Aero Modeller

June 1975
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MAP HOBBY MAGAZINE

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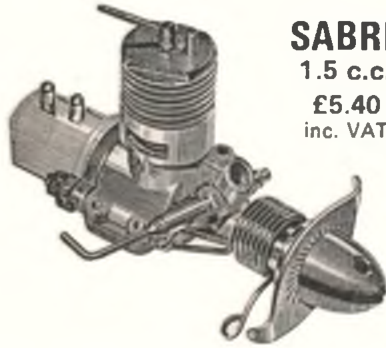

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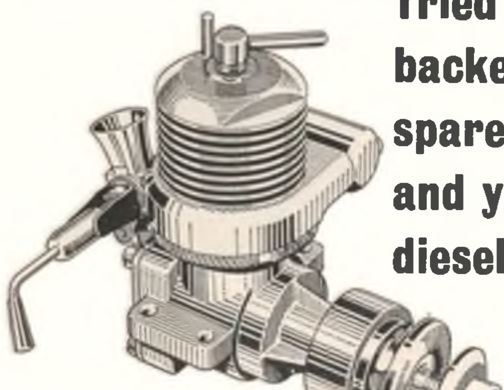

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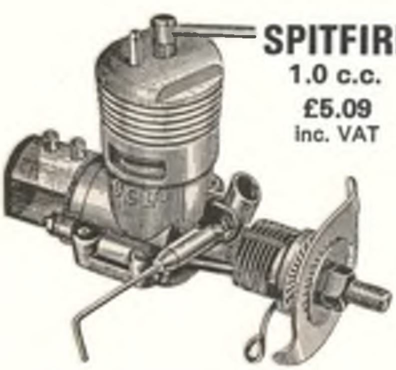

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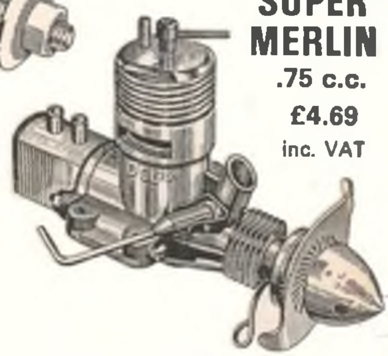

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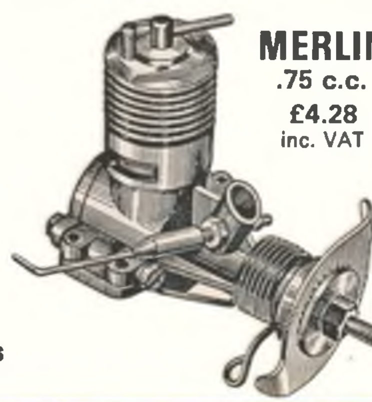

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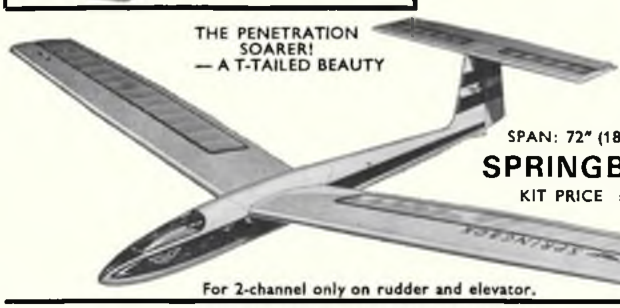

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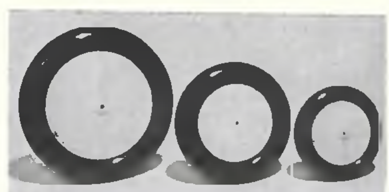

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Aero Modeller

INCORPORATING
MODEL AIRCRAFT

June 1975

Volume XL No. 473

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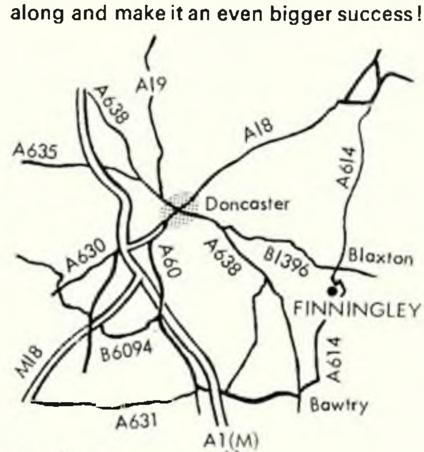
Editorial Director	**D. J. LAIDLAW-DICKSON**
Managing Editor	**R. G. MOULTON**
EDITOR	**P. S. RICHARDSON**
Advertisement Manager	**M. GRAY**

Comment

For so many modellers, the Spring Bank Holiday is the highlight of the year, as this is the traditional date (24–26th May) for the British National Championships, which on this occasion are to be held at RAF Finningley, near Doncaster, Yorks. This is not just 'another' meeting for the competition fraternity; it is a great weekend for all aeromodellers, whatever their interest. Where else can you see so many different types of model, see so many of the well-known names in action, and above all, renew old friendships and make new ones? Once more, we have to thank the Royal Air Force and their modelling section, the RAFMAA for their co-operation and provision of a site, plus of course the officials and workers of the SMAE, whose many hours of planning and discussion meet their fruition on this weekend. Come along and make it an even bigger success!



on the cover

A Sterling kit of the Boeing P26-A Peashooter – flown as it was never intended to! Harry Butler converted the design (held by his son Simon) for electric round-the-pole flying by installing a Johnson 36D motor geared down 2·6:1 to turn a Cox 7 × 3½in. propeller. This 28in. wing span, 9oz. model flew superbly, as witnessed by the many visitors to the 1975 *Model Engineer Exhibition.* (Photo: Harry Butler)

next month

Plans of Ewan Jones' winning ½A free flight power model, plus feature and full-size plans for an indoor scale model of the Fournier RF5 – built from expanded polystyrene! For more experienced modellers, Elton Drew begins a detailed analysis of circular tow techniques for gliders, covering an outline of the system's development, explanation of the various methods employed, plus personal, practical experiences of this feature widely adopted on the Continent. All in the July issue – on sale 20th June.

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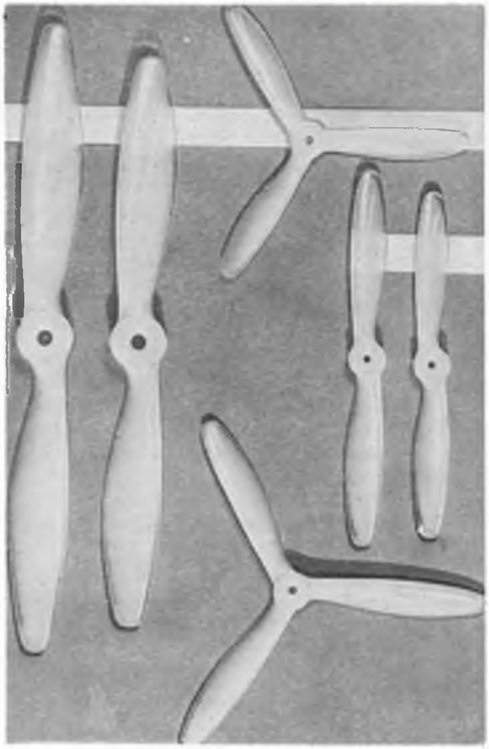

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4" 13p
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6" 17p

7" Dia×8" 17p
8" Dia×4" 25p
6" 25p
8" 25p
9" Dia×4" 32p
6" 32p
7" 32p
8" 32p

10" Dia×4" 38p
6" 38p
11" Dia×4" 42p
6" 42p
8" 42p
12" Dia×4" 62p
5" 62p
6" 62p

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4" 10p
6" Dia×3" 13p
6" Dia×4" 13p
8" Dia×6" 35p
9" Dia×6" 39p
10" Dia×6" 44p

TORNADO NYLON 3-BLADE TRACTOR (yellow)

5" Dia×3" 19p
4" 19p
6" Dia×3" 22p
4" 22p
7" Dia×8" 35p
8" Dia×6" 52p
8" 52p
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35	10×6 11×4
49	11×5 11×6
61	11×6
ENYA	
09	8×3 8×4
15	9×4
19	9×4 10×4
19BB	9×4 10×4
29	9x6 10x4 11x4
29BB	9x6 10x4 11x4
35	10×6 11×4
35BB	10×6 11×4
45BB	11×6
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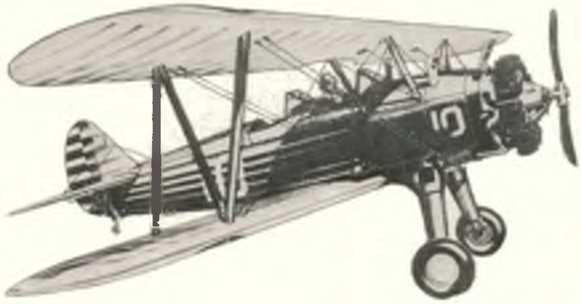

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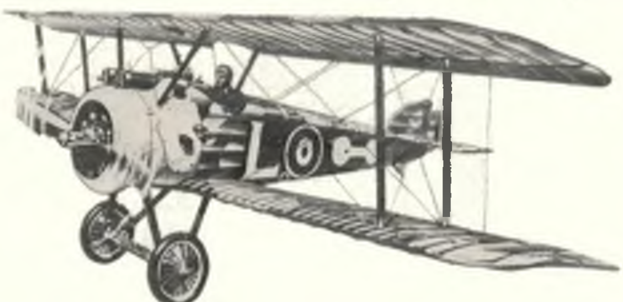

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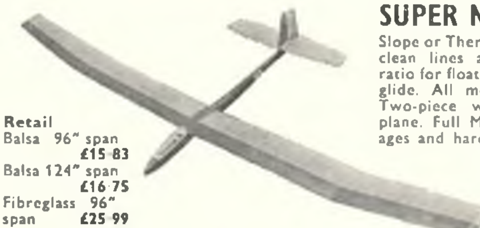

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warlord ▶

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Heard at the HANGAR DOORS

Part of the BBC TV ten programme series 'MODEL WORLD' starting May 13, is the introduction of the BBC 'Hawk' double delta rubber model created by Ian Dowsett. Programme interviewer Bob Symes - Schutzmann (2nd left) is being given an explanation of assembly by Ian and his two sons at the Bristol Studio.

FINAL DATE for the receipt of entries for the *Richard Ormonde Shuttleworth Rememerance Competition*, which is for a working reproduction of the Wright Brothers' wind tunnel, has been extended until 1st August, 1975. £500 prize money is available and details of the competition, which should be of particular interest to students of aerodynamics, are obtainable from Mr D. F. Ogilvy, General Manager at the Shuttleworth Collection, Old Warden Aerodrome, Nr. Biggleswade, Beds.

SINCE publishing details of Donington Park as a venue for a series of control-like meetings, we now learn that the Park has been subjected to a large number of changes in staff and policies, and that all these meetings have been cancelled. A great pity, especially as the control-line fliers themselves were originally approached by the Park management, rather than vice-versa.

HMS FLYCATCHER, the SMAE's carrier deck, is now in the custody of the Wolves MAC who would like to remind all control-line competition organisers that it is available for regular use. Arrangements for borrowing the deck – always a major crowd-puller – should be made through the SMAE c/l Technical Committee, or contact G. Sibley at 63 Emerson Road, Bushbury, Wolverhampton, WVIU 8DE (phone Wolverhampton 738556). So far, the following dates have been 'booked': 26th May (British Nationals), 22nd June (SMAE meet, North Luffenham), 10th August (Midland Area, Wymswold), 24th August (North Western Area, Woodford), 14th September (Midland Area, Cranfield).

The carrier's trailer has now been modified to enable it to be towed safely, and brakes are now being fitted to bring it up to legal standards.

MORE ON that *AeroModeller Annual* cover comes from the man who made the model as flown by proxy in France by Roger Garrigou. It appears it is the *Copacetic Coupe* by Glen S. Powers who runs Free Flight Specialities from Portland, Oregon, USA, and was built by Jay Hicks of Orlando, Florida, who sent it to France in February, 1972, when it was placed 49th despite the 20gm of lead ballast in its pylon. Jay tells us CdH is his favourite class and that he is very pleased to see the return to 80gm.

1975 BRITISH NATIONALS PROGRAMME

Saturday, 24th May

Free Flight
A/1 Glider 12.00–16.00hr
FAI Power 15.45–21.00hr
flown in 45 minute rounds
Open Rubber 18.00–21.00hr

Control-Line
Combat 14.00–19.00hr
Speed 14.00–19.00hr
½A Team Race, heats 15.00–19.00hr
Rat Race, heats 15.00–19.00hr

Radio Control
FAI Multi-task thermal soaring 12.00–20.00hr

Scale
Free Flight, Round 1 from 18.00 or 07.00 Sunday

Sunday, 25th May

Free Flight
Wakefield 05.00–10.15hr
Open Glider 06.00–09.00hr
Hand-launched Glider 12.00–16.00hr
½A Power 12.00–16.00hr
Junior Kit Contest 10.30–16.30hr
Fly-offs from 18.00hr.

Control-line
½A Team Race heats: 09.00–12.00hr
semi-finals: 12.30–13.00hr
finals: 15.00
Rat Race heats: 13.00–16.00hr
semi-finals: 16.30–17.00hr
finals: 17.30
Goodyear heats: 09.00–13.00hr
FAI Team Race heats: 13.00–17.00hr
Mini Goodyear heats: 13.00–17.00hr
Combat, stunt and speed 09.00–19.00hr

Radio Control
FAI aerobatics 08.00–11.00hr and 14.00–17.00hr
FAI Pylon Race 11.00–14.00hr
Thermal Soaring 17.00–20.00hr

Scale
Free Flight, Round 2 from 18.00 or 07.00 Monday
Control-line from 10.00 or 10.00 Monday
Radio Control 08.00–17.00hr

Monday, 26th May

Free Flight
FAI Glider 05.00–10.15hr
fly-offs from 10.30hr
Open Power 06.00–09.00hr
fly-offs 09.15–09.30hr
Tail-less, Coupe d'Hiver, Vintage Duration, Women's Cup, Frog Junior 12.00–16.00hr
fly-offs from 16.15hr

Control Line
Goodyear heats: 09.00–13.00
semi-finals: 15.15–16.00
finals: 17.40
FAI Team Race heats: 11.00–15.00hr
semi-finals: 16.15–17.00hr
finals: 18.00
Mini Goodyear 09.00–13.00hr
Class 'B' Team Race heats: 09.00–15.00hr
semi-finals: 15.45–16.30hr
finals: 17.00
Combat heats: 09.00–16.30hr
finals: 17.20
Carrier, stunt, speed 09.00–16.30hr
Junior Stunt from 14.00hr

Radio Control
Thermal Soaring 07.00–09.00hr
FAI Pylon Race 09.00–13.00hr and 15.00–18.00hr
Aerobatics Team Selection Trial 13.00–15.00hr

Scale
Radio Control 09.00–18.00hr

A *really* practical beginner's glider, as proved by the numerous examples successfully built ..... and flown!

MAY MORNING

Designed by Andy Crisp

'MAY MORNING' was designed to be built by members of the model aircraft club at Magdalen College School where I teach art. In fact, it is model No. 3 in a series which progressively introduces the raw beginner to various modelling skills. (No. 1 is a rudimentary chuck glider with V-dihedral and flat sectioned wings; No. 2 features wing carving and polyhedral; No. 3 is this glider, and No. 4 is an all-sheet C/L trainer for DC Merlin or similar which can be made basically from one sheet of $\frac{1}{8}$in. balsa.)

Having taught many young potential aeromodellers in schools and youth clubs, I have come to some fairly definite conclusions about the 'ideal' beginners' model. When we are dealing with 12-year-olds working on their own, the model should be inexpensive and use the minimum number of parts. Why make the wing 40in. span, when if it were 36in. long just one lot of leading and trailing edges would have to be bought? It should be simple to build and yet not *too* quickly made, or the sense of achievement will be lacking and, most important, it should fly with the minimum of fussy adjustments.

These requirements are not, I am afraid, fulfilled by many so-called beginners' kits which are on the market today, which are all too often outdated, over-complicated and weak. Have you ever seen a fumble-fisted junior struggling to cut the notches in the formers on a circular-fuselaged 'scale' job, or trying to get a gull-winged 'sailplane' to fly properly?

And so, to overcome these deficiencies and provide juniors with something to get into the air with a reasonable chance of success, *May Morning* was conceived. Some half-dozen prototypes have been constructed, and all have flown straight-off-the-board with only the odd piece of tail packing being necessary for adjustment.

The name, incidentally, comes from the traditional 'May Morning' celebrations in Oxford, where choristers from our school sing on the top of Magdalen Tower at sunrise. Just the time for trimming!

Building instructions

Balsa wood is a material which varies greatly in density, the harder wood usually being heavier. The wise modeller chooses the right grade for the job it has to do, hopefully ending up with a model which is lighter *and* stronger than one built from unselected timber. If you have a sympathetic model shop, they will let you sort through their wood and even help you with your choice. This model uses the very minimum of wood and should suit the slimmest wallet in this inflationary day and age.

It is best to start with the wing. The 37 ribs do not take all that long to produce, and besides there are no spar slots to cut out. It is best to make a template of the rib shape from thin ply (which can be cut out with scissors) and cut around that to make the ribs, using a sharp-pointed knife. A little square of sandpaper glued on either side of the template will stop it slipping on the wood as you cut around it. Try to arrange your ribs on the $\frac{1}{16}$in. sheet to allow sufficient wood to be left for the fuselage side sheeting and the fin. There should be ample space on a 4in. wide sheet of wood.

The next chore is to mark the rib positions (1in. apart) in pencil on the ready-shaped trailing edge and make a small notch to receive each rib. This can be done with a small file, or with two bits of 'junior hacksaw' blade held together, or by the method I prefer which is to make two small nicks with a stiff-backed razor blade.

This notching could, at a pinch, be omitted, but I feel its use adds greatly to the anti-warp properties of any glider wing.

Now we can start assembling the structure. First, rub the plan with a bar of soap to prevent the glue joints from sticking to it, then pin the LE and TE in position and fix in all the ribs, being reasonably generous with the glue. Balsa cement or a white PVA glue like Evostick Resin W can be used throughout this model. The slower drying time of the latter gives youngsters more time to make good joints. The wing can be built in three sections, as shown on the plan, or in 1yd. length, then sawn through for the dihedral joints when dry. Naturally, to keep your wing true, you will want to build it on the flattest board you can find. At this stage, the tips can be completed by offering the curved shape up against the end rib and adding the supporting triangular gusset.

Now comes the only tricky bit on the model – putting in the dihedral joints. Prop up the tip 3½in. with a convenient box, and arrange for the ribless end to be flush with the edge of the bench. Now sand against the LE and TE in-turn in an up-and-down motion, using a sanding block covered with fresh medium-grade sandpaper. Check for a good snug fit of each panel against the centre section. Next generously pre-cement the surfaces to be joined. Pin down the centre section, give the joints another coat of glue and offer the tips up to the centre section, again propping both to the same dihedral angle – i.e. 3½in. Finally, add all the gussets and sandpaper lightly all over.

The tailplane is very simple. Pin down the outline, add the straight 'ribs' and fit the 'diagonals', trying to be accurate in the corner joints. Round all the edges of the tailplane for streamlining and lightness.

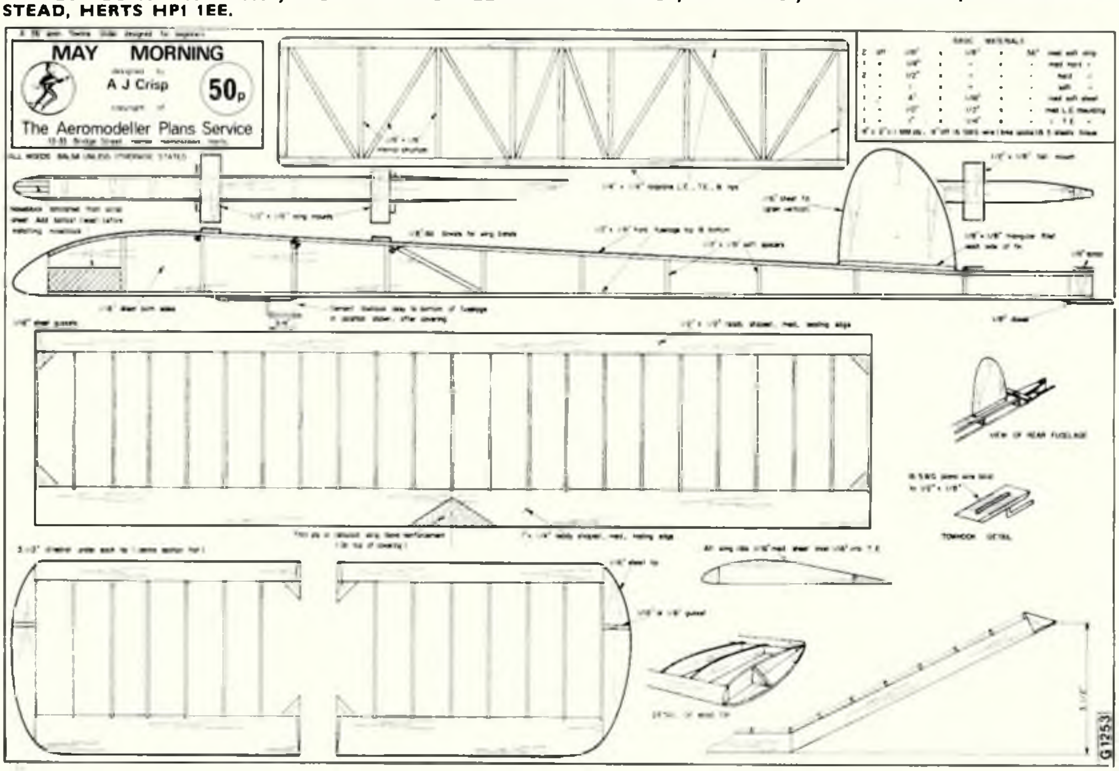
The wood for the top and bottom of the fuselage must be straight and hard. We don't want a weak banana-shaped body! The wood for the vertical spacers can be softer for lightness and easy cutting – save the ends of the longerons for wing and tail mounts. Before pinning down the top longeron, it is best to put in the curve at the nose, either by steaming or by making lots of little score marks across the strip and cracking it gently around the curve with the fingers. When the longeron fits the shape on the plan, rub cement in top and bottom. Pin down the longerons and glue in the spacers. As soon as the frame is dry, remove from the plan and sandpaper on both sides. Add the $\frac{1}{16}$in. sheet front panels, but leave off the nose block, mounts, fine and towhook until the fuselage is covered. The fin is cut from $\frac{1}{16}$in. sheet, but note the direction of the grain.

Covering is a job which many beginners find difficult but which can be made easier with a decent adhesive and a methodical approach. Before we go any further, it is a good idea to give the complete airframe a fine sanding to remove excess blobs of cement, and to check that no parts have come loose. While, for the expert, dope is undoubtedly the best medium for sticking on tissue, wallpaper paste, like Polycell, is much better for the beginner, being cheaper and with its slow drying time allowing the tissue to be worked tight with the thumbs. Use lightweight Modelspan tissue throughout. Coloured tissue is lighter than coloured dope and looks neater – choose contrasting colours like black and orange and your model will show up better in the air.

In covering the fuselage and tail, use one piece of tissue for each side. The wing, however, will need six separate pieces. If difficulty is experienced in covering the tip panels, dampening the tissue will help. Should the covering appear slightly slack and wrinkled, 'spray' everything with clean water by flicking off a nailbrush. Stand the wing and tail on their leading edges to dry. This avoids warps, although due to the construction of the flying surfaces twisting should not appear. A slight upward bow might occur in the wing if extra light wood has been used, but this is not harmful. Doping is best

continued on page 327

FULL-SIZE COPIES OF THIS 1/5th SCALE REPRODUCTION ARE AVAILABLE AS PLAN NUMBER G1253, PRICE 50p (INCLUSIVE OF POSTAGE AND VAT) FROM AEROMODELLER PLANS SERVICE, PO BOX 35, BRIDGE STREET, HEMEL HEMPSTEAD, HERTS HP1 1EE.



READERS' LETTERS .....

Dear Sir,

I would like to apologise for the ruthless 'gamesmanship' I used in the first three rounds of combat at the recent C/L Gala at Rissington. I flew hit-and-run tactics (against the advice of the other members of my team) for two reasons *(a)* because I went there to win and *(b)* because during my seven-year lay-off from serious combat I have had a chance to notice this great gaping flaw in the FAI and SMAE combat scoring system, soon to be used in the first World Champs. My tactics at Rissington were to take two cuts as soon as possible in the bout, check with the centre marshal that I had flown for more than 40 seconds, then land the model thus sealing the fate of my opponents. I will be the first to agree that it *'just isn't British'*, and as Richard Evans said, it is not in the spirit of the thing. Quite right too, and I have no intention of doing it again! It does not, however, violate any rule written in the rule books, and just because it is against the British code of ethics that we have been obliged to adopt because of this error in the rules – caused by too many points being awarded for a cut – we cannot be sure that the other 200-plus countries in the world (all theoretically eligible to enter this extravaganza next year) will have any sympathy for our point of view. In fact, those picking up a copy of the rule book for the first time in preparation for this big event, may arrive fully practiced in hit-and-run, and fly those tactics in all innocence. However unlikely it may seem, we must not rule out the possibility of seeing the Icelanders flying Nigerians, and Mexicans flying the Japanese and they won't like the Belgian judge telling them they are disqualified because that is not the way we do things here old chap!

Something has to be done about it, and as I see it there are three options:

(1) Leave the scoring system as it is and hope that other nations share our point of view.

(2) Introduce a new rule giving the judge the power to disqualify anybody from adopting this practice.

(3) Reduce the points awarded per cut thus forcing the competitor in the lead to remain airborne for a much longer period.

As for *solution No. 1* we have no right to impose our personal code of ethics on others, and it would be quite pretentious for us to assume our way is best – if indeed it is.

Solution No. 2. This is easy if, and it is a very big 'if', this practice is used in such a blatantly obvious manner as I used it. But lets admit it, it has been going on for years in a more discreet manner ever since combat began. If you are in the lead and crash 20 seconds from the end of the bout and make no attempt to get airborne again, you are just as guilty of breaking the 'code' as you would be if you ditched 20 seconds from the start after gaining three cuts. You are still denying your opponent the opportunity of evening the score.

Besides, it is so easy to fake a crash by flying a very convincing 'wiggle' into the ground, and doing the same with the spare model, that would fool any British – let alone any International judge – into thinking it is all pilot error.

Solution No. 3. Awarding 100 points per cut is a prize that is sometimes won by accident, and is equal to a pitman spending a massive one minute 40 seconds starting your motor, and is at the root of the trouble.

Suppose only 20 points were awarded per cut. The British who claim they don't want to play hit-and-run anyway in domestic combat need not be affected, except that pitmen must be a bit quicker off the mark. Then, if you are lucky enough to be 2–1 up on your opponent you must fly for at least three minutes 40 seconds before you ditch, should you decide to ditch at all. It could be argued that the person in the lead has earned the right to choose. If one can build up a lead of six cuts in two minutes or so, should that person really be obliged to remain a target for a further two minutes, or should he not have the right to make the choice between giving his opponent time to get equal or to ditch the model and save it for the next round? After all, at that rate the final score could be 12–0 not 6–6.

Possible arguments against it are that you are not giving your opponent a chance. In fact, if the bout is terminated after only 60 seconds, both contestants have had an exactly equal chance within that time to take cuts; both models are airborne with motors running towing streamers. Some poor chap will travel half-way round the world next year and after spending hundreds of pounds getting there, he might not feel like giving anybody a chance! As for lucky cuts, you score only 20 points and have to remain airborne anyway, so the best man should still win.

So to sum up this method will:

(1) Do away with the present 100 points awarded per cut, chosen only because it is a nice round number and with little forethought of the trouble it could lead to.

(2) Solve the different nations 'codes of ethics' problems – everybody will know where they stand, and what to expect.

(3) Give British fliers in domestic comps. the option of carrying on with our fly-for-four minutes code of ethics.

(4) Make life a lot easier for judges at International level.

(5) Provide a bit more excitement and interest in a race against the clock, should you wish to play hit-and-run.

(6) Reduce the feeling of anybody being hard done by should their opponent play hit-and-run.

All that needs deciding, should you agree with any of the contents of this letter is whether or not 20 points is the right award for a cut, bearing in mind the extra pressure that is put on the pitman.

It is a basic human instinct to oppose change, but change we must. I hope we see a trial-comp under some new rules soon this year.

Richard Wilkins.

Swansea, Glam.

Dear Friends,

I am writing this open letter of thanks to all of you who answered my plea for a copy of Frank Wooten's book *How to Draw Planes*.

Peter Richardson has sent me the letters he received from you. It made a heavy and impressive bundle. Along with the other letters I received direct, the total ran over one hundred!

I'm frankly numbed by this response. I read every letter. Many came from old friends who knew me before I emigrated here. Several offered the books for free. Some, even more touching, said they had the book but could not part with it at any price but would send me copies of every page!

What can I say? Will you accept this combined letter of thanks in lieu of a personal one? But more, you're entitled to know how it came out.

The first package I received contained the book itself and the request that my offered trade be sent to an old friend of the sender *anonymously*. This was duly accomplished. I can't say who sent the book of course, but the recipient of the kit is Ken Marsh of West Essex Club, an old friend of mine too.

My warmest thanks to you all, and to you, Peter: as you say, 'it pays to advertise in *AeroModeller!*'.

Cordially,
Dave Platt

Fort Lauderdale, Florida, USA

Dear Sir,

Having read Martin Dilly's criticism of my statement in *Flying Scale Column*, in the January edition, I can only but agree with the points put forward in the latter part of his letter regarding beginners kits. I think my review of three such kits in the May edition should verify this.

Martin, however, missed the whole point I made, and have tried to make, in my Column over the years. Whether he likes it or not, youngsters want to make models which *look* like aeroplanes, and preferably aeroplanes of WW1 which they have seen on the 'telly' recently. Whereas they would be far better *advised* to build an Achillees as a first model, it just does not appeal to them – ask any model shop proprietor! I think Martin makes the assumption that every young modeller is a budding contest duration enthusiast, hell-bent on cross-country chases after models doing three minutes plus. In actual fact, he usually wants a realistic model to perform quite modest time (15 seconds probably), in his local park. Whether it is good for him or not, he wants a scale kit – hence my statement that the potential market amongst the young is vast. If he wants that, well I would like to see the Trade give him a *good* kit that he has a chance of making fly. I am always therefore quite frank in my criticisms of kits which come in 'flashy' boxes with no hope of the contents building up into anything like the artwork on the front, and even less of flying more than a few yards.

E. A. Coates

Dear Sir,

May I be allowed to reply to Mr N. W. Scott in reference to his letter in February issue of *AeroModeller?*

In replying, it might be said that I am entering into 'the hassel' from 'across the pond' so to speak. The 'hassel' of course has to do with the Combat event which I might mention is quite popular here in the States. For the sake of the matter, I shall have to side with the *Outlaws* in this case of Glow *v.* Diesel power. The reasons Mr Scott states for diesel power are basically his own personal preferences in an airplane. I (and I think I can speak here for most Americans) enjoy Combat flown at high speed; we normally use ·35 size motors on pressure with high percentage of nitro in the fuel. This arrangement in a plane such as a *Spectrum* yields speeds of upwards of 120mph. Its a good 'work out' for the reflexes and eye to be sure! In this class, diesels don't stand a chance, but again this is a personal matter. We also have a 'slow combat' event that has a number of followers. WW1 biplanes with metal tanks are popular for this class.

A new 'Unlimited' combat event using ·60 size motors on 80ft. lines with speeds in the 140mph range is beginning to take root among some addicts. For this event I recently experimented with an all-aluminium design made of beer cans to survive 'mid airs'. This type of plane can in fact 'cut' the balsa opponent out of the sky. With a 'pen bladder' tank and 40 per cent nitro, on a good day it can get an honest 130mph.

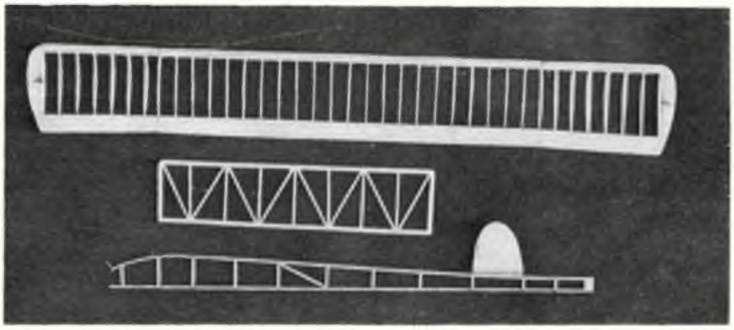
In closing, I would like to say that a glow motor has, to myself, one advantage over a diesel for any event, and that is the fact that they have a rather pleasant smell to their exhaust fumes! I, and I think other flyers will agree, find the 'air a bit sweeter' round the circle where the glow fuel is burning!

J. Ross

Chesterfield, Ma., USA

MAY MORNING

continued from page 325



done with a soft mop brush. Use a half-and-half mix of dope and thinners, and give the wing and fuselage three coats, the tailplane two.

Now is the time to add all the bits and pieces to the fuselage. The fin must be glued on vertically and straight with the centre-line of the body. Reinforce with ⅛in. square strips on either side. Make small holes in the fuselage sides underneath the wing position and fix-in the wing band dowels. The mounts for the wing and tail should be very securely glued on (pre-cement if using balsa cement). Fit on the wing and tail, and check that they line up when viewed from the front.

The nose of the aeroplane should have purposely been left unfinished to facilitate balancing. Obtain some lead, and hammer it into a block which can slide into the front of the fuselage. Cut the lead so that the assembled model balances slightly behind the arrow shown on the drawing of the fuselage side. Fix in the weight by wrapping with scrap tissue and smearing with PVA glue. The actual nose block can be laminated up from left-over $\frac{1}{16}$in. sheet or carved from scrap block. When all dry, sandpaper into the lines of the fuselage and wrap with tissue and dope well. This should bring the balance point to the exact position shown on the plan. Finally, make up the towhook unit from $\frac{1}{2} \times \frac{1}{8}$in. and scrap wire, well bound with cotton and glued. Secure to the bottom of the body so that the hook falls $\frac{3}{4}$in. in front of the balance point. If you value your creation, now is the time to add your name, address and telephone number on a piece of paper doped to the fuselage side!

Flying

The original models needed hardly any adjustment to obtain good flights, but you may not be so lucky! Please, at this stage, be patient and wait for a calm day before venturing forth to fly your *May Morning*. Before trying a proper tow launch, we must test glide to see that nothing is radically wrong. Throw the model from shoulder height into whatever wind there is, with the nose pointing downwards. It should glide off and land about 20 paces away. If it stalls – i.e. raises its nose and swoops to the ground – try throwing with the nose slightly lower. If the stalling persists, put a piece of matchbox wood under the front of the tailplane, and try again. Should the opposite occur – i.e. the model dives rather steeply into the ground – place some packing under the trailing edge of the tailplane.

When you are satisfied with the glide from a gentle throw, the time is right to try a tow launch. Fifty yards of 10lb. breaking strain nylon fishing line on a suitable reel for the tow line. On the end, attach a curtain ring, and a foot below that a tuft of tissue or nylon for a pennant. Get your helper to hold the glider with the ring slipped over the towhook while you reel out the line, dead into wind. It is not necessary to run like an Olympic sprinter to get the model up – just gently trot forward, *looking at the model all the time*. Have the assistant let the model slide out of his hand at your call and not throw it upwards. If all is well, it should climb slowly to the top of the line and release above you. Try to let the model off on an even keel at its flying speed, and not with the nose pointing up, when it might stall a lot before settling down.

If it does not tow up straight, one of two faults will probably occur. It might weave – i.e. swing from side to side. This means the towhook is too far in front of the balance point. Either move the towhook back ¼in. or add a small amount of weight to the nose. If the opposite occurs – i.e. it persists in swinging over to one side – cut through the fin where indicated on the plan and bend over to form a rudder to correct the swing. This should affect the glide as well and you will probably have to pack up the back of the tailplane a little to compensate for the added turn. If this does not provide the cure to the towing problem, cut off the tow hook and reglue ¼in. forward of its original position.

After all this, you should now have a trimmed glider. Tow her up and turn her loose. Put on your running shoes, and don't forget that name and address on your *May Morning!*

BETWEEN THE LINES

with Dave Clarkson

CLASS 'B' – IN NEW ZEALAND by Rod Brown

TO UNDERSTAND the way in which the models and flying tactics have evolved here, it is necessary to bear in mind the conditions under which we fly. Firstly, flying is always done over mown grass; this is not from choice, but we just do not have the necessary tarmac. The weather is usually warm, with temperatures varying in the range 5–30°C; windy conditions are normal. New Zealand is known as the land of the 'long white cloud' (with head up and toes down) because of the predominating strong westerly winds. Finally, because the aeromodelling community is made up of a lot of relatively small clubs scattered all over the country, we do not have to fly with fixed team compositions. With *ad hoc* teams sometimes formed on the day, team racing is mostly friendly – it is not uncommon for one entrant to lend the opposition a prop., or even a motor. Most of those who fly 'B' do so for the fun of it; about half a dozen fliers take it seriously.

Our rules are similar to your old rules, but with no width or cross-sectional area requirements for the fuselage. A few years ago, models were flown on 14-thou. lines, but at speeds of around 120mph they had a habit of flying away. So now our rules call for two 16-thou. lines, 60ft. long. Heats and finals are the same distance – i.e. 140 laps equals 10 miles.

Picture top left shows the current NZ Junior record holder – powered by an OSH-29R a very fast motor in the right hands. Below that is the quickest of 'em all – Phil Staple's record holder with a time of 5:59·6 for the 10 miles to its credit. Bottom left is another typical NZ racer – flies at around 110mph with its Super Tigre 29RV powerplant. Note forward wheels employed on all these racers – essential for flying from grass.

Models

Model designs are generally based on FAI-team race wing and tail areas. All-up weight averages between 25–30oz.; our rules limit total weight to a 32oz. maximum. Models are normally built with fairly long fuselages and with forward wheel undercarts – i.e. with the wheel no further back than the motor cylinder axis. This stops nosing over on our rough ground and also allows the tail to be dragged in towards the centre to maintain line tension during take-off. I tried a CG wheel plus nose-skid set-up as an experiment, but this proved to be a disaster over grass! Because of our prevailing strong winds, we have to have good-flying models. A lot of models used to have the disconcerting habit of rising when going into wind and dropping on the downwind side. Gliding into the wind with an uncontrollable floating machine, followed by the inevitable stall, was also common. We tried rounded-off wing leading edges and forward CG positions and, whilst these help, they are not the complete answer. A lengthy search through plans and magazines failed to reveal any complete solution, so we looked at the relatively few well-behaved models flying and they all had one thing in common – lifting-section tails.

Having tried both a symmetrical-section tail and a lifting-section tail on one model, I am convinced that the lifting-tail is the answer for all evils. Since fuel shut-offs are gradually being introduced, good handling characteristics are becoming more important. Besides the tail section, a lot of work has been done here on wing sections: one of our number built four identical models to take the same motor/tank/pan unit, with the only variation being the wing

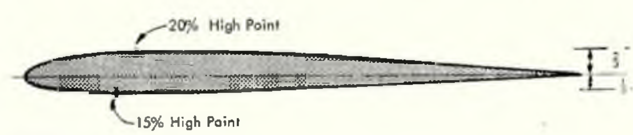


Figure 1

section. He tested the models twice each on the same day, just swapping the complete motor/tank/pan unit from model to model, and this was the result:

Model 1	–	105mph
Model 2	–	108mph
Model 3	-	112mph
Model 4	–	118mph

Model 4 used a well-known speed model wing section – the Husted and Roy section – See *Figure 1*.

Most models here use similar $\frac{2}{3}:\frac{1}{3}$ semi-symmetrical wing sections, but normally with more rearward high points and with identical section tails or thinned 'Clark Y' section tails. One feature I am trying out on my new model are anti-vortex tips, as drawn in *Figure 2*.

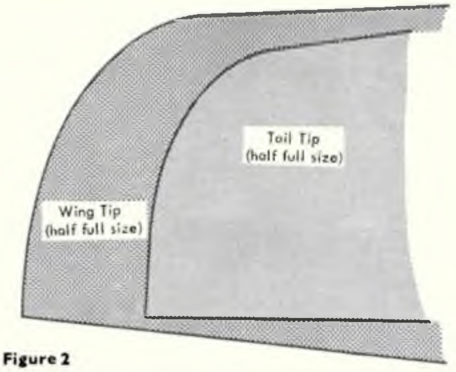


Figure 2

According to an Australian computer, such tips are worth a lot of speed (a drop in 40 seconds of the Australian '40' Rat Race record is attributed to the use of such tips).

Motors, tanks, fuels and props.
Most successful motors in use at the moment are the Super Tigre 29's; the RV version has not proved to be superior to the FI, so most people use the FI. The OS H29 R has also proved to be a competitive motor in the right hands. To make the FI really move, you simply fit an ABC piston/liner assembly, and bore the choke to $\frac{3}{16}$in. diameter. If you are fortunate enough to obtain the old simultaneously-timed ABC assembly, then this is the best; but the newer pipe-timed assembly is OK (I have done half a dozen times in the 6 : 30's, using a pipe-timed ABC assembly).

Almost everyone uses the faithful *Bartels* GFRP 8×8 prop. trimmed and thinned to personal preference. All 'B' records in recent years have been achieved using this prop., including our recent present sub-six minute record.

Pressure refuelling and fuel shut-offs are only now coming in, so most people still refuel through the tank vent (using a squeeze bottle) and overflowing through a car tyre valve. Popular tank designs are the Stockton/Jehlik chicken-hopper type and the front feeding 'Uni-flow' type. With the Stockton/Jehlik tank, the hole between the main and bottom cell must be at least ¼in. diameter. otherwise the motor will only run for a short period on the ground and may suffer from peculiar in-flight runs. With the 'Uniflow' type, it is best to situate the vent pipe just above the feed pipe to ensure that the motor does not go rich when the model climbs or at the end of the engine run: this sometimes occurs with the vent pipe situated at the top of the tank.

The most popular race tactic is to go for a two-stop race (i.e. at least 47 laps) and this is easily obtained using a fuel containing xylene. We tend to keep the nitromethane and xylene contents equal in our fuels – i.e. our 'standard' brew is: castor oil 20 per cent, xylene 20 per cent; nitromethane 20 per cent, methanol 40 per cent. which is worth 50–60 laps at 110mph in a good motor and model.

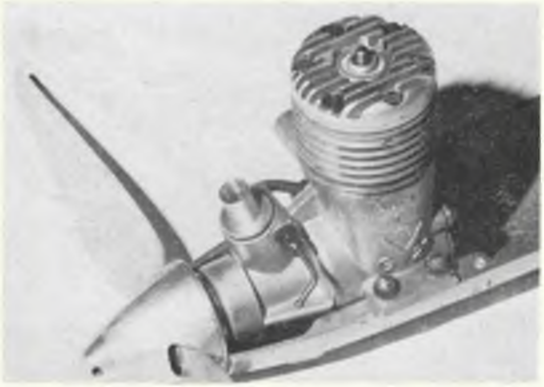
Cumene-containing fuels similar to the formula given below are also used to give a one-stop race at similar speed, but these real 'long-range' fuels need a very good needle valve on the motor, so many people use a Rossi needle-valve assembly, and also the motor must be warmed-up most carefully to ensure that when you come to start the motor in the actual race it is still really hot: it is very easy to be caught with a 'dead' engine on the starting line, using a cumene-base fuel.

Castrol M	– 25 per cent
Iso-propyl alcohol	– 20 per cent
Cumene	– 35 per cent
Nitro-methane	– 10 per cent
Methanol	– 10 per cent

As a rule, the coldest plug with consistent performance is used. Because of their availability, Fireball 'blues' are generally used, and these fit the bill very well. Plug changes during a race are for the birds; in fact, its years since I can recall anybody being caught out this way. Part of this maybe the way we set up our motor heads – most FI users stick to the standard head, but check the squish-band clearance and adjust this to 12 thou., by shimming if necessary.

Present record holder
The present record holder is Phil Staples of the Wanganui MAC, with a time of 5: 59·6 His model typifies the New Zealand approach perfectly – i.e. 26oz. total weight, semi-symmetrical section wing and lifting-section tail, squash bottle refuelled 'Jeffe' type tank, forward wheel undercart, Bartels 8×8 prop. thinned and trimmed to 7¾in. diameter. Motor is an ST 29FI with an 'old' ABC piston/liner assembly, a $\frac{3}{16}$in. diameter nylon venturi, a standard head gapped to 12 thou. squish-band clearance and a Fireball 'blue' plug. On a 13 per cent xylene/13 per cent nitro fuel he does a very, very fast two-stop race. Note the absence of frills and 'gadgets'. Phil just goes fast and is very reliable.

At the moment, I am building what I hope will be a new record challenger with all of the features described here, but with pressure refuelling and a motor shut-off to try to get faster pit-stops. I reckon on 112mph being possible for a one-stop race, and even higher speeds for a two-stop race using the fuels described. We shall have to see if it all works. I want my record back!



Rod Brown's Super Tigre 29FI – note the . .in. venturi and Rossi needle in ST spraybar. Has ABC piston/liner (pipe timed) and experimental Cox 15 insert-type head. Twice previous holder of NZ record, now being prepared for new attempt.

SMAE CENTRALISED MEETING – *RAF Little Rissington – 6th April*
The first of the major control-line contests of this year, and a very important one, too, being held only three weeks before the 1975 European Championships team trials. Like last year, the weather was wintry, with a little snow lying on the airfield in the morning and quite a heavy snow shower in the late afternoon. Fortunately, there was little wind; but temperatures remained low all day – low enough to make me grateful that I was only a spectator this time!

Combat
Obviously, some people have been working very hard over the winter on glow-powered models, because besides Hammersley, Strudwick and Lissmore of Outlaws, who have become well known for their pioneering the use of glows, we saw Richard Wilkins (of *Early Bird* fame – a blast from the past) and Frank Smart, amongst others, new to glows. For the rest, faithful to their Olivers, it was noticeable that the models have got even bigger, with spans straying up to 38in. and wing areas all over 300sq.in., all in the interest of more manoeuvrability. It is well worthwhile noting Richard Wilkins' models, for they are the biggest of the lot with a span of about 40in. and over 350sq.in. of wing area. He has kept the weight down by using expanded polystyrene tips and leading edges and, as a result, his models were incredibly light. The power available from his rather old-looking G20 glows on 7×4in. props. was more than adequate, and simple metal pressure tanks gave quite acceptable motor runs. Richard was sensible enough to use fairly large tanks, to avoid time troubles. One other glow operator's 'trick' was the use by the Outlaws fliers of *warm* fuel. They had a pan of water on the go on a stove all day, enabling them to warm up filled squash bottles at will. The aim was to avoid trouble with their pacifier tanks, due to the cold, and it certainly worked. The metal pressure tank users (Wilkins and Roberts) did not find such precautions necessary – a point in favour of such tanks, perhaps.

Of the 'selected 16' invited to the Team Trials, only Dave Wood now flying with the *GO Combo* found his way into the semis, mostly due to the manoeuvrability of his *Titan* models. The others fell by the wayside (maybe keeping their best models back for the Trials). The most impressive flier throughout was Richard Wilkins, who was flying using 'old-fashioned' ruthlessness, and it was he who made his way through to meet Dave Wood in the final.

The final was quite dramatic, with both models instantly up at the start but with Wood having a very poor motor setting, so he went straight down before the 'attack' call for his spare; that was badly set as well, so he again rapidly was back on the ground and finally was given a well-set motor and battle commenced. This performance cannot have done Dave any good mentally, but was nevertheless surprising to see him soundly beaten quite quickly by Richard Wilkins in a battle of manoeuvrability, where Wilkins was able to turn inside twice to take nice small cuts and finally turn very tight indeed to present Wood with all of his streamer. Dave Wood, now in a position where he could not win, promptly conceded victory

and put his model down, leaving Richard Wilkins the very impressive winner (a win that obviously pleased him considerably).

FAI team race

Despite the cold and wet we were treated to a 4:17 heat by Heaton/Ross using a brand new model. Some details of this highly impressive model are:

Power: Bugl Mk 1. Prop.: Howard-Russian 170 × 190 (reworked to 6½ × 8in. approximately). Model weight: 16oz.

The low weight comes as a result of a 'minimum model' approach and careful construction. An interesting feature of the large wing (around 155sq.in.) is the very far-forward high points wing section used. Besides this time, the rest seemed quite ordinary – e.g.:

Tribe/Tribe	4:35	Bugl Mk 1
Neville/Graham	4:39	Bugl Mk 1
Hammond/Williams	4:40	ST G20D
Horton/Haworth	41:40	ETA 15
Daly/Howard	4:44	K & B 15 conv.

The last three were troubled one way or the other in the semis, so we had a Heaton/Ross, Tribe/Tribe, Hammond/Williams.

With Heaton/Ross having 'salted away' their new model and best Bugl, and Hammond/Williams non-starters because of a rotated liner (caused by a loose cylinder head), we had a two-up final, Heaton/Ross using their flying wing 'windy weather' model, and Ron Tribe (joined on this occasion by younger brother Micky) using a new Bugl-type model powered by a Mk 1 Bugl motor turning a Bartels Bugl-Baumgartner prop. Ron had been practising a brand new model with a new Mk II Bugl motor and a Russian-style prop. during the day, but 'salted' this away for the Trials, too. The first final was a dead-heat in 10:01, but the re-run resulted in victory for Heaton/Ross by just two laps.

Results:		
	1. Heaton/Ross	9:27
	2. Tribe/Tribe	9:32
	3. Hammond/Williams	retired

The event was marshalled quite strictly by Chris Coote, who used his 'John Horton' style warnings board very well, and the organisation by Bob Horwood was smooth and efficient.

'B' team race

A very small entry meant just two heats and one final; quite fortunate, really, since the people who had volunteered before the contest to do the organisation, etc., didn't turn up, and the Coote/Horwood combo thankfully filled the gap. Only Bill Cooke and Roy Everitt with a 4:31 heat were at all impressive in the heats, the rest being clustered around the five-minute mark, and they won quite easily

At the Dutch Utrecht meeting, Helmrich/Kroon won the FAI event with a Bugl in a 'Moskito' racer. Heavy rain and the absence of groupers resulted in a relatively slow meeting – their best heat was 4:38, with a 9 nimute final. They were also low on laps – reaching only 28/29 per tank. None of the German Rossi users even recorded a time.

The Dutch Metkemeyer brothers have recently been working hard on a new T/R motor, and have now been running this Rossi 15 which they have converted to front exhaust (note the duct at the front to prevent slipstream blowing the exhaust gases back into the combustion chamber). A Cox Tee Dee front housing has been grafted onto the rear to provide drum induction a la Stockton/Jehlik. Results so far have produced 50 laps at around 85mph, very promising indeed!

this the first final to the new rules. On a simple 10 per cent nitro fuel (no range ingredients), their Enya 29BB gave 50–55 laps range at around 100mph on a Cooke 8 × 8 GFRP prop., confirming the promise shown by examples of this motor late last year. Heaton/Ross's ETA 29 was giving 40 laps at similar speed on G-Max 10 per cent nitro fuel and a 8 × 8 Tornado Wood now down to just over 7in. diameter. Taylor/Smith's old ETA model was slower for just over 30 laps, despite using 20 per cent cumene in their fuel (the same fuel that apparently gives John Gray 60 laps at higher speed in his ST 29RV ABC).

Results:		
	1. Everitt/Cooke	9:15
	2. Heaton/Ross	
	3. Taylor/Smith	

This 'B' event was very obviously an early season one, since there was a lot of talk concerning new models on the way but not ready yet – all aimed for the Nationals? Both Heaton/Ross and Horton/Haworth are readying new models, both using ABC Super Tigre RV's. When all this machinery appears at a 'serious' contest later in the season, a big improvement in times must come

* * *

One final note about Little Rissington. It is quite obvious that the towline incident last year at Wroughton has not pleased the RAF. Flying was stopped for about one hour in total on the day to allow a helicopter to land and then take-off, and very wisely all competitors co-operated without argument. For the first time, we got a noise complaint from the RAF also. It is apparent that we shall have to step carefully indeed in the future.

EPOXIED 'FIREBALL' GLOW PLUGS

Two types of glow plug widely available here predominate on the contest field; they are *Taylor* and *Fireball* plugs. Experience has shown that the *Taylor* has an excellent seal, but only a moderate element as far as life is concerned; and the *Fireball* (particularly the 'blue' or cold variety) has an excellent element, but a poor seal. In my view, the perfect plug would be a *Taylor* fitted with a *Fireball* 'blue' element; however, such a plug does not exist, as far as I know. So we have either to use a *Taylor* and risk an element failure, or use a *Fireball* and risk a seal failure! Hardly a nice choice to have to make, and yet I have not come across any better plugs yet for racing glows.

Only Chas Taylor can do anything about improving his plug's element (and make it the best plug in the world!), but we modellers can do something about the *Fireball* seal. What seems to happen to the *Fireball* seal is that the ceramic part of the seal degenerates, causing the plug to leak. Result: bad or non-existent starts, and a big loss in motor revs. Putting stress on the *Fireball* centre post by using a 'Hot Thumb' or by hanging a permanently connected contact on it (as you would to use a 'Hot Glove' or 'Hot Fin') seems to accelerate this degeneration process. I first noticed John Dixon using epoxy-reinforced plugs, and since then have seen them used by Daly/Howard amongst quite a few others, so I had a try and it definitely helps with the seal problem.

Simply, what you do is reinforce the plug centre-post to body joint, using a dab or epoxy (slow curing variety, not the 'five-minute' stuff) and the seal life is increased, making the *Fireball* 'blue' a

fairly reliable plug. The epoxy never seems to stick to a used plug, only to new ones carefully washed in hot 'Daz', and dried. The accompanying sketch shows what I mean by reinforcement.

Reading a copy of the MACA newsletter tells me that plug seal reinforcement is common in the USA, and that better materials than normal epoxies may exist – more news later, perhaps!

THE AEROBATIC SCENE (by Glen Alison)

The first stunt competition of the season was the SMAE event held at Little Rissington on 6th April. A good entry of 13 included a few new faces to the competition scene, in particular one must praise the semi-scale *Spitfire* flown by R. Wallace to a well deserved fifth place. Tragedy struck Jim Mannall in the first round when his Merco ran dry in the overhead eights with the 'usual' result, which forced him to fly his new and untried *Nimrod 6*, into fourth place. The weather got worse in the second round, in fact it snowed hard for half-an-hour and proceedings came to a temporary halt. More than one flier was heard to mutter that they wished their models were fitted with skis! Winner was John Newnham flying his attractive own-design *Shadoogie* with Merco 35 – his fast, crisp style is very precise.

In the stunt schedule, *precision* is just as important as *smoothness*, but it takes much more skill to get the pull-outs at 5ft. and the intersections in the same place, etc. A good judge will spot these errors and mark down the score although the error may not be as obvious as, say, a three-sided square loop.

Try to make use of markers in relation to the wind for positioning your manoeuvres. You will need two: upwind and downwind. It is vital to enter the reverse wing over *exactly* upwind; the wind pushes the fin of the model towards you, thus keeping the nose out and maintaining line tension. Remember to give the control about 15ft. before the upwind point is reached. Our models do not turn as fast as we think! The same applies for the overhead eights; you will need the downwind marker for the other eights and the clover leaf. The tendency is for the loops to overlap because fliers make the whole manoeuvre too narrow due to entering it too late.

Another aid to successful stunting is to practice a manoeuvre for a whole flight. If you fly 20 square eights you will soon get in a 'groove' and find it easier to get it right . . . your wrist will ache but it is worth it!

Results

1.	J. Newnham	1,156 points
2.	G. Alison	1,071 points
3.	J. Heanon	1,063 points
4.	J. Mannall	1,048 points

SPEED '75 (by Mike Nash de Villiers)

The first speed meeting of the year (the Elliott comp., held on 30th March) was won by Dave Smith of Southend/Elliott with an FAI model which achieved a speed of 129·3mph – a handicap percentage of 93·05 per cent. Dave also flew his ST 29 model on two lines with groupers at 151·1mph – not bad for a motor in its fifth year of speed flying. Second place went to Mike Billington flying his enlarged K&B 40, nicknamed *Colt 45* at 166·9mph (91·8 per cent). Unfortunately on his second run the piston shattered and caused severe damage to the rest of the motor; in fact to remove the liner Mike had to mount the motor in a lathe and turn out the bits to allow a new liner to be fitted! Mike's next project is enlarging the motor to ·50cu. in. by using a McCoy 60 piston – this he hopes to fly at the 'Nats'.

Third placed flyer was Ray Cox flying the late Ralph Goulds ST60 model. It is nice to see that most of Ralph's gear has gone to Ray as he is possibly the only clockwise flyer left. Ray put in a personal best ever speed of 164·5mph (90·64 per cent). A well deserved speed considering the flight was started in a heavy snow storm.

Martin Radcliffe placed fourth with his latest OPS 60 model, the motor having been rebuilt after a very severe bang at RAF Wyton last year. He recorded 159·8mph on straight fuel.

This was the first time the new '40 times' line pull was used, and proved straight forward enough, except when trying to pull 96lb for 10 seconds on Martin Radcliffe's OPS! The model cannot pull anywhere near this amount in flight, and to prove this Mike Billington is building a special spring balance Stanzel type handle for Martin.

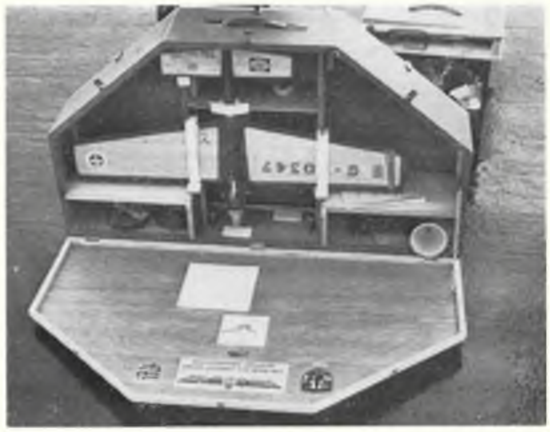
Flying continued up till 7 o'clock when the weather had brightened up considerably. All in all, a very good meeting.

The second meeting was at RAF Little Rissington on 6th April, and proved something of a letdown as it got off to a very late start.

At about 2.45pm the first flight of the day was possible, and promptly made. A few more flights were made until the snow started and lasted until approx. 4.15pm. The tarmac was drying slightly and several were preparing to fly when we were told the meeting was closed, the time being 5 o'clock. A protest by several flyers to the contest director brought the meeting back open to 6 o'clock. In fact it is the first time since 1950 that anybody can remember a dispute being referred to the contest director in speed flying.

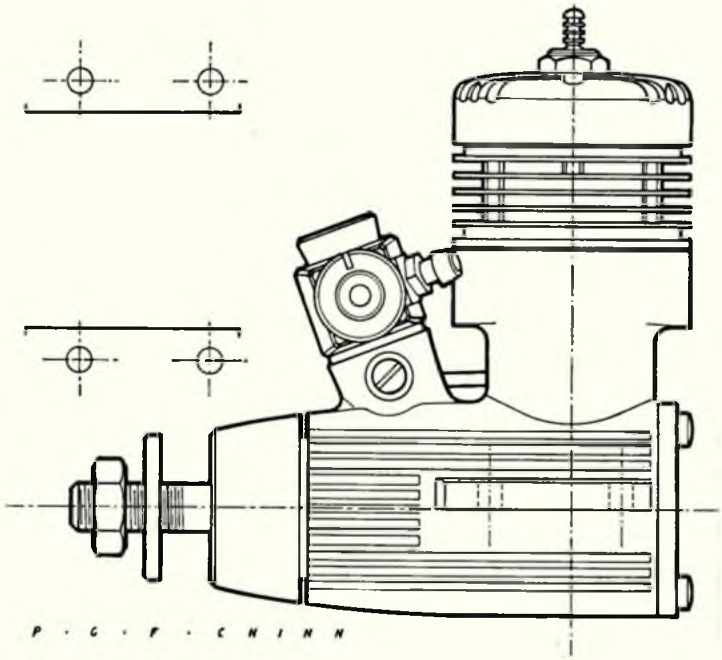
Ivor Roffey, had been preparing his OPS 60 model since the snow had stopped (it is much too dangerous to fly any large speed model on wet ground because of the heavy pulls involved) only to be counted out of the competition at the stroke of six. At 6.02pm the flights were made – poor reward indeed after having driven 120 miles to the meeting.

The results of the meeting are a bit vague due to the contest director's idea of having a small slip of paper with the times flown, signed in by himself. Due to the fact that each flyer has to hold his own card, no-one knows how he or any other flyer is doing, and in turn has no idea who is leading. In fact Mike Billington won at 166·9mph in ·40 class. The old method of an easily read scoreboard seemed to work very well for many years, leaving everybody in no doubt where he stands in any stage of the meeting.



Ron Tribe is going 'continental' in a big way – apart from teaming with Jim Broad (now working in Germany) which involves channel-hopping, he flies Bugl-Moskito racers and has built this typical continental style transport box. Was going well at Rissington, pitted by his brother Mick on this occasion.

Richard Wilkins made a return to combat flying at the Rissington 'do' – and won convincingly with his huge model – powered by an ex-Kevin Lindsey G20 glow motor. See 'Readers' letters' for details on how he won!

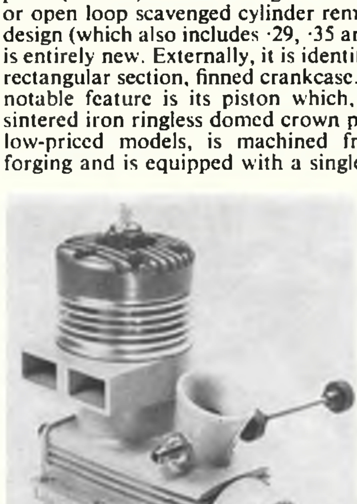


ENGINE TEST: McCOY 19 Ser. 21

by Peter Chinn

THE VERY FIRST McCoy 19 engine went into production 27 years ago. Since that time, this well-known American motor has appeared in numerous different guises, ranging from a ball-bearing racing unit, with ringed piston and rear rotary-valve, to some very low-priced 'economy' models. Seven years ago the then current model dealt with in the *AeroModeller* Engine Test series, was a plain bearing shaft-valve lapped piston engine of simple design, low cost and modest performance. This model, with minor modifications, was actually in production for more than a dozen years, but was eventually superseded by the 'Series 21' version that is the subject of this month's report.

Although the basic formula of shaft-valve induction, plain (bushed) main bearing and a one-piece crossflow or open loop scavenged cylinder remains, the 'Series 21' design (which also includes ·29, ·35 and ·40cu.in. models) is entirely new. Externally, it is identified by a distinctive, rectangular section, finned crankcase. Internally, its most notable feature is its piston which, in contrast to the sintered iron ringless domed crown pattern of the earlier low-priced models, is machined from an aluminium forging and is equipped with a single Dykes-type piston ring. The McCoy is the only current production ·19 to have a ringed aluminium piston.



McCoy 19 is available in both standard and R/C versions, the latter (drawn full-size above) is identical with the standard version actually tested except for the addition of Perry carburetter and coupled exhaust restrictor.

Largely due to its solidly proportioned crankcase, the 'Series 21' has a decidedly hefty appearance, and this is confirmed by a check on its weight. The engine scales some 220 grammes or just over $7\frac{3}{4}$oz., a figure that is considerably more than most glowplug engines of similar displacement, but in return for this penalty one does get an engine that should have rather better resistance to crash damage than most. Lengthy beam mounting lugs project well forward, leaving only a short frontal overhang, while the crankshaft, which has a $\frac{7}{16}$in. journal and a $\frac{1}{4}$ UNF propshaft, has the same diameters as the shafts used by the ·29, ·35 and ·40 models.

The bore and stroke of the 'Series 21' are the same as those of the previous McCoy 19, but the connecting-rod has been made shorter, presumably with the object of lowering the piston which, combined with a shorter transfer passage and a smaller crankcase i.d., helps to reduce crankcase volume and thereby increase primary compression ratio for improved fuel draw and gas transfer. Mixture is drawn through a rectangular shaft port timed to open at 35° ABDC and close at 47° ATDC. The large trumpet-shaped intake has a plastic venturi insert held in place by the spraybar, and this gives an effective choke area of approximately 13·5sq.mm.

In contrast to most other current ·19 size motors, the McCoy does not have a separate cylinder liner. Instead, it uses a one-piece steel cylinder with integral machined fins. These are zinc plated to resist corrosion, and the cylinder, plus its detachable diecast aluminium head, are tied to the crankcase with three long screws. Three more screws secure the head to the cylinder.

The cylinder head has what is basically a shallow bowl-shaped combustion chamber with squish band, but is broken by a slot for piston baffle clearance. The cylinder ports, as befits a ringed engine, are bridged, dividing the transfer, on the left side, into three ports, timed to remain open for 118° of crank angle, and four exhaust ports timed to remain open for 130° of crank angle.

The 'Series 21' McCoys are not widely distributed in the UK, but can be found, from time to time, at a few of the larger model shops.

Performance

McCoy motors are manufactured by the Duro-Matic Products Company division of the Testor Corporation who do not offer silencers for their engines. All our tests were therefore carried out with the ·19 in standard, open exhaust, trim. A suitable expansion chamber-type silencer, however, could be expected to reduce the peak power achieved in our tests by 15–20 per cent.

Handling qualities were very satisfactory. From new, piston seal was good when the engine was cold, giving a quick start and, after a short running-in period, hot restarts were equally rapid. In these respects, the 'Series 21' was a very considerable improvement on the former sintered iron piston engine. Needle-valve response was positive yet non-critical, and the engine ran quite steadily and smoothly on most props.

Peak bhp also was markedly improved, the 'Series 21' being 20–25 per cent above the levels achieved by its immediate predecessors on the same fuel. Maximum power was delivered at between 13,500 and 14,0C0rpm, an increase of over 1,500rpm, and the shape of the torque curve was much flatter, especially between 7,000 and 12,000rpm.

Probably the most useful prop. sizes with the 'Series 21' McCoy 19 are 9×5, 9×4 and 8×6. Using our standard 5 per cent nitro test fuel, the test motor turned a 9×5 Top Flite wood prop. at 10,600rpm, and a selection of popular nylon 9×4s at 11,400 (Tornado), 11,600 (Keil Kraft) and 11,900 (Top Flite). On an 8×6 Top Flite nylon a figure of 11,700 was obtained, and on an 8×6 Power Prop wood the reading was 12,650rpm. There would be little point in propping the engine for any higher static rpm as, in the air, it would then unload to a speed beyond that at which it develops its maximum power. On the other hand, the 'Series 21' showed no distress at being burdened with larger props., turning a 10×3½ Top Flite standard wood at 10,600, a 9×6 Top Flite maple at 9,400 and a 10×5 Punctilio at 8,500. There would probably be no occasion to use a 9×6, but the finer pitch, 10in. diameters might be called for in the case of, say, a largish slow-flying scale model.

Although the average McCoy 19 owner is not likely to be looking for substantially higher power outputs, it is perhaps worth noting that very much higher levels of performance are available with this engine. This is due to its very good response to high nitromethane content fuels and increased carburettor choke areas. At the suggestion of the manufacturer, we checked this, at the conclusion of our tests, by running the motor with the venturi insert removed (which almost doubles the effective choke area) and on a racing-type fuel containing 40 per cent pure nitromethane. This is not a combination

SPECIFICATION
Type: Single cylinder, air-cooled, glow plug ignition two-stroke with crankshaft rotary-valve and bushed main bearing.
Bore: 0·642in.
Stroke: 0·617in.
Swept volume: 0·1997cu. in. = 3·273cc.
Stroke/bore ratio: 0·961:1.
Weight: 220 grammes – 7·76oz. (less silencer).

GENERAL STRUCTURAL DATA
Pressure diecast aluminium alloy *crankcase/main bearing unit* with bronze main bearing bush. Hardened steel counterbalanced *crankshaft* with 0·437in. o.d. main journal, 0·310in. i.d. gas passage and 0·187in. o.d. crankpin on full circle crankdisc with integral crescent counterweight. Forged aluminium alloy *piston* with straight baffle on flat crown and fitted with single Dykes type *piston ring*. Fully floating 0·181in. o.d. tubular *gudgeon pin* with Teflon pads. Forged aluminium alloy *connecting rod* with bronze bushed big end. Machined steel *cylinder* with integral cooling fins and zinc-plated external finish. Pressure diecast, black anodized aluminium alloy finned *cylinder head* with 0·015in. soft aluminium gasket. Head secured with six screws, three of which pass through cylinder fins to tie complete cylinder assembly to crankcase casting. Pressure diecast aluminium alloy *prop.-driver* engaging 30° taper on crankshaft. Steel prop. retaining washer and hexagon nut. Brass spraybar assembly. Steel needle-valve with ratchet device and flexible extension.

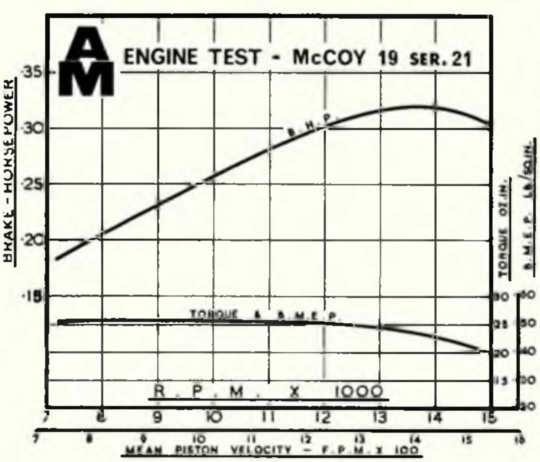
TEST CONDITIONS
Running time prior to test: 1 hour.
Fuels used: (i) 25 per cent Duckhams Racing Castor Oil, 75 per cent methanol (running-in).
(ii) 5 per cent pure nitromethane, 25 per cent Duckhams Racing Castor Oil, 70 per cent methanol (tests).
Glow plug used: K&B KB-1L long-reach, platinum filament.
Air temperature: 21°C (70°F).
Barometer: 1010mb (29·8in.Hg.).
Silencer: Nil.

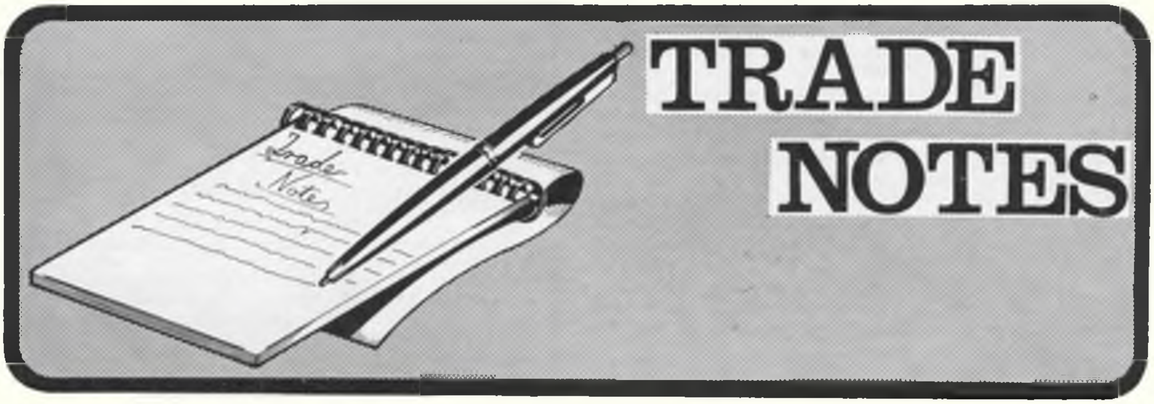
recommended for C/L stunt work, but, for the record, a quick check indicated that the prop. speeds mentioned above could be increased by between 900 and 1,500rpm and that the peak output could be raised to over 0·45bhp at 16,000rpm.

For the benefit of radio-control enthusiasts, we would mention that the McCoy 'Series 21' is also obtainable in a throttle-equipped version. This is identical with the standard model, except for a shortened intake into which is fitted a small-size Perry carburettor. Its performance is much the same as that of the free-flight/control-line version featured here when this is fitted with its standard venturi insert.

Power/weight ratio (as tested, less silencer, on 5 per cent nitromethane fuel): 0·66bhp/lb.

Specific output (as tested, less silencer, on 5 per cent nitromethane fuel): 98bhp/litre.





FOX MANUFACTURING CO.

Duke Fox's motors have never been renowned for being of orthodox appearance – and the latest *Fox Combat Special 36X* is no exception with it's canted plug set in a non-finned head and large bore, square sectioned venturi. However, this schneurle-ported, twin ball race motor is robust, weighs just 7½oz. and is very 'short' (from backplate to prop. driver) which all helps the 'B' combat flyer, or indeed open-class free flight power enthusiast. Not one for the beginner, this motor is designed for running on nitro fuels and bladder/pacifier type pressure feed fuel tanks. More details to follow soon when we try this motor in a 'B' combat kit review model! Price of this powerhouse is £17.47. Distributed to the trade by Irvine Engines, Veron and Ripmax, Fox engines are available from virtually all model shops.

RIPMAX

I.P. Propellers. Two ranges of glass-filled nylon propellers at very low prices. Being glass-filled, these props. are much stiffer than 'normal' nylon props. and are devoid of 'flashing at the trailing edge – which is good news for your fingers!

Moulded in yellow, the *Hi-Torque* range consists of a 7×6in. (26p), 8×6in. (32p), 9×6in. (39p), 10×6in. (48p) and 11×7½in. (that's a new size!) costs 55p. The *Hi-Power* range is moulded in black and comes in 7×4½in., 8×4½in., 9×4½in., 10×5in., and 11×7½in. sizes – prices being the same as for the previous range.

Saphire Products Plug Tidy. A neat way to store your spare glow plugs without getting the element covered in dirt. Measuring just 42mm in diameter, this plastic accessory safely holds a dozen plugs for 38p.

I.P. Glow Clip. Another of the 'new brand' of push-on glow plug clips, which is particularly useful for cowled-in engines, when a 14mm hole will provide the necessary access to the plug. The clip is provided with 55mm of flex and a pair of crocodile clips for connecting to the battery – cost is £1·65.

Ripmax Glow Clip. Somewhat smaller than the previous item, its lower price (99p) is reflected in the fact that the side contacts are not of spring metal, and thus presumably could not 'take up wear' or suit plugs of slightly varying diameter. In this example the terminal part of the plug is gripped, whereas the plug body itself is gripped by the I.P. product. Pay your money and take your choice . . . although it should be mentioned that the Ripmax item is slimmer (10mm at widest point) and is not supplied with clips.

Ripmax Modellers Handbook. A well-produced book measuring some 8x11in. and containing 176 pages, detailing not only the entire range of kits, engines and accessories available from Britain's largest importer/exporter/manufacturer, but also containing many articles of interest to modellers no matter what their particular field. *All* the items are clearly illustrated with photographs and line drawings – a mammoth task with so many listed – and the handbook will provide many hours of reading . . . no doubt causing some itchy fingers and reaching for the cheque book when you realise quite how many tempting products that this company can supply. Price is just 95p.

Schuco Hegi. Two kits for the newcomer to model flying. *Jim* is a 39in. span simple glider, featuring an all-wood fuselage and tail, but the robustly constructed wing has to be tissue covered. As this is flat-bottomed and uses generous wood sizes, there should be no problems even as a 'first attempt'. The kit is certainly in the 'de luxe' range, with all balsa and ply parts cleanly die-cut, the trailing edge pre-notched, while three different glues are provided, as are tissue, lead ballast, rubber bands and even a name and address label! In all a very well presented and complete kit for a very practical design (which incidently incorporates a dethermalizer) and this is reflected in the price of £4·70.

The *Dohle* is slightly more advanced, featuring a built-up (all sheet) fuselage and is of more semi-scale appearance. Again the kit is first class in its completion and quality of die-cutting – leading and trailing edges are pre-shaped and most of the 'hard' work is eliminated. A dethermaliser arrangement is clearly detailed, as is the rest of the construction. Price of this 47in. span towline glider is £5·55.

All of the above Ripmax items are available from any of their stockists – which includes virtually all model shops. If in difficulties, write to Ripmax Models Ltd. at Ripmax Corner, Enfield, Middlesex, for details of your nearest stockist.

ST LEONARDS MODEL SUPPLIES

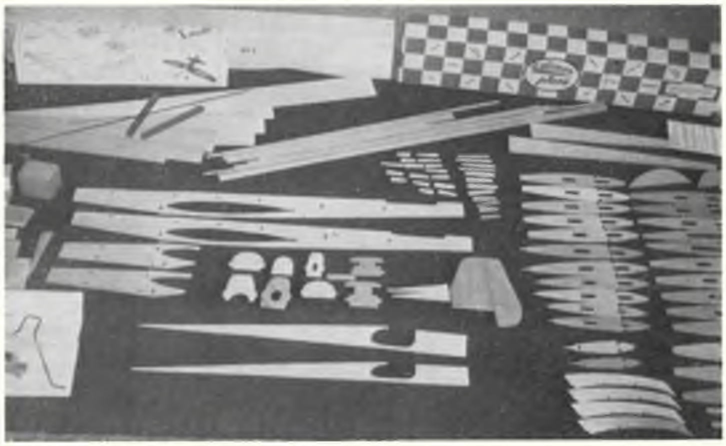
Yet more designs from the drawing board of Jim Baguley – and we are assured that even more are to follow.

Smallest (and cheapest at 63p) is *Atom 12* – a 12in. span swept wing chuck glider of simple construction. The wing is pre-shaped to an airfoil section, just needing cutting to shape and finish – sanding, while the remaining parts are pre-cut. A clear, full-size, plan is provided which details brief construction notes and even briefer flying advice. In similar vein is the *Atom 18* at a price of 91p. Not surprisingly, this is an 18in. span version of the *Atom 12*, and the same comments apply!

Much bigger is *Ariel* a 36in. span all-sheet (Jedelsky structure) towline glider, which features rapid assembly aided by the pre-shaped leading edge section of the wing. The plan is very clear, detailing a D/T arrangement and the instructions clear, even if they do assume a little prior knowledge. All parts are die-cut or pre-cut which certainly helps fast, accurate, assembly. Price is £1·85. *Aries* shares the same span at 36in., but the flying potential is no doubt greater than *Ariel* due to the lighter construction employed on this all-built-up model. In consequence, construction is rather more complicated, and the tyro must venture into tissue covering and a structure which could warp if a little care is not taken. Both an auto rudder and dethermaliser are shown, and the kit is supplied with two colours of tissue for covering – quite a novelty in itself these days. All parts are die cut to aid construction of this model which retails at just £1·78.

Last in line is *Pluto* – a 24in. span rubber-powered sportster with built-up surfaces (fuselage has sheet sides though, as with the *Aries*. It also has a flat-bottomed wing section, in common with this glider, which eases building somewhat). The prop. is not carved, but consists of sheet blades set on a common balsa shaft – thus overcoming a major obstacle. Previous comments apply re die-cut parts and kit contents all for £1·98.

The previously mentioned kits may be obtained from most model shops, but if not available, write to The Trade Distributors, J.N.T. Model Products Ltd., Long St., Easingwold, Yorks. for the name of your nearest stockist.



KIT REVIEW:

DUMAS 'SMOOTHIE'

the classic control-line stunter, built and flown by Peter Miller

THE DUMAS (Ex Veco) *Smoothie* kit is by no means new, as it originally appeared in the '50s when it was a contemporary of the old upright engined *Thunderbird*, both these models being designed by maestro Bob Palmer. The *Smoothie* kit was always rare in this country and along with other kits in the range has not been available for some years, so as soon as I heard that **Irvine Engines** were importing Dumas kits I just had to have one! I chose the *Smoothie* as it was Bob Palmer's windy weather model, and after the last year it seemed the logical choice.

Featuring parallel chord wings with long eliptical tips, the wing section is thin with a sharp leading edge and the point of maximum thickness over 30% back. The flaps are comparatively small and the tail plane is of straight taper planform with a very low aspect ratio. A choice of three engine installations is given: upright uncowled, inverted uncowled and inverted cowled, the first two involving turning one former upside down and moving a spacer on the second former. The last version involves cutting out new parts and was a fairly unconventional method of mounting engines in a stunter. The instructions state that for the cowled version extra wood will have to be bought, but in fact the kit contains the materials for all three versions . . . but I am getting ahead of myself!

Open the box!

The box is packed with top quality wood, obviously carefully selected for each job while the die cutting was the best that I have ever seen; so good that in most cases I could not see the cut. As construction proceeded this proved to be very accurate on all counts. The only exception concerning balsa selection was one fuselage side which was much harder than the other and which had been 'crushed' slightly. Care must be taken when removing parts as the tailplane and elevator ribs are mixed up with the rest of the components and can easily be missed. The only parts that are identified are the wing and tailplane tip ribs, but this did not cause any problems.

There is no plan as such, just a sheet of drawings and an instruction sheet: the latter is set out for maximum quickness of building and goes from wing to fuselage and back again so one must tick off each step as completed to avoid confusion. The nose blocks are beautifully soft and straight grained.

The plywood was not up to the standard of the rest of the kit, being soft and tending to separate, but the extra plywood for the cowled version is $\frac{3}{32}$in. 5-ply and I feel that it is a pity that the formers were not of the same material, though I expect that this would have made die cutting more difficult. One other fault was that the wing T/E was bowed and even steaming did not completely remove this, though I did manage to cure it almost completely at the doping stage.

No bellcrank or lead outs are supplied and only enough tissue for the wings and tail (four strips about 10in. wide). On checking I found that the grain ran the wrong way and so used Modelspan. Two very nice control horns are provided, plus assorted clamps and cowl hold-down hardware.

Sticking it together

I chose to build the uncowled upright engine version, as I was not too enthusiastic about the cowled version's system of mounting the engine, and uncowled engines can dig-in on soft ground causing havoc among the engine bearers in a bad landing, especially when there are no plywood doublers as in this case. I built the kit without any modifications, but did change the sequence of assembly in one or two cases.

The wing is built 'in the air' so to speak, though I think that pinning down would be possible, so great care must be taken at all times to avoid warps. Construction is perfectly conventional and no problems arose, the leading edge sheeting conformed to the eliptical tip with a little damping on the outside and slight trimming. The instructions call for the wing to be built, covered, doped and installed in the fuselage, the complete flap assembly being passed through the wing cutout before the wing and then hinged before fitting the bellcrank and pushrods. I deviated from the sequence here and did not cover the wing: mainly because I ran out of dope but also because I do not trust tissue in a high stress joint. I also left the flaps off the horn as I never hinge controls until the model is fuel-proofed, so avoiding sticky hinges.

The instructions call for the fuselage to be assembled from the rear forward, fitting rear formers and glueing the tail together, then when this is dry fitting the front formers and engine bearers but due to the unequal hardness of the fuselage sides I knew that this would produce a banana-shaped fuselage, so I reversed the sequence, assembling the bearers and ply formers first to give a 'square' unit to work from.

After fitting the wing, the controls are installed – there is no exact location for the bellcrank, this being governed by the pushrod length. My first pushrod was too short, the bellcrank fouling the rib cutouts, so I suggest holding the bellcrank with pins while bending the pushrod and then drilling the bellcrank mounting hole to get exact neutral. At this stage a former has to be fitted over the wing cutout, but due to the fuselage sides being glued to the wing it is impossible to get the locating tongues into their slots, so one tongue will have to be cut off.

The tail plane is easy to build once all the ribs have been sorted out. The control horn goes through a hole in the elevator leading edge and rests in a slot in a $\frac{3}{32}$in. balsa rib. I feel that this may tend to work loose after some time, so I added plenty of epoxy in the area; possibly a ply rib would be better. The pushrod has to be bent exactly to length; as I *never* manage to do this, I used a two-piece rod soldered in the middle with a piece of tube to reinforce the joint.

The top decking was simplicity itself to fit, just follow the instructions. The bottom sheet must be cut carefully as there is only just enough and cutting oversize will mean a trip to the scrap box. Nose blocks and hatches were a delight to carve and shape after the blocks in some kits that I have come across, but I would advise reinforcing the dowel hole for the tank hatch as this wore rapidly.

The complete airframe less tank, engine, wheels and covering weighed 1lb. 3oz. Before covering the fuselage the slots for the former locating tongues will have to be filled as these are rather prominent. Instant Polyfilla works well here – after which apply your favourite finish. I used Duplicolor spray cans for lightness.

I made up a true Palmer tank as detailed in the *Control Line Manual*, the tank is readily accessible through the large tank hatch which is a feature of all three versions and which should be retained for curing leaks and trimming the tank.

I felt that this model deserved the best, so I invested in a Fox 35 Stunt motor. The model weighed just under 2½lb. and balanced as per the plan without the silencer fitted, but the light weight of the Fox silencer makes very little difference.

An attractive design with its eliptical tips and general semi-scale appearance, the 'Smoothie' lends itself to colourful decoration. Our reviewer opted for the upright engine in the interests of simplicity and care of operation, but the plans also detail methods of mounting it inverted.

Proof of the pudding

The weather was impossible for two weekends after I had built the model, with gale force winds and rain but eventually the weather was perfect so I called up another club member and we went down to our field to catch up on some of the lost flying hours.

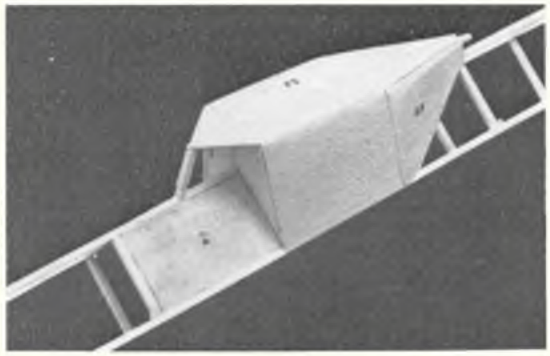
The Fox instructions tell you that the motor can be run in on the plane, so I ran a tank full through the motor just to check it out and had it running third flick, and then out to the circle. I would not presume to discuss the handling of a Bob Palmer design; the model will fly far better than I ever will so I will just describe how I found this particular model. The take off was smooth and steady, the climb-out being just as described in the schedule. She was rock steady in flight, both upright and inverted; loops were beautifully smooth and round and after curing my habit of over-controlling, the squares were crisp and clean with no bounce or wobble while the glide was perfect with no tendency to balloon. I found that on the first flight, with the engine running rich in deference to its newness, I was flying stunts better than I had flown them for a long time, and the second flight simply confirmed this. The only trimming needed was slight bending of the flaps to cure the last trace of a warp that was my fault. Definitely a model that brings out the best in the pilot. Line tension was positive and constant, though not excessive even in moderate winds.

Summary

I consider that this kit is very good value for money at £13·60, the few faults found were of a minor nature and would not apply to all kits; mine was ordered by mail order so it was in no way selected. Construction was quick and easy but careful study of the plan is called for and one or two points could cause an inexperienced builder some problems. Other *Dumas* kits that I have had the chance to inspect appear to be of an equally high standard and I hope to add some more of them to my stable. I am sure that all control line fliers will join me in thanking Irvine Engines for bringing us some new, big stunt kits.

Dumas kits are imported into the UK by Irvine Engines, and are available from any of their stockists. In case of difficulty, write to Irvine Engines at Unit 8, Alston Works, Alston Road, High Barnet, Herts for details of your nearest dealer.

The Mentor's fuselage is basically a square box which is then tilted onto one corner to form a diamond shape.



The sheeting is added around former F1 and F2 to form a rigid mounting for the wing as well as forming the 'cabin' area.

BACK TO SQUARE ONE

more on building the Mercury Mentor rubber model

IN THE LAST issue we started building the *Mercury Mentor* in an unusual way – with the propeller first. As explained, we did this because if you have not tackled hand-carving of a propeller before there is usually a 'psychological block' with this task, which may even put youngsters off from purchasing kits with this feature. Well, as you saw, it was not as bad as it looked, and having completed it the rest of the model is plain sailing now, isn't it? (We haven't quite finished with the propeller yet, but it is best to complete the fuselage before we tackle the propeller and nose-block assembly – you will see why later.)

Fuselage

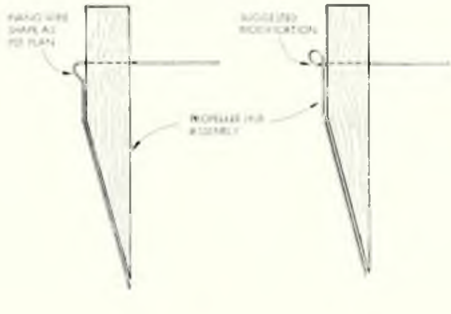
The fuselage assembly is quite standard – and, indeed, is exceptionally simple on the *Mentor* because no sharp bends are required in the main longerons, and the nose joint has a broad spacer instead of the normal simple $\frac{1}{8}$in. spacer.

First choose four $\frac{1}{8}$in. square longerons of even stiffness and then build two identical sides on top of one another just as explained in *Back To Square One* in the February 1973 edition of *AeroModeller*. If you cut the $\frac{1}{8}$in. square spacers in pairs, then the two sides will automatically turn out identical. While the sides are drying, cut another complete set of pairs of $\frac{1}{8}$in. square spacers of exactly the same sizes as used for the sides. These are used as spacers between the two sides to produce a perfectly symmetrical, square cross-sectional fuselage frame.

Now choose one 'corner' of the cross-section to be the top of the fuselage (if you have built it right, one corner should be as good as another!) and use the parts cut from the printed $\frac{1}{16}$in. balsa sheet to build up the wing supporting platform-cum-cockpit. The plan and instructions are not very clear on this point and the photographs in this article will help considerably – particularly on the placing of F1 and F2.

All that remains before sanding down (using a sanding block carefully) is to remove the last few inches of the top longeron, the length behind the final spacer. This allows the two 'side' longerons to form the basis of the tailplane platform.

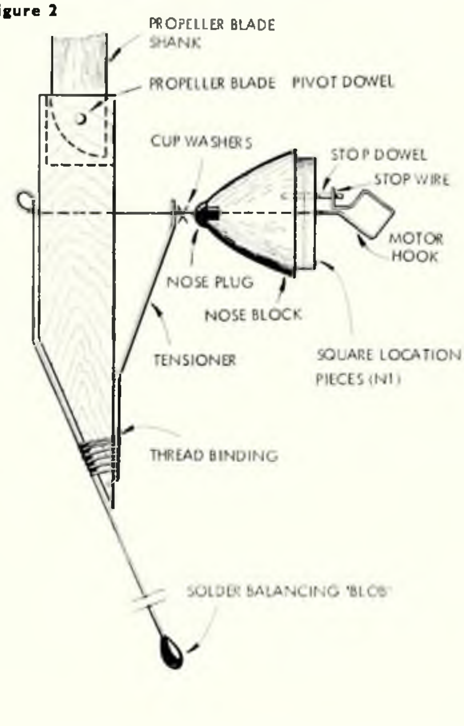
Figure 1



Propeller and nose block assembly

We can now complete the propeller end of the construction: firstly glue the two square pieces N1 (cut from the printed sheets) to the nose block cube. Make sure the N1 pieces are central and square on the correct face of the cube – offer it up to the plan to be sure you use the right face. When dry, *drill out the main shaft hole before carving takes place*. By doing it now, you can ensure that the hole is perfectly square to both sides *and* the hole will give you a good guide when shaping the nose block. Now, using a small dab of balsa cement in each corner, 'tack' the nose block cube in position on the fuselage front end. The squares N1 should fit snugly into the nose. When the cement is dry, start carving the nose block to the correct shape, using a sharp balsa knife (or razor-blade plane), and then garnet paper, ending up with a fine grade, giving a smooth finish. Carefully

Figure 2



separate the shaped nose block from the fuselage again.

Now, with a larger drill, open up the first ¼in. or so of the shaft hole at the front end to allow the plastic nose plug to be inserted. Make sure that you drill vertically and that the drill remains central. It is best to 'creep up' in the drill sizes gradually, rather than go directly for the final size. Before pushing the plastic plug into the balsa nose block, thread a piece of the correct wire through the block and plug, and gently slide the two together. If the enlarged part of the hole is not concentric with the shaft, then you will immediately see the error and be able to correct it before it is too late. When everything is central and square, push the plug home with a smear of cement to secure it.

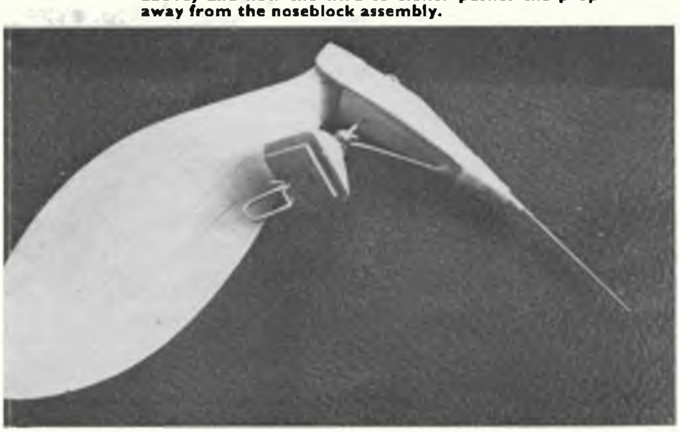
We now come to the other bit which sometimes puts youngsters off – the wire bending. The *Mentor* uses 18swg piano wire which is not particularly hard to bend with normal pliers, so we do not recommend any special procedures such as heating and rehardening. We made a small modification to the wire shape, as shown in *Figure 1*. As the wire has to make a right-angled bend into the hub-piece (to form the shaft), the plan shows a small 'hump' to allow engaging of a winding hook. We felt that a larger loop would be more suitable, and would also protect the wood from wear – so our first bend was a small circle of about ¼in. inside diameter, formed by turning the wire through 270° round a suitable nail, held in a vice or (better) round the jaws of round-nosed pliers. This was done so as to leave about 4½–5in. of free straight wire one end. In this free end a shallow bend is then made about ½in. from the circle to match the taper of the hub-piece, as shown on the plan. Do not guess or even measure this ½in. – simply offer the wire up to the hub-piece and make the bend precisely where needed.

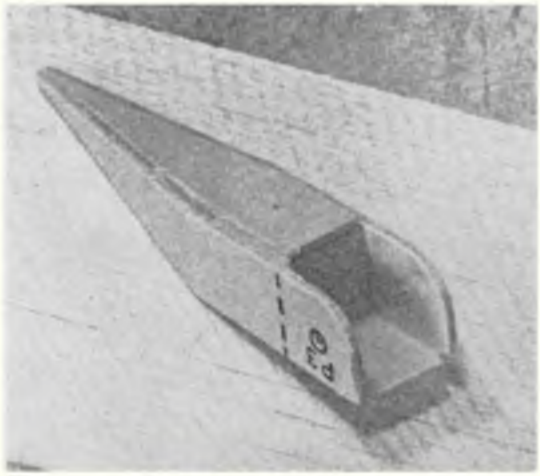
Now assemble the hub-piece and nose block on to the shaft as per plan (do not forget the washers!).

Next, bend the diamond-shaped rubber motor hook behind the nose block, ensuring that about ⅞–1in. of total free play is available for the nose block to slide up and down at this stage. The 20swg wire tensioner is now bent to shape and inserted into position, and the two wire lengths both bound and cemented to the tapered hub-piece as per plan. When completed, the tensioner should be about ½in. behind the rear of the hub-piece and, with the nose block just resting on this tensioner, there should be about ¼in. free play behind the nose block before it meets the rubber motor hook stop. See *Figure 2* for details.

Now, liberally dope the inside of the hub-piece where the propeller blade shank will fit, and let this dry. Do the same with the blade shank. *Carefully* drill the blade shank between the correct two faces at a position marked by offering the blade (the right way round!) to the hub-piece and using the side plate holes of the latter as the

The completed propeller assembly, as shown in Figure 2. Note how the propeller blade is hinged within the hub (see photo above) and how the wire tensioner pushes the propeller hub away from the noseblock assembly.





The basic propeller hub, before finishing – the ply facings have been added to the ½in. square tapered balsa block. The open box thus formed allows the propeller blade to fold back alongside the fuselage.

guide. The hole position must be drilled squarely and carefully and be positioned so as to allow the blade to be fully upright in its erect position and yet not foul the hub-piece when folding. After drilling, round off the leading corner of the blade shank to allow a perfectly free folding action.

The blade is fixed to the hub by the ⅛in. hardwood dowelling provided and so the drilled hole in the shank must be a fraction over the ⅛in. to allow the blade to fold. Glue the dowel at the outside of the ply pieces of the hub – it will pay to cut off the dowel slightly proud here to avoid any chance of the blade springing out of the hub.

Finally, put the complete assembly into the nose of the fuselage and fold the blade until it lays neatly along the upper port side (left when facing the direction of flight) of the fuselage. Holding everything like this, poke a pencil through the side of the fuselage to mark the rear of the nose block (N1 rear face) just to the starboard of the short vertical 'stop' formed with the motor hook.

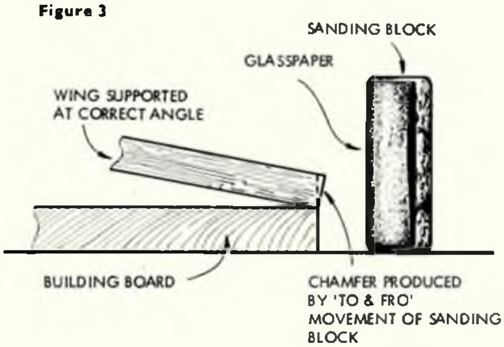
Remove the nose block and drill (with an ⅛in. drill) into the rear face parallel with the shaft, but about ¼in. away from it at the mark made above. Make this hole about ⅜in. deep and cement in a piece of the ⅛in. dowel about ¾in. long. When complete, the dowel should just prevent the noseplug (or propeller) from fully rotating when the noseplug is held gently against the spring tensioner. You can now see what it's all about – as the rubber motor is wound up, its tension will force the nose block and propeller hub closer together and free the nose block from the control of the stop device at the motor hook. As the motor runs down the stop device gets nearer and nearer until at last it prevents rotation and the blade will fold itself flat against the side of the fuselage nose.

Dead clever! Don't worry too much about the action for now, we will need to adjust the tension position when we start to insert the motor later.

Wings, tailplane and fin

Little need be said about these items as they are all straightforward. Do not forget to build *two* centre panels (and make one of them right hand and the other left hand!) – the plan shows only one layout to cover both panels, a common space-saving device on plans. Also, be careful to keep the wing parts pinned down during all stages, and be very careful when shaping and sanding the leading and trailing edges, plus tips. The wing is very fragile in the uncovered state, as it has no spars at all. With the undercamber to the ribs, you may even learn the hard way to be careful where you hold the wing when shaping and sanding! If you press in the middle of the chord, it will surely break.

Figure 3



Chamfer the ends of the LE and TE ready for joining the wing panels together at the correct dihedral angle. Do this by propping up the panel at the correct height and arrange for the end to be chamfered to just overhang the edge of a board or piece of hardwood placed on your worktop (see *Figure 3*). Then carefully sand the chamfer, using a sanding block held vertically all the time – *and watch where you press and hold the wing panel.*

Cement the panels together, inserting the ply braces and the final ribs (tilted to half the angle), supporting the panels at the correct angle until dry. A short spar at the centre gives added strength and prevents the rubber bands from splitting the covering.

Both tailplane and fin are easy to build.

to be continued

F.A.I. CONTEST CALENDAR

	World Championships	
15–20th August	**Bulgaria** Plovdiv	*Free Flight:* F1A, F1B, F1C
8–13th September	**Switzerland** Berne	*Radio Control:* F3A
	* * *	
	Continental Championships	
9–14th July	**Belgium** Verviers	Criterium des As *Control Line:* All categories
	* * *	
	Open International Events	
17–18th May	**France** Maubeuge	Criterium du Nord *Free Flight:* F1A, F1B, F1C Coupe d'Europe *Radio Control:* F3A
17–19th May	**France** Besancon	*Radio Control:* F3B
19–19th May	**Austria** Koblach	Rhine Cup *Radio Control:* F3A
18–19th May	**France** St-Andre-de-l'Eure	*Radio Control:* F3B (gliders only)
1st–2nd June	**Italy** Milan	3rd Coppa Caproni Tagliedo *Radio Control:* F3B
7–8th June	**Belgium** Namur	*Control Line:* F2D
7–8th June	**West Germany** Drove	7th Eifel Cup *Free Flight:* F1A, F1B, F1C
8th June	**Italy** Biella	4th Avioraduno *Radio Control:* F3A, F4C
20–22nd June	**Czechoslovakia** Karlovy-Vary	*Space Models*
21st–22nd June	**Norway** Lillehammer	*Radio Control:* F3B
27–30th June	**Bulgaria** Jambol	Diana Cup *Space Models*
29th June	**Italy** Ravenna	*Control Line:* F2D
3rd–11th July	**Hungary** Pecs	Meczek Cup *Control Line:* F2A, F2C, F2D
5–6th July	**West Germany** Munich	Munchen '75 *Free Flight:* F1A, F1B, F1C
11–13th July	**Czechoslovakia** Bratislava	*Radio Control:* F3A
14–15th July	**Czechoslovakia** Brno	*Free Flight:* F1D
19–20th July	**France** Longuyon-Villette	*Control Line:* F2D
25–29th July	**Spain** Alicante	Garcia Morato *Free Flight:* F1A, F1B, F1C
9–10th August	**Netherlands** Terlet (Nr. Arnheim)	*Control Line:* F2D
14–17th August	**Austria** Kraiwiesen	11th Igo Etrich Wanderpokal *Radio Control:* F3A
17–20th August	**Hungary** Debrecen	Hajdu Cup *Free Flight:* F1D
21st–24th August	**Austria** Völtendorf-Kölbling	11th Kolibri Cup *Free Flight:* F1A, F1E
22nd–24th August	**Czechoslovakia** Bratislava	*Radio Control:* F3A
23rd–24th August	**France** Marigny-le-Grand	*Criterium Pierre* Trebod *Free Flight:* F1A, F1B, F1C
30th–31st August	**West Germany** Dortmund	*Radio Control:* F3B
30th–31st August	**Portugal** Cascais	*Control Line:* F2D
5–7th September	**Bulgaria** Sofia	Diana Cup *Control Line:* F2A, F2B, F2C, F2G
6–7th September	**Switzerland** Lausanne	*Radio Control:* F3C
6–7th September	**Italy** Rieti	Europa Cup *Radio Control:* F3B
8–13th September	**Switzerland** Berne	*Radio Control:* F3A
9th September	**Italy** Lugo di Romagna	Coppa d'Oro *Control Line:* F2C
12–14th September	**Rumania** Constanta	Interaero75 *Control Line:* F2A, F2B, F2C, F2D
13–14th September	**West Germany** Bochum	*Control Line:* F2A, F2B, F2C
19th–22nd September	**Yugoslavia** Lesce-Bled	8th Bled Cup *Radio Control:* F3A
20th–21st September	**Liechtenstein** Bendern	*Radio Control:* F3A
20th–21st September	**Hungary** Pér	Raba Cup *Free Flight:* F1D
28th September	**Rep. de Saint-Marin** San Marino	*Radio Control:* F3B
3rd–5th October	**Hungary** Nyireqvhaza	Nyirseg Cup *Control Line:* F2A, F2C *Radio Control:* F3A, F3B
4–5th October	**Netherlands** Utrecht	Criterium Midden Nederland VII *Control Line:* F2A, F2B, F2C

FAI Contest Categories:
F1A, Glider; F1B, Wakefield; F1C, Power; F1D, Indoor; F1E, Magnet Glider; F2A, Speed; F2B, Aerobatics; F2C, Team Race; F2D, Combat; F3A, Multi; F3B, R/C Glider; F3C Helicopter; F3D, Pylon; F4B, C/L Scale; F4C, R/C Scale.

FLYING SCALE COLUMN

by Eric Coates

MARCH 16th, 1975, will probably be looked back on in British aeromodelling history as the date when the Indoor Scale Model 'came of age', as this was the occasion of the first of three Scale Indoor Meetings the SMAE have planned for 1975 in the Cardington shed. Certainly more indoor flights were made than ever before, and the standard of model was the highest ever. In the four years or so since the indoor 'revival' commenced, the standard must have improved at a higher rate than any other class. In 1970 most models (which flew for anything over 10 seconds) were about the standard of the late 40s, i.e. the period when interest in rubber as a means of propulsion died with the upsurge of the miniature diesel. Without being derogatory to the scale pioneers of those days, you have only to look at copies of this magazine, dating back to the war years and just after, to realise their models would rate nowhere in modern competitions. Scale structures hardly ever seemed to be a feature of models of that era – a semi-scale outline with grossly enlarged tailplane was more the order of the day. After four years of flying in the flat calm of Cardington, modellers have realised that those standbys for good stability: plenty of dihedral and enlarged tail surfaces, are not necessary and provided one sticks to the fabric covered era (which luckily coincides with the most stable prototype era) it is feasible to produce a perfect rib-for-rib replica which also flies well. Just such a model is Alan Callaghan's *Udet Flamingo* which took the honours in the Open Scale Event. This was no lightweight, spanning 19½in. and weighing the best part of 2oz. with its step-up ratio gearbox and hefty rubber motor. Flight performance improved throughout the day so that 75 points were achieved on its realistic last flight. This, coupled with a high static score of 81, gave Alan a victory by 13 points over Mike Reeves' similarly geared *Hornet Moth*. As in the '74 Indoor Nats Meeting,

Mike's machine made the highest flying score but the far-from-perfect finish on this large machine drags its static mark down.

Newcomer to the Cardington scene, Jeff Kilburn (Whitefield clubmate of Mike) flew his attractive *Comper Swift* into third place. John Blagg entered a beautiful *Eastbourne* monoplane which scored equal best statically with Alan Callaghan, but inability to ROG reduced the flying score, and John's position, to fourth. Rex Oldridge had a most interesting model – to me at any rate – a Peanut version of the *Puss Moth*. He just reduced my 1/24th scale drawings down to Peanut dimensions. The model flew superbly, much better than my rather tatty original which I entered into competition, I think, for the last time. A true reflection of how things have advanced in the three years or so since this model was built. Although never actually winning, at first it figured in the top half of the results, but on that day it was one off the bottom! Such is life – I shall have to build something else! The trouble is these radio machines take up so much building time that one just has to keep the old 'uns flying. I can hear my DH9A groaning in the corner as it faces yet another contest season and remarks such as '*he's been flying that in comps since 1972*'.

To return to the Cardington meeting – the only competitor to finish beneath me, in 8th place, was Andrew Moorhouse. He really handicapped himself into this position with his choice of prototype – the *Sopwith Schneider* seaplane. This was beautifully built but having to sacrifice take off points and with a glide that fell out

Both the pictures on this page depict our columnist's first foray into competition radio-controlled scale modelling – the subject being a Martinsyde G102 Elephant to one-seventh scale, which results in a 65in. wing span. Power is supplied by a Merco 61. At present Eric is burning the midnight oil in attempting to finish it in time for the Nationals – which accounts for the absence of his column last month! Many of his F/F techniques have been incorporated, as regular readers will see by these 'naked' pictures.

And now for something a little different . . . above is John Blagg's beautifully built Cierva C-6B which he took to Cardington, but unfortunately did not find time to trim it – should be quite spectacular when 'sorted'. At right is Alan Sheppard's Grainger Archaeopteryx, which regrettably was not very successful - nice to see some different subjects though. Not an easy design for your first indoor model?

of the sky when the power ran out, he only managed 20 flying points.

The experimental Peanut competition, to Miami rules, was much better supported, with 21 entries; far too many to describe in these columns in detail. The results were not to everyones liking and certainly a scrutiny of the rules before picking your prototype so that you can gain a high static mark and yet record a high flying time is imperative if one is to figure on the leader board. That wily indoor expert, Butch Hadland, did just this and produced a *Lacey M10* (no I hadn't heard of it before either) a typical American homebuilt which looks rather like a low aspect ratio *Ajax!* Very nicely built and absolutely true to scale (with a prototype like this designed by an ex-aeromodeller, tail surfaces are nice and generous, therefore one does not have to 'cheat' and lose marks by enlarging them as is sometimes necessary with more adventurous prototypes). Butch topped the static marks with 31 and with 101 flying points was second in flight marks giving him a total of 3 place points, well above his nearest rival, Rex Oldridge, with 7. Rex incidentally was flying a Blackburn 1912 built from Butch's drawings of the model which won the first experimental Peanut event last December. Laurie Barr again topped the flying section with 150 points – his two last flights being of 75 seconds duration apiece – but being bottom of the static marks, with 11, he attained 22 points to finish 8th overall. In third place, flying one of the most ambitious models present – a *Wright Light Scout* – was Brian Hewitt from the South Bristol Club. Indoor scale seems to be attracting seasoned modellers from all disciplines. I can remember Brian flying in, and winning I think, the Gold Trophy at the 1950 Nats. In those days the 'Gold' was the premier spectator event at the Nats, holding a similar prestigous position that R/C scale has today. Such was the standing of stunt C/L then that the event was held separately on the Saturday afternoon, in York Rugby football stadium so that the crowds would have a better view! I think the model was a *Stunt Queen*, powered by a Yulon 30, if my memory serves me correctly Brian? There, who says I don't know anything about C/L models!

Fellow South Bristol Club member, Doug Sheppard, also making his first foray into the indoor scene, flew another ambitious prototype – the *Grainger Archaeopteryx*; not very successfully though I am afraid. Fourth slot was taken by the *Farman Moustique* of Bill Hannan which I again flew proxy: I feel I should achieve better times with this machine than the 35 seconds I do, but I always seem to suffer either a rubber bunch or breakage or something. Fifth was Alan Callaghan with his *Jungmeister* putting up better flight times nowadays and then, surprisingly, my very tatty *Andreason BA4*. Now this thing always flies well and can be relied upon for a 40-second plus flight but it is not an accurate model, built in a terrible rush, pranged into obstructions many times and, to be quite frank, looks a proper 'heap' these days. Yet, because it possesses certain features, such as two wings and was sprayed with coloured dope it attained a reasonable static score of 19 points. My *Zero*, which I also entered and also flies well, if only for half as long, is much better built but being a low winged monoplane with an enlarged tail area scored exactly the same static mark as the *BA4* – result being that the final position of the *Zero* was 19th. This was not the only anomoly, but is typical of the rather distorted static results these rules produce.

Winner of the SMAE Open Indoor Scale Meet at Cardington against stiff opposition, was this Udet U12 Flamingo built by Alan Callaghan (yet another new subject from this prolific builder!). Spanning 19½in., this gearbox-equipped model weighs 1¾oz. and topped the static scale section, placing second for flight performance.

This was a very fine meeting with plenty of fun flying going on. I observed several interesting models present which did not take the air – their owners, like myself too busy trimming and flying their contest entries.

Results:

Position	Entrant and model	Static	Best flight	Total
1.	A. Callaghan *Udet Flamingo*	81	75	156
2.	M. Reeves *DH Hornet Moth*	62	81	143
3.	J. Kilburn *Comper Swift*	60	74	134
4.	J. Blagg *Eastbourne Monoplane*	81	48	129

Experimental Peanut (Miami rules)

Final position	Entrant and model	Static Pts	Static Place	Flying Pts	Flying Place	Overall place Pts
1.	C. Hadland *Lacey M10*	31	1	101	2	3
2.	R. Oldridge *Blackburn Mono.*	29	3	72	4	7
3.	B. Hewitt *Wright Light Scout*	26	5	60	7	12
4.	W. Hannan (proxy E. Coates) *Farman Moustique*	24	9	69	6	15

After the Peanut competition there followed a meeting between the competitors and the judges (Messrs Thumpston and Danials) chaired by your scribe, in his official capacity as Chairman of the SMAE Scale Technical Committee, to determine the reaction to the Miami Rules. After over an hour of earnest and sometimes heated debate it could be concluded that the Miami system of place marking was accepted as the best way of evenly dividing the static and flying points, without recourse to maximums, but insufficient weight of marking was placed into the static section to cover workmanship and complexity of colour schemes.

At the Scale Technical Committee meeting held the following week a new provisional set of rules were, therefore, drawn up, based on the Miami system, but modified in line with the wishes of the active flyers. These are reproduced below and will be used throughout the remainder of 1975.

1. Qualification
Open to any scale model of a man carrying heavier-than-air machine of not more than 13in. span. Power is restricted to rubber.

2. Documentation
The minimum documentation is as follows:
Either a GA drawing of at least 2in. wingspan plus one photograph of the aeroplane reproduced, or a coloured three-view (i.e. Profile Publication) to a minimum of 1/144th scale.

3. Flying section
Each contestant is allowed three official flights with two attempts per flight (an attempt is less than five seconds' duration). The time of the best two flights will be aggregated to form the contestant's flight score. Flights may be hand launched or ROG. If the latter is successfully achieved, without pushing or similar assistance, then 10 seconds will be added to that flight time recorded.

4. Appearance
Models will be judged visually, in comparison with the documentation provided, by one or more judges. No measurements will be taken. Marks will be awarded as follows:

- *(a)* Workmanship (marked on merit): 0–6 points.
- *(b)* Complexity of colour and markings: 0–10 points
- *(c)* Authentic details: Many, 3 points; some, 2 points; drawn on, 1 point; none, 0 points.
- *(d)* Flying surfaces: All double-covered, 3 points; double wing but single tail, 2 points; single sheet, 1 point; single surface, 0 points
- *(e)* Type of covering: Colour doped, 6 points; clear doped tissue, 5 points; undoped tissue, 3 points; condenser paper, 2 points; microfilm, 0 points.
- *(f)* Landing gear: Scale length, 3 points; slightly enlarged, 2 points; greatly enlarged or no documentation, 1 point; none or retracted, 0 points.
- *(g)* Dihedral: Scale, 3 points; slightly exaggerated, 1 point; grossly exaggerated or no documentation, 0 points.
- *(h)* Stabiliser outline: Scale, 3 points; enlarged, 1 point; grossly enlarged, 0 points.
- *(i)* Bonus points for complexity: Low wing, 1 point; biplane, 3 points; triplane, 5 points; autogiro, 7 points; helicopter, 9 points; flying boat or floatplane, 3 points; scale number of ribs, 2 points per wing; scale number of tailplane ribs, 1 point; scale number of rudder ribs, ½-point; separate ailerons, 1 point; separate rudder and elevator, 1 point; other than square fuselage, 1 point; wheel parts or spats, 1 point; three-dimensional pilot, 1 point; exposed radial engine, 1 point.
- *(j)* Negative points for deviation from scale to assist flying performance: Lengthening of nose or tail moment, 2 points each; moving wing back, 2 points; simplifying fuselage cross-section or outline, 2 points; enlarging rudder, 2 points; all other non-scale performance aids, 2 points each.

5. Scoring
The order of marking in Sections 3 and 4 will produce a 'place' in Flying and Appearance Sections respectively. Each contestant's 'place' in the two sections is added. The lowest overall totals then determine the final overall placings in the competition. A fly-off, in which the realism of flight is the determining factor (marked to SMAE Open Scale Rules), will be held, if necessary, to break ties in the final placing of the leaders.
However, after a tie for appearance or flying, the next position gets points according to the number of contestants ahead of him

i.e.			
(1)	Contestant A	187 seconds	1 point
(2)	Contestant B	177 seconds	2 points
(3)	Contestant C	177 seconds	2 points
(5)	Contestant D	168 seconds	4 points

Andrew Moorhouse believes in really small models – hence this 7in.-span Cessna CR3. What do you want Andrew – hazlenut scale?

Concluding part of Ron Pollard's fascinating insight into his VITAR II F.A.I. rubber model

DEVELOPMENT OF A WAKEFIELD

'*THE PROPELLER is the most important single component of a rubber model*' – I am sure most of us have heard that type of remark before. There is a lot of merit in the statement since the function of the propeller is to convert all the energy stored in the rubber motor into thrust, and consequently height on the climb. In reality, from figures produced from both theory and experiment, the efficiency of the best rubber model propeller is unlikely to exceed 80 per cent.

As stated last month, 1968 was the year that Christian Schwartzbach of Denmark presented his now famous propeller theory. I am not in a position to challenge this theory but it is enough to say that I have used this design over a number of years with good results and this is the design which is used on VITAR II. Apart from this design theory, I feel that part of the success of this propeller is in the close tolerances (for balsa) during construction. Christian Schwartzbach recommends using very hard balsa (notionally 16lb./cu. ft.) for the blades, and a reference jig. The very hard wood is to prevent flexing and thus distortion of the pitch angle distribution along the blade length. The jig allows constant monitoring of the undersurface during carving, and there seems little doubt that the chances of making two prop. blades the same is greatly increased.

Jig construction

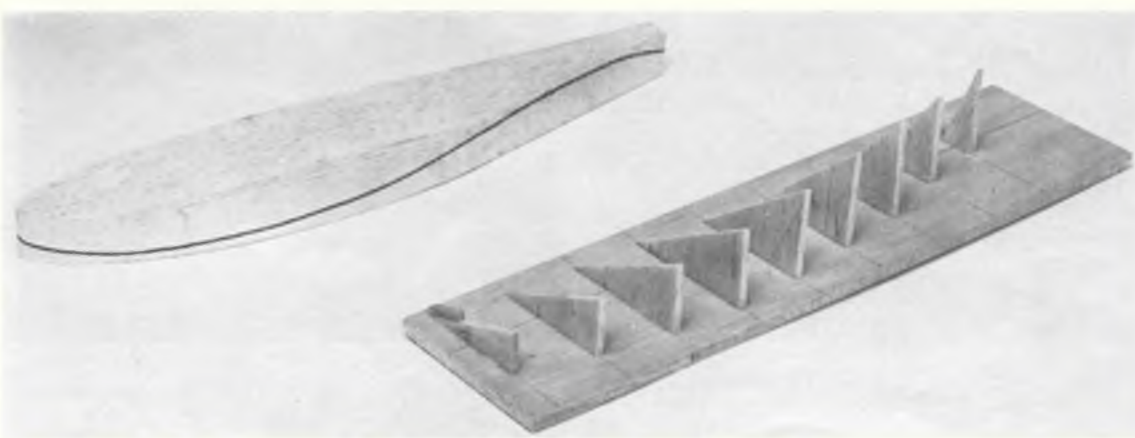
A suitable base is needed which is flat and unlikely to twist or distort. Something like 6mm. or thicker, plywood of dimensions 300mm by 70mm is ideal. Cut the pitch triangles, the angles of which are given on the drawing, from 3mm ply or hard balsa and epoxy on to the correct stations marked on the base. Give the complete jig a couple of coats of dope or banana oil to help preserve and to resist dampness.

Construction

As stated earlier, the original called for very hard balsa blades, but the early part of this article could apply to the construction of blades whatever the density of the wood. However, the main purpose of this article is to introduce modellers to the use of very thin epoxy resin, which is thin enough to soak into the balsa. This epoxy, together with lightweight glass-fibre cloth is used to strengthen and reinforce the soft wood. Carving 16lb./cu. ft. balsa is hard work and this epoxy/glass fibre cloth treatment allows much softer balsa to be used with a stiffness and durability approaching that of the hard wood.

Choose a sheet of ½in. (12·5mm) or ¾in. (20mm) thick balsa, 36in. by 3in., which has been sawn to give a quarter grained surface and with a density of 6 to 8lb./cu. ft. This will be enough for four blades, with the ¾in. sheet preferred since this gives a small surplus of wood as shown in the accompanying photograph. Cut out two prop. blanks as shown in the drawing, ensuring that they are accurate and similar. Place a blank on to the jig (it won't fit yet) making sure that no part of the top surface is more than the thickness of the blank away from the jig. Hold the blank in place with masking tape and mark the face of the blank at the pitch triangle points. Finally join up the points in a continuous line right around the blank as shown in the photograph. This now gives the under-surface which is carved with

Heading picture shows a selection of propeller assemblies, the blades being made from relatively soft balsa covered with glass fibre cloth and epoxy resin. The result is a very rigid blade, with a high gloss, smooth surface. Below is seen the prop. jig together with the balsa blank which has been marked out as described in the text.



frequent references to the jig. Carve until satisfied noting that there is no under-camber on the prop. blade section. By placing the second blank on top of the partly carved first blank, mark off the second one as already described. If you plan to make more than one propeller, i.e. more than two blades, then now is the time to use this partly carved blank as a template. Carve the second blank under surface as described above. The top surface can now be carved to suit the under surface, and start by removing the excess and surplus balsa. Now cut a template (from thin ply) of the blade sections at the three points along the blade length. There is no easy way to carve propeller blades – you have to use skill, experience and lots of patience. It will take a lot longer to carry out the next stage than it will to read the next sentence! Carve and sandpaper the two upper surfaces to the correct sections to a standard which allows the templates to be an easy, sliding fit at the indicated points. Shape and finish the root to receive 1mm ply facing pieces. Drill the ply facing pieces to receive 14swg brass tubing then epoxy one facing piece to each blade and allow to dry. Place a blade on the jig, and epoxy the hinge tube and second ply facing to give the correct pitch angle. The blades are now ready for the 'treatment'.

Epoxy resin/glass fibre cloth treatment

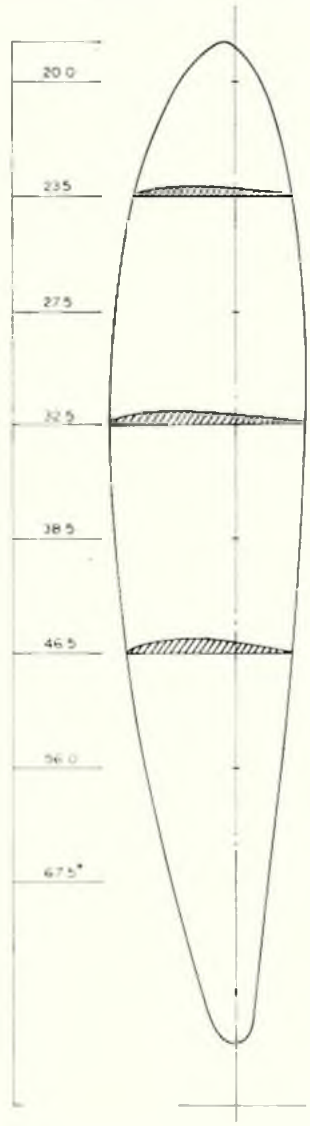
Obtain some thin epoxy resin and hardener which can be further thinned with methanol, or some similar solvent. There are a number of suitable epoxies available and the only requirement is that it can be thinned without destroying the curing properties. Mix enough epoxy resin, suitably thinned to coat eight blade surfaces, and give both blades one complete coat. Hang up to dry in a room of approx. 20°C for two to three hours and in the meantime, put the remainder of the epoxy in a cold area to slow down the curing rate. After a couple of hours or so, apply a second coat paying special attention to those areas where the resin has soaked into the balsa. Hang up the blades and allow to dry for approx. 48 hours. Now rub down the epoxied blades with 'wet and dry' until a smooth finish is obtained. Thin glass fibre cloth (27 grammes per square metre) is used to strengthen the root. This is applied for some 100mm from the root on both upper and under surfaces and is applied using thin epoxy as an adhesive. When this has dried, rub down the area with the cloth until a smooth surface is obtained.

The entire blades are now covered with glass fibre cloth as described above and given two further coats of thin epoxy, and allowed to dry and harden. It will be found that the blades have been stiffened out of all proportion to the originals in soft balsa. Now it is necessary to rub down with 'wet and dry' and plenty of water until a good finish is obtained. All recent propeller blades have been given a final finish of Humbrol enamel.

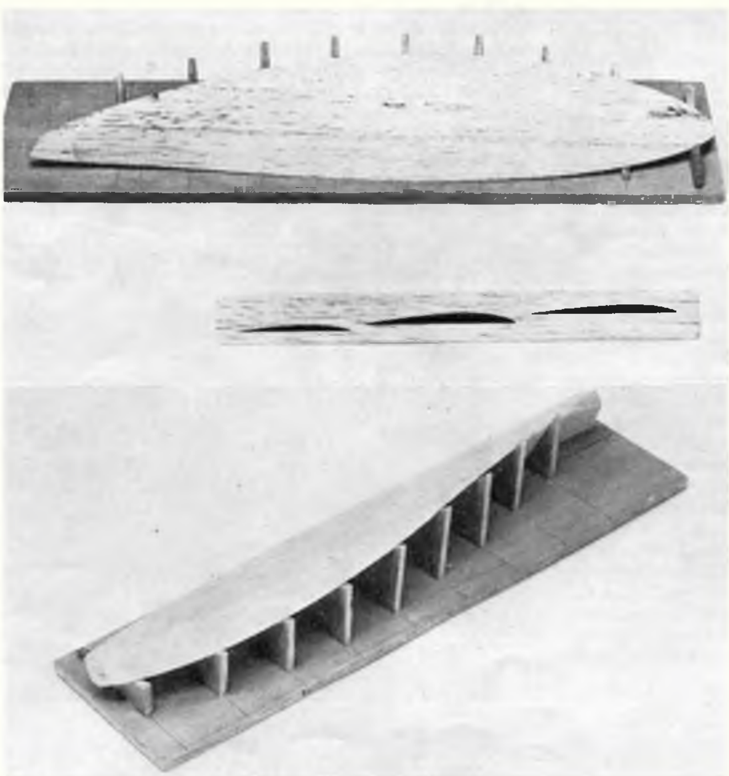
Tail boom

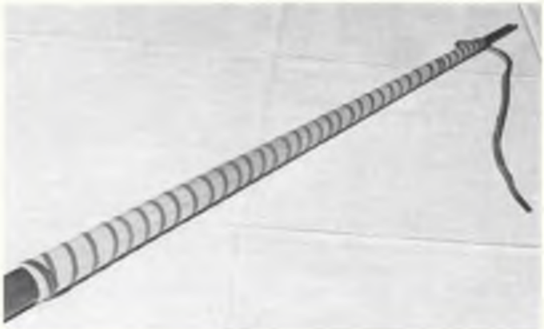
The method of construction and treatment has been evolved over a number of years. A large number of booms have been made and the following method has proved

Propeller blade drawn half full size



Photograph at bottom shows the propeller blank with its carved undersurface laying on the jig – note that no under-camber is used. This partly carved blank can now be used as a template if more blades are required. Below is the completely carved blade on the jig, together with the blade section template – essential for an accurate end product.





At left the fuselage boom is being laminated – two layers of 0·8mm balsa are bound to the mandrel whilst drying out. See text for details.

The completed boom covered with glass fibre cloth and epoxy resin – a stiff, light structure with a high degree of strength.

to be the most reliable. Adequate strength is obtained consistent with acceptable weight: approximately 15 grammes. Early booms have consisted of three types of balsa cones, a single layer of 0·8mm, two layers of 0·8mm or a single layer of 1·5mm balsa. Three adhesives have been tried; Cascamite, PVA and epoxy, whilst three types of covering material have been used: tissue, silk and glass-fibre cloth applied with dope, banana oil or thin epoxy resin. Perm any four from twelve and I think that I have tried it!

Mandrel

A suitable mandrel must be obtained. The most likely material is wood, but I now use a glass fibre mandrel which has itself been *made* on a mandrel! The advantages are in the lightweight and the smooth finish. Suitable mandrel dimensions are 30mm diameter tapering to 7mm diameter, 800mm long.

Construction

Select 0·8mm, straight grained, balsa sheet which has a density of 8lb/cu. ft. As a guide, a 4in. wide, 48in. long, 1/32 sheet, should weigh 14 grammes (0·5oz.). This sheet should be strong enough to work with but still soft enough to soak up the thin epoxy resin. The boom on the VITAR II is 610mm (24in.) long allowing two layers to be obtained out of one 48in. sheet. Cut the sheet in half, and cut one half to the approximate dimensions of the inside sheet i.e. 95mm tapering to 35mm. Give this inside sheet a coat of dope and allow to curl. This will help to seal the pores and later, prevent the thin epoxy resin from soaking through. Soak the prepared sheet in water. Mark your mandrel at a point 3mm less than the required finished diameter i.e. 27mm for a 30mm boom. Dry off the surplus water, place on the mandrel at the approximate point, and bind the balsa sheet in place with some of that early 1973 Filati rubber that no-one wants! Allow the sheet to dry slowly, on the mandrel, for the next 24 hours.

When the sheet is dry, remove the strip rubber and cut through and remove the surplus sheet to give a butt joint. Remove the sheet from the mandrel, and apply a line the full length of the working area with a release agent such as PVA or a wax release. Replace the sheet, butt joint the edges with balsa cement and bind in place. Remove the binding when dry and immerse the sheet and mandrel in water. The balsa cone will swell and should release from the mandrel with only gentle persuasion. Dry the cone, dry the mandrel, replace the cone on to the mandrel and allow to dry. When the balsa cone is dry, and the marks from the rubber binding have disappeared, sandpaper lightly to give a smooth finish. The combination of the first balsa cone on the mandrel then becomes the mandrel for the second layer of balsa sheet. Taper the second sheet, from approximately 100mm (4in.) to 45mm (1¾in.) and soak in water. Dry off the surplus water, place on top of the first layer and bind in place in the usual way. The first layer will swell with the dampness from the second layer, but the two layers will dry out together without any problems. When dry, remove the binding rubber and cut through the surplus balsa as described for the first sheet. Care should be taken not to cut through the first cone as well! At this point, it is best to attempt to remove the indentations, made by the binding, simply by swelling with water.

You should now have a balsa cone on a mandrel with a second balsa sleeve which has not been butt-joined or attached, as yet, to the first balsa cone. Mix enough thin epoxy, suitably thinned with methanol to cover a little more than twice the boom area. Coat the outside of the first layer and the inside of the second layer. Now place the second layer on top of the first ensuring that the two seams are 180° apart; bind with strip of rubber, and allow to dry. When the epoxy is dry (approximately 24 hours later), remove the binding and soak the balsa until it swells enough to release from the mandrel. Remove the surplus water and allow to dry on the mandrel to make sure it maintains its 'roundness'. When dry, sandpaper to give correct diameter, even thickness of the top sheet and smooth finish. Now the complete boom is covered with lightweight glass fibre cloth using the thin epoxy as an adhesive. Start and finish the cloth to give a small (5mm) overlap around the joint of the top sheet. Allow to dry and harden and then rub down with 'wet and dry' with plenty of water until an even surface is obtained. Give the complete boom (still on the mandrel for easy handling) a further coat of thin epoxy. Allow to dry and rub down for a final finish. All recent booms have been painted with Humbrol Enamel to give colour and final finish, and is not as heavy as one may imagine, adding only 1 gramme to the final weight.

Component parts of the propeller assembly reveals the silver steel shaft, twin ball-races and two spring-loaded pins: one to engage the torque arm and the other is the 'hold' pin.

topical twists

by 'Pylonius'
illustrated by Sherry

"What! Just to fly that?"

* * *

Long trail a-winding

JUST THINK back to those hoary pioneering days when the free flight modeller – they were all F/F modellers in those less choosey times – just wound up his motor, which he would unabashedly call elastic, by revolving the prop. with his finger, and then consider the amount of gadgetry now required to achieve the same end. There is the mechanical winder, the cartridge loader, the winding tube, and, not least of all, the team of trained helpers. And where the pioneer just took himself and the model to the flying field, usually the local park, his modern equivalent has to mount a special expedition to that far off airfield. He takes with him not just his sturdy index finger but a whole range of complex equipment. There is inevitably the rusty retrieving bike and the muddy pair of wellies, plus, if he is really keen, the club bubble machine. On top of this there is the tree-climbing equipment, including the spiked irons, the weighted line and its projecting catapult. Among other impedimenta there's the sighting apparatus, cardboard arrows, various coloured flags, and, of course, the binoculars. I am not too sure about the kitchen sink, but it might be advisable to load it just in case.

Thus, heavily and costly prepared, you get to the airfield, only to spin your model in on the first comp flight.

Scaling the depths

An unfortunate effect of the brief but disastrous bombardment of local flying sites by the new-fangled radio models is that the ban they inevitably incurred also extended to anything with an engine, however innocuous it might be. This may be why the sports model is now such an uncommon sight, and why there is a return to those highly unflyable contraptions of my youth: rubber-powered scale models. Most of us have tried our hands at this particular game of frustration in our innocence, to find that the flimsy little what-not always turned out looking like a wrongly put together sports model rather than the hyper-realistic illustration on the carton. One thing of which you could be sure, whether it flew two feet, or six yards, is that it would resolve itself into its component parts, plus a few extra, on contact with the merest blade of grass.

What surprises me about the new cult is the cult within the cult, by which I mean the vintage aspect. Exactly why anyone should wish to build scale models to outdated designs I just cannot imagine, particularly if you think of the suffering they inflicted on our poor old antecedents.

Getting hooked

The approaches to our hobby are many and diverse – particularly if you are trying to find your way on to an airfield – and just how diverse was brought home to me the other day upon seeing an advert for ready-to-fly radio models, plus tuition, just after I had spent two finger-blistering, naughty-wording hours bending up an S-hook for a rubber motor shaft. I got there in the end, though, and was as pleased as a dog with two tails – which was what the shaky S-hook looked like.

On the face of it, it does seem rather odd to be bending up wire hooks for elastic motors in this press button, electronic age. Put to the layman (he gets that way dodging radio models) he would have no hesitation in recommending the wire bender for immediate committal. 'Round the bend' would be the undoubted verdict. Yet that reckons without the law of diminishing returns, which does not mean those calamitous flyaways, but finding that tenth flight of your ready to fly model getting just that little bit tedious. Either you carry on playing with the same old toy or to go on to bigger and better things. The bigger and better things, though, cost quite a bomb, and all too often behave as such. You soon learn where the term multi-millionaire came from, for you'll be digging deeper into your pocket than a nose cone into the ground for that advanced kit, and even deeper for its radio equipment.

Still, bending wire hooks can be fun – ouch!

O. Loseall

I see that up north they have introduced a handicap system for contest flying. A commendable way to achieve wider participation, no doubt, but one which has its controversial aspects. I remember some years ago visiting a house where the sideboard (pre-facial type) simply groaned under the weight of huge silver trophies. Here is a champion for sure, I thought. Not a model flyer, though – they get only tatty, thirty-bob plaques – but some remarkable talent. Well it turned out that the owner of the silver collection was a golfer, though not as you might think, a veritable tiger, but a sort of fierce rabbit with a sizable handicap.

Now, if the handicapping system takes on in the model world we might get a similar situation, with the rabbits of the movement taking all the honours. The emphasis would shift from tactical ploys to devious stratagems in the handicap stakes, the perpetrators of which would get their just deserts by being landed with some of the antediluvian cups still knocking around – at least one of which used to be given for kite flying.

What is a 'modern' team racer?

by I. Catchum

RECENTLY, through the pages of that widely read, sometimes controversial, but much enjoyed column, *Between the Lines*, the team racing fraternity has been bombarded with the phrase 'modern team racer', together with sketches of what this so-called 'wonder machine' looks like; the crux of which would appear to be pod and boom *à la* Clarkson.

However, is the pod and boom really the answer to a team racer's prayers? Is it better than other models? I suggest not, and as supporting evidence present the following facts:

(*a*) The 1966, '68, '70, '72 and '74 World Championship winners' models were *not* pod-and-boomers, and in fact there were very notable differences between the models of Stockton/Jehlick and the Russian teams.

(*b*) The last time a pod-and-boom model won the British Nationals was 1972.

(*c*) The current British FAI heat and final records are held by Heaton/Ross who took the heat record from Place/Haworth (both *non*-pod and boomers). In fact the only pod and boom model to approach the old record was Joe Devenish's, who just pipped the old record at the same time that Heaton/Ross were establishing the new one.

(*d*) Although there has been a decline recently in the number of ½A team racers seen at competitions, a pod and boom model has not managed to win the British Nationals for at least the last 10 years!

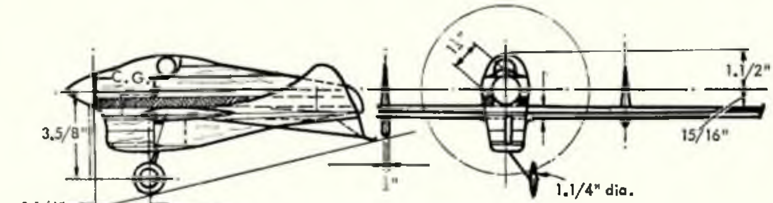
The general trend of team racers is towards lighter weight and obviously the only way that this can be achieved is by using less material to both build and finish the model, hence the 'modern' trend – the line of argument being less profile area means less material used, and less area to paint.

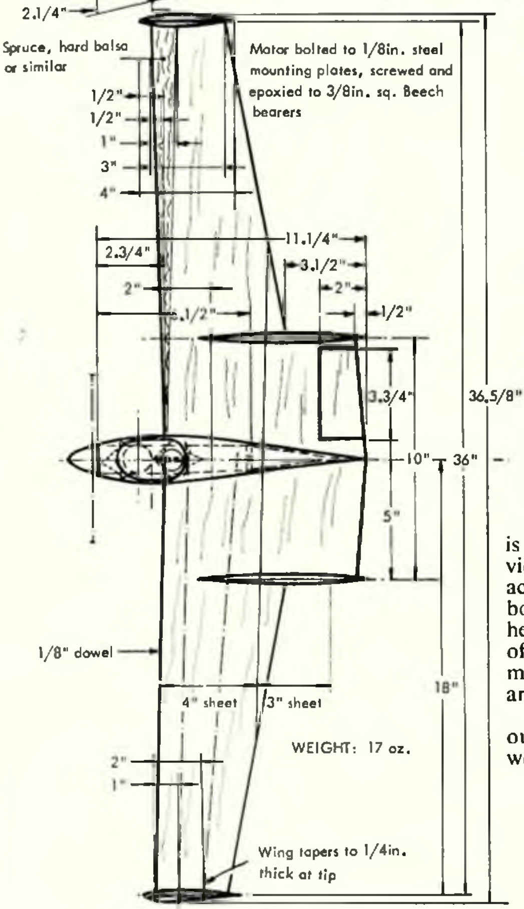
If however we were to rephrase our basic requirements slightly we would get a rather different answer i.e. the only way to achieve a lighter model is to use less wood to build it with and therefore to retain the same strength the wood used must be utilised more efficiently. To enable us to do this we must first study the forces that act upon the model – the most obvious of these are the forces incurred at pit stops:

1. The undercarriage, especially with the very short leg lengths currently used, exert a great deal of force on the fuselage, thus we obviously need a fair amount of wood around the connection point of the U/C to the fuselage and we can help to relieve these loads slightly by giving the 'leg' a bit of spring. The simplest way of doing this is to mount the U/C leg in the side of the model, and cut the slot for the leg oversize and fill the gap with silicone rubber (bath sealant) to give the required 'springy' effect. (See *Figure 1*.)

2. When the model is caught by the pitman the tailplane of the model has a natural urge to want to continue, with the result that the rear of the model tends to whip outwards (see *Figure 2*).

This puts a *compression* load on the outside of the fuselage and *tension* on the inside. Balsa wood,





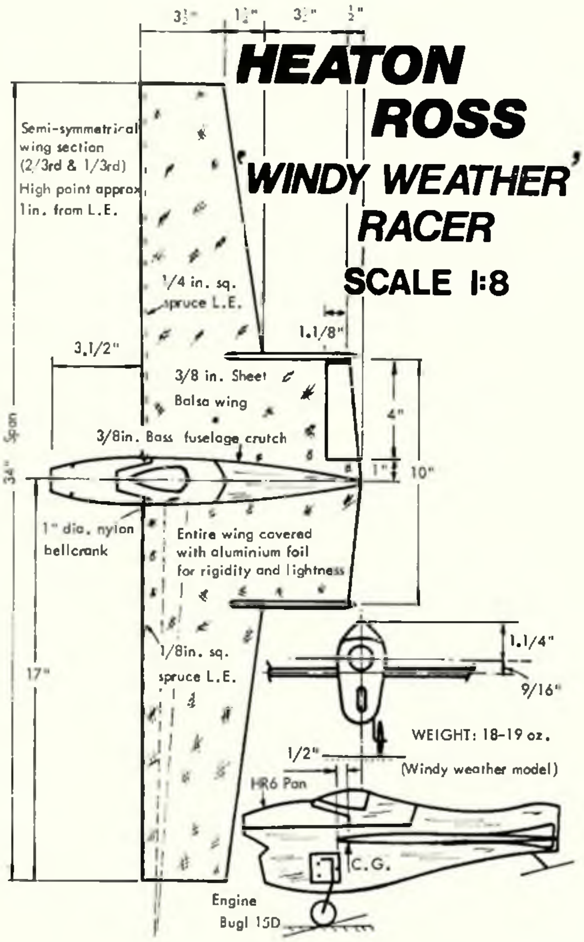
XFW-3 by John Horton

Scale 1:8

'Modern' need not mean ugly — Kraznorutsky produced this beautiful retract U/C model in '72, although he did not race it. Many are now playing with retracts!

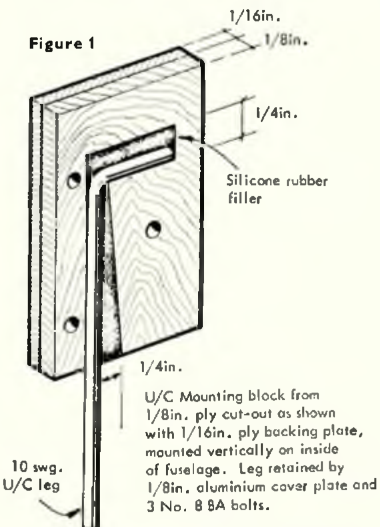
Don Jehlik's stayed with his basic 'Jefe' design for nearly 10 years - but this rugged, reliable airframe is still highly competitive.

Brian Turner's 'Mistress' may seem old fashioned, but compare with Onufrienko's (current world champion) model below and drawn on Page 350. Deep fuselage, almost conventional appearance by each - only the modern 'systems' and engines really separate the two.



especially the soft grades, has limited capabilities of resisting these forces – hence the usual practise of using a stronger basic crutch, e.g. spruce, maple or bass wood.

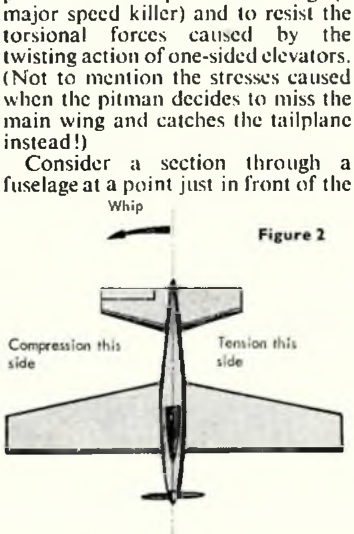
Figure 1



3. The rear half of the fuselage must have sufficient rigidity to prevent the tailplane fluttering (a major speed killer) and to resist the torsional forces caused by the twisting action of one-sided elevators. (Not to mention the stresses caused when the pitman decides to miss the main wing and catches the tailplane instead!)

Consider a section through a fuselage at a point just in front of the tailplane as shown in *Figure 3*.

Figure 2



Note that the wall thickness of fuselage 'B' has been chosen to give the same cross-sectional area as 'A', i.e. using the same materials both fuselages have the same weight.

By analysing the properties of these two sections it can be shown that fuselage 'A' is:

6 times as strong as 'B' against vertical bending,

1¼ times as strong as 'B' against horizontal bending (whip),

4 times as strong as 'B' against torsional forces.

Basically the larger the outline size of the fuselage then the stronger it becomes. Hence it can be seen that the pod and boom model has very little to commend it from the strength to-weight consideration.

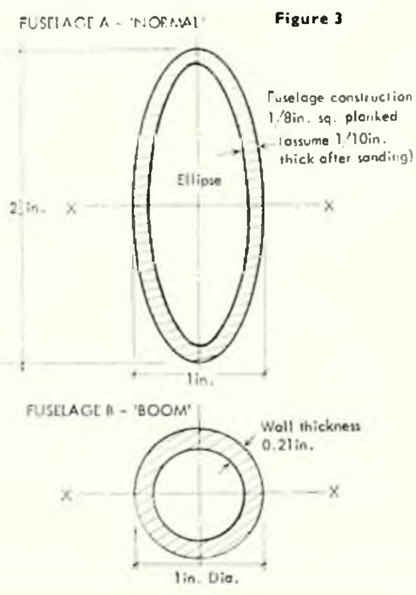
In fact the only way in which a boom can be made as strong as fuselage 'A' is to use a much stronger, and therefore heavier, material than balsa wood. The most successful pod and boom model to date is undoubtedly Paul Bugl's *Mosquito* which has:

(*a*) very small tailplane and symmetrical elevator (to keep torsion forces to a minimum),

(*b*) a metal crutch for strength – not many of us has either the time or facilities to follow this trend!

The philosophy of building in strength where it is most useful applies equally as well to wing construction where the aim is lightweight with good rigidity to aid smooth flying and adequate strength for those occasional faster-than-normal pit stops. The general trend is to cover the wings with a layer of

Figure 3



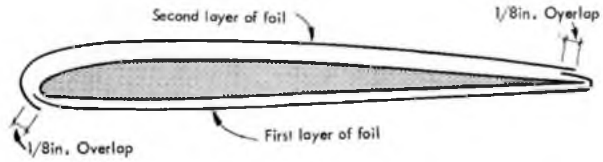


Figure 4

glass fibre cloth ($\frac{3}{4}$oz. per square yard) and then literally scrape-on sufficient epoxy to just fill the cloth. The wing is then finished in the normal manner, i.e. dope and filler to give a smooth surface.

There is, however, another method available which is somewhat simpler in operation and gives even more rigidity than the glass fibre method: covering with aluminium foil.

The merits of this system were adequately demonstrated a couple of years ago at the British Nationals by the well-known Danish team of Bobjerg/Siggard. At one of their pit stops (in the semi-finals) the balsa wood core of their wing was quite clearly heard to break, however they were able to continue their flight with the broken part of the wing being held in place by the strength of the aluminium skin! The foil used by the Danes is approximately $2\frac{1}{2}$thou. (·025in.) thick. The method of applying this material is very straight-forward; first the balsa wing is carved to shape (note that lighter stock than normal can be used for the wing since it is only acting as a core, all the strength being supplied by the aluminium. However, it is still advisable to use a hardwood leading edge on the outer wing to prevent it from crumpling on contact with the pitman's hand). The wing is then given several coats of dope, sanding down between each to achieve a good smooth finish. After the final sanding the wing is carefully cleaned to remove all particles of dust as any imperfections or particles on the wing will be very clearly visible through the aluminium foil.

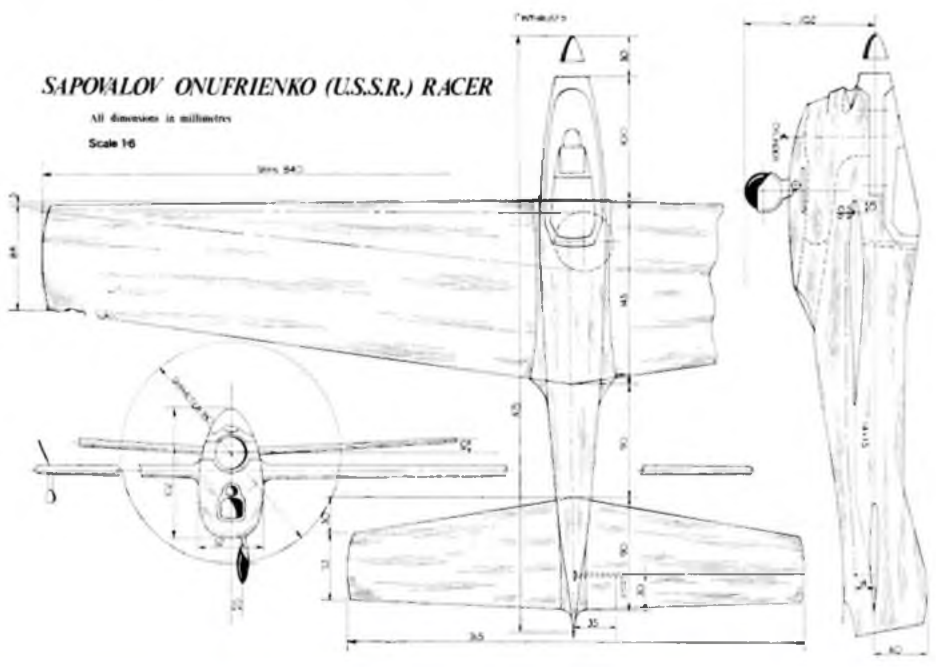
A piece of foil is then cut $\frac{1}{8}$in. larger overall than the size of the wing and both the foil and underside of the wing is coated with contact adhesive (3M's Fastbond or similar). The adhesive should be thinned down (with cellulose thinners) so that it can be applied easily with a dope brush to give a uniform covering. This is allowed to become tack dry before the foil is laid in place, lining the edge of the foil up with the leading edge and bending the foil up around the trailing edge $\frac{1}{8}$in. as shown in *Figure 4*.

The foil is pressed carefully into place using a soft rag; great care must be taken when rubbing the foil that no pressure is applied through hard spots, i.e. rings or fingernails, as the resulting dents are permanent! This process is repeated for the upper surfaces, this time starting at the trailing edge and working forward. By carefully rubbing the overlapped edges, the difference in thickness will 'disappear'. And that is all, if you have followed these instructions you will now have a light, very rigid, fuelproof wing . . . or the only pair of aluminium foil covered hands in team racing!

Therefore I think it can be shown that there is no *need* for a stereotyped pod and boom model to dominate the current racing scene. In fact, the exact reverse is true – if we all try out our own ideas then by observing the success and failures of other competitors we shall all learn something new and thereby make progress. So come on you designers: do not be fooled into the belief that pod and boom is the answer – get back to the drawing board and let us see more varied models next year. To start you thinking take a look at the plans for the two flying wings that were seen in '74, both of these were somewhat experimental models but both have already met with a reasonable amount of success.

Surely the criteria of whether any particular model is modern or not is dependent upon its capability to win competitions, and not its outline shape?

Ekholm of Finland warms up his 'Karbunkle' design - which won the 1971 International. . . . another non pod-and-boom design! The conventional model still remains supreme, so what defines a 'modern' racer?



The Free Flight Scene

this month: Bob Bailey

IN THIS SERIES of articles, it is intended to provide technical comment on the 'latest state of the art' concerning free flight contest modelling. We hope that the experts and many of the 'regulars' will bear with us in reading some of the contents, since much of what we write is intended for those modellers who would like to try their hand at competition free flight. The material content is, of course, also intended to help modellers who might not be able to attend many contests, since these events are the ideal medium for talking to other modellers, picking their brains perhaps (they will almost invariably be more than willing to give helpful hints and advice on any difficulties) and generally 'soaking up the scene'.

Pursuing this theme a little further, I would repeat that we wish to hear from *you*, the readers, not only on the content of the articles, but we can act as a medium through which we can pass on ideas, and report technical developments and, above all, answer problems.

POWER – TECHNICAL COMMENT

In my articles, I shall try and report on developments, etc., with Power models – in particular, FAI which, by its very nature, demands a fair amount of development work on motors, propellers and airframes to make models competitive. In particular, I hope to provide some progress reporting on the Power Team's preparation for Bulgaria (its going to be hot out there in more senses than one!).

By contrast, Open Power modellers (with one or two notable exceptions) put much less refinement into their models compared with FAI followers. This may be because they are reckoned to be much more expendable than their more expensive brethren; but with the price of materials being what it is, the actual cost difference is probably rather less than might at first be thought – particularly with the large '40 size' models which undoubtedly have a big advantage in competition, as Russell Peers has shown fairly conclusively over the last two seasons.

Why use VIT?

VIT *(Variable Incidence Tailplane)* is currently in use on power models and, to a considerable extent, on Wakefields with the high power which is fashionable now.

To the average modeller it may seem to be unnecessarily complicated, but it does offer several advantages in terms of model trimming and performance. The following comment is written with Power models specifically in mind, but much of it is applicable to Wakefields, as Ron Pollard's articles in the last two months will have revealed.

To explain the system: during the model's flight, four events occur in sequence, but not necessarily in the order written down.

- *(a)* Engine stops.
- *(b)* The rudder changes from climb position (straight) to the glide position (right turn, usually).
- *(c)* The tailplane changes incidence from climb position to glide position (for a model with a fixed, i.e. non-flapping, wing); the trailing edge moves up about $\frac{1}{8}$in. for a typical FAI power model. This represents an incidence decrease of approximately $2\frac{1}{2}°$.
- *(d)* Model dethermalises - we hope - there will be a bit more about dethermaliser (D/T) timers later!

For FAI Rossi-powered models, my own experience indicates the timing of events *(a)–(c)* as follows:

(b) follows *(a)* by about half-second. This delay is needed to allow the model to slow down a bit, since I have found that if the rudder comes in too early the model tends to roll left, resulting in a bad transition to the glide.

(c) follows *(b)* by one to two seconds. This interval is not very critical.

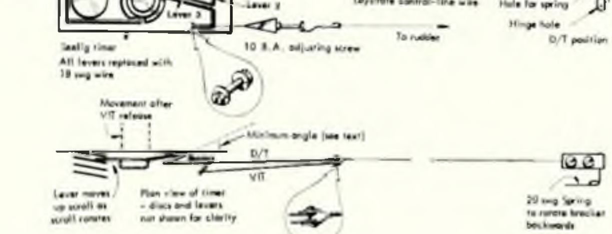


Figure 1 — Ron Collins' VIT system

The first three functions are all carried out by levers actuated by the engine mer. D/T is often operated by the same timer – e.g. Seelig or Ray Monks' timer – but not always. Having explained what happens, now for the advantages of using VIT.

Firstly, VIT makes the model *easier* to trim – in fact, an FAI power model is almost untrimmable without it, as I hope may become clear. It may sound paradoxical to say that adding gadgets to a model makes it easier to fly!

The reasoning is fairly simple. In the case of a power model, there are two distinct flying conditions which have little in common – climb and glide. The *climb* requires that the wing and tail be rigged at very similar incidences on the fuselage – about 1° more for the wing than the tail is typical for an FAI power model. If the incidence difference is much more, the model will produce some spectacular loops, particularly if there is a good Rossi at the front end! If this set-up is used for glide, the glide stability on a large heavy model with a rearward CG is very poor, and this means that the model tends to plunge all over the sky when gliding!

Returning to the practical mechanics of trimming, it is usually found that either the climb or glide can be set up correctly at the expense of the other. A cure usually requires some undesirable, and difficult, adjustment like moving the CG position. VIT enables the climb and glide to be set up *entirely independent* of each other. This brings us on to the other main advantage of using VIT. That is, a model with VIT is almost invariably superior in performance to one not so equipped. This follows from the fact that climb and glide are independent. The CG can be moved forward from about 95 per cent of wing chord to 75 per cent of wing chord, and the incidence difference between wing and tail is now about 3°. The glide performance is much more consistent with the incidence difference ensuring that the model recovers rapidly from a bad pull-out from the climb, or from turbulence, whereas the absence of VIT can easily mean loss of 50 per cent or more of the climb height from a

Tony Child of the Brighton club won the power event at the London Area's FAI meeting at Bassingbourn, when foggy conditions reduced the power run to just five seconds. Even so he dropped just 68 seconds in the three flights.

At the Norwind 'Novelty' indoor meeting, Peter Brannigan flew this tow-line flex-wing glider – his son, Nicholas, is seen releasing it at left. It was a very promising approach, but the straight glide killed its chances in the confines of a hall.

bad transition to the glide.

Now for the systems as used by the Power Team members. Starting off with Roy Collins' system shown in *Figure 1*. He uses a Seelig timer, which operates the VIT and D/T. An alloy bracket at the rear of the model determines the tailplane incidence. The bracket is held forward for climb so that the *rear* adjusting 10 BA bolt holds the tailplane trailing edge.

Lever No. 3 is released for auto-rudder, and lever No. 2 is released for the tailplane. The bracket rotates back slightly so that the *front* adjusting screw now holds the tailplane edge which jumps up to meet it. The bracket is moved by the 20swg spring and can rotate as far as allowed by the D/T line (lever No. 1). For D/T, lever No. 1 is released by the scroll and the bracket rotates clear of the tailplane trailing edge, allowing the tailplane to move to the D/T position. A separate line attached to the tail provides a stop for the D/T angle. Roy and Ken Faux both favour Seelig timers, but have introduced some modifications based on flying experience. Roy has replaced the flimsy levers as supplied with sturdy 18 gauge levers which are more rigid and cannot easily be put in the wrong slots – this could have disastrous consequences in terms of a contest flight, and quite possibly the model as well!

Roy also points out that the minimum angle shown in *Figure 1* is very important – the D/T lever (lever No. 1) rotates slightly as it moves up to the top of the scroll, and the D/T line can therefore move *back* during a three-minute glide. The result is a change in glide trim if this point is not closely watched.

My own system *(Figure 2)* performs the same functions, but in a different manner. I have favoured Autoknips timers for engine and VIT, since they have been more consistent than anything else I have seen so far, and a KSB timer operates the D/T.

Seelig timers have always seemed to me to be slightly suspect on consistency and reliability, whereas Autoknips are exemplary in this aspect.

In contrast to Roy's, the levers release all lines, which are consequently made of some material like multi-filament nylon *(do not* use mono-filament, it tends to break at the most embarrassing times).

An alloy bracket is mounted at the rear of the model and is actuated by a spring system similar to Roy's. The adjusting screw determines glide-trim. The VIT line holds the tailplane trailing edge down for climb via a small hook on the tailplane, climb incidence being adjusted by packing on the fuselage. For D/T, the bracket rotates clear on release of the D/T line. The VIT line provides the stop for the tail D/T angle.

In addition to Autoknips timers, I am currently using Ray Monk's timers as well (Autoknips are obsolete as far as camera use is concerned, and therefore difficult to obtain). Ray's timers operate D/T as well as VIT and are very smooth running and consistent. The mainspring bearings wore quickly on the original timers, but Ray has replaced all the necessary bearings so that this problem should no longer be present. He is working on a development to improve engine run consistency (very important with the seven-second rule coming in next year), and I shall report on this in a later article.

Ken Faux also uses a Seelig timer to perform all four functions (engine, autorudder, tail and D/T). His system differs from Ray's in that there are three independent lines, all of Laystrate control line wire, going to the rear half of the model. Since the fixing at the front of the model is otherwise identical to Ray's, only the rear half of the system is illustrated in *Figure 3*.

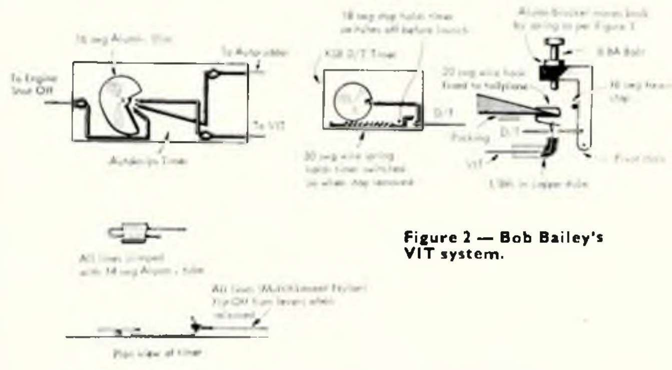


Figure 2 — Bob Bailey's VIT system.

The VIT line (lever No. 2 in *Figure 1)* releases a pin mounted under the fin. The tailplane can then slide up from the packing on the fuselage for climb trim to engage the alloy bracket for the glide. The bracket is released for D/T, the nylon line acting as D/T stop.

* * *

Talking of the seven-second engine run leads me to the next topic – how are we going to time it properly? Roy Collins and I,

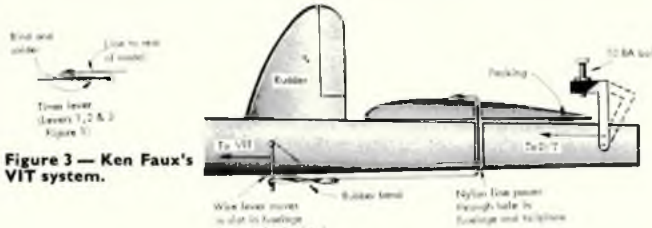


Figure 3 — Ken Faux's VIT system.

as members of the SMAE F/F Sub-Committee, have been asked to investigate ways and means by which this objective can be satisfactorily achieved. Investigations we have made so far have highlighted the severity of this problem. There are some people who *'don't want to know'* – SMAE members may have noted a recent letter in *Model Flying* on this topic, which had nothing constructive to offer and made an obscure comparison of FAI power models with dinosaurs!

I must emphasise that we have to make an honest attempt to enable timing of seven-second engine runs to be done fairly. Should this prove not to be possible, our FAI delegate will be able to present a strong case *backed by experience* to increase the engine run to eight seconds, which was the British proposal at last year's CIAM meeting. The British proposal was withdrawn when it was discovered at the CIAM meeting that there was no support for it.

In timing engine runs, there are several 'problem' areas:

1. Starting the watch as the model is launched.
2. Deciding when the engine has stopped.
3. Stopping the watch, on observing the time at which the engine has stopped.

One is not a severe problem, as it is quite easy to observe a competitor preparing to throw his FAI model. Thus, there is plenty of 'warning' of when the model takes to the air. The reaction time before starting the watch is kept very small, provided the timekeeper is awake! A reaction time of 0·2–0·3 seconds should not be difficult to achieve.

Two is very ill-defined, as most regular free flight flyers will know. The FAI ruling is that the engine run is considered stopped when the propeller has stopped. All very well in theory, but who can see a propeller on an FAI model at 500ft. altitude? Different people have different views on when the engine has stopped, and this is reflected in their timekeeping. For instance, some people wait until the model changes attitude if they are uncertain about when the engine stops – this actually happened to me at the World Championships in 1971! On that occasion, I was given an overrun of 11 seconds when everyone else timed it for nine seconds. Other people wait until the noise has died away – this includes the 'rundown time' when the engine is not doing any work: this period is quite long (about one second) when the model goes off trim and consequently is flying much faster than it would be if the model was correctly trimmed.

What is clearly needed is for a standard procedure to be set up which defines in a simple, unambiguous manner when the engine stops. My suggestion is that when the engine noise has considerably decreased – i.e. the power strokes have stopped – or the engine speed has dropped to about half the original speed, should be taken as the end point. I should point out that this is one area where *your* suggestions will be vitally important in solving this problem.

Three is, again, a somewhat contentious matter. Roy and I had an ideal opportunity at Bassingbourn on 23rd February when the fog restricted power flyers to very short runs of about two to four seconds. We took this opportunity to test people's timing of engine runs. Whenever a model was launched, several people timed the runs. The variation in the results was enormous. We found that some people stopped their watches one second – yes, one second – after others! On a four-second run this represents a 25 per cent variation in measured time.

This variation was due almost entirely to people's reaction times, and is so large that it is not acceptable. I believe that the practise of stopping a watch when the engine noise vanishes is archaic (I know that Roy Collins agrees fully, since he pointed out that it was good enough when engine runs used to be 15 or 20 seconds). Our observations show that it simply is not accurate enough. I therefore believe that a practical solution to this problem is to watch the second hand or the stopwatch and *listen* to the engine stopping. I tried this approach at Bassingbourn, and it seemed perfectly feasible.

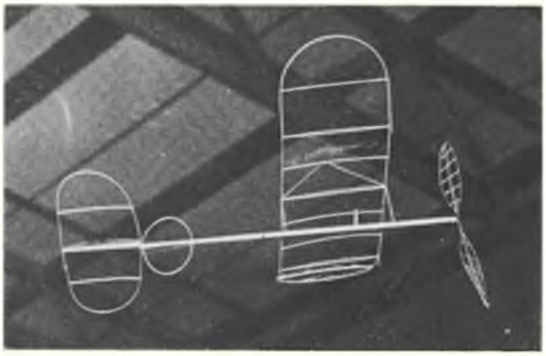
If one does not stop the watch, it is possible to detail a 'history' of how the engine stopped – e.g. main power stopped at 8.5 and 'burble' until, say, 10·2 seconds. Does that constitute an overrun? I do not think that it should, but your guidance is needed to help the F/F Sub-Committee to formulate a standard procedure for timing runs which I think must be adhered to for *all* competitions.

An entirely different approach to the problem has been suggested by several people. Each competitor has his engine runs checked on the ground. The timer setting for this run, if the timing is satisfactory, is marked, and it is the *timekeeper's* responsibility to ensure that the competitor's timer is correctly set before launch. This check provides the assurance that the engine run is OK.

The idea is simple, not too difficult to carry out in practise, and eliminates the above problems. There are two possible disadvantages.

(a) If the timer is erratic, the engine run-time is not sufficiently assured.

(b) If the competitor prefers to see the timer run down to the mark before launching, this could cause problems for the organisers/timekeepers. However, the system is worthy of further consideration.



Mike Fantham's indoor FAI class microfilm model reaches for the ceiling at last February's East Grinstead meeting – a popular well supported contest.

Ron Green, who's indoor EZB drawing was published last month also won the Wakefield class at the London Area's Bassingbourn meeting with his very typical approach to modern rubber flying. Wing features extensive anti-warp structure.

A NEW CLASS – 0·5cc VINTAGE REPLICA?

Jim Moseley has sent a proposed set of rules for a new class of vintage model. These are:

1. Maximum engine capacity: 0·55cc.
2. Maximum wingspan: 36in.
3. Engine run: 15 seconds ROG (rise off ground).
   Engine run: 12 seconds HL (hand launch).
4. Eligible: Designs published before January 1951 – same as current vintage rules.
5. *(a)* Designs to be scaled from the original in outline – e.g. cross section, airfoil, angles, etc. Structure must follow same trend as original – e.g. sheet may not replace built-up construction.
   (b) Existing small designs may be used and lightened if desired. Examples are: *Jr. Mallard, Slicker Mite, Fubar, Gossamer,* etc.
6. Number of flights to be determined by the contest director on the day. Probably three or five flights of 2–2½ minute maximum.

Sponsored events will be held at Vulcans Rally, Leeds Rally, N. Area Rally, Northern Gala in 1975.

Kits available are *Strato Streak, Playboy, Brooklyn Dodger* and *So-Long,* from Bob Ashby, of Bob's Models, at Batley, Yorkshire.

Brian Picken releases his helicopter at the Norwind 'Novelty' do – reckoned it flew better in his lounge! The winner of the towline glider category was John O'Donnell with a relic from the late 1950 Corn Exchange Meetings, with Plasticene substituting for the prop. and an offset towhook added.

INDOOR MATTERS

I have to hand the minutes of a recent Indoor Sub-Committee meeting. This was held at Brize Norton during one of the winter flying sessions, which were not overcrowded and very enjoyable. The meeting took place while the simulator fans were switched on, rendering the air so turbulent that flying was temporarily impossible!

The main points arising from the meeting were:

1. The Free Flight Indoor Nationals (to be held at Cardington) were moved from the August date (which clashes with the World Championships) to 5/6th July. Events will be EZB, Pennyplane, FAI and Open Microfilm, and Chuck Glider. Scale remains at 17th August.
2. The number of official SMAE classes has been increased from one (FAI 1-gramme microfilm) by the addition of two extra classes:
   (a) EZB. This class has gained immensely in popularity over the last twelve months, and the specification is as follows: *Maximum projected span:* 18in., 3in. chord maximum. *Wing and tail:* No curved outlines allowed; solid motor stick and tailboom; no bracing of any kind; no built-up propellers; no weight restriction; paper covering only.
   (b) Open Microfilm. No restriction on size or weight, except that model must be microfilm-covered.
3. Record attempts will be accepted for the above classes on the following basis:
   (a) Records for ceilings more than 10m height and for ceilings less than 10m height. The existing rules as regards who may wind, and steering, etc., are the FAI rules. It is hoped to clarify these in a later article.

New records must exceed the existing one by at least 10 seconds. One stopwatch and observer is required. The Records Officer will be R. Parham, of 3 Tayson Way, Malvern Link, Worcestershire.

It seems that one division of ceiling height is somewhat restrictive – the advantages for low ceiling records must lie with those who can get to the site with the highest ceiling. For instance, there is considerable variation between different sites over the country – e.g. Brize Norton, 30ft.; East Grinstead, 27ft; Wigan, 25ft.

The Americans have a well-tried system for compensating for different ceiling heights. This is the NIMAS *(National Indoor Model Airplane Society)* 'Fudge Factor'. The flight time is multiplied by the fudge factor appropriate to the ceiling height to give a score factored to a 35ft. ceiling.

If this method is applied, an equal chance is given to every low ceiling site to give a record flight rather than the main opportunity being given to the competitors who can get to the highest ceiling site. The NIMAS fudge factors reproduced from *Indoor News and Views* are, for rubber models:

Height	*Fudge Factor*
18ft.	1 . 394
20ft.	1 . 323
22ft.	1 . 261
24ft.	1 . 207
26ft.	1 . 16
28ft.	1 . 118
30ft.	1 . 08
32ft.	1 . 046
34ft.	1 . 014
35ft.	1 . 0

The Americans have a 'Top 10' for EZB, in which competitors submit their best flight times every so often. The flight times are multiplied by the appropriate fudge factor, to give a score which determines the competitor's position in the Top 10. I am certain that the current interest in low ceiling flying will ensure the success of such a scheme in Britain. From the American results I've seen, we have some catching up to do to compare with the top five!

ST. ALBANS SPRING GALA – *6th April, 1975, Bassingbourn*

The best flying day for many months made the contest a most enjoyable affair. One hundred and twenty-seven entries in six events ensured a hard-fought contest, and so it proved to be with flyoffs in all six events, causing a slight organisational headache!

Despite the excellent conditions, which were strongly reminiscent of Wiener Neustadt or Pierre Trebod, with a nylon streamer weaving intricate patterns in the air, FAI power produced only two full houses out of eight.

Unsuspected downdraughts were a major problem to all flyers, power included. The FAI power flyoff was to a four-second engine run, and was very close with both engine runs well inside the limit. Applying a four-minute maximum to Open Rubber reduced the number in the flyoff considerably!

Jim Baguley, Pete Harris and Russell Peers were the most successful in sharing seven places out of eighteen. Julian Hopper was very unfortunate in having his tailplane fall off during the power flyoff, when the model was at a very useful altitude.

Results:

F1C *(8 entries)*. 1. P. Harris (Birmingham) M+2:03. 2. R. Monks (Birmingham) M+2:01. 3. R. Collins (Anglia) 14:55. **F1A** *(40 entries)*. 1. J. Baguley (Norwich) M+2:36. 2. P. Kimber (Stanstead) M+2:02. 3. G. Madelin (Cookham) M+1:44. **F1B** *(14 entries)*. 1. R. Pavely (Norwich) M+2:24. 2. J. Baguley (Norwich) M+2:10. 3. D. Greaves (Birmingham) 14:42. **Open Power** 1. R. Baggott (Birmingham) M+6:10. 2. R. Peers (Falcons) M+5:02. 3. P. Harris (Birmingham) M+4:20. **Open Rubber** *(14 entries)*. 1. R. Peers (Falcons) M+7:22. 2. J. Cooper (Southampton) M+6:32. 3. R. Wells (Norwich) M+6:02. **Open Glider** *(39 entries)*. 1. A. Jack (Southampton) M+3:30. 2. J. Baguley (Norwich) M+3:00. 3. P. Stewart (Cookham) M+2:56.

Our columnist Bob Bailey not only flies power models – he is also gaining a keen interest in indoor modelling, quite a contrast! Here he get down to the serious problem of launching his microfilm model at the East Grinstead meet.

CLUB NEWS

A SLIMMER POSTBAG this, reflecting, perhaps, a return to a spell of distinctly unflyable weather. Spring is the time of the year when we begin to look outwards from the workshops and clubrooms, but, although the daffodils are beckoning through the sleet and showers my new Coupe d'Hiver remains discreetly unfledged. But hope springs eternal, etc.

It always is the purple passages that catch the eye, and this is certainly true of **Long Eaton MAC's** *Informer*. Kit Spackman, the editor, tried to enhance the readability of his newsletter by going over to a gruesome green, but hope, like the print, quickly faded, leaving the pukish purple parts loud and clear by contrast. The issue happens to be a somewhat technical one, delving into the abstruse mysteries of fuel brewing and the why's and wherefore's of split radio frequencies. Fuel is, of course, a big expense factor these days, but with the split frequency system knocking the models out of the sky you won't need all that much splosh. A few comments made also on all those lush goodies on display at the Nuremburg Toy Fair, with not a little chagrin at calling all the super pieces of machinery, toys. Personally, I am all for a return to the simple life, with model flyers making their own 'goodies' out of the basic means. The more we come to depend upon the commercial package the less are we masters in our own hobby house.

High Flyin is very much the watchword on the **Anglia MFC's** highly countrified flying field, for the continual rains have given it a 50 per cent water content. *High Flyin* is, of course, the name of the club magazine. It is produced in booklet form and contains a goodly mix of news and feature. The club has a very large radio content, and a very much up-and-coming free flight section. To give an idea of the expanding nature of Anglia free flight, the big contingent that attended the Area meeting at Bassingbourn in March fielded no less than eight entrants in the KMAA Cup for Glider. Plenty of entrants, too, it is hoped, for the series of One Model Coupe contests to be held throughout the season. The design springs from Ray Paveley's very fluent drawing board, and has already proved itself on the contest field. About six have been built so far. Going from one contest extreme to the other, the newsletter includes the Club 20 rules for pylon team racing. The club is not without experience in the hairy art of pylon racing, staging many of its own events with its own special equipment.

Still in the same part of the world, we have to hand the March/April issue of *East Anglian News*. Perhaps the piece of news of most import is that the Area Committee has sent a resolution to the Society that it should offer a research grant to a University or other institution for design work on silencers for model engines. It would be a worthy venture, but what are the manufacturers doing about it? An overall ban on power flying – always on the cards – would hit them the hardest. Back to more parochial affairs, it could be that the East Anglian Area, with its 17 clubs, is getting too big. Distances within the area are certainly vast – a factor of some concern in these mpg-conscious days, and it is understandable that the Anglia free flight boys, who live in the western part of Essex, should opt to fly at London Area's Bassingbourn site rather than the East Anglian Area venue at far away Watton. However, as pointed out, it does tend to split the Area down the middle, indicating the need for some re-thinking. The newsletter is enlivened and given extra substance by the inclusion of a number of member clubs' bulletins, best known of which is the **Thetford** *Panic Button* which, I believe, once enjoyed an independent existence. Apart from the general interest given by these newsletters they contain quite a number of useful tips and bits of information. For instance, from 'The Expert's Way' by Bob Ellis, in the **Newmarket Club** section, we are given a few encouraging pointers on how to get that recalcitrant engine to start – mainly its a matter of thoroughly knowing your engine and seeing that your glow battery is up to scratch.

Main news from the Leicester MAC Bulletin is of the formation of an R/C Glider Group within the club, and the need for such was demonstrated at the first meeting of the Group – no less than 14 models were rarin' to go. Chairman, Mike Pitchers, and the Gerrard brothers, also on the committee, supply the experience to the enthusiastic following. One thing about Radio Gliders is that no one is likely to complain of the noise, unless the winch needs oiling, but towing up can be a problem. You need to be strong and agile to lodge a large glider into the thermal regions, and the only hope for the middle-aged manipulator is the club winch.

In the **Three Kings** *Court Circular* the saga of Croydon Airport reaches its between the wars millenium, and the history of Croydon during those years, from Vickers Vimy's to Handley Page *Heracles* is the history of the origins and growth of passenger flying, from an adventure to a routine. And back in history, too, at Old Warden, no less, where members venture for first-hand info on those scale veterans the club turns out so prodigiously. Ideal time is the winter months, when visitors are sparse, to get a close look at the scale detail, or rather, detail for scale. But the gargantuan efforts now coming off the stocks, like a 63in. *Gladiator* and an 11ft. job by Vic Wilson, make it not so much scale as part size. Biggest threat to the circle is a *Fournier* motorised glider. Rumour has it that wingspan is such that no lines will be required, just handle to lead outs. Did you realise that model building and flying was a physical recreation? Now that the SMAE is a member society of the Central Council of Physical Recreation we must think in these muscular terms. No direct benefit results from this association, but, according to Norman Chapman, the idea is to secure a greater recognition of model flying and its needs. It is a pity that hobby activities, such as model flying, cannot be evalued on their merits as cultural interests, and given state assistance on that basis, as is the case in many other countries. Another question? Who is the General? The title crops up generously throughout the newsletters, and we wonder how the particular member came to earn his high-ranking appellation. Or does it infer that he is a general dogsbody, like most hard-working officials?

The founder members of the **Avondale MFC**, have had to cope with a rapid growth factor since the club was formed in November of last year. Membership, which started off at a modest figure of seven, has shot up to a full capacity of 50, with ten hopefuls on the waiting list. Mr. T. G. Spiers, the Hon. Sec., says that this stunning success is due largely to the opening of a model shop in the locality. Possibly another enticing factor is the use of Long Marston Airfield, for which the club has negotiated sole flying rights. Club interests range not only across the field but into the water, too; for among the gliders, radio models and helicopters there is a power boat. Any club seeking a friendly contest or an invitation to fly at Long Marston can contact Mr. Spiers at 76 Fairfield Road, Evesham, Worcs. (phone Evesham 3117) or Chairman, R. Grimmett at Evesham 45828.

According to *The Scimitar*, the newsletter of the **Buckaneers Model Club**, even that rugger field is worth a 'try' when looking for a flying field. For 55p per member per annum they have the use of the field, bar and other amenities of the local rugger club. It is now a question of using those ear plugs to cut out the model noise or the equally rumbustious songs. Even so pylons and high goal posts make for interesting flying schedules. The club had a good day out at the Nene Valley Club's flying site for the 1st Open Club 20 (Pylon Racing) meeting of the season. The 36 entrants elected to fly in spite of the drizzle, and an exciting day was had by all. One tiny reservation, though. The idea of Club 20 is to keep all systems at club rather than expert level, and there were obvious breaches of the rules in the all important engine area. Let the Boy-os in with specially tuned motors and the club laddie is sunk.

Fed up with Limbo, Aerobatics, Pylon Racing, or even heart-stopping Spot Landing? Then take a leaf out of *Flypaper*, newsletter of the **Sussex Radio FC.** They have evolved a whole series of new and exciting events, of which I can only describe one. An egg cup type container is attached to the fuselage and a ball balanced in it. The model is flown over the target, the model put into a roll (very tasty) and the ball ejected on to the target. It is, of course, advisable to use a radio model for this purpose.

We see in *Star Skippers* newsletter of the **Flying Dutchman Club** of New York, that Stephen Carr of Liverpool topped the result sheet in the HL Glider Indoor Postal Contest, organised by the *National Free Flight Society*. The Dutchman club concentrates on the simple glider and rubber models with which the 10–15 age group can successfully cope. So many young people come to grief on kits and plans far in advance of undeveloped abilities that such a club fills a very real need.

It is 40 years since the **Chicago Aeronuts** launched their punning appellation on a world not yet weaned from such delicacies as bamboo and oiled silk, and they celebrated the 40 years on by a gathering of the aeromodelling greats: people like Carl Goldberg and Pete Vacco. The club has enjoyed a long history of success in the contest field, and, at one time, back in the late 30's, held no less than 35 national records. We look forward to the next 40.

More reports required. **Clubman**

Contest Calendar

24th–26th May	**BRITISH NATIONAL CHAMPIONSHIPS:** At RAF Finningley, Nr. Doncaster, Yorkshire.
1st June	**SMAE INDOOR MEET.** General indoor fly-in, at Cardington, Beds.
1st June	**FELTHAM C/L RALLY.** FAI, Goodyear, combat. At Charville Lane, Hayes, Middx.
1st June	**NORTH CHESHIRE R/C FUN FLY/ THERMAL MEET.** Venue: Hadfield Centre, Nr. Glossop, Derby. Car park, toilets, food, etc. available. Enquiries (sae) to R. Wilson, 92 Mottram, Old Road, Gee Cross, Hyde SK14 5NJ, Cheshire. Note: efficient silencers essential, also proof of licence and insurance.
8th June	**FLYING DRUIDS R/C FLY-IN.** Pylon (open and max. ·20 engines), spot landing, most spins. Details: A. Bull, 69 London Road, Amesbury, Wilts.
8th June	**R/C CHARITY RALLY.** Fun-fly comps., class 2 scale, helicopter. Good prizes! Good family day out – refreshments, etc. available. Venue: Valence School, Brasted, Kent.
15th June	**SMAE 3RD AREA CENTRALISED MEET.** FAI rubber, open P/G Area venues.
15th June	**BUCKANEERS C/L STUNT MEET** at Rickmansworth, Herts. Details: J. Mannell, 27 Kestrel Road, Bedford. Tel: Bedford 52960.
21st–22nd June	**CLWYD '75 SLOPE-SOARING MEET.** Saturday (from 2pm) R/C scale and intermediate. Sunday (from 10am), F/F and R/C pylon race and aerobatics. Pre-entry 50p by 7th June to: C. R. Filtness, 26 Raymond Street, Chester. Venue: Moel Famau, off A549, between Mold and Rutlin.
22nd June	**SMAE C/L MEET.** FAI, Goodyear T/R, speed aerobatics, combat, carrier. Venue: RAF North Luffenham, Leics.
22nd June	**YORK RALLY.** F/F, open R/G/P, combined mini, HLG. R/C, fly for fun. Venue: Elvington, from 10am.
28th June Saturday	**BURNS BROWN COMBAT MEET.** For Burns Brown Trophy plus good cash prizes! Pre-entry (35p) essential to P. Rabjohn, 47 Hillyfields, Dunstable, Beds. Venue: RAF Halton, Nr. Aylesbury, Bucks.
29th June	**ELLIOT MEC C/L RALLY.** Combat, Goodyear and FAI T/R stunt, scale. Further details: R. James, 21 Rochester Crescent, Hoo, Rochester, Kent ME39 JH. Venue: Elliot Bros. Airport Works, Rochester, Kent.
5th–6th July	**COMBAT INTERNATIONAL,** organised by Alfreton and District MAC. £5 entry fee includes camping facilities, every meal and a chance to win £200 worth of prizes. Full details: Dennis Degg, 31 Strettin Lane, Higham, Derby.

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For sale. 'Matador' kit, E.D. Racer, old type. E.D. Fury with throttle, £7. English, 184 Mansfield Road, Warsop, Mansfield, Notts NG20 0DG. B.

'AeroModeller' 1954 to 1971. *AeroModeller* Annuals 1954–55 to 1973–74. Model Aircraft 1951 to 1958. Sailplane and Gliding 1961 to 1968. Sae for complete list. Nichols, 1a Chichester Place, Brighton BN2 1FE. B.

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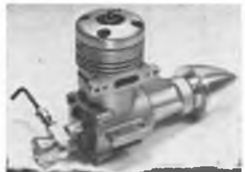

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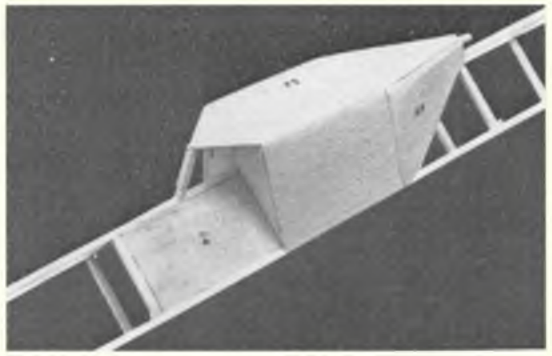
The Mentor's fuselage is basically a square box which is then tilted onto one corner to form a diamond shape.



The sheeting is added around former F1 and F2 to form a rigid mounting for the wing as well as forming the 'cabin' area.

BACK TO SQUARE ONE

more on building the Mercury Mentor rubber model

IN THE LAST issue we started building the *Mercury Mentor* in an unusual way – with the propeller first. As explained, we did this because if you have not tackled hand-carving of a propeller before there is usually a 'psychological block' with this task, which may even put youngsters off from purchasing kits with this feature. Well, as you saw, it was not as bad as it looked, and having completed it the rest of the model is plain sailing now, isn't it? (We haven't quite finished with the propeller yet, but it is best to complete the fuselage before we tackle the propeller and nose-block assembly – you will see why later.)

Fuselage

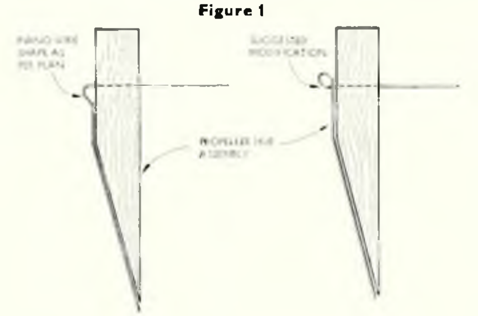
The fuselage assembly is quite standard – and, indeed, is exceptionally simple on the *Mentor* because no sharp bends are required in the main longerons, and the nose joint has a broad spacer instead of the normal simple ⅛in. spacer.

First choose four ⅛in. square longerons of even stiffness and then build two identical sides on top of one another just as explained in *Back To Square One* in the February 1973 edition of *AeroModeller*. If you cut the ⅛in. square spacers in pairs, then the two sides will automatically turn out identical. While the sides are drying, cut another complete set of pairs of ⅛in. square spacers of exactly the same sizes as used for the sides. These are used as spacers between the two sides to produce a perfectly symmetrical, square cross-sectional fuselage frame.

Now choose one 'corner' of the cross-section to be the top of the fuselage (if you have built it right, one corner should be as good as another!) and use the parts cut from the printed 1/16in. balsa sheet to build up the wing supporting platform-cum-cockpit. The plan and instructions are not very clear on this point and the photographs in this article will help considerably – particularly on the placing of F1 and F2.

All that remains before sanding down (using a sanding block carefully) is to remove the last few inches of the top longeron, the length behind the final spacer. This allows the two 'side' longerons to form the basis of the tailplane platform.

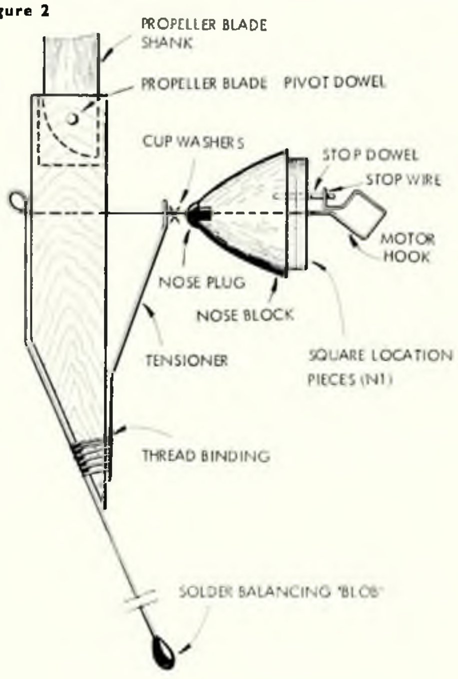
Figure 1



Propeller and nose block assembly

We can now complete the propeller end of the construction: firstly glue the two square pieces N1 (cut from the printed sheets) to the nose block cube. Make sure the N1 pieces are central and square on the correct face of the cube – offer it up to the plan to be sure you use the right face. When dry, *drill out the main shaft hole before carving takes place*. By doing it now, you can ensure that the hole is perfectly square to both sides *and* the hole will give you a good guide when shaping the nose block. Now, using a small dab of balsa cement in each corner, 'tack' the nose block cube in position on the fuselage front end. The squares N1 should fit snugly into the nose. When the cement is dry, start carving the nose block to the correct shape, using a sharp balsa knife (or razor-blade plane), and then garnet paper, ending up with a fine grade, giving a smooth finish. Carefully separate the shaped nose block from the fuselage again.

Figure 2



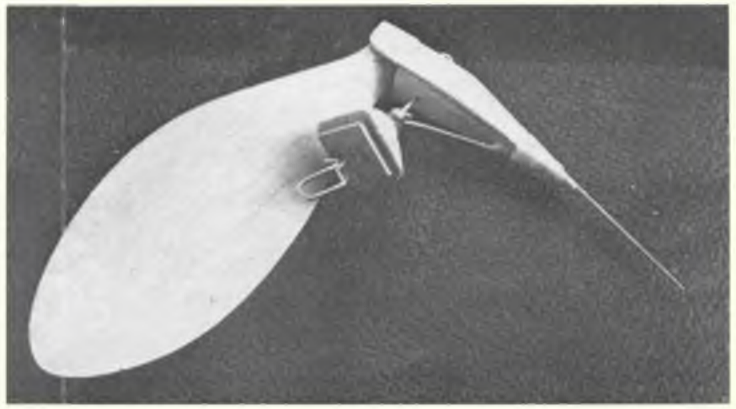
Now, with a larger drill, open up the first ¼in. or so of the shaft hole at the front end to allow the plastic nose plug to be inserted. Make sure that you drill vertically and that the drill remains central. It is best to 'creep up' in the drill sizes gradually, rather than go directly for the final size. Before pushing the plastic plug into the balsa nose block, thread a piece of the correct wire through the block and plug, and gently slide the two together. If the enlarged part of the hole is not concentric with the shaft, then you will immediately see the error and be able to correct it before it is too late. When everything is central and square, push the plug home with a smear of cement to secure it.

We now come to the other bit which sometimes puts youngsters off – the wire bending. The *Mentor* uses 18swg piano wire which is not particularly hard to bend with normal pliers, so we do not recommend any special procedures such as heating and rehardening. We made a small modification to the wire shape, as shown in *Figure 1*. As the wire has to make a right-angled bend into the hub-piece (to form the shaft), the plan shows a small 'hump' to allow engaging of a winding hook. We felt that a larger loop would be more suitable, and would also protect the wood from wear – so our first bend was a small circle of about ¼in. inside diameter, formed by turning the wire through 270° round a suitable nail, held in a vice or (better) round the jaws of round-nosed pliers. This was done so as to leave about 4½–5in. of free straight wire one end. In this free end a shallow bend is then made about ⅛in. from the circle to match the taper of the hub-piece, as shown on the plan. Do not guess or even measure this ⅛in. – simply offer the wire up to the hub-piece and make the bend precisely where needed.

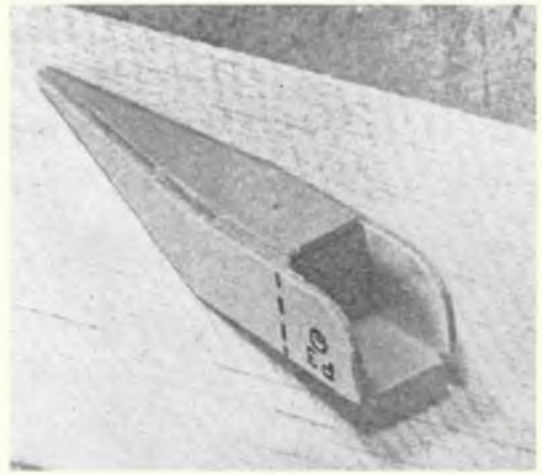
Now assemble the hub-piece and nose block on to the shaft as per plan (do not forget the washers!).

Next, bend the diamond-shaped rubber motor hook behind the nose block, ensuring that about ¾–1in. of total free play is available for the nose block to slide up and down at this stage. The 20swg wire tensioner is now bent to shape and inserted into position, and the two wire lengths both bound and cemented to the tapered hub-piece as per plan. When completed, the tensioner should be about ¼in. behind the rear of the hub-piece and, with the nose block just resting on this tensioner, there should be about ¼in. free play behind the nose block before it meets the rubber motor hook stop. See *Figure 2* for details.

Now, liberally dope the inside of the hub-piece where the propeller blade shank will fit, and let this dry. Do the same with the blade shank. *Carefully* drill the blade shank between the correct two faces at a position marked by offering the blade (the right way round!) to the hub-piece and using the side plate holes of the latter as the guide. The hole position must be drilled squarely and carefully and be positioned so as to allow the blade to be fully upright in its erect position and yet not foul the hub-piece when folding. After drilling, round off the leading corner of the blade shank to allow a perfectly free folding action.



The completed propeller assembly, as shown in Figure 2. Note how the propeller blade is hinged within the hub (see photo above) and how the wire tensioner pushes the propeller hub away from the noseblock assembly.



The basic propeller hub, before finishing – the ply facings have been added to the ⅛in. square tapered balsa block. The open box thus formed allows the propeller blade to fold back alongside the fuselage.

The blade is fixed to the hub by the ⅛in. hardwood dowelling provided and so the drilled hole in the shank must be a fraction over the ⅛in. to allow the blade to fold. Glue the dowel at the outside of the ply pieces of the hub – it will pay to cut off the dowel slightly proud here to avoid any chance of the blade springing out of the hub.

Finally, put the complete assembly into the nose of the fuselage and fold the blade until it lays neatly along the upper port side (left when facing the direction of flight) of the fuselage. Holding everything like this, poke a pencil through the side of the fuselage to mark the rear of the nose block (N1 rear face) just to the starboard of the short vertical 'stop' formed with the motor hook.

Remove the nose block and drill (with an ⅛in. drill) into the rear face parallel with the shaft, but about ¼in. away from it at the mark made above. Make this hole about ⅜in. deep and cement in a piece of the ⅛in. dowel about ⅞in. long. When complete, the dowel should just prevent the noseplug (or propeller) from fully rotating when the noseplug is held gently against the spring tensioner. You can now see what it's all about – as the rubber motor is wound up, its tension will force the nose block and propeller hub closer together and free the nose block from the control of the stop device at the motor hook. As the motor runs down the stop device gets nearer and nearer until at last it prevents rotation and the blade will fold itself flat against the side of the fuselage nose.

Dead clever! Don't worry too much about the action for now, we will need to adjust the tension position when we start to insert the motor later.

Wings, tailplane and fin

Little need be said about these items as they are all straightforward. Do not forget to build *two* centre panels (and make one of them right hand and the other left hand!) – the plan shows only one layout to cover both panels, a common space-saving device on plans. Also, be careful to keep the wing parts pinned down during all stages, and be very careful when shaping and sanding the leading and trailing edges, plus tips. The wing is