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APRIL 1990
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Issue 651

ISSN 001-9232

AERO MODELLER

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Cover: John Armstrong's AvroAvian, a star of past Old Warden meetings, basks in the Shuttleworth sunshine. A feast of top-class models coming up in our 1990 season of fun-fly rallies: see p.192 for details – and see you there!

ASP
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Advertisement Offices: Argus Specialist Publications, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST. Tel: 0442 66551.

Postmaster: Send address changes to Aeromodeller, c/o Mercury Airfreight International Ltd Inc, 2323 Randolph Avenue, Avenel, NJ 07001, USA.

Subscriptions: Direct subscription rate including Index: Home £23.40, Europe £28.20, Middle East £28.40, Far East 330.20, Rest of the World £28.70 or US $50.00. Airmail rates upon application from Infonet Ltd., 5 Riverpark Estate, Billet Lane, Berkhamstead Herts HP4 1HL. Tel: 0422 876661/4.

Overseas Availability: Second class postage paid at Rahway N.J. USA. Postmaster: send address corrections to Aeromodeller, c/o Mercury Airfreight International Ltd Inc, 10B Englehard Ave, Avenel, NJ07001. Distribution to news stand sales by Eastern News Distributors Inc, 1130 Cleveland Road, Sandusky, Ohio 44870. Distribution to North American hobby and craft stores, museums and bookshops by Bill Dean Books Ltd., 166-41 Powells Cove Blvd, Post Office Box 69 Whitestone NY 11357, USA. Tel: 1(212) 767-6632. USA Subscription agent Joseph D Daileda, Wise Owl Worldwide Publications, 4314 West 238th Street, Torrance CA 90505.

HANGAR DOORS

Above left and right: Senior and Junior winners at the DPR Chuckie championships – Phil Ball and Darren Bellworthy. Lack of space this month procludes more news of model flying activity at the ME Exhibition but watch out for our next issue. Right: David Newby's splendid Viscount in Manx Airways colours was built from APS plans and appeared at the 1988 ME. The airline actually got in touch afterwards and arranged a flight from Liverpool to the Isle of Man on the very aeroplane David modelled – lucky chap!

Great stuff!

One of the rewards of being involved in aeromodelling journalism is the opportunity to digest current trends. Most notable at the moment is the mushrooming renewal of interest in control-line activity, helped greatly by a hugely successful Eurochamps last year, and augmented by a healthy C/L entry at the Nationals in August. We at Aeromodeller have done our best to take this on board, so – as will have been noted – a considerable amount of space has been devoted to various forms of C/L activity to stand its revival on as firm a footing as we can manage. As a result, we have received an absolute flood of articles and plans for inclusion in the magazine, and can promise some fascinating projects for the season ahead. We're sure free-flighters don't begrudge this renewal of emphasis; they can expect their usual consignment of editorial space during the remainder of 1990 with some handy full-size plans too.

We're delighted that our 1990 ration of colour pages proved so popular. As a result, every issue from May will contain full-colour coverage of at least one feature. Lots more coming up too; here's to a great model flying summer!

Disc drive

Confirmation now of the Daedalus international Stunt and Combat meeting first reported last month. Venue is confirmed in the 1990 CIAM Contest Calendar at the village of Hem, near Amsterdam on 4-5th August. Events are Stunt, 1/2A Combat, A Combat and F2D Combat. Full details from Frank Smart at 1 High Street, Tredworth, Gloucester, GL1 4SP.

Doctor J F P Forster

With the passing of John Forster on 14th February in his 83rd year, aeromodelling has lost an important figure. Because he did not take up the hobby until the mid-1930s he absolutely refuted the claim that he was any sort of pioneer, yet if we take one of the dictionary meanings of this word ('an early leader') he was most certainly that. During WWII, when engines were unobtainable and the flying power models prohibited because of wartime restrictions, he kept interest in this branch of the hobby alive in his avidly read well-written column Petrol Topics, and there is no doubt that the upsurge of enthusiasm for power models immediately after restrictions were lifted was in large part due to his labours. In 1943 his book Petrol Engines for Model Aircraft appeared, and this is still regarded as the best in its field. A stout devotee of the practical power models he also promoted near-scale appearance, his two most famous models being his Spitfire (1943) and his fine Neptune flying boat (1945) both of them outstanding petrol-driven free flight models.

Professional and family ties limited his involvement at times, but with the coming radio control he modified and flew some of his old models by this means. A in-depth appreciation of his activities and contribution to the hobby will be given in a future issue of Aeromodeller. We extend our sympathy to Mrs Forster and family. **Al**

Dr J F P Forster, of Petrol Topics fame, with his Spitfire II.

More on the Indoor Scale Nats!

Over to Mike Hetherington for latest Alumwell news:

In conjunction with the extensive competition flying programme a series of talks and demonstrations have been arranged for the Indoor Scale Nationals, to be held at the Alumwell Centre, Walsall, on 22nd April, to be given by personalities from both the model and full size aviation scene.

Chris Strachan, the well known and successful free flight competitor, will give us the benefit of his experience by talking on 'Trimming for small halls'.

Builder of those exquisite scale models, Paul Briggs, will explain his finishing and detailing techniques. Aviation artist, pilot, aircraft designer and builder, Lynn Williams will give what promises to be a fascinating talk on his work.

In addition, at various times during the day, the splendid video film of last year's event, produced by David Hanks, will be shown on the large screen.

All this in addition to the top Indoor Scale craft of the year. Don't miss it!

Support Britain in Hungary

If you would like to support our team at the 1990 European Free Flight Championships at Domsod, Hungary in September now is the time to contact team manager Martin Dilly in order to be included on the official entry from Great Britain.

The dates are 8th-14th Sept inclusive, and the cost including meals and accommodation is 300 Swiss francs. Campers will pay 20 francs, plus 30 francs for the banquet.

Team member or not, you can fly in the Puszta cup, which is an FAI World Cup event and immediately follows the Champs from the 14-17th. Entry fee, which includes food and accommodation, is 140 Swiss francs. Domsod is a superb flying site, Hungary is a great country for a holiday; and if you're a fan of real ice-cream it's the place to be! For more details on either event send a stamped addressed envelope to Martin at 20 Links Road, West Wickham, Kent BR4 0QW.

'Umbrella, quick – the plane's getting wet!'

...so come to Shuttleworth!

Elsewhere in this issue we publish full detail of our 1990 Old Warden Season – but here's our chance to mention especially our curtain-raiser on 29th April; the ASP Designs Model Flying Day. Any model built from a design that has appeared in any of our publications (including Model Aircraft magazine) will be heartily welcomed. Airfield space will be given to R/C, F/F and C/L, and informal awards will be made to the craft we like best. Lots of enquiries already, we're pleased to say – and see you there too!

Pennyplane challenge

New target for Pennyplane fliers (see our Kenny Penny feature in this issue) is to win prizes of £100, £50 and £25 at Cardington later this season. What's a Novice? Someone who has never placed in the top three in a National Duration contest. There's also a prize for top expert in an 'Open' event £25, actually. Date? 2nd September. More gen next time!

WHAT'S ON

8th April
PETERBOROUGH MFC 5th ANNUAL SPORT AND VINTAGE DAY 'THE CABBAGE PATCH NATIONALS'
Venue: The River Embankment, Peterborough. Classes: C/L Old Time Stunt, Briish Nostalgia Stunt (1953-60), Yolcke Comp. Vintage A&B Team Race (Grass circle – large wheels advised!), Midge Speed, Vintage combat, Concours. F/F Jetex, CO_2, KK/Veron/Earl Stahl Flying Scale Rubber, Vintage HLG, Concours. Plus C/L and F/F small field fly for fun. Proof of insurance required. Contact: C/L, Mick Taylor. Tel: 0733 204484. F/F. Peter Gibbens. Tel: 0733 314741, or Mick Page. Tel: 0733 72533.

22 April
INDOOR SCALE NATIONALS
Venue: Alumwell Centre Walsall. CO/Electric, Open Rubber. Air Racing. Aeroplane Monthly Trophy for Best Ul;tralight Talks and demos. Contact: Doug Sheppard. Tel: 0272 697595.

29 April
WHARFEDALE & DMAC OPEN MINI GOODYEAR EVENT
Venue: Dewsbury. Contact: Jeff Smith. Tel: 0532 663432.

29th April
ASP DESIGNS MODEL FLYING DAY
Venue: Old Warden Airfield. Bring and fly any model from an Aeromodeller plan. Lots and lots of choice You must have a suitable model already! Come and enjoy this new event in our Shuttleworth season. Contact: Aeromodeller. Tel: 0442 66551.

29th April
WITHAM CUP EVENT CL
Venue: Clip End, Luton. Open Stunt, Vintage Stunt, Novice Stunt. Contact: Glen Alison. Tel: 0923 772675.

2nd May (Wednesday)
WEST LONDON MAC GRAND BRING AND BUY AUCTION
Venue: Large Hall, Rattle of Britain Club, RAF Station, Hillingdon Road, Uxbridge, Middx. Doors open 7.30pm. Auction starts 8.30. Sell off your surplus gear, or purchase some more! Loads of film, low-priced drinks too! Super raffle of three, four-stroke motors. Contact: Peter Nicleen, 176 Cherry Tree Road, Beaconsfield, Bucks.

5-7 May
BRISTOL AND WEST WOODBURY WEEK-END
Venue: Woodbury Common, Nr. Exmouth, Devon.

5 May
Champagne fly-offs for OR, OG, combined OP/SOP, Vintage Rubber. 5-8pm.

6 May
Open Rubber, Combined Open Power/Slow Open Power, Open Glider, Vintage to SMAE rules.

7 May
Combined FA15 rounds – Ray Inker Memorial Trophy plus prizes for to flyer in each class. Vintage to SE rules. 8am-3.30pm. Caravan accommodation at special rates. Sunday evening supper. Contest details and accommodation booking forms from: Elton Drew, 2 Downfield Close, Alveston, Bristol, BS12 2JN.

6 May
CONTROL LINE SCALE MEETING
Venue: RAF Hullavington. Contact: Martin Fardell. Tel: 0454 412486.

13th May
BLACKPOOL AND FLYER RCMS NORTH WESTERN HELICOPTER FLY FOR FUN
Venue: The Blackpool 200 Flying site, 5 minutes from M55. Classes: Beginners Hovering, Drag Racing, Auto Sport Landing, Bottle Knocking, Scale etc. Refreshments, Model Shop, Entry Fee £3.00. BMFA insurance required (insurance available on day £2.50). Contact: John Prothero Tel: 0253 855928 (Evening).

20th May
WHARFEDALE & DMAC OPEN AEROBATICS EVENT
Venue: Dewsbury F2B and Class 2. Contact: Jeff Smith. Tel: 0532 664432.

20th May
ASP LARGE MODELS FLY-IN
Bring and fly the biggest and the best! No free-flight models at this event; CAA rules demand that we use all the field for the R/C craft. Contact: RCM&E. Tel: 0442 66551.

20th May
THE BIRMINGHAM MFC CONTROL LINE FLY FOR FUN
Venue: Rubery Hill Hospital, Rubery, Nr Birmingham. General flying for all SAM and BMFA members. Speed and Stunt competitions to SAM 35 rules. Contact: Peter Martin. Tel: 021 459 5520.

20th May
THREE KINGS C/L SCALE FLY IN
Venue: Old Croydon Aerodrome, Purley Way, Croydon, Surrey. Stand Off and Profile Scale classes. Silencers and proof of insurance essential. Contact: Wal Cordwell. Tel: 081 764 1681.

26-28th May
BMFA FREE FLIGHT NATIONALS
Venue: RAF Barkston Heath. Top competition at this central airfield; three full days of activity for Mini, Open and FAI. More details to flollow. Contact: BMFA.

26/27/28 May
WEST MALLING 1990 INTERNATIONAL AIRSHOW FOR RADIO CONTROLLED MODEL AIRCRAFT
Venue: West Malling Airfield, Kent. 10.00am-6.00pm each day. Admission charges £3.50 Adults. £2.00 Children/OAP's advance tickets £3.00 & £1.50. All in camping passes (including barbecue) £8.00 Adults. £4.50 children/OAP's. Contact: WMMAS, 58 Salisbury Road, Tonbridge, Kent, TN10 4PE. Tel: 0732 350691.

3rd June
BLACKPOOL & FYLDE RCMS SCALE DAY
All welcome.
Venue: Not supplied, but contact: A Dawson. Tel: 0253 506513.

10th June
WHARFEDALE & DMAC 1/2A COMBAT EVENT
Venue: Dewsbury. Contact: Jeff Smith.

17th June
CHILTERN CUP EVENT CL
Venue: Slip End, Luton. Open Stunt, Vintage Stunt, Novice Stunt. Contact: Glen Alison. Tel: 0923 772675.

16/17 June
THE OXFORD MFC FREE FLIGHT RALLY
Venue: Port Meadow, Wovercots, Oxford. Saturday from 7.00pm progressive champagne fly-offs for A1 & CDH also HLG Comp. Sunday from 10.amm A1, CDH both in 5 rounds. HLG, Vintage HLG, Tail-less, Canards Combined, Vintage Rubber (34in Max span) Vintage Glider (A2 or 72in max span). No thermistors, Bubble Machines, Streamers on poles, or power models to be flown. Contact: Andrew J Crisp, 30 Portland Road, Summertwon, Oxford, OX2 7EY, tel: 0866 53800.

23-24th June
ASP SCALE WEEKEND
Venue: Old Warden Airfield. The world's best fun-fly scale meeting for R/C, C/L and F/F! Don't miss it! But Scale Models only, please. Contact: Aeromodeller, Tel: 0442 66551.

1st July
WHARFDALE 7 DMAC CLASS A DIESEL COMBAT EVENT
Venue: Dewsbury. Contact: Jeff Smith.

1st July
CONTROL LINE SCALE MEETING
Venue: RAF Abingdon. Contact: Martin Fardell. Tel: 0454 412486.

15th July
ROLLS ROYCE MAC VINTAGE C/L MEETING
Venue: RR Airfield, Hucknall, vintage T/R A and B, Old Tyme stunt, Vintage Speed. Fun Flying over grass and tarmac. Contact: Terry McDonald. Tel: 0332 511273.

15th July
ASP GOLDEN ERA, MODEL FUN FLY
Venue: Old Warden Airfield, Plenty of room for craft from those glorious twenties, thirties and forties. Scale and Vintage equally welcome! Contact: Aeromodeller. Tel: 0442 66551.

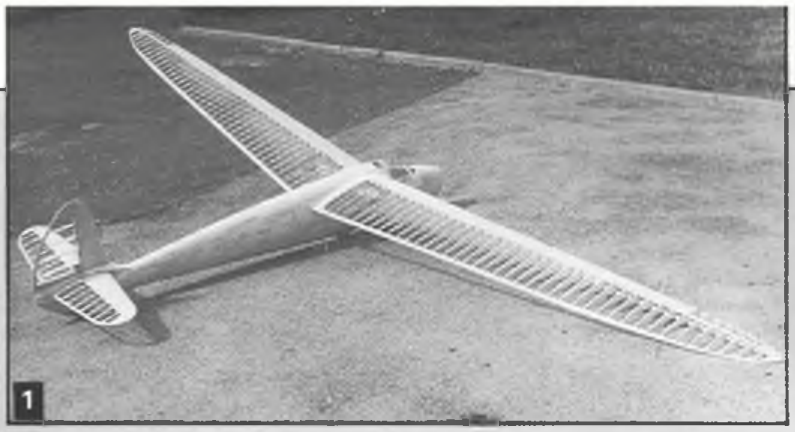
15th July
MORLEY INTERNATIONAL SILENT DAY FF
Venue: Heath Common, near Wakefield. Classes: P-30. Mint-vintage (up to Wakefield size). CDH, Dart Power. Maybe Chuckie. Contact: E Whitehouse, SAE to 29 Church Street, Royston, Berneley, S.Yorks, S71 4QU. Tel: 0226 726335.

15th July
KNAVESMIRE FREE-FLYERS ANCIENT AND MODERN SILENT MINI EVENT
Venue: York Racecourse. 10.00am start. Classes: A/1, CDH, CO Duration, Mini-Vintage Rubber, Mini-Vintage Glider, HLG. Handicap Flying Scale, Mini tail-less, P-30, Achilles kit Contest, Best Junior, Possibly more. Contact: John Pool, 8, Sycamore Road, Barlby, Selby, North Yorkshire, YO8 7XB. Tel: 0757 703060.

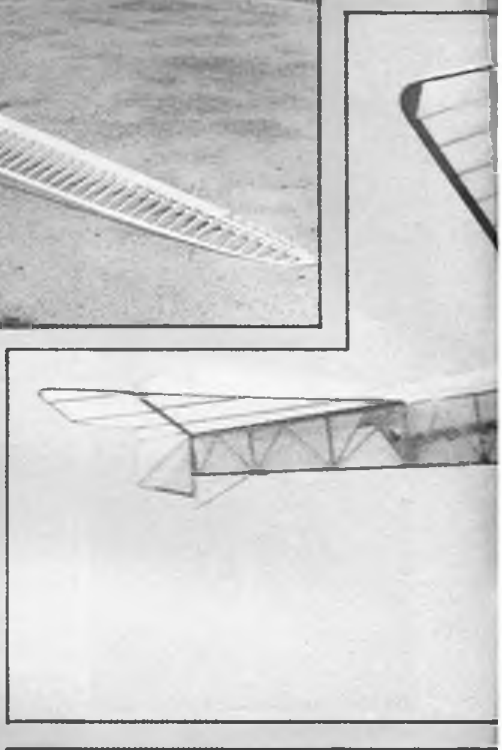
22nd July
BRUMFLY 90
Venue: RAF North Luffenham. 10am start. Competitions will be flown in rounds from a line. Classes: Open Power, Open Glider, Open Rubber, 1/2A, CDH, A/1. Send SAE, and submit name, telephone number, BMFA number and car registration before 15 July to Stafford Screen, 66 Stevens Close, Wollescote, Stourbridge, West Midlands. Tel: 0304 396535. Identification will be needed on the day.

29 July
NEWBURY & DMAS ANNUAL VINTAGE DAY
Ven ue: Newbury Racecourse, Newbury, Berks.
Control line and R/C Vintage ONLY. A full day's flying in a relaxed atmosphere. All welcome! Proof of insurance essential. Contact: Mark Bees. Tel: 0635 46426.

MODEL NEWS

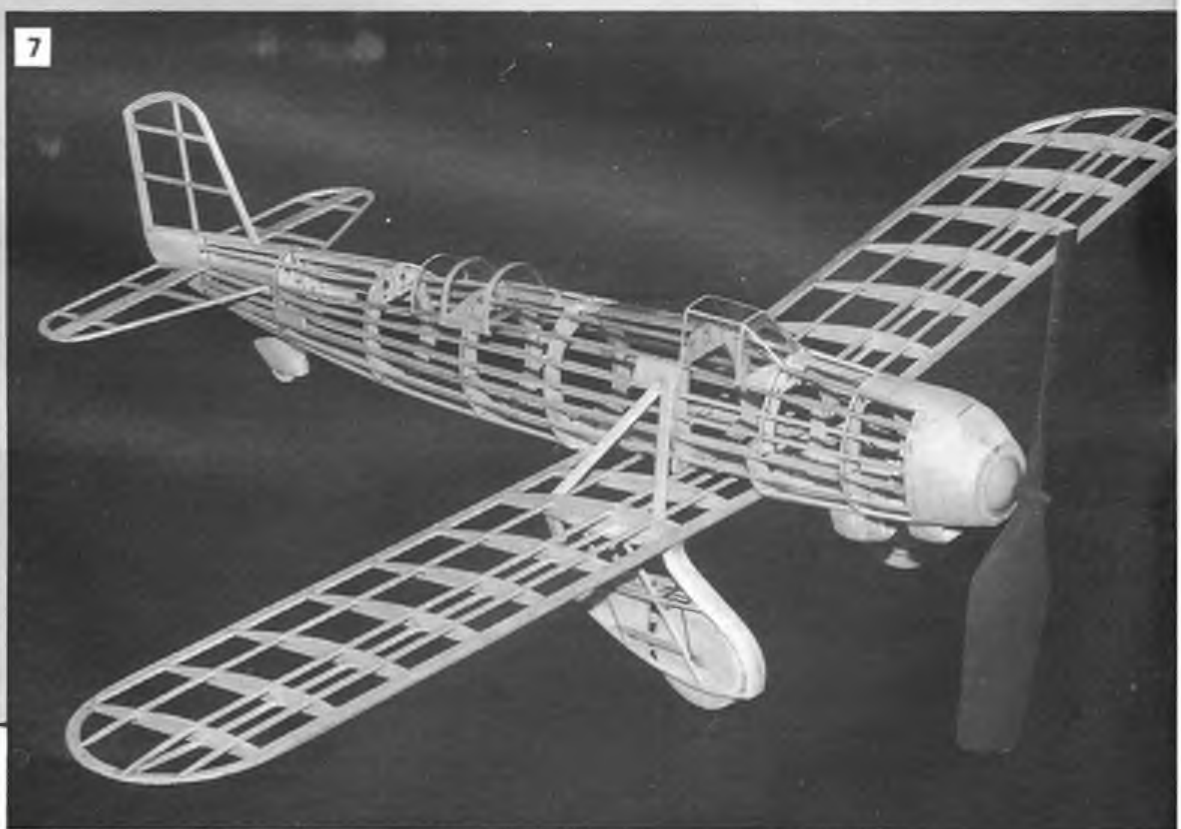


1: Ace Vintage Glider enthusiast Rolie Lelliott has chosen the imposing APS Celestrial Horseman as his latest subject. Just wait 'til it's finished... 2: Andy Sephton, ex RAF and now flying Harriers for Rolls-Royce, takes time out to admire his Hot Canary racer at the last Alumwell meet.



Another selection of shots from out and about – and indoor too. Send us yours and we'll print the best!

5: Neat Rumpler CIV for CO_2 power by Jim Latham is promised for Aeromodeller soon. 6: Robin Woodhead's neat Nobler seen at breezy Barkston Heath was a ME Exhibition contender too. 7: Super construction – Doug McHard's Curtiss Shrike is from the David Diels kit. 8: Ron Franklin winds his Flying Aces Moth, built from our Aeromodeller free plan.



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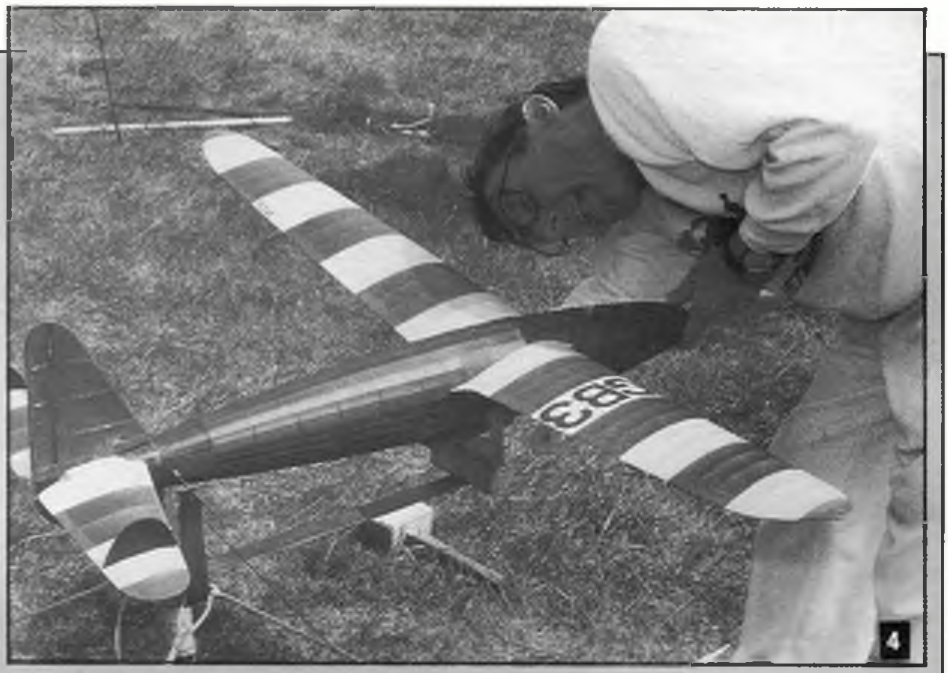

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3: APS Blackburn Monoplane flies sedately by at Old Warden Scale Weekend in gentle rubber power. 4: Peter Michel gets down to GB3 Vintage Wake business at the Nats. Time to start preparing for both events in 1990!

6

8

9: Bright Bellanca Aircruiser for full-house R/C snapped at the last Toledo Expo in the States. Glittery!

9

Pump up the volume! Doug McHard investigates air power and its implications

GOTTA LOTTA BOTTLE!

TECHNICAL advance rarely moves as a smooth progression. Every once in a while, the curve of the development graph is marked by an outsize blip. Some of the important model power plant blips have been the Brown Junior petrol engine, the Compression Ignition (diesel) engine, the CO_2 Engine and the practical Electric Power Unit. Each one of these has opened up a completely new range of model possibilities and now, in my opinion, we have another equally significant development with the appearance of the MM3 compressed-air motor from the Italian company of 'Z Model'.

Nothing new...

The compressed-air principle is, of course, not at all new. Some of the earliest flying models were powered by such motors, which were being made and flown long before the practical miniature internal combustion engine was developed.

For anyone interested in the history of compressed air (CA) power plants there is no better reference than the magnificent book produced by Bert Pond – the leading American CA expert – which was reviewed by Alex Imrie in his Vintage Column in the May 1989 issue of Aeromodeller. There are still a few copies available but hurry if you want to get one. The title is 'Expansion Engine Powered Model Aircraft'.

It is nevertheless true to say that although

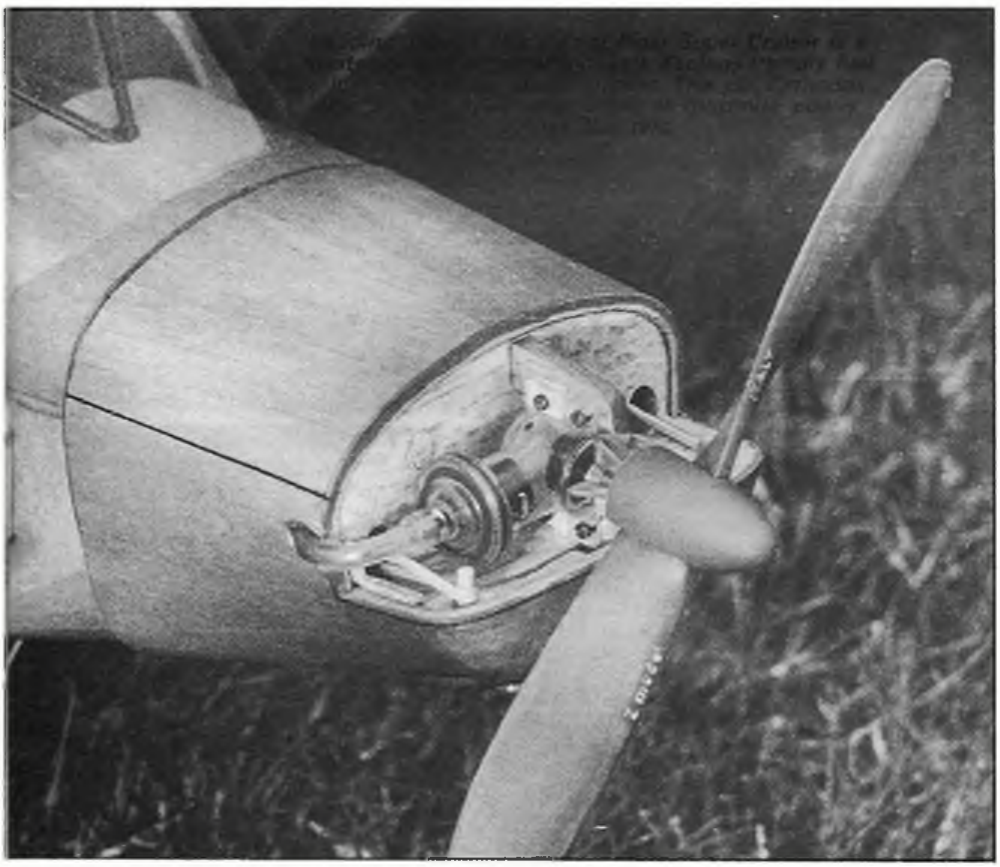
refinement and some ingenious innovations have taken place in CA engine design over the years, no really major commercial development has taken place for over sixty years. CA-powered models in the past have generally been somewhat freakish creations using an indoor model approach to construction, in order to achieve the very low airframe weights that were necessary in order to achieve satisfactory performance from the power available. They have also been big and susceptible to damage, these considerations being largely responsible for the limited popularity of the class, although the introduction of the lightweight plastic 'pop' bottle as a practical air container has revived considerable interest in this form of power in recent years.

...until now

With this new engine, most of the earlier CA limitations have been overcome at a stroke (or should we say several strokes). Using quite sophisticated injection moulded plastic parts for 95 per cent of its construction, and with several ingenious and highly significant design innovations, the MM3 presents us with a modern CA power plant offering enormous possibilities, although it is really marketed as a toy. The advertising blurb calls it Ecological Air Propulsion which seems to me a bit of a green mouthful! (Although the basic operating principle is not unlike that of a CO_2 Engine, the CA unit is completely free from the irritating icing-up problems associated with CO_2 in certain atmospheric conditions. But the bit that really appeals to me is that the 'fuel' is completely free, and the exercise gained by pumping up the tank can only do you good...

I first became acquainted with the engine at Old Warden in 1989, where it was being flown in a ready-to-fly all sheet balsa and obechi creation called Jonathan. This was going very well, despite its weight which topped 5.1/2oz for a span of 650mm – certainly no ultra light-

Suitably be-hatted, Doug launches Jonathan amidst the mountains of Bavaria. Healthy stuff! Super flyer is currently imported by Harden Associates who provided our own test example. More next month!

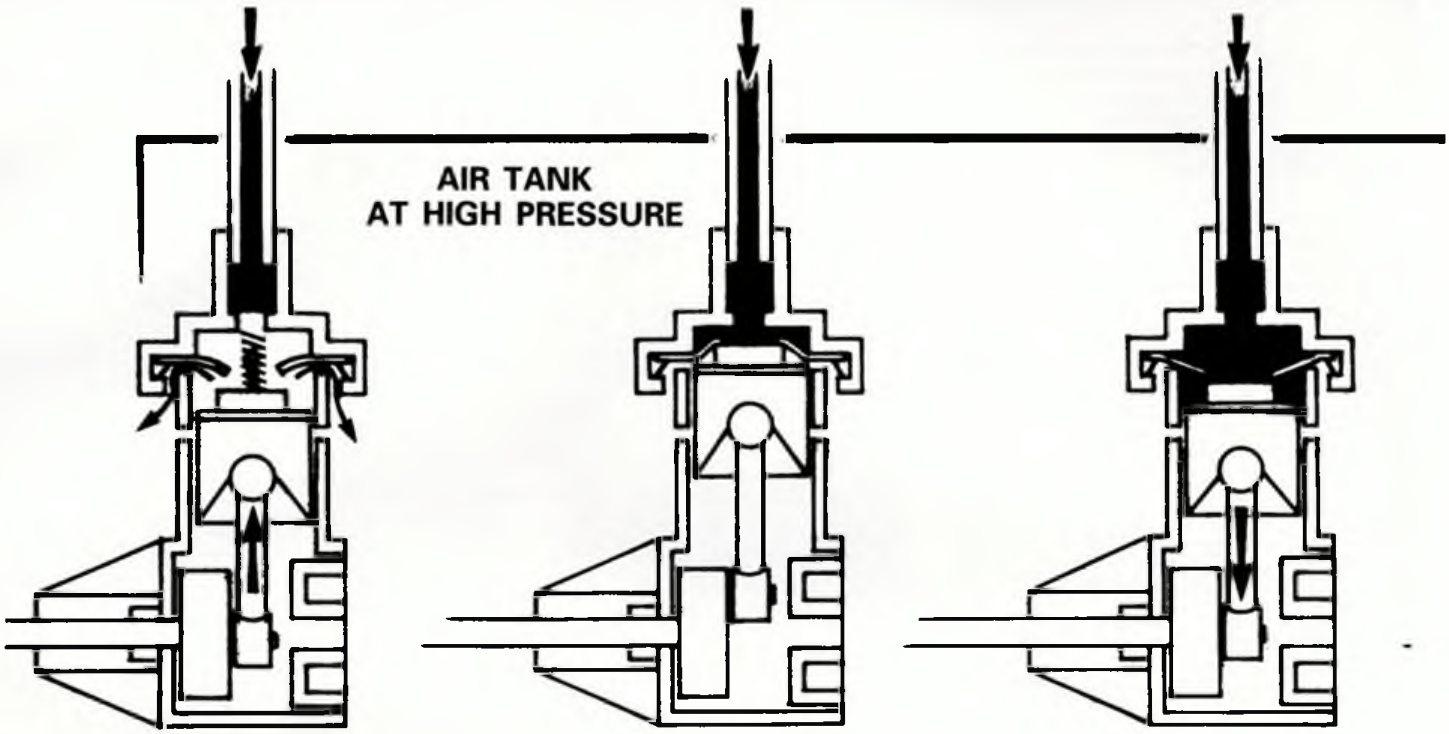


weight. The following week I was starting a holiday in Bavaria and managed to track down a Jonathan in a Munich toy shop. Having the opportunity to study the engine at close quarters really brought home to me its significance. A plastic bicycle pump is supplied with the model and fifty strokes produced sufficient tank pressure to run the risk of a fly-away. I must say that I became quite excited by the prospect of flying the engine in a scale airframe.

Just after returning to UK I attended the RAFMAA Championships at Watton. On the last day of the event I had the chance to give Jonathan a really good pump-up – 100 strokes in fact – and this was producing flights of between 1.1/2 and two minutes duration.

Having learned a lot about the operation of the engine in Jonathan I was anxious to find a suitable scale model for it. Searching through my plan collection for a suitable existing design, the nearest I could find was a 1950 Comet plan for a Piper Super Cruiser. This was 40in span; just a bit bigger than I would have liked, but it would take the air bottle with room to spare and it involved a minimum of effort in terms of design input before I could start building.

On reflection, I think an ideal size would be 36in span. Such a model would have a shorter nose and could, of course, be built a bit lighter, requiring less power to fly.However, my Super Cruiser with quite a beefy airframe, came out at just 60z. ready to fly and with 1.1/2 sq.ft. of wing area gives me a mere 40z. per s.ft. wing loading. Total weight of tank and engined is 49grams, roughly the equivalent of a suitable



In the 'at rest' position the head diaphragm is clear of top rim of cylinder thus allowing the piston to travel upwards without any resistance from internal cylinder air pressure.

The piston crown raises the head diaphragm valve lifter spring is compressed and air valve is lifted by piston pin just before TDC allowing high pressure air to pass for only a short period.

As piston descends, the head diaphragm seals off the head ports.

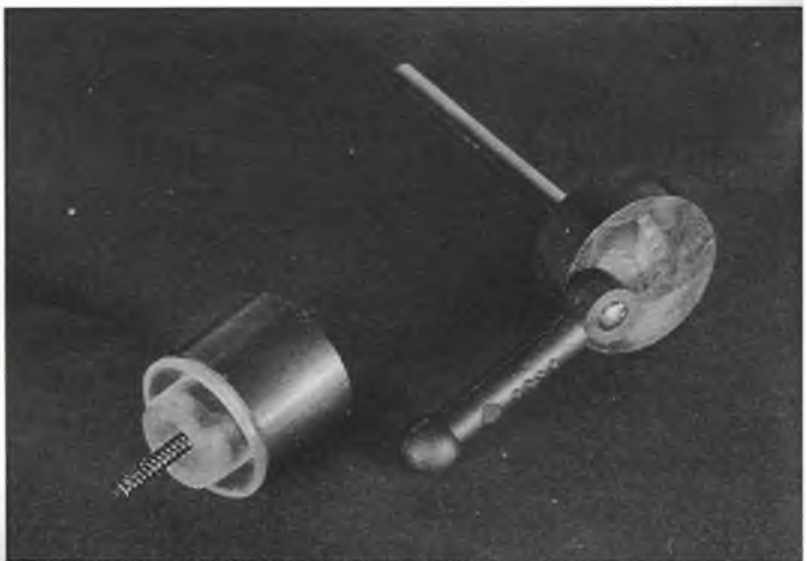
rubber motor, but the weight is in the nose, so no extra balance is needed, which consequently results in a lower all-up weight. When 100 strokes of the air pump have been given, the weight increases by six grams so it is quite important to ensure the centre of the air bottle is roughly under the CG in order to avoid undesirable in-flight trim changes.

Innovation

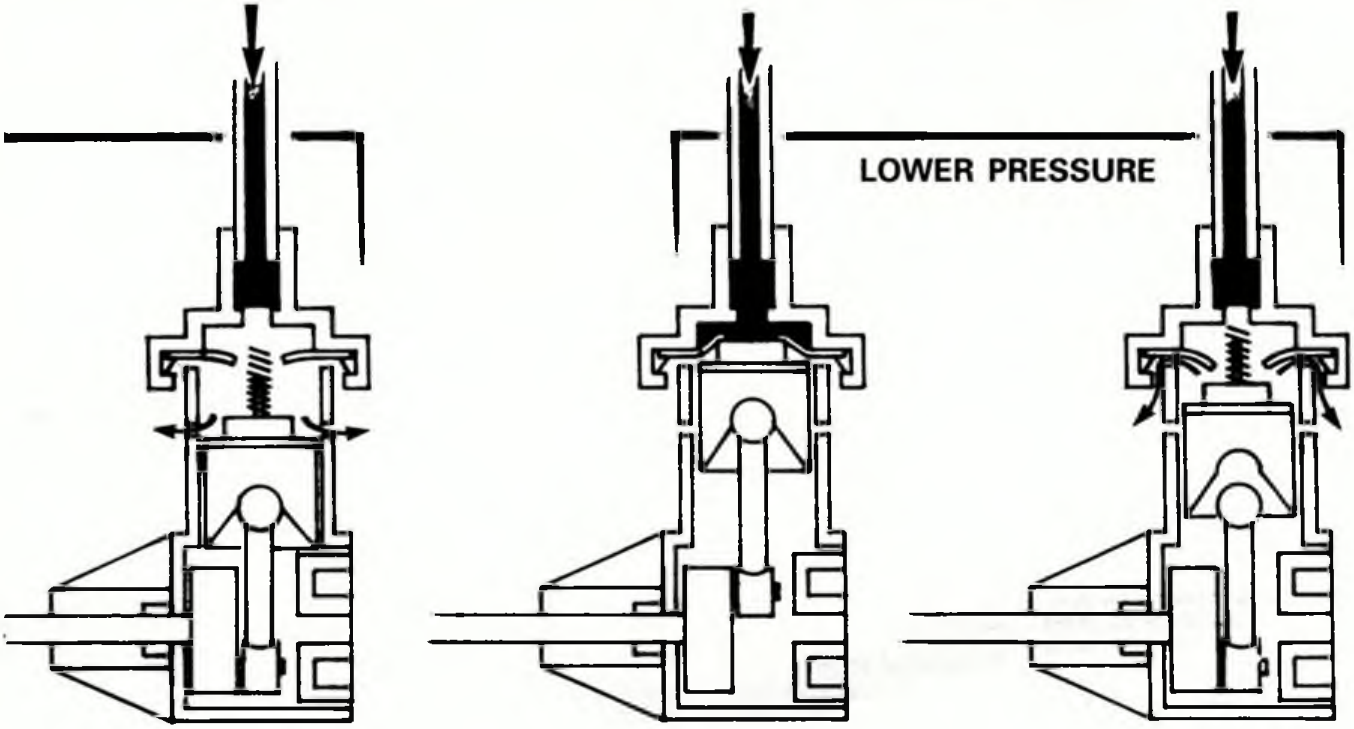
A study of the drawing and text explaining the sequence of operations of the MM3 engine will reveal the three major design innovations which together make this engine so important.

1. The head ports which are closed by a thin rubber diaphragm when pressurised air is admitted, remain open when the piston is rising in the cylinder. This eliminates all resistance from air being compressed in the cylinder (normally inseparable from piston-opened head valves as on CO_2 engines).
2. A stiff compression spring surrounding the valve-opening pin on the piston crown extends well above the pin. When the air bottle is fully pumped up, the connecting airline pressure is sufficient to keep the head inlet valve closed until the piston spring is compressed down to the level of the valve opening pin, at which point, the piston is nearing Top Dead Centre. Thus, the air valve is open for only a very short period and so only a small amount of air is used. As the air bottle pressure drops, the piston spring begins to open the air valve before it is fully compressed, resulting in the air being allowed to enter the cylinder earlier and for a longer period. This simple innovation greatly improves the efficiency of the air usage. In effect. it progressively alters the valve timing as the air bottle pressure falls.
3. The piston/cylinder seal is effected by a

A neat trick. Con-rod isn't actually connected to piston. Why? Read all about it!



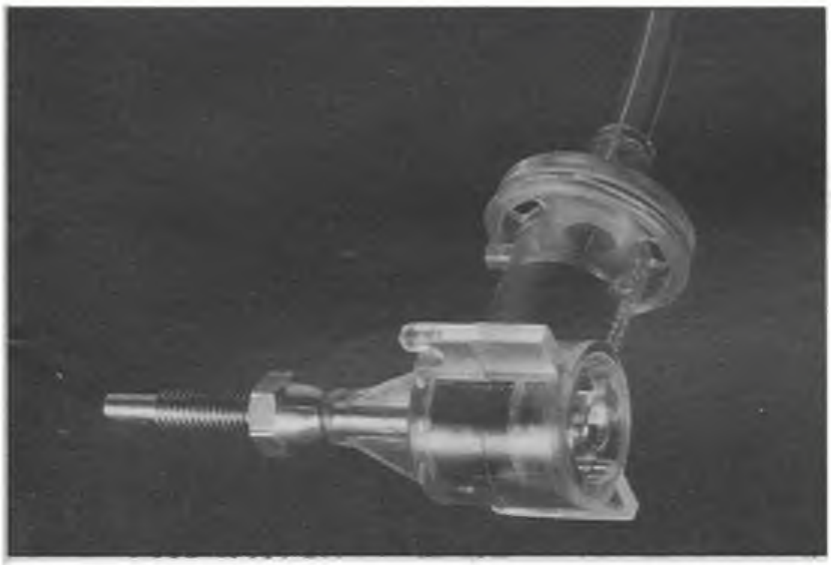
Secrets. Compression spring encloses valve-opening pin. Air valve is opened earlier and earlier as reservoir pressure decreases, improving efficiency as a result.



At BDC cylinder air pressure is released through the side ports and the head diaphragm returns to 'at rest' position thus opening headports. AT high pressure the piston and connecting rod remain in contact throughout the complete cycle.

As tank pressure falls, the air valve is lifted by the valve lifter spring before the piston pin makes contact. As piston descends the head diaphragm seals off the head ports and the air valve remains open for a progressively longer period.

The piston descends until internal pressure falls sufficiently to allow the head diaphragm to return to the 'at rest' position. At which point the piston stops but the crankshaft continues to rotate opening a gap between the connecting rod and the piston which is closed again on the next cycle.



Simple, robust layout of motor, available as separate unit for your own installation in the model of your choice.

The bits. All important rubber diaphragm sealed within 'head' of motor.

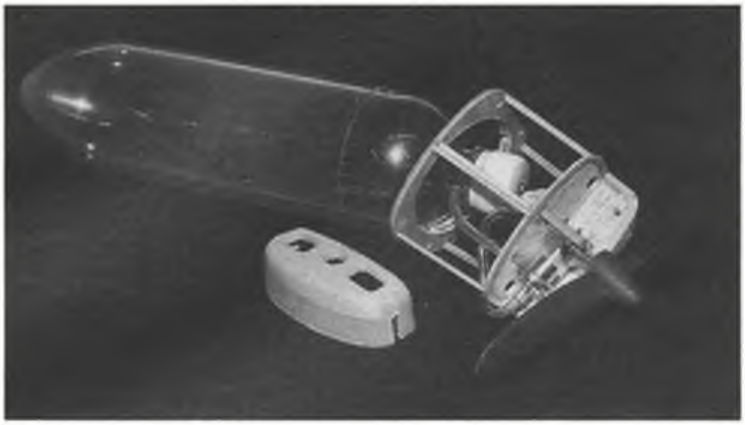
Teflon moulded top face, resulting in a good air seal with very low frictional losses. The main body of the piston is quite a loose fit in the cylinder and remarkably, is not attached to the connecting rod (I suppose one could therefore refer to it as a disconnecting rod!).

The top (little end) of the con-rod is spherical and seats in a mating cavity within the piston at the apex of a conical recess in its underside. At full air pressure, the con-rod little-end remains seated in the piston throughout the full cycle, but as the air is used there is eventually insufficient pressure to hold the rubber head diaphragm closed for the full piston stroke. At the moment that the diaphragm opens the head ports, the piston stops – perhaps only halfway down the cylinder, but the flywheel effect and airflow over the propellor, carries the prop shaft round until the con-rod again meets the piston on the up-stroke! This further reduces frictional losses although it does produce a noticeable 'clattering' sound.

Eventually, when the air supply is exhausted, the propellor will freewheel – just like a rubber model. At 100 strokes, the engine runs for 1.1/2 mins; half-a-minute of good high power, about half-a-minute of 'cruise' and the rest running down to freewheel.

There is a safety valve in the cap of the plastic air bottle. This is set to open at 8 Bar (about 110 lbs. per sq.in.) so you can't over-pump the bottle although an adhesive notice on the bottle warns against exceeding 7 Bar! The engine is supposedly rated up to 12 Bar at which pressure it is said to reach 15,000 rpm. At 100 strokes, I am getting about 4,000 rpm initially, falling to roughly 2,500 after half a minute so there is more power to be had if you can find the pressure!

A long stroke stirrup-type pump would make the pumping up operation easier and an electric tyre pump connected to the car battery



Doug's motor and tank installation. Plenty of room for reservoir in most three-foot cabin desgins.

would even eliminate the physical effort altogether, but in this case it would be wise to watch the pump's pressure gauge closely, in order to avoid any possibility of over-stressing and bursting the bottle in the event of the air input rate exceeding the release capacity of the safety valve.

The physical effort of pumping up the bottle with the bicycle pump supplied can be greatly reduced by placing the bottom end of the pump on the ground and driving the pump handle downwards with sharp powerful strokes. Doing it gently is much more tiring.

Bigger bottles are obviously going to be attractive to some modellers, and there are obvious mouth-watering possibilities for experiments with multi-engine installations. Linked multiple air bottles end-to-end would reduce the cross section for a given capacity, extra length being generally less of a design restriction than bigger diameter.

Flexible neoprene tubing is used for all air piping, and simply inserting it in a close-fitting hole in the bottle neck seems to hold the pressure with no problem. When considering the bottle installation, some small allowance must be made for expansion, the Jonathan bottle increases in diameter by about 3/64in at full pressure.

The only modification that I made to the engine in transferring it to the Piper was to drill two more holes in the engine bearers. The two little slots in the bearers as supplied being, in my view, inadequate for reliable location over an extended period.

Points of view

There are one or two further comments that I would like to make concerning the design of the engine. I do think that it would be nice to have some means of replacing the rubber head-diaphragm should it become necessary. Fro the manufacturer's point of view, it is probably easier and perhaps cheaper to replace the complete crankcase/diaphragm unit rather than design a possibly expensive removable cylinder head. It is also probably safer to have the head permanently fixed. Even so, a damaged diaphragm puts the engine permanently out of action and at this stage, the anticipated life of this thin rubber membrane is unknown.

There is no external means of adjusting the speed of the engine other than by pumping less air into the bottle. This is, of course, perfectly effective if the aim is merely to reduce revs. for initial flight tests. However, eventually, someone will want to go for maximum duration with a very light airframe and reduced revs for an extended engine run. With the present unit, the only way of delivering this is by using a larger bottle at lower pressure. Perhaps an eccentric sleeved main bearing would provide an answer.

The crankcase back-plate is simply a push fit in the crankcase moulding. Should it be displaced, the con-rod will come off the crankshaft with possibly disastrous results if the air pressure is high. Unless it is kept pressed in place, the backplate is easily unseated when the prop shaft collet is tightened. I suggest a small block of balsa should be placed behind the crankcase to ensure that this does not happen in the model.

It is most important to ensure that the threaded brass prop driver sleeve is very securely locked to the crankshaft. To do this, grip the unthreaded end of the sleeve with pliers and tighten the rear collet nut very firmly with a 4 BA spanner. Make sure that the crankcase backplate is kept fully seated during this process and that when tightened, there is an absolute minimum of end float on the crankshaft.

Oil must not be used to lubricate the engine. It will rot the rubber head diaphragm and ruin the engine. Only use a silicone lubricant through the cylinder side ports.

My first thoughts when handling this plastic engine were that it might be highly vulnerable to crash damage. My original engine has been involved in several quite severe impacts with walls, trees and runways without apparent damage to its plastic mouldings so this is provisionally reassuring.

FREE FLIGHT SCENE

Dave Hipperson reviews some outstanding events from the end of last season.

To begin with – the First Trials

IT IS rare for such a pleasant atmosphere to prevail at a Trials meeting where nerves are traditionally at their most edgy.

However, at Beaulieu for the first rounds in early October, contestants were united in one respect; their common concern over the use of such a field for a major SMAE event. The site was surely the enemy and blamed for just about everything – usually with good reason.

The first day, still mild for the time of year (and thankfully much calmer than the forecast) was dull and overcast to the point where, towards the end, CD Ian Bracken, became concerned about the light. The north-westerly breeze, sometimes backing west for long enough to take models at least parallel with, if not actually towards, the edge of the New Forest, gave few retrieval problems, even if later power flights did come perilously close to the ponds in the eastern corner. It would have been useful it we had been able to use all the heath, but we were precluded from venturing any further upwind by local restrictions. (To my knowledge these limitations were not discussed by the FFTC when deciding on this venue).

For the first time in history there were more entries in F1B than any other class. Presumably many Glider flyers were discouraged by the undergrowth and general lack of clear area in which to tow freely. (The loose end of the line being no longer an 'affectation', since winches have been effectively banned from contest flights, is a point worth considering when deciding venues in future).

Despite this most F1A flyers did well on the first day, as did those in F1C. However, Wakefield, finished with only two full scores after three contest flights due – in the main – to a very cold, turbulent patch coinciding with the last round. The CD came in for some criticism for halting the flying so early as to allow only four flights in Glider and three in the other two classes. He may or may not have been correct to be concerned about the light. The complaints did make amusing comparison with the hysterical rumours abounding before the event that this same organiser was determined to squeeze all fourteen flights into the weekend!

Real gales were forecast for the next day. We were incredibly lucky again. It was very bright and slightly breezy from the 8am start but it never became worse than 20mph – and that only momentarily. it was often pleasantly warm in the sunny spells. The first early rounds certainly sorted out a few in Glider but it wasn't until the fifth flight that leader Dave Oldfield dropped time. Unlucky with a launch that didn't unlatch, the model (which would have maxed comfortable had the line not stayed attached) was retrieved and flown again haste for a disappointing but not disastrous two-minute-plus flight. Both Cuthbert and Edge had suffered double towings when lines snagged in the undergrowth. Edge is a regular flyer at Beaulieu and would have been expected to have been used to the place. Cuthbert's opinion of it is well known already!

Within on e flight there were no full scores in F1B either, and the number in power was reducing steadily. William Beales, now moving on to F1B, had but one model and that only trimmed the night before on Chobham on the way to the contest. Despite some repairs to the rear boom during the contest he was to finish with a very good score. Likewise, Laurie Burrows – back again with very attractive and competitive models – suffered a boom break in the gorse and subsequently dropped time.

The wind reached its worse around mid-day, and although it was blowing virtually due south and giving just about the maximum space on offer, models, particularly Power craft which were climbing into the faster moving air high up, were reaching a large wood some one-and-a-half miles distant. During this period (and, in deed, for much of the day) it was rare to find one's own aeroplane. The terrain was ruined by large areas of gorse, either very dense and shoulder height, or more patchy bushes up to several feet high. It was neither possible to walk anything like a straight course nor, when one arrived at the estimated area, to hope to see the model unless it was close. To compound the problem, distance itself was hard to judge as the downwind heathland was slightly domed, and drift was so variable in the lift that two flights of the same length made at the same time could be hundreds of yards apart.

So, with the entire entry at one time or another crashing around the cursing in the prickles downwind most models were found – often somewhat belatedly. Sadly, a number were lifted off the road by over-enthusiastic members of the public. The ones that got Alan Jack's F1C model thought it had come all the way from Newcastle. At least they were right about the wind direction! They took it home with them to Swindon so Alan had a long journey home via that detour.

Power flyers were actually given a respite during the day when one of their rounds was held over after a spate of tree'd flights and some furious lobbying of the CD's desk. The contest was stopped after five more rounds on the second day whilst light was still enough for some serious searching, which accounted for a few more models.

Beaulieu is a crucial site for the Southern Area's local meetings and offers a fine venue for the occasional club free-flight event in mid-summer when crops render most aerodrome sites in the heart of the country all but useless. However to use it for a Trials event, particularly considering better sites were available, was foolishness bordering on

Looking ahead to the summer, here's a reminder of last year, with sun shining through the tissue as Gordon Beal holds on to the Coupe at Port Meadow.

irresponsibility jeopardising as it did, both the future use of the heath and, just as importantly, the performance of the competitors. There was unnecessary loss of models to both the public and the distant woods (that were still far too near when the wind rose). Not only that, but substantial breakage of models landing and blowing about in the gorse definitely affected the outcome. Consider the example of Pete Watson who had two F1C models mangled by the undergrowth and the third lost in threes by half way through the second day. He consequently missed a round altogether. Neither was it an argument to say that it was the same for everyone. It certainly was. It was bad for everyone.

Stafford Screen's closing remark that he 'beat the field' referred to his having flown seven rounds of a Trials at Beaulieu in a breeze, and survived (nine flights in his case because he had two overruns). I hope neither he nor any of us is ever asked to do such a thing again...

First Trials 7-8th October

F1A (23 flew; 8 flights)

1	D. Oldsfield	23:06
2	J. Williams	22:08
3	J. Bailey	21:46
4	C. P. Williams	21:07
5	S. Philpott	19:58
6	M. Fantham	19:46

F1B (26 flew; 8 flights)

1	D. Greaves	23;20
2	M. Chilton	22;39
3	D. Hipp;erson	22:35
4	W. Beales	22:32
5	L. Burrows	22:03
6	R. Peers	21:47

F1C (17 flew; 7 flights)

1	K. Faux	21:00
=	R. King	21:00
=	S. Screen	21:00
4	A. Jack	20:46
5	P. Harris	20:40
6	F. chilton	20:30
7	R. Baggott	20:10
8	A. Cordes	20:06

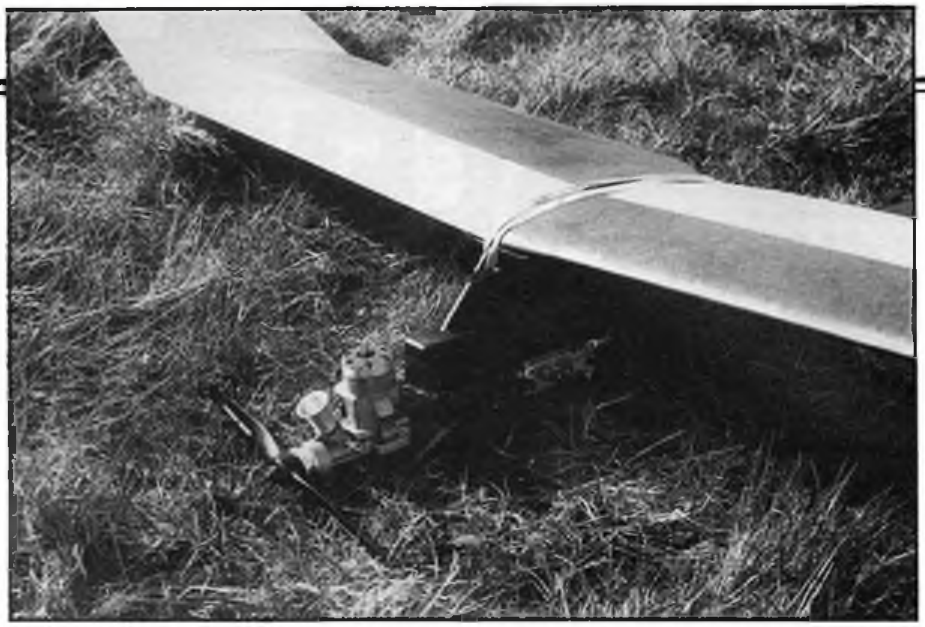
Croydon Wakefield Day: Barkston Heath, 29th October

A strong contingent from the Croydon club turned out to run this now well-established annual event. Such were the appalling conditions that (at the start at least) organisers outnumbered contestants! At the same venue the week before the Trials themselves had been postponed due to excessive wind but this day was *worse* . Estimates varied but from the distance models were covering in the time the average wind speed appeared to be around 30mph. There were certainly lulls of less than this, when the foolhardy few that dared usually launched, but on the other hand there were most certainly gusts of much more – perhaps nearly 40 mph in the centre of the aerodrome around mid-morning.

Both 40z and F1B classes were won by single flights. Dennis Davitt got only that in 8oz when after a sub-minute flight with his trusty Yankee IV the fuselage was destroyed before he could fly again when a well-wound motor exploded after the winding tube had been removed. Willis flew a Red Rumpus to good effect, (a couple of one-and-a-half-minute-plus scores) but broke the wing a number of times including launching for the last flight! Bob Wells' trusty 25-year-old Gipsy was so badly damaged after a first reasonable effort that he had to continue with a reserve. His second flight was a masterpiece – flying very smoothly for over two minutes and clinching the class for him.

Last year's finalists in the "own design' category for the main prize of the day, the Ted Evans Trophy, were at it again. John O'Donnell got the bad breaks in more sense than one when his first flight didn't quite clear the aerodrome perimeter track and suffered serious damage on landing. His second round flight hit sharp turbulence, as did most models at some stage, and stalled out badly. Hipperson's total comprised the only two maxes of the day in any class. Even his slightly short flight comfortably cleared the aerodrome, so his model was landing in soft, open fields and sustaining virtually no damage. His last flight was far more than required to win but it was deemed more important to launch in the right air than to worry about pulling the fuse through to length. It DT'd at nearly four minutes, was down just short of Wilsford over two miles away in five minutes – and he was back with it in time for the prize giving.

Once again the host club had done their best to maintain the standard of the event. After so many consecutive calm years a day this wind just had to come along eventually. With such a tiny entry it was a credit to the organisation that they stuck with it. next year hopefully back to normal – flat calm.



Two more views of free-flighters in the summer glades; contrasting disciplines of Open Power and F1B proving the potency of F/F competition following these days. Plenty coming up to report from home and overseas this season – so stay tuned with us for 1990!

Croydon Wakefield Day: 29th October

4oz Vintage Wakefields
(All maxes 2:30 – 3 flights per event)

1	D. Beales	1:20

8oz Vintage Wakefield (5 flew)

1	A.Wells	4;17	Gipsy
2	S.Will	2:58	Red Rumpus
3	D.Davitt	0:53	Yankee IV

Own Desiign Wakefiels to pre '51 rules (2 flew)

1	D.Hipperson	7:18
2	J.O'Donnell	3:00

F1B Wakefield (3 flew)

1	R. Peers	1:38
2	J. Baguley	0.04

Fields of dreams?

If you consider the most serious problems facing contest free-flight in the UK as we enter the 1990s, the chances are that our

dwindling choice of suitable flying sites will appear top of your list. Right at the moment there may be something worse and if we could put it right itmray be the first step towards solving the flying field shortage.

Our real problem is administration, or, more correctly, however – the individual free-flighters – are actively discouraged in helping organise our sport. I use the term 'sport' here without reservation, for although aeromodelling is both a hobby and a sport, the hobby part we look after ourselves (building) and if we are lucky enough flying, too, at home. When it comes to contest administration and rule making it is every sense a sport. Currently the FFTC – Free Flight Tech Committee stands grossly undermanned and hence hopelessly overworked. Much of this was created by the domino effect of poor direction last year causing panic and mass resignations – well, four out of six anyway. Basically the motivation behind these resignations was (probably) the frustration of not being able to either improve the situation, nor even maintain standards, however poor. It would be true to say that committees, the FFTC are no exception, are in the habit of widening their scope as it is hard to keep a narrow-tracked view when one sees so many things needing attention. Hence the workload snowballs until eventually the bubble burst and people leave under the pressure. This is what has happened.

I can remember when the early FFTCs were formed they were strictly in an advisory capacity. (That was how the USA became embroiled in the Vietnam war – at around the same time, if I remember rightly!) In those early days members of the committee could count amongst their names top flyers like French, West, Godden, Tipper, Lucas, Fantham, Cooper, Dilly and so on. However, since those simple beginnings when no-one minded giving a bit of time occasionally to advise the SMAE (BMFA) Council, the workload falling on the FFTC and all the other committees, to a greater or lesser extent, has mushroomed out of all proportion. To give you an idea of what is involved; I estimate I spent over a thousand hours on it when I was chairman in '83; and the job is even more complex now and would require more than this – presupposing that all the other members of the committee did their stuff to! That's probably as much as half the time one would expect to have to spend earning one's living in full employment!

This sorry state hasn't come about because the demands of Free Flight have become any greater but rather that the SMAE (BMFA) itself does far less to help. The job of the FFTC is no longer that of a sub-committee; it IS the SMAE (BMFA) as far as Free Flight competition organisation is concerned! The workload on the FFTC staff is such now that they cannot hope to do their jobs properly without substantially curtailing the amount of actual aeromodelling they do. Most likely they won't get involved in the first place.

There are thus two courses of action. Either the workload is dramatically reduced (this can be instigated either from on high or dealt with by the committee members themselves, at the expense of some niceties, I am afraid). The alternative is to make the

Above: Back to last year's Midsummernight Trophy. Seja waits with invigorated F1B. Below: Same meeting – and here's Zeri's all-mylar winning Coupe.

role of Chairman, at least, more attractive. That is: make it a professional position with a salary and expense structure.

The SMAE already supports quite a large paid team at its head office but it's difficult to see how they help free-flight more now than they did when the entire staff was voluntary! Whether this has developed because the SMAE is hopelessly top heavy or too taken up with running what appears to be a cut-price insurance brokerage for the hordes of R/C flyers in the belief that maintaining a high number of members at any price s the Society's raison d'etre, is immaterial. It's the situation faced now by the discipline that gave birth to the Society in the first place – Free Flight – and it's giving us real trouble.

From last year's disasters – two major centralised events cancelled at short notice and a Trials incomplete due to insufficient man-power to expedite a simple remedy (to book another aerodrome,quickly), it would appear that the SMAE (BMFA) are, as of this moment, not capable of administrating anything like a comprehensive national contest programme. Against this we see individuals and Clubs doing it so well. Perhaps their personal approach to the authorities works better? Of course they too have to negotiate their way onto MOD property via the SMAE but applying the old rule that one volunteer is worth a dozen pressed men their enthusiasm for the job from then on seem, in practice, to help any event over potential hang-ups even to the extent of obtaining alternative sites at short notice if that becomes necessary.

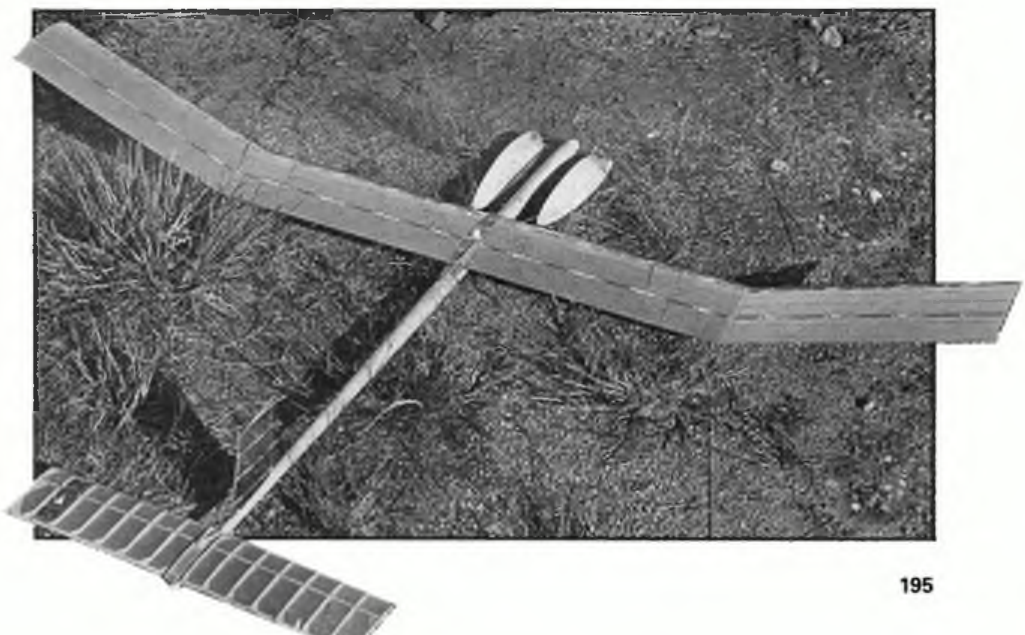
So while we wait for the SMAE (BMFA) to get its house in order one way or another perhaps those individuals planning to organise events this year can set a standard for the SMAE (BMFA) to follow. Let|s shame them into doing better. Perhaps it's time for a return to those days when the host club members felt t their duty to actively assist and not fly at all for the day. How nice it would be to attend an event with spare time-keepers and model spotters in windy weather or over difficult terrain. (How that would have helped the Trials!) I am sure those facilities would be very bit as welcome as tangible prizes and it can be actually very rewarding spending a day saving your mates' models from crops or the clutches of the public. Particularly when, like as not, he will be doing it for you at the next event.

It is going to take a little sacrifice once in a while on everyone's part if we are going to make our contests more appealing. It just appears to me at the moment at least that individual efforts at club level could see a very quick return for the investment of one day not flying. Certainly far less onerous a prospect than tying up a whole year, maybe two, on the Technical Committee.

Pete's Paradise

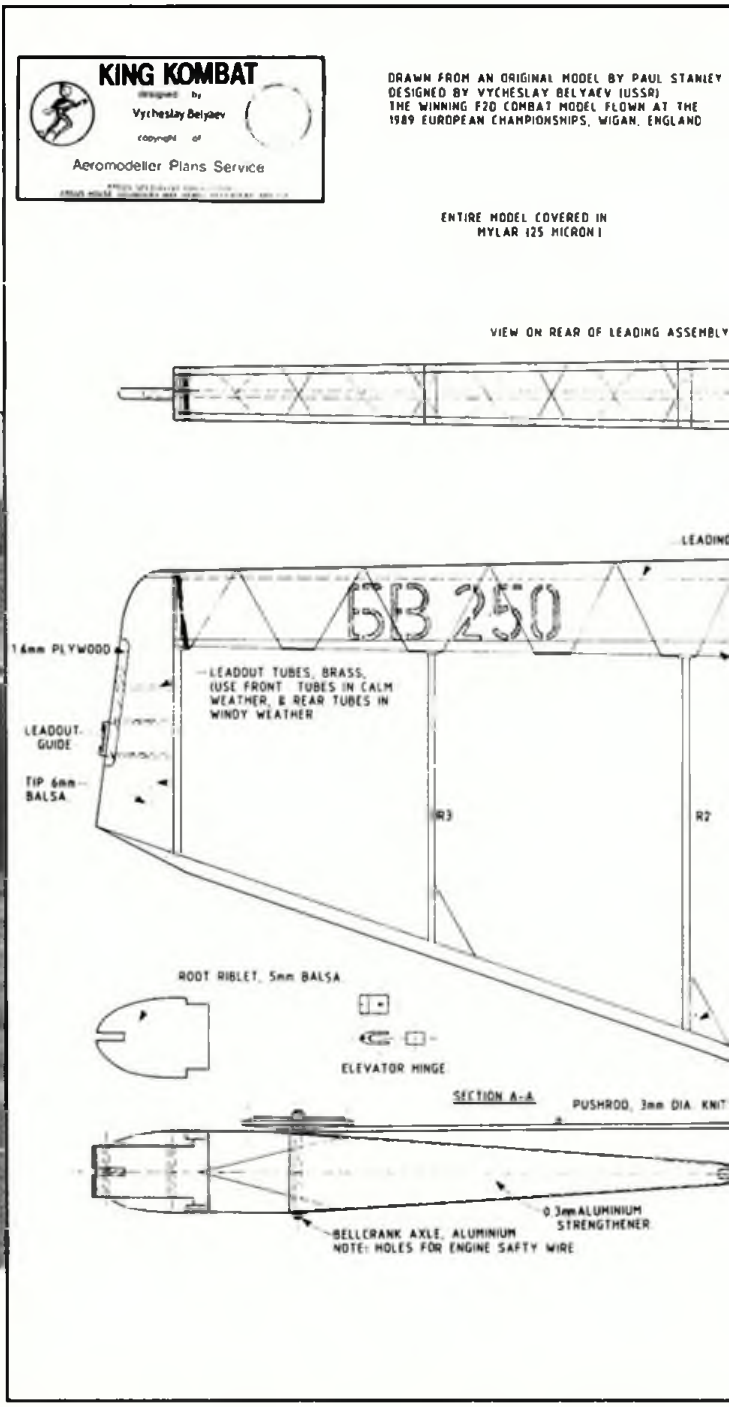
Those of you with sharp eyes who were watching the last episode of The Paradise Club on BBC TV a few months ago might have spotted someone you recognised in the club's band playing the theme music over the final credits. Croydon's latest Wakefield star Pete King was playing sax. Quite a long shot with him in it and he too a little solo too.

For those of you that only know him from his flying, Pete is actually one of the world's leading jazz alto saxophonists and greatly in demand as a result. Indeed, even when he flew F1B at Cambrai earlier this year he had to dash off between the days to play a session in Paris!



KING COMBAT

Nats CD Paul Stanley reveals more Soviet Combat secrets



Full-size plans are available as fref. AM1616, price £4.35 including postage.

As event director for Combat at the 1989 European Championships, I was ideally situated to observe the contest and to study the model designs and performance. Of those present, one design stood out, head and shoulders, above the rest. Yes, you've guested – it was, of course, the Championship winning design flown by Vyacheslav Beliaev representing the USSR.

Incredible

So what makes this such an outstanding model? First and foremost must be its incredible manoeuvrability. It out-turned every other design present. This is thought to be due, in part, to the short shaft of the motor, which means a reduced gyroscopic couple caused by the propeller, thus allowing the model to change direction more quickly. The weight of the motor cannot be significant in this respect as it is virtually the same as the Nelson 15 FI SE. In level flight the model was certainly not the fastest, yet once hanging on the elevator it quickened up considerably. The governing factor here is almost certainly the propeller used which is small in diameter and has comparatively less small in diameter and has comparatively less pitch than its contemporaries. This allows the engine to run at higher revs than most; and this is certainly rewarded by no loss of performance in tight turns.

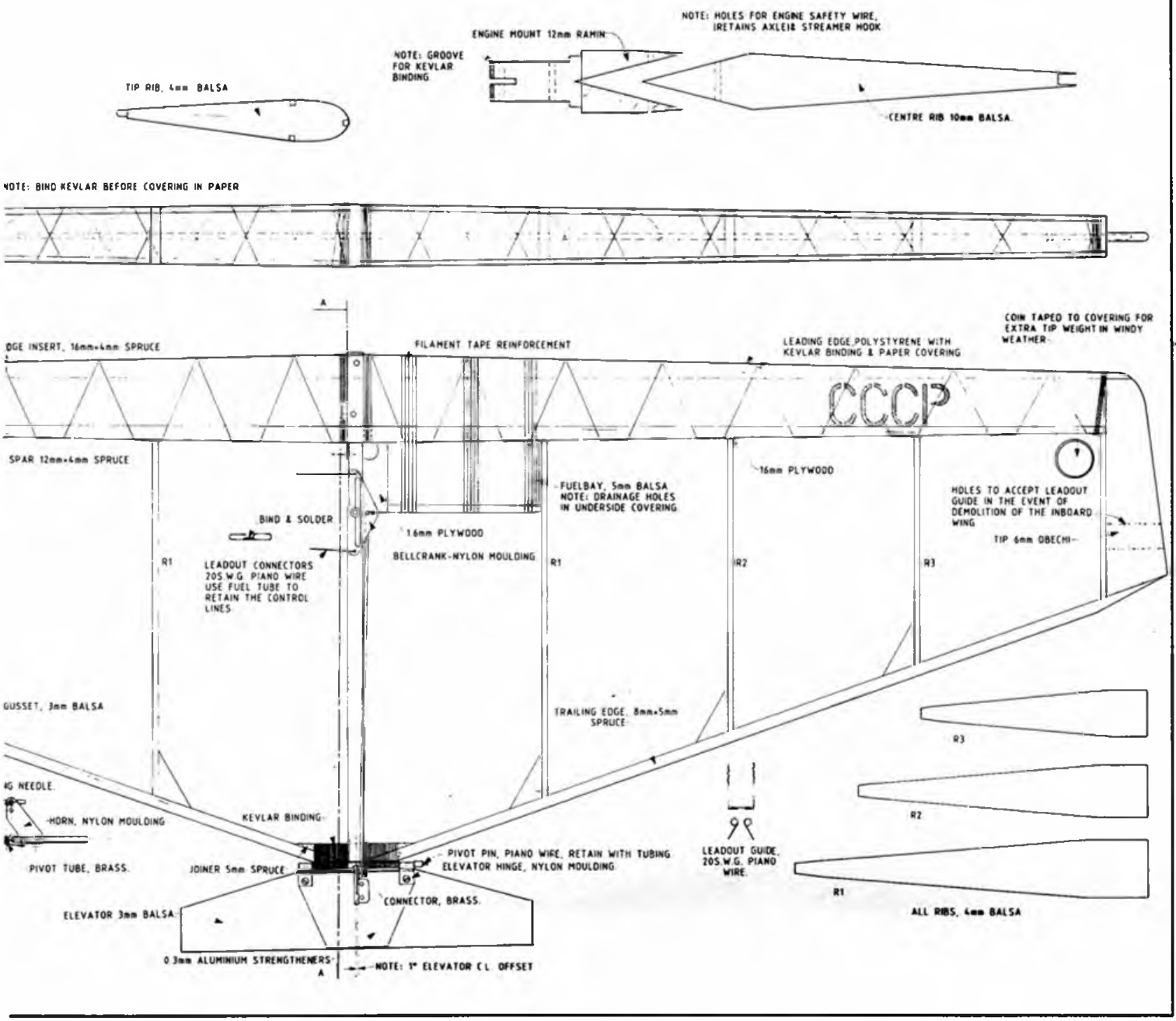
The second, and perhaps more significant factor is the design's durability. On many occasions this model was still flying, virtually unscathed, after a mid-air collision had rendered the opposing model into so much confetti, distributed over the flight circle. The model is no lightweight, tipping the scales at 450gm (16oz) in flying trim, whereas most contemporary designs weigh in at round 340gm (12oz) but this obviously does not detract from its performance, perhaps due to its relatively large wing area. The design has a comparatively large span of 1.2m (47in) giving a high aspect ratio (for a combat model!).

The most interesting feature is the clever selection and use of materials. All the spruce is of a thicker section than that traditionally used in British designs. The sizes shown on the plan are not commonly available but I understand The Balsa Cabin can supply to special order.

How's it done?

Let's take a detailed look at the construction and assembly technique. The centre rib is a development of earlier Russian designs, simplicity and strength being the order of the day. Frankly, the only conceivable way of breaking this rib is a direct hit from the opponent's engine. The front section of the rib, which is Ramin, provides a durable location for the lightweight yet robust aluminium engine bearers. Note the offset on the bolt holes which give an increased line tension. The rear section of the rib is of hard balsa, vee-jointed to the ramin and covered in 0.3mm aluminium using a suitable contact adhesive. When the centre rib is complete glue the spruce leading edge, pre-tapered as shown, into the centre rib ensuring accurate alignment and glue the riblets to each side of the centre rib. Now bind, just in front of the LE, with Kevlar which has been wetted with thin resin. This adds considerably to the strength of the engine mount and prevents the ramin from splitting.

Cut the leading edge section from polystyrene using the hot wire technique, ensuring the spar slots are cut accurately and the ends are square. Offer the polystyrene onto the spruce leading edge and check for a good fit and alignment prior to assembly with PVA glue. Next fit the pre-tapered top and bottom spars using PVA and hold the assembly together, while the glue dries, with sticky tape. The next stage is to fit the tip ribs. Accuracy in construc-



tion so far is invaluable, since the alignment of these two components dictates whether (or not) the model is built 'true'. Alternatively, a simple jig can be used to guarantee alignment. Add the plywood ties which hold the top and bottom spars together and provide a good glueing surface for the ribs.

Wrap up!

When the glue is dry, lightly sand the leading edge assembly to smooth out any imperfections, then bind the leading edge with Kevlar as shown. The easiest way to do this is to tack glue the Kevlar to the spruce with cyano, then wet with thin resin as you proceed along the wing. Finally, wrap the entire assembly with good-quality gift wrapping paper after painting the polystyrene with wallpaper adhesive. Cover the top and bottom separately, ensuring all air bubbles have been removed. A little time on this will pay dividends in the final appearance of the model. Nothing looks worse than air bubbles and wrinkles in the paper! You now have an incredibly strong leading edge and centre rib assembly which are the main load bearing components of the design. So long as just these stay together the model will still fly (after a fashion) and this may be enough to win a bout.

Assemble the three trailing edge components flat on the building board, noting the slight angle at the joint which gives elevator offset (this is believed to aid line tension through tight, consecutive manoeuvres). Bind the pivot tube to the trailing edge, again using wetted Kevlar. Now glue the trailing edge to the centre and tip ribs. Add the tips, ensuring the obechi tip is fitted to the outboard wing! Fit the wing ribs and fuel bay. Bind the fuel bay to the leading edge with filament tape. Paint the structure with two coats of Balsarite and iron on 25-micron mylar covering.

Make the elevator from hard balsa and attach the aluminium doublers with contact adhesive: again paint with Balsarite and cover with mylar. The plan shows nylon elevator hinges as used on the original model. To the best of my knowledge there is no suitable commercially available item in the UK. As an alternative fix brass tube to the elevator, drill through the aluminium and bind in place with Kevlar.

Finally fit the elevator horn, bellcrank, pushrod and leadout guides; and the model is complete. Note the leadout guide is not glued in place. It relies on friction for retention in the tip tubes. In the event of a mid-air collision demolishing the inboard wing the guide can be removed and transferred to the outboard tip, thereby allowing the model to fly. This is perhaps the most significant reason for having an external bellcrank. Don't forget to turn the handle upside down if this occurs since the controls will be reversed...

Kevlar is available from a number of outlets but if you have difficulty in finding a supplier contact Jim Parry on Chesterfield (0246) 827859 who will be pleased to supply. Jim can also supply other items of interest, such as spinner nuts, sleeve nuts, and aluminium engine bearers to your specification, plus helicoil thread repairs, diesel conversions from glow motors – plus and he will carry out a variety of machining/engine modifications at reasonable prices. Give him a call on the above phone number for details.

You may be surprised by the flying characteristics of the model. It is incredibly stable in level flight but use the elevator and its out of this world. You have been warned!

Dick McGladdery sets up our Simple Speed Trainer: conclusion

FRANKLY, props are a problem. Commercial speed props are rare and usually far from ideal when found; hence the improvised single-blade example used on SST. It may look crude, but it performed much better than Topflite/Revup 6 x 7s and 6 x 8s (130mph vs 120mph), and it is repeatable. Irvine engines have considerable stocks of the Top Flite pylon racing props in the 8-9 1/2in diameter/pitch range, all of which are suitable for modification as suggested.

When cutting off the redundant blade, leave as much of the root intact as possible. Don't trim away any more on the de-bladed side than absolutely necessary. Ease the hole for the propshaft so that it is an easy sliding fit but not loose, thus avoiding including any splitting stress; but it is essential to locate the prop accurately for consistent balancing.

The counterweight was made from a piece of mild steel strap sold by DIY shops for repairing/reinforcing domestic joinery and furniture. Take care to make the propshaft hole a close fit) a round file can be used as a reamer) for a consistent balancing.

The chamfering on the side opposite the tab helps considerably to reduce the amount of tab needed to balance the blade. When bending the tab over, grip the whole of the 'washer' area in the vice so as to avoid bending it, and hammer the protruding tab over about 45 degrees.

Balance of opinion

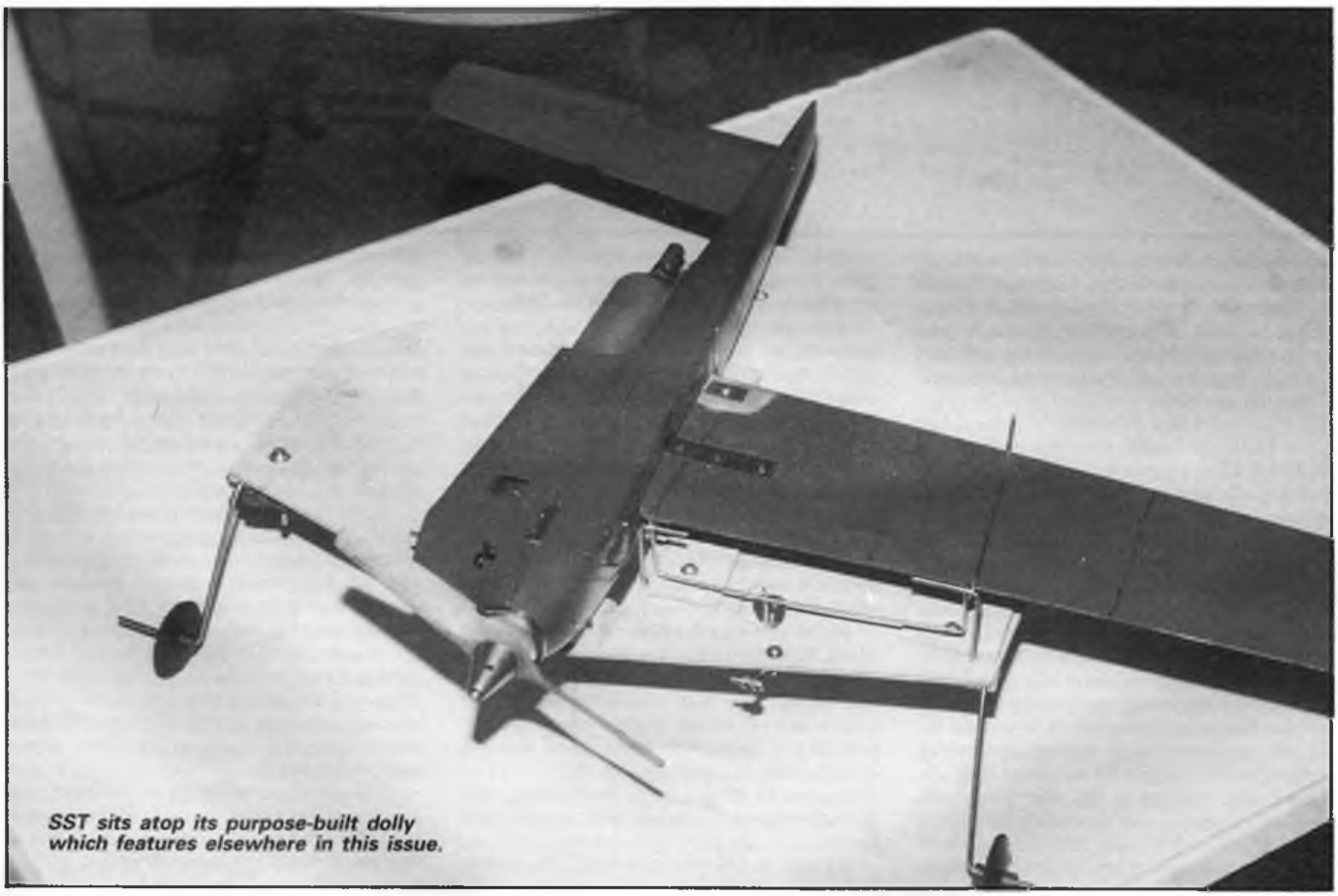
Balancing single-blade props is an imprecise subject. I've heard that what we actually need is dynamic balance, which is different to static; and practical experience indicates that good results – that is, reasonably vibration-free operation – can be obtained when the counterweight slightly outweighs the blade, whereas in the reverse condition excessive vibration results. If it can be accepted, then, that slight imbalance is satisfactory, the equipment needed to achieve it is relatively simple, as shown in the sketches and photos. Starting with the counterweight very heavy, the blade/counterweight assembly will flip smartly to a position with the blade approximately upright. Slacken one of the nuts of the balancing shaft and twist the counterweight round so that, by trail and error, the blade adopts an approximately vertical position when placed back on the balancing table. The latter, by the way, should be checked for truth by a small spirit level. File a small amount off of the counterweight, check the balance and centralise the blade as before. Keep repeating this file-a-bit/check balance/centralise blade-sequence until the blade moves from horizontal to vertical lazily, taking perhaps a second to make the trip.

This is actually quite good enough, but in case you can't quite shake the notion that static balance should be sought, give the blade a few coats of Tufkote or similar – half a dozen coats or so will achieve a situation where the blade will rest appropriately 45 degrees either side of vertical, but from here on, you are on your own.

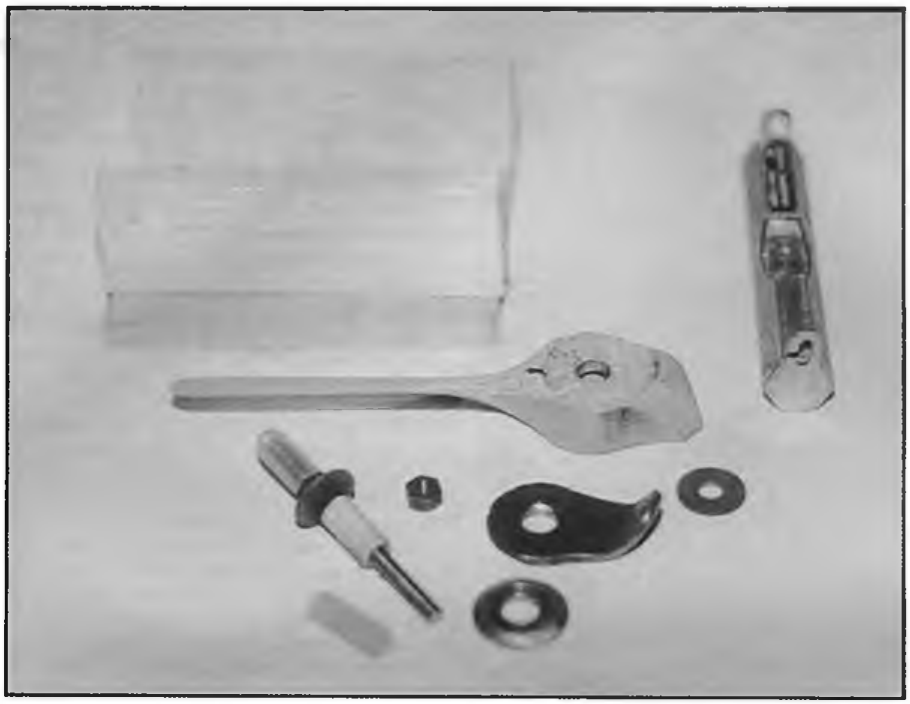
I recommend that the Tufkoting of the blade be deferred until the assembly has been flown, because after that, you will probably find little cause to bother. However, the wooden blade should be fuel-proofed before the balancing procedure is started because otherwise fuel soakage may warp the blade and/or upset the 'balance'.

Regarding the balancing gear, especially the shaft: this needs to be reasonably straight and true, otherwise the results will be misleading. My best suggestion for an empiric check is to roll it on a piece of glass; if there is no apparant hesitation or erractic motion when the shaft (4BA tapped rod or 'allthread') rolls when the glass is tilted, it is probably good enough.

To ensure that the counterweight is reasonably accurately orientated to the blade when installed on the engine, the 'nick' in the counterweight can be used to make a mark on the



SST sits atop its purpose-built dolly which features elsewhere in this issue.



Components of prop balancing jig and shaft.

blade when the balancing has been completed, either by inking and fuel proofing or epoxying in a small pin to locate the position.

In closing on the prop subject – beware! Thermoplastic props, including glass filled examples, are adequate for sport use, but any speed engines worth its name will destroy the prop, possibly itself and the model too – and, much more importantly, may skewer an innocent bystander with a thrown blade. A Graupner 7 x 6 or 7 is rated safe to only about 19,000rpm, but this is only the sort of figure that a half-decent speed 21 engine will reach on the ground; the in-flight rpm would be somewhat higher around 22-24,000, at which level the prop will be operating beyond its safe limit. Risk yourself by all means – it's a free country – but you may find your insurance company denying liability, in case of an 'accident', on the grounds of irresponsible disregard of product advice.

Tool up!

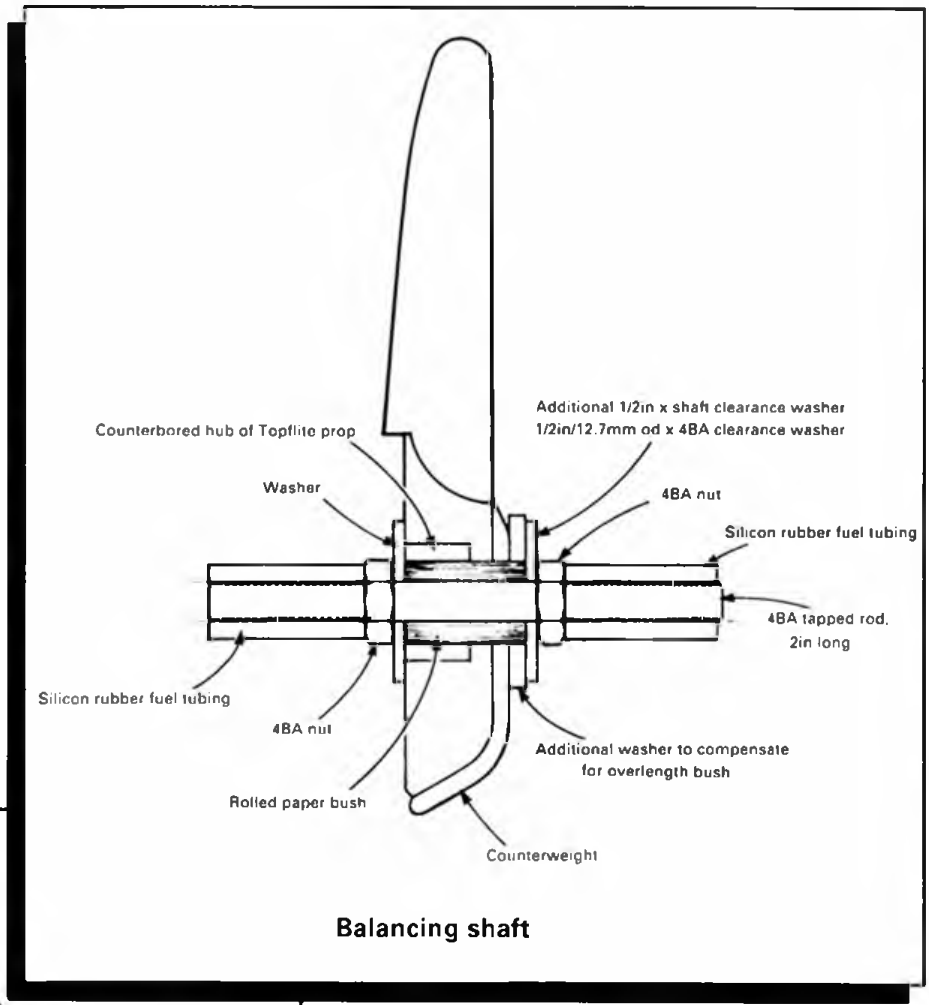
For the items that you are unlikely to find at your local model or DIY shop, steel, brass and aluminium plate, sheet, shim and drills, taps and absolutely loads of other useful things, K R Whiston will supply, in modellers' quantities, by mail order. The catalogue is crammed with the above, plus hinge selection of nuts, bolts washers and other 'fixtures', costs about a pound, which is refunded (I think) if your first order is more than a certain amount. Their full address is:

K R Whiston Ltd
New Mills
Stockport
SK12 4PT
Tel: 0663 42028

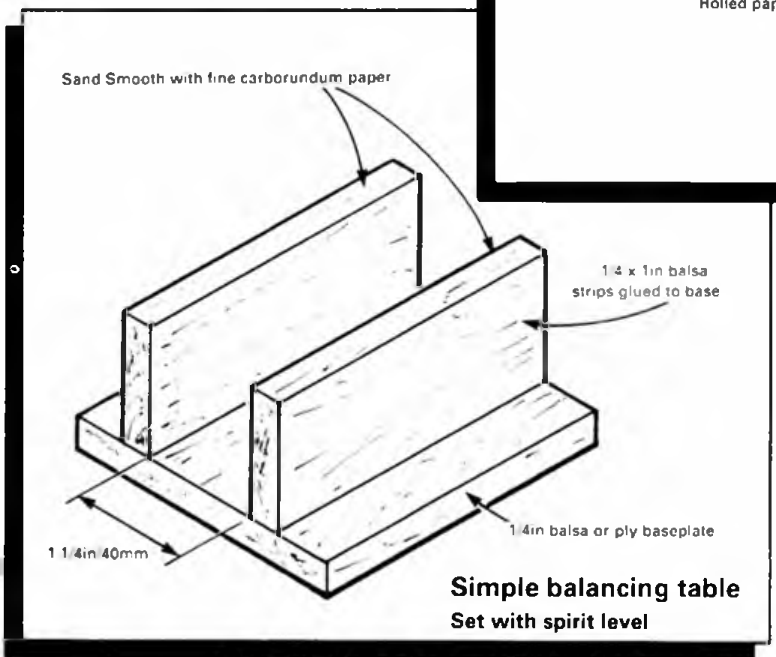
You can also call in person. Another supplier of these goodies, though a smaller range (mainly metals, but some tools, taps, bolts etc.) is:

Clay Bros Metal Supplies
24 The Green
High Street
Ealing
London
W5 5DA
Tel: 01-567 2215

Clays also produce a catalogue, for which I suggest a telephone enquiry. I think they also provide a mail order or personal service. As already mentioned, the 6BA nutrunner is an essential item, but is not available from either Whistons or Clays, as far as I know, so sift through the telephone Yellow Pages for suitable suppliers. Classifications may vary from district to district, but a likely-looking classivication in my directory is 'Engineers Merchants & Suppliers', 'Engineers Tools and Instruments' and 'Tool Manufacturers & Suppliers'. Be prepared to dig around a bit – seek and ye shall find!



Balancing shaft



Simple balancing table
Set with spirit level

Above and left: how they're made.

Flying SST!

SST is fairly docile but, like all speed models, the high wing loading limits its manoeu-

vrability so the best policy is to maintain flat and level flight, preferably between two to four metres high, though six metres is safe enough with the engine pulling strongly. If the motor is not giving plenty of power, the model should be brought as low as safety allows, which reduces the amount of power needed to sustain flight and reduces the height that has to be glided down when the engine eventually stops. This is useful because the sink rate is rather more than on other types of model, and the less it has to sink, the gentler will be the final arrival.

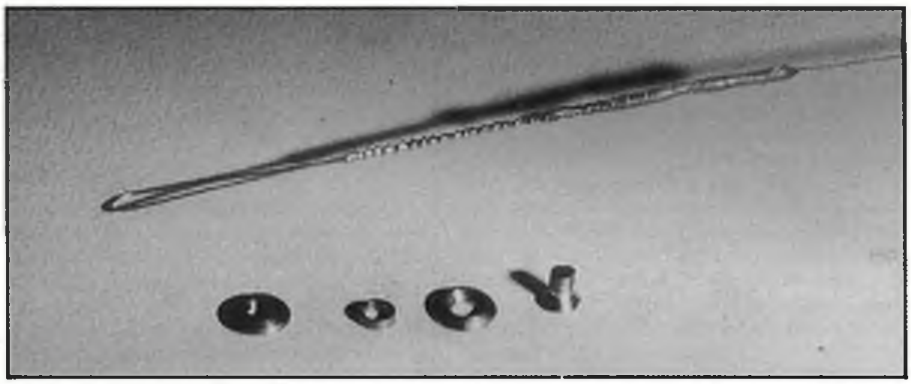
Speed models generally respond best to positive piloting; that is, always leading the model with the handle, rather than following it. Sometimes this amounts to hard whipping, at other times merely keeping just ahead of the model. Coping with taking off from a dolly is the first hurdle. However, at the moment of release, the model is liable to be a bit uncertain where it wants to go, and it is advisable to be ready to take up the slack if the model wanders towards the pilot. Stepping or running backwards is a very inefficient way of doing this. Something akin to T/R style is much better, although over-enthusiastic pulling could upset the dolly. In a mishap – just keep the tension on so that the dolly will roll easily. Once on the move, after five metres or so, the wheels should stat to grip, and provided the dolly tracking is not wildly wrong and the low-grip wheels recommended are fitted, the model should accelerate fairly rapidly so that a modest amount of 'up' elevator will result in lift-off, followed by separation of the dolly. Relived suddenly of a lot of ballast, the model may tend to climb rapidly, and this must be headed off before it gets out of hand, by a brief tap of 'down' elevator, so that level-off is achieved no higher than about six or seven metres.

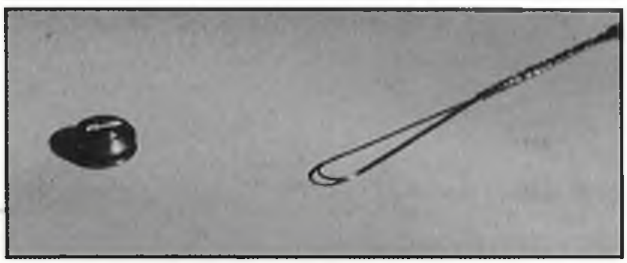
Balancing jig levelled up for use.

During the take-off sequence, don't stand square to the model; before it is released, position the body sideways-on, as if to walk parallel to the model, with the right arm outstretched towards it. At the moment of release, start walking in a circle about two or three metres diameter around the circle centre, ready to run; and give a big armful of whip if needed to take up slack wires. Keep going like this until the model is airborne and settled at a comfortable height, then head for the centre of the circle, which is where the pylon will be.

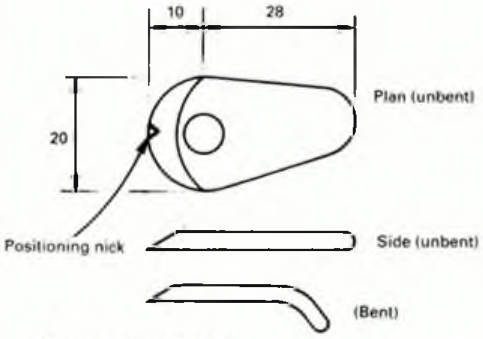
Flying with your wrist in the pylon yoke will be very strange at first, so practice by holding the wrist above the yoke for several flights before attempting to enter it. Get close to the pylon – so that your left foot brushes against it, then keeping the handle in front of the model, let your body 'get behind' so that your right forearm lies across your chest; this gives a reasonable stance for 'dummy' pylon runs as well as flying with wrist pylon. At the first sign of trouble, come out of the pylon, sort yourself out and have another go when you are composed – don't rush it; there are no medals or places for bravado, only for properly completed timed flight.

When the engine cuts or sags, come out of the pylon (and fire the shut-off in the latter case) get back into the same stance as for take off (body and handle in front of the model) and get a fairly generous 'whip' on whilst bringing the model down as low as comfortable – be prepared to feed in as much 'down' elevator as necessary to stop it climbing as it comes round into the wind (if any) and as the speed decays, bring the model lower so that it touches down before rapid sink sets in. Skilled pilots can whip a speed model with a dead engine for many laps, but this requires a special technique and a fair degree of physical fitness – definitely 'advanced' rather than 'newcomer' stuff.





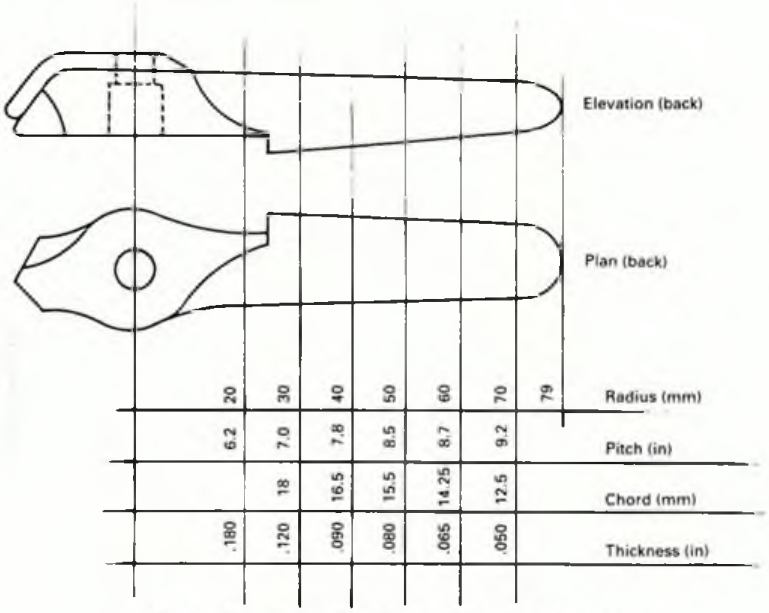
Above: and right: Connector button and components – see also Dolly Mixture feature this month.



Counterweight

13swg mild steel (2.34mm)

Made from domestic joinery/furniture repair/reinforcing strip from DIY shop



Propellor (modified Topflite 7 1.2 x 9)

MIND THE LINES

He's back! Ron Prentice re-enters the old-time control-line circle

Above: Angelo Piacentini with your columnist's All American and Boxcar and (top) in 1950 with his 'No 5' design. See 'Where are they now?'

BECAUSE of the special reports on the Nationals, Control Line Eurochamps and World Free Flight Champs it seems a very long time since I had to sit down at my typewriter and write a Mind the Lines column. Having sifted through the mound of material which has appeared on my desk during the last couple of months, I have decided to start on a subject which I raised in the August issue under the heading of 'Too Stiff?' This referred to a problem I had experienced – new lightweight Laystrate lines stiffening up during aerobatics to such an extent that all control was lost and the model crashed. I asked anyone who had experienced similar problems to write to me.

I was surprised to receive nine letters complaining of similar problems and at the Nationals, several modellers came over to tell me personally of the difficulties they had experienced.

Ashley Shaw wrote to tell me of a near-prang with his Taurus on 85ft lines, when after four or five loops the lines seized up. However, he managed to do some outside loops and the lines gradually freed themselves. A Taurus would have made a large crater! David Baxter wrote to say he had experienced the problem and was now reluctant to use this make of line again. Dave Day definitely attributes the crash of his Ambassador to the problem, as does Roy Cherry who smashed his Nobler, and Bob Arnold whose Frog 500 powered Clipper also came to an untimely end. The consensus of opinion among all those who took the trouble to contact me was that they are using other makes such as SIG or Superline. I have personally changed to SIG 15 – thou line and find it to be as smooth as silk and beautiful to handle. Although it is more expensive than Laystrate, it is worth having for the peace of mind it brings.

Just Nostalgia...

In another MTL I mentioned the Nostalgia Class of competition which had been instigated by PAMPA in the USA. This takes the Vintage Class a few years further on to cover the period 1953 to 1964. It can now be revealed that a British Nostalgia Class has been dreamed up by Mick Taylor and the Peterborough MFC. They are running 'The Cabbage Patch Nationals' at The River Embankment, Peterborough, on Sunday 8th April 1990. From the control line angle, the events covered are Old Time Stunt, British Nostalgia Stunt (1953-60), Yoicks Competition, Vintage A & B Team Race (Grass circle – large wheels advised!), Midge Speed, Vintage Combat and concours. In addition there are F/F comps for Jetex, CO_2, KK/Veron/Stahl rubber Vintage, HLG and Concours, so there is plenty of fun for everyone. Any interested modellers should contact Mick Taylor on 0733-204484.

For those interested in the British Nostalgia Stunt event, the rules are as per SAM 35 Old Time Stunt Rules and Schedule, including bonus points for 'no flaps' and engine capacity, but not including bonus points for age of design. The event will be run concurrently with OTS but the results will be awarded separately.

A selection of suitable designs is listed below.

Jasco Tracer
Harlequin 9APS 8/54)
Mercury Monarch
Mercury Wasp
Thunderbolt (APS 8/55)
Veron Combateer
334G APS 8/56
KK Joker
Rascal APS 5/57
Mercury Marvin
Skiffler (APS 6/57)
Cougar (APS 11/57)
KK Gazelle
Coy Lady (APS 7/59)
Frog Chimp
KK Firefly
KK Marquis
Frog Gladiator
KK Talon
Satellite (MA 2/59)
Mercury Viper
Mercury Cobra
Yeoman Bantam Cock
Frog Talisman
Cheshire Kitten (APS 6.58)
Frog Aerobat
Pedro (APS 8/58)
Frog Condor
KK Spectre
Griffon (MA 10/58)
Black Ghost (MA 11/58)
Princess (APS 4.59)
Mighty Mouse (MA 5.53)
Lucky Lady 9MA 7/55)
Sh-Boom (MA 7/56)
Acrobator (MA 1/58)
Revolution (MA 5/59)
Geisha Girl (MA 3/60)
Dingbat (MA 1.54)
Bee 25 (MA 11/54)
Performance Kits Pinnacle
Mercury Crusader
Frog ME 109, Hurricane
KK Firebird
Skua (APS 11/60)
Simple Simon (APS 12/60)
Elf Cat (APS 1.59)
Perf. Kits Lynx
Skipper (MA 3/54)
Zephyr (MA 3.56)
Scimitar (MA 1/58)
Komm-Batt (MA 8/58)
Gaisgeach (MA 1/60)
Kentish Wind (MA 7.60)
Ker-Mando (MA 6/54)
Mercury Toreador

Would you believe that there are fifty-six designs in the above list! I must admit that until I started looking through the magazines of the period, I did not realise that the Nostalgia era would cover so many British designs. So get to

it you vintage fans and partake of a whiff of Nostalgia.

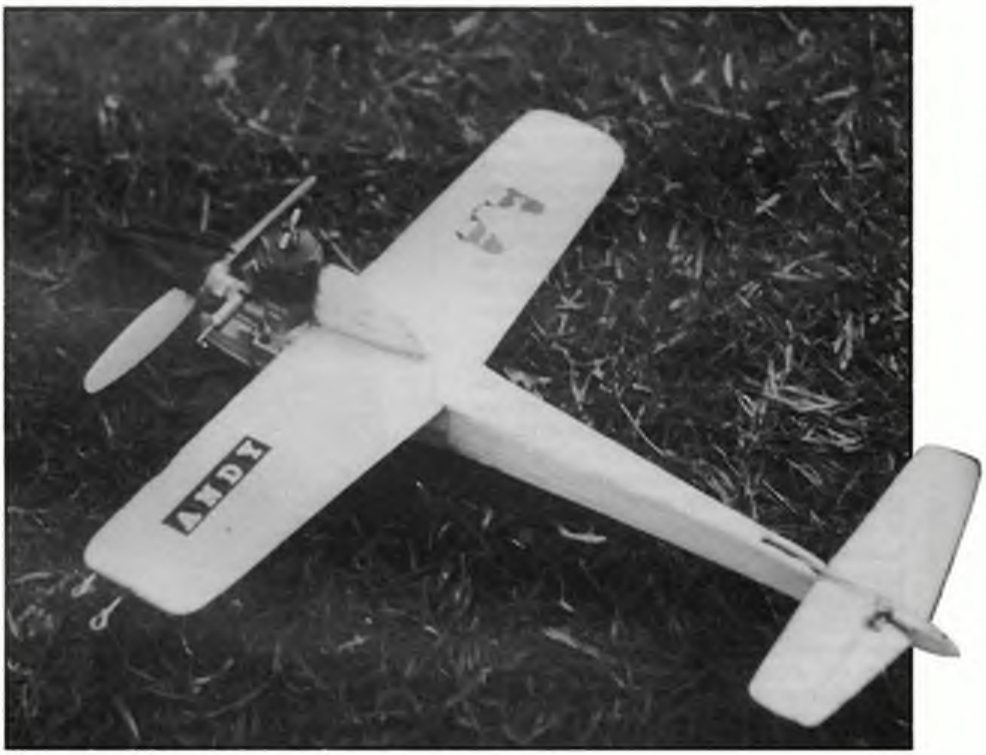
Where are they now?

While on the subject of Nostalgia, I was recently wondering what had become of the Gold Trophy Winners of the early days of control line. Is Pete Cock still modelling, I wondered? I know that the Hewitt Brothers are still building, Brian in Sussex and Alan in Devon. In 1953 the winner was Angelo Piacentini from Salisbury with an old mate of mine from the Chingford Club, Pete Smith, fighting for second place (does anyone know of his whereabouts? I would love to know). After being known as the man who was always second, Pete finally won in 1954. Peter Russell won in '56 and '57 with his famous 334G. We all know Peter of course, as a well known radio flyer and columnist with a sister magazine. In 1958 it was Peter Ridgeway from Macclesfield and in 1959 the Australian Brian Horrocks. Imagine my surprise, when a few weeks later I was flying a stunter at the Oktoberfest, which is really a Vintage radio/free flight occasion, when a balding, bespectacled gentleman came up and started talking to me. He said he was interested in control line flying, although he hadn't done any for years. 'In fact, I won the Gold Trophy in 1953!' he said. I racked my brains to remember who won it in 1953, but finally had to admit defeat and ask his name. It was Angelo Piacentini.

I did not realise that he was now a well known radio flyer until at the end of the day I saw numerous prizes being presented to him. Angie told me he was thinking of making a control liner and rather fancied the Ringmaster, a Harry Williamson design from the October 1951 model Airplane News. However he was in the throes of building a scaled up (96in span) of the Astro Hog R/C model and wasn't sure he could find the time. However he did say that he would be at the next Vintage Weekend. In the control line circles, I wonder?

Down under

Several months ago I had a letter from Derek Pickard, a modeller from Down Under, in which he told me he was thinking of building a deBolt Stuntwagon to be powered by a ST .51. Recently he wrote again to tell me that the Wagon was at last in the air – and how! 'Please advise people just how sensitive this plane is,' he says. 'In many ways I found it just like a combat wing – wow! My ST 51 goes like a rocket and would pull the pants off a Merco 49. In fact it's more like a ST 60 in performance. So the Stuntwagon has had to be de-sensitised and slowed down – a lot! The ST 51 is turning a 12 x 7 propeller and with a 7mm venturi it runs for seven minutes on 90cc of 4:1 fuel'. I can certainly confirm what Derek said, because having flown my Wagon for a number of years I was used to its sensitivity. However after flying the All American for most of last season, I did some fun-flying with the Wagon early in October and just could not believe the difference. The line tension and sheer speed of the model



Ace Vintage aficionado Andy Brough is seen at left with APS Juggler, Frog 249BB powered. His Frog 150 powered Midge is a useful combination (above).

The third of Andy Brough's models this month – this Frog 500 powered Stunt King with characteristic, small flap. Compare with present-day Laser-inspired stunters in From the Handle; how designs have changed...

took several flights to get used to again.

While in the antipodes it would be a good time to give some gen on a vintage stunt and team race day held by the Knox Model Aero Club near Melbourne in Aussie. The information was given to me by enthusiast Alwyn Smith, who dropped in to see me while on a visit to 'the old country' in October. He said that there was a good turnout, with fourteen stunters and eleven team racers. As you would expect, the majority of models were Australian designs. There were three Hearn's Hobbies Demons – two with Frog 500's and the other with a Burford Glow Chief 29. David Kerr also flew a Hearns Flapjack, again with a Frog 500. Other models seen were a Hearns All Australian, made by Robin Hiern; Andrew Frith had a Montgomery Ramrod with an OS 29. Terry Matthews, coming back into flying after a lapse of many years, flew a Tarbaby powered by a vintage Taipan 15 glow. Other models seen were two Hearn's Jitterbugs, a Carioca (from Model News), a Peacemaker, two Noblers (John Hallowell's powered by a Fox 35 and Garry Thornton's by an OS 40 four-stroke). Alwyn apologises if he has forgotten any models! The wind was about 15-20 knots and gusty, so that most competitors opted out of their second flights. During his official flight Andrew Kennedy was unlucky to break a crank shaft on his Frog 500 in flight and the judges Dennis Hipperson (any relation to Dave?) and Ken Taylor awarded first place to John Hallowell flying his Nobler.

While in this country Alwyn managed to find time to attend the October Rubery Hill rally organised by Peter Martin. Apart from helping me with my comp flights and some fun flying with my Box Car, I noticed he was busily taking photographs and chatting to all and sundry. He was particularly interested in the Midge competition, because although they had heard of the model 'down under', he had not actually seen one before.

Fireball fun

Regular readers will recall the report on the Fireball Trophy in the December issue. On this occasion the judging was done by Sid Sutherland and myself. Afterwards, Sid promised to put down on paper some of his thoughts on both making and flying suitable models for this very prestigeous competition. A copy of Sid's letter was sent to Mike Beach, the donor of the trophy, to get his reactions to the suggestions. He thought it was a good idea to publish Sid's letter, so that all intending entrants know just what the judges will be looking for and would not be disappointed if their model was not selected because of some thoughtless use of modern materials. Mike would like to make it clear that all entrants should be able to compete at whatever level they are able and that any suitable model is competitive at any level, as long as the simple suggestions in Sid's letter are adhered to.

Over to Sid Sutherland: *'Thanks for the privilege of helping you judge the Fireball Trophy at the Old Warden Vintage Week End. As promised, here are my comments and, I hope, constructive remarks about the event for future consideration. Firstly – Mike Beach is to be congratulated on formulating this event. It gives a tremendous boost to control line flying and encourages this most enjoyable side of the aeromodelling scene. With the simplicity of this side of our hobby, the way is open for all to participate according to their enthusiasm.*

'Back to the event in question; I do feel that the rules should be published again both in SAM Speaks and the other modelling publications, also the requirements to make the modes, possible contenders to qualify. Working along the line of models for processing, it was soon evident from your experienced comments that advice is needed to avoid the pitfalls modellers can fall into in making and presenting these models for consideration for the Fireball Event. It would be nice to point out the following do's and don'ts:

1 Simple documentation backing up the subject in question.

2 Air frames to be constructed in original materials.

3 Covering materials as original (how often did we find that day film being used)?

4 The correct finish. Was the original model painted or just doped and what colour scheme?

5 Control hinges, plastic hinges are out, mostly tape or stitching was used.

6 Control linkage. Bell cranks and horns as original. No R/C type horns etc.

7 Wheels: many were made from scratch, or Keil Kraft and Veco wheels. No removable wheel collars. Washers or even nuts soldered on is so simple (and cheap) and was the regular way of securing wheels.

8 Engine as original: best to choose a model you either have an engine for or can obtain easily (a large bank balance is not needed with small diesels still at realistic prices).

9 Spinners if fitted, as original, though many models just have plain prop nuts.

Summing up, choose your model subject which you can easily obtain the necessary correct components for.

Flying To be as original. For example speed to simulate a speed run at the correct height you would expect.

Stunt Should demonstrate the full flying schedule that model would have performed, once again summing up, the flying must emulate the original.

Judging Now that's a vast debatable subject. I feel two judges are needed for static and flying, possibly the same two for both sections.

Marking and awarding points for the flying: I do not know whether our system last Sunday was ideal, but it did work that day. I liked your comments about a possible use of the 25 points awarded for starting in one minute (of course a watch would be needed for that). Zero points if it is over run. Judging against a watch does eliminate the personal thoughts.

'These are, for what they are worth, my personal comments and thoughts on what I observed on that most enjoyable Sunday. I drove home that evening thinking what else do I want in this world. All modelling activities are magic, especially in such wonderful company'.

Many thanks Sid, for taking the trouble to put pen to paper. I hope that the above will help both competitors and organisers alike, to enjoy taking part in the 1990 Fireball Trophy.

Where to get it

Finally for this month a word on the availability of those 'hard to get' control line goodies, plans etc. Most readers will know of the range of motors, landing gear, needle valve assemblies, Truturn aluminium spinners, vintage, nostalgia and Road, Atlanta, Georgia 3039, U.S.A. I can now reveal that Tom is also able to supply a range of 26 vintage radio control plans and a full range of BOLLY carbon/glass reinforced epoxy propellers in 2, 3 and 4-blade formats. These props were used by most of the top placed flyers in last years U.S.A. Nationals. (I have bought some 12 x 6 and 11.5in samples and will report on them in a future article). Tom is now able to accept Visa and Mastercard for payment, which makes ordering a whole lot easier. Just send all relevant numbers and expiry date.

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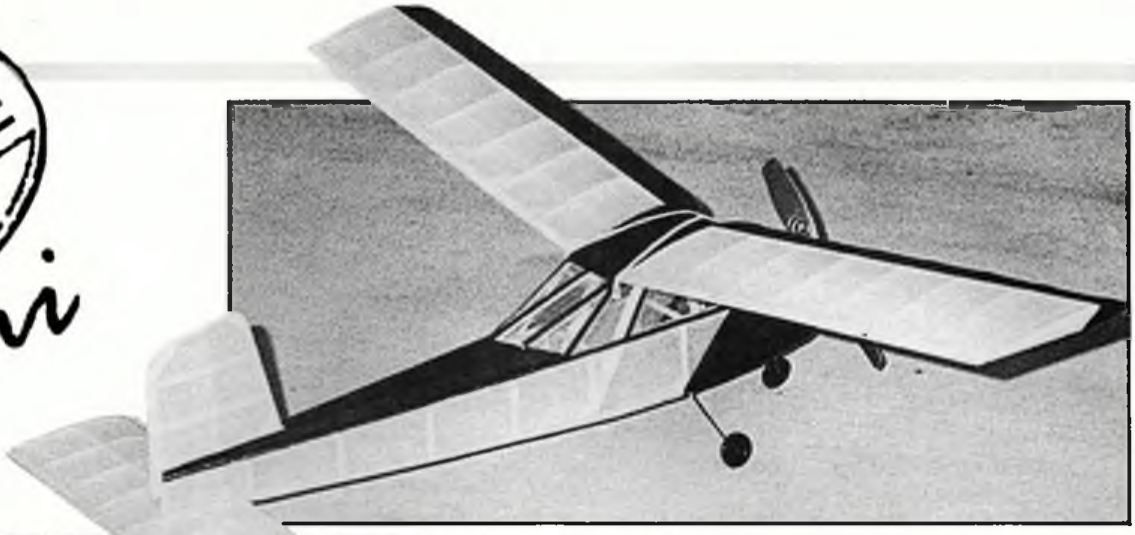
Mini



SKYSKOOTER

Go for a neat mini-Vintage cabin classic with Clive Westerman's two-footer for CO_2 power

THE original Veron Skyskooter first appeared in the early fifties – actually, just early enough to be accounted, authentically, as a vintage design nowadays; and the smart four-footer with attractive semi-scale looks and tricycle undercarriage became an instant favourite. Its roomy cabin, with provision for access via large door, endeared the Skyskooter to the radio control fraternity and several British records tell to this design in the days of ECC radio and the Mills 1.3. Others were built by the dozen for F/F and the ED Bee powered Skyskooter was, for quite a time, as popular a 'period' combination as was the Veron Cardinal and Mills .75.

Plans for the Skyskooter are still available from the designer, Phil Smith of 32 Verwood Crescent, Southborne, Bournemouth, Dorset, who has given permission for Clive Westerman's half-size reproduction to be published here.

Our mini-model

Some designs look just fine when reduced in size; others, curiously, somehow grotesque. The mini-Skyskooter, we venture to suggest, is an absolute jewel. Telco CO_2 power is perfectly sufficient for reliable yet zippy circuits, and is robust enough to absorb the rough-and-tumble of outdoor flight as well as the less turbulent world of Indoor activity. At half-size, the original construction scales down quite happily with few deviations from 'scale'. Sticking the bits together presents no difficulty and the mini-Skyskooter assembles rapidly. Build one now for the weekend!

Fuselage

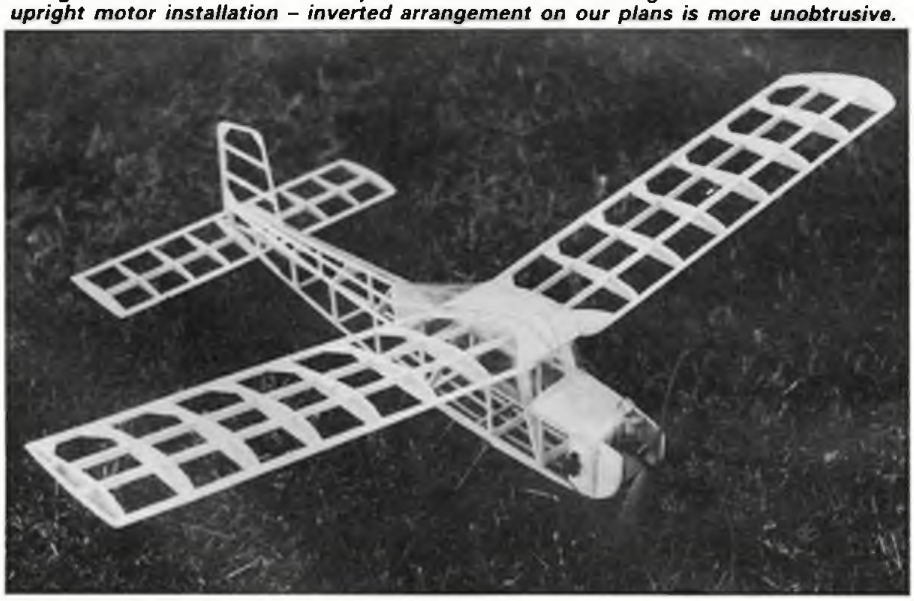
This is a straightforward 'box' assembly with stringered turtle deck and, on our version, extra 3/32in sq stringers from the nose to the rear of the fuselage – governs the correct tailplane incidence. The main undercarriage legs are bound to the lower longerons in the same manner as its larger ancestor. The CO_2 tank may be allowed to float, unsecured, in the cabin with only the pipework to give a degree of rigidity, but some builders may prefer to create a firmer interior framework. Similarly, the filler valve is not fixed to the structure, although if desired, this could easily be arranged. N1 is suggested as the best location, with extra stiffening desirable to take account of the considerable load imparted at charge-up. On the whole, the 'free' system, though not so neat, is quite satisfactory. We have shown an inverted motor layout on the plan, although the original mini-Skyskooter featured an 'upright' arrangement which was the more common alternative in the days of its larger ancestor.

Wing and tail surfaces

These are perfectly straightforward, with the usual *caveat* about care in construction ensuring no warps. To save a little weight, the original three-spar wing was slightly modified to the layout shown. Purists may wish to add the omitted spar (directly below to top one). The fully symmetrical tail is a touch unusual, but is easily created by building it flat-bottomed in the usual way, then adding the supplementary, undercambered rib portions.

Take care in covering – crispness really matters on 'miniature' models – and you are ready for flight! The prototype was yellow-and-black, but there's plenty of scope for going to town on the tissue finish. Three coats of well-thinned (30/70 per cent) dope/thinners should give a weather-and-airproof finish to the fuselage. Two coats should be sufficient for the wings and tail.

Straightforward lines are faithfully reduced from the 48in original. Clive chose an upright motor installation – inverted arrangement on our plans is more unobtrusive.



Up and away!

A few gentle test launches should establish if anything is widly out of trim. Mind you, providing incidence angles and balance point are as per plan, no dificulty should arise. Try a few gas charges before committing yourself to a full liquid charge and maxium power. Left-hand circuits are best, but the mini-Skyskooter is really viceless in flight.

Happy Skyskooting!

We're looking for tons of designs suitable for our centre-page full-size plans. Fresh scale subjects and awesome unorthodox models especially sought – and let's see some charming, freelance rubber jobs too. So what are you waiting for?

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JADED MAID

Build a super CO_2 mini-Vintage winner – here's Tony Brookes' version of a Norman Marcus favourite

IT may seem discourteous for someone like me, who nowadays does very little contest flying, to offer criticism of contest rules. Nevertheless, it was a strong feeling that something is wrong that provided some of the motivation for this model, and to ignore that would be to present a false picture. The following is best read with that in mind.

One major objection to the SMAE Vintage rules is the way that the publication requirement is unnecessarily combined with the cut off date. There is an obvious need for both, but there is a strong case for keeping them distinct. In 1950 and earlier nobody could have foreseen that there would ever be a Vintage class for which their designs might quality, and certainly there was no reason to suppose that tardiness in getting a design published would have regrettable consequences thirty years and more in the future.

But that is what has happened. A number of designs which achieved success and fame in 1950 or earlier were not published until well into 1951. Any reasonable person would say that they ought to qualify as Vintage. The publication requirement itself makes sense since there must be some sort of reference point which determines whether a model has been built as the designer intended. Nevertheless it does seem reasonable that where a design was published after the cut off date, proof that it was built and flown before that date should suffice to qualify it..

Such a case is Jaded Maid, a contest power design by Norman Marcus which collected him a cabinet full of trophies in 1950 (and again in 1951). In May 1951 Aeromodeller announced it with a degree of hype which confirms that it had already attracted a great deal of favourable attention. 'Another Aeromodeller scoop... the model YOU have requested...' and more in similar vein. Jaded Maid is one of the last great designs of the Vintage period, and to disqualify if on purely technical grounds seems all wrong.

It was in an attempt to remedy this injustice to a limited extent that Jaded Maid was chosen as a subject for a CO_2 miniature. That however, is not the whole story. It still had to meet criteria for scaling down, or the project would have been abandoned with great regret. Among the things to be taken into account are these...

First of all, a straightforward approach to structural design is essential. Any complexities of structure become very much more difficult to cope with when scaled down. Secondly, an aspect ratio of not more than 7.5 is desirable. This will usually result in a realistic wing chord in the miniature. Wings which scale down to a chord of less than three inches can lead to very disappointing performance. Lift/drag ratios fall off alarmingly in smaller wings than that. Thirdly, a chance, at least, of building the model down to a target weight of 1.75 ounces or less is a good thing. Finally, it is nice if the design needs little or no modification to take a CO_2 installation.

Jaded Maid has a typical no-nonsense Marcus approach to structure. No problems there. At 7.58 the aspect ratio is just above that arbitrary limit, but since the limit is arbitrary one may stretch a point. Then much of the success of the original model was attributed at the time to its exceptionally light weight, which is encouraging. As for the motor installation, the original had its Eflin 2.49 anchored to a massive radial mount made from quarter-inch ply and strapped in place with rubber bands in the Frank Ehling manner. This is idea, since the mounting modifications (which are considerable) can be strictly localised. The only other necessary change is to lengthen the undercarriage leg to accommodate a proportionally larger prop.

The build-up

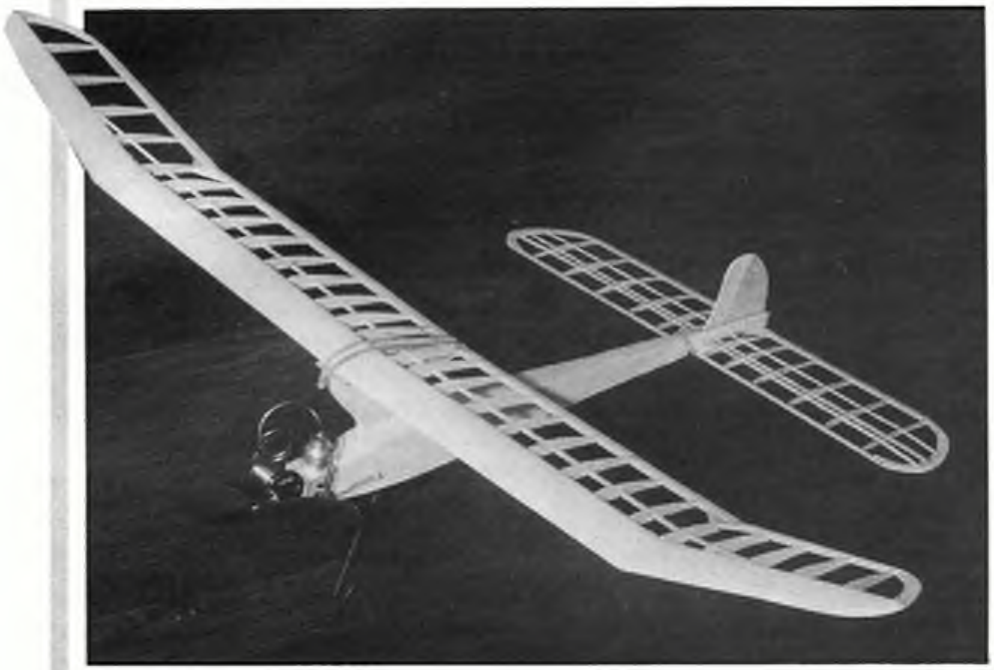
In his original write-up, Norman refused to give building instructions on the very sensible grounds that anyone who needed them ought not to be building a high performance model anyway. No such excuse is available here, since CO_2 miniatures are quite suitable for the inexperienced, so here goes.

Wood selection is always crucial in a model like this. Where soft balsa is specified it must be the very soft but very strong kind,the sort you can dent with your fingertips but which still doesn't break easily in cross grain tension. Your rib stock must be true quarter sawn, with the radial grain showing as stripes, not as blotches, on the surface. The hard balsa should be like spruce.

It often pays to start by cutting out all the sheet parts. There is nothing like getting the tedious part of the job over first. If you are of that opinion, then you might well decide to build the fin first of all. All it requires is the pinning down and butting together of three pieces of balsa sheet. Note the grain direction – it matters. The early completion of a major component, even the smallest one, creates a wonderful illusion of progress.

The fuselage is best started with the pylon. Pin down the strip parts and add the shaped sheet pieces at the front and rear. Here, too,

Neat mini Jaded Maid is just as potent in 24in, CO_2 form as was the original



the grain direction is important and must be observed. The next operation is to build the fuselage side frames from light 1/16in square balsa, pinning them down one on top of the other. When they are dry, take them up and separate them. Pin them down in the vertical position over the plan view and add the cross pieces (note carefully which ones are required at the top, which at the bottom and which in both positions). Leave out the ones which must be cut to accommodate the sheet pylon parts.

The next stage MUST be done properly or the model will be ruined. Carefully mark the exact position of the pylon spars on the cross pieces to which they will be attached. Cement the pylon in place, making sure that it is perfectly upright and in line with the centre line of the fuselage. Then add the remaining cross pieces. Bend the undercarriage leg to shape and bind and cement it to the rear pylon spar and the adjacent upper cross piece. Either a 1/2in wheel or a bent hoop shape may be used to terminate the undercarriage – the original article offered the choice although the plan showed a wheel only. A hoop is shown here but a half-inch wheel would be equally authentic, perhaps more so.

Cover the fuselage all over with 1/32in sheet balsa. Which way should the grain go? On engineering grounds, fore and aft seems right. Rearward of the wing position bending loads are more significant than torsional loads. Finish the pylon by covering both sides with very light 1/32in balsa. Then install the wing and tail mounts and the bamboo fixing dowels. Cement the fin to the fuselage and proceed to make the motor mount. The latter consists of five pieces, two of them made from hard balsa and three from ply. Take care when making the holes in the top and bottom to accommodate the tank. To avoid splitting the plywood, make the hole first in an oversize piece, either by cutting it out with a fine blade or by using a very sharp half-inch twist bit. Then cut the piece to size. The motor is side mounted on the front panel. The filling nozzle may be mounted on one of the side panels or left floating. A rectangle of 1/16in balsa is cemented to the front of the fuselage to locate the open back of the motor mount.

The only tricky aspect of the wing lies in the fact that the leading edge is both raised and angled back. What I did was make a simple jig by sanding a length of 3/32 x 1/16in balsa to the shape indicated and pinning down the LE on top of it. The TE is sanded to shape, notched to receive the ribs and pinned down in place with the front edge of the TE raised by 1/64in. The ribs and upper spar are then cemented in place. Proceed in this way with both main panels. Construction of the tip panels is generally similar. In this case the TE should be tapered on its forward edge (after sanding to shape), then pinned down flat and the tip parts added. Let the assembly dry, then continue with the procedure above.

Pin down whichever main panel has the centre rib and join the other one to it, supporting it at the correct dihedral angle. While it is pinned down, join its tip panel to it, again making sure it is correctly supported. Then pin down the other main panel and add the remaining tip panel. Install all the lower spars, gusset and dihedral braces. The tip dihedral joints are braced with two struts running from the lower surface to the upper. Finally, cover the wing from the LE to the upper spar with the lightest, most flexible flat-sawn 1/32in sheet balsa that ever came out of a sawmill.

The tailplane is straightforward. Pin the LE, TE and tips down flat. Add the lower spar, the ribs and the upper spars in that order. In this case the sheet balsa covering for the leading edge extends over the three central ribs only.

Use lightweight Jap tissue to cover the wing and tail. Dope with a 50/50 or even 40/60 dope/thinners mix. Use enough dope to seal the tissue properly and no more. How you finish the fuselage is up to you. One coat of well thinned banana oil is as much extra weight as I would tolerate.

The DT parachute is made from 3.1/2in square of that same lightweight Jap tissue with a 3/8in hole in the centre. It is strapped to fuselage just behind the wing position. If you prefer a flip-down tail DT, remember that it is not authentic and will disqualify you under SAM35 rules.

My example tipped the scales at just 1.1/4oz. This works out at less than 2.1/2in per square foot, which ought to be light enough by anybody's standards.

Head for the sky

Never having seen a Jaded Maid fly, I cannot comment on the fidelity or otherwise with which the miniature reproduces its characteristics in the air. A little thought given to the matter suggests that it should be trimmed for a spiral climb at full power, with the motor opened up to the point just short of distress. With a CO_2 model, this point can be approached in easy stages, starting with very low power and gradually opening up. Furthermore, anyone who is nervous can stop this process at any point. Indeed, competitive flying calls for a long, gentle run. A model which climbs to, say, 150 feet in twenty seconds is very likely to do a worse time than one which gets no higher than 120 feet, but takes sixty seconds to do it.

But the excitement of heading for the sky by the shortest route takes some beating.

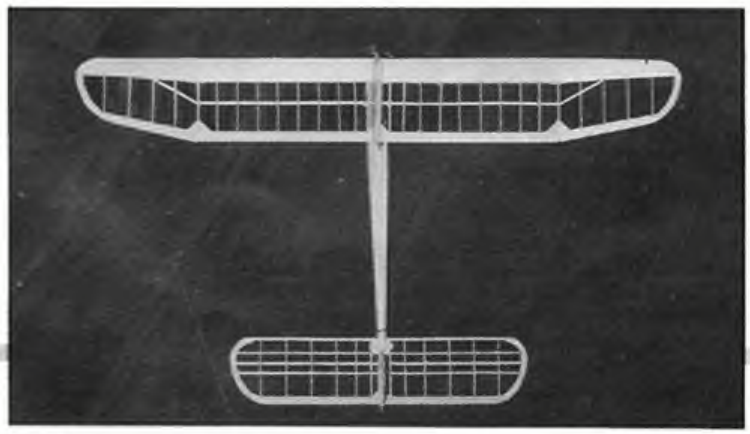
The design has some predictable characteristics. It has a fairly large tailplane (40 per cent) and a fairly rearward CG (40-70 per cent) without taking either feature to extremes Models which go to the limit in these respects are capable of handling very high power, but tend to be tricky to trim, with a preference for very wide turning circles. Models like Jaded Maid will loop under high power unless made to turn fairly tightly. That dictates the strategy – a spiral climb, turning the model enough to kill any looping tendency, opening out into a gentler turn on the cruise and glide.

Get the glide right first. It must be slow, flat and floaty but with no tendency to stall. When launched from shoulder height on flat ground, there should be just enough right turn for the eye to see. If the turn is obvious, it is excessive. Those who can use a slope, or better still a mound, for their test glides should aim for a turning radius of around eighty feet.

Then give it a little power, just enough for a shallow climb, and ensure that it still turns gently right. As the power is increased, the climb should become steeper and the spiral prop wash impinging in the pylon should tighten the turn slightly. during this phase of trimming, leave the trim tab alone or the glide turn will go wrong. Control the power turn with thrust line adjustments. By the time the motor is flat out, the model should be corkscrewing up, with both climb and turn easing off as the power fades.

Now give it a liquid charge, light the DT fuse and make sure the bike is to hand.

In conclusion, I would like to thank Norman Marcus not only for providing the inspiration for this project, but for giving it his approval.



Construction follows the 'full-size' version – there's just less of it... Why not try one this season? Loadsa fun!

BALSA CUTTINGS

More Aeronautical 'appenings with Cyano de Bergerac

Friends in high places

It might be *nice* to find a total stranger is an aeromodeller, but is it *lucky*? Well, there was a gentleman who whiled away some of his RAF service by flying one of his duration jobs from the large 'drome (there's a quaint old word, look you) whereat he was stationed. Now you know it is written – 'Seek and ye shall find'? Right, seek through King's Regulations and the Air Navigation Act, and ye shall find that doing this sort of thing during business hours is reckoned to be off-side. Never mind that for the minute – along came a really weary B.29, just groaning to get the weight off its wings, whose request for permission to land was met with an instruction to go round again *because there was a model aircraft in the circuit*. Going round again in one of those buckets with flaps and gear down is a long old way when you are out of luck, temper and coffee, and the fourteen jagged-off Americans who had just done thirteen noisy hours of screwing up their eyes and getting headaches searching for a sister-ship over the Bay of Biscay were not a pretty sight. Our model flyer, then aged 26, didn't look like making 27. But – the captain was an aeromodeller, and that *was* lucky.

Dead giveaway

If you are going out to play with the big boys, you should be wearing long trousers. If you want your model to be accepted as vintage, tex or film covering is not *on* (silk, tish or bamboo paper should be) extra bits of ply are not *in* (especially if they are) and if a design was notorious for breaking its back – put up with it; don't sneak in any strengthening. All fair enough – can you hack it or can't you? It is not the object to find fault with chaps who feel the breed should be kept pure. However, whilst a Bantam .19 sparkie from 1946 is what ought to be on the front of a Spearhead, where do you get one? You can pay the earth for an ancient motor, only to find it's a heap of rubbish which is okay when it goes, but you have to spend all day flogging it whilst others are getting in flying time. Your columnist, who is not a 'collector', used to have two categories of engine – efficient ones of all ages which could do the job properly, and beloved old friends which were real history but which grumbled and sputtered, mucked about and then died half-way upstairs. There came a very flyable sunny day when there must have been a lot of anti-phlogiston about. One after another, all the beloved old friends did all these shortcomings just once too often. Suddenly there arrived a decision of the kind which used to lead blasphemers to the stake, and some people who do collect beloved old junk got pleasant surprises at Christmas. From that heretical moment on, in the de Bergerac Power Department there is only one category. Sure, it hurt at the time, but now – flick, flick, varoom! It feels a lot better.

And they all 'flu well

Mad Ray, fully accredited Waste of Space and Grand Master of Long Circle Technology from which he claims to have developed the original elliptical fuselage section, sat shivering and aching on his model box, face bright grey and eyes like mouseholes in the snow. Our First Aid expert, Peter (Fingers Neatly Bandaged, always too tightly) unkindly referred to as Dr.Death, bestowed upon us his valuable opinion that Ray had influenza – something we might never have thought of by ourselves – and began grubbing about in the bottom of his khaki haversack, bringing up glass-headed pins, and old tobacco tin and rusty razor blade. 'He's going to cup and bleed him' breathed Arnold in horror. 'Rubbish – he's looking for his jar of leeches,' retorted Phil, who hadn't been to medical school for nothing. (On the contrary, his unproductive sojourn there had cost his father a great deal.) To our universal disappointment, Peter merely produced a foil of aspirins, to which tatty fragments of balsa adhered through the agency of dried-up diesel fuel, and dosed and patient, who was promptly taken home, placed horizontally in a warm environment, primed and choked with strong waters then left to get on with it. The diagnosis proved quite correct, but how Ray can make one attack of 'flu last for five new models, even Dr. Death cannot tell.

Oh, wizard prang!

At a display last year, models were deliberately crashed. Oh, calamity! Some the admonitory finger wagged. David Boddington, on the other hand, wrote of the destruction in a tolerant vein, on the grounds that this is good entertainment. So it is. Zoooom – boink! Vote for Boddington. Do you think the majority of people who watch motor racing want to see a sedate procession round the track, or a good hearty pile-up? Kids will do their homework with one hand, and with the other run computer games crumping up space-ships with Tom and Jerry violence. The shows we tend to offer, with a bunch of similar-looking models bumbling aimlessly around are Tom and Jerriatric. If you feel impelled to do your flying very publicly, or think that by doing this you can serve some charitable or other end that strikes you as worthy of your endeavours, then to keep up the box-office receipts you are going to have to think about raising the excitement factor a notch or two above Dead Boring. Safety? In the right hands, one controlled crunch is worth a hundred hairy orthodox arrivals in the wrong ones. A specially-developed Cannibal-Kamikaze class may emerge, perhaps even blessed by the trendy old bishops as C-K2b, for mid-airs, blaze-ups through paper hoops, tail-chewing and terminal-velocity pull-outs. The events will have to be held on Saturdays, though, since you'll need all Sunday to clear up the airfield, but that's show-business, folks.

'Instead of Alton Towers how about a picnic at Barkston Heath?'

VINTAGE CORNER Special

Alex Imrie examines old-time aeromodelling at the ME, past and present

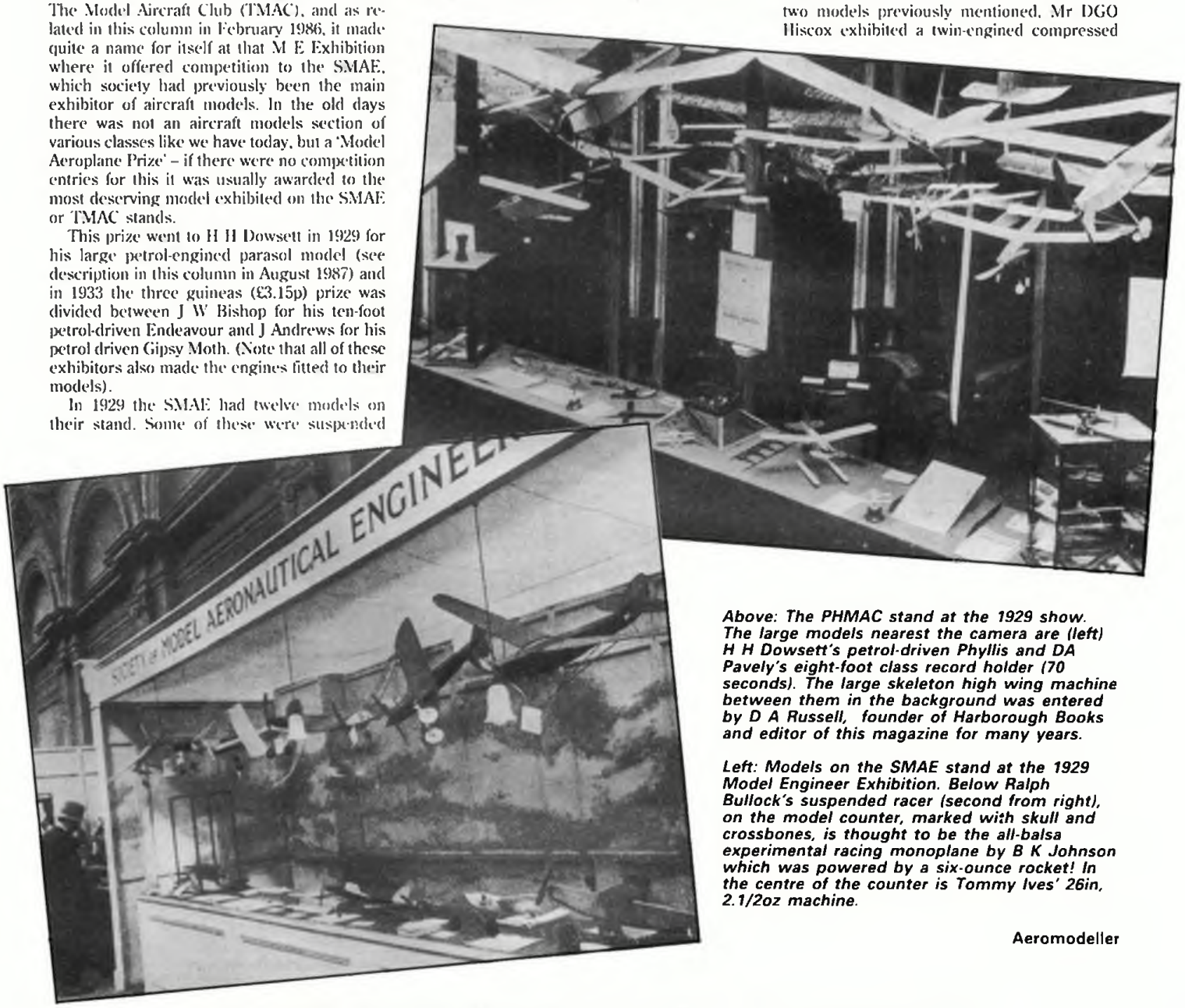
BEFORE looking at this year's Model Engineer Exhibition, come with me down the years and have a glimpse at what went on, in aeronautical terms, at this eagerly awaited annual exposition some sixty years ago. In those days it was held in Westminster's Royal Horticultural Hall; and the emphasis being on engineering meant that locomotives, traction engines, ships and their power plants, stationary steam engines, machine tools and similar heavy items formed the bulk of the entries. In fact, for some years, model aeroplanes appeared at this show almost by accident, although they and related objects were, of course, the main theme of the SMAE stand. A new club presented itself in 1929, the Parliament Hill Model Aeroplane Club that later changed its name to The Model Aircraft Club (TMAC), and as related in this column in February 1986, it made quite a name for itself at that M E Exhibition where it offered competition to the SMAE, which society had previously been the main exhibitor of aircraft models. In the old days there was not an aircraft models section of various classes like we have today, but a 'Model Aeroplane Prize' – if there were no competition entries for this it was usually awarded to the most deserving model exhibited on the SMAE or TMAC stands.

This prize went to H H Dowsett in 1929 for his large petrol-engined parasol model (see description in this column in August 1987) and in 1933 the three guineas (£3.15p) prize was divided between J W Bishop for his ten-foot petrol-driven Endeavour and J Andrews for his petrol driven Gipsy Moth. (Note that all of these exhibitors also made the engines fitted to their models).

In 1929 the SMAE had twelve models on their stand. Some of these were suspended against a 'background of blue sky flecked with clouds having a sunset coloured tinge'. Amongst the models were R N Bullock's low-wing Wakefield winner, T H Newell's Falcon and J E Pelly-Fry's Heron, all machines that had made a name for themselves during the year. One of the highlights on this stand was reported as '...samples of Balsa wood, that ultra-light weight wood half the weight of cork, which is sure to be used more in model construction, particularly indoor models, in the future, was handled with amazement by hundreds of visitors.' (BK Johnson's model on the stand was a balsa model... rocket powered at that!).

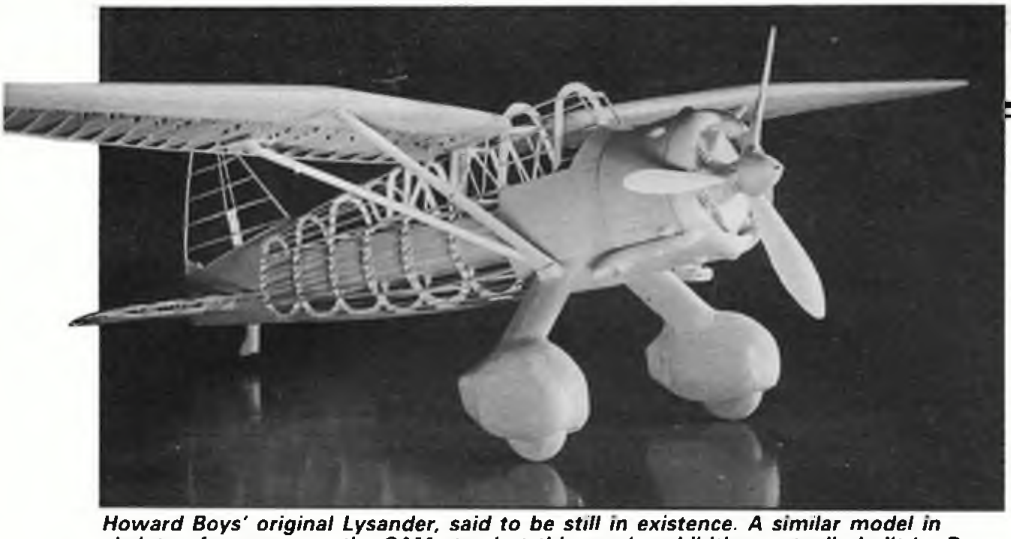
The Parliament Hill Club's stand was more austere, but what it lacked in scenic beauty it made up for by not only having twice as many models as were shown on the SMAE stand, but they were also of greater variety and more technically advanced (if we ignore the experimental rocket model); all the rubber-driven machines having double-surfaced wings, geared motors and sprung landing gears. H.H. Dowsett's petrol model and D A Pavely's compressed-air model were examples of power other than rubber, and compressed-air engines were demonstrated on this stand during the whole period of the exhibition. There is nothing like healthy competition to foster advancement, and there is no doubt that the PHMAC showing (although affiliated to the SMAE) gave the governing body a severe jolt!

In the years that followed, more clubs took stands at the exhibition so the number of model aeroplanes on display gradually increased,. In 1930 the Wimbledon Aero Club joined in and both the Ersham Aero and Model Club and Northern Heights Model Aero Club were represented in 1932. Trade stands catering for the aeromodeller also increased in number, joining the already long established firms like A E Jones Limited, Bond's O' Euston Road and Pavely's DAP Model Aeroplane and Engineering Company. Power-driven models were now well to the fore and in 1933 in addition to the two models previously mentioned, Mr DGO Hiscox exhibited a twin-engined compressed

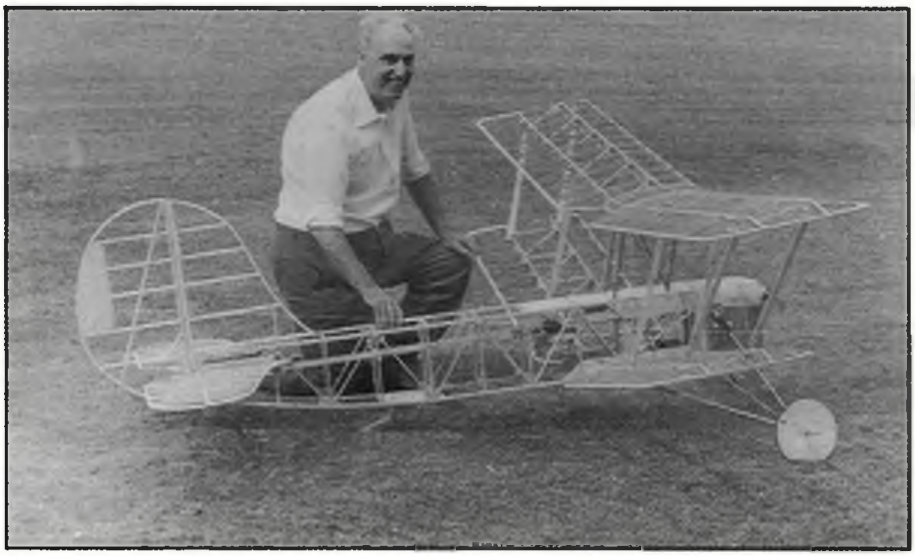


Above: The PHMAC stand at the 1929 show. The large models nearest the camera are (left) H H Dowsett's petrol-driven Phyllis and DA Pavely's eight-foot class record holder (70 seconds). The large skeleton high wing machine between them in the background was entered by D A Russell, founder of Harborough Books and editor of this magazine for many years.

Left: Models on the SMAE stand at the 1929 Model Engineer Exhibition. Below Ralph Bullock's suspended racer (second from right), on the model counter, marked with skull and crossbones, is thought to be the all-balsa experimental racing monoplane by B K Johnson which was powered by a six-ounce rocket! In the centre of the counter is Tommy Ives' 26in, 2.1/2oz machine.



Howard Boys' original Lysander, said to be still in existence. A similar model in skeleton form was on the SAM stand at this year's exhibition, actually built by D Hillier in 1941.



Another fine framework – Arthur Fox's Endeavour is deceptively complicated (featuring home-made turnbuckles, for example) and flies as well as it looks, now completed, overleaf. More top Vintage subjects like this in 1990, please!

air model and C E Bowden's Atom Minor powered Bee dominated the SMAE stand.

59th Model Engineer Exhibition

Some 140 vintage models were displayed on the SAM stand this year which was a combined effort by both Chapter 35 and the more recently-formed Chapter 1066. As in previous years some of the models had been seen either at ME Exhibitions in the past or on the field at our vintage meetings. However, there were, of course, newcomers and these were keenly examined, and comments on some of them will follow. I have previously mentioned that the ferreting-out of relatively unknown models seems to be a particular bent of vintage modellers who leave no stone unturned in their search for rare types that meet our accepted cut-off date of 31st December 1950. That there was little or no duplication of the models shown also shows that the field of choice is vast, long may this activity continue.

A model that I had not previously seen was the Keil Kraft Hornet. This green control-line model displayed the SMAE registration LAD 24. Although Ron Moulton flew his original Baby Bipe at last year's Vintage Weekend meeting at Old Warden, where it seemed to be continually in motion, so it was nice to see the model stationary and note that it was powered by a repro Deezil engine – Ron's original power unit in this model was, of course, the Mills 1.3, an engine that powered just about everything in the late 1940s. Also shown, although out of the vintage period was Ron's Arrowhead design, that was published in the March 1953 *Aeromodeller*.

The red and blue shoulder wing twin-rudder Lippens 1949 Belgian Nationals winner built from plans in the 1951/52 Frank Zaic Yearbook by Michael Barton was of especial interest since the major part of this model was actually constructed on the SAM stand at last year's exhibition in demonstrations for visitors. It was powered, like the original, with an ED Racer diesel. This year Michael was building a Keil Kraft Junior 60 at the show, so I expect to see it on view next year, after a successful flying season, such as the Lippens has enjoyed. I have always been attracted to Howard Boys' 50in rubber-driven Westland Lysander that was kitted by Super Scale Kits of Uppingham in Rutland, and on show was a skeleton example built in 1941 by D Hillier with what must have been some of the last balsa before obechi and other substitutes came into use thereafter. Also it appears that this model was never finished; how about completing it, Mr Hillier? By the way, Howard Boys' original Lysander is said to still exist in the Northampton area. Can any reader confirm this? And if it does, it would be an idea to exhibit it at next year's show. The plan for this fine model, one of our classics, surely, is still available from ASP as FSR 161, price £5.25 plus 60p postage.

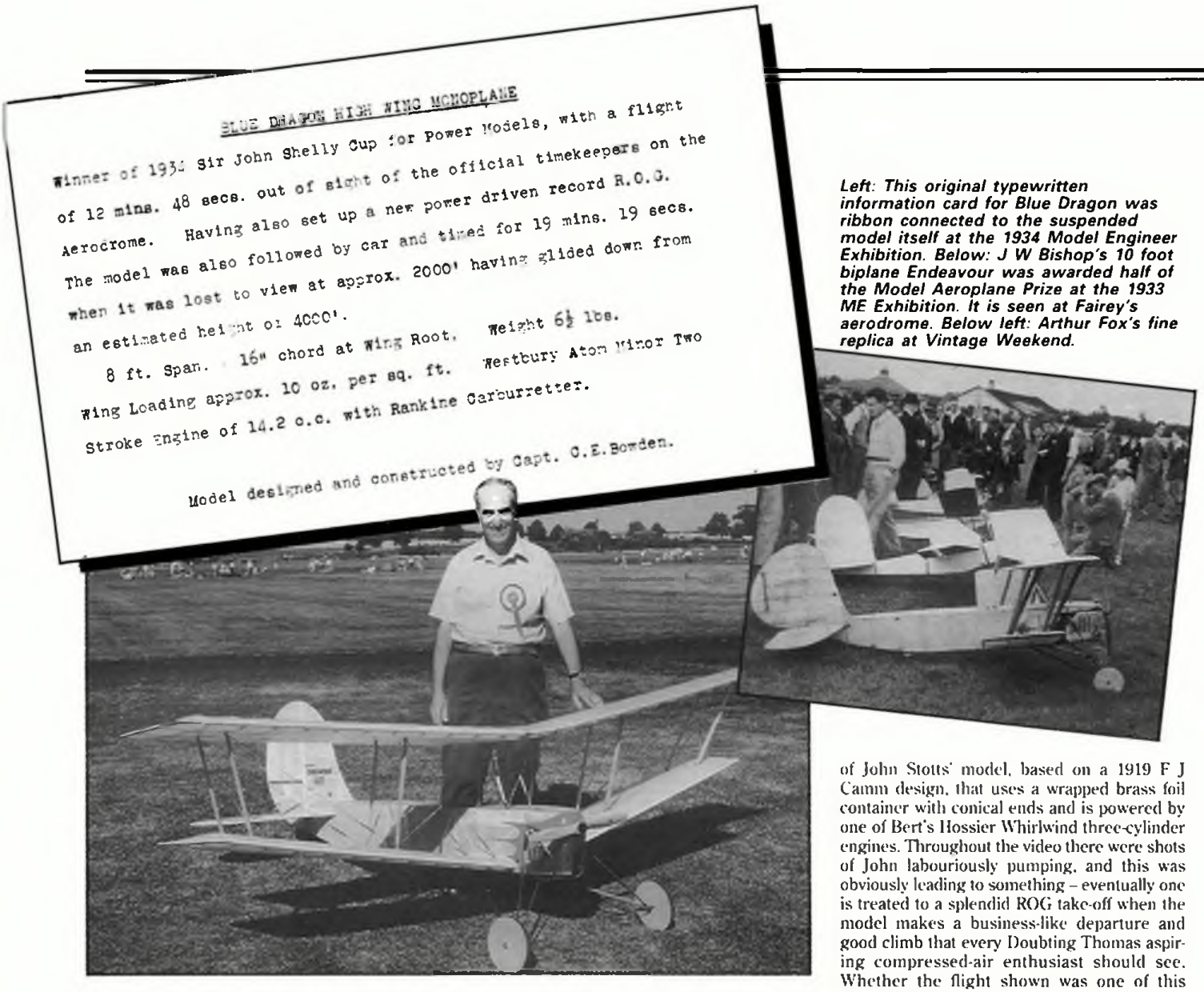
The models shown actually represent the work of a small percentage of enthusiasts. One must remember that the members who did exhibit models often showed more than one; George Hollingdale, for example, displayed eighteen craft. A much larger showing could be arranged; and SAM with its 900 members could have its own competitions with awards that would add greatly to the appeal of this annual display of the Society's work.

The Bowden Bee petrol model dominated the SMAE stand at the 1933 exhibition. Next door, on Hamley's stand, can be seen Ralph Bullock's low-wing 1929 Wakefield Winner. This 48in 9.3/4oz model was kitted by Warneford as the Wizard.

Some Earl Stahl rubber flying scale models were to be seen, many of them George Hollingdale's work who also exhibited a doubled-up Peerless Supermarine S6B of 30in span for which hopes are high, it being said that the floats will help with the lift; but if they do indeed provide any lift will it counter the high drag of these components and their struttery? The model weights 5.1/2oz without rubber and will have to balance at the wing leading edge! I remember a similarly-sized Joe Ott designed S6B at Old Warden in 1987, built by Brian Harvey from Oxford. This one was intended for entry in the Masefield Trophy but had a flat torn off in a firm arrival. Does anyone have any news on how this model has progressed?

It was pleasing to see two examples, in different sizes, of Chester Lanzo's Puss Moth. Their red-and-black colour schemes immediately proclaimed them to be David Baker's handiwork. Readers might find a comment on the oddly-applied registrations of interest. Jim Mollison made the first East-to-West solo crossing of the Atlantic on 18-19 August 1932 flying Puss Moth G-ABXY and this feat and the high-wing layout of this small machine caught the

The SMAE stand in 1934. Below C E Bowden's Blue Dragon can be seen Bullock's racer, and on the right SR Crow's autogiro and Frank Zaic's monocoque Wakefield that was proxy flown at Warwick. Note the tapes connecting the models to information data on the counter.



Left: This original typewritten information card for Blue Dragon was ribbon connected to the suspended model itself at the 1934 Model Engineer Exhibition. Below: J W Bishop's 10 foot biplane Endeavour was awarded half of the Model Aeroplane Prize at the 1933 ME Exhibition. It is seen at Fairey's aerodrome. Below left: Arthur Fox's fine replica at Vintage Weekend.

imagination of modellers. One of the first kits was that for a 26in model of 'The Heart's Content' produced late in 1932 by the Crescent Model Aircraft Company of New York; and this manufacturer, doubtless being unfamiliar with the style of British civil aircraft markings got the top surface wing lettering upside down. That is, the base of the letters were at the wing leading edge instead of the trailing edge. This seemed to set a precedent since several other Puss Moth models that appeared shortly afterwards were similarly marked. When Chester Lanzo made his model (described in the March 1939 issue of Model Airplane News) this error was not only perpetuated but the fuselage sides bore incomplete displays; but that style of lettering is so distinctive that it is as much a part of that particular model as the high wing or the cabin! The adherence to original model marking is something that appeals to me, so I was pleased to see that Dave had marked his models just as Chet had done all those years ago.

There was also a Scientific Flea rubber-driven model featuring a small, dummy engine cylinder protruding from the top of the nose, making it one of the 'gas-type' rubber models which were popular in the late 1930s. The small size, plus the high cost of engines at the time meant that modellers of limited means made them to get the thrill of flying a power model, a ratchet on the prop shaft producing a suitable noise. I gave the propeller a turn but didn't hear the tell-tale click of the motor-hum device, so maybe it was not fitted in this case. Of the other models that come to mind were the Halfax Commando (first I have seen), Club Super-Duration, Buzzard Bombshell, Lil'Misery (John Worth's little Atom powered tailless), Rambler, Zipper, Korda and Lanzo Wakefields, Fairy Facula, John Greenland's Zaunkoenig and a fine ignition – Ohlsson 19-powered Miss Fortune X by Derek Ridley. A real feast of vintage types in such concentration that the mind could not absorb it all. And, all the while, this display was presided over by stalwarts who answered many visitors' questions with infinite patience. Of those that performed this necessary duty who gave so readily of their time to make the SAM display such a success and an integral part of the Model Engineer Exhibition were many members who filled-in at various times, but mention must be made of George Hollingdale, Michael Barton and Alan Wiggs who lasted the whole course.

Thanks to David Baker, a highly interesting video of American models and modellers provided a focus of attention on the stand. The compressed-air features of this video showed Bert Pond demonstrating his single-cylinder walking beam engine and the electric pump that he uses to charge his plastic bottle containers. Bert also explained the advantages of a special propeller for this work that he has developed with angled forward blades based on a design by E W Twining for full-size application. The slipstream is straightened to some degree, thus producing less drag than that from a normal propeller. Bert's prop also had a pivotted hub that 'gives' on ground contact with less risk of damaging the shaft of the compressed-air engine. There were close-up views of John Stotts' model, based on a 1919 F J Camm design, that uses a wrapped brass foil container with conical ends and is powered by one of Bert's Hossier Whirlwind three-cylinder engines. Throughout the video there were shots of John labouriously pumping, and this was obviously leading to something – eventually one is treated to a splendid ROG take-off when the model makes a business-like departure and good climb that every Doubting Thomas aspiring compressed-air enthusiast should see. Whether the flight shown was one of this model's four or five-minute flights made at Westover AFB in 1982 or the two-minute hop this same model made before visitors from UK in 1986 is not known. It was an eye-opener anyway, and shows the potential of this ancient compressed-air plant in the right hands.

Comment...

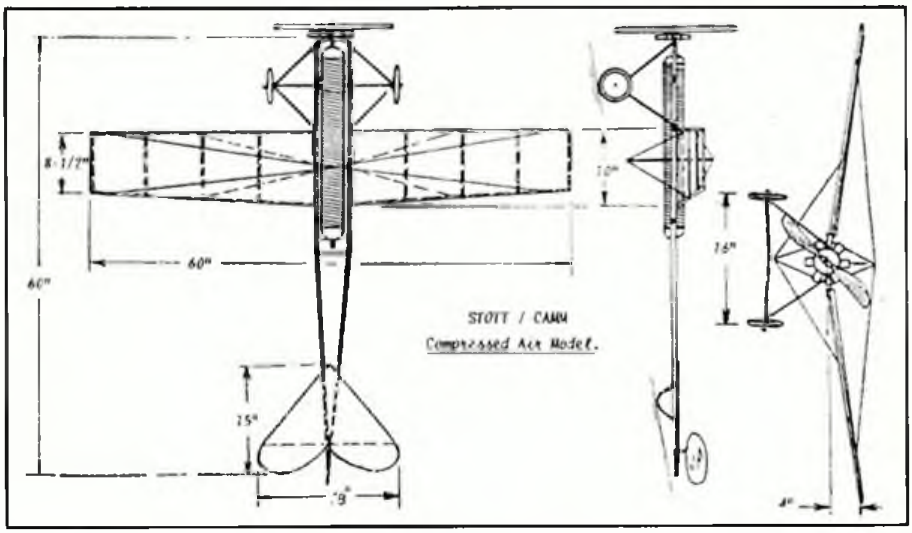
A criticism of the SAM stand was its sheer concentration. Too many models were crammed into quite a small space and there was a lack of information to visitors on what these models were or what they had done, or could do. Here we can learn from the old exhibitions of which I write. On the SMAE stand in the early 1930s, it was normal to run a coloured ribbon down from the model suspended on the stand to an informative piece of card which related details of the respective model – since the models on the SMAE stand were usually record breakers or at least winners in particular classes this might have been easier in their case, but I am sure that SAM members submitting models for display would be able to compile a short history of their model stating, for example, main dimensions, designer, year, and engine originally fitted. This sort of thing is often shown on the original plan anyway; plus additional information like any particular contests entered and placings, as well of course, as the name of the builder. If the modellers find that they cannot do this, a SAM Research Group could be formed to hunt the information out of old magazines and other sources. For

uniformity, all the cards would have to be the same size, and the information neatly printed or typed. Not all the models displayed need be so treated; more space, or less models would be the first requirement, and if the 'ribbon, model to card' was used it would have to be done in an orderly manner otherwise the end effect might look like somebody's knitting!

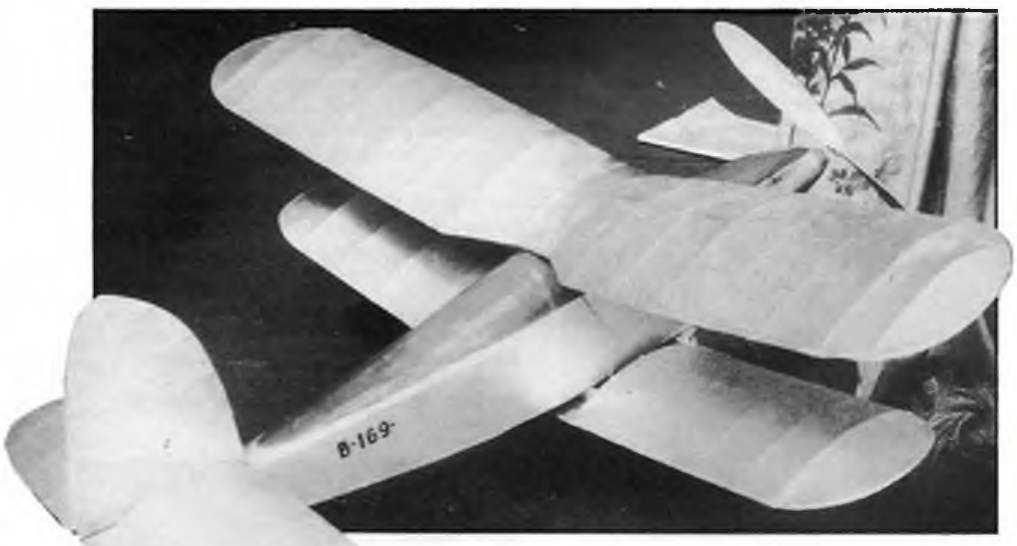
Competition models

Many fine models were on show in the competition classes. One can only wonder at the skill of the modellers who produce such masterpieces, whether these be 1/72nd scale 'solids' or the large scale radio controlled replicas that are almost the real thing. It was noticeable that the WWI types are still firm

Above: The other half of the 1933 Model Aeroplane Prize went to J Andrews for this splendid Gypsy Moth powered by a 15cc petrol engine. The five-foot model was actually a combined effort by Messrs Andrews, Bennet and Collins, named Corsicanfly.



Above: This 1919 F J Camm designed compressed-air model was the basis for John Stott's fine performing machine that was watched with great interest on the video running on the SAM stand at this year's show.



C E Bowden's rubber powered Fox, of 39 inches span and weighing seven ounces was one of three models that he showed on the SMAE stand at the 1931 Model Engineer Exhibition.

favourites, but disappointing to see stereotype markings chosen for the majority of these. One would have thought that modellers, after creating such beautiful models, would have finished them in less well-known liveries; seeking these out must surely give the builder more of a kick than using the old hackneyed colour schemes. This is really the same thing as the vintage modeller hunting out that rare type of model that nobody else seems to have modelled. There were, for example, two fine Albatros DVa machines, both expertly built, but both displaying the colour scheme of the aeroplane preserved in the American National Air and Space Museum, when so many more colourful schemes for this aircraft type abound. When a modeller tackles a large scale model the correctness of detail fittings is essential, otherwise all that he is presenting before the judges is mass – so all those lugs, brackets, turnbuckles and fabric stitching have got to be exact. Nowhere was this more apparent than at the RAF Museum at Hendon when the Large Model Association put on a display on 29th October where models were placed alongside the original full-size articles – there a direct comparison could be made and some surprising divergences were to be seen, even on the best models. At the Model Engineer Exhibition such models are on their own, so unless one knows the real aeroplanes intimately it is easy to be swamped by pure size and disregard non-scale or incorrect detail. The smaller scale builder on the other hand, can get away with creating everything to look right; it does not have to work – he is more of an artist than an engineer. In this regard the models and their infinite range of authentic colour schemes and markings regularly entered for many years at the Model Engineer Exhibition makes the work of A F Woollett such a delight.

Tailpiece

Finally, movement creates interest, hence the knot of visitors around video screens and working models. Did anyone else notice the hush that fell on the West Hall when, after inflating with gas, the Tamiya balloon trailing an advertisement banner, was flown via the thrust of its vectored electric motors by Ron Moulton?

Hopefully my criticism will be treated as constructive. This exhibition, now approaching its 60th occasion is the greatest show of its kind and the organisers and all exhibitors deserve the fullest praise for making it such a hallmark of the modelling year.

High potential

What to build for electric free-flight? Chris Coote comes up with a notion or two

FIRST I am going to answer a common plea for a suitable scale model for the KP01 – which is OK for both indoor and outdoor F/F. The design I have chosen is an old APS free plan first published in the January 1964 issue of Aeromodeller. The model chosen is the Fokker Eindekker designed by John Simmance for electric RTP or 010/020 glow motors and C/L flying. This has an ideal layout for our purposes with a large enough firewall to take the required size cutout for motor mounting, and sufficient wing area to give the low wing loading desirable for indoor use. I first saw a particularly neat conversion of this design in the hands of Brian Roberts at a recent indoor meeting at Alumwell. Brian's version was fitted with a standard two-cell KP01 and flew well at 52gm AUW. This was only to be expected from the man who has now won Kit Scale three times in a row with his KK Super Cruiser. Perhaps he will convert that too and enter it in Electric/CO_2 next year! As to the modifications to the design, these are minimal. The tailplane should be made larger for F/F. A conventional structure of 1/16sq outline and ribs would be better than the rather over-thick symmetrical layout shown on the original plan. The fuselage modifications comprise extending the sides right up to the rear face of the cowl ring,and glueing a 1/16 ply engine mounting former (F2) in between the front of the main fuselage sides at the rear of cowl ring position. The original firewall (F1) can be simplified to a single one of 1/16 sheet balsa. This should be cut into three pieces the central one the same shape as the engine mounting former (F2). This is glued between the sides and the two cowl cheek pieces added outside the fuselage sides to make up the round cowl section. Similar cheek pieces can be added at the front to give something to glue the wrap around cowl sheet to, rather than trying to butt join it to the cowl ring. The KP01 motor is mounted upside down, and there is enough space in the fuselage to take the earlier 'long battery tube' versions as well as the latest, compact design. Do not forget to glue the wings on with one inch of dihedral at each tip, and put your name and address on it! This may be a scale model but it can thermal with the best; you have been warned.

Get forward!

I am fortunate that arch indoor scale flyer Andy Sephton has recently moved to my area and flies with us at Colerne on occasions. On my last visit I was reminded of his views on trimming and basic aerodynamics of indoor scale models as I observed the antics of some new models taking off. The points he made are equally applicable to both electric and rubber models. One of the points that seemed so obvious when explained by Andy, but which is rarely appreciated is the advantage of an extremely forward CG. Andy's own ABC Robin balances at about 10-15 per cent of the wing chord back from the L.E, rather than the more conventional 30-50 per cent. To balance this forward CG lots of negative incidence (or up elevator) is required on the tail. In this condition a small increase in forward speed results in lots of extra lift. Thus the takeoff speed required is only a little above that of normal flight speed. The effect is a nice slow takeoff with a smooth transition to cruising flight with no great variation in speed. This is just what the judges are looking for. Also, if you should be unfortunate enough to hit the wall or ceiling, the diving model will quickly pull out before it hits the floor due to the large amounts of up elevator built into the trim.

Another advantage of the forward CG is that it lines up more closely with the scale undercarriage position. This is particularly important on a tail-dragger, two-wheel U/C since the smaller the horizontal distance between CG and wheel axis, the less is the tendency to ground loop. This is essential in scale flying where the quality of the takeoff scores lots of points in the flying section. The thought occurred to me that, once again, electrics can score well here over other power systems. The fact that we have relatively heavy batteries that are small and can be easily located almost anywhere within the model means that arranging such an advantageous CG is child's play compared to achieving the same without the use of ballast in a CO_2 or rubber model! So now you scale electric flyers have no excuse for not scoring top marks in the flying section! See Fig. 1.

Modifications

I have had an extremely interesting conversation with Pete Frostick recently concerning motors. He kindly allowed me to photograph his much-modified Mabuchi 380 motor and kindly supplied some details of the results of his work. To those of you lucky enough to have seen his indoor R/C model fly at Crawley, there can be no doubt as to the effectiveness of the modified motor. What started as a standard 2.2oz fairly 'cooking' sort of motor now weighs in at only 1.5oz, yet produces over 3.5oz of static thrust on only three cells. This is more than sufficient to flit his 9.5oz indoor R/C job around like a small pylon racer! On four cells the thrust is up to 5.5oz static which is enough to perform vigorous aerobatics (subject to the strength of the lightweight wing structure). Power-on durations of over three minutes are obtained from three 70mAh cells. Some of the

Tony Searle's Abzug S-4 is Kyosho AP 29 powered via five 100mA cells. Motor costs approx. £12...

...and here's Tony's 60in Simplex. Astro 05 'ferrite' motor and six 270mA cells. Tony recommends the Radio Control Model Centre, 214 High Street. Harlington, Middx as a great 'electric' source.

Tony Searle's third model this month – a converted Mercury Matador for Astro 02 'cobalt' drives 9 x 5 prop via five 270mA cells.

background to the motor mods stems from Pete's involvement in an industrial design competition where electric power was required to speed a trolly over a complex, monorail type link at ultra high speed. Experience with slot car motors led to his modified 380. Basically, the can is cut away to reduce weight and increase ventilation. The ferrite magnets are then removed and replaced with some smaller but more powerful cobalt magnets from a slot car 16D type motor. The cheaper form of cobalt magnets are formed from a polymer or resin type base material loaded with cobalt. This means that the magnet shape can be easily reprofiled with hand tools to fit the 380 case.

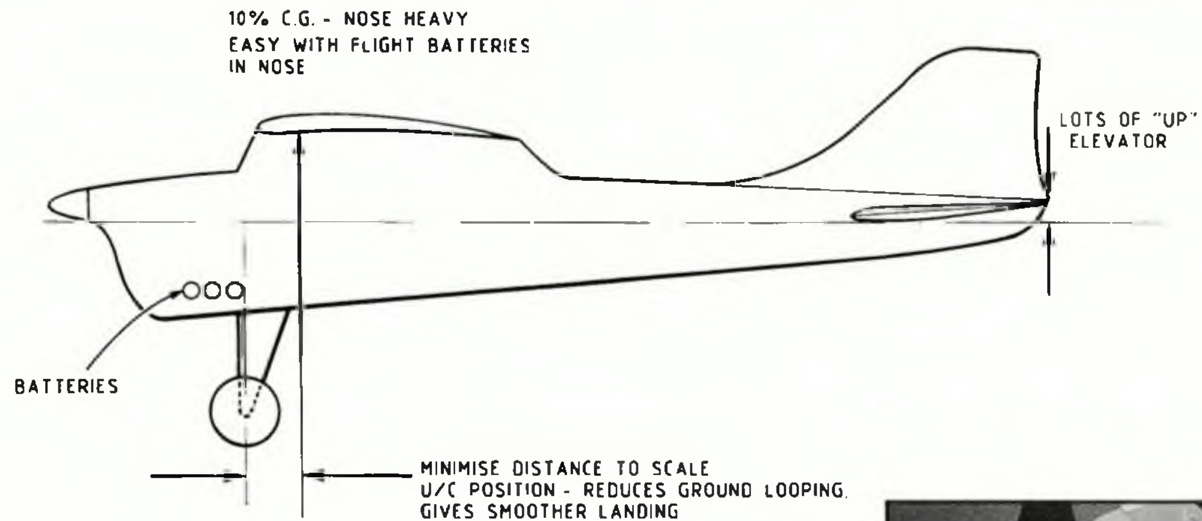
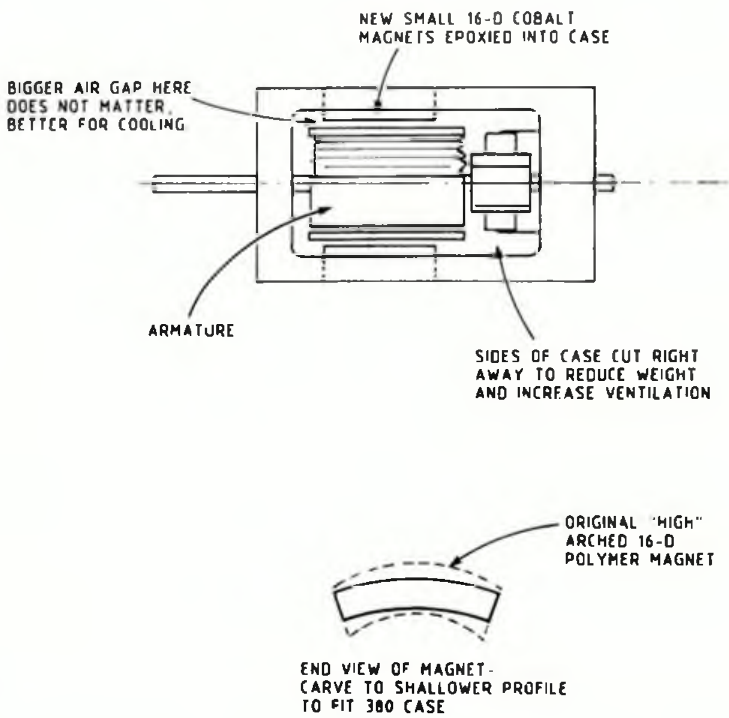


FIG.1 OPTIMUM TRIM FOR SCALE F/F TO GIVE BEST FLYING POINTS

Tony's favoured charger – this MFA unit, here with two six-volt batteries, since replaced by a single twelve-volt battery.



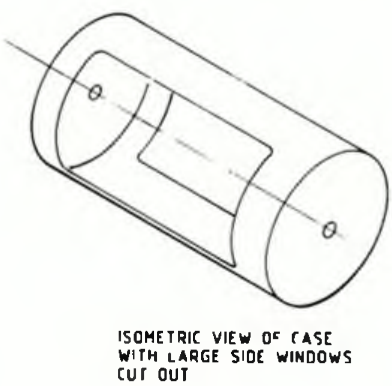
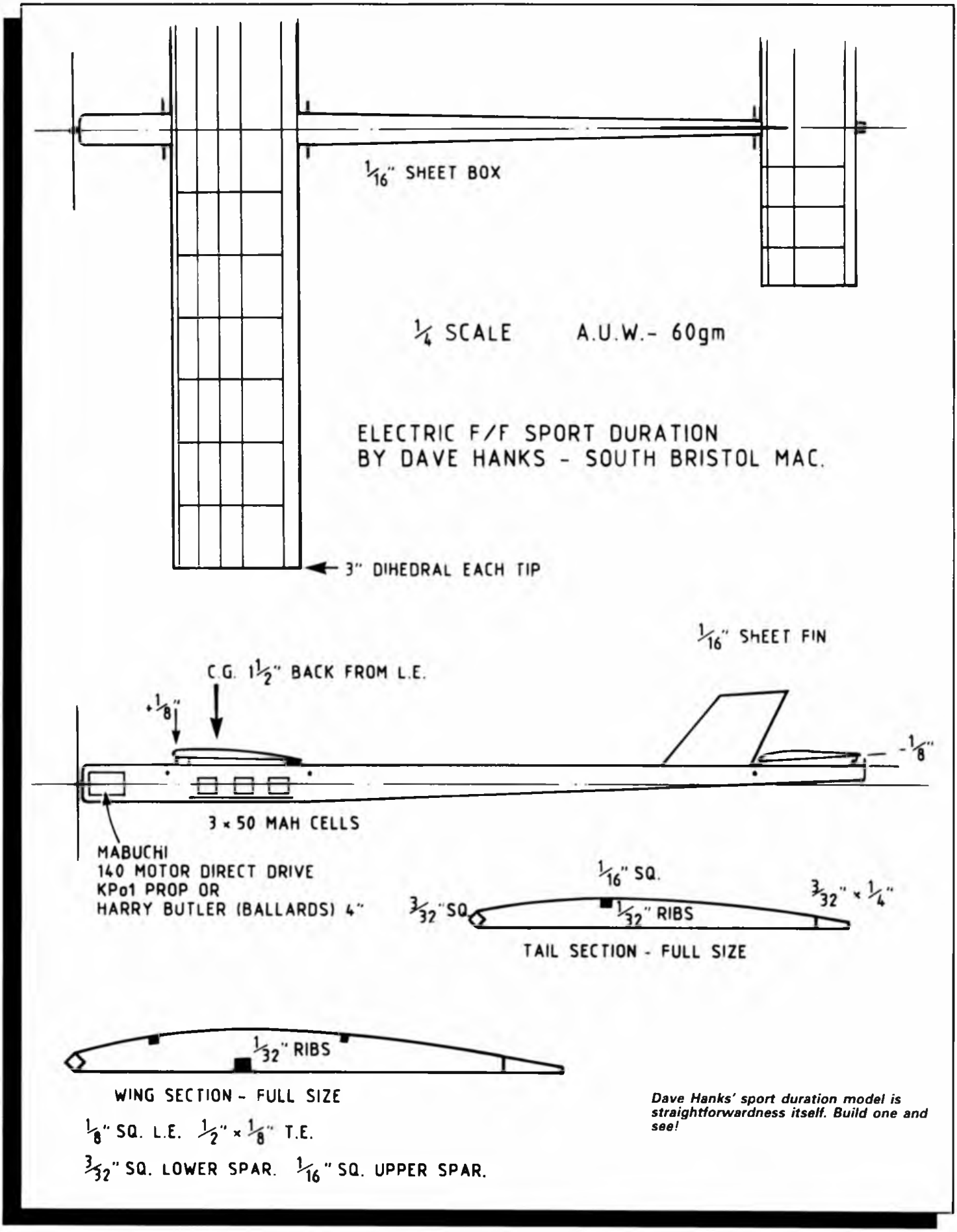
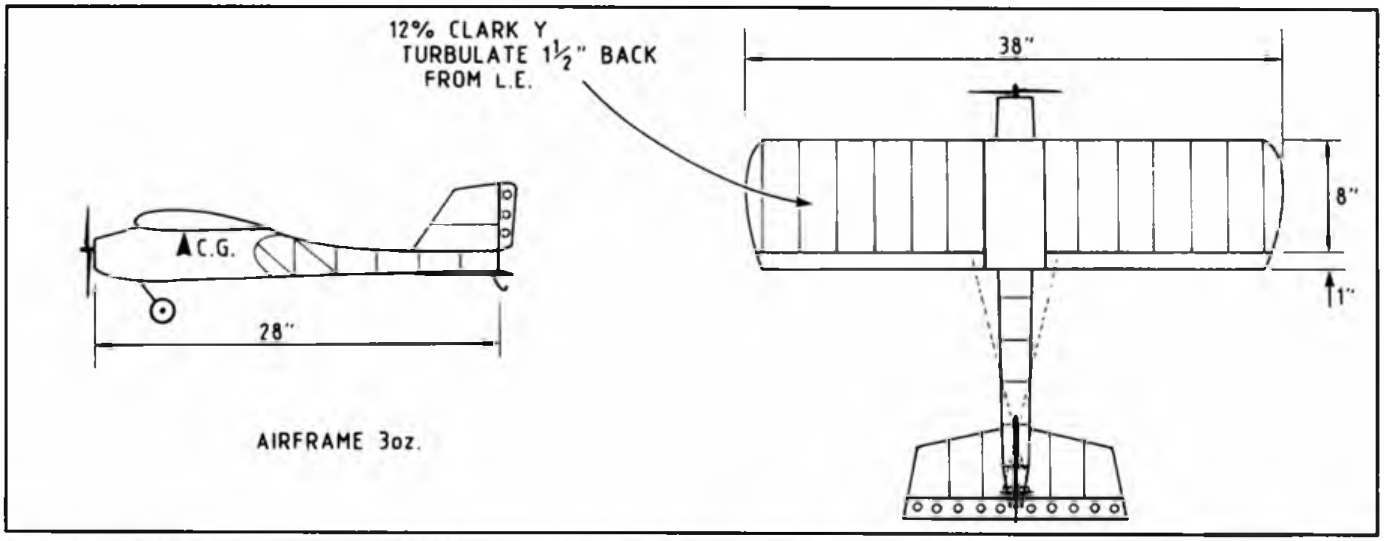


FIG 2



Dave Hanks' sport duration model is straightforwardness itself. Build one and see!

The increased magnetic flux (or strength) more than makes up for the loss of the metal can. Indeed, modern, super-high-performance slot car motors merely consist of a thin metal strap to hold the bearings and brushes, with no can or case at all to help the magnetism; the strength of the super cobalt magnets used is more than enough to overcome quite large gaps in the magnetic circuit. The smaller magnets mean less weight, but the increased magnetism means more power on less cells. The motor has to run fast to give of its best and Pete uses a depitched KP01 prop. This is easily twisted at the hub when heated with hot air to give about 1.5in pitch only in the blade root area. Magnets and all sorts of useful goodies like gears and bearings can be obtained from slot car specialist such as Dave Harvey of "101" as mentioned previously (and advertised in past issues; you can telephone him on 0634-389004). See Fig. 2 for sketch of modded motor.



Peter Frostick's Indoor R/C model details in text below. Note large wing area; thus light wing loading and (relatively) slow flight. Model has proved a capable performer at Crawley and Watford meetings. Peter's motor modifications detailed in this column – see also Fig. 2.

I have included Pete's own drawing of his model together with some notes on the equipment used. The speed controller is particularly interesting since it uses a modern power MOSFET device. The original circuit was published in an American magazine and subsequently made available as a kit of parts with a ready made printed circuit board. This design can use anything from one to four output transistors depending on the current handling capability required. When using four output devices currents up to 40 amps can be handled making this unit suitable for the larger outdoor R/C types with 540 size motors and bigger. The kits can be obtained from:

Elden-ken Electronics, PO Box 1853, Arvada, Colarado 80001, USA.

A modified version of the circuit would make an excellent high current speed controller for free-flight using a small multi-turn variable resistor to provide the input control variation rather than the decoder output from a radio receiver.

Details of Pete Frostick's Indoor R/C model

Wing 38in span, 9in chord inc 1in wide full span ailerons. Airfoil 12% Clark Y, turbulator thread 1.5in back from LE CG at 25% wing chord.

Fuselage 28in long overall; built up box structure (warren girder).

Coupled rudder and aileron via nylon line

Motor: modded Mabuchi 380 with lightened case and cobalt magnets.

Battery pack is 3x270mAh Sanyo cells, giving 2.5 minute run.

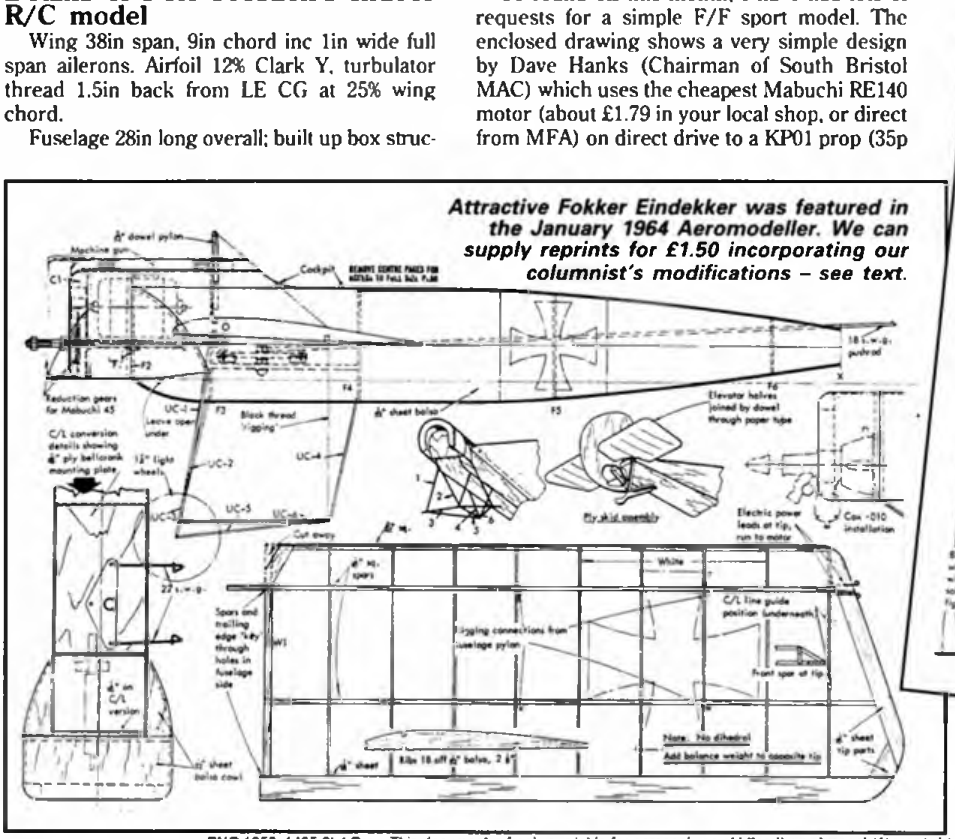
Prop is 5.5in dia KP01 type depitched to 1.5in at hub with heat gun.

Receiver is Fleet mini powered by 4x50mAh nicads.

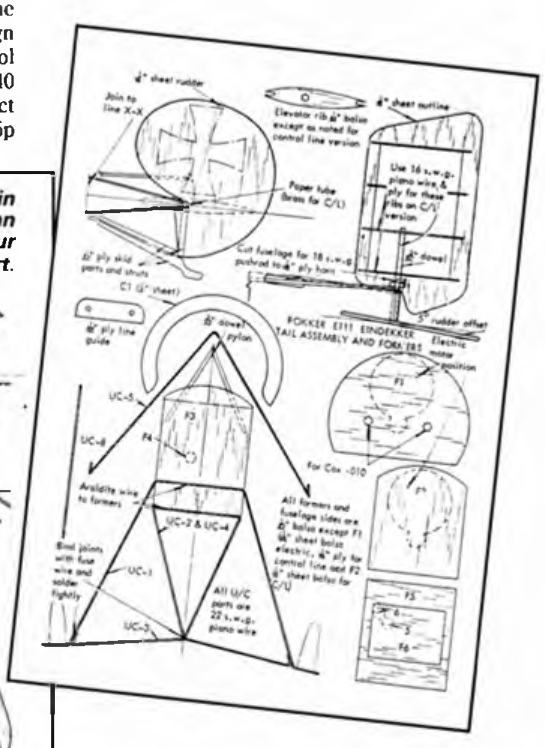
Servos 2 off HB micros, speed controller home made Cano design.

Weights: Motor and prop	1.5oz
Receiver and 4 off 40mAh nicads	1.0oz
Servos: 2 off	1.0oz
Speed controller with one power transistor	0.5oz
Flight battery pack: 3 off 270mah cells	2.25oz
Airframe covered in tissue	3.0z
total flying weight	9.25oz

To round off this month, I have had lots of requests for a simple F/F sport model. The enclosed drawing shows a very simple design by Dave Hanks (Chairman of South Bristol MAC) which uses the cheapest Mabuchi RE140 motor (about £1.79 in your local shop, or direct from MFA) on direct drive to a KP01 prop (35p from Derek Knight!). The model flies well on a standard 3x50mAh battery pack. Use the combined switch and charging jack as shown in one of the first 'High Potentials'. Construction is absolutely conventional, but do try to use light wood. Covering should be Jap tissue or similar. I have been pleased with the Micro-X Old Timer tissue sold by SAMS. This water-shrinks well and only seems to need one coat of 50/50 dope/thinner to seal it. The model as shown is equally suitable for the geared KP01 and will have a better performance than the direct drive (and heavier) RE140. The fuselage is a simple 1/16in sheet box which can easily be varied in size at the nose to accomadate a wide variety of power units. Flying weight should be less than 70gm and should be possible down to 50gm with the lighter KP01 unit. Please put a DT on it because Dave lost the original when he changed to a more efficient prop and was surprised at the improved climbout, never to be seen again! Keep flying light clean and quite electric, more next month, and do write in with your views and experiences.

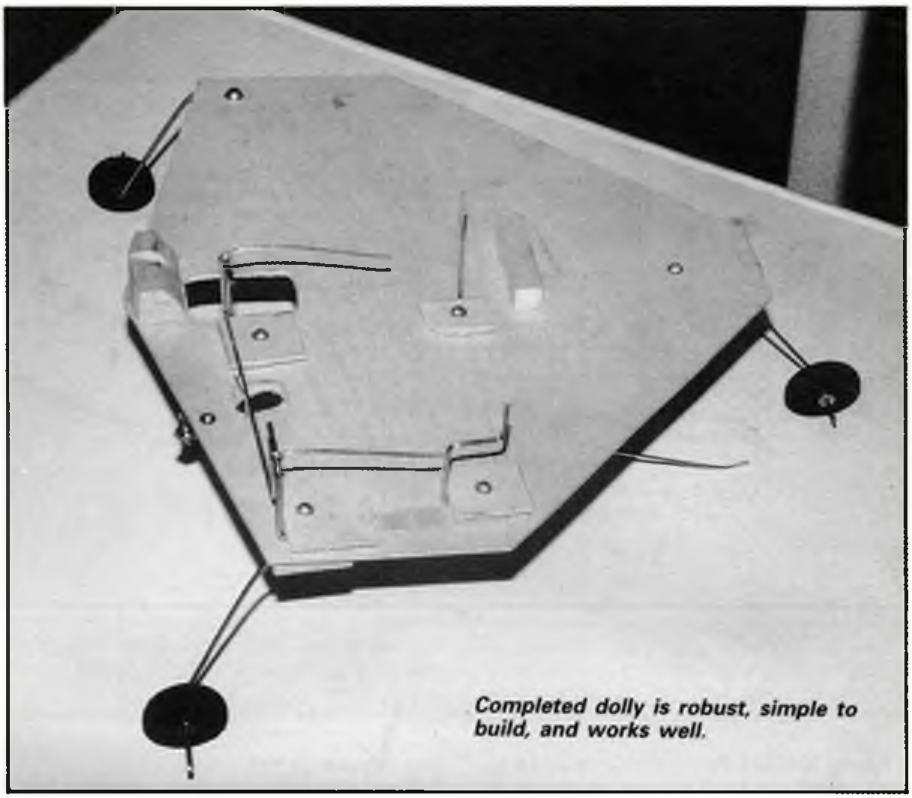


Attractive Fokker Eindekker was featured in the January 1964 Aeromodeller. We can supply reprints for £1.50 incorporating our columnist's modifications – see text.



Dolly Mixture

Dick McGladdery describes his latest dolly – ideal for use with our SST design – and looks at control loops

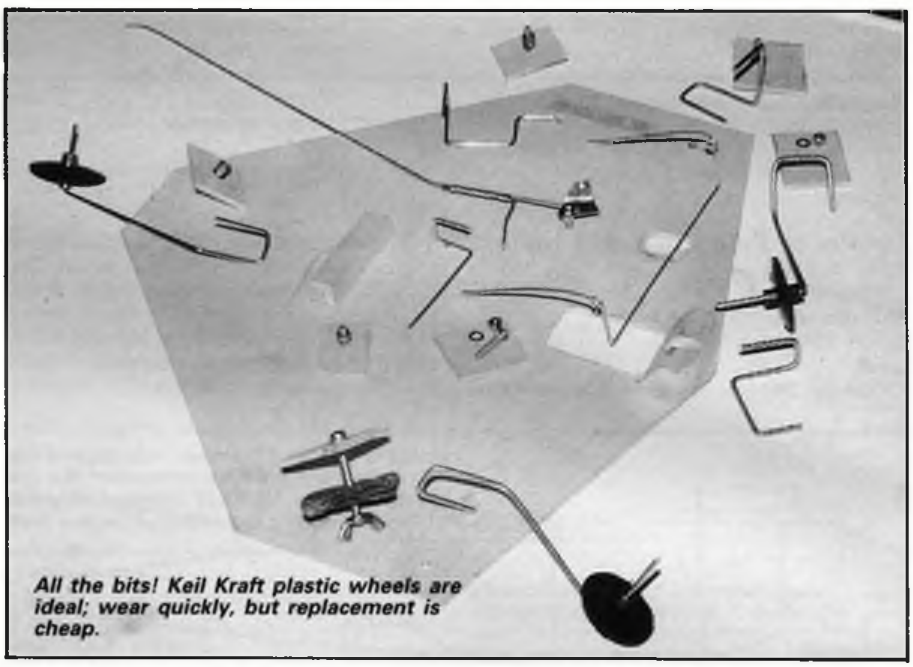


Completed dolly is robust, simple to build, and works well.

BACK IN the April 1986 Aeromodeller, I tried to explain the basic problems that afflict these devices, and although I then commented unfavourably on the 'rat trap' type, they are better suited to inexperienced users due to their inherently superior security, holding the model firmly until the whisker releases the clamps. The design shown here is generally similar to my previous effort, but the ply clamp plates sharply reduce the number of bolts needed to hold the thing together, yet allow the positions of the guides etc to be adjusted so that the model fits snugly but without binding.

As in the earlier design, skinny, hard wheels are recommended. I used Keil Kraft 1.1/2in plastic wheels intended for sports rubber F/F models. These tend to wear extremely rapidly, lasting perhaps only a dozen or so take-offs, but they are very cheap, so can be replaced when needed without excessive financial pain.

As a more durable alternative, Ed Needham makes some very neat wheels of suitable size for dollies, consisting of a polystyrene disc 'tyre' mounted in a turned aluminium hub, for about £9-10 a pair. These will last for years, and can be obtained from Ed at 10 Lowfield Road, Stockport, Cheshire, SK3 8JR, along with a host of other goodies for Goodyear and T/R. I made my example of the present dolly design with axles long enough to take fat balloon wheels, to try a few theories on the tracking problem when the opportunity arises, but until then, I recommend this type of wheel be shunned in favour of skinny ones.



All the bits! Keil Kraft plastic wheels are ideal; wear quickly, but replacement is cheap.

Another feature repeated from my earlier design is the ballast attached on the outboard front wheel mounting bolt. This counters the tendency for the model to swing in just after release for take-off. Unfortunately, with a rat trap, the model has to lift the dolly clear of the ground in order to release the clamps, and if too much ballast is attached, the model has a hard time lifting it. After initial tries with about 90gm attached, I finished up with only 30gm, and in this condition the model was successfully taken off and flown by someone who had never previously flown a speed model, so I guess 30gm is enough.

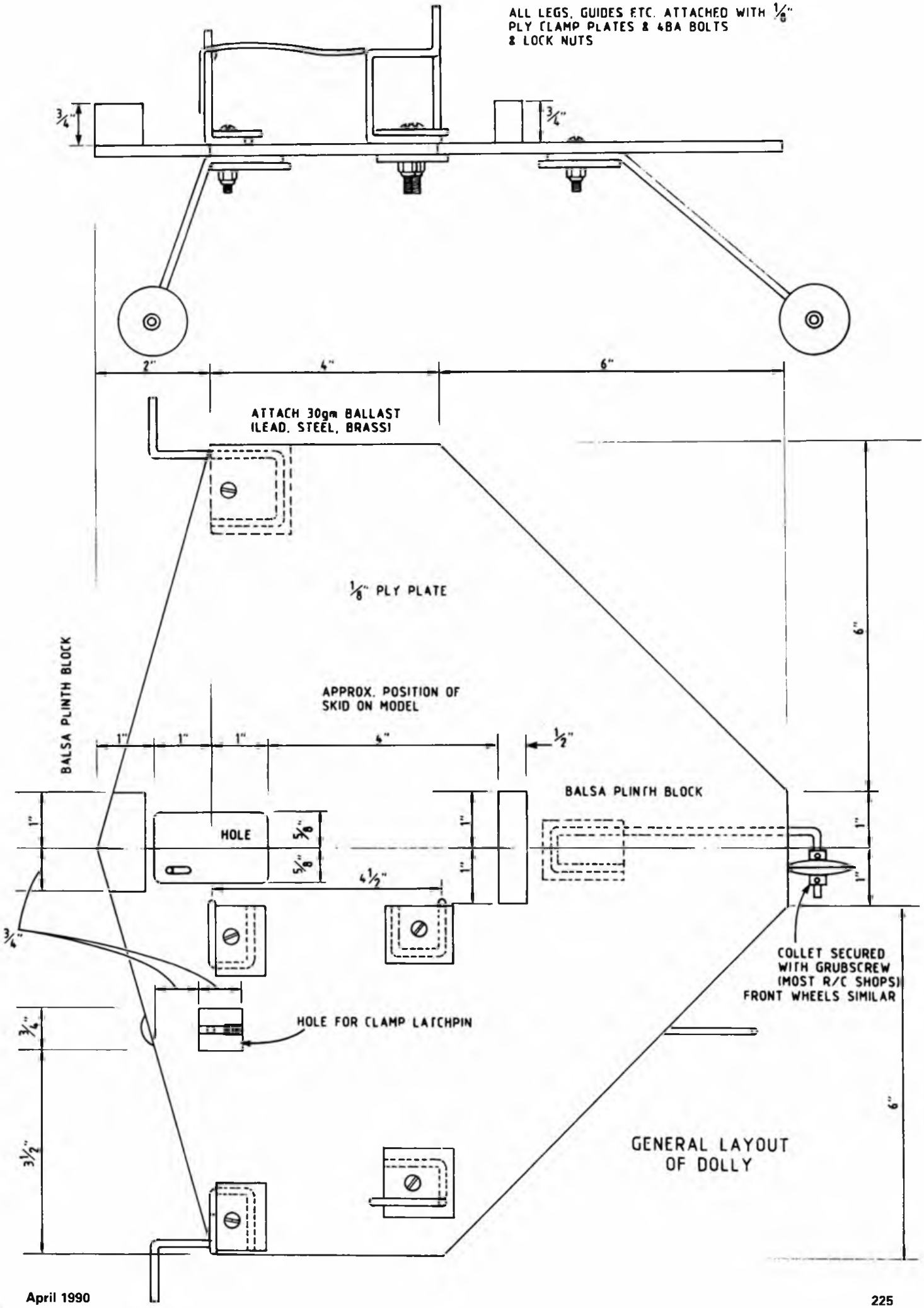
The release mechanism should be adjusted so that when testing static, release occurs when the assembly is lifted between 10-20cm above the ground. Release in actual use will occur somewhat later, at around two metres altitude. It is important that release should not occur too soon, otherwise it could happen on a bump during the ground run, before flying speed has been reached. Similarly, it should not release too late, otherwise it will get thrown harder and further than necessary – rat trap dollies tend to have a hard life, being ill-equipped for flying and lacking the sense to land properly by themselves.

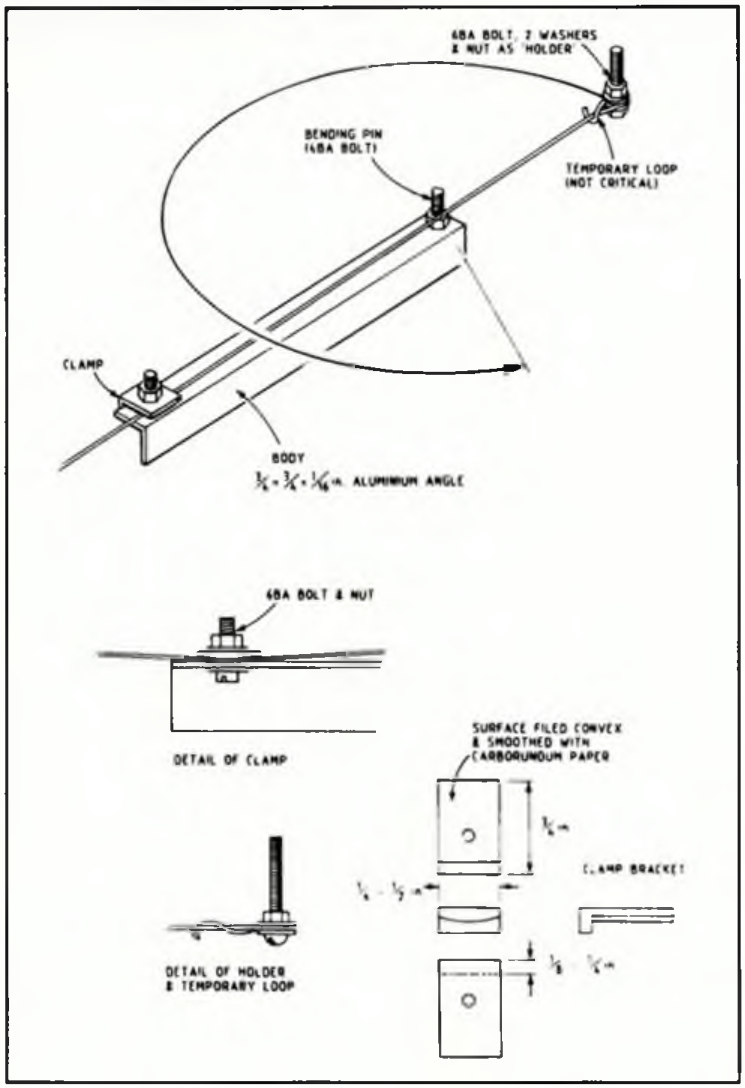
Build your dolly

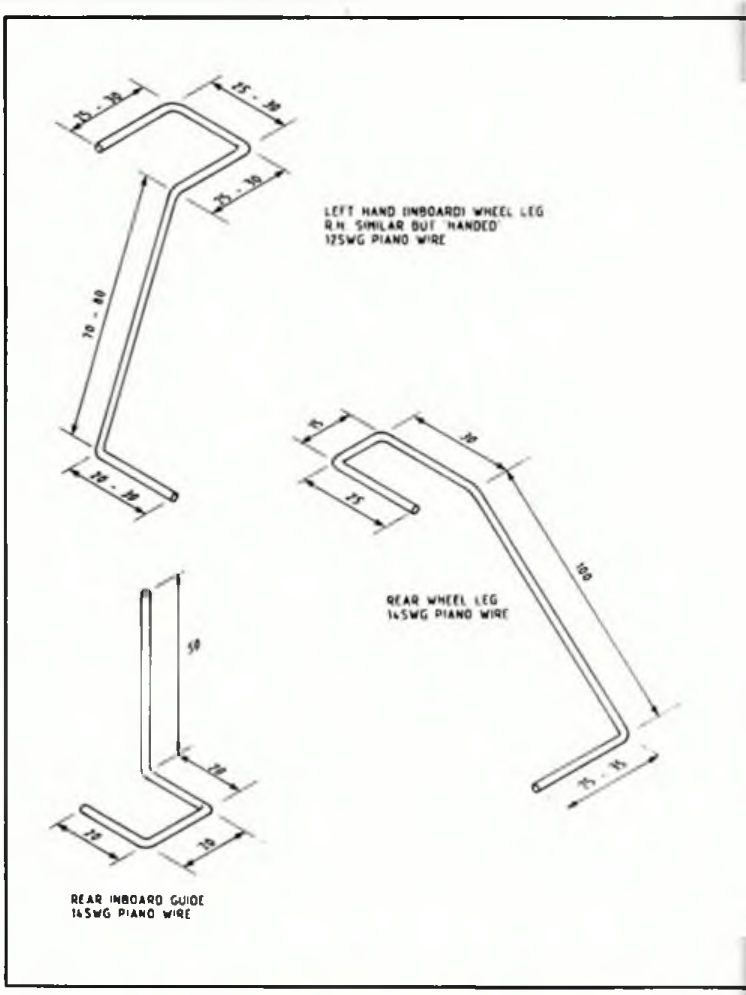
The hold through the main plywood plate or chassis for the model's main landing skid as shown on the drawing is the minimum practical size – if anything, the outboard edge should be extended another 10mm or so.

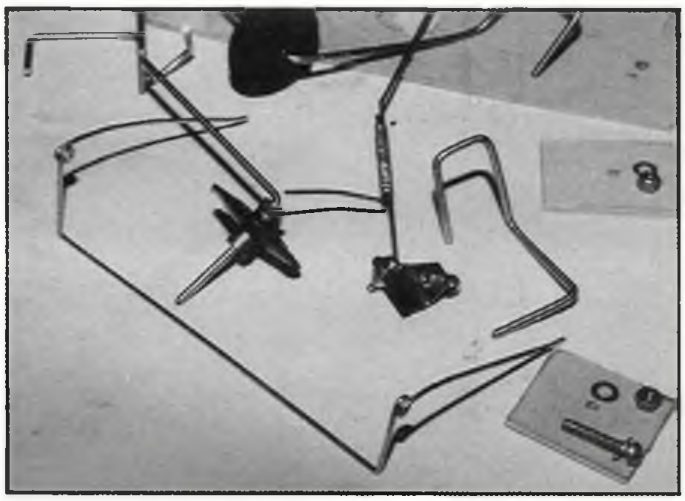
The front plinth block needs to be notched to clear the end of the cutout crusher bar on the model. Gaining access to the latter, for instance to shut off or open to stop fuel flowing through whilst awaiting the moment to start up, is less than desirable; but it is a minor inconvenience which will have to wait for a Mk2 version to sort out.

The positions of the clamps and guides









Wire bender shown above. See 'Control lines'. Dolly metalwork dimensions above right; major components at right. Far right: critical dimensions of control loop. Be accurate! Below: Dolly inverted, showing outboard weight and whisker.

shown on the drawings are fairly approximate and are consequently not located by dimensions. To locate them, place the model on the plinths with some temporary packing under the wing to position it level with the plate, then, one at a time, offer up the guides' mark the position of the clamp bolt with a pencil, drill the hole and install the guide, fairly lightly for now, because it will have to be removed later for painting. When all the clamp brackets and guides have been fitted, the main wheels and tail wheels can be installed in much the same way. I painted the plywood plate and clamp plates with ordinary household oil paint, then assembled permanently. The wheels were eyeballed for alignment, and tracking adjusted so that the dolly tended to swing gently out of the flying circle.

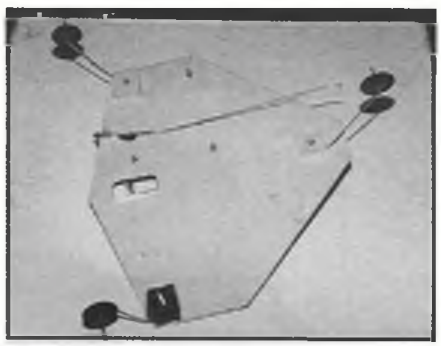
In testing, we noticed it was desirable not to climb too high, otherwise separation was too jerky. The model took over a quarter of a lap to unstick, and the only difference between more or less 'up' only seems best, and to deliberately hold the model low until the dolly drops off, so I suggest start with 'level' elevator at the moment of release, and then feed in a little 'up' after a ground roll of a quarter of a lap.

Control lines

Speed models pull harder than other types, and the wires are consequently more heavily stressed. The nominal strengths of the sizes required in the various classes are much higher than the models are ever likely to generate, but they have to be for several reasons.

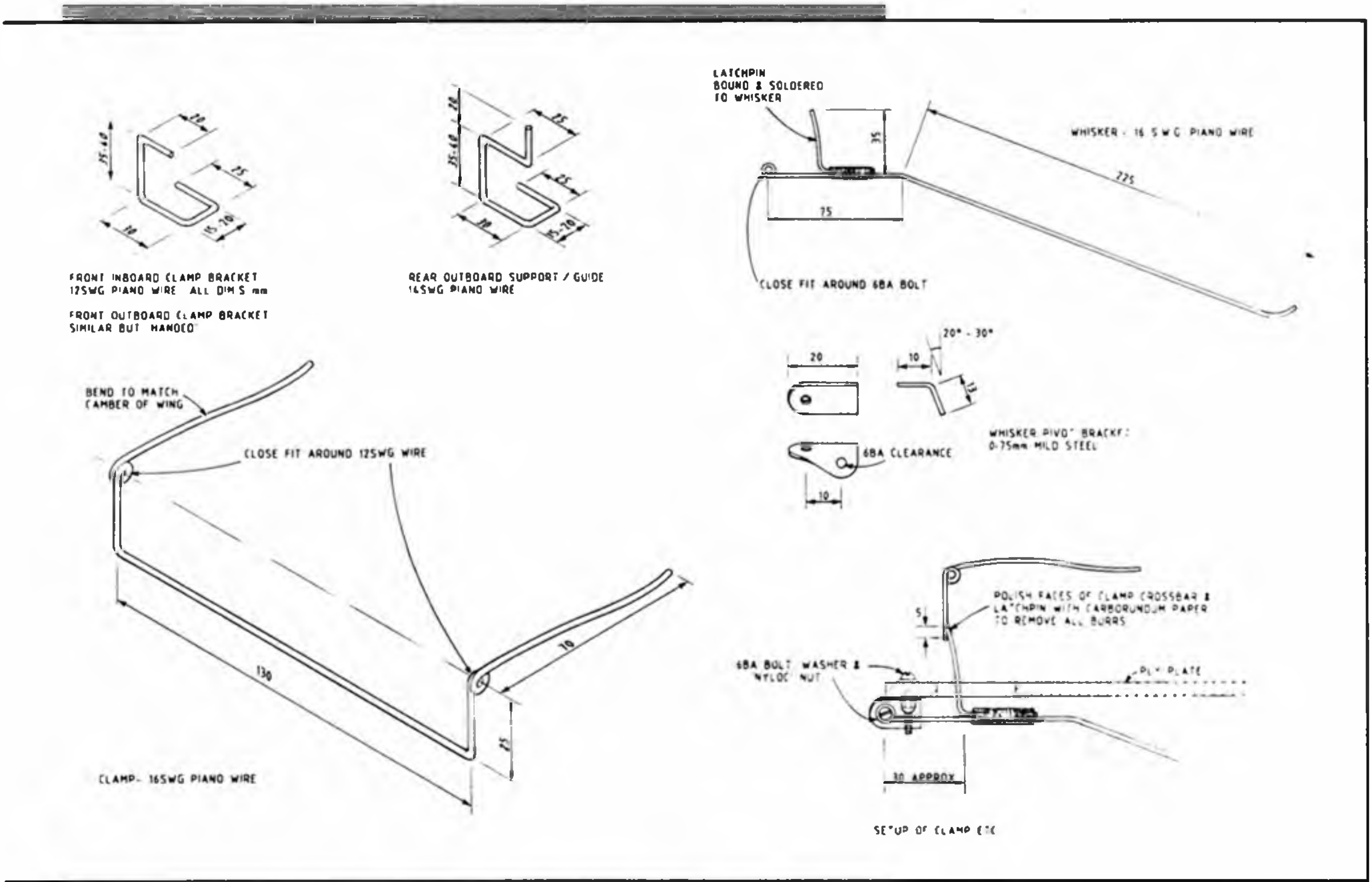
First, at the quoted strains, fatigue life is very short; second, the laboratory methods of testing the wire are performed without the looped connections we use to attach the lines to the model and handle. Any permanent bend deforms the wire, reducing its cross-sectional area and therefore its strength; the tighter the radius of the bend, the more pronounced is this 'waisting' (and weakening) effect, and as previously indicated, a generally accepted minimum 'safe' radius for bends is four times the wire's diameter, beyond which the degree of weakening becomes progressively more severe.

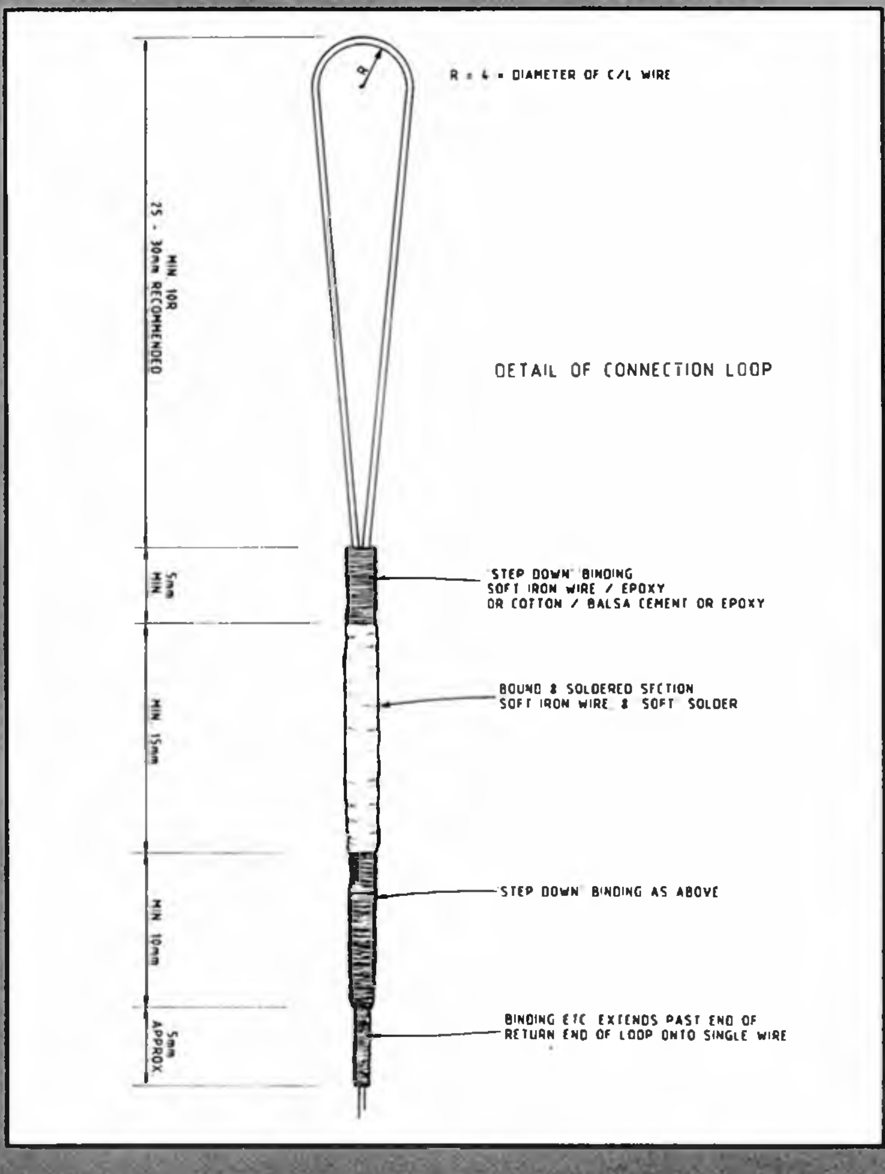
For safety reasons, it is important to avoid weakening the wires unnecessarily when making the connection loops. Apart from avoiding excessively tight bends, care should be taken to avoid distorting or marrying the surface of the wire as happens when pliers are used to grip it – don't use pliers on any part of the wire or loop. Annealing is another danger, so any soldering should be carried out without excessive heating – never use a naked flame and use the soldering iron at the minimum practical temperature. If the wire (and binding wire) is properly cleaned immediately before soldering, the operation is much easier because there is less time for atmospheric corrosion to hamper it.



Now to bending the loops to the required shape and size without recourse to re-bending and 'teasing' (which is another cause of weakening). The jig shown in the diagram will be found very useful. After a few practice tries with scrap wire, consistent well-shaped and correctly sized loops can be produced.

For the general design of loops and the manner of fastening them, the SMAE Speed Rules are illustrated in the sketch. The object of the 'step down' portions of binding either





side of the solder portion is to provide a progressive transition in both stiffness and strength; it may not look devastatingly technical, but it is quite effective. The binding of the 'step down' sections can be either soft iron wire coated with epoxy (24 hour Araldite is recommended) or cotton and balsa cement or epoxy.

For binding wire, obtain some electrical flex; anything in the diameter range from 0.006in (0.015mm) to 0.010in (0.025mm) is suitable. It has not much strength to speak of, being mainly a construction aid to hold the control lines together whilst being soldered. Binding should be carried out in an open spiral so that the solder can penetrate easily to the C/L wires, these being the principal target of the operation.

To use the bender, line the wire up carefully so that if is straight and tangential to the bending peg, then tighten the clamp, but not too much, otherwise the wire might be distorted or kinked. Holding the bender in the left hand, draw the wire taught – a few pounds of pull – using the temporary loop, and pull the wire around the bending peg, keeping the tension throughout, to a total of 225-270 degrees.

Release the tension, unfasten the clamp and snip off the temporary loop, and there it is. It's worth doing a few practice tries with scrap to find out how much past 180 degrees you need to pull the loop bend, as this will vary according to how much tension is applied during the bending process.

Right – that's all there is to it! This article in conjunction with our SST feature elsewhere (and last month) should get you started on the speed circuit. Tell us how you progress!

1: Ian Henry won Vintage Precision with silk-covered, O&R 60 powered F/F Hayseed. 2: Phil Crump of Gore with Red Rocket 1/2A. Note invigorators and C/F boom. 3: Top junior in F1A, David Merrilees flew this neat Czechmate into sixth place.

2

4: Country Boy 450 won Open Power for Chris Murphy despite a spectacular over-run. Taipan 3.5 runs on pacifier. Conditions throughout were hot, sunny and windy. C/L Champ was Paul Coghlan; F/F Champ and Champion of Champions was Paul Lagan (again!).

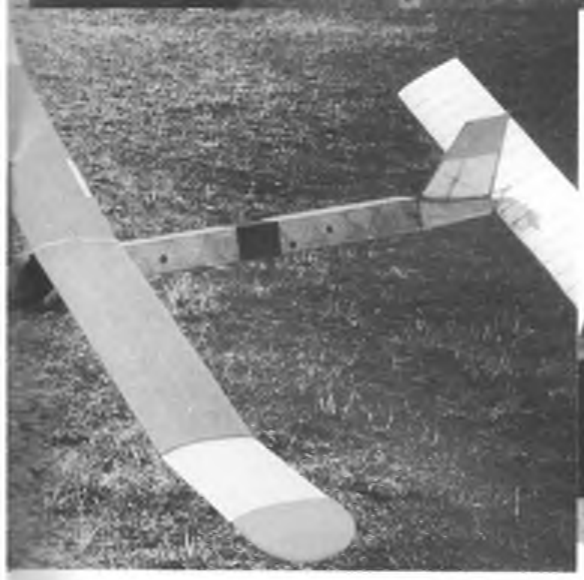
5: Don Burt prepares in 1/2A. Placed third in Combat too! 6: Paul Lagan's Open Rubber craft, Bornuith.

4

6

NZ NATTERINGS

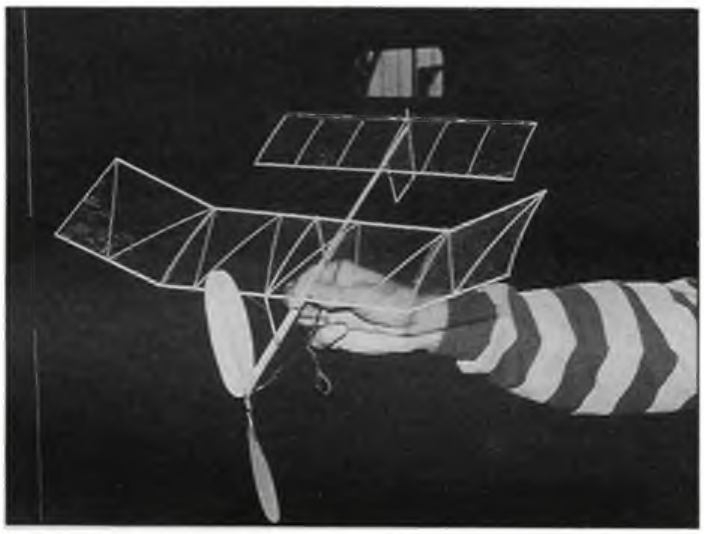
The 89/90 New Zealand Nats were held at RNZAF Wigram, Christchurch. Photo-report from David Ackery



7: OS 40 powered Laser gave Alan Lawrence victory in F2B. 8: Jet C/L was popular; this is Nigel McArelly's, who flew with help of dad Des. 9: C/L Champ Paul Coghlan, third in Goodyear with Nelson-powered Mr D.

Top prizes of £100, £50 and £25 to be won – see Hangar Doors!

KENNY PENN



Fly Novice Pennyplane Indoor this season – over to Brian Kenny

The Indoor Technical Committee of the BMFA are constantly searching for ways to popularise the use of Cardington by the newcomer or non-expert indoor flyer. There seems to be a general view prevailing amongst the non-indoor modeller that Cardington events are for the exclusive use of the Microfilm flyers. This could not be further from the truth, which may be judged from the fact that even at the recently held Trials Competitions to choose the GB F1D Team to fly in the future World Championships, fun flying of other classes of models was allowed, providing that this was done in a considerate fashion.

What's Penny-Plane?

Index competitions have been run for the past two years or so. Here different recognised classes of model fly in the same competition but are placed according to their best time expressed as a percentage of the particular class record time. This has produced some exciting competitions and has seen the Novice Penny-Plane class rise in popularity as flyers discovered this formula would produce models which were easy to trim and, what is more, produced winning models.

The Novice-Penny-Plane formula results in some of the ugliest models ever seen flying indoors, but they do have the virtue of simplicity; they are robust and are not prone to handling damage, and they do fly well. The design shown here has proved to be a capable and potent contest model; it has been built by four regular indoor flyers so far. All these versions proved to have the good climbing attribute of the original and are capable of handling the torque of a fully-wound motor to produce a powerful nose up climb to a very good height.

The Kenny-Penny has been chosen by the Indoor Technical Committee for a one-design competition to be held in Cardington towards the end of the 1990 indoor flying season,so why don't you build one now and bring it down to trim and fly in the many Index and Cardington League competitions to be held in the forthcoming season? You will be assured of a friendly welcome by the regulars who would be pleased to offer advice to help you get the best from your model.

Constructing your Kenny Penny

Careful wood selection pays dividends in indoor modelling and makes possible a strong but light model. The target weight for this model is a minimum of 3.09gm and this is achievable without resort to specialist indoor quality wood. Indeed, all the wood in the original model was from Contest Grade sheets obtained from The Balsa Cabin Prototype weights stated on the plan should be target weights to help you control the weight of your model as you are building it. You should get in the habit of recording the weights of all components for future reference so that you can adjust wood sizes to produce a required airframe weight on subsequent models. The fuselage motor stick and the propeller account for the major part of the weight of this model, so extra care should be exercised when choosing wood for these items.

Wing spars, tail spars and the fin outline are stripped from a sheet of light straight grained 1/16in sheet. The original used 7lb/cu.ft. stock for these components. Make sure that you use a new blade in your craft knife, or better still use a carbon steel razor blade for all the cutting to ensure that you do not crush the soft light wood that you have carefully selected. The wing and tail ribs are cut from a 1/32in sheet with the aid of a thin ply or card template which has been prepared to the correct camber shape. Simply lay the template on top of the balsa sheet and slice round the camber to produce the top surface of the rib, then move the template down the appropriate amount and produce another cut to obtain the rib. Since the top and bottom camber are identical for indoor model ribs, no wastage of wood occurs by this process.

The wing, tail and fin are built flat on the plan. The outline spars must not be pinned through. Straight strips of balsa may be pinned to the plan to provide the outline of the particular part and further scrap pieces pinned against the spars to hold them in location against this outline. The wing and tail ribs are then trimmed to fit between the spars and are glued in place with the minimum of glue commensurate with the required strength of the joint. You must not use full strength balsa cement for indoor duration models since the high shrinkage of this glue results in distorted and heavy frameworks.

Ambroid cement thinned with a solvent such as acetone in a 50:50 ratio makes a satisfactory glue, as does water thinned PVA, or there are the special purpose indoor cements supplied by SAMS Model Supplies.

The tip spars of the wing should be separate from the centre span. After all the ribs have been glued in place, the tips are raised 2in and are blocked up to incorporate 1/32 in washout. A good butt joint between the mating tip and centre spars should be carefully cut and the joint cemented when there is a good fit.

You will see from the plan that the wing and rear tail post are located in tissue tubes which are glued to the fuselage. The tubes are produced as follows. A piece of Jap tissue approximately 5/8 x 1/2 in is rolled around a piece of cleaned and sanded 16g. piano wire. The tissue is then unrolled from the wire and whilst approximately one turn is still on the wire, a liberal coating of cement is smeared onto the tissue. This is then quickly rolled onto the wire to form a glued tube. As soon as possible the glued tube should be slid off the wire using a combination of first finger and thumb nails. The tube is then put on one side to set and the wire is cleaned and used again to make the subsequent tubes.

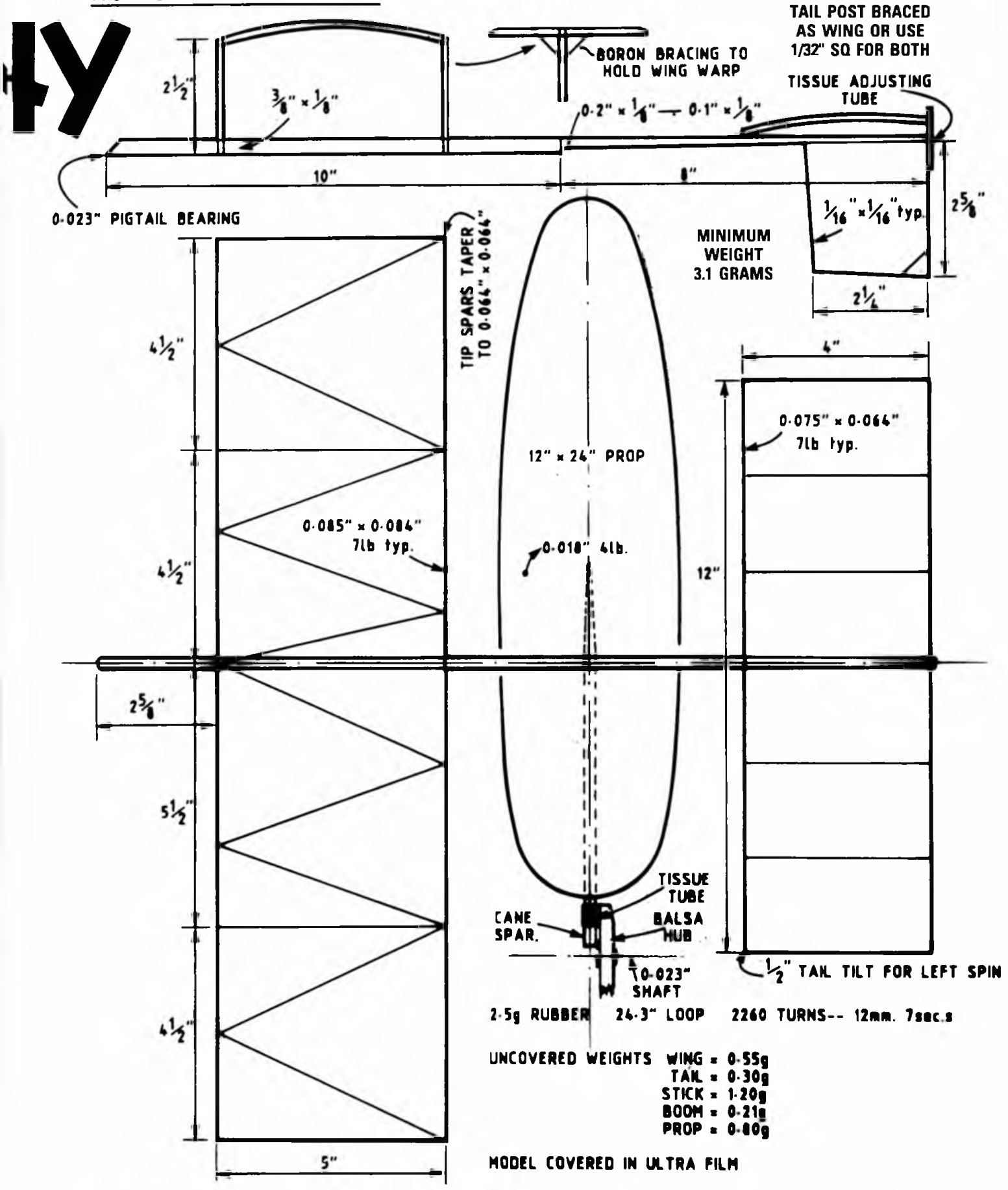
The ends of the wing and tail posts need rounding off to form 1/16in diameter cylinders to fit the tissue tubes. This may be accomplished by gently taking off the corners with fine sand paper, after which the post can be gently rotated and at the same time slid into a piece of 16g tubing to the appropriate depth. The sudden change of section between the square post and the rounded end may be carefully blended by further sanding. When the tissue tubes have dried, check that the wing and tail posts fit snugly, adjusting the post as necessary.

The flying surfaces of the original were covered by a thin plastic film called Ultra Film using Grab as an adhesive (both obtainable from SAMS). The Grab glue must be used sparingly; I advise a piece of 3/32in sq. balsa strip to spread a thin smear of Grab on to the ribs and framework to be covered. Other modellers prefer to use one of the contact adhesives sold in aerosol form and which are normally used for mounting photographs. Once the adhesive is on the frame, the precut oversize panels of film are rolled into a ball between the palms of ones hands, and then are straightened out again. This gets rid of the residual static charge on the surface of the film and allows the film to be handled in the same way that you would handle a tissue covering. It also results in a uniformly fine crinkled surface to the covering which some modellers consider to be beneficial. Remember to always use a new blade to prepare and trim the film and you should experience no difficulties with it.

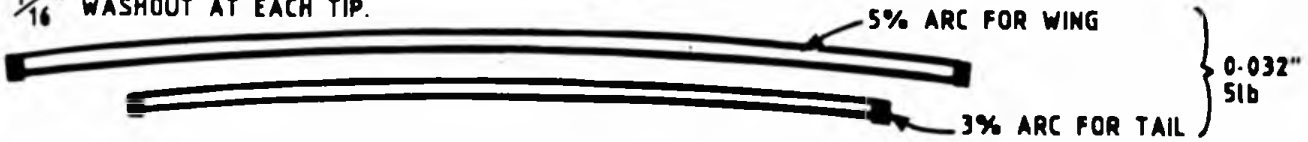
Nearly there

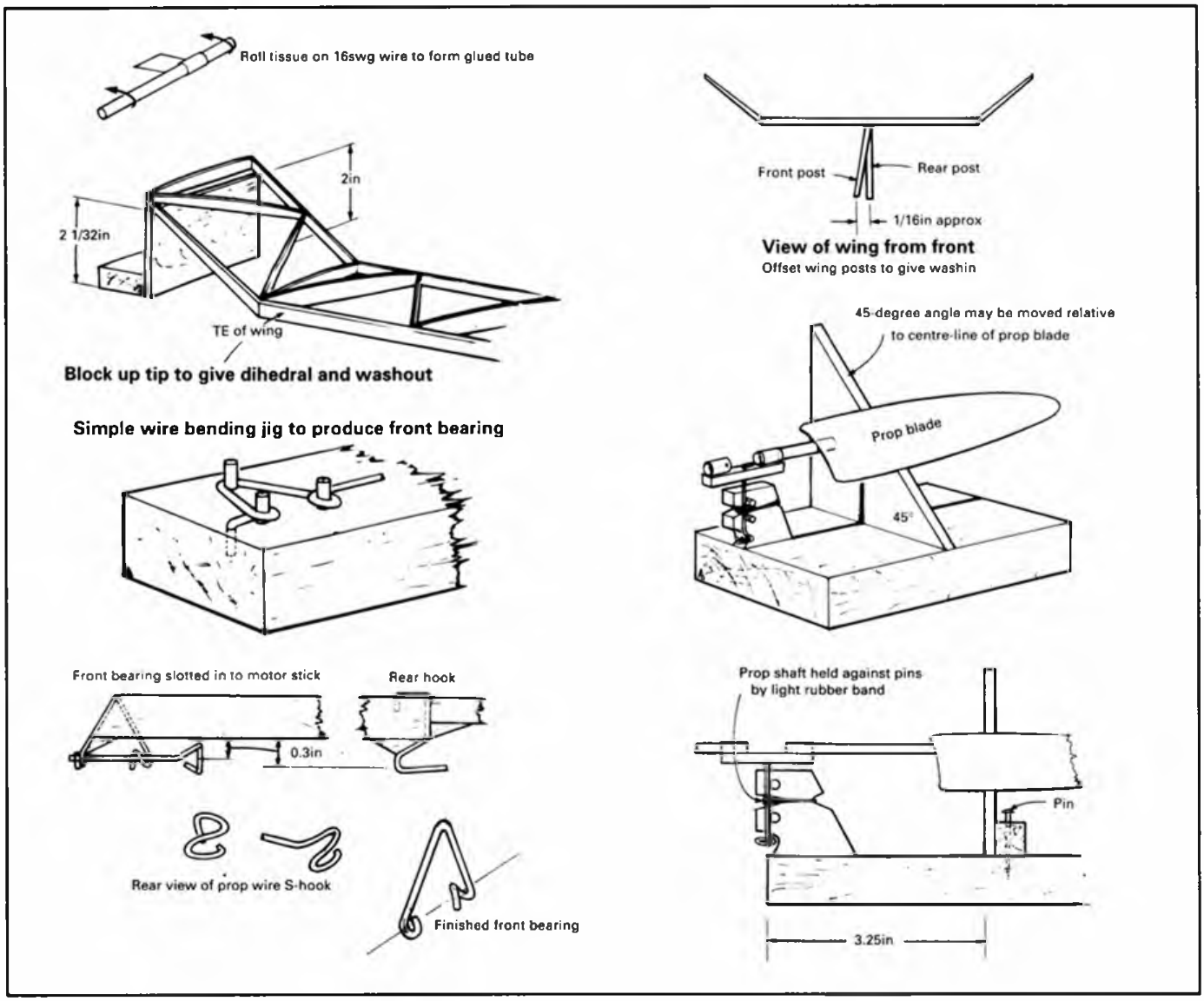
It has long been established that indoor models fitted with a conventionally-rotating propeller, fly most efficiently when trimmed to fly in left circles. You will see from the plan

NOVICE PENNY PLANE — THE "KENNY PENNY"



WING HAS FLAT CENTRE PANEL WITH APPROX. 1/8" WASHIN FOR LEFT TURN - .2" TIP DIHEDRAL WITH 1/16" WASHOUT AT EACH TIP.





of this model that the left hand inner panel of the wing is longer than the right hand inner panel and that the left hand wing has approximately 1/8in washin at the dihedral break to handle the left turn. The washin may be produced by intentionally misaligning the front and rear wing posts by approximately 1/16in when viewing the wing posts from the front of the wing as indicated.

The propeller front bearing the rear motor hook were formed from 0.023in diameter piano wire on the original. A simple wire bending jig was used to form the front pig-tail bearing whilst the S-hook on the rear of the prop-shaft was formed by eye using a pair of fine nosed needle pliers. A vertical slot is made in the front of the motor stick to accept the front wire bearing, whilst the rear motor hook is pressed into position at the rear of the motor stick as indicated. A cyanoacrylate glue is used to firmly attach these two wire parts.

The propeller blades are cut from a suitably prepared sheet of soft balsa and they must have the correct twist induced in them. A prop-blade jig was carved from a balsa block as shown in the diagram. The blades are soaked in hot water for approximately twenty minutes and, after the surplus water is wiped off, they are bound as a pair onto the block using a bandage. The block is then placed in a coolish oven for about half-an-hour for the blades to dry out thoroughly. When the blades are carefully unwrapped and removed from the block they should retain the correct twist distribution. The propeller spars were from cane on the original but other builders have used hard balsa spars with equal success. Just remember that this model uses a relatively powerful motor and the prop-spars need to be strong and flexible. Note that the spars are rounded to a cylindrical section at the hub end and are tapered from there to their outer limits. The spars are glued to the backs of the blades.

The propeller may be assembled by means of a simple jig such as that shown in the diagram. The pitch of the propeller is altered by means of the position selected for the 45 degree angle. As this is positioned further away from the centre line of the propeller, the pitch of the resulting propeller increases. A suitable pitch to start with, if you are intending to use a loop of 1/8in rubber, would be obtained by positioning the 45 degree angle at 3.25in from the centre line. This produces a pitch of approximately 20in A suitable source of this size of rubber is from Mike Woodhouse who advertises in this magazine and who can supply FAI Tan rubber.

Flying Trim

Indoor rubber duration models produce their best duration if they are under power for the whole of their flight, so they are not glide trimmed initially as you would do for an outdoor rubber model. Low power is required initially and you should launch your model with perhaps 100-200 turns on the motor in order to produce just sufficient power from the motor to get the model to fly positively.

With slight left thrust and left rudder, your model should be trimmed to fly in gentle left circles with a slight nose up attitude. This is done by carefully observing the model when it is cruising steadily at a constant height and adjusting the rear tail post to achieve the best flight attitude. When you have reached this stage, you should be able to increase the turns on your motor and the model should climb in a steady left spiral pattern. If a power stall develops on increasing the power, try some downthrust to correct this tendency. If that doesn't do the trick then you may need more positive incidence on the tailplane. It is crucial to only make one adjustment at any time and to observe its effect on both the flight pattern and flight duration. It is only by this means that you will be able to judge if the adjustment made was beneficial or not. Good indoor durations are obtained by getting the best climb-cruise-letdown combination for your particular model. You may improve the cruise by raising the tailpost but this will reduce the height gained by the model. Lowering the tailpost improves the climb but at the expense of the cruise. The best compromise trim is found by trial and error. You should keep notes of every trim change and also the result of these. Read and digest your notes later; you may discover why your durations were low, or even why you won the competition!

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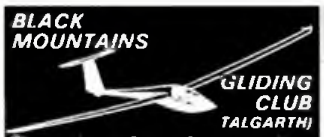

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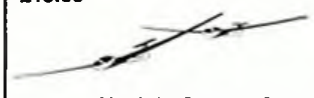

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