *accurately* into the *same* air.

You cannot do this from dead underneath, as it is impossible to ascertain whether a model is rising or descending from that vantage point - you try it.

In practice however you will not get far enough downwind or will not be allowed to if there is a launch line. Therefore you will neither have enough time to decide, nor a good enough observation point from which to decide.

Of course, a gliding model is much more of an indication than one on the climb, however, a low power rubber model may well give away a thermal. It helps if you are having to make decisions before the model is gliding to know or have studied the model in question first. Long running rubber models are useful in this way.

Remember also, that you want to be *sure* your model will finish up as close to the one in lift as possible. Just launching is not enough, it has to be *positioned*. If you are lucky enough to be downwind of a model in a clearly marked thermal, make sure the height of the marker model is not out of reach of whatever you are flying and also *wait for it to go past*. Remember, if it is a classic tube type thermal, which you hope it is, you will not be in it at all if you fly *under* the marker model. Wait till it has gone past - let the base of the thermal reach you...

As for everyone launching together off the flight line as is so often seen at F1B and F1C meetings I am afraid that owes more to mass hysteria than science. You will probably do better to avoid those launches as a matter of principle... but believe me its difficult. You can only go confidently under a model which has just been launched if you know its flight characteristics - its still very dicey...

Piggy-backing can certainly be very useful for learning the art of feeling for lift. It is often worth stopping as you are walking back up wind when you see a model ahead of you in lift. Wait there and watch the model pass overhead and feel what the air does as it goes by. All useful learning.

Every day and every venue is different but on any one day, the signs can be the same over and over again - try to get into a rhythm with it. It takes practice to recognise lift instinctively and some times it can be counter productive to have too many indicators. In very gentle conditions I have been known to completely shut my eyes to aid concentration on skin sensed wind and temperature variations.

Let a 'pattern' of air go through - commit it to memory and when and if the same pattern should begin to re-occur get ready to launch. To do this successfully is very rewarding and confidence building and there is no equipment to fail, and none to move when the wind shifts either! As I said at the beginning we have the technology now, to make the infallible thermal detector, even though it would take a fair sized team to set it up. However if you have the time available to create such sophistication I cannot help thinking it would be better spent studying Zen Buddhism. It may well have a beneficial effect on more than your lift picking!



electronic system is a God-send as you need all your wits to steady the model on the ground or behind a vehicle. Very short lulls can be spotted easily without recourse to standing in the wind - you may well be wearing too many layers of clothing to feel much anyway.

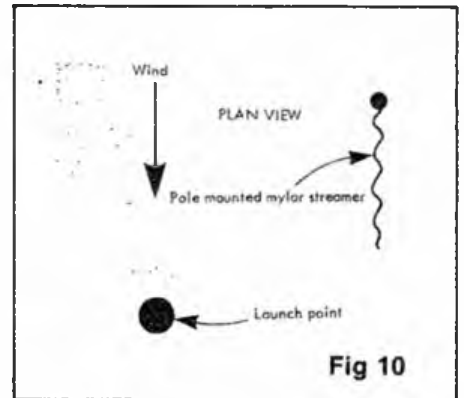
Patterns come through so quickly that you do not have to remember them for long either! I used this system at the Northern Gala last year - 30-40mph winds - would have been impossible to fly well without it


### Mechanical systems

The Mylar streamer, pole mounted upwind, has become very popular in recent years. It is best to arrange this so that from your intended launch point you can see the streamer partly from the side (Fig 10). In fairly calm weather - up to 15 mph - bends in a 20ft streamer can suggest lift. A wiggle travelling along it, then another with the loose end 'flicking' like a whip as the rising air passes are good indications.

I have watched Phil Ball use one very effectively flying HLG and they have the advantage of portability and easy interpretation - they actually show you what the air is doing. In very hot calm conditions - usually continental - such streamers abound and can often be seen actually pointing vertically upwards. One on its own can be misleading when the conditions are like that but there are invariably dozens. The more the better...

The Chinese brought a dozen to the World Champs and spread them out around the launching area, some at quite a distance. Remember, if you are going to use a streamer for detection it will be useless as a wind direction indicator. Don't ask it to do both





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# VINTAGE CORNER WITH ALEX

IMRIE

## A Tribute to M R Knight MBE

**D**URING the mid-1930s, included in my father's fleet of models there was one machine that was quite unlike the others which were of balsa and tissue construction. This was a hardwood and wire, silk-covered low-wing monoplane, with aluminium wheels and a clockwise rotating propeller. Resplendant in silver dope and with flying surfaces and longerons outlined in black Chinese lacquer - I can see it now, and smell it too, even after the passage of 50 years. I always had a strong affection for that model...

Although it did not fly as long or as high as its lightweight stablemates, it was a survivor, and despite spending many a night out of doors when lost in nearby crops, it outlived all my father's other models and stood up well to the ill-treatment of clumsy repairs carried out by the writer, then an 'aeroplane mad' 10 year old! Its name was 'Kinglet', and although I did not know it at the time, was designed by M R Knight with

most active in the country numbering amongst its members such greats as C J Burchell, A E Jones, T H Newell, D A Pavely, R J Trevithick and A T Willis. The club was not completely in favour of the then common stick models, or models built merely for duration flying, but tended to concentrate on a more scientific approach to the hobby. With members trying to incorporate proportions into their models that made them more closely conform to the shapes of full-size machines.

This aim was fully justified when at the 1929 *Model Engineer Exhibition* the club stole the show when all their models were of



Above, M R Knight with a large shoulder-wing strut-braced model in 1928 which was probably the forerunner of the 'Kittiwake' series. Note the small low-wing model at bottom left, a portent of things to come.



Above, 'Kitten' was M R Knight's first design specially for the 'ab initio' modelers at Hackney Marsh. The rudder marking denotes The Model Aircraft Club, while the '4' on the fuselage signifies the 4th Wing.

the attributes that I mention, very much in mind.

Maurice Rickards Knight was born in the St Pancras district of London on 4th March 1897. I know little of his early life, but he grew up with aviation, so it is hardly surprising with all the events in this field taking place around him, that he became air-minded and by 1913 he was engaging in the construction of model aeroplanes.

This interest in the hobby remained with him even during his wartime service as a Petty Officer in the Royal Naval Air Service, doing duty at Felixstowe and in the Eastern Mediterranean.

After the four year struggle he returned to his chosen profession of journalism, being for a period on the staff of a Hampstead newspaper. He continued modelling despite the general lack of interest in the hobby that was an aftermath of that war, and it was 1928 before he joined with a small band of enthusiasts to form the Parliament Hill Model Aeroplane Club.

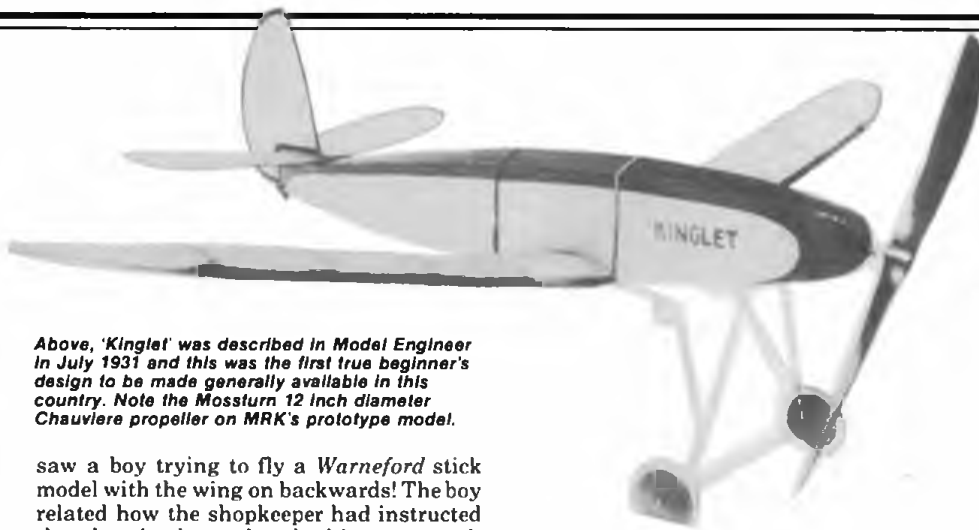
In short order this club became one of the

the fuselage type when many other clubs were still following the stick model layout.

At the beginning of the *ME Exhibition*, club membership stood at 40 and by the end of the show had mushroomed to 178! Since many of the new members were from different parts of the country, it was decided to adopt a title less local than hitherto and the name was changed to The Model Aircraft Club.

Right, even simpler than 'Kinglet' and described in MRK's book 'Model Aeroplanes Simply Explained'. His original machine is shown here named 'Nighthawk I' and is fitted with parachute release gear, the rubber band extending from the nose piece to the belly parachute stowage being clearly visible.





Above, 'Kinglet' was described in *Model Engineer* in July 1931 and this was the first true beginner's design to be made generally available in this country. Note the Mossturn 12 inch diameter Chauviere propeller on MRK's prototype model.

saw a boy trying to fly a *Warneford* stick model with the wing on backwards! The boy related how the shopkeeper had instructed that the wing be so placed - this was enough for MRK who 'made a bee-line for this particular offender's establishment' where he found that all the models in the shop had their wings fitted back to front...

Needless to say he soon persuaded the shopkeeper to mend his ways! (This error in assembly was common with *Warneford* models, caused by the manner in which the trade name was inscribed across the wing roundels).

The influx of new members to TMAC resulting both from exposure at the *ME Exhibition* and at flying meetings (300 people and 120 cars present at a Sunday afternoon meeting at Epsom in 1929) meant that a re-organisation of the club was necessary, this was done on the basis of forming Wings, Squadrons and Flights in the four main London areas. While the majority of original TMAC members were experienced modellers, it soon became apparent that most of the enthusiastic new members were incapable of successfully making any of the advanced designs then available as so-called construction sets or working drawings.

This fact was forcibly brought home to MRKnight when he became the Leader of the 4th Wing of TMAC at Hackney Marsh which comprised a large number of would-be modellers. He has recalled how he remembers watching a boy trying to build a *Warneford* 'Wizard' (RN Bullock's 1929 Wakefield Cup Winner).

"Never will I forget the fearsome sight of one persistent youngster, manipulating a pair of pliers for the first time and vainly trying to produce a set of fuselage formers from light steel wire kinked at each corner to carry a spruce longeron... it was certainly no job for a beginner... Like other designs it had been published simply because it was a Cup winner and seemingly it hadn't occurred to anyone to produce or publish a design specially for the beginner..."

"I had to do something about this need...", and he did, by designing a simple single-surfaced low-wing model called 'Kitten', 15 of which were built and the result certainly justified the need for a special design for this purpose. "For, whether the models were painstakingly and neatly built

or were rag-tag bobtail affairs, as some undoubtedly were, they all flew. Not one of their constructors was cheated off to the point of dropping aeromodelling through failure to get encouraging results..."

Soon MRK had to design another machine in order that the 'Kitten' group could have some competition, the result was 'Kingfisher', another simple low-wing, with single-surfaced wings. Both of these machines were designed for the exclusive use of the Hackney Marsh modellers and the success of the venture spurred MRKnight on to seek wider distribution for a simple beginner's model, that he knew was wanted all over the country. He convinced Percival Marshall that this design should be published in *Model Engineer*.

The model that evolved was based on the earlier 'Kingfisher', and was an ungeared 36 inch span single-surfaced low-wing monoplane, which did not unduly sacrifice performance and appearance despite its freedom from structural complication. Inexpensive to build, it was of sufficient stability and strength to withstand inexpert adjustment and launching.

This machine was named 'Kinglet', and having flown for the first time on 8th May 1931, full construction details were published some two months later in the pages of the *Model Engineer* issue for 23rd July. It was a source of great satisfaction to MRK that this model was an instant success.

Many hundreds were built and flown all over the world, and some five years later, at a time when balsa construction had taken a real hold on the aeromodelling fraternity, the 'Kinglet' design was published again, this time in *The New Model Aeroplane Manual* in 1936.

This later version was only slightly modified from the original form, in that, the *Mossturn* left-hand propeller was replaced

Below, against a background of bicycles, model boxes and small boys, a 'Kingfisher' gets away at Hackney Marsh. TMAC flying meetings were held, rain or shine, every Sunday of the year in the early 1930s.



with a more modern right-hand one and the fuselage width increased to comply with the revised SMAE fuselage formula.

Mr R A Yeomans, the Organising Secretary speaking at the third AGM of the club on 31 August 1931 commented "...it was the duty of TMAC Wing Commanders to endeavour to obtain constructional facilities for the newcomers and beginners, but the only Wing in the London area to do this was the 4th Wing (MRKnight) at Hackney Marsh which was seen as a model of what a well organised wing should be, and one could not do better than visit them either at work or play." That was praise indeed, but MRK had merely started...

Following the initial publication of 'Kinglet' and the interest that it created amongst readers, MRK wrote a series of articles in *Model Engineer* under the pseudonym of 'Sky-Pilot' called 'Model

Right, TMAC officials at Stag Lane Aerodrome on Sunday 25th March 1934. Left to right: M R Knight (Assistant Hon. Sec.), R J Trevilthick (Chairman), R E Gustine (Organising Secretary, 3rd Group), and A E Jones (Hon. Sec.). R J Trevilthick's compressed-air model in the foreground. Below, forerunner of a number of flying scale models by M R Knight was his semi-scale 'Klemlet' which was based on the German Klemm monoplane. Note the near scale undercarriage position and tailunit made from sheet balsa.



In September 1935 *Flight* asked MRKnight if he would take over this feature, which he then conducted from November 1935 until the end of 1939 when *Flight*, having more serious aeronautical happenings to record, suspended their Model Section. During this time he also described beginners' models in various boys' annuals and these were invariably of the low-wing type. Additionally he contributed to *Model Aeroplane Constructor*, *Practical Mechanics* and *Hobbies Weekly*, so his was a busy pen...

Early in 1938 MRK developed a simple form of composite model, which after its first showing on Wimbledon Common on 22nd May was often demonstrated at model meetings. Two low-wing models one of 26 inches span and the other of 28 inches span were used to launch an upper component in

Aviation for Beginners' and these articles were later published in book form as 'Model Aeroplanes Simply Explained'. He now undertook a more advanced series of articles in the same magazine titled 'Further Steps in Model Aviation' which ran from late 1933 until December 1934.

Despite the demands made on his time by these journalistic pursuits, his modelling continued unabated and in addition to his beloved low-wing models he spent much time experimenting with biplanes and thus was born the handsome 'Kit-Fox' which later led to 'Kittihawk' and 'Kaylet' the last named being an open cockpit machine fitted for parachute dropping.

*Flight* magazine had periodically devoted space to model aircraft, especially in the pre-World War One period and had been reporting SMAE doings since 1923, but for a number of years model information in its pages had become extremely sporadic. Then, when the pace of the hobby quickened, from mid-1934, it began to run a regular monthly section 'Devoted to the Progress and Development of Model Aeronautics.'



Left, The *Model Engineer* articles 'Model Aviation for Beginners' were published in book form in 1933 with this attractive cover.







Right, looking back. M R Knight with Alwyn Greenhalgh's replicas, 'Kinglet' on the left and 'Avis' on the right.



Above, MRK seen here with his first composite model which he flew on Wimbledon Common in May 1938. The 26 inches span carrier is the forerunner of a series of models that culminated in 'Kamlet' which was described in Aeromodeller 1941/42. The upper component is a Frog 'Raider' with its balsa mainplane suitably lightened.

the form of a 13½ inch span FROG ready-to-fly 'Raider', secured to the top of the carrier's fuselage by a rubber band tensioned thread.

The 'Raider' propeller was prevented from unwinding by resting against the carrier's fuselage. A small piece of touch paper was attached to the thread and was lighted just prior to launching, separation being effected when the thread burned through. Later a 9oz Wakefield low-wing model of 49½ inch span was used as a carrier for 'Kenna' one of the earlier lower components, thus the carrier became the carried! Over 100 successful separation flights were carried out by these combinations.

How M R Knight was able to accommodate regular classes on model aircraft construction for the London County Council Evening Institutes into his already full schedule is not known, but it was sufficient reason for him to know that there were beginners who needed help and he considered it was his duty to make himself available.

This willingness to serve remained a Knight hallmark throughout his long life. He was also, of course, a contributor to *Aeromodeller* and wrote an interesting two part article in its pages in 1941 pleading the case of the neglected low-wing model.

Thought-provoking stuff, it contains,

inter alia: "...High-wing successes are the outcome, not of inherent superiority, but of the vast volume of experience obtained with this type of model. And the basic reason for this line of development is the simple fact that the coupling of a wing to the top of the fuselage constitutes the most obvious way of arranging these components..."

"It is not true that the low-wing lay-out has been well tried and found wanting. It has been dabbled with and hurriedly damned by a few, and entirely neglected by nearly everyone else..."

He goes on to present a convincing argument for the advantages of the low-wing model and ends with: "...Might one suggest, therefore, to those who may be so qualified, that instead of condemning the low-wing type of model out of hand, as so many do, they follow the more scientific course of thorough investigation? Or for ever hold their peace!"

To give emphasis to some of the points raised, he then described 'Kamlet' (Knight's Aero-Modeller Low-wing Elementary Trainer) in the issues between September 1941 and January 1942 which was hoped might be a worthy all-balsa successor to 'Kinglet' of bygone days. An additional *Aeromodeller* contribution for a period was the conducting of the popular Gadget Review, he was well suited to this task since he himself enjoyed gadgetry, as indeed did Rupert Moore who illustrated this feature.

Amongst modellers he was not only renowned for his tenacious belief in the low-wing model and the biplane, but also for his sharp wit, and in the interchanges while discussing the relative merits of the various types he certainly gave as good as he got!

He also, no doubt, had his leg pulled about the nonchalant way in which he threw his models around, but he persisted in this, virtually putting himself in the beginner's shoes making deliberate inexpert hand launches to confirm the strength and stability of the structures that would have to

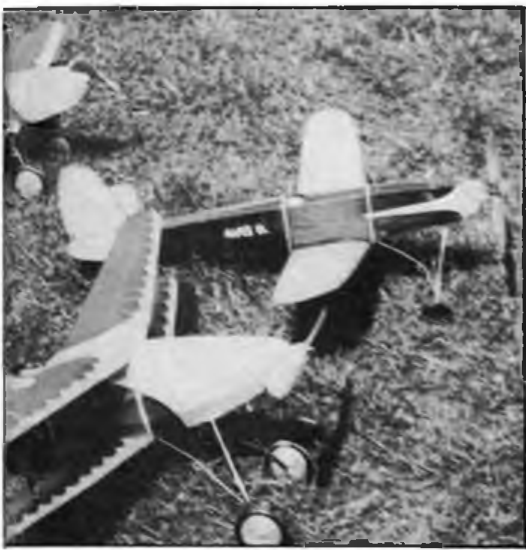
stand up to such treatment in the hands of his pupils.

After the close of World War Two, during which he instructed Air Training Corps cadets in a variety of aeronautical subjects, he became a Founder-Member of the Sportsdrome project at Eaton Bray and attended a number of model meetings there in the late 1940s.

Other demands on his time had greatly restricted his own model building and the model that he took to Eaton Bray on Opening Day (Vintage Corner Dec '85) was similar to his mid-wing 'Kabee' of pre-war vintage and represents the last 'family' of

Continued on page 121

Below, certificate designed by R J Trevithick awarded to M R Knight for achieving 31.46 mph with 'Kaylet' as a high-wing monoplane in the TMAC Speed Contest, 18th August 1935. It sports the attractive blue and gold TMAC winged gearwheel insignia.



Left, interesting group of MRK's models mid-1934. In the foreground is the 'Kaylet' general-purpose biplane which did much parachute dropping and became a racer when flown with one wing removed. Open cockpit monoplane at right rear is 'Avis II', while behind 'Kamlet' on the left can be seen the cabin version, 'Kamlet Major'.

IT HAS BEEN suggested that an accompanying article to that dealing with pouring/lifting microfilm (*Aeromodeller* Jan 85) might be of interest.

The reader may remember that they were left admiring their new sheet of film having recently lifted it from the water-bath. It would then be stored in a safe place until mature - this state being indicated by the film slackening on the lifting frame and taking a long or short time depending on the solution used. Of course, many models are covered with film that hasn't slackened. Other priorities may rule, for example, it might be in all other respects a very nice sheet of film - but if slackening hasn't occurred then there is always a risk that it may be shrinking...and that it will eventually mean a distorted flying surface.

But let us return to the stage where that new airframe sits on the building board awaiting completion.

There would seem to be two basic covering methods which we might choose; they might be termed the *mid-air* and the *controlled* techniques. No disguise is made in the choice of terminology, as to which is found



Although this article is aimed at the F1D model EZBs such as this by Graham Davitt all use the same techniques.

# Covering with

# MICROFILM

The basic facts: explained in detail by Bernard Aslett.

preferable. However, many indoor modellers use *mid-air* techniques successfully, so just one will be described, the wing.

## Wings

Usually, the film on the (original) lifting frame, is made even more slack in the following manner. Narrow strips of adhesive tape are attached to the film and

frame, approximately 6mm inside the frame sides and ends. The film is then separated from the frame using a brush and acetone or preferably heat (eg soldering iron of 10 Watt rating - any greater and you might need the Fire Service!). The ends of the adhesive tapes which now totally supports the film can be adjusted on the lifting frame to produce the degree of slackness in the film, that is desired.

The wing in its flat, unbraced state, is now carefully placed *upside down* onto this slackened film. The weight of the structure causing a (hopefully) uniform tension of film across the chord and along the span (fig. 1). With care, adjustments may be made. Attachment is made with a wet, soft brush applied to the outside of the frame, with considerable ease.

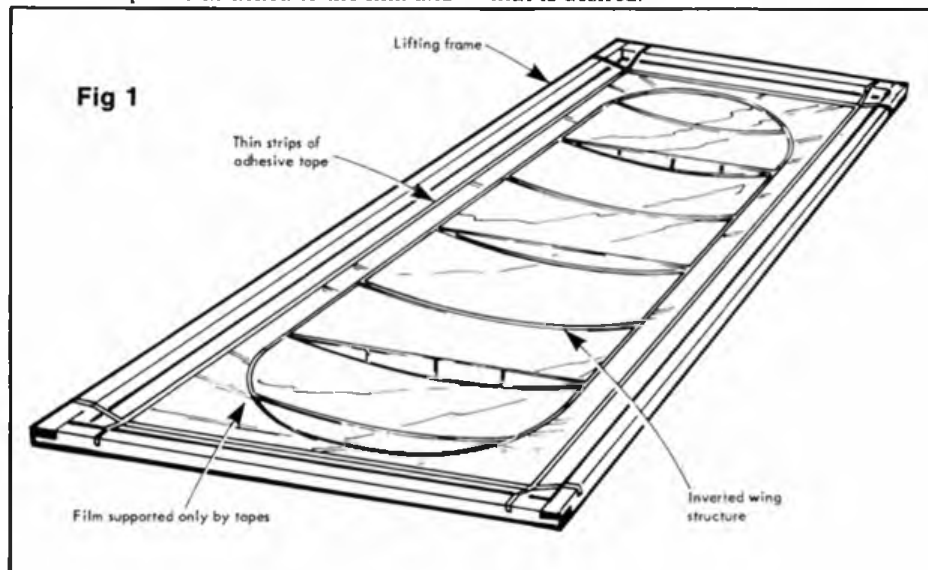
A word on brushes. Microfilm will only tolerate the passage of the very softest bristle/hair and it is worth the expense of a pure sable long-haired brush.

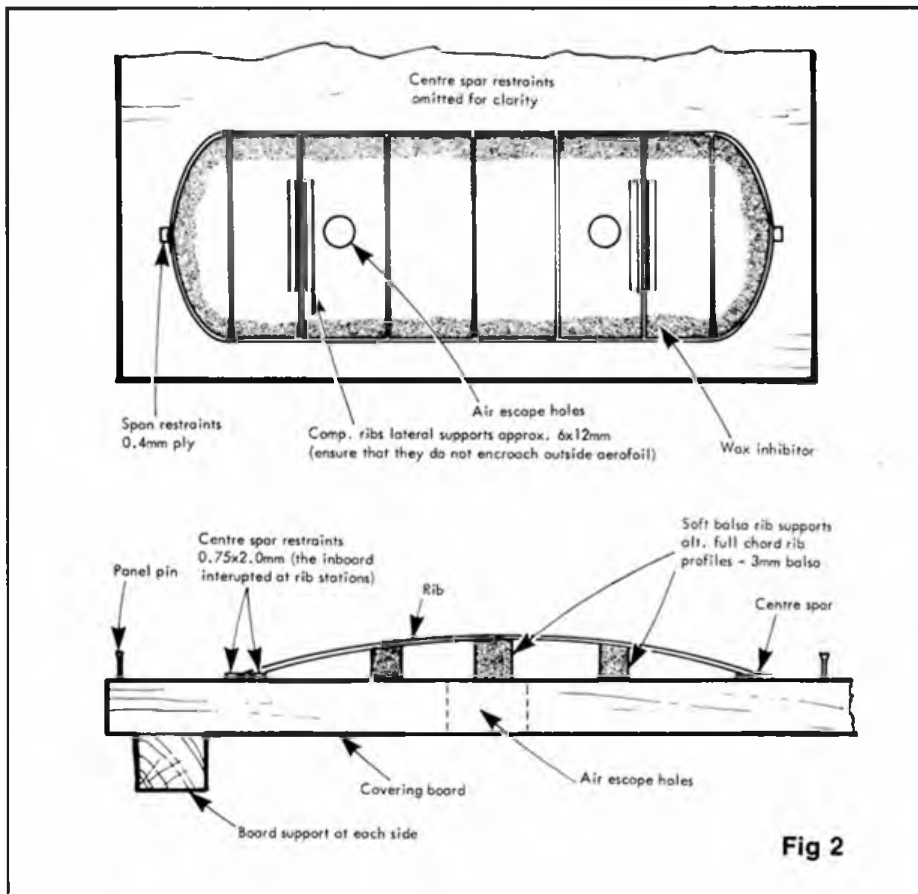
The airframe may now be removed from the excess film using acetone or heat.

Surprisingly microfilm is really quite strong when under tension and will resist efforts to alter the alignment of the covered structure, if doing so places the film *in* tension. It is for this reason alone that a more controlled technique is preferred...

In principle this *controlled* technique requires first the setting of the structure in correct alignment *prior* to covering. The wing/stab would be placed on a flat wooden board (details later) - laminates are too fond of attaching themselves to the film. For the propeller, it might be said that, it should *never* be covered on anything other than the 'pitch jig' on which it was constructed.

To return to the wing. The intention now is to take the film to the wing rather than the reverse as described in the *mid-air* technique. The board should have an outline





drawn on it *including* rib stations in order to preserve the desired wing shape. It has been found helpful to control the centre spars with thin strips of balsa, (0.75 x 2mm in section) previously fixed to the covering board. Two or three holes should be made right through the board, *inside* the wing outline, to allow escape of air which would otherwise be trapped under the film, causing a distortion due to ballooning of the film.

It is also necessary to preserve the rib profile. This can be done by blocks of soft balsa strategically positioned, or alternatively full profile ribs fixed to the board at each rib station. Compression ribs usually only require lateral support.

One shortcoming of this *controlled* method is that more water will be used than with the *mid-air* technique. It is very important that this water application should be controlled. This is done by generously impregnating the board *inside* of the airframe with a wax candle, being careful not to stray outside of the outline. The wing can now be set to the board, but as yet left dry (fig. 2).

We now turn to the subject of the covering frame. It has already been stated that the lifting frame is necessarily robust. A much lighter frame is now needed, constructed as shown in figure 3.

The transferring of the film is initiated, by first separating the film from the frame *just inside the ends*. The covering frame is then gently lowered on to the lifting frame. We now note that the covering frame size is required to be a little in excess of the lifting frame length but slightly less in width - a point only briefly referred to in the previous article.

The sable brush is then liberally wetted and carefully run along the *outside* of the 3 x 6mm members (fig. 3). The film is now

attached to the covering frame and can be separated from the lifting frame using heat/acetone. It will be noted that the extra length of the 3 x 6mm members now prevents the covering frame from falling through the lifting frame as the film is parted.

We now return to the covering board. It is desirable to control the position of the covering frame in relation to the wing. This can be done successfully by six small panel pins set into the board; three each side in a spanwise direction - the covering frame to just sit inside them, leaving an equal amount of excess film each side of the covered wing.

It will be noted at this point that the *arc* of the rib aerofoil is naturally in excess of the flat chord and for a typical F1D wing by about 5mm. If a strip of 5mm wood is set inside *one* row of panel pins, the covering

frame will be constricted across the chord by this amount when it is finally lowered on to the wing. With care and small adjustments, the film can be set on the wing at an optimum tension without distortion occurring.

Having everything prepared it just remains to wet the wing outline and also ribs at centre and polyhedral stations. The outline requiring quite copious application as the board will soak up much, and scrupulous care is needed to ensure that not a drop of water gains access to the inside of the wing outline.

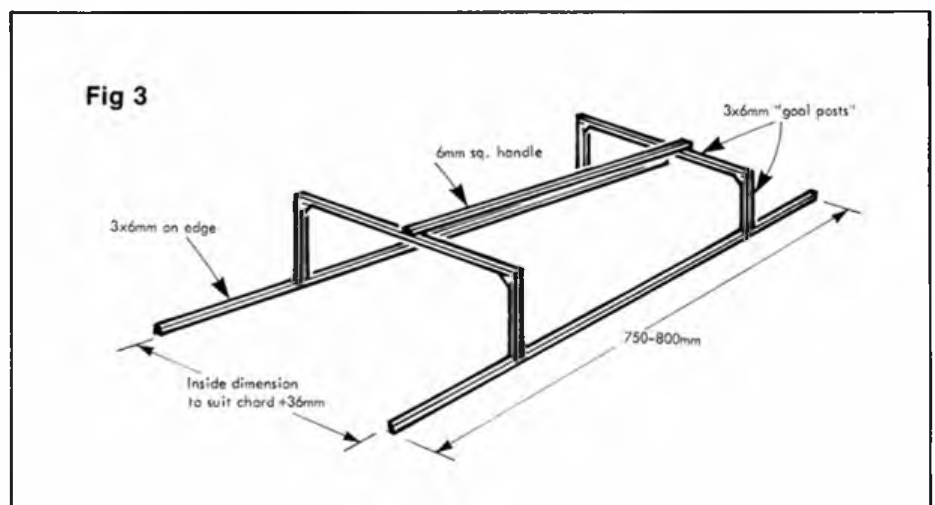
The covering frame is brought without delay to the board and one side is gently positioned inside one row of panel pins and on the board surface. Having established that the spanwise location will cover *both* tips, gently lower the second side of the frame constricting the width at the 'goal posts' to just slide inside of the slip of 5mm wood (fig. 4). Efficient attachment to outline *and* ribs can be gained by gently blowing on the top surface of the film, to make contact where this does not occur naturally.

Heat can be taken around the wing to remove excess film and surprisingly close to the saturated outline without fear of damage. The covering frame, panel pins and 5mm strip can now be removed.

Undesirable wrinkles should be eliminated at this point to prevent the film sagging to the surface of the board - which tends to occur at the tips, where the arc of the aerofoil is least. This is achieved by a wet (not saturated) sable brush, held at an angle of about 30° to the film surface, being carefully drawn along the wrinkle. It is worth experimenting with this technique a little, in order to find the direction that best preserves the film to aerofoil section.

This is a point when it is worth noting that there is a considerable range of opinion in the 'Indoor World' as to how slack or tight, is desirable for best performance. From the best of knowledge available, aerodynamics such as lift/drag ratios, boundary layer thickness and aerofoil sections are speculative and unproven in the circumstances in which we fly. Thus immaculate covering without a wrinkle, might even be at a *disadvantage* to one somewhat more slack. However, that a properly tightened film contributes significantly to structural rigidity and in turn strength, is unlikely to be denied.

The airframe with taughtened film is now left to dry out completely (preferably 24 hrs), prior to very carefully easing the structure



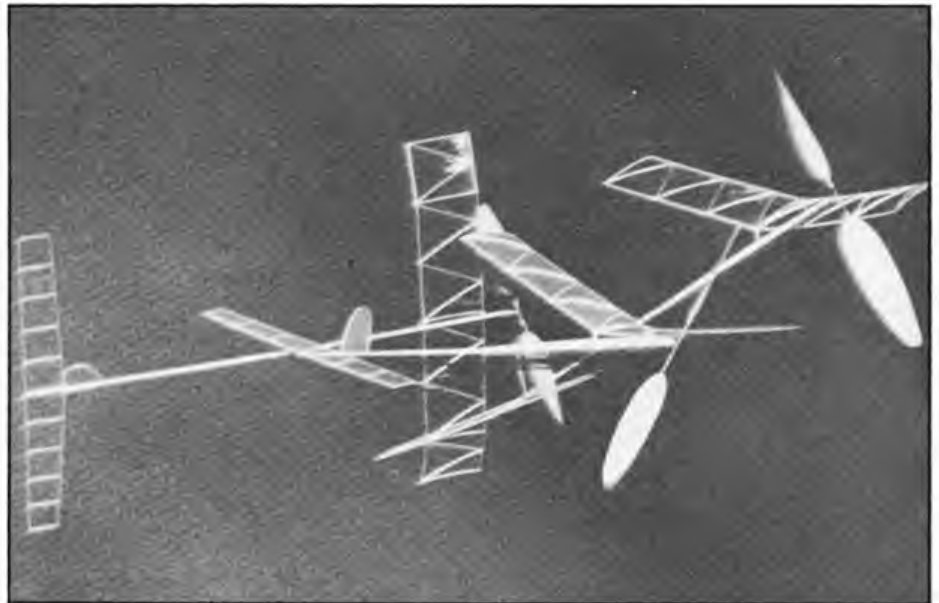
This spectacular three model collision was seen at the second SAMS indoor event at Watford - surprisingly little damage occurred...certainly no need for the full treatment described in this article...

away from the constraints built into the board. Bracing can now take place which of course, is another subject. The attentive follower might at this point wish to know, that the remaining (unattached) ribs are attached to the film *after* bracing.

### Propellers

Much described already, applies to the propeller, with the advantage of dealing with a smaller structure. However, the twist that occurs along the blade presents a new consideration. It is necessary to present a covering frame to the structure that is able to match this twist.

A rectangular frame of light balsa (6-8lb/cu ft) is constructed that will comfortably cover the blade shape chosen, but *not* to exceed the dimensions of the pitch block - explanation later. The cross section should be approximately 3 x 1mm. This frame is laid on an area of the lifting frame and attached with the sable brush and water. A thin strip of adhesive tape is placed right across the lifting frame, close to the covering frame to protect the rest of the film whilst separating the smaller from the larger.



With the section (3 x 1mm) chosen, it will be found that it will easily accept not only the blade twist but other curves and contours as well. This twisting actually induces some wrinkling, but this can be removed later, as described for the wing.

In order to prevent the film attaching to the pitch block - *inside* of the blade outline - tissue of a matching blade shape but about

2mm smaller all round can be placed *under* the blade prior to covering. A slightly hairy tissue eg *Modelspan* has been found most suitable.

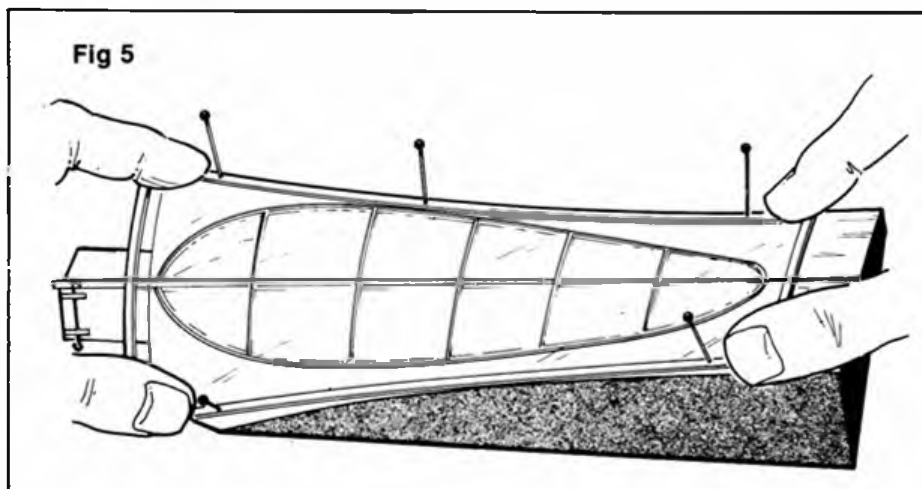
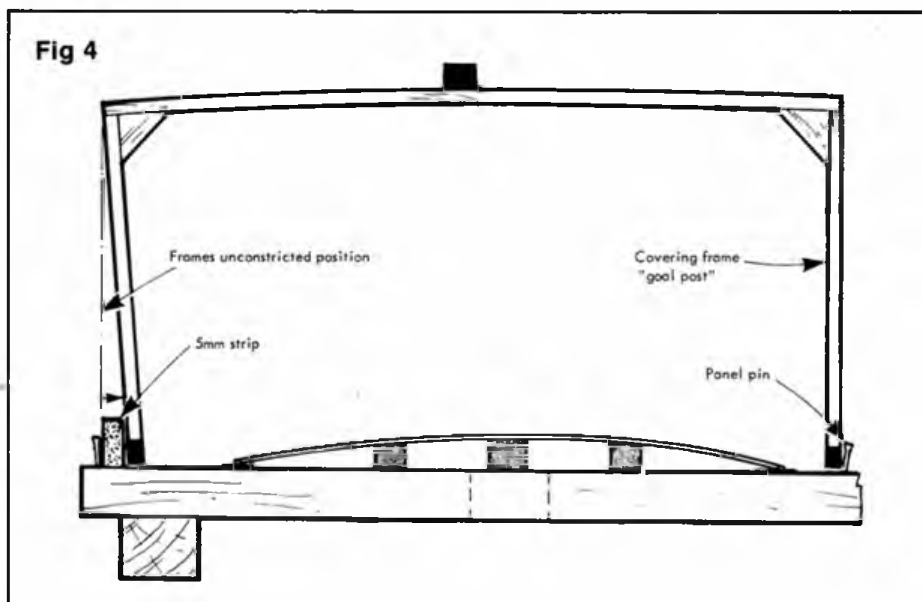
The ribs and blade outline are now carefully wetted, again avoiding any moisture on the inside of the outline. This should also serve to attach the blade by capillary attraction, to the block's contours. The covering frame is now twisted between the fingers of both hands and carefully presented to the wet blade (fig. 5).

It is useful at this point to have a third hand to lightly pin down the frame to the pitch block, thus the frame cannot reasonably exceed the block dimensions. Blowing should ensure good attachment. Separate the frame in the prescribed manner. It may be helpful at this point to describe how to deal with a part of the structure outline that was not quite wet enough for the film to adhere. A small hole (or series of) can be burnt in the offending area encroaching to within approximately 1mm of the outline. Through this hole/s a wet brush can introduce water to the outline, and blowing should produce the attachment previously resisted.

With the removal of the covering frame, the blade should be left to dry out thoroughly...before moving on to the opposite blade. In order to preserve the accuracy of the blade, it may need judicious use of pins to gently hold it to the block during this drying period.

A final thought on propellers - use of a thicker, more durable film than that for elsewhere, is usually a wise selection.

Although this (necessarily) pedantic description is directed towards FID structures, the principles involved can quite easily be adapted to an EZB airframes - and indeed these ideas can in true aeromodelling traditions, very healthily be modified to suit one's own approach. It is always a great help if one can have the assistance/advice of someone already experienced in indoor procedures, to deal with the unexpected. Thankfully aeromodelling seems to attract and encourage such generosity and one of the most warming experiences of international competition is the recognition that these exchanges are not in any way restricted to National boundaries.



# Ian Peacock dips into what may be the future for gas powered models...

# CO<sub>2</sub>



## Where to next?

**U**P TO THE PRESENT, most writing on the subject of CO<sub>2</sub> powered model aircraft has been based on an assumption! An assumption in fact carrying considerable support from the modelling public but one whose validity is really in question. An assumption that says that CO<sub>2</sub> flying is always free flight!

In fact we are not the first to question the use of the CO<sub>2</sub> motor for controlled flight.

Radio Control, whilst problematical, is within the realms of possibility and so is control line.

Now the very thought of the low power output of these tiny motors seems alien to the serious control line flyer but pause to ponder the problem a little, and a great deal is seen to be advantageous. Firstly few people associate control line with flying indoors. However many would support the amazing popularity, particularly amongst younger modellers, of Electric RTP, popularized over a number of years by the incorrigible Harry Butler.

It takes little imagination to see the conversion of the lightly loaded RTP model to

CO<sub>2</sub>, resulting in what amounts to no more than *tethered* free flight. What more natural step therefore than to fit a bellcrank, add lines and a handle, and *presto*, instant indoor control line. Reports that filtered through from the USA a year or two ago suggested that CO<sub>2</sub> control line team racing is common amongst school model clubs. Flown four to a heat, on 12 - 16 feet lines in the school hall or gymnasium, some 10 - 15 laps per charge are possible with a standard Telco engine and tank.

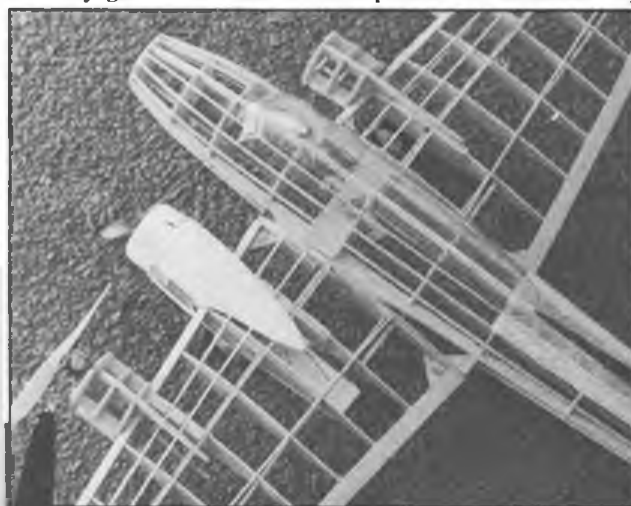
In fact, in the current era of high powered professionalism surrounding the team race events, one may well look to these school children for the return to the very grass

roots of the class, for with a common charge of CO<sub>2</sub>, the flight duration (and subsequently the number of pit stops!) depends solely upon engine revs.

It is apparent therefore, that a faster lap speed expends more fuel and requires more pit stops while a slower lap speed consumes less gas and requires fewer pit stops. Doesn't this bring us right back to the very fundamentals of team racing - balancing speed against duration?

As yet we've not tried aerobatics but models such as Harry Butler's Pitts 'Special' may be flown through loops and wingovers in the RTP mode and I imagine that it would not take much to produce an aerobatic CO<sub>2</sub>

*Right and below, the Stirling kit for the Boeing B17G 'Flying Fortress', seen here well on the way to CO<sub>2</sub> control line conversion.*



*Heading picture, this model was used as a test bed for the minute Dunham servo and was powered by a prototype Telco motor, see picture on page 87.*



Left, the control line 'Beaufighter' referred to in the text, powered by two Telco Co. motors - conversion from electric RTP resulted in the external controls, later regretted by the team!

control line model from just such a kit. Is there anyone out there who fancies a go? Indeed - is there anyone out there who has done it already?

Our trials to date have, due to our liking for the *real thing*, centred around the scale side of flying and have been achieved with the assistance of the late Martin Simpkins. Martin who at the time was a member of the Biggles team, was already well versed in the RTP field (amongst others!) and his own design RTP 'Beaufighter' was an obvious choice for conversion...

As can be seen from the photograph, this conversion was deliberately kept simple for ease of construction and to shorten the time scale. If we'd known how successful the results were going to be, we would have perhaps spent a little more time over the job and cut away the framework to get the bellcrank and pushrod inside the fuselage!

However in our eagerness, we simply fitted the control system outside of the structure. Two standard Telco motors are fitted together with four standard Telco tanks. Because of the lengths of the pre-cut copper pipes it was decided to fit a tank in each nacelle and a pair within the fuselage.

Assembly of the tanks in this manner was comparatively simple and was achieved without recourse to any special pieces. Flying the 'Beau' revealed lack of attention to the position of the CG, and like many control line scale models a tail heavy, uncontrollable model resulted. Correction of the balance point, however, produced a stable flight pattern with no vices and power to spare. In fact, the majority of the flights were made on about  $\frac{3}{4}$  power giving a flight time of around  $2\frac{1}{2}$  - 3 minutes with a very satisfying *power on* landing as the gas pressure drops off. Martin became so carried away with the success that he even managed to remove the outboard wing tip on the wall of the school assembly hall.

Like all control line models and twins in particular, the 'Beau' requires a bit of right rudder and even a little right aileron to ensure good line tension. And like its larger brothers, a bit more thrust from the left hand engine also helps, but beyond this there really were no snags.

Next up was the Boeing B17 'Flying Fortress' from the Sterling kit. Here, because of the wingspan, the pre-cut copper tubes proved too short and simple sleeve adaptors

were made up as shown in previous articles. Again four Telco motors were used (mainly because they were to hand rather than for any specific technical reason!) but instead of standard tanks. One of the large 20cc Brown tanks was fitted which produces a similar flight time to the 'Beaufighter' with less overall tank weight. As mentioned previously Brown motors and accessories are not commonly available in the UK but a phone call to George at SAMS on 0438-832011... will reveal the position on UK stock. Experiments were made to try three bladed Keil Kraft props as an alternative to the Telco ones, but tests proved inconclusive.

It did look however, as though they may well be just as good and they do look more scale-like when stationary! There are several kits on the British market right now which simply cry out for a CO<sub>2</sub> conversion, not the least being the Guillows B25 'Mitchell' that we originally built for free-flight. It's all up weight was greater than we would have liked which reflected in its limited performance, but built in the control line mode it would be ideal.

Similarly the De Havilland 'Mosquito' (also from Guillows and marketed in the UK

by RIKO) makes an ideal subject. In fact we kept our 'Mossy' sample back for just this purpose as we were somewhat sceptical about its free-flight capabilities. Both these Guillows kits, together with the slightly larger P38 'Lightning' from the same stable are actually designed as control line models and it was only our infinite enthusiasm for CO<sub>2</sub> that prompted their earlier adaption to free-flight.

Harry Butler's 'Islander' and the Comet kits of the Douglas 'Invader' and P38 'Lightning' (smaller than the Guillows P38!) will also convert easily to control line. One of the most attractive kits to come our way during this series was, at the time, put to one side as unsuited to CO<sub>2</sub> due to its sheer size. I refer to the Sterling P61 'Black Widow'. At the time that we received it, it was felt to be too large

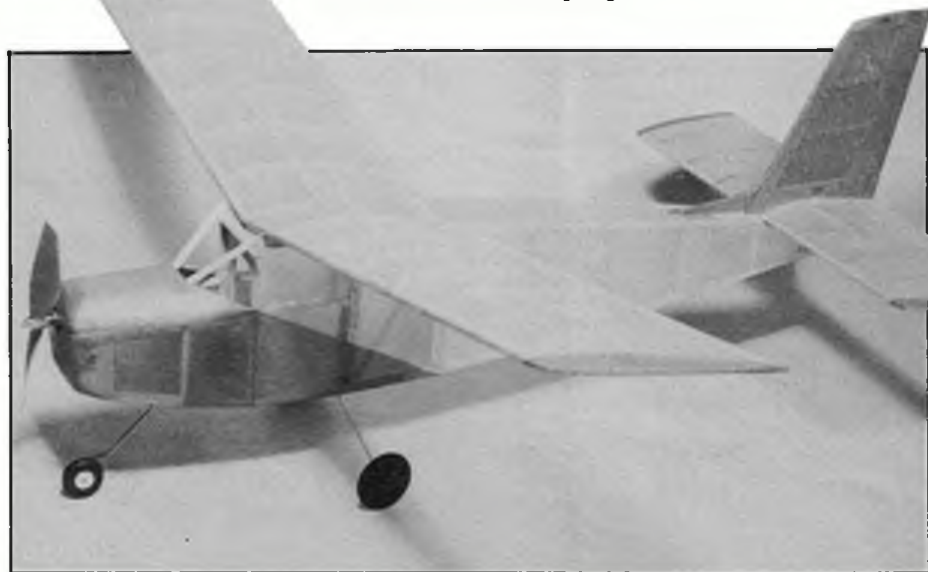
and too heavy for the currently available CO<sub>2</sub> motors. However with the advent of the turbo tanks this spectacular looking WWII nightfighter may well be *on*, either for F/F or C/L!

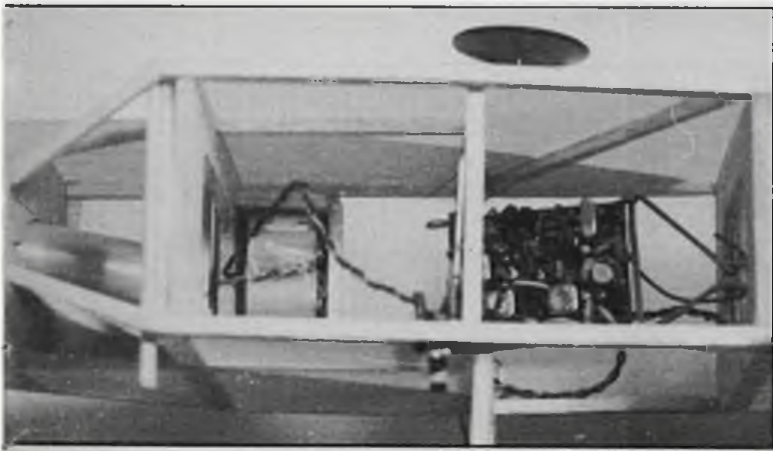
Also from Sterling and of interest to control line modellers is the Ford tri-motor, although, being gluttons for punishment, we elected to fit three Telco motors, one Brown 20cc tank and R/C!

So what about R/C? Well, CO<sub>2</sub> R/C is not new, many successful models having appeared from the workshops of the experts over the last few years. But what about Joe Average? Well, with the advent of lighter R/C equipment, not to mention developments of ideas like the 'turbo-tank', one can confidently look forward to a resurgent interest in the smaller scale (say up to 36 inch) R/C models being flown harmlessly (and without noise!) in local parks.

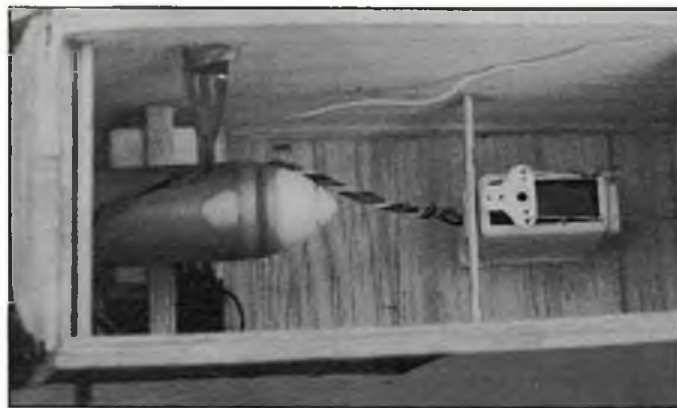
Engine availability has already been covered but what about radio equipment? Well even with the ever present trend of miniaturisation, the *average* set of equipment is, by and large, still too heavy for the low power of the CO<sub>2</sub> motor. An average two function airborne pack may still tip

Below, this Mercury Magna variant is CO<sub>2</sub> powered and uses the Ace pulse proportional R/C system. Ace equipment is not often seen in the U.K. but is worth investigating.





Left, the airborne package of the Ace R/C gear - receiver is about one inch wide and is powered by two very small Ni-cad batteries seen to the left.



Right, smallest true proportional servo tested was this Dunham servo shown here - width of fuselage was about 2 inches so draw your own conclusions to servo size!



Above, so that you know what to look for... here is the total Ace system. Rudder wagging servo is seen to the right.

the scales at around six ozs but there are exceptions.

For some years now the American Ace company have produced a *super-light* single channel, pulse proportional rudder-wagglers! Airborne weight in the region of two ounces makes this an attractive proposition in the more stable, high wing style of aircraft. Many of these sets found their way into the UK over the past decade and are still around. They are still being made and our sample came direct from Tom Runge at Ace.

Also from the States and shown at the Toledo fair as far back as 1979 was Bill Cannon's new Micro-system all four functions of it - with the incredible airborne weight of less than 5ozs. Most CO<sub>2</sub> models will only need two functions which should yield an airborne weight of nearer 3 - 3½ozs this new system has never been available in the UK market, but the ever helpful Mr Cannon lent us a set in 1980 and it was used with great success. Nearer home, *Micro-Mold* experimented with a new line in single and two function proportional outfits tailored to the Dunham Micro servo, although to my knowledge they never got further than prototype stage.

Surprisingly, one of the world's lightest

R/C sets is made in the UK, yet known perhaps to only a few. I refer to the *World Electronics* series of R/C outfits manufactured by Mick Wilshire in Watford. The *World Electronics* R/C may be tailored to any specific requirements and Mick will assemble a set from standard sub-assemblies to meet the needs of the CO<sub>2</sub> flyer.

If one is seeking a radio outfit to some specific limit however, there are many specialists around who will *custom build* such an outfit to order.

One such specialist is Dave Day of Helicopter fame. Dave was seen flying a 100mph mini-pylon racer as early as the summer of '79. Powered by a Cox 010 and having a wingspan of a mere 18in, the *entire model* weighed a scant 6ozs. The two function, specially built radio had an airborne weight of just 3ozs. People like Dave will often build an airborne pack to match an existing transmitter, which of course, is cheaper than buying a whole new outfit.

In terms of models, the specialist light-weight designs must yield the best results but there are still many 30-40 inch wingspan rubber driven models ideally suited to conversion. The *Sterling* 'Ford trimotor' has already been mentioned and the excellent Piper 'Comanche' at 36in span (also from *Sterling*) is another 'natural'.

Many towns, ours included, have by-laws

prohibiting the use of power driven model aircraft on the grounds of safety and noise. The re-awakening of an interest in CO<sub>2</sub> may well help to reverse this trend. Incidentally whilst on the subject of CO<sub>2</sub> R/C, our ex Editor Martyn Cowley advises that on a recent trip to California he witnessed a member of the 'Gossamer Albatross' team flying a 100in R/C Thermal Soarer - powered by no less than six *Telco* motors running on an *enormous* home-made tank

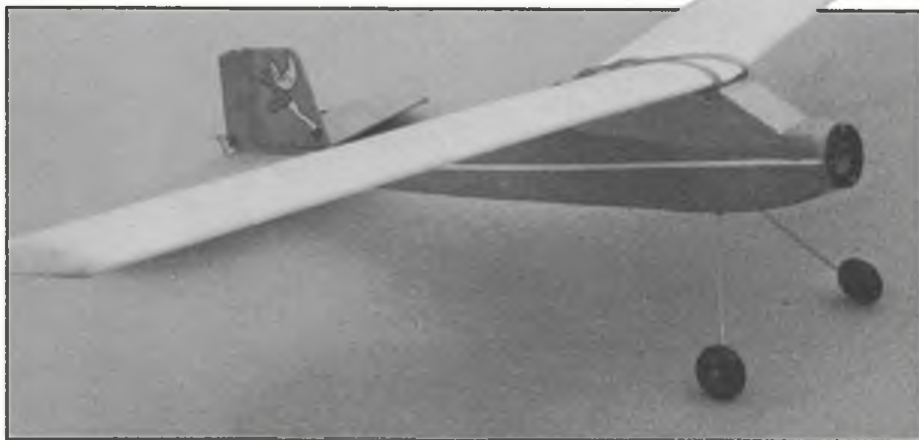
for engine runs of up to 20 mins!

With the safety aspect of CO<sub>2</sub> very much in mind we hesitate to publish just how this large tank was made for, while it works extremely well, built incorrectly it could be *very hazardous* - if not lethal.

So there you have it! Not every corner of the CO<sub>2</sub> field has been covered, and not every corner deeply probed, but enough, hopefully to set you thinking. There are many enjoying the CO<sub>2</sub> scene - I know - I have met many of you and I am sure that a lot of you have valuable knowledge and experience to pass on. Hints and tips, no matter how trivial they seem to you - are of immense help to others. If you are currently flying R/C CO<sub>2</sub> for example, how about telling us how you have made out...



Below, going up in size is this 36 inch model - engine fixing bulkhead features 'universal' fitting to allow for various engines to be tested...



# MIND THE LINES

with  
**Andy Brough**

## Midge Comps '86

The formula for the past two years has worked very well; the number of events running 'Midge' comps has increased, as has the number of participants. The speeds have risen dramatically and several models are just short of the magic 'ton'. In order to achieve these high speeds, some extra mph has been provided by arm power (whipping), hand carved wooden and glass fibre props have appeared and some motors seem to go rather better than one would expect!

Whilst I understand the attraction of trying to reach the dizzy heights of 100mph I think we are moving away from the spirit of this 'Vintage' fun event. The true vintage motors, *Elfins* and *Javelins* now stand no chance, and the chap who builds a model just for Vintage Day is going to be put off.

So, for this year some changes... In order to emphasise the Vintage nature of the competition the models using a vintage motor will receive a bonus of plus 15%; that is their recorded mph + 15%. I hope to see more *Elfins* and *Javelins* this year so start hunting now! The most radical change though, is to allow other Class 1 (up to 1.5cc) vintage designs to enter, and if that isn't enough, miniatures of any vintage speed model design published or kitted before 31st December 1950.

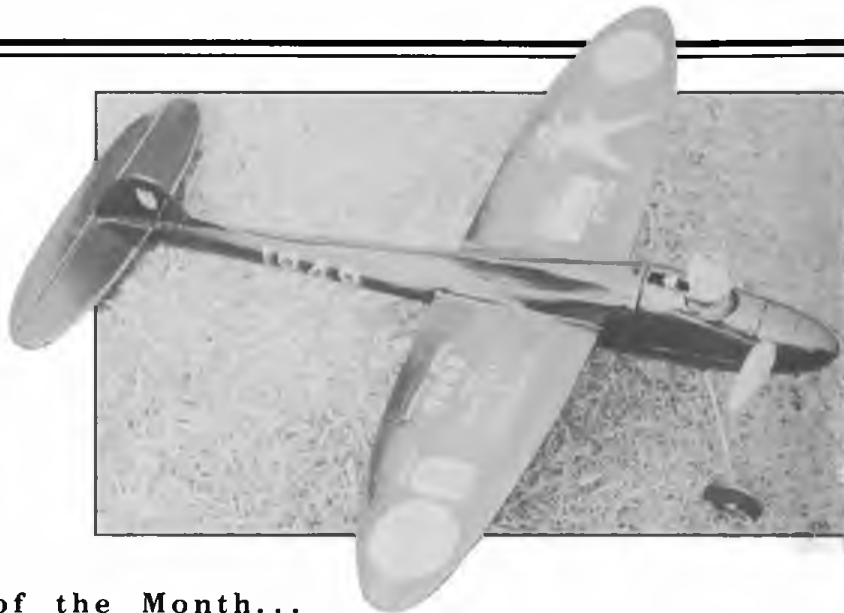
There now, start hunting through your old *Aeromodellers!* The philosophy behind the miniatures is that the only way we will see some of those old designs in competition again, with safety, is to build 1.5cc sized replicas.

to give you a start I've listed some speed model designs that could be scaled down:

Aeromodeller August 1950 N.G. Taylor's 'Lazybones', Aeromodeller May 1950 J. Sadler's 'Little Rocket'. Ron Moulton's Control line Manual has small drawings of: Babcock's 'Jughaid', Tex Russell's 'Vampire', and de Bolt's 'Speedwagon'. The 1948 Aeromodeller Annual shows the 'Snowflake', 'SpeeDee', and 'Movo M31'.

Many more plans must exist so why not rout out your favourite design - reduce it to 12in span (all other dimensions reduced proportionally, of course) and get building.

Right, Brian Hunt's Mills 1.3 powered 'Weatherman', designed by Cyril Shaw, published in 1948 in Model Aviation magazine. Keen eyed readers will note that all this info is on the model - saves Brian having to talk much!



## Model of the Month... Speedwing

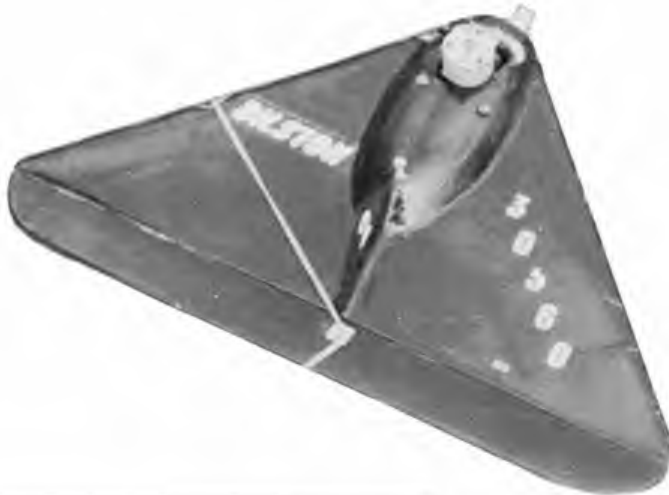
Just to show that some planning goes into these articles (well sometimes anyway) this month's design is a 1.5cc speed model! Published in the September 1950 issue, and designed by Robert Burns, this was drawn up to relieve the monotony of conventional designs. Certainly, deltas were not common, not yet used in full size practice Vulcans etc and in speed have never found favour although the Czechs used them in the late 50's but they never proved better than the then conventional layouts.

Peter Wright and Johnny Hall flew deltas in the early 60s at Brussels using the CCS (Carter Checksfield Specials) motors. In fact Johnny phoned whilst this was being written and apparently Fred Carter, Ron Checksfield and Johnny are still great friends (A Carter repaired and signed stop watch will be used at this year's Old Warden

do!) Johnny recalls that the degree of sweepback (rake) is very important and on looking at the 'Speedwing' plan this would appear to be about right. A replica is being constructed so we'll soon find out...

The construction is very simple, the wing made up of three pieces of 3/8in balsa, and plenty of sand paper to produce the taper and the symmetrical aerofoil section. The fin, bellcrank and top fairing are built on the wing, but the engine and tank are mounted on a pod held on by two 1in x 6 wood screws. This allows for tank/engine fiddling, the pod is then screwed, from above, through the wing, the engine popping up through the fairing.

Having no fuselage the recommended launching method is to bowl it underarm using the fin. Tom Hughes successfully uses this method to launch 'Midges', but of course holds this by the fuselage.



Left, another Bilston model a 'Speedwing' built by Sam Kidd, a PAW 1.5 to provide the 'push' (pull?). Far right, to whet your appetite, a reduced scale drawing of the 'Speedwing' - see text for full size plans...

## 1986 Vintage Class 1 Speed Event (including Mercury 'Midge')

### MODEL

- Any Class 1 speed model which was kitted or the plan published before December 31st 1950
- A miniature of any class of speed model, to a minimum span of 12in, which was kitted or the plan published before 31st December 1950
- Any model not a *Mercury 'Midge'* will be checked against a drawing (reduction or full size) supplied by the entrant
- Models must be as near to the original design as feasible

### ENGINE

- Any 1.5cc engine in production before December 31st 1950
- PAW 1.5 DS, DC Sabra, ME Snipe, Frog 150, AM 15.

### CONTEST

- 35ft lines of 0.015in stranded steel wire
- Models may fly anti-clockwise or clockwise
- The timing is for 6 laps. This starts the lap after the pilot raises his hand and the handle is on his chest. However, if in the Timekeeper's judgement, the pilot is 'whipping', no time will be taken. A re-run will be allowed
- A +15% bonus will be added to the speed of a model powered by a vintage engine
- Only commercial thermo-plastic props allowed
- The 'Midge' and Vintage Class 1 speed events will be run together, the fastest 'Midge' being the winner of the *Mercury 'Midge'* speed event

As this plan was a full size drawing in the magazine and not a separate plan as such, it is not listed in the APS range. However for a S.A.E. I can supply full sized copies for those who would like one. Send to 13 Winston Avenue, Bamford, Rochdale OL11 5JA Lancs. A recent example of the 'Speedwing' appeared at Old Warden in August, powered by a PAW 1.5 it was built by S. Kidd of the Bilston club. A photo of Johnny Hall and his delta is shown in 'The Control line Manual' (R.G. Moulton) page 86.



## Chit chat...

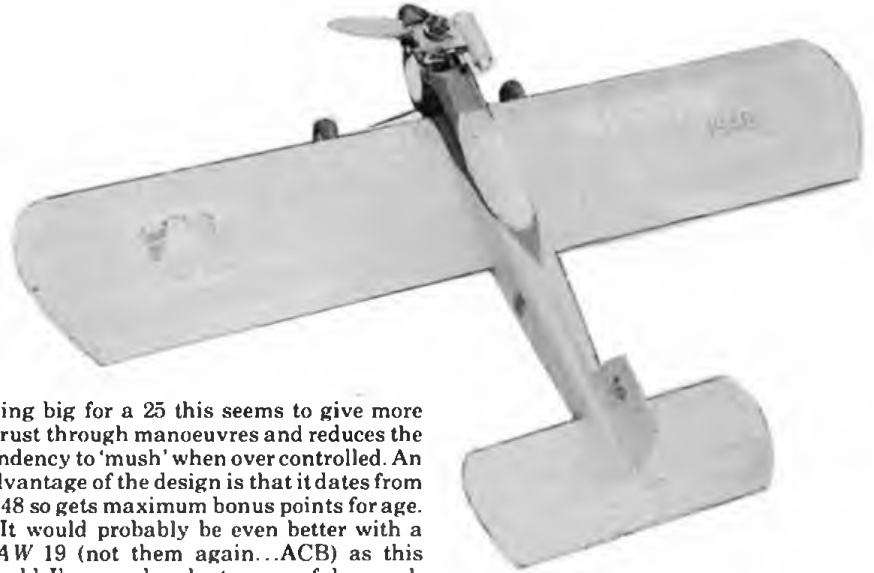
In recent months I have received letters on a variety of interesting vintage control line topics which goes to prove that some people do read the column! I try to reply to all letters, eventually, or to publish their comments which I hope is due reward for their efforts.

One person who has written on several occasions is Mike Rolls of the Three Kings Club. In the October issue I asked about who had the rights to the 'Stunt Queen' plan, well Mike pointed out that the plan is available from Peter 'Swap and Chat' Martin. £2 gets you the plan and photo-stats of the building instructions and what were originally the printed wood sheets. Peter's address is 38 Howard Road East, Kings Heath, Birmingham B13 0RY. P.S. Peter also has the 'Stunt King' plan for the same price.

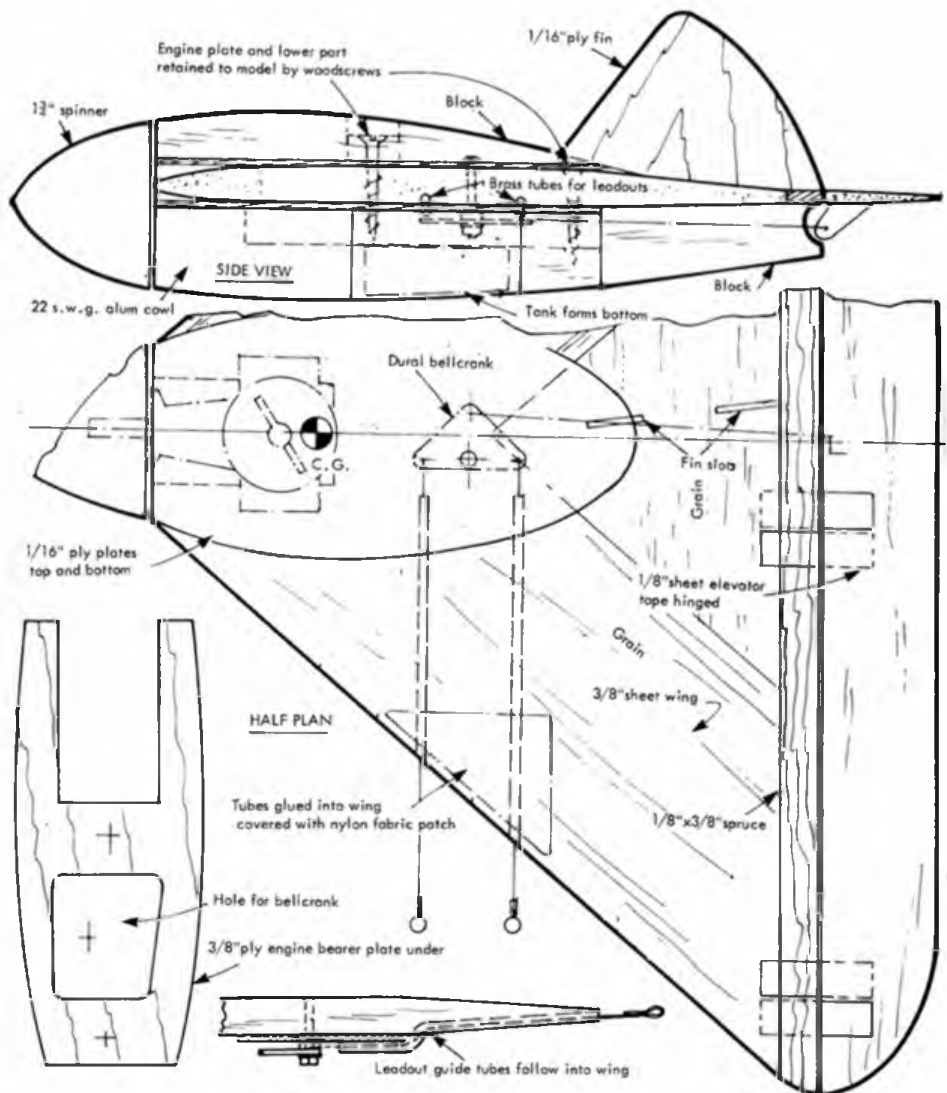
Mike also sent details of the 'Magician' he flew at Old Warden. The model was virtually new on Vintage Day but now he has had chance to fly it more, and is very happy with its performance. The Fox 25 has more than enough power even if the original was claimed to take from 0.23 to a 0.49. Mike goes on to say: "A 10 x 5 prop is currently being experimented with - despite

being big for a 25 this seems to give more thrust through manoeuvres and reduces the tendency to 'mush' when over controlled. An advantage of the design is that it dates from 1948 so gets maximum bonus points for age.

It would probably be even better with a PAW 19 (not them again...ACB) as this would I'm sure be plenty powerful enough and allow the weight to be trimmed by a couple of ounces or so (mine weighs 25oz., of which 10 are engine, silencer, spinner and prop - the PAW would be around 7.8oz with



Above, Mike Rolls' version of the 'Magician' seen at Old Warden last summer... Would-be builders take note of the comments on the C.G. position mentioned in the text below.



muffler ring and prop). The only possible problem to look out for is the very short nose - the engine had to be moved forward by about an inch from the main bulkhead to cure a very marked tendency to hunt in level flight.

This hunting, incidentally, is a point to watch for on quite a number of the designs originally designed for spark ignition - the nose tends to be rather short because of the weight of the ignition equipment carried. Also some early designs seem to have delighted in having excessively rearward CGs - John Coasby was notorious in this respect, John Perry's 'Taurus' (that of electric fuel bottle fame!) has 8oz of lead under the Fox 60 crankcase to get the CG right for flying..."

Mike's point about CG is very valid and we would do well to heed it during construction this winter. Thanks Mike.

Gordon Counsell passes on some hints to stop planes mushing - restrict the elevator movement to about  $\pm 20^\circ$  - makes sense. Peter Coates, a noted stunt flyer, always puts stops on his elevator and flaps to prevent over control. One needs to assess the control movements in flight first though and then solder stops on the lead-outs. These can then be re-adjusted later if required.

Gordon also says Woolworth balloons are OK but only give about two minutes running with a Frog 500, but asking around toyshops will often unearth balloons sold individually which give much longer runs.

Another idea is the use of plastic bags as a 'balloon' tank. To fill either, is best done by sucking out the air using a squeeze bottle half full of fuel, then filling up the balloon. Excess fuel is then allowed to run out of the feed pipe before attaching and a bulldog clip clamps the pipe before fitting to the engine. The engine is started on a prime and the clip removed immediately. Watch the FAI combat guys with their pacifiers, the process is almost the same. Gordon's current balloon has been going for three years...

More on Scale Stunters next month.



# SCALE MATTERS

# SPECIAL

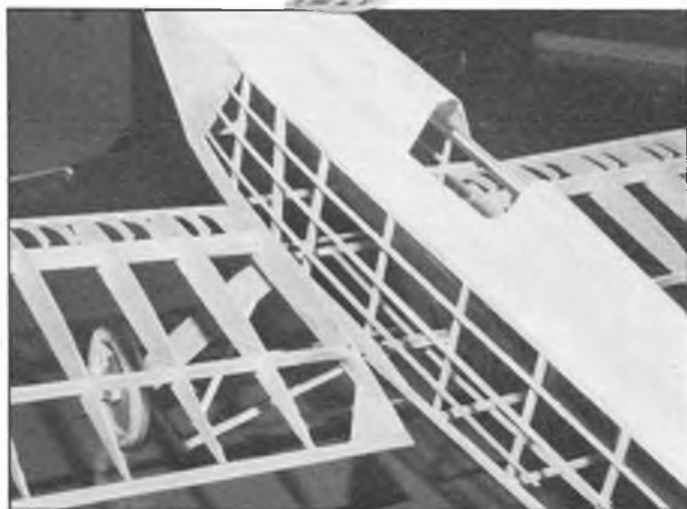
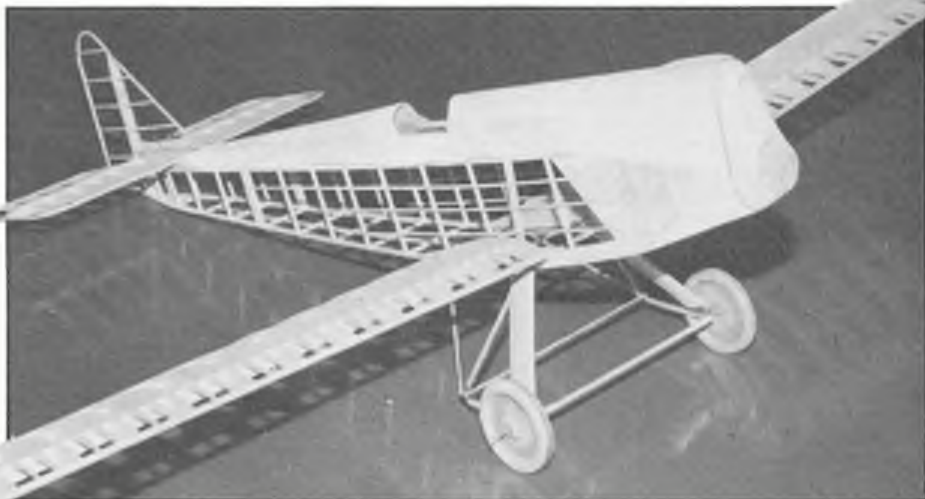
## Avro Avian Monoplane

### Bill Dennis' introduction to indoor scale...

**A**FTER YEARS of attending indoor scale meetings as a spectator, I decided recently it was time I had a go myself. I had built an Andrew Moorhouse 'Luton Minor' some time ago, but this is my first serious attempt.

I decided Peanut was too small for my limited skills, and people appeared to be having great difficulties with CO<sub>2</sub> indoors, so I settled on the open rubber scale class - these always seem to have the most pleasing performance. I chose the 'Avian' because it is mostly very simple, with not too much structure and I built it large in an effort to keep the wing loading down.

I then thought it would be a good idea to relate my experiences, as a beginner, and your editor agreed to feature the plan so that others could have a go and learn from my mistakes; there were one or two...



*Above, at this stage - not a warp in sight - take note of Bill's hints on jiggling during construction! Left, simple and effective 'wing joiners' are made from fine gauge aluminium tube and 20swg piano wire dowels, note lower stringers tapering to nothing at mid-fuselage.*

### Materials

To build this model you will need some items not available from your local R/C model shop, namely plastic propeller, basswood, Jap tissue and narrow strip rubber, all of which can be obtained from SAMS, 2 The Drive, Blackmore End, Wheat-hampstead, Herts.

I used no special indoor wood, light 'shop' balsa is adequate for the larger model. What was not adequate was the quality of my wood grading, which erred on the heavy side. For example, having cut a spar from light wood, it would seem in isolation to be very weak, so I replaced it with something stronger! However, when the structure was complete I could see how each piece imparted strength to the whole and it was obvious that it was much stronger and heavier than necessary, contributing to the generally excessive 'avoirdupois'. I should

have known better since I had 'phoned Alan Callaghan beforehand and he had advised me to use the lightest wood everywhere, except for the wing leading edge and longerons, so beware! My realistic target weight was 45g - it finished up at 62g.

A three-view, article and photos appeared in the Autumn 1985 'R/C Scale Aircraft Quarterly' - a limited number of back issues are available and 1/24th scale drawings are available at £1.80 plus 50p postage from *Aeromodeller Plans Service* - please quote plan number 3068.

### Fuselage

I began with this component and quickly came across my first difficulty, namely that of keeping the structure accurate and true. On an outdoor model, fuselage longerons are large enough to keep their shape, but when dealing with 1/16in sq balsa, I found

that they were very easily distorted from their intended path by badly fitting spacers. This is especially noticeable when the fuselage lines are straight, as in the 'Avian'.

My first attempt at a fuselage side frame, built in my usual way, ended up like a wavy banana, so out it went. However, the following method worked very well. First I cut two pieces of 1/8in sheet with straight edges and pinned them on the plan following the outer edges of the straight sections of the upper and lower longerons. These were cut to length and held against the sheet with scraps pressed up to the inside edge. It goes without saying, of course, that no pins are hammered through any part of the structure!

The curved portion of the lower longeron is held to shape with pins either side and reinforced with 1/16in sheet - if you do not do this, it will try to straighten itself when removed from the plan, with the upper longeron bending downward. Spacers are cut and the ends lightly sanded to get a perfect fit and glued in place with sufficient but not excessive PVA type glue. Finally, the second side is built over the first in the time honoured way - again, the sheet jigs ensure both sides are the same.

I found it even more difficult to assemble the sides accurately, so the sheet jig idea was extended. The fuselage tapers in straight lines from the front of the cockpit to the tailplane and again straight edged pieces of sheet were pinned down, this time along the inside edges of the longerons on the plan view. You can now easily cut two identical sets of accurate spacers, one of which is pinned in place *dry* between the jigs. Next, one of the jigs is removed and one side glued in place - inverted - against the spacers. The jig is replaced against the outside edge and the side kept vertical with several balsa right angled triangles.



The jig left along the other edge ensures that you do not accidentally push any spacers across. When all is set, the process is repeated for the other side and the lower spacers added, and with a little luck you should now have a perfectly accurate rear fuselage. I decided I could not hope to pull in the sides at the stern post without introducing distortion, so I cracked them and joined them in straight lines. Later I added some 1/16in sheet to each one and sanded it to the correct planform.

The curved forward section is more tricky, but not too difficult, especially if you have matched the longerons properly. Again I used balsa triangles to keep the sides vertical and in the right place over the plan while the spacers were glued in. The front sheeted portion of the fuselage tapers in a straight line, these are joined with a temporary former.

Adding the nose former presents a bit of a problem since the fuselage sides taper to nothing at this point. Two temporary jig pieces are tack-glued to the sides, leaning inwards at the correct angles and F1 is glued to these. The area under the nose is filled with 1/8in sheet and sanded to shape - note that the taper is straight here also.

Next I came to the top decking which turned out to be the biggest problem of the model. I soon realised that any attempt at

plotting out formers and sheeting over them would end in tears, so I decided to try and make it from tissue paper maché. In cross section there are two distinct curvatures which merge towards the rear. The dividing line was drawn on the side view and tapered balsa blocks produced to suit, from soft 1/2in sheet.

The lower block was lightly spot glued to the top of the fuselage, and lines drawn on the plan view surface to show where the change of curvature starts. Using knife and sanding block, the lower curvature was carved in, using the photographs as a guide; the upper blocks were shaped before glueing in place. The fillet was made with *Polyfilla* applied with the back of a spoon to get the correct radius.

The former was doped and sanded, then glued to a baseboard. I could have made a plaster mould but what I had to hand was fibreglass and I used a combination of one layer of *Modelspan* plus two of matt. Use a suitable release agent - I used *Vaseline* and it doesn't work!

The decking was laid up with three layers of lightweight *Modelspan* soaked in diluted PVA. This proved a very quick method but there were problems. Several blemishes appeared which needed filling and it was

heavy at 6 grams - with dire consequences in terms of nose ballast. On reflection, another method would be to produce the former block and cut it up to give a series of perfectly accurate cross sections for the production of formers. These could be reduced by 1/32in and glued in place, and finally sheeted over with 1/32in balsa panels; it may not be as easy but certainly much lighter. Alternatively, use *very* soft block and hollow out...

The four aluminium tubes for the wing dowels and undercarriage are firmly glued in place, followed by the side and bottom stringers, for which only basswood is suitable. Glue these to the outside of the fuselage and taper them to 1/32in or less at each end - they are very resilient and will not pull in under the covering.

Finally finish filling in the upper nose area and produce a noseblock, incorporating side and downthrust when drilling for the bearing tube. Glue some scraps of balsa block to the port side of the nose and sand them to the correct shapes, using the sketch, three-view and photographs as a guide. These will be partially overlaid with litho plate, overlapping at the rear to give a realistic effect.

### Flying surfaces

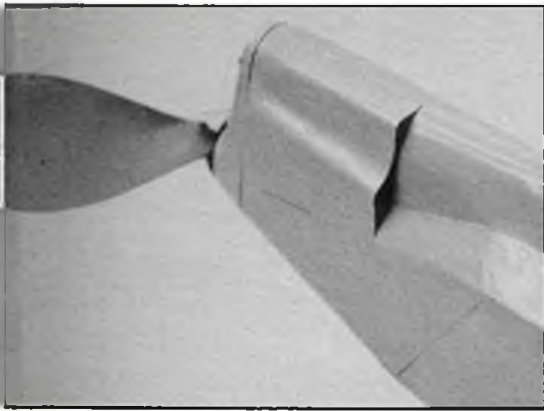
Both wings and tail use laminated outlines. I used three laminations of 1/16in x 1/32in soft balsa, but two of basswood would be better - the latter would need soaking in diluted ammonia solution to facilitate bending. Basswood is stronger and more resilient to pulling-in of unsupported areas, which proved to be a problem.

Cut formers to the inside outline shape, being careful to maintain the correct curvature, rub the edges with a candle to prevent sticking and pin down over some polythene sheet. Glue the strips together with plenty of thinned PVA and run them through a tissue, squeezing out excess glue. Then hold them against the formers with scraps of balsa that also have been 'glue-proofed' with the candle.

The main structures are quite straightforward, requiring no special techniques, except to reiterate the importance of good fits. Incorporate scraps of 1/64in ply between aileron spars etc to maintain a gap

Above and right, completed model enhanced by neat lettering - well worth the time spent. Photos show scale propeller, flying prop is cut down Peck 8 Inch...





Above, litho plate is used for nose panelling (chat up your local print shop). Below right, wheel and rigging detail.

on final assembly. A major problem that cropped up during covering was that of pulling-in of unsupported surfaces, especially the wing tips. This will be eased if using basswood but it is very disappointing if it happens, so I would advise a little judicious reinforcement with 1/32in x 1/8in strips glued along the inside of the wing and tail tips.

I chose to make the wing 'knock-off' and haven't regretted it - don't be tempted to save a tiny amount of weight in this area. I know many experts can get away with one-piece models but the wings always come off mine, taking half the tissue on the fuselage with it. Glue the tubes in place in the position shown.

### Undercarriage

There is a lot of wire in the undercarriage but I can't see much scope for reducing weight. You might get away with 24swg in places, but I don't think it is worth it - weight here on a low-winger adds to stability. Make the two main frames, spring them into their tubes and make some temporary balsa jigs glued to the lower fuselage to hold them at their correct angles. It is then an easy matter to bind and solder the other members.

I had hoped to make 'real' wheels with rubber tyres but these would have been 3 grams each and I was beginning to worry about weight at this stage, so I made them from balsa rings glued to a 1/32in ply disc.

Put an 8 BA bolt through the centre, mount in an electric drill and turn them using a sanding block. A similar method is used for the spinner.

### Covering

Models of this type are covered with Jap tissue - I got mine from Mike Woodhouse (see *Aeromodeller* July 1984) but it is also available from SAMS. If you have not used Jap before, you will find it has quite different properties to *Modelspan*, although they are not dissimilar in weight. Jap has a shiny finish and does not absorb dope to anything like the same extent as *Modelspan*, it is for this reason that it is ultimately lighter. In turn, this means that you cannot use the technique of attaching the tissue by brushing thinners through onto the previously doped structure, since it will not soak through so easily.

What you will have to do is apply the dope to the model and lay on the tissue while it is still wet, pulling it out so that it is as wrinkle-free as possible. Do not worry too much about getting it tight - it is more important not to induce warps. It is also essential to make sure that it adheres properly, so use a small brush to apply extra dope to local areas if necessary. If you do not do this, the tissue will pull away when being shrunk (see Dave Hipperson's 'Covering problems' in November *Aeromodeller*).

The other property of Jap tissue is that water shrinking is much more effective than dope. The method I used was to lightly steam the tissue over a kettle; you can always increase the degree of steaming if the tissue does not tauten but this is unlikely. I gave the model two coats of 50% dope/thinners but in retrospect I think this was a little over-enthusiastic - 30/60 should be okay or even use non-shrinking banana oil. I did not bother to pin down the flying surfaces but held them near a fire (not close!) until the dope was dry. Use banana oil - not shrinking dope - on the top decking, or it will pull-in like mine did!

With the model covered, now is the time to add the details, although there are not many. The hooks for the rigging are bent from strips of litho plate 1/8in wide and epoxied in place. I also used litho plate for the panelling around the nose, since the weight does not matter here and it looks so much

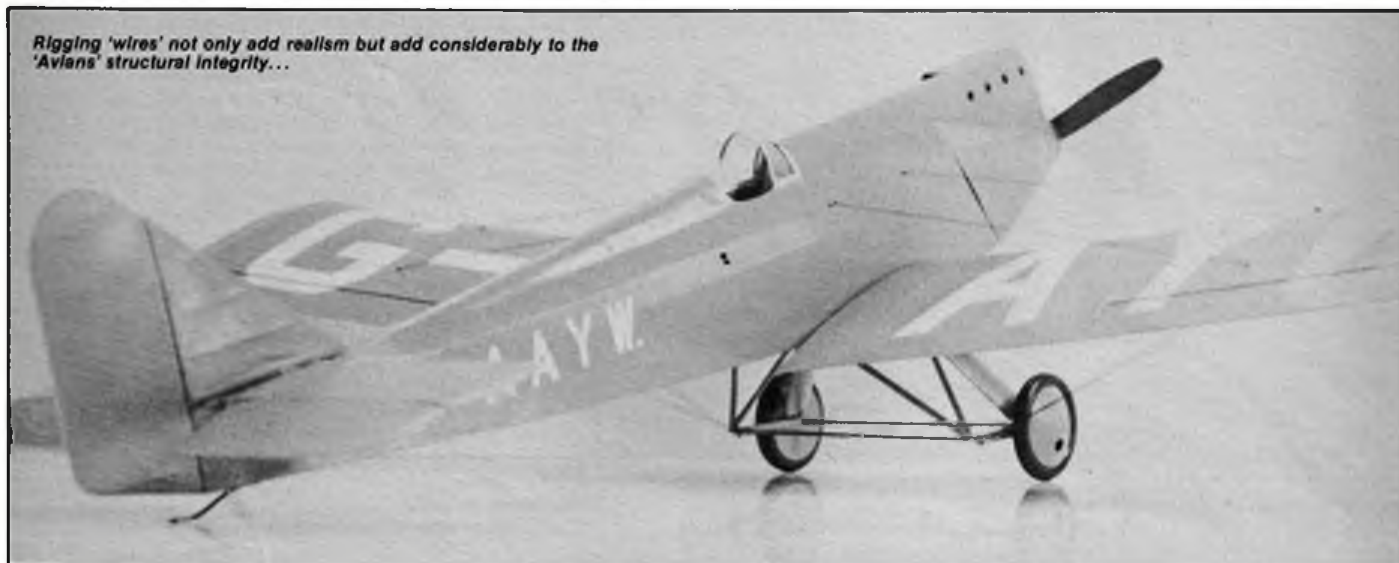
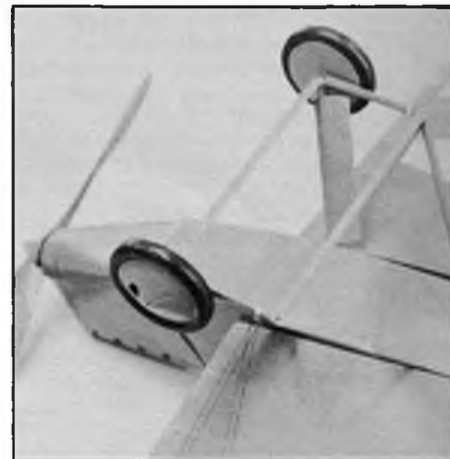
better. The various shapes were developed with tracing paper and transferred to the plate, cut out and annealed if necessary to facilitate bending. The upper port panel overlaps the balsa side formers to the rear, but falls short at the front where there is double curvature - the gap is filled with *Polyfilla*. By one of those happy coincidences, litho plates have a series of holes along the edge of the correct size and spacing to suit the exhaust holes and these were gratefully made use of.

The article accompanying the scale three-view describes the colour as being *Humbrol* 38 Lime Green with a dash of white added and there is a picture of an R/C model finished in this scheme on the cover. If you possess and can wield successfully, an airbrush then this stage will be easy. I rely on car aerosol paints for this kind of job and a very good match is *Dupli-colour* BL Applejack Green.

I found it useful to spray a first light coat of white primer; this makes it easier to get a good finish with fewer coats. When the green is sprayed, the tissue goes horribly slack but it tightens up again and looks very good... with an eggshell sheen.

The lettering really transforms this model. For the fuselage registration use *Trimfilm* white decal sheet, available from *Hannants of Lowestoft* (address: 56 London Road North, Lowestoft, Suffolk). Very carefully trace the letters, go over on the rear

Continued on page 105



Rigging 'wires' not only add realism but add considerably to the 'Avians' structural integrity...

# Mini Helides

A CO<sub>2</sub> mini-version by John Russell of R.A. Grasmeder's 1950 original...

## Construction

Wood used should be of medium to soft grade. Make every effort to keep the rear end as *light as possible*. The tailplane has to be a compromise, as it is of rather high aspect ratio and prone to warps if really soft wood is used.

Balsa cement was used for construction of the original, except where otherwise stated.

## Fuselage

Build two sides over the plan in the usual manner, noting 1/16in components to be used towards the rear. Incorporate front sheet parts at this stage.

To avoid any slight distortion caused by the upper longeron pulling the lower one into a slight curve on removal from the plan, it is worth splitting the top longeron into two laminations over the front two thirds of its length and glueing together. Pin down over the plan while still wet and the curve will be permanently set. This is not very easy unless a balsa stripper is used and is a good



Above, John with his well-flown model - a real floater, so do ensure you have a good dethermaliser system and that the model has your name and address clearly visible!

idea but not essential. Diagonal braces would be another solution to this.

Pin and glue the sides together at the tail post and before glue sets, insert the main former. Wait a couple of minutes, then pull sides together at front, and fit the front bulkhead and pylon former. Fit pylon centre piece and semi-circular formers, then wrap round soft 1/32in sheet to form the pylon front. Sand the bottom edge of this to match the pylon core, fit cross former, then soft 1/32in balsa curved into the fuselage side sheets. Dampen the 1/32in sheet if necessary, or use several pieces if reluctant to bend!

Fit the remainder of the cross pieces and gussets. Epoxy the undercarriage to former, then fit bottom sheet and ply mount for charging nozzle. Mount the motor onto the ply mount, make recesses in 1/4in sheet backing for nuts and bolts and epoxy together. A little grease on the bolts will prevent them being epoxied in. Remove the motor and glue the mount to the front bulkhead, then add side cheeks.

Finally sand the fuselage smooth. Dowels, dethermaliser guides and main wing mount may be fitted after covering.

## Wing

Laminate the tips around a balsa former and shape the trailing edge from 1/8in x 3/8 straight grained balsa. Build the wing flat on the building board, propping up the front of the trailing edge 1/32in to suit the undercamber of the ribs. Omit the spar and 1/16in ribs at the dihedral breaks at this stage. Cut 'V' notches at the dihedral breaks, prop up to correct angle and glue with P.V.A. When set, fit the remaining ribs, then the top spar. (Using P.V.A. again).

Make the spar joints a good fit as no ply braces should be necessary in a model of this size and weight.

Fill in beneath the spar in centre bays with scrap spar stock flush with the bottom of the ribs to provide a firm area to suit the wing rest.

The wing rest can be made at this stage to fit wing, then glued between the fuselage sides.

## Tail unit

Build the tailplane over the plan using ribs cut to approximate shape from 1/32in

Above, 'Helides' is very much a '50s design with the wing almost over the engine! Make sure you build the tail end as light as possible...

sheet. Sand these to final shape when cement has set, using fine sandpaper on a long block (Now stick back the ribs you have just knocked out!).

Fin and end plates are made from the lightest 1/16in sheet you can find, sand to help reduce weight (to about 1/20in). Sand base of fin to a good fit on the centre rib.

The end plates are best fitted to the tailplane after covering the bottom surface but before covering the top. The top covering can then be extended over the top edges of the end plates.

## Covering

Cover with lightweight Jap tissue, steam to shrink and give one coat of dope, about 50/50 dope and thinners on fuselage and slightly thinner on wing and tailplane (about 40/60 dope/thinners).

Pin down while the dope dries, the tailplane can be pinned down across short lengths of 1/2in sq balsa. The inner right wing panel should be given slight wash-in at this stage - about 3/32in under the leading edge should suffice.

## Trimming

Cut across the fin for about 1/2in near the base to form a trim tab, this can be simply bent for turn, then fixed by running a bead of cement along the base to fix when the correct setting is established.

Add weight if necessary behind the front bulkhead, until the model glides just off the stall. Bend trim tab to the right to obtain circling glide. On a gas charge, the model should now climb gently in right hand circles, the wash-in preventing a spiral dive.

My model flew with very little trimming apart from slight reduction in wing incidence as noted on plan, if any incidence adjustment is necessary, this is easily done by packing up, or cutting away the rear wing supports.

If your model is reluctant to turn right, try a left turn...I once spent a whole afternoon trying to trim a 'Scram' to fly left because the instructions said to do so. In the end I tried a right turn and that model has flown perfectly ever since, in right hand circles. If 'Helides' is flown left then the wash-in should be *reversed*, although if reluctant to turn right - your warps have probably changed anyway!



## Introduction

Some years ago at the suggestion of the then editor of the *Aeromodeller*, Peter Richardson, I designed the 'Mini-Slow' as a quickly and cheaply built profile sports model for 2.5cc motors. I guess that this has proved to be one of my more popular designs for I even see today many examples still being flown. The reasons for this enduring popularity must be its simple and robust structure, coupled with its excellent flight characteristics.

I can still remember my surprise at the first flights of my prototype 'Mini-Slow' for it flew amazingly well for such a relatively crude model. If 'Mini-Slow' has a fault, it is that its wing area is a bit small and its



# Midi-Slow

## Build this ultra simple, ultra cheap, sports stunt trainer by Dave Clarkson.

airfoil a bit thin for manoeuvres except at full speed, so it flies more like a combat model than a sports model.

Over the years I have built a few enlarged versions to add sports model characteristics to its other virtues. The result of this development process is the model presented here which I have called 'Midi-Slow' to reflect its origins.

In developing 'Midi-Slow', the original design philosophy has been retained. So, the structure must be simple and rugged, construction must be quick and easy, and wood wastage in construction must be minimal. 'Midi-Slow' achieves these objectives...for the wing structure now utilises standard sheet and strip dimensions and needs less precision in construction because of the partially overlapped joints, and the generation of scrap in construction could not be less.

In addition, its larger wing area (20 dm<sup>2</sup> compared with 17 dm<sup>2</sup>) and its thicker wing section (12% compared with 9%) means

improved manoeuvrability at moderate speeds, so that line tension is maintained. 'Midi-Slow' features a motor thrustline offset and tip weight arrangement rather than the asymmetric wing area and line rake arrangement of 'Mini-Slow'. A by-product of this change is that line tension varies less with speed and that its wing flaps around less in sharp manoeuvres! However, it does mean that the amount of tip weight used is important and what is shown on the plan should be regarded as the minimum.

In conclusion, 'Midi-Slow' is as cheap and as quick and easy to construct as 'Mini-

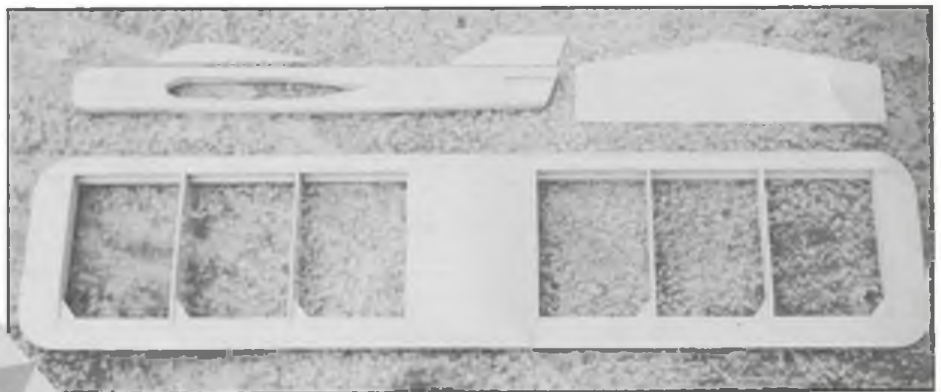
and a sheet of lightweight tissue for covering the fuselage and tail plus half a metre of *Solarfilm* for covering the wing.

The optional undercart shown on the plan for use when flying over mown grass or tarmac adds little more to what must be the shortest materials list for any comparable model.

Construction is as simple as the materials list and so I give this as a numbered list of instructions as follows:-

### Wing and Tail

1. Mark and cut out ribs, tail, tips and gussets from 4in x 1/8in sheet. Drill through ribs 1/4in diameter holes at



Above, just a few hours work and you have the basic components of 'Midi-Slow' ready for final assembly... Left, check all fits before deciding to epoxy wings to fuselage!

Slow' and has even better sports flying characteristics. 'Mini-Slow' has been a stalwart of club flying activities and 'Midi-Slow' has been developed as a worthy successor.

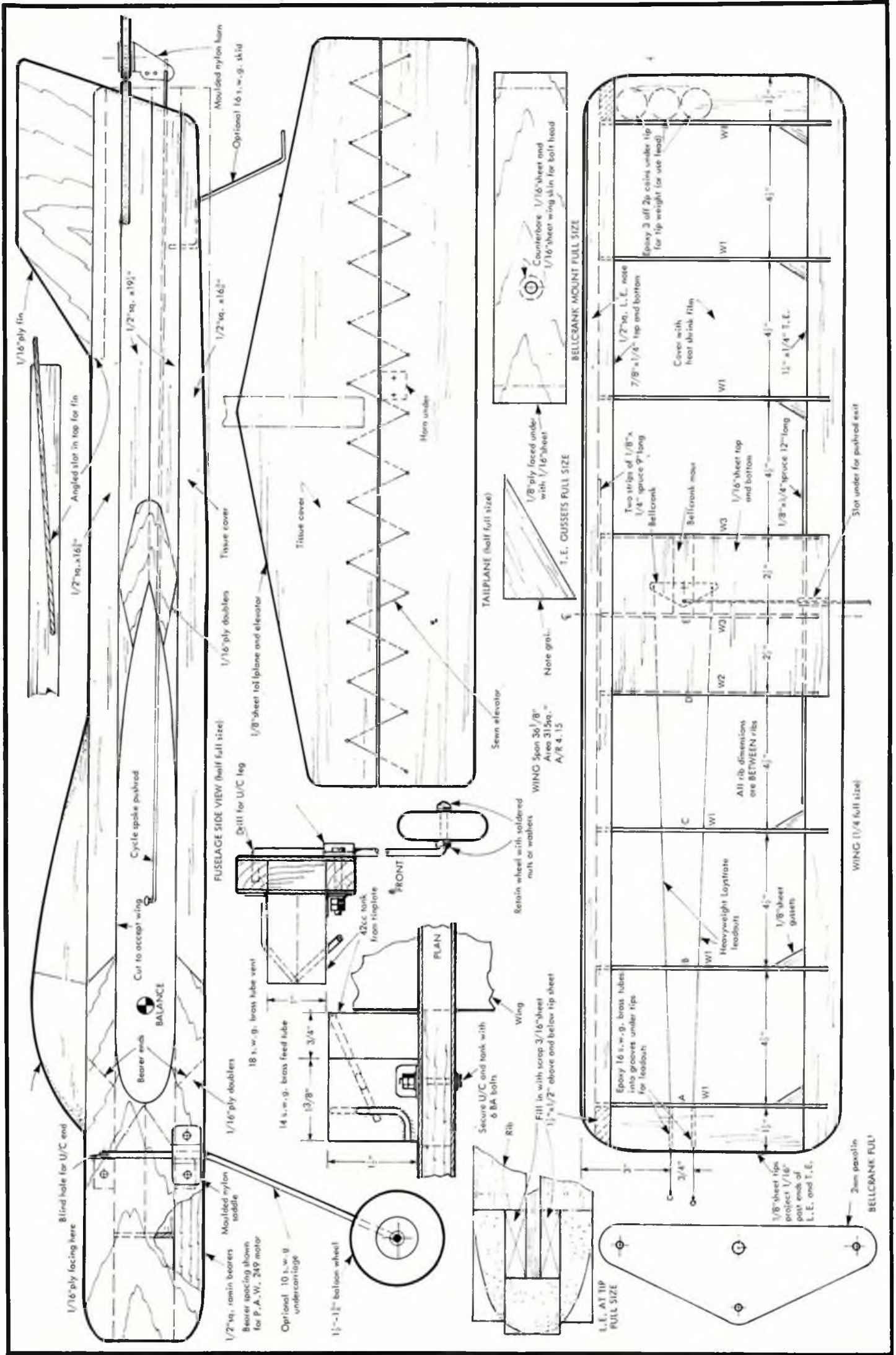
### Construction

The wood list could hardly be simpler and to complete the package you will only need a tank and the usual items for the controls,

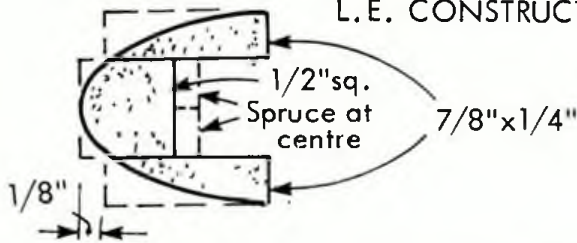
required locations for leadouts.

2. Mark rib locations square across 3in x 1/4in sheet. Slice off two strips 7/8in wide for leading edge leaving one strip 1/4 wide for trailing edge.
3. Glue 9in x 1/2in x 1/8in spruce strip to middle of 1/2in sq strip and then glue 7/8in x 1/4in marked strips to top and bottom with markings inside groove formed. Use another 1/2in sq strip to





## L.E. CONSTRUCTION FULL SIZE



All ribs 1/8" sheet  
 W1 6 off  
 W2 1 off  
 W3 2 off

## Material list

1 off 3in. x 1/2in. medium soft sheet. 1 off 4in. x 1/8in. medium hard sheet. 1 off 3in. x 1/16in. soft sheet. 3 off 1/2in. sq. medium strip plus a small amount of 1/16in. plywood. 1/2in. x 1/8in. spruce. 1/2. x 3/8in. beech bearer wood and scraps of 3/16in. and 1/4in. sheet.

Spruce at centre

W1 to outline



T.E. SECTION FULL SIZE

Leadout holes 1/4" dia. centres shown

E D C B A      A B C D E

W3

R2 and R3

R2 and R3

WING RIBS FULL SIZE

1"	Rib	Rib	1 1/2"	Tip	Gusset mat	Gusset mat
1"	Rib	Rib	1 1/2"	Tip	2 1/2"	2 1/2"
1"	Rib	Rib	7 1/4"	Centre rib	13	13

From 4"x1/8" sheet



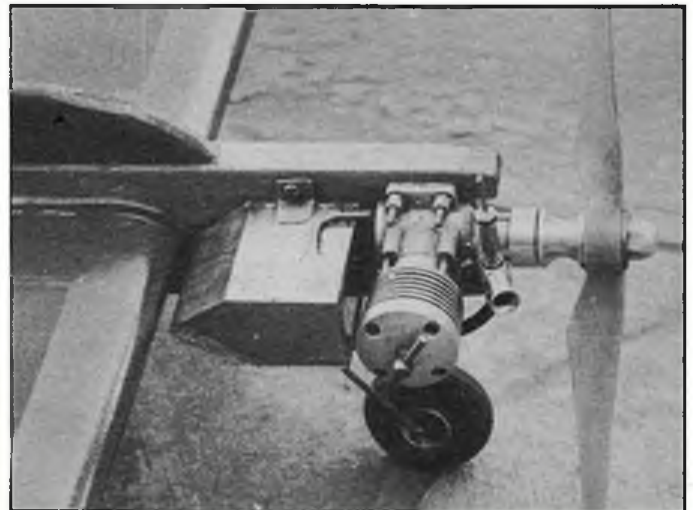
SHEET CUTTING LAYOUT

From 3"x1/4" sheet

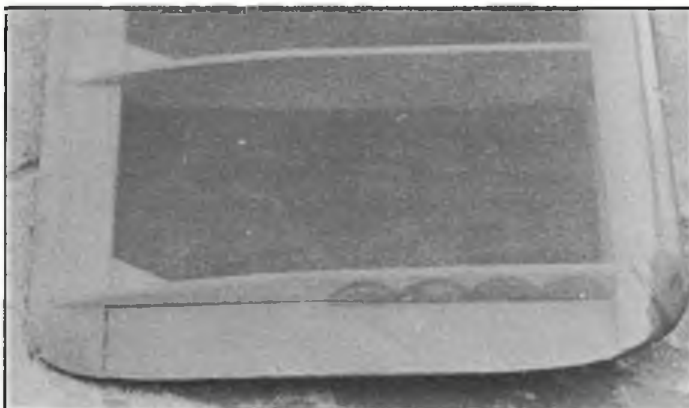
ensure groove formed is 1/2in deep.

4. Glue ribs to trailing and leading edges and add gussets. Use set-square and flat board to ensure ribs are square to structure and wing is flat.
5. Glue together tip and bellcrank platform components. Drill platform for bellcrank pivot and bolt this in place complete with leadouts and pushrod. Glue in bellcrank platform and tips then glue on centre section covering sheet.
6. Shape leading edge, trailing edge and tips using razor plane then sand all smooth including rib surfaces. Epoxy to

*Right, stunt tanks are not all that common these days (there is a moulded nylon one from Micro-Mold... Ed) so get out your soldering iron and start practising...*



*Left, outer (starboard) wing tip of 'Midi-Slow' must have tip weight as shown on plan - this version has one extra penny for luck!*



3. Shape fuselage to profile and cut out hole to neatly fit wing. Glue on trailing edge doublers. Tissue cover fuselage and canopy.
4. Groove rear fuselage for fin (and tailkid if used). Drill mounting holes for motor and tank (and undercart if used). Glue on canopy and fin.

## Assembly

- tips the leadout guide tubes and tip weight coins. Insert leadouts through guide tubes.
7. Cover wing in Solarfilm then remove 5/8in wide strip from top and bottom where fuselage will be - using a very sharp blade.
8. Round edges of tail, then cut off elevator and round hinge edges. Cover tail and elevator in tissue using thinned dope.

## Fuselage

1. Divide 1/2in sq strips to give fuselage inner and outer core strips. Relieve upper core strip for tail and glue all strips together. Cut out bearers, canopy, doublers and fin.
2. Chamfer front ends of fuselage outer core strips to match bearers and glue on bearers. Sand fuselage sides flat and glue on front doublers.

1. Araldite in wing and glue in tail using tape measure to check all square. Hinge elevator to tail using sewn hinging.
2. Dope all surfaces not covered in Solarfilm to seal, including elevator sewn hinges. Add any desired transfers etc. Fuelproof all doped surfaces and Solarfilm edges with Tufcote.
3. Bend pushrod end and install elevator horn to give equal amounts of up and down. Make leadout loops to give equal leadout projection at neutral elevator.



4. Bolt on motor and tank (and undercart if used) using washers under motor lugs on front mounting bolts for motor thrust-line offset and lock nuts to secure.

That is it for the construction and all you will need to go flying is a set of lines (52ft of lightweight *Laystrate* is fine), your handle and some fuel. Before you do so, however, it is worth checking the wing carefully for warps and removing any you find. For your first test flights fit the pushrod into the horn to give a *maximum* of 30° up and down elevator and select a fairly calm day. Even with a well-proven design like 'Midi-Slow' such precautions are necessary to make sure everything is okay.

Suitably sized and designed commercial stunt tanks seem to be as rare as hen's teeth these days so the plan shows the tank I have developed to go with 'Midi-Slow'. It is a rearward wedge, 'Uniflo' tank of 42cc capacity and I have found this design to give excellent fuel feed characteristics right through the flight except for a few 'burps' towards the end that serve to give warning of fuel exhaustion.

Soldering up tanks is one of the skills of control-line aeromodelling so if you do not yet have this skill, 'Midi-Slow' because of its removable and therefore repairable tank, is an ideal vehicle for developing it! Good fits, clean materials, overlapped joints, lots of flux and a big clean and hot iron (60w is minimum, 80 or more watts is ideal) are the essentials to successful tank making.

My earlier versions have had an *Oliver 'Tiger'* with a 9 - 4in size nylon prop clipped down to 8 1/2in diameter. This present version has a *PAW* based special driving an 8 - 4 nylon prop. These motor/prop combina-

*Right, 'Midi-Slow' could never be called graceful but functional IT IS! Single wheel undercarriage need only be fitted if you have a smooth flying site...*



tions have proved ideal, giving more than sufficient airspeed for good line tension throughout the flight. My preference for 4in pitch for 2.5cc sports motors as opposed to the more usual 6in results from the superior low speed thrust and lower maximum airspeed that this gives.

Other 2.5 to 3.5cc front induction motors should prove fine, my only reservation concerning motors is that if the one you plan to use weighs less than about 150-160gm then your 'Midi-Slow' may turn out tail heavy and therefore potentially dangerously light on the lines and sensitive to its controls: use of an effective silencer (or some noseweight if no suitable silencer exists) can be a great help in giving a balance point *no more* than 45mm behind the front of the wing.

## Conclusion

'Midi-Slow' is an ideal club field sports model. It is cheaply and quickly built and its structure is both sufficiently robust to survive minor crashes and easily repairable should it be damaged in a major crash (and we all have those). It uses the most commonly available and reasonably priced size of motors for we control-line fliers - is there anyone in the country who doesn't have a *PAW* 2.49 or 19?

I have had a lot of fun with my prototypes even to the extent of teaching myself to fly simple manoeuvres *including* squares, for I have to confess that until 'Midi-Slow' came along, I, a racing pilot of approaching 20 years experience, had a horror of flying inverted. I hope that you enjoy your 'Midi-Slow' as much as I have enjoyed mine...



## Avro Avian Monoplane

Continued from page 92

face of the tracing paper and transfer to the white surface of the decal. This way, you only need to lightly cut the shapes - if you trace onto the back of the carrier sheet you will have to cut right through, of course. Use a clean rubber (eraser to our American readers!) to remove the pencil and then apply the decals to the model.

Wet the area with a little water to which a spot of washing-up liquid has been added. This makes it easy to move the letter around, in fact it can be used to soften a 'set' decal if you subsequently decide it is in the wrong place. Position the letters against a feint line drawn on the model with a soft pencil and space with a strip of paper marked off from the plan.

Unfortunately, *Trimfilm* is too narrow for the wing registration. You could make each letter in two parts, but *Hannants* also supply sheets of clear decal, you will need two to allow for mistakes! Give this just sufficient coats of the spray white primer to cover and treat as for the *Trimfilm*, although the effect is not quite as good, since it is thicker. There are also two tiny red, gold and blue emblems and a weight table, neither of which I have done as yet, but these will be made from the clear decal.

Finally, solder twists of fuse wire to retain the wheels, then apply the cones made from paper, previously doped and coloured.

## Assembly and trimming

Control surfaces are attached to the wings and tail, glued with little pieces of 1/64in balsa between, in order to give a gap. I found that if the rigging loops were made fairly tight, they kept the wings in place on their dowels. With the motor installed, I was disappointed to find I needed several grams of lead in the nose to achieve a reasonable balance point...the model clattered onto the scales at 64g - well over my target weight!

I did my initial trimming outdoors and had little trouble in achieving a stable right-circling flight pattern, with ample duration and scale speed...in spite of the weight. In fact this would make a very nice outdoor model for calm evenings, but it was intended for indoors so I took it along to a local meeting to see how it performed within four walls...

The hall was quite long but very narrow compared to, say, the Walsall site for the Indoor Nationals and I found myself very glad that it was not a one-piece model! With some extra right rudder I was able to get it to turn tightly without any problems but there was so little margin for error that most flights gradually wandered towards a wall - those that were not terminated early, finished in very satisfactory landings.

Once again, the scale speed seemed about right even with the model carrying so much weight - it was just the sound of the bang when it hit the wall that worried me!

I would say that getting almost any indoor model to fly safely is fairly straightforward - the time-consuming part is getting the right combination of motor thickness and length. The aim is for the model to have sufficient power to take off and cruise at

reasonable height, but also land with turns remaining. This latter point seems quite important, as it eliminates problems of transition and the need for a freewheeling propeller, not to mention the noseblock falling out!

I would suggest beginning with four strands of 1/16in flat rubber, and take it from there. Increasing motor length will give more duration but less power for take-off and height gain, while shortening the motor, or increasing strand number and/or width will have the reverse effect, possibly leading to turns running out in the air. You may find it useful to make a jig on which to test the motors with a propeller attached, rather than keep putting them in and out of the model.

In conclusion, I think this has proved to be a very suitable first indoor scale model, and it should be a simple matter to produce a lighter version by following the retrospective suggestions. Why not have a go at the Indoor Nats.?



### Avro Avian weights:

	Uncovered	Covered and painted
Fuselage	8.0g	16.1g (+ panel)
Wings	7.0g	14.3g
Tail	1.5g	3.7g
Undercarriage	7.0g	7.3g
Prop/noseblock	5.2g	5.2g
	28.7g	46.6g
+ motor, details and ballast		Total 64.0g

# FREE FLIGHT SCENE

## Flashback... 9 years!

An encouraging start for Andy Crisp at the first Trials - he finished up going home with one more model than he had taken! A group of early arrivals were chatting to a publican a few miles from the drome the night before the contest when he admitted to having someone's A2.

When he had been given it the name and address were already too faded to read (we'll believe you) so he had not been able to contact anyone about it and had no idea where it had come from. The word 'Flashback' in artistic tissue decor on the wing meant nothing to him but was enough for his guests to realise to whom it belonged.

The publican was happy to hand it over and the next morning it was presented to an amazed Andy. It had been flown a bit during its stay away...evidence being the odd brown paper patch but apart from this Andy reckoned it to be almost in flying order particularly surprising when one considers Andy lost it in 1976!

## Carbonate No 26... F1A by Chris Edge

As is so often the case, this model was conceived immediately after a Team Trials. Following the October '84 event where Chris thought he needed both more performance and greater reliability. It is a stretched version of his earlier design with slightly smaller tail and longer moment arm to compensate.

It was the wing construction and covering which particularly caught my eye. No prizes for guessing that there is extensive use of Carbon Fibre in the wings and as the precise spar construction is vital to the model's towline performance a little detailed explanation of this may be in order.

Chris has really gone to town. He layed up the carbon fibre sheets himself from a material known as XAS/914 whilst studying at the Cranfield Institute of Technology (thickness accuracy to 3 decimal places of mm!).

With Cranfield's not inconsiderable facilities at his disposal he could then determine both theoretically and from practical laboratory experimentation the dimensions necessary to withstand typical towing and zoom launch loads. The spars were then cut to their correct widths and tapers on a diamond toothed saw!

The wing panels are of the increasingly popular 'D' box arrangement but assembly is novel. Chris builds the basic balsa structure of trailing edge, leading edge and ribs on a jig and constructs the spar 'D' box sheeting separately. The Carbon spars are really just cap strips of no greater thickness than the leading edge sheeting itself. Therefore they are butt glued edge to edge with the leading edge sheeting.

Right, memories of the few summer days in 1985 - John Bailey with Open Rubber model at the Club Champs.



These spar/sheeting pieces are then attached to the wing with thin epoxy. No glass cloth is used. Covering of the inner panels consists of lightweight Jap tissue over the top of Mikalento tissue. This is available from M. Dilly and is approximately the same weight as lightweight Modelspan but is very smooth on one side like Jap.

It becomes waterproof with much less dope than Modelspan and hence less weight and shrinkage. The tips and tailplane are covered very neatly with clear Mylar. Chris uses Balsa-rite for sticking the Mylar and heat fixes and shrinks it with a domestic iron on the 'wool' setting.

He believes that a neater job can be achieved with the clear film as it tends to shrink slightly more than the aluminised variety. It is just as reflective as it is so shiny and of course encourages even better building because the structure is on show!

Balsa-rite also enables practical repairs to be carried out as the adhesive usually stays put on the structure even if the Mylar is peeled off. This allows a new patch to be simply 'ironed' straight back on.

He has found the Mylar quite practical in use, rarely tearing even in the rough and tumble of gorse bush landings common on Beaulieu. More often than not the surface will just dent and a little heat will remove this.

The wings and tail constructed and covered in this fashion showed not the slightest signs of warping even in the heat of Livno last August when he accompanied the British Team to the World Champs.

The fuselage boom is a carbon/glass Tchop-Ronytube and a Koster electronic timer, hook and bleeper are housed in a balsa/aluminium pod. To avoid the inner panel dropping too much on the zoom release the wing halves are rigged at different angles. That is to say the starboard half is given one degree wash-in. He sets this with a neat little 12 BA scissor jack type screw adjuster.

Altogether things look promising. The model was particularly effective at the recent 2nd Trials where it returned nine straight maxes in those rare conditions where every last ounce of performance really mattered and already No 27 is complete

and under evaluation. This differs only in a slightly more forward tow hook, more carbon in the tip spars (bottom as well as top) and invigorators over the rear of the section instead of a tubulator thread on the nose entry.

## Perhaps this year...

Looking at the backbone of the competition menu as laid out in the '86 SMAE Calendar we see little change from past years. By my way of thinking that is how it should be but it should not preclude experimentation with contests and contest procedure.

Birmingham's debut in contest management at the end of last year showed how a basic event with a few embellishments can be popular. Open and combined FAI all flown from a flight line, to four flights and in rounds, proved workable. The Falcons Rally a week later proved conclusively what a draw decent prizes and friendly organisation can be.

Single class days like the Wells Wakefield and the Aeromodeller Coupe are outstandingly popular. It is up to organisers outside the spectrum of the SMAE events to use their imagination a bit and try new flying rules to existing classes - even new classes...

What about F1C Mod for instance - who is going to take the lead on that? Remember the SMAE events have to be flown to their rule book so everyone knows where they are. Club CDs on the other hand have a free hand. If good ideas emerge and are proved to work then they will eventually be absorbed in the regular SMAE rules. Show the SMAE what you want in contests by running some according to your ideas and prove it works. Asking the SMAE to experiment on your behalf with untried rules would be chaos.

We need to keep a hold on the keen people that participate now and if possible draw back a few that have given up recently or might be thinking of starting again after a long lay off. We are never going to sell this sport of ours to the massed youth of the country again so forget that! Let us conserve what and who we have and improve if we can bit by bit. It needs constructive input from all of you and the best way to tell us is

to show us the way forward to the 1990s...

## European Team Trials

Both weekends (5, 6 and 26, 27 Oct) were held at Sculthorpe and gave us a selection of weather. The first day although very breezy - up to 20 mph - was warm and sunny with plentiful strong lift. A few people still managed to drop time, including Fantham and Philpott in F1A the latter's model hitting the top of a hangar still with enough height to max!

In F1B all but Spooner dropped but the top half dozen scores were high and close. The second day changed a lot of things quickly. It was much windier and, blowing as it was from an awkward direction, turbulent too. Few maxed but those that did moved well up the list.

Owens and Philpott were the only ones to make it in glider and as the wind increased to well over 30 mph at times with none of the encouraging sun of the previous day the Wakefield flyers did well to get away at all. Although few crashed, most were thrown around in the deceptive air. Ball, Pollard

and Peers maxed and went straight into the lead as a consequence. Most of the rest scored two minutes or less.

It had become too dark for the 4th F1C power round the previous evening so this had been run first thing in the morning but still most maxing models left the drome perimeter almost two miles away. This second flight for them was very difficult. Pete Watson had both his attempts pile-in under power. The second being extremely spectacular as the model struck the concrete runway under full power and at considerable speed.

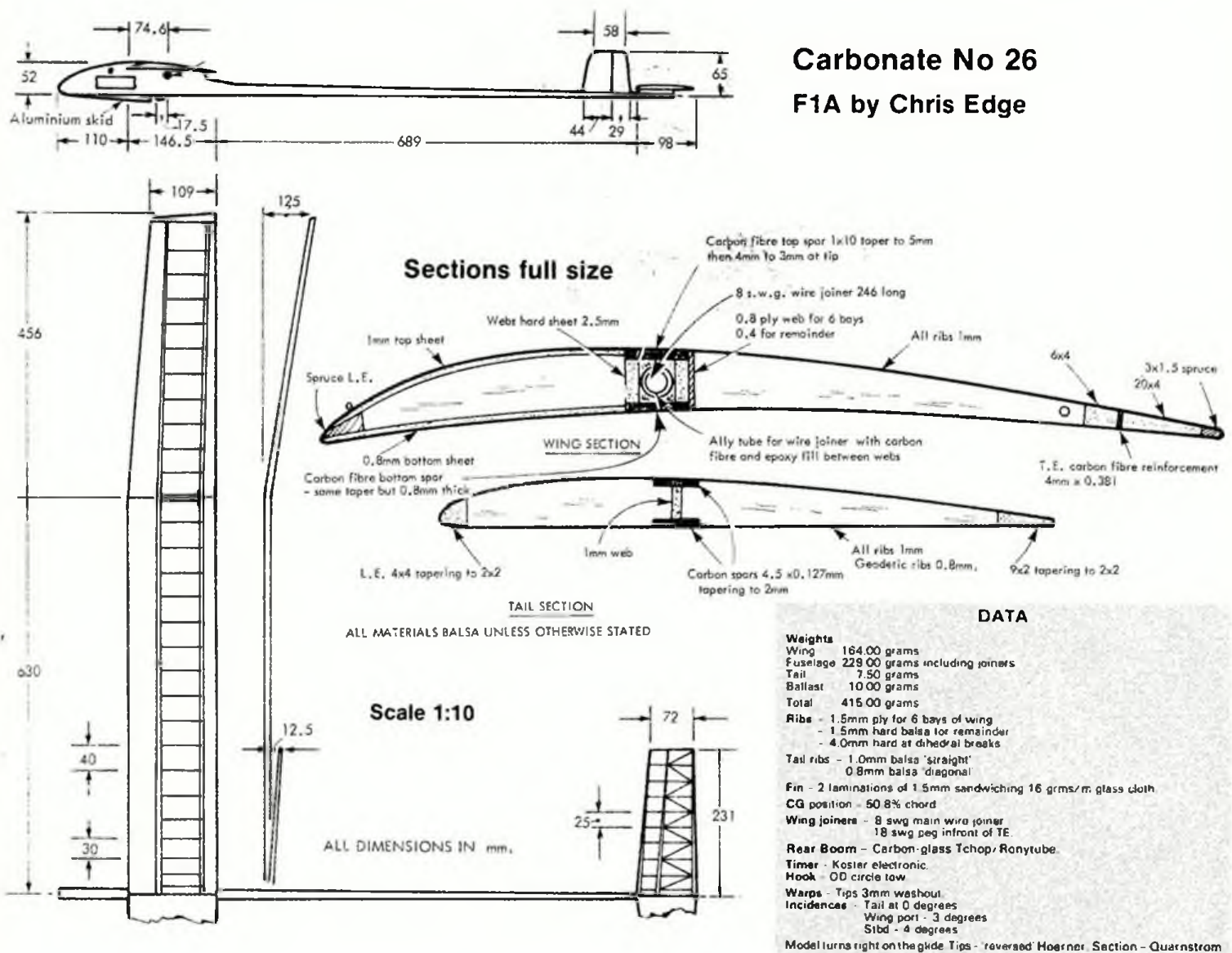
Although the debris so produced could have been expected to cover quite an area - indeed some of it being so small it was never recovered in the wind - no one expected that the motor could have 'bounced' 200 yards from the point of impact! It was estimated that to have thrown it that far would have been beyond the ability of any human being therefore just what happened at the moment of impact can only be imagined.

Remember the motor had to hit the ground and tear itself loose before it started this

trajectory. All this was enough to hold up proceedings for an hour or so and with no prospect of the wind reducing, the event was halted to recommence at the second weekend when hopefully the remaining nine flights would be run off. The CD sweetened the pill somewhat when notifying all contestants of an early start the next weekend by including a results list thus far - nice professional touch.

In F1A Fantham and Philpott improved their positions, maxing out nicely to finish the first day just outside the top slots whilst Wells and Hipperson also began pulling up in F1B on these six flights. Bob admitting at the end of the day that he had actually used the same *Pirelli* motor for all his flights and was disappointed to see that it had a broken stand - he had been hoping to use it some more!

The last day should have been simply a matter of finishing off three flights. It wasn't quite that easy. The wind had picked up a little and to make matters worse was swinging around and occasionally selecting a very inhospitable looking hangar over



which to blow - trials never seem to be easy!

After a round in F1A in which said hangar obstructed much of Gregorie's flight and dropped him out of second place and way down: the control was moved. No sooner had this been accomplished when the wind swung again. It was also getting appreciably colder. This scenario was repeated a few times consuming more than an hour of driving up and down the peri-track before it settled down and we found ourselves back virtually where we had started. Mercifully it then remained 10-12 mph for the remainder of the day.

After this disturbance there were signs of nerves in the F1B flying when many people mis-read a lull and flew together in poor air. They all dropped time including Pollard who at that time was leading. This opened out the top of the field and allowed Wells to actually slip into 3rd whilst Spooner took the lead by maxing a few seconds after...

Paul Rowledge was in all sorts of trouble with off-trim flights in F1C allowing Jack to move up and tie for 3rd with Johnson. There had been some confusion over a glider flight of Chris Sharmans spoilt by a line tangle. He was erroneously allowed a re-fly. The CD quickly realising this was wrong, then had the unenviable task of explaining the glider rules to the man who up until then had been leading.

This left Madelin top as they came out for the final flight, despite some nervous towing on his first flight of the morning. He, Philpott and Owens were literally three seconds apart. They all maxed on the final flights, giving Owens his second consecutive team place and Philpott his 2nd consecutive European team place. Madelin had only once before qualified - in 1983 when the FAI event at that year's Nats counted as the European Team Trials.

In F1B, Pollard and Spooner were a comfortable minute clear of the field due to reasonable flights at the end of the 1st Trials and great consistency since. Third was wide open. Wells flew early as usual but this time in poor air for his worst flight of the weekend. Hipperson was within striking distance at last and despite being very nearly skewered by Dave Greave's model ploughing into thermistor poles as it crashed on the flight line, he got away in one of the best patches of the day to max and again sneak in on the last flight.

Stafford Screen leaned out his motor a little too much for this crucial last flight and it very nearly cut on launch. The stutter didn't spoil the flight and his max gave him his 11th consecutive team place. It was left to an 'on form' Roger Baggott to top the list however and with Alan Jack making no mistakes, Dick Johnson muffed it to drop away from 3rd to 4th.

There were comments about the reduced attendance during the first Trials and not a little disagreement over when that first weekend should have been held up. On the later point the CD - Ian Bracken - behaved perfectly within the rules which allow him discretion as to what he considers to be unflyable. Those that queried his decisions would be best to learn the rule book and suggest changes through the appropriate channels if they wish.

Before they do however, perhaps they ought to consider the subject of reducing attendance. This is exactly what I predicted would occur if we had a cancellation clause. The fringe FAI flyer will never travel far nor

Right, another rare picture from 1985 - Phil Uden in shorts! Again from the Club Champs, amazing what a bit of sun will do - can't see any mad dogs though!



waste a weekend coming to an event which might never be run. The fringe flyer is important. Although today's rules are ostensibly what the experts want; they are visibly *not* the best way to encourage participation.

#### Results

F1A (34 flew - 26 continued 2nd weekend)		
1 G Madelin	Crookham	40 37
2 S Philpott	Biggles	40 35
3 P Owens	Liverpool	40 34

F1B (28 flew - 17 continued 2nd weekend)		
1 B. Spooner	Croydon	41 03
2 R Pollard	Tynemouth	41 01
3 D. Hipperson	Grantham	39 58

F1C (12 flew - 9 continued 2nd weekend)		
1 R Baggott	Birmingham	41 44
2 S Screen	Birmingham	41 22
3 A Jack	Tynemouth	40 41

### SMAE Senior Championship

It would be accurate to say there are perhaps only half a dozen flyers who make a conscious effort towards winning this title each year. That is not to say everyone doesn't start with the same chance, even if flying in a limited number of classes. The merit of the scoring system 3, 2, 1 for 1st, 2nd and 3rd is that it rewards excellence - quality rather than quantity.

A good performance in just a handful of events can place comfortably in the top ten but for that last little bit, the tactics of flying in as many classes as possible *can* pay off. What is more this can add prestige to the smaller and more poorly supported events - every SMAE event becomes important.

This can only encourage participation and quite a few people with whom I spoke during the year - many of whom have not the time to devote to 15 or more events - told me they were always encouraged if they could get on this top 20 list - that is why we print it.

Watson (15th) and Chilton (16th) are both refugees from other disciplines of competitive aeromodelling. Pete Watson used to fly Radio pattern until the year before last. This, his second Free Flight season and he showed a firm grasp of all the power classes. He won the Frog Senior for Open Power at the 1st Area meeting and took 2nd in 1/2A at the Nats and F1C at the windy Easter Meeting. Chilton still specialises in Cd'H and won it in style at the Southern Gala. He was 2nd at the Nats and again 2nd, this time a tie, in F1B for the Weston Cup hence the odd points.

At 12th Steve Philpott. Two of his 2nds were in A1. One at the Spring Meeting and then again at the 5th Area event. He could only manage 3rd in CO<sub>2</sub> at the Nats after winning this on the last two occasions but came good in his main event taking 2nd in the F1A Trials at the end of the year. His 2nd consecutive European Team place in glider.

Also equal 12th are George Sharp and Phil Owens from extreme ends of the Country and with very different approaches. Phil concentrates on F1A and won the 3rd Area event with the only flyoff and then the Nats a few weeks later where some 80 competed. He was certainly on form that weekend as he also managed a 3rd in Open Glider against a couple of dozen others in the flyoff. He figured again when he won himself another Team place at the end of season Glider Trials.

George Sharp alternated with Mike Chilton at the two major Cd'H events. That is to say he beat Mike at the Nats to lift the 308 Trophy but had to be content with a close 2nd at the Southern Gala. Perhaps his most emphatic win was the early season Gamage Cup victory even if it did cost him a model left on the roof of a Barkston hangar.

Julian Hopper only flies Open Power with occasional expeditions into HLG when there is time. It was indeed in this class that he achieved his only Nats success, 3rd, when he was held down to 4th in his main class as a result of the Smiths making the

Sir John Shelley a family affair! Nevertheless he won both White and Short Cups at the 3rd Area and Southern Gala respectively and he was also 2nd behind Watson in the Frog Senior at the beginning of the season.

With 10 points each, three people tie at 8th. Cuthbert and Cooper both flying almost entirely Glider and Bailey very much the all-rounder. John Cooper's 2nds were in F1A at Easter, Open Glider at the same Salisbury Plain site, but in rather warmer conditions at the Club Champs, and again behind Tony Cordes in the flyoff for the SMAE Cup at the last Area event of the year.

He was third individual at the Model Engineer Trophy for Glider teams and in so doing helped his club win the event but his best performance was his winning of the British Airways Trophy for A1 at the very turbulent first day of the Nats.

John Cuthbert proved to be a volatile character but great when on form. He came on well at the start of the season with a 2nd in the Open Glider flyoff in February and again at Easter in a bigger flyoff still. Things looked even better when he won A1 convincingly at the Spring Meeting and again well up in the same class close behind Cooper at the Nats. He was consolidating points nicely when surviving an awful Northern Gala to place 3rd.

It is sad to hear that he is talking about giving up completely after some political aggravation during the year and then a mishap at the Trials. Such is sometimes the fate of the perfectionist - I hope we see him back next year.

John Bailey flew calmly and effectively in both Power and Glider and was seen with Rubber models too. He won F1C at the Easter Meeting, and took 2nd in Open Power at the 3rd Area day. He was 3rd in the same class at the Club Champs and this and his 4th place in Rubber coupled with Cooper's efforts on the same day clinched the team title for Biggles. He finished off the season winning the Glider flyoff at the Southern Gala and so taking the Pilcher Cup.

Mike Fantham is really very good at F1A. He is perhaps the perfect illustration of someone who although devoting all his time to one class has not let it get out of proportion. He seems to be able to keep his nerve

and can take defeats without cracking up. This year he started well with a straight win of the KMAA Trophy and followed this with another 1st at Easter in the same class. Bailey pushed him down a slot at the Southern Gala but he won the Club Champs flyoff over two minutes ahead of the field.

Tied at 5th: Alan Jack and Pete Harris. Pete had a good Nats winning Slow Open and placing 2nd in F1C. He was also 2nd in F1C at the 2nd Area flying for the Halifax Trophy. At the Spring event he took 2nd in 1/2A and he was 3rd in F1C at the 4th Area. He then won the Club Champs Open Power flyoff with a staggering 18 minute flight out d'ing his rival and clubmate Screen.

Alan Jack also has the distinction of having edged out Stafford in an event this year - namely the Astral for F1C at the 4th Area meeting. Here Alan had a field day. First he topped the individual results in Team Glider with an encouraging 6+ glider flyoff time and then he flew without DT in the F1C flyoff and bettered 12 minutes! Not a bad day's work.

He had already made 2nd in F1A at the 1st Area event behind Fantham and again 3rd in Open Glider at the 3rd Area event, so the Area events went his way for a change. He topped the list in Open Glider at the Nats' an achievement in itself and then came so close to an easy place in F1C had he not been mistimed or rather not timed at all in the flyoff! His European Team place in F1C won after two weekends of very steady flying was a fitting end to his season.

To run the Free Flight Technical Committee and appear on this chart at all was more than I could manage in '82. Phil Ball however takes 4th place this year despite those extra pressures. His 3rds in Open Rubber came at either end of the season - the 1st Area do and again at the Southern Gala. He also placed in both CO<sub>2</sub> events - 3rd at the Spring Meeting and winner at the Nats for the Sparklets Trophy. He came back to form in HLG winning both the Southern Gala and Spring meeting but the flight he must savour most is his winning 28 minute epic in the Club Champs Open Rubber flyoff.

All quite necessary too, as the 2nd place time was over 20 minutes but it will stand for a long time as the longest SMAE Open Rubber flyoff ever. Free of his commitments

to the SMAE - remember he actually ran some events last year - he is planning to figure four places higher on this table in '86.

The same three are involved at the top as were last year and once again Russell Peers is 3rd. His main interest is Open Power and will usually fly nothing else on a day unless he drops a flight, even though he is just as much a threat in Open Rubber, particularly since the advent of his big models. He was a bit unlucky to have a very poor Nats - only a 3rd in Tailless for his efforts.

At the Spring event he was 2nd in Vintage and 3rd in 1/2A Power. He won Open Rubber at Easter and placed 2nd in the same class at both the Club Champs and the Southern Gala. His Power wins were at the February meeting and culminated with his tremendous full house victory at the Northern Gala in 30-40 mph winds for the coveted Hamley trophy.

It would be true to say that of the top four he is probably capable of the best performance as far as numbers of competitive models and classes are concerned. However there are physical limits to flying in say 30 or more events a year even for Russell!

Stafford Screen did not have the breaks necessary to win the title this year. Flying in his usual events - only 16 - everything has to be right to amass the necessary points when some of his opponents fly in nearly twice as many. He was 3rd in Open Power in February, 1/2A and Open at the Southern Gala. Three of his 2nds were also in Open, at Easter, the Club Champs and the 5th Area event flying also for the Team prize, which his club Birmingham won after a close contest with Anglia.

He was also 2nd in F1C at the 4th Area event held out of the top slot by Alan Jack. However he won both the 1/2A events at the Spring Meeting and 6th Area and the Halifax at the 2nd Area but not alas the Nats. Here he had all manner of trouble that kept him out of the points. Timer failure on the power cost him an Open model in spectacular fashion and the 1/2A also suffered timer trouble.

The F1C flyoff on the final day should have been a formality but he didn't qualify. A poor pull out with a wet model coinciding with bad air dropped him those vital seconds on one flight. He made amends at

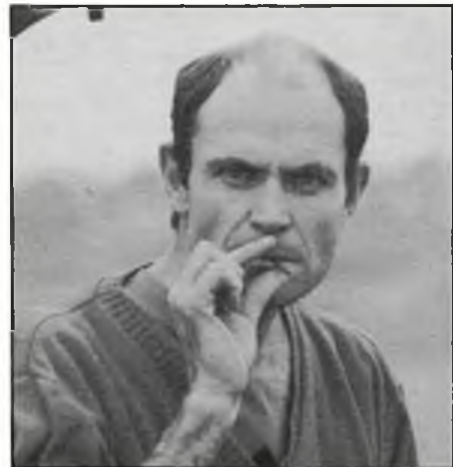
Below, when will he get a new hat? Third place in the SMAE Senior Championship Table went to hard working and persistent Russell Peers of Falcons.



Below, surely our present king of power - Stafford Screen, second in the Senior Champs tables... remarkable performance when you realise this was achieved flying only in power classes.



Below, no, Phil Ball has not taken up smoking to calm his nerves - he just chews motor pegs! Fourth in the Senior Champs table and Chairman of the F/F Tec Committee too - no wonder he has to chew something...



the end of the season however by achieving his 11th consecutive British Team place but even so he didn't win. Nevertheless 22 points from 16 events is a very high return on investment.

In '84 Hipperson came within 1/3 of a point of this title and he made no secret of his determination to win it in '85. However even that is not enough without a little bit of luck and he had divine help from the first day! At the season opener in February he became the only person to have won three SMAE events on one day - 9 points straight away! What was more, he managed to win Slow Open Power first, which meant that he took the lead in the Championship table from the very start - he was never to relinquish it.

The Open Rubber and Vintage flyoff double wins were just icing on the cake that day. This start was then consolidated quickly during the early part of the season - 2nd in Open Rubber at the next event the 1st Area although no more Area successes were to come despite some close misses. Last year's double win at Easter was moderated to a double 2nd in the same events, F1B and Open Rubber and at the Spring meeting he took Vintage and a 2nd in the CO<sub>2</sub> flyoff against Chris Strachan.

He was now way ahead on points although in the excitement he actually forgot to enter Slow Open and therefore forfeited a first flight max that might have... The Nats went well although he didn't place in the points in any of the three Rubber classes but he was high enough to take overall Rubber Champion for the first time - his worst was 7th in Cd'H a class in which points eluded him for the rest of the year.

His tangible successes at the Nats came with a CO<sub>2</sub> 2nd place in the flyoff against Ball and Philpott and the next day his convincing win of the Vintage flyoff with his 'Lanzo' lifting the Jubilee Trophy and completing the grand slam of all three SMAE Vintage events in one year!

Brought on partly by the thinning of the SMAE contest programme in mid-summer there then followed a slightly poor patch interrupted by the Club Champs at which he dropped his only Open Rubber flight of the year and the World Champs at which he dropped two in F1B! Although still well ahead in the Autumn the pressure was back on, as Screen was expected to have a better finish than actually occurred.

Dave won the Caton Trophy for Open Rubber for the 2nd consecutive year at the very windy Northern Gala. He has his mates in Falcons to thank, as recovery of one flight proved to be decisive. The far balmier conditions at the Southern Gala suited him better and he put the finishing touches to the end of the Open season with another victory in Rubber once again by a large margin to take the Flight Cup and clinch the Senior Championship title.

If it had depended on the Trials as it had the year before he could not have faced it. As it was he was clear and the reduced pressure enabled him to make the Team again and win another point! He finishes 10 points clear, so even that day in February wasn't essential but in a contest where so much hangs on nerves and determination a six point margin won on the first day must have a beneficial effect for the rest of the season!

He flew even more classes than Russell

Right, Phil Ball received this magnificent 'aero-pic' of his launch that began that epic 28 minute fly-off flight at the Club Champs - awarded in recognition of his fine effort all year at FFTC Chairman



Peers and apart from a couple of completely unnecessary events at the Southern Gala and the disaster at the Club Champs, always finished all flights in everything flown - for this reason he rarely placed outside the top 6! It remains to be seen what effect the new scoring system of 9, 6, 4, 3, 2 and 1 for the top 6 places will have on the outcome this year.

It should make a difference to the mid-field positions but those in contention at the top or trying for the top will now have to consider not only which events to fly and *when* but *whether* to fly them at all if the class looks like being poorly entered: for under 6 entries there are no points awarded at all - what a dilemma!

Had the scoring been like this in '85 there are very few events in which Hipperson would not have scored points. On the other hand those flying Open Power in February, F1C at Easter, Slow Open at the Spring Meeting and both Open Glider and Power at the Northern Gala would have scored *no* points for their flying no matter *where* they placed. I leave you to ponder the calculations...

### Brumfly '85...3rd November

It was just too much for the Birmingham Club to think of sitting at home while

Barkston Heath was booked but lay unused on 3rd of November - the date reserved for an emergency spillover Trials. With only a week's notice to prepare and advertise they used it to make their debut to contest organisation. Stafford Screen ran the day and even managed to produce plaques for the prize giving!

The continued calm autumn weather helped, as despite the frantically short notice the event was well supported. All classes were flown from a launch line - a couple of people needed telling twice - and all flights were made in rounds. The first one sensibly two hours long to allow for late arrivals and then another *three* plus flyoffs squeezed into the remaining daylight. This four flight schedule was a little odd for Open events which might have been more of a test had a slightly larger max been applied but the tricky lift all day kept the flyoffs to a manageable size.

Mike Cook did well to make nearly four minutes with an F1A in combined FAI but at rather a disadvantage against Roy Collins' F1C! Pete Watson was unlucky again - this time a stuttering engine in the Open flyoff stretched to an over-run and invalidated a flight that might have won. It is hoped that if an aerodrome is available later in 1986 the event will be repeated.

#### SMAE Senior Championship Table

Name	Events	1st	2nd	3rd	Points
1 D. Hipperson	27	7	5	1	32
2 S. Screen	16	3	5	2	22
3 R. Peers	28	3	3	2	17
4 P. Ball	24	4		3	16
5 A. Jack	13	3	1	2	13
= P. Harris	15	2	3	1	13
7 M. Fantham	9	3	1		11
8 J. Bailey	16	2	1	2	10
= J. Cuthbert	11	1	3	1	10
= J. Cooper	17		3	1	10
11 J. Hopper	7	2	1	1	9
12 G. Sharp	7	2	1		8
= P. Owens	7	2		2	8
= S. Philpott	9		3	2	8
15 P. Watson	13	1	2		7
16 M. Chilton	10	1	2		6.5
17 D. Wain	6	2			6
= D. Greaves	9	2			6
= R. Baggott	10	1	1	1	6
= C. Plant	9	1		3	6
= M. Howick	10	1		3	6
= I. Devitt	12		3		6
= B. Lavis	17		2	2	6

#### Brumfly '85

##### Results

All events flown to four - three minute maxes.

##### Open Glider (13 flew)

1 J. Cooper	Biggles	12.00 + 3.27
2 D. Bertle	NYFFG	12.00 + 3.16
3 B. Lavis	Biggles	12.00 + 1.59

##### Open Rubber (8 flew)

1 J. Carter	Falcons	12.00 + 7.03
2 J. O'Donnell	C/M	12.00 + 5.09
3 D. Morley	C/M	12.00 + 4.49

##### Open Power (8 flew)

1 R. King	Morley	12.00 + 4:17
2 P. Watson	Birmingham	12.00 + over-run
3 S. Fielding	Morley	11:30

##### Combined FAI (21 flew)

1 R. Collins	Anglia	F1C	12.00 + 4.28
2 M. Cook	NYFFG	F1A	12.00 + 3.53
3 D. Morley	C/M	F1B	12.00 + 2.49
4 A. Cordes	Birmingham	F1A	11:56

# VIEWPOINT

**Martin Dilly has a viewpoint that he has to get off his chest - how about a few replies? Do the mass of aeromodellers care nothing for the Country's Teams or is it just a few that are hard-hearted and selfish. . .**

**F**IRST, I must regretfully state that the following is my own opinion and, unfortunately, not necessarily that of SMAE Council, on which I serve as PRO.

I am a 'fun-flyer', like most *Aeromodeller* readers; I enjoy flying in contests, and if I did not find it fun, I would probably have stopped about the time I built my eleventh Supa Dupa in 1949. Far from being 'cut-throat' or 'frenzied' or 'pot-hunting' or 'elitist', as some of those who wrongly call themselves 'sport flyers' would have you believe, contest flyers are simply people who enjoy the challenge of trying to fly model aircraft better than they did the previous time, and find that doing this in the company of other people with the same aims adds immensely to the satisfaction.

Inevitably there is a stop-watch or judges to provide a framework for contest flyers to tell how well they are succeeding, and that, too, adds to the enjoyment. So let us remove some of the little fences some of us nervously erect round our own particular interest, as we all benefit in various ways from the whole body of model flying, and were it not for the SMAE none of us would be flying models in Britain today.

Since the SMAE drastically cut its membership fee, it has also had to suspend publication of its newsletter, which let members know what their Society and their fellow-members were doing, had achieved and planned to do. Some of the proposals put to recent AGMs could charitably be termed divisive, and one result over the past couple of years has been that the costs of representing Britain at World and European Championships in Teams picked by the SMAE are largely borne by those same team members themselves, instead of being shared by their fellow-members of the Society.

Naturally the costs of getting to a Championship varies, but if every member even bought a team supporter's sticker or paid a membership fee levy of just one pound, then each team flyer's financial burden would largely vanish. I have been British Team Manager for several Free Flight Championships, and one of the most heart-breaking jobs I had was to write to three of our top flyers, who had put in an enormous amount of effort in developing models and in flying, and who had finally won a place on the team at the Trials, to tell them they were being dropped, simply because they had been unable to find the spare cash for travel and entry fees.

I hope that no British model flyer ever receives a letter like that again. In short, and I know the people who *have* flown for Britain will take my point, we should be sending the *best* flyers, not just the best rich ones.

50 years after world model flying championships first started, the perfor-

mances have increased enormously but the same challenge is there; and it still costs money to get there. We now have no wealthy benefactor to support model flying in Britain (but why on earth is the British model trade and the aerospace industry not stepping into the breach?) So, like so many aspects of the sport, it is left to the SMAE to take care of.

Few of the people who take part in contests do so because of the value of the prizes; it is the organisation and forward planning that makes a good event. Certainly most of the goods given away at contests make me glad to have missed the winners' circle, and maybe it is time we adopted the Continental practice of giving medals or diplomas.

Certainly spending the entry fees on hardware or goods from the local trophy shop seems to me like an insult to those who are in British Teams, and who reach deep into their pockets as well as putting in the time practicing and building. Domestic contests do not need a lot of financial outlay to make them a success, and, as far as I am aware, few people who fly in Open events grudge some of their entry fees going towards World Championship teams.

I think that we in Britain have a serious problem, partly of our own making. With over 16,000 members but no newsletter with which to communicate with them, the SMAE is now seen by some contest flyers as some sort of insurance operation that has no interest in them. Certainly it seems ludicrous that in 1985 there was no way of informing the individual members of what the SMAE's members had done, what events were being run, what decisions were being taken, what matters required an input of ideas from them or even that the AGM and the dinner would be taking place!

Cynically, one could perhaps understand the reluctance of the commercial model press to give much prominence to contest activities; after all, few of their advertisers produce much that is of any use to the

contest flyer, and certainly in the areas of free-flight and control-line in Britain the profits to the trade are far less than in the buy-it-and-fly-it market.

With some justification we think we can make a far better item than we can usually buy in some sealed plastic bag or some gaudy box, and many model shop proprietors are little more than stock-shifters, as anyone wanting technical advice will confirm.

However, one of the objects for which the SMAE was established is 'The promotion, protection, organisation and encouragement of model aircraft building and flying in all its aspects...collaboration between members of the Society...; another object is 'to act as promoters of national and international model aircraft meetings, contests and exhibitions...'

Without proper financial support of our teams and with no newsletter it is hard to see how these aims are being followed. With the greatest respect to this magazine and to the rest of the model press, it seems to me ludicrous that model flying's national body relies on these journals, not only to talk to people outside the SMAE, but to communicate *with its own members!* To charge a membership fee of £5 or so, and then to expect members to pay £24.50 for a magazine subscription to find out what the Society they have joined is doing seems a little odd to me.

In short, our Society must be seen to be doing far more for its contest flyers than is the case at present. At the moment one could almost believe that the philosophy is 'Perhaps if we ignore them they'll go away'. How on earth can we expect young would-be model flyers to be attracted if there is no visible pyramid of achievement for them to see their way up?

Contest flying is an integral part of model flying; the fact that Britain, almost alone now in the world, happens to fly a number of Open classes, as well as the FAI ones, should not be allowed to divert the very necessary funding from the latter.

It is significant that most of the objections to the Society's proper funding of our teams comes from the vociferous few, most of whom have not the slightest idea of work that those who represent us put into ensuring that they do so as well as possible when they fly at a World Championship. Most SMAE members and British model flyers in general, feel some justifiable pride when 'their' team does well in the face of the world's best, whatever the class, so the price of a packet of cigarettes is not too much to pay to be actually *involved* in the success, and it is money far better spent than on a roomfull of smoke. . .

*Martin Dilly has worked hard and long for aeromodelling in this country - both as the SMAE Public Relations Officer and in numerous other roles at home and abroad. He is seen here in Yugoslavia talking to the CIAM President Sandy Pinedoff whilst fulfilling his role as Team Manager.*



# FROM THE HANDLE

CONTROL LINE NEWS

## Racing with Jim Woodside

### Don Haworth's Nelson Special - Six Bearing

The engine in the photographs was made in 1984 by Don Haworth to be used by Derek Heaton and myself at the Chicopee, USA World Championships. Some small teething problems prevented its effective use in '84, but it did come good in 1985; placing second in the European Championships.

The original idea was to incorporate an integrally finned liner into a Nelson crankcase, but like Topsy it sort of grew. The case is machined short at the exhaust stack where there is just material enough to accept four 2.5mm socket head bolts spaced on asymmetric centres. The transfer ports are divided into two sections, each at a different angle.

The evidence of the burn pattern on the cylinder head suggests that it is effective; transfer and exhaust gases are clearly



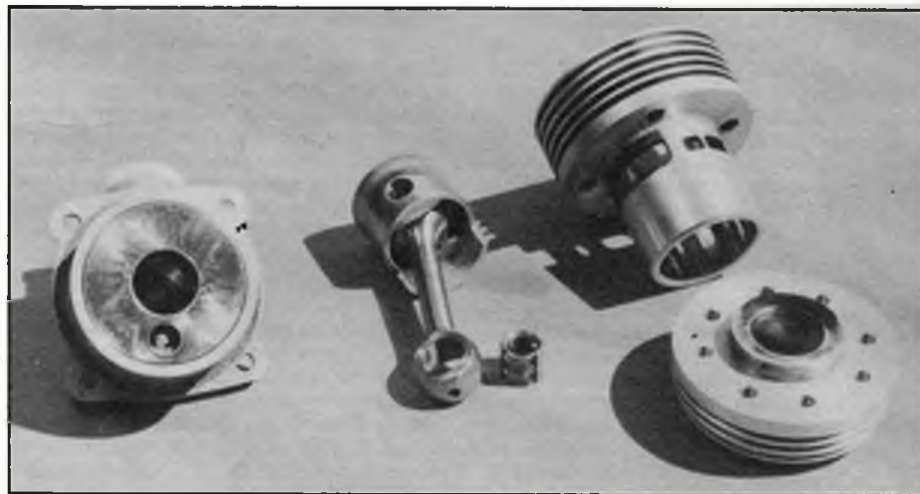
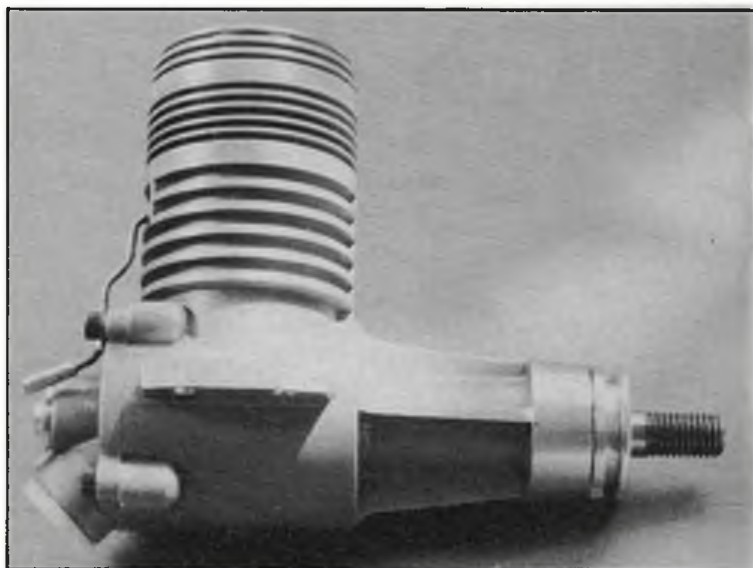
divided. This engine has always been economical, giving as many as 42 laps on a 4mm carb. By the way, the cylinder material is Mahle from the famous German piston manufacturer. Eight 8 BA bolts retain the cylinder head.

The backplate casting was machined to accept a brass sleeve which partly acts as a housing which holds two ball races. The single drive hole is a dead fit on the crankpin and so the drum, supported by its races, is a load bearing member.

The conrod is machined from titanium, with the eyes bushed in hardened steel. The small end has a crowded needle bearing assembly composed of 1mm needles. The big end originally had a caged needle race but the cages had only a very limited life and were eventually abandoned in favour of the bronze floating bush shown in the photograph.

In all a magnificent piece of work. It should be realised though that the main benefit is not speed but stable performance. Once set the engine did not have to be re-adjusted over the three competition days!

*Right, Don Haworth's Nelson cased six bearing special - used to such good purposes by Heaton/Woodside at last year's European Control Line Champs. Below left, note the cut down Nelson case and the peg to locate the liner.*



*Above, the six bearing special - showing main components, left to right: twin bearing backplate, piston with titanium con-rod, integrally finned liner and the cylinder head.*

### Construction Technique: Tube bending

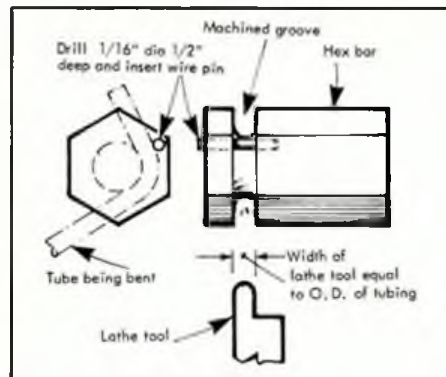
Making tanks often calls for some pretty fancy tube bending. While copper tube can often be persuaded round corners it is heavy and bulky. Much lighter and compact is brass tube but without special equipment - is very difficult to shape. Some years back I bought an American bending device...

This simple gadget makes really easy work of shaping tubing in any material. This tool is of USA origin and I do not know of any supplier in the UK. However, if you have some hexagon bar of about 3/8in across the flats and access to a lathe, you can readily make your own version.

Face off a short piece of hexbar and drill a hole in the apex of the hex to accept a piece of 16 swg wire. Now mount the bar in the chuck and using a tool of a width equal to the tube you wish to bend and with a radiused end, machine a groove into the bar to a sufficient depth to just allow a piece of the tube to be slipped under the 16 swg wire when it is inserted into the drilled hole (fig 1).

By trapping the end of a piece of tube under the pin it is simplicity itself to impart any degree of bend by guiding the tube around the groove. No significant deforming of the circular section will take place.

My own bender has a 3/32in groove at one end and 1/4in groove at the other; these cover the most frequently used sizes in my own modelling.





## Speed with Dick McGladdery

### Into Speed...

To attract newcomers, UK speed rules incorporate a special class for 'novices' (a 'novice' is anyone who has not previously scored higher than 80% of the handicap record in any *non-novice* class at an official SMAE speed contest). The present novice class is 21N otherwise identical to F (for 'Formula') 21 which is 'open' except two-line control is required, with 0.4mm (0.016in.) diameter wires and no groupers allowed.

Although 21N has brought a few into the fold, its appeal has been blunted by the extent to which specialised equipment is considered necessary. Items such as speed pans and alloy wing gloves are not generally sold in model shops, and locating motors, props, fuel and even line wire can be very difficult.

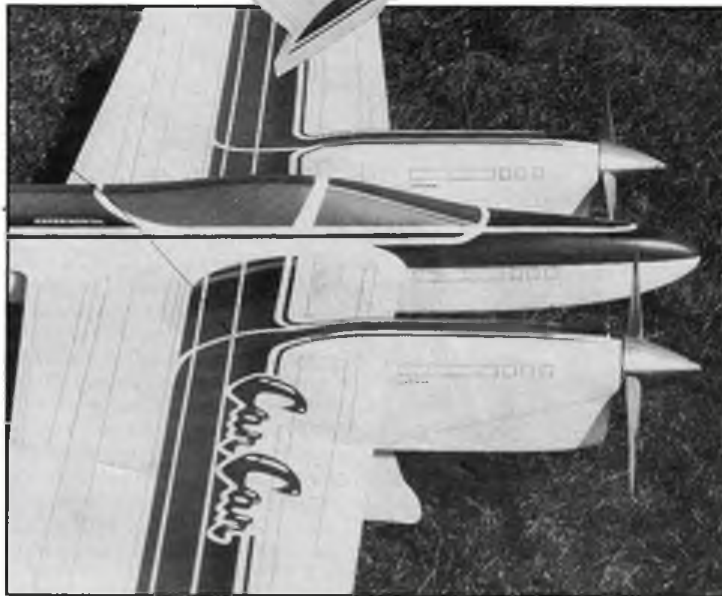
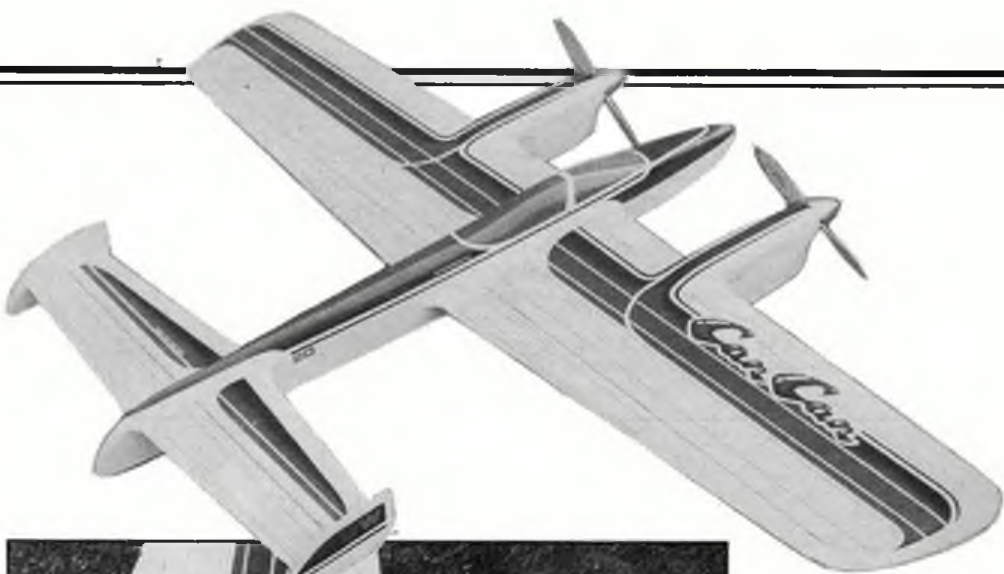
It seems to me that what is needed for newcomers is a class for models which can be built with motors, accessories and materials that are easily available in model shops, and 'Midge Speed', introduced by Andy Brough in his 'Mind the Lines' column, looks ideal for this purpose. Accordingly, next year, all SMAE Centralised, Bicester and Nationals speed events will include 'Novice Midge', run to the current SAM 35 rules (and the 'Open Midge' rules) with the addition of the 'Novice' qualification and normal SMAE speed contest standard safety and procedure rules.

For the purpose of handicapping, the record will initially be set at 80mph; a bit below some speeds recorded at SAM 35 meetings in '85, but these were not made in a pylon, which we expect will slow things down a bit. The first few meetings could turn into a 'Novice Midge' benefit because placings are decided on the basis of your best speed expressed as a percentage of the record so a 'Novice Midge' could win the competition just as easily as a '60'.

However, as soon as somebody exceeds the provisional 80mph record, the new record will become the handicap basis at future meetings until that is also exceeded... and so on. Novice Midge is inherently limited in its development potential, so a 'plateau' will be reached where it becomes very difficult to score near 100%; however, new records in the established classes are comparatively rare and many speed comps are won with a sub-100% score.

I noticed in a recent *Aeromodeller* that Michael's Models are offering motors and accessories for 'Midge' and are apparently trying to revive the kit, but in any case the required bits can be culled from model shops of any quality. I would suggest very careful attention to controls, including hinging of the elevator and reinforce the tailplane with glass cloth.

Also, because SMAE speed events are flown over tarmac, a skid will be needed - a simple glued-on sacrificial hardwood strip should suffice (bamboo would be good for this), but landings (intentional controlled variety) should be less damaging than landing on grass, which I see has caused some grief at SAM 35 meets. Another source of gripe at SAM 35 meets was heavy



Above and left, Claus Maikis' twin engined stunter 'Can Can', basic format was development of his well known 'Savoy' (APS plan CL/1451) Two OS 29 engines provide plenty of motive power...

whipping by some flyers and although a pylon is not fully whip-proof, it reduces it to a negligible level.

The dates and venues for '86 will be settled during the winter, so watch *Aeromodeller* for announcements which will be accompanied by location maps where possible. The Centralised etc. meetings will supplement the SAM35 meetings, which will also be run as before so there will be no shortage of choice - come on, Midge flyers!

## Stunt with Claus Maikis

### Double your fun..

Trying to produce the ultimate aeroplane is a challenging goal. Choose a proven design, make slight modifications to some areas, omit the bad ones, keep the good ones. Finally you'll end up with a high performance aeroplane. This method can keep you busy over many years. It might even lead you to success. Nevertheless it can just become boring. A little change is in order now and then to fulfill your creative mind. A twin might be the solution...

'Can Can' was built for this purpose. A predecessor was created many years ago with two Webra 'Mach 1' diesels. The sheer sound of two engines running in synchronism is enough stimulation to design such

a model. The engine question is easily answered if you think a little bit about suitability of different motors. A lot of powerful engines are available but if you add the weight of two engines plus two spinners, propellers, silencers, and tanks, you soon realize that engine weight is an important factor in engine selection.

To get satisfying flight performance, the choice narrows to only a few makes. It depends on the intended use of the model, too. If you plan to fly it in contests, you also have to adhere to rules - that is, maximum allowed capacity. While there are powerful 15 or 19 engines, their power to weight ratio is prohibitive for competitive flying. I also consider the (then suitable) small props not efficient enough.

The best solution is probably to fully use the permitted capacity. If rule restriction is no consideration, the choice is of course much wider. All these considerations taken into account, the OS 29 or 35 engine was the only choice for me. These engines have the same crankcase and mounting dimensions. Thus you can pick whichever size you want.

The dimensions of this design were developed from my 60 size stunter 'Savoy'. Since the *Super Tigre* 60 has the same weight as two OS 35s, areas and dimensions are pretty much the same. The OS 29 is a little heavier than the 35, so the noses (note the plural!) were kept as short as possible and the tail was slightly lengthened. Construction and shape were kept as simple as possible to save weight. The twin rudder layout was chosen merely to emphasise the

twin configuration.

Many think a twin is a lot of work. If you think it over it's not so bad. The wing is planked up to the engine nacelles. The nacelles are simply slipped over the wing. Since fuselage construction is grossly simplified, the actual additional work is the second nacelle. This is a trifle, since you can build both nacelles together with identical parts. Just watch out for different wing cutouts in the side sheets needed for the swept wing leading edge. Otherwise the design is strictly conventional.

Setting the engine speed was considered more of a problem than it actually is. There's just a small difference from normal practice to get used to. The common practice to set your engine slow and rich will cause some problems. Firstly, it's difficult to tune the second engine to the same revolutions as the first one by ear, as the rpm changes constantly if only slightly... just enough to make tuning difficult.

Secondly, you don't know the speed increase of the engines in flight. This may result in the engines running at different speeds. An easy solution is to choose propellers which will allow the engines to run rather fast without increasing aeroplane speed.

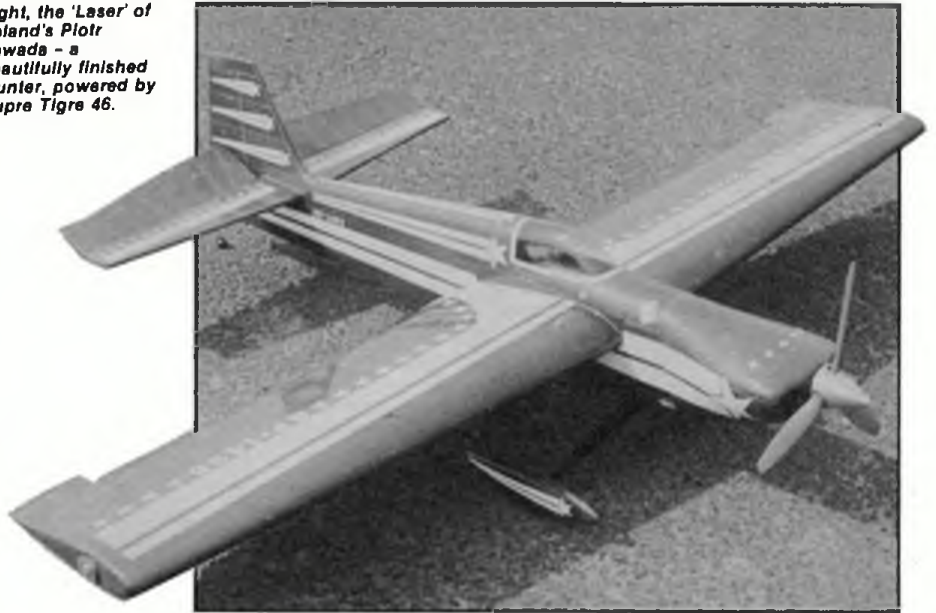
Props with low pitch and narrow blades make engine setting quite easy. You easily hear synchronous running at high revolutions since the sound is more constant. Engine tuning is really easy, and in flight revolutions are more easily controllable. Remember that the tank capacity is much smaller now...

Of course, you'll need engines which will start reliably. The outboard engine is started first to ensure that it will stop first. With a dead inboard engine, straight and level flying is no problem, but I wouldn't like to do it in a high wind. The outboard engine has two degrees sidethrust, the inboard engine is mounted 'straight ahead'. The outboard rudder has slightly more deflection.

I use double battery leads which are simultaneously connected to both plugs, but each has a switch. Both engines are prepared for starting, until you feel the well known 'kick' in your hand. Then the engines are started, but current is only switched to the engine being started. Plug clips are only removed when both engines are running.

Use quick clip connections which connect to the plug only... and ensure they cannot fall off - even with the vibration from one engine running. If you know your engines well, starting within one minute is possible. I must admit that it gives me more 'nerves'

Right, the 'Laser' of Poland's Piotr Zawada - a beautifully finished stunter, powered by Supre Tigre 46.



than handling just one engine!

The weight of the aircraft was the same as my 60 model (1900g), so performance is almost the same. It seems that gyroscopic forces of two running engines will stabilize the aeroplane more than one engine does. It might be advantageous to place the centre of gravity more rearward than usual.

Competitive performance with a twin isn't out of reach. A different approach will cause some additional work, of course. But once you've overcome it, the effort will pay-off. When airborne, the sound of the twin will make up for any troubles you may have encountered.

### Know thyself!

In this modern radio-everything world, to fly little aeroplanes on two simple strings is a downright anachronistic occupation. It takes a certain mentality to choose control line flying as a hobby or sport...

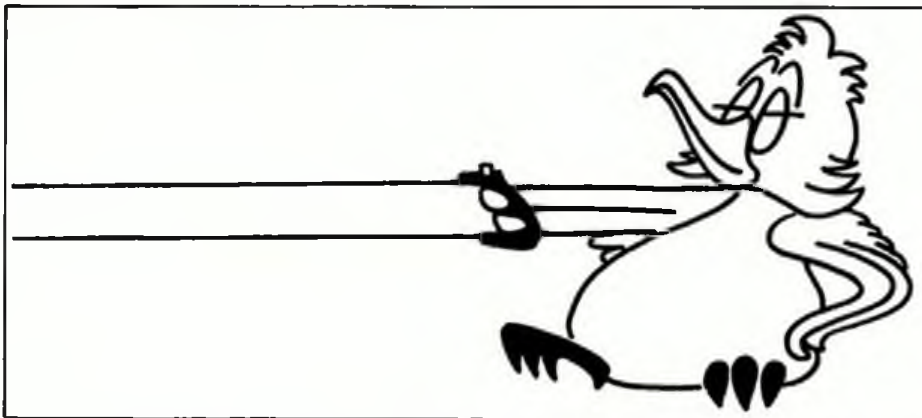
In these 'circles' aerobatic flyers seem to be a special breed. Somehow the peculiarities of an event only attract certain characters, or after many years of participation characters are formed by the event!

If your activity forces you to fight the stopwatch (as in speed, team race, or all free flight classes) performance is all that counts. If you have a high score, you're top - if not, you're nobody. The only way to make a name in these circles is by constantly increasing your performance - or at least keeping up a high performance level.

In events with high technology - as practically all events are nowadays - this can be a demanding and sometimes frustrating task. If you don't have the required talent (or combination of talents) needed for success, you'll bungle forever, stay on an unsatisfying level, and maybe quit through frustration.

You may be richly talented otherwise, but that doesn't help you - beauty isn't asked for in speed, for example. In stunt flying the situation is different. You have a choice of

Below, Pete Grange, British Diesel Combat Champion for 1985, with the Burns Brown Trophy. To celebrate the end of season (?), Peterborough ran an additional event - Ironically Pete was knocked out in the early rounds!



different ways to go, to make use of your abilities *and* to reach satisfaction.

First of all there is - of course - the pilot in you. People with a precise eye, good reflexes and a sensible hand, can develop their ability to a high degree. These are the ones we usually see with the winner's crown. They may or may not have other talents. For example, I remember the early models of Frenchman Gerard Billon, which were an offence to an aesthetic eye. But he is surely one of the world's best pilots. Flying is the thing for these people. They enjoy it so much that they don't care about the looks of their models.

Then we have the builder. Among those people who regularly show up with a new beautiful stunter every year are Yves Fernandez of France and Franco Ballesio of Italy. The superb quality of workmanship of their models is known throughout Europe by now. To me, the most perfect builder is still Les McDonald (USA). Besides being a most successful stunt flyer, I've never seen a model built better...

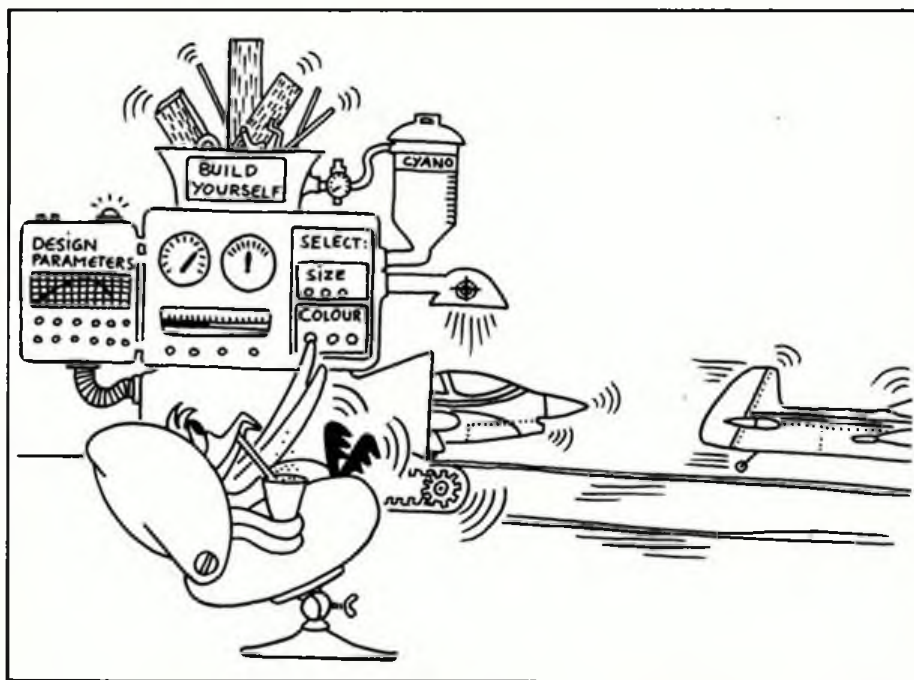
Even if Les couldn't be a top pilot the quality of his workmanship alone would give him so much reward that he could easily renounce all other citations...

There's also the technician. We still owe our thanks to George Aldrich for giving us the 'Nobler', and the name Al Rabe stands for new ideas and high technology. Lately, Gilbert Beringer helped the four stroke engine break-through in aerobatics.

There's a completely unknown stunt flyer in Austria (Rudi Trogbacher. Maybe this remark will make him world famous) who'll never reach the top ranks in flying. But his models are always full of neat and interesting features. I always take a close look - and always I find another clever idea.

These people are most interested in solving technical problems, and they enjoy their sport from this point of view. Improving technology is a big satisfaction even if not certified with a medal. To these people we owe a lot of thanks, without them we might still hack solid models out of hardwood trees.

The designer is a type whose preferred tool is the drawing pencil. Shape can sometimes be equal - or even more - important than performance. Maybe you will place me into this group. It's a challenge to design a new aircraft with aesthetic shape, colour com-



bination, and paint scheme. To fly one of the more beautiful models in every contest is a satisfaction in itself...and you don't rely solely on a trophy to fortify your self conceit!

There's an endless number of ways to choose where to find satisfaction and recognition. There are stunt flyers who concentrate on scale ships and become well known for their beautiful models. Just remember Frank Warburton and his outstanding designs...

Some flyers are hooked to a certain design and develop this over many years to a high level of performance. Their name is often synonymous to a particular aircraft ('Chipmonks' forever!). There's the inventor who always comes up with new ideas. The theorist tells us why and how our models fly and helps us to improve our design. Some people always construct or finish their model in a specific manner which then becomes their trademark. Other people are famous for their unusual, outstanding designs like Brian Dyke and his monstrous aircraft.

You see, in our event there's a place for everybody. Unlike other events aerobatics can offer a wide range of possibilities, and

acknowledgement in so many different ways that nobody is kept outside because of their lack of talent.

You may feel that I've stressed the terms success, satisfaction, recognition a little bit too much. If somebody says he doesn't look for these, he's not telling the whole truth. Everybody needs some recognition, if not by other people or trophies, at least by himself. In case you don't believe, just take a look at the so-called fun fliers at RC fields and how engine capacities and spans have risen over the years...

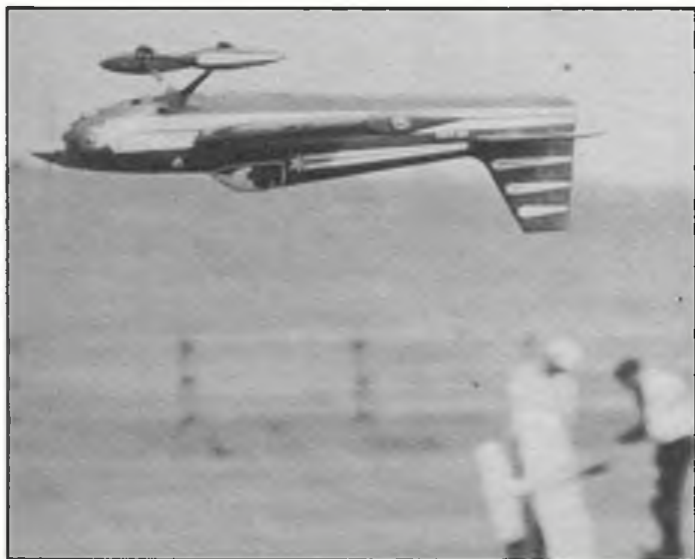
Becoming World Champion is a wonderful thing, but it's not everything. Finding out *your* very own way is more important than a big trophy. It might be the deployment of your personality - that's what aerobatics has to offer...

### Glassware...

Three blade propellers are nothing new on the stunt scene. As long as I can remember the Italian stunt team has always used this type of propeller. Since the choice really isn't very wide the Italians flew the *Tornado* 10 x 6. Maybe they never knew that actually this is a 10 x 5 prop. When Bob Hunt became World Champion, he used a home made three blade prop. Not only because of his achievement, interest in three blade props suddenly rose.

Many Americans experimented with these propellers. I was told that there is a definite advantage when using them. During my first American trip, I was convinced of what I heard and saw and returning home I frantically began to build my own three bladed props... Some results were reported in the control line stunt newspaper CLAPTRAP.

Since then I've built some 40 three blade propellers. Some of the first examples proved totally useless. While I tried to work as accurately as possible, my method wasn't good enough. In the meantime I've gained enough experience to know how to make a prop. Most of all, I've learned that it is a whole lot of work to produce these props and I can only say that I'd rather prefer to buy them... Continued on page 121



Left, Piotr Zawada's 'Laser' in full inverted song at the C/L Euro Champs at Three Sisters. He had some engine feed problems that forced him out of the final fifteen...but made up for this by placing third in the International Nograd Cup held in Hungary in September.

# HOLLAND'S HINTS

by Peter Holland

Continuing this month with simple structures, we deal with single surface sheet wings, including the Jedelski system for lightly loaded machines and a few tail end tips.

Small models are quick to make if all-sheet flying surfaces are used. Choose light, straight grained balsa and rely on a spot of trickery to keep it in shape.

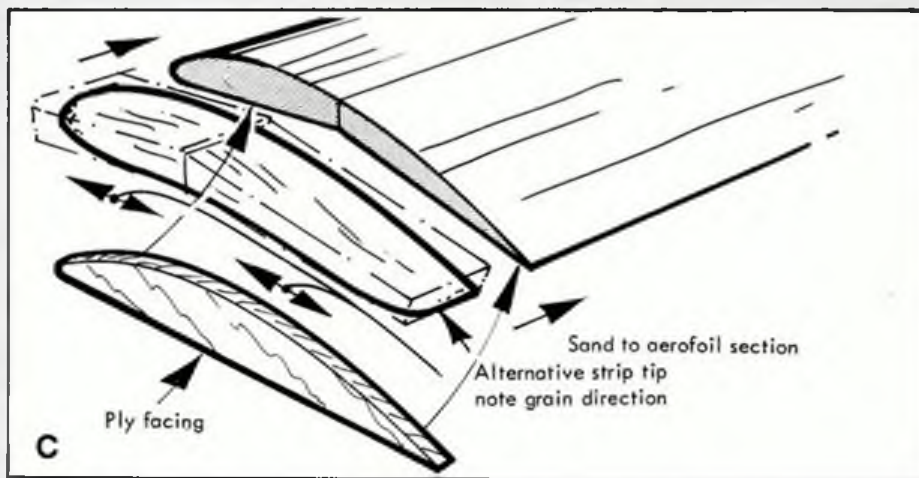
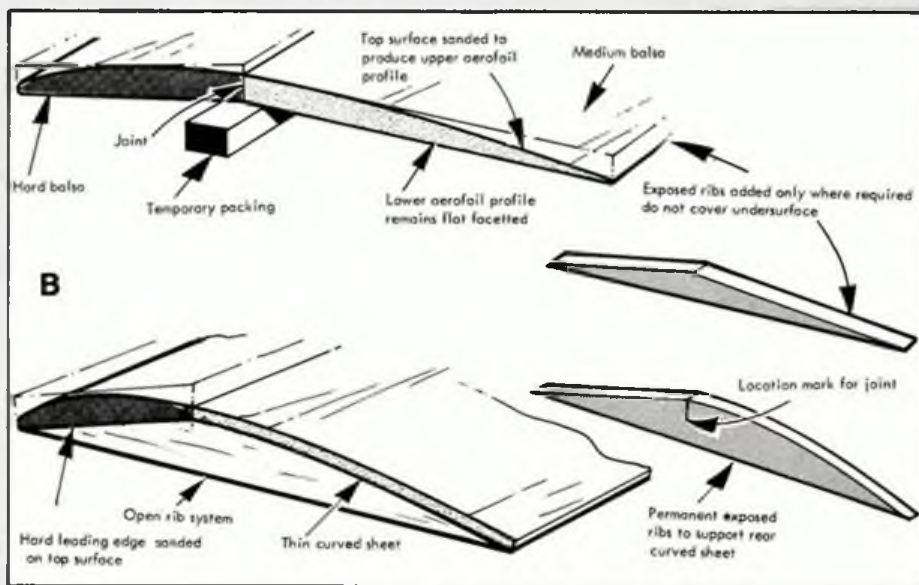
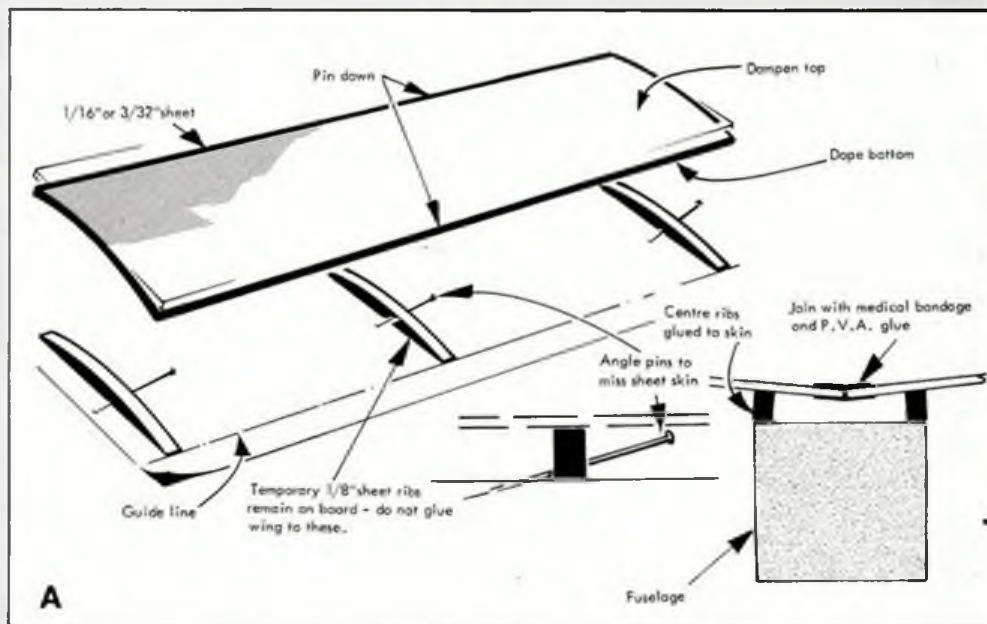
For example, a camber can be introduced by dampening the top surface and dopping the underside, this causes the sheet to curl, which not only gives it undercamber, but makes it more rigid to resist flying loads. (Modern venetian blind slats are made to this section for rigidity - look how thin they are). To ensure that the camber is right, pin some rib-shaped packing pieces to the board, but do not glue the wing to them... just pin the sheet down along the edges and fit real ribs at the ends, glued on, this time. Thicker ribs are used as seating if the fuselage is flat on top, this allows for dihedral and fore and aft adjustment. Such wings can be joined at the centre with bandage and white glue, but don't forget to sand the meeting faces to accommodate the angle... Sketch 'A'.

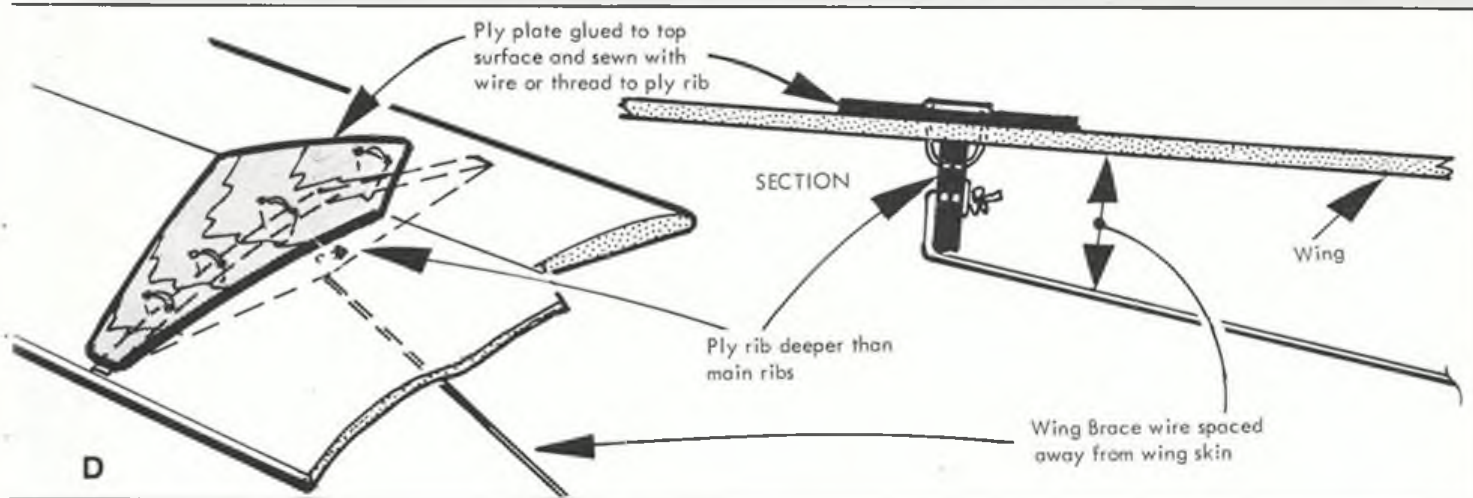
## Larger

Now up a stage in size... Sketch 'B' shows how an undercambered wing can be made nice and strong by using hard sheet at the leading edge and medium-soft for the rest. Thicker (3/16in and up) can be joined after carefully packing up the joint edge and sanding it vertical along the edge of the bench with a sanding block. Wax the top surface of a packing strip and join the sheets, then when dry, sand the top surface to a proper camber. Add the occasional exposed rib to maintain the angles, but do not tissue skin flat across the bottom if it is to stay undercambered. The faceted underside is O.K. at model sizes. Tips can be reinforced with hard balsa strips and rounded or faced with 1/32in ply if left blunt (Sketch 'C').

## Jedelski

Jedelski wing construction is just that... the name is not an aerofoil reference. Like the previous example, it has a strong leading edge sheet sanded to profile on top and faceted (straight) below. The rest of the wing is bent sheet, formed just as our first example and supported at regular intervals by specially shaped, exposed, ribs. Avoid deep undercamber unless the model has a very light wing loading with low angles of attack.



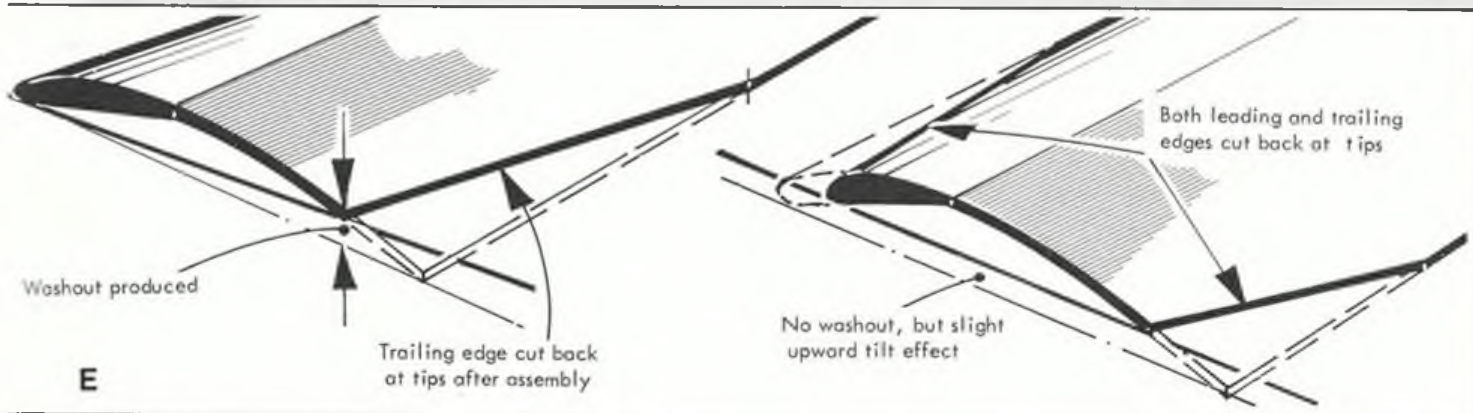


Sketch 'D' shows the construction and also gives an example of wire bracing for towline work.

How do you get accurate washout on these types of wing? Simple, taper the last few

inches of tip at the trailing edge as seen in Sketch 'E'. This has the effect of bringing the tip trailing edge further up the camber, so raising it in relation to the main part which would be flat on the board. Ahhh - but

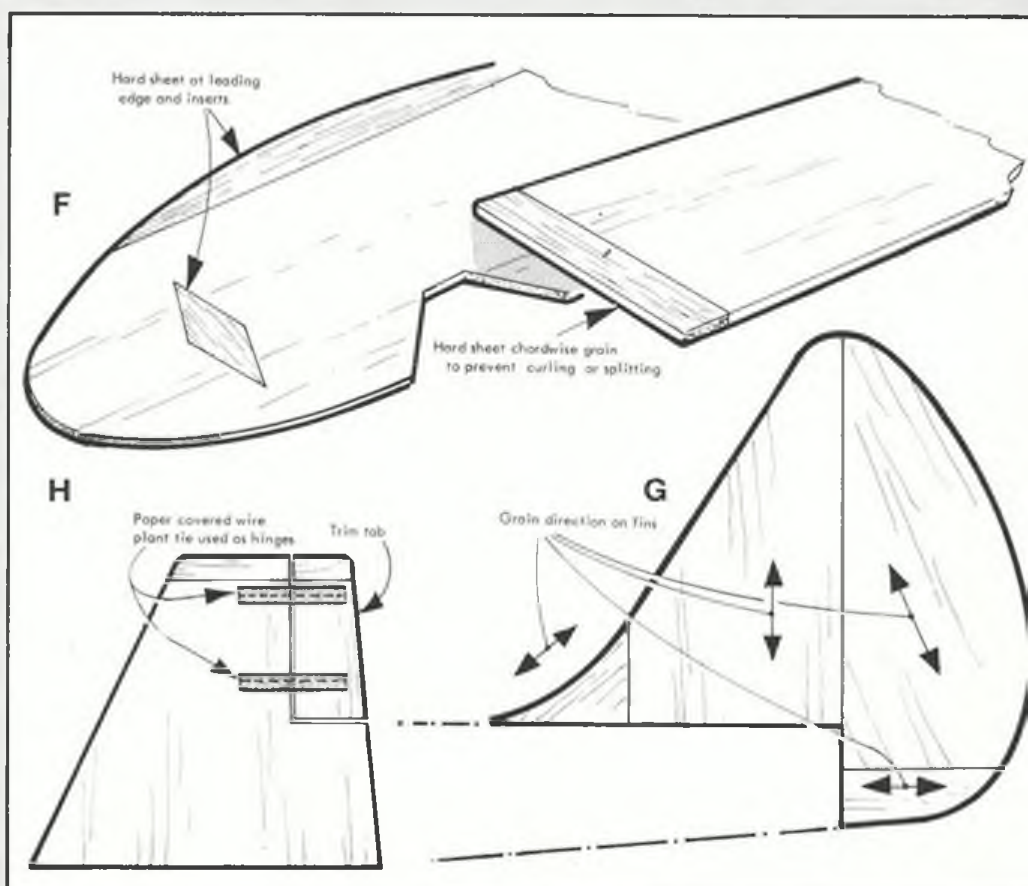
watch out, you 'double taper' designers. Leading edge taper has the reverse effect and only raises the undersurface at the tips. Taper on the leading edge only gives wash-in instead!



## Tails

This brings us to the end of the tail...Sheet ones...I've seen some rather curly ones in my time. Avoid this by adding hard balsa strips with the grain running fore and aft, to the tips of rectangular tails and insert patches and hard leading edges to those with rounder planforms, or when the 'elevators' are cut back at the centre. Cut those patches on top of the tail sheet, allowing the knife to score the appropriate shape for cutting the holes to receive them, double sided *Sellotape* stops the wood skidding while this is being done (Sketch 'F'). Fins can benefit from planning the arrangement of sheet so that resistance to curling or splitting is achieved without inserting pieces, as shown in Sketch 'G'.

Trim tabs on small models are often shown with inserted wire or sheet aluminium hinges, which are supposed to stay put when bent during flight trimming. Thin sheet does not take too kindly to being slit and prodded for this method. Try those paper clad wire plant ties from gardening shops, they can be glued on the surface and treated as part of the colour scheme if you like. When the trim has been finally set, a pair of ties may be glued on the other side to lock it, as seen in Sketch 'H'. If your model cannot make up its mind, fit the ties in cross-over form per control line elevator hinges, C/L fliers please DO NOT COPY!



# ADVERSE YAW!

## A regular, irregular view on the world of aviation from Ron Moulton...

THE INK WAS HARDLY DRY on the paper of the December issue before the letters came in to remind me that I hadn't given mention to that delightful fictional character McGillicuddy. He inspired so many readers in the '40s with the exploits out of Auchengargle Model Aero Club with his favourite Seagull Drambuie, achieving the impossible and forever getting tangled with a devilish character named McSwindle. I have appropriated a sketch to illustrate the noble maestro along with his pals, fleeing the wrath of the local notability when six of his rockets were fired off amid the village pageant to celebrate Victory in Europe. Let's hope this restores the confidence of one or two disillusioned readers, lest it be thought that this scribe had completely overlooked Drambuie and his master.

Elsewhere in the December issue, we described the Fokker D VII and illustrated it with a photo of Paul Mantz's example in the USA. Would you believe it! Alongside the Fokker was a young lady posing for the portrait and who should write to us but Ken Hamilton who recognised said picture despite having sent it to us no less than 30 years ago! Kathie was then just ten years old visiting Orange County Airport (now John Wayne Airport) along with her totally aeronautically minded pop. Seeing the Paul Mantz D VII, Ken could hardly resist pulling out the old 616 and recording the occasion. Little did he know how long it would take us to get his shot into print. Ken has been a great correspondent over all the intervening years and even earlier. We well remember him as the designer of the splendid free-flight 'Flying Flea' back in pre-war days and the hey day of 'Flying Aces'. After a lifetime with North American Aviation, working for the legendary Dutch Kindelberger during which Ken saw the Harvard, Mustang, Mitchell, Sabre and F-100, as well as the later supersonic jets, emerge from that great factory, he's now retired and taken up very much with his great love - tramways! However, he has not forgotten his aeromodelling and says he is into construction on a 1/16 scale Vickers Vildebeest.

Mention of 'Flying Aces' gets me back to those pulp magazine days and Bill Barnes and another letter from Gordon Coddling with yet more plans for Bill Barnes' air adventurer planes. Apparently, Bob King of Granger, Indiana, has been pursuing RC versions of the 'Snorter' and 'Silver Lancer' designs, while Gordon himself drew up plans for a full scale home-built version of the 'New Eaglet'. Tells me he had to resort to a tricky fuel transfer system to help

*Back in '63 Ron exchanged new Trophies with Maurice Bayet for the Anglo French Challenge in Coupe d'Hiver. Alas, both trophies and Maurice are now gone; but a new Coupe arises in memory of France's doyen among magazine and plan publishers, see below*



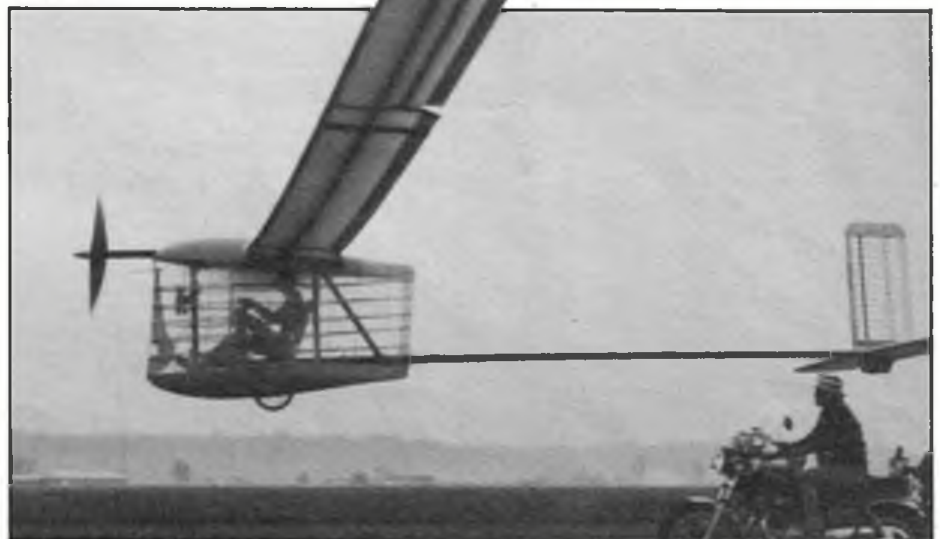
compensate for the wide range of CG during retraction and extension of those massive twin floats. Apparently we found quite a few new, or should I say old, fans of the Bill Barnes' trait when they were given mention. All power to them and long may the great character live.

A real-life character left us in October. Maurice Bayet, founded MRA (Modele Reduit d'Avion) and stoically maintained a wonderful spirit for free-flight and control line modelling in France over many, many years. In '39 Maurice created the first regulations for Coupe d'Hiver and, although at each of the Eaton Bray International weeks our French friends tried their best to encourage us to take up this class of model, it wasn't until the late '50s that free-flyers in the UK recognised the attractions of these smaller models. No need to relate here how successful the Cd'H Class has become.

Through the '60s into the '70s we escorted many teams each winter to airfields around Paris for the Anglo-French Challenge always to be greeted by Maurice and Lucette, generous hosts and wonderful organisers who always found a galaxy of trophies so no one went away from the event empty handed.

Maurice sold over the MRA magazine title, now run from Lyons, and retired. Unhappily he lost Lucette and now he has gone himself. It was an irreplaceable loss for the French aeromodelling movement. Now the French vintage flyers have given details of the Coupe Maurice Bayet to be run at Persan-Beaumont just north of Paris on February 23rd and they welcome all British modellers that can attend. It would be just great to bring back those wonderful memories of visits ten or more years ago when one could travel to France by Viscount

*What do you do after a lifetime in aviation, flying, designing, modelling? Wayne Bilesner makes man-powered aeroplanes. This is his latest, a blown up model. Reminds me of Cleveland kits somehow!*



and stay in a reasonable hotel all for less than £20! There are many tales that could be recalled from those hasty weekends - some of them deserving a cloak of discretion. But highlights in my memory were the arrival of Robert Lestournaud on a splendid stallion as a volunteer model chaser, of the British modellers insisting on flying right through the day whilst the French took off for a two hour lunch, of Maurice introducing our team to the strongest cheese imaginable and then telling them it was named after the Abbess's socks! Great days, but now past. Happily, Maurice had already agreed to give his name to the new trophy and approved a notice which has been sent around to clubs. The rules call for 80g models with 10g of rubber and the traditional ROG while, as ever, each entrant will be permitted to enter an unlimited number of models.

Attending the National Championships of the International Plastic Modellers' I couldn't help but be impressed by new trends. It seems that if you can't buy it, then you have to make it in the plastic business these days and this has given rise to the emergence of a flurry of vacuum form kit originators, some of which are decidedly better than their injection moulded counterparts. The movement appears to be as international as the Society itself; I spotted Roseplane, Airways, Modelair, Falcon and Hallam-vac from this country with strangers like ZTS, Waku and a host of Polish specials all on the attractive trade stands. The thought occurred that this same enthusiasm which refuses to acknowledge any sort of demise among the plastic kit manufacturers, ought to show itself among

free-flight and control liners. Wouldn't it be great if the same techniques were to be developed and vacform control line fuselages started to appear? We see the same techniques widely used and commercially produced for R/C - why not for sport free flight even? Come on modellers, let's have some ingenuity. These static scale plastic fans have it in abundance.

At Stoneleigh there was one line-up of too many to count Avros ranging from the prototype Manchester through to the last of the Lincolns, every mark represented with all kinds of colour schemes and modifications. It was a great effort by the Newark Club while over on another table the Rotherham and Sheffield Group commemorated the 50th Anniversary of the Hawker Hurricane with a splendid collection to do justice to an otherwise neglected fighter which always hovers in the shadow of the Spitfire.

Talking of Spitfires, those who went to that brilliant last open flying day at the IWM Duxford had a real treat.

Even if the day was filled with drama like the Spitfire XI being thrust around tight loops over-energetically to the extent that the undercarriage flipped out and was wisely left that way for an early landing and another Spit freshly remade by the experts at Booker which returned from a mass formation with Mustangs and the impressive Bearcat, engine overheating, trundling over the grass with a stilled prop very much reminiscent of a forced lobe in the '40s. Great stuff but still not as great as watching Mike Russell (son of DAR) and his Gunbus with a passenger hoisting the

Union Jack from the front seat and making the flattest and safest of turns with his film star. Mike was a very busy fellow that day, selling seats in his Dragon Rapide, refuelling the engines, swing starting the Kinner in the Gunbus and hopping from seat to seat to keep the show going. Ordinarily he is a skipper on a Boeing 767 and I guess this sort of weekend activity comes as a hobby!

Still in the flying world, I have to bring up my favourite man-powered subject with a new photo from Seattle of Wayne Bliester showing how easy it can be to aviate on one's own pedal power. Wayne may have lost the race to the latest Kremer prize, thanks to that superb Musculaire II built by Gunter Rochelt which we described last November, but just the same his multi-rib design carries an even greater impression of being a blown-up model and will, I am sure, be of interest to everyone who cuts Balsa.

Latest challenge in the MPA game is for a flight to re-enact the mythical escape by Daedalus from the island of Crete to the mainland of Greece. A very serious study group has already made exploratory visits to the Mediterranean and the Smithsonian have backed a feasibility study along with highly-qualified technicians from MIT. It's not so daft when one considers that, by island hopping, the longest pedal haul is a mere 100 kilometres. With Rochelt flying at around 45km/h, this is not such an impossible challenge as Brian Allen demonstrated when he flew across the Channel with the Gossamer Albatross. Whoever does it is going to be mighty tired at the end of the day but good luck to him or her, whoever it may be and I would not mind betting it's going to be somebody with a modelling background.

Can't help winding up with a mention of the 'Atom'. This teeny engine has reappeared in American advertisements. The 1/2in bore, 1/2in stroke ignition engine which weighed only an ounce and three quarters was a great little product in its day if you had a lot of patience and kept it free of corrosion. Ray Arden created it and must have learned a lot in the process because his subsequent engines which went on to appear with glow ignition, were a tremendous advance in power output; but the Atom, despite all its frustrations, was quite something to handle. It was lighter than the coil condenser and batteries it had to transport, so fragile that if it hit tarmac that was tickets and the magnesium in its alloy crankcase was likely to go white and porous while looking at it. The ignition points bounced all over the place and the poppet valve in the centre of the piston which acted as a transfer port soon told you when you had dirty fuel if it became clogged.

Nevertheless, I had a lot of fun with one, and I am sure that even at \$90 a throw, John Morrill who is in the midst of a limited production run is going to find quite a lot of customers. They'll have a big advantage nowadays in the '80s using lightweight ignition batteries and coil and should take great delight in showing how an .09 engine on ignition can make a very impressive sound.

*Not forgotten at all in our 50 year celebration if unmentioned. McGillicuddy and mates flee a VE day mishap. Aeromodeller's version of Phineas Pinkham, and Drombule, his pet Seagull kept humour alive in the 40's.*



# SECTIONS • SECTIONS • SECTIONS •

## Davis A.93/B.17 and Benedek 7406f

It never ceases to amaze me just how much a change of wing section can effect a model's performance. Yet despite the very small chords which we use, quite tiny alterations do have a marked effect, construction and surface finish in particular.

The two sections here are my favourites for almost everything I fly and I have become well acquainted with their limitations and advantages.

The Davis section (A.93/B.17) - the medium thickness design in the Davis family of three - has been used successfully for Open Rubber, PAA Load, 1/2A and Open Power... and even one very early Wakefield. When equipped with a multi-spar turbulating surface it has always produced an excellent glide particularly on lightly loaded models. What is more, it will happily accept a very rearward CG - up to 100%. I usually

aim at something around 75% - 80% although that occasionally slips back on big Open Rubber models if the motor knots up unevenly! Normally it can take this much CG shift - very useful!

The Benedek section (modified 7406f) - I now use on my Wakefields, Coupe d'Hivers and CO<sub>2</sub> models and have only once as yet experimented with it on an Open Rubber model. It is rather thin at the rear and so design accordingly: I usually make a point of taking the trailing edge stock from stiff wood. The construction used has always been one top spar at maximum thickness, with smaller spars underneath and riblets for tissue support on the first one third chord.

Although no additional turbulation has been found necessary on Wakefields a thread is used on the main spar in Cd'H although I don't believe it is entirely necessary. On the very lightly loaded CO<sub>2</sub> models the section has produced a very good glide

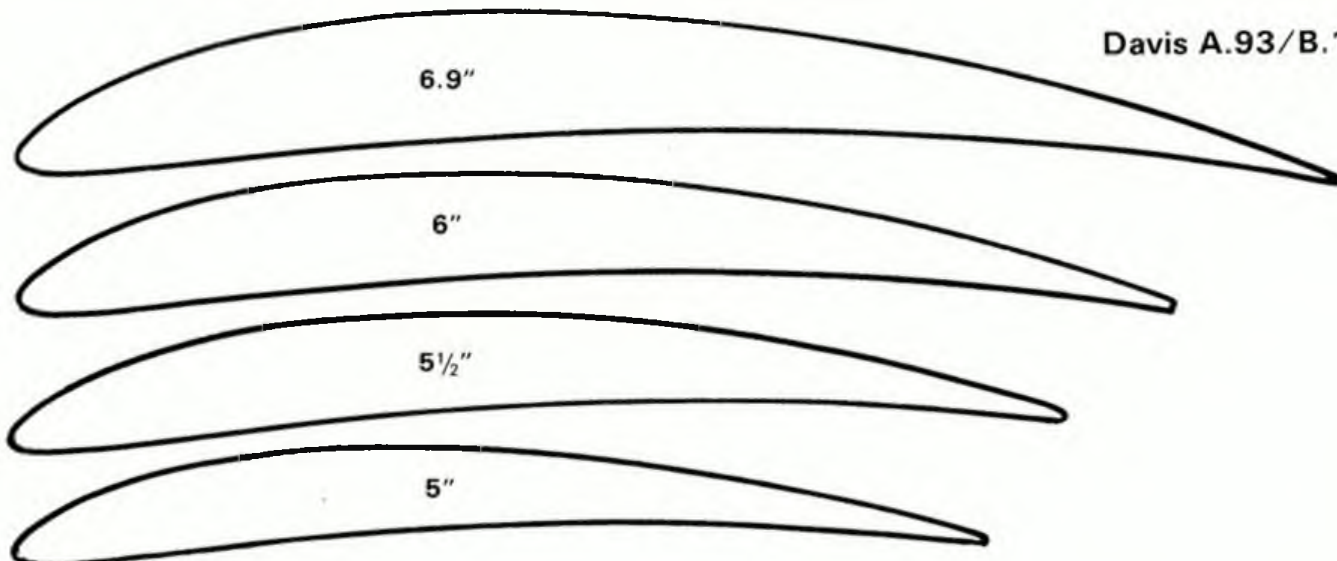
but at the expense of penetration: to such an extent that such models are virtually unflyable in a wind although fabulous in the calm. The Wakefield loading seems to utilise the section best of all - I know none that can out-glide them.

As well as the co-ordinates for the original shapes we have presented here the exact template outlines that I actually use. *They are somewhat different from the pure forms.*

This may explain why I find them so effective whereas others may have tried them in their exact form and had poor results. All I can be sure of is that these shapes are exactly what I have been using for the past 20 years. The 6.9in Davis has only just come 'on stream', in a big Open Rubber model, and is I must admit thinned a bit. The very small Benedek is the tip rib from my Taper Wing Wakefields - unblended.

Dave Hipperson

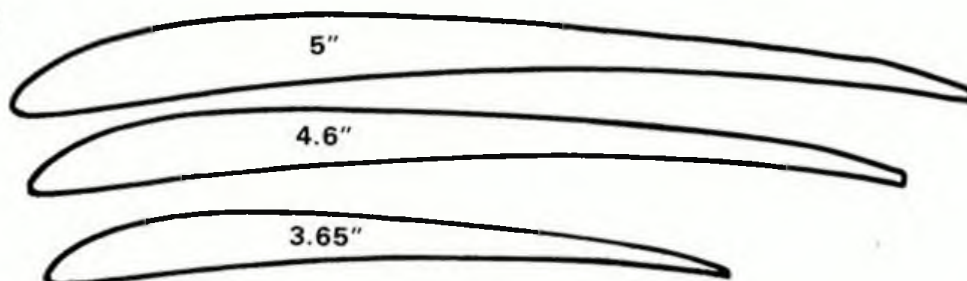
### Davis A.93/B.17



Section	DAVIS A.93/B.17																		
Station	0	1.25	2.6	5	7.5	10	16	20	25	30	40	50	60	70	80	90	95	100	
Upper	0	2.1	3.0	4.6	6.5	8.3	—	8.7	—	10.0	10.3	9.9	8.8	7.4	6.5	2.0	—	0	
Lower	0	-0.7	-0.8	-0.9	-0.8	—	0	—	0.8	1.4	1.8	2.0	1.9	1.5	0.9	—	0	0	

## Benedek — 7406F

Hipperson modified



Section	BENEDEK 7406K																		
Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100	
Upper	0.9	2.95	3.95	5.6	6.6	7.4	8.55	9.2	9.55	9.65	9.65	9.3	8.6	7.7	6.65	5.4	3.95	2.9	
Lower	0.9	0.1	0.1	0.45	0.8	1.0	1.5	1.95	2.4	2.8	3.4	3.8	3.75	3.4	2.65	1.6	0.9	0	





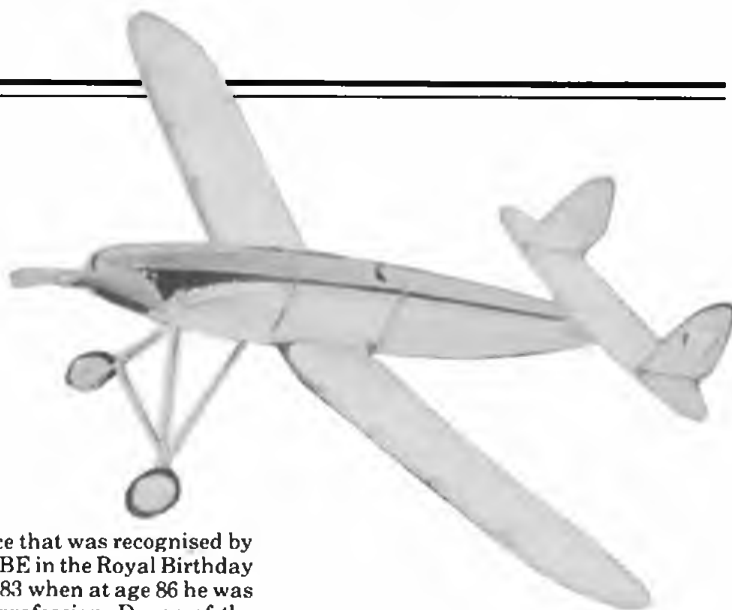
MRK designs. All had butterfly tail-units and tricycle undercarriages with varying wing positions. This is what MRK had to say about 'Kaybee's' behaviour, "...flies quite strongly in high wind, and incidentally, has a very flat glide. Hand launched vertically into the air - a somewhat drastic but effective stability test! - it passes unhesitatingly into a steady climb."

What is thought to have been his last model was also of this configuration, the 30 inch span 'Knight-Errant', appropriately of the low-wing type... it was his 100th design.

Never forgetting the needs of beginners, he took up his model aero pen on their behalf again and started a series in the January 1947 *Aeromodeller* titled 'Mainly for Beginners', this was well received but for some unaccountable reason did not progress beyond a few issues. His name never appeared in the top competition results, so he passed into history without being a 'big noise' in that respect - but to the thousands of beginners who avidly read his expert treatise on design and construction, and following his advice, embarked on successful aeromodelling careers via models like 'Kitten', 'Kingfisher', 'Kinglet' and 'Kamlet', he remains an *unforgettable* PEGBA.

Having spent a lifetime in journalism working for local newspapers in North London and at Faversham whence he removed in 1952, he had been at it too long to even consider giving it up when he reached normal retirement age, so he just kept on going, contributing and reporting to a number of newspapers for another 20 odd years.

Right, nicely furnished 'Kinglet II' with double-surfaced wing and twin-rudders. This model named 'L Arlésienne' was built in 1932 by Miss K Beard who was Secretary of the 19th Wing TMAC at Wanstead Flats.



It was this service that was recognised by the award of the MBE in the Royal Birthday Honours List in 1983 when at age 86 he was still active in his profession. Doyen of the SMAE Fellows (Membership number 10!), he had been a Fellow since February 1941.

More recently he had been offered a Life Membership of SAM 35. In accepting, he wrote: "...I am considerably cheered to have implied testimony to the fact that I am not written off as a relic that is now somewhat tatty. It is painfully true, however, that I have long ago lost the capacity to climb three or four trees in a morning to retrieve a model that I had failed to endow with a homing capacity. I recall that my final climb was to retrieve a model 'Kingfisher' from a huge blackthorn at Parliament Hill, Hampstead... Sincerely I thank you..."

Our own Hangar Doors commented in August 1983 on the occasion of the award of his MBE "...Among his features in the Sheerness Times-Guardian we specially

liked the account of a highlight in his life - a flight in Concorde at Mach 2 in which he reminisced on the windy cockpit of the RNAS BE 2c some 65 years and 33 aircraft types earlier in his remarkable career."

M R Knight was a keen member of the Church of England and in 1936 was admitted at St Pauls Cathedral to the office of Reader and for a period of almost 50 years had regularly read the lesson, latterly at St Mary's Church, Faversham. He had also held office in branches of the RAFA, of which organisation he was made an Honorary Life Member in 1969 and was active in other local community work until the onset of the short illness only four days before he passed away in Faversham Cottage Hospital on Sunday 27th October 1985 at the age of 88 years.



**From the Handle**  
Continued from page 115

Exactly that situation arose a few months ago. A fellow control line flyer who has some experience with fibre glass props. (he's producing fibre glass speed props for the German speed team), built a three blade prop suitable for stunt flying. Just for fun! He offered me some of the first examples to try out and tell him my findings.

Seeing the possibility to go the easy route (buying!) I promised to make some test flights as soon as possible. Bear in mind that the weather in Southern Germany at the beginning of the year is everything but encouraging for stunt flying. Choosing a relatively mild day, I managed to do a few tests hops...the first flights of the year. Thus a competent statement about the characteristics of this propeller is not quite possible. Nevertheless those flights gave a definite impression about its general qualities.

When testing new items I first fly my aircraft with equipment with which I am quite familiar. In this case, I used my 'Jack in the Box' stunter with *Super Tigre* 46. On this, I prefer an 11x5 three blade prop, made of *Top Flite* blades. I made a few flights to remove the cobwebs from my hands...

Then I switched to an 11x6 three blade prop again *Top Flite* blades) to get the correct setting for the 6in. pitch. At last I tried the new glass fibre propeller. I flew on 19.50m lines which - including arm length and half span - transfers to about the maximum line length of 21m. There was a slight breeze, just what we love!

The flights with the 11x5 were used to get

accustomed to the aircraft again after a long winter break. After some first fast flights, I tuned the needle to a 5.2 or 5.3 sec. lap, which is what I usually fly. The change to the 11x6 prop gave some very slow flights. I had to speed things up to give about 5.4 sec. This prop gave a marked improvement in line tension which is a normal experience with 6in. pitch. At the same time corners were a bit more sluggish, I needed more handle movement. This, too, is well known when using the higher pitch. A 5.4 sec lap time was about the slowest possible.

When switching to the glass fibre prop, I first kept the same needle setting as for the wooden prop. When I started the engine rpm were so low that I considered flying impossible. By ear I tuned the engine to a similar sound as with the wooden prop. Result: a lap time of 5 secs!

Gradually opening the needle, I arrived at 5.3 secs. I could have gone to an even slower lap time, but cold feet and fingers prevented further flights. Flying characteristics were the same as with the *Top Flite* prop. The intriguing experience was the extremely low rpm at which the engine was performing. Obviously this prop has a much better efficiency.

Proof, is the much faster lap times with the *Top Flite* setting, and the surprisingly low rpm for an acceptable lap time. An additional bonus is the pleasant sound and low noise level. Add to this that only with the heavy glass fibre prop will the engine run steadily at such low revs. It wouldn't like such low rpm with a light wooden propeller, especially a two blade prop. Also, the airplane seems to be smoother in level

flight. The sluggish corners are a result of the pitch, not of this propeller.

There is no such thing as a 'best' propeller! Each stunter needs a different prop, each pilot needs an aircraft that flies differently... In this endless game it is quite helpful to know what a certain propeller can do. It can enhance the performance of your stunt ship, it can help you trimming the airplane and it can save the day when flying at comps with strange weather conditions. A three blade prop isn't automatically better, but on the average I feel it is superior.

Finally, what is this glass fibre prop? The original propeller was a wooden three bladed prop, made from *Top Flite* 'Power Prop' 11x6 blades. No modifications of any kind were made to the blades. A slight modification was made to the hub (slightly conical) to be able to take the mould apart. The mould is mostly filled with glass fibre, with some additional strings of carbon fibre for added stiffness.

Some of the glass fibres are taken around the hub centre, so shedded blades are practically impossible. If you feel like modifying the aerofoil, you can do so without risk...this seems another area to improve efficiency. The blade can be thinned quite a lot and still retain sufficient stiffness.

Jochen Schiffler is the man who makes them. He doesn't intend to start mass production and he only works when he feels like it! If you are prepared to be on a waiting list, pay a reasonable price, or even to be refused, you may write to him at Alte Strasse 107, 4330 Mühlheim/Ruhr, Germany...



# AT THE LAUNCH PAD

with John Wheddon

## Estes 'Designer Special'

As befits a company which includes many active rocketeers on its staff, the American manufacturer, *Estes*, have recognised that many modellers prefer to build 'own-design' rockets. So, in addition to their vast range of kits and accessories, *Estes* produce a 'Designer Special'...

This package contains a range of different sizes of body tubes, nose cones, engine mounts, recovery systems and all the necessary detail parts to enable home-designers to build their own special rocket. This pack is also a really useful way of getting started in the hobby as the 'Special' provides a very good basic stock of building materials.

## 'Sea Squirt' and 'Mini Squirt'

Stuart Lodge, whose designs have been previously featured in this column has kindly sent us his latest offering. 'Sea Squirt' is a semi-scale model based upon surface-to-air missile design. It can accept engines of up to 'D' (20 Ns) power and can be constructed from 'Designer Special' components. The 'Mini Squirt' is a scaled down version which will accept mini (13mm dia) engines. Both sizes perform very well and were displayed by Stuart to an appreciative crowd at the Plumpton Model Spectacular last August.

Construction of either variant begins by making a kit of usable parts, cutting tubes to size, making fins and forming bulkheads. These latter should be glued as shown on the bottom body tube and set aside to dry. Taking great care to ensure concentricity...

The two mating body tubes should be glued together. The four fins should be sanded smooth and in the case of the larger version covered in lightweight tissue to mask the grain and strengthen; for 'Mini-Squirt' just rub talcum dust into the wood-grain and dope. In either case, the fins will require sufficient dope to produce a flat, fuzz-free surface to accept the finish.

The fins should now be mounted to the bottom tube after first accurately marking their positions. A personal preference is to initially attach the fins using cyanoacrylate adhesive backing this up with PVA glue fillets.

The motor mounts should now be decided upon; the original 'Sea-Squirt' has flown

using 'C' motors, so a suitable mounting unit for these was added. For 'D' power, or for mini-engines in 'Mini-Squirt' only a 'stop' is required; most easily made from a slice of spent motor. No motor clip was employed on the originals, the motors being secured by a wrap of PVC tape. At this point the launch lug may be attached (approx. 2.5cm long) near the base of the larger diameter body tube.

In the larger variant the PNC-60MS nose cone will just need the moulding flash removing and sanded down, the 'Mini-Squirt' will need to be carefully carved from the 2.5cm balsa dowel. The shock-cord system must now be chosen, some modellers prefer to have the model hanging horizontally under the parachute by using an external leader attached to the model's balance point.

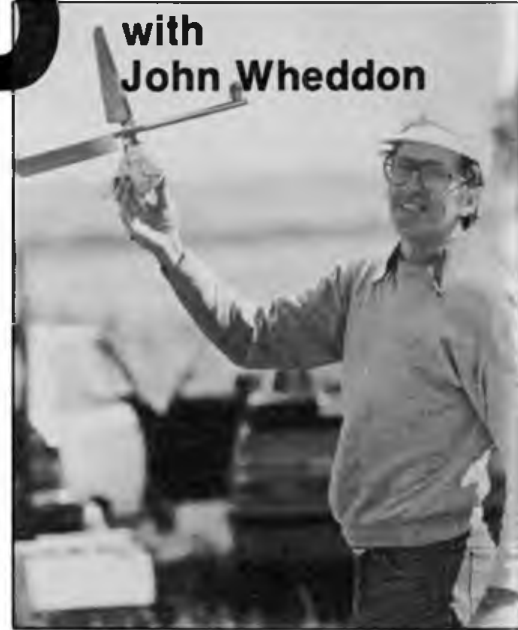
This method helps reduce fin breakage albeit at the cost of some 'untidiness', alternatively one can use the *Estes* method of sticking the shock-cord inside the body tube.

Using compasses and by referring to the diameter/circumference of the mated body tubes, the card fairing may be marked out, cut and then rolled around the tube interface as neatly as possible, attaching with PVA adhesive and trimming/smoothing down when dry. The card will benefit by a coat or two of clear dope to seal the surface.

The model should be finished using the method of your choice; the originals being sprayed so as to resemble full-size surface-to-air missiles. Enhancement of the effect can be achieved by the use of *Letraset* graphics to imitate rivet lines, inspection hatches etc.

With all finished and dry, the usual stability checks can be performed by swing-testing. The two original models flew successfully with no nose-cone ballast whatsoever this being due to the generous fin area and light all-up weight.

First flights should be carried out on a calm, clear day in a large field. The original 'Sea-Squirt' utilised as recovery system, two 300mm diameter polythene parachutes, nested together using the 'slider system'; the 'Mini-Squirt' used 500mm of plastic streamer. The former under 'C' power (C6-5) flies to some 250m (800ft); using 'D' power half as much altitude again should be gained. 'Mini-Squirt' initially flew with a 1/2 A3-2T motor to 80m (250ft), and with a A4-6M to over 100m (350ft).



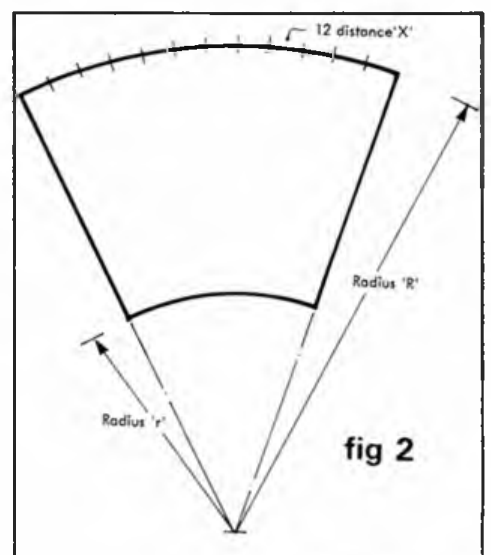
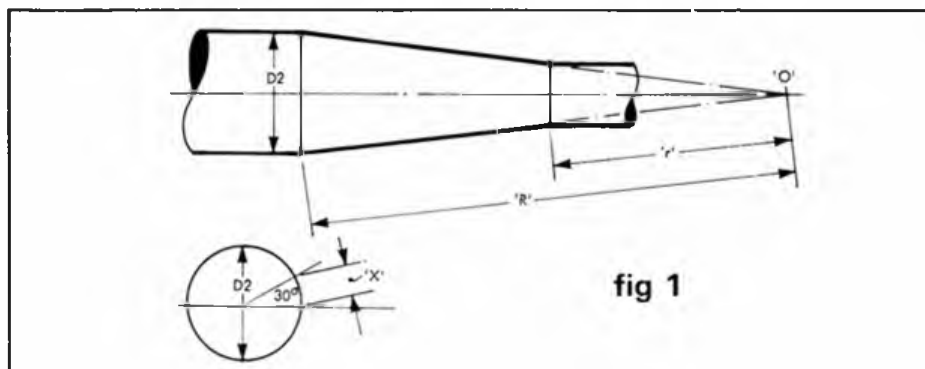
Above, Paul Clark, founder of the British Space Modelling Association with own design Jetex powered (they are rocket motors you know...) helicopter. Model is destined to fly once annually - whilst fuel lasts - at BSMA rocket meets.

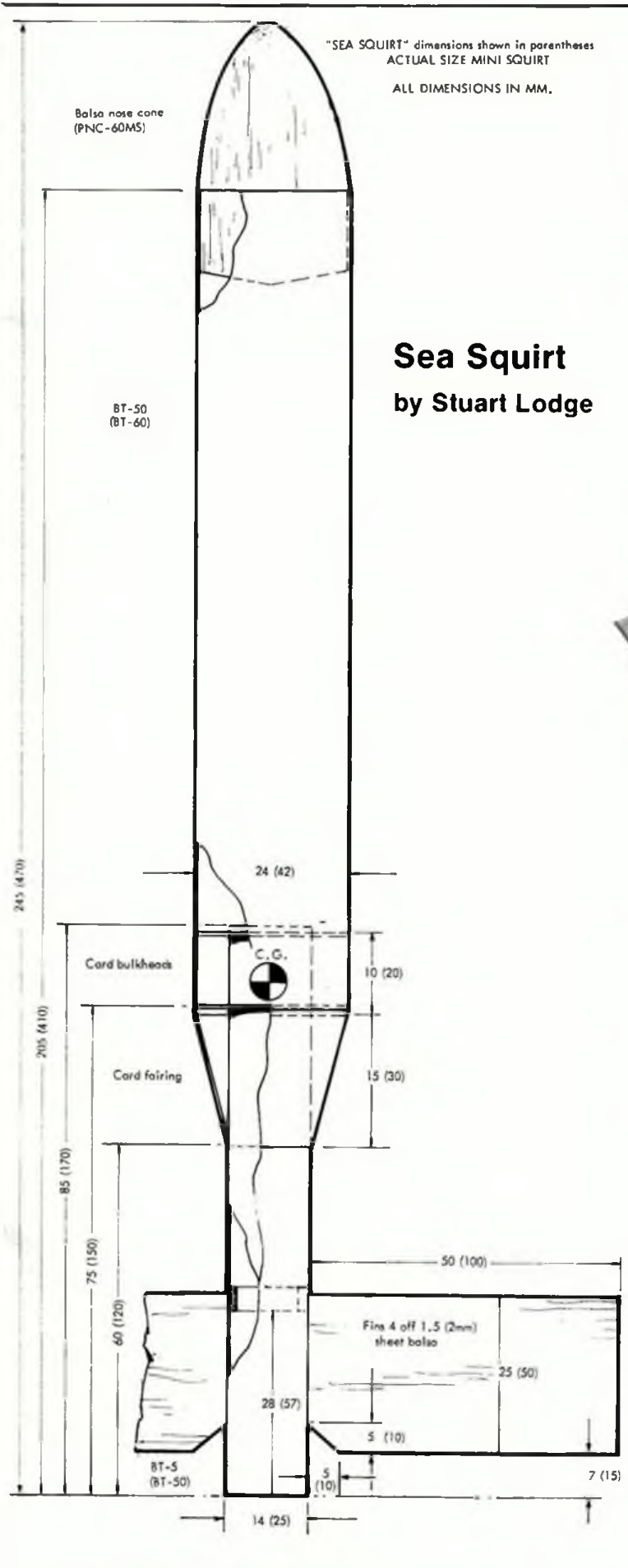
## Reducer sections

Stuart's 'Sea Squirt' design features a 'stepped' body section which requires the builder to produce a simple conical fairing. Students of Technical Drawing will no doubt be familiar with the various methods of 'developing' cones and conical sections. However, for those who do not undergo this particular kind of torture the method is shown below.

Begin by drawing an accurate full size plan of the desired section as in Fig 1. Then extend the tapered sides until the projected lines meet at point 'O'. This distance 'R' will be the radius of the developed section. Next, draw a circle of diameter 'D2' and carefully divide its circumference into twelfths. The pattern for the fairing can now be drawn as shown in Fig 2.

For the ultimate in accuracy, the 'Handbook of Model Rocketry' by G. Harry Stine provides a method for calculating the two radii and the included angle - this method also avoids having to draw the full-size plan as per step 1 above!

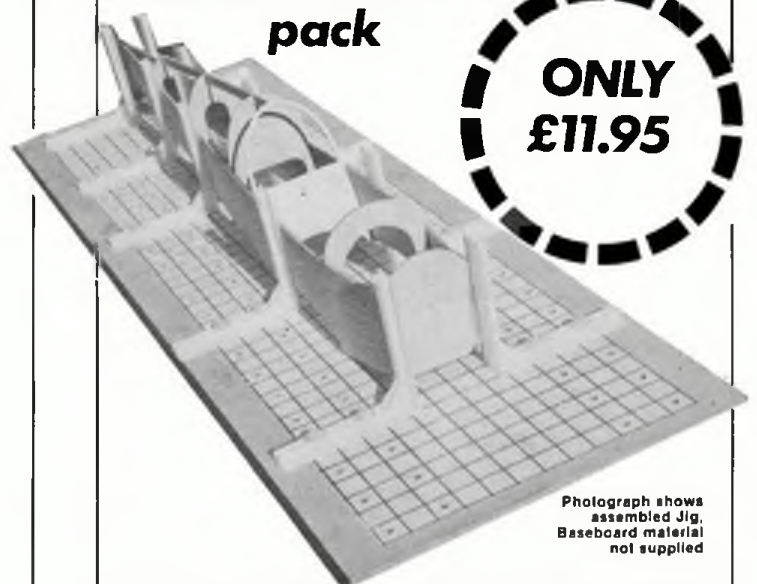




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# APPENDIX - LINKS to the plans

The original Issue comes with two free plans (Avro Avian, Mini Helides) printed front/back on a pull out banner of four sheets. The banner is not included in this document.

## Aspis by Pete Fisher

FF Power Vintage Style

<https://outerzone.co.uk/search/results.asp?keyword ...>

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## Avro Avian Monoplane by Bill Dennis

FF Indoor Rubber Rcale

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## Mini Helides by John Russel

FF CO2 mini version

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## Midi Slow by Dave Clarkson

CL Stunt Trainer

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ASPIS-Vintage style sports model

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