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MODELLER

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PAW 100 R/C	21.25
PAW 1.49 R/C + Silencer	25.30
PAW 2.49 R/C + Silencer	27.60
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JUNE 1986

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AERO MODELLER



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Cover
H.J. Pridmore's Skylark rubber sportster from 1947 is as pleasant a craft as you could wish to see. This freshly-built version by Peter Michel forms the basis of our feature on p.328. Inset: Metal-covered wings on F1C models, for a long time a Russian speciality. Pioneer work in the UK is revealed in this issue.

Other MAP Hobby Titles:

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HANGAR DOORS

At your service

It is not for this magazine to comment on international affairs which have no direct link with the sport of model building and flying; other, wiser sources must do that. Suffice it to say that as this issue of *Aeromodeller* is being completed - and even as *Hangar Doors* itself was being penned - news was received that the SMAE Southern Gala at Odiham, scheduled for 27th April, had been cancelled. As all who have flown there will know, Odiham is a fully operational RAF Station, and clearly the presence there of a horde of aeromodellers is superfluous at the moment...

The Southern Gala is an eagerly awaited event which always attracts strong local support, and the loss of April's meeting will have been felt by many. Nevertheless, in an age of dwindling availability of flying sites (we have just learned that RAF Lindholme is no longer available to the Northern Area; events have been re-scheduled elsewhere; see 'What's On') perhaps we should reflect on our good fortune when Service hospitality is extended to the aeromodeller, and be grateful.

A grateful guest will not abuse his host's property. Note, then, the following extracts from a letter by F/O JH McCormick, who until recently was Site Liaison Officer for RAF Barkston Heath. The subject is Foreign Object Damage, which costs the

RAF millions of pounds every year:

"...When aircraft taxi on the ground, the jet engine acts like a huge vacuum cleaner and will suck up anything from the ground; a 2BA bolt or even men in some cases. In order to reduce this the driving of vehicles on runways (as well as on perimeter tracks) is prohibited. This is because the close-knit tread pattern of the tyres will pick up any bits of FOD and thus deposit them on runways and perimeter tracks. The answer is therefore clear to all free flight members; drive as little as possible on perimeter tracks, don't ever drive on runways, and try not to drive on grassed areas of the runway. Many station commanders frown on driving on the grass because it will beat down the grass, enabling FOD to migrate to runways and finally encourage birds to roost on the runways. Also, many cars leak oil and fuel, which will stain runways and cause the runway to rise and crack up, with obvious results, when landing..."

Finally, note that the indiscriminate use of CB is forbidden at Barkston Heath; prior permission is needed.

As F/O McCormick was Liaison Officer for the last F/F Nats and the Wakefield Anniversary meeting, he can be said to have all our interests at heart. Take notice, take care, and remember, *check* that an event scheduled for an RAF Station is

The Canadians are coming - their team for the three-day Indoor World Championship's starting at Cardington on 28th August is the same as last year. First in their Trials was Ron Higgs (below) with a top time of 22:13.



still on before turning up...

£1.25 plus 35p postage and packing.

At your plans service

Just out - the 1986 Plans Handbooks are all ready to help you select your next aeromodelling project. Handbook No. 1 deals exclusively with model aircraft of all types from R/C Scale to F/F Gliders, featuring designs which have appeared in our companion publications RCM&E and Radio Modeller as well as Aero-modeller Plans. There should be something for everyone within its 96 pages! A 'money back with first order' scheme means that your Handbook will cost you absolutely nothing if plans to the value of £5.00 or over are ordered from it. Initial outlay is

Owners of existing Handbooks should note the Price Code amendments below.

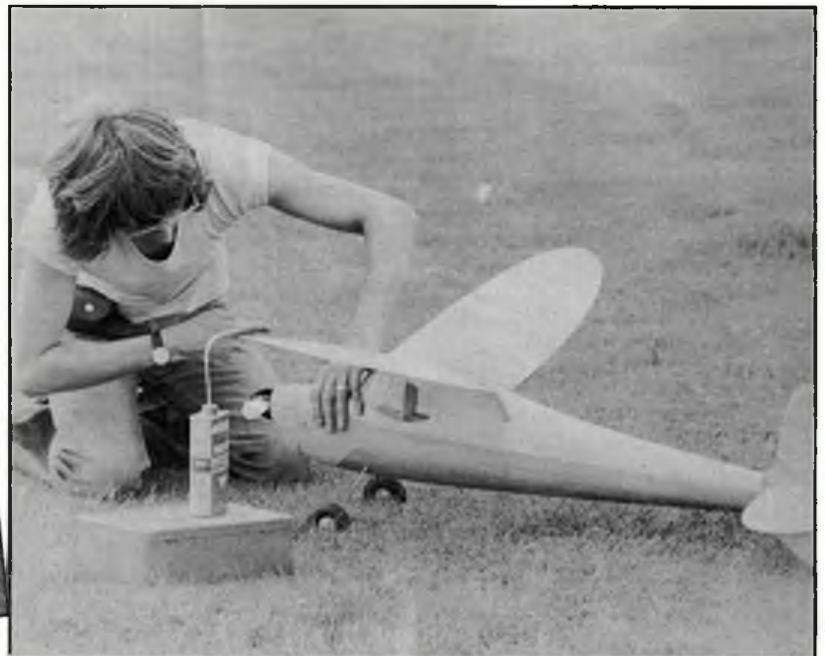
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Left: New edition of Plans Handbook No. 1 contains a full range of subjects from gliders to R/C. Right: Beware - if spotted, this enthusiast may jump up and start asking questions. Aeromodeller's New editor, Geoff Clarke, in characteristic pose with his Southerner...



What's on... lots on!

18th May
SAA C/L TEAM RACE
 Comps: Open Goodyear, 1/2A, FAI Venue: Newhouse. Contact: Neil Munro. Tel: 0875 344026

18th May
C/L AEROBATICS FLY-IN
 Venue: Slip End, Luton. Fly and learn, with experts on hand to help you! Contact: Glen Alison. Tel: 0923 772675

324-26th May
1986 SMAE NATIONAL F/F CHAMPIONSHIPS
 Venue: RAF Barkston Heath. Contact: SMAE, Kimberley House, Vaughan Way, Leicester LE1 4SE.

25-26th May
NORTH LAKES RADIO CONTROL SOARING ASSOCIATION SOAR-IN
 Venue: Club site. Meeting place: Castle Inn car park, 8 miles north of Keswick on the A591. Insurance cover needed. Contact: D.S. Atkinson. Tel: Kirkbride 51822.

1st June
WHARFEDALE OPEN MINI GOODYEAR
 SMAE rules but Open models eligible. Venue: Dewsbury. Contact: Jeff Smith. Tel: 0532 663432

1st June
S.E. AREA'S R/C "FLY FOR FUN" DAY.
 Venue: Ardingly, Nr Haywards Heath, Sussex. Details S.A.E. to M. Richardson, 64 Grange Close, Horam, Heathfield, East Sussex

1st June
WALSALL M.A.C. SCALE DAY
 Comps: F/F, C/L and R/C. Venue: Walsall Airport, Bostly Lane, Aldridge, Walsall, West Midlands. Contact: Malcolm Taylor. Tel: 0922 415316

1st June
THREE KINGS C/L SPORT & VINTAGE DAY
 Classes: Vintage Stunt, Midge Speed, Fly for Fun. Venue: Old Croydon Aerodrome. Contact: Derek Bird. Tel: 01 874 6394. Silencers essential.

7-8th June
3RD WEST MALLING MODEL AIRCRAFT SHOW
 R/C and C/L aircraft plus cars, trains, trade stands, etc. Admission £2.00 adults £1.00 children and OAP's 10.00am-6.00pm. Contact: 58, Salisbury Road, Tonbridge, Kent. Tel: 0732 350691.

8th June
NORTH LONDON MFC SCALE DAY. R/C scale at the club's flying field at Baldock, Herts. Snacks will be available and prizes awarded. Entry will be £1 on the day. Contact: Richard Barley, 44 Orchard Avenue, Berkhamsted, Herts HP4 3LS

8th June
3rd ANNUAL HUDDERSFIELD & DISTRICT VINTAGE EVENT
 All vintage event will be R/C assist and classes will include Taxaco, Precision and Duration. It is also hoped to run Flying Fifteen this year and radio frequencies are restricted to odd 35MHz Yellow, Green, Blue or U.H.F. only. Refreshments will be available on the field all day and further details are available from Colin Thompson, 132, Staithwaite Road, Meltham, West Yorkshire HD7 3PW. An s.a.e. would be appreciated.

14-15th June
RAFMAA SMAE THURSTON TROPHY
 Comps: F1A, F1B, F1C, (1/2A, A1, Cd/H on Sunday) 11.00am start on 14th. Champagne Fly-offs on 14th. Pre-entry £1.50 per event. Camping on Saturday night. Venue: RAF Barkston Heath. Contact: Gil Hart, 12 Argosy Road, Lyneham, Wilts. SN15 4AP (send SAE).

14-15th June
NORTH WEALD WINGS AND WHEELS SPECTACULAR
 Demos, models and full size aircraft; cars, autjumobile, trade stands, etc. Venue: North Weald Aerodrome, Essex. Contact: J. Woodley. Tel: 04024 73079

15th June
SHEFFIELD VINTAGE COMP.
 Comp: SAM League event but open to any vintage modeller. Venue: One mile from entrance to Rother Valley Country Park, A618. Contact: Dave Hanson. Tel: 0742 740316

15th June
SAA C/L TEAM RACE
 Comps: Open Goodyear, 1/2A. Venue: Newhouse. Contact: Neil Munro. Tel: 0875 340026

15th June
MEON VALLEY SOARING ASSOCIATION OPEN EVENT.
 Cross Country. Venue: Butser Hill, Petersfield, Hants. Contact: Ken Sapsed. Tel: 0705 453688. Entry Fees: £2.00 non-members, £1.00 members. Frequencies: 35 Mhz, even numbers only. Two sets of crystals.

15th June
THE OXFORD M.F.C. FREE FLIGHT RALLY.
 At Port Meadow, Wolvercote, Oxford. Classes: A1 Glider, Coupe d'Hiver in rounds starting at 10.00am. Hand Launched Glider and Vintage - no rounds. N.B. Vintage is rubber and glider combined, span limit on rudder 36in. No power models to be flown. Contact: Andrew Crisp 30 Portland Road, Summertown, Oxford.

21-22nd June
ASP SCALE WEEKEND
 Venue: Old Warden Airfield, Biggleswade, Beds. The scale pilgrimage! Contact: 0442 41221.

22nd June
BLACKBURN & DMAC SUMMER FLY-IN
 Scale/semi-scale or unusual model rally. Excellent prizes. Entry £1.00. 10.00am start. Venue: Wiltton Country Park, Blackburn. Contact: Michael Winder, 27, Belgrave Rd, Darwen, Blackburn, Lancs BB2 2RP.

22 June
PETERBOROUGH MFC.
 Class: Diesel 'A' Combat. Venue: The Embankment, Peterborough. Contact: Mick Taylor. Tel: 0733 204484.

28/29th June
THREE SISTERS C/L GALA
 Comps: FAI T/R, Goodyear, Stunt, Class 2 Goodyear, Novice Stunt, Diesel Combat (Mainstream Trophy), Vintage T/R A & B, FAI Combat, Open Speed (inc. Jet), Mercury Midge Speed. Contact: John Noble. Tel: 061 790 4056. Events start 12.30pm Sat 9.00am Sun.

29th June
PAISLEY TROPHY
 Class: Open F/F. Venue: Newbigging, Nr Carnwath. Contact: Ron Sabey. Tel: 0698 429170.

29th June
C/L AEROBATICS, OPEN AND NOVICE
 Includes the Chiltern Cup. Venue: Slip End, Luton. Contact: R. Landon. Tel: 05271 3472.

6th July
PETERBOROUGH MFC
 Classes: C/L Stunt and Midge Speed. Venue: The Embankment, Peterborough. Contact: Mick Taylor. Tel: 0733 204484. SAM 35 Rules.

6th July
WALSALL M.A.C. VINTAGE DAY
 Comps: R/C Assist and F/F. Venue: Walsall Airport, Bostly Lane, Aldridge, Walsall, West Midlands. Contact: Jim Shelley. Tel: 0922 28553.

6th July
ASP MODEL HELICOPTER FLY-IN AND SILENT FLIGHT DAY
 Venue: Old Warden Airfield, Biggleswade, Beds. Contact: 0442 41221.

12/13th July
C.L.A.P.A. CHAMPIONSHIPS
 Comps: Open Novice Stunt, Profile and Scale Carrier, C/L Scale (C.L.A.P.A. members only). Venue: Essex Show Ground, Nr Braintree. Contact: Pete Burgess. Tel: 0376 516881. Camping available. Pre-entry from Pete at 42 Blunts Hall Road, Witham, Essex CM8 1LY

12-13th July
YORKSHIRE MODELLERS' WEEKEND
 Comps: Mini Goodyear (separate Junior prize), Class A T/R, Diesel Combat. Venue: Newby Hall, near Ripon, N. Yorks. Contact: J. Holman. Tel: Harrogate 866096(W), Ripon 2898(H).

13th July
SAA C/L TEAM RACE
 Comp: Open Goodyear, Class II Goodyear. FAI Venue: Newhouse. Contact: Neil Munro. Tel: 0875 340026

13th July
NORTH LONDON MFC VINTAGE DAY.
 R/C only (no free flight) Vintage character models. Barbecue will be available - bring own food. Contact: Richard Barley, 44 Orchard Avenue, Berkhamsted, Herts HP4 3LS

13th July
S.E. AREA R/C SCALE DAY. Ardingly, Nr Haywards Heath, Sussex. Details S.A.E. to N. Couling, 7 The Green Walk, Willingdon, Eastbourne, East Sussex

20th July
WHARFEDALE CLASS A COMBAT
 Venue: Dewsbury. Contact: Jeff Smith. Tel: 0532 663432

20th July
SHUTTLEWORTH MODEL GROUP FLY FOR FUN OPEN DAY. Venue: Old Warden Aerodrome, Biggleswade, Beds. SG18. Gates open at 9.00 am. Contact: M.S.F. Staples 11, Whitehill Road, Cambridge CB5 8LT.

20th July
BLACKPOOL AND FYLDE RCMS R/C SCALE FLY-IN
 Low-key competition. All scale models welcome. Venue: Club site, next to Blackpool Zoo (bring the family!). Contact: Chris Bromley. Tel: Blackpool 25080.

27th July
F.A.C.C.T. BARCS LEAGUE
 Comp: R/C Thermal Soaring. Venue: RAF Weston-on-the-Green. Contact: N.G. Webb, The Bungalow, 13 East Street, Fritwell, Oxon OX6 9PX. Pre-entry £2.00 plus s.a.e. plus frequency details.

27th July
RAF ALCONBURY 1986 AIRSHOW. Full-size flying programme. Contact: Public Affairs Division, RAF Alconbury, Huntingdon, Cambridgeshire (Tel: Huntingdon 52131 ex 2174/2125).

27 July
OXFORD MFC DREAMING SPIRES F/F SCALE - SILENT VINTAGE GALA
 Comps: Open Rubber (15in span plus), CO₂, Power/Electric (max 1.5cc), Twin Rubber Scale and also Mass Launch. Vintage: Wakefield (Pre '51), Lightweight, Folding Prop, Lightweight Freewheel and Glider. Venue: Port Meadow, Oxford. Contact: C. Newman. Tel: 086 77 3020. Note: Absolutely no diesel/glow powered models permitted - other than those entered in the F/F Scale event.

August 16-17th
ANNUAL MODEL SHOW AT PLUMPTON RACECOURSE. 300mph Dutch pulse jets, parachutists, planes, cars, boats, trains, traction engines, space rockets, junior comps, camping, live entertainment, helicopter rides, children's fairground, videos, bar, refreshments, lectures, special ladies entertainment, trade stands, etc. Contact: Dave Bishop, DB Sound, 17 The Square, Tatsfield, Nr Westerham, Kent TN16 2AS (tel: Tatsfield 77550)

16-17th August
SCOTTISH FREE FLIGHT NATIONALS.
 Classes: FAI, Open Mini and Vintage. Venue: Newbigging, Nr Carnwath. Contact: Ron Sabey. Tel: 0698 429170

16-17th August
ASP VINTAGE WEEKEND
 Venue: Old Warden Airfield, Biggleswade, Beds. Vintage fliers - miss this at your peril! Contact: 0442 41221

23-25th August
1986 SMAE NATIONAL R/C AND C/L NATIONALS
 Venue: RAF Barkston Heath. Contact: SMAE, Kimberley House, Vaughan Way, Leicester LE1 4SE

24-25th August
NORTH LAKES RADIO CONTROL SOARING ASSOCIATION SOAR-IN
 Venue: Club site. Meeting place: Castle Inn car park, 8 miles north of Keswick on the A591. Insurance cover needed. Contact: D.S. Atkinson. Tel: Kirkbride 51822.

7th September
STEEL TROPHY
 Class: F/F FAI. Venue: Newbigging, Nr Carnwath. Contact: Ron Sabey. Tel: 0698 429170

7th September
MEON VALLEY SOARING ASSOC. OPEN EVENTS. CROSS COUNTRY.
 Venue: Butser Hill, Petersfield, Hants. Contact: Ken Sapsed. Tel: 0705 453688. Entry fees: £2.00 non-members, £1.00 members. Frequencies: 35 Mhz, even numbers only. Two sets of crystals.

September 7th
SHUTTLEWORTH MODEL GROUP SILENT DAY at Old Warden Aerodrome, Biggleswade. Beds. All welcome but no I.C. engines to be run. Contact: M.S.F. Staples, 11, Whitehill Road, Cambridge CB5 8LT.

14th September
"TOWNER TROPHY" R/C Thermal Soaring. Golden Cross, East Sussex. Details S.A.E. to N. Couling, 7 The Green Walk, Willingdon, Eastbourne, East Sussex.

14th September
C/L AEROBATICS, OPEN AND NOVICE
 Includes the Doug Blake Trophy. Venue: Slip End, Luton. Contact: Glen Alison. Tel: 0923 772675

14th September
ASP FOUR STROKE FLY-IN
 Venue: Old Warden Airfield, Biggleswade, Beds. Contact: 0442 41221

14th September
SMAE NORTHERN GALA
 Venue: Driffield (N.B. venue change from Lindholme) for F/F events. C/L events at RAF Dishforth. Contact: R. Hoff. Tel: 0742 732582.

21st September
WHARFEDALE 1000 CLASS B T/R
 Venue: RAF Distorth. Contact: Jeff Smith. Tel: 0532 663432.

14th September
ST ALBANS MAC VINTAGE FLY-FOR-FUN DAY
 R/C or small free-flight. Venue: new club site at Bulls Mill on the A602 out of Hertford, 10am-6pm. Contact: Steve Payne. Tel: St Albans 34267

21st September
SMAE "SOUTHERN GALA" (SMAE Members only) at RAF Odiham, Hants. F/F, R/C Scale, Vintage F/F, Helicopter and R/C aerobatic. Details S.A.E. to N. Couling, 7 The Green Walk, Willingdon, Eastbourne, East Sussex.

21 September
SHEFFIELD JUNIOR 60 AND FLYING FIFTEEN COMP
 Flying Fifteen to SAM 35 rules. Any radio and engine may be used in Junior 60 comp. Venue: One mile from entrance to Rother Valley Country Park on A618. 10am start. SAM or SMAE Insurance required. Contact: Dave Hanson. Tel: 0742 740316

21st September
THREE KINGS SCALE DAY
 C/L scale and Profile. Silencers essential. Venue: Old Croydon Aerodrome. Contact: Derek Bird. Tel: 01 874 6394.

28th September
SOUTH MIDLANDS AREA BARCS LEAGUE
 Comp: R/C Thermal Soaring. Venue: RAF Weston-on-the-Green. Contact: J.H. Shaw, 'Alvere', Witney Road, Freeland, Oxon OX7 2HQ. Tel: 0993 881350. SMAE members only. Pre-entry £2.00 plus s.a.e. plus frequency details.

28th September
1986 LYMPNE TRIALS
 Scale Rubber and CO₂, models of Lymphyne Trials craft as described in Aeroplane Monthly. Miami rules plus precision. Venue: Watford Leisure Centre, 10am start. Contact: Butch Hadland. Tel: Windsor 855359 (W), 0628 72402(H). Event sponsored by SAMS.

28th September
ST ALBANS MAC ELECTRIC FLIGHT FLY-IN
 Venue: new club site at Bulls Mill on the A602 out of Hertford. Contact: Albert Botterill. Tel: St Albans 59789

5th October
S.E. AREA SMAE "LONG MAN" SLOPE SOARING Details s.a.e. to A. Lawson-Wood, 4 Cumberland Walk, Tunbridge Wells, Kent.

5th October
EASTBOURNE CLUB VINTAGE DAY (R/C only) Golden Cross East Sussex. Details from S. Coombe, 7 Petworth Place, Hampden Park, Eastbourne, East Sussex

5th October
SOUTH BIRMINGHAM VINTAGE C/L RALLY
 General flying for all SAM 35 and SMAE members. Fun comps to SAM 35 rules. Presented by South Birmingham MFC, SAM 35 and University of Birmingham Model Engineering Society. Venue: Rubery Hill Hospital, near Birmingham. Contact: Peter Martin. Tel: 021 444 7964

19th October
PETERBOROUGH MFC
 Class: Diesel 'A' Combat. Venue: The Embankment, Peterborough. Contact: Mick Taylor. Tel: 0733 204484.

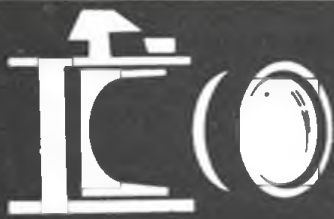


PHOTO PRIZE

Model News With Fliar Phil

Wood for the Winner

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

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



ALTHOUGH FLIAR PHIL has experienced interesting (and hairy!) R/C flying, he remains addicted to F/F models. A paragraph in a letter from an aeromodelling buddy (Frank Green of Baldock) caught F.P.'s fancy. Quoting Frank: "I've remained fixated from my earlier days to the "Chuck it and run after it" model. Certainly F/F provides a lot of fun (AND exercise!!) Frank. Maybe there's room for a C.I. and R.A.I. Club!

Photo 1: Winner

It is difficult to believe that this is a model and not a beautifully illuminated exhibit of

the real thing in an aviation museum. This fine photo comes from Gordon Norris of New Milton, Hants and shows his 1/48th scale Bristol 'Boxkite'. Gordon says he built it from a Pyro Kit, bought about twenty years ago. The craft is expertly built and most dramatically photographed. F.P. is sure everyone will want to shake Gordon's hand for being this month's winner!

Photo 2

Using an inner pair of Sabre 1.5's and an outer pair of P.A.W. 1.5 diesels to power this C/L Avro 'Lancaster' (City of Lincoln) meant the expenditure of quite a few pennies! But the outlay resulted in a fine model which looks terrific when airborne.

The 'Lanc' was built from an APS plan (CL 1081) by Mr A J Ward of Scunthorpe, South Humberside. Span is 51½in; weight is 4.4lbs. Impressive, Mr Ward.

Photo 3

In Fliar Phil's opinion (and it is an opinion shared by Scale enthusiasts worldwide) Doug McHard of Billingham, Lincoln is the supreme master of the scale model. No greater proof of this is needed than Doug's Grumman 'Gulfhawk'. For once at a loss for suitable superlatives(!) F.P. will just give scale buffs the details: span 19in; power, Brown CO₂ twin; weight 80 grams. A superb model and pic, Mac.

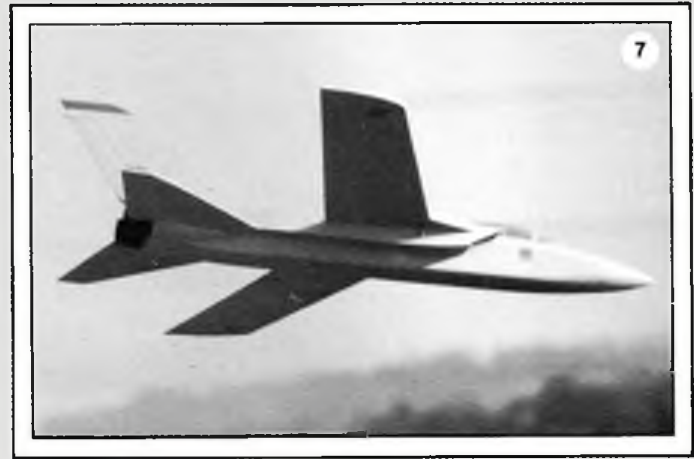
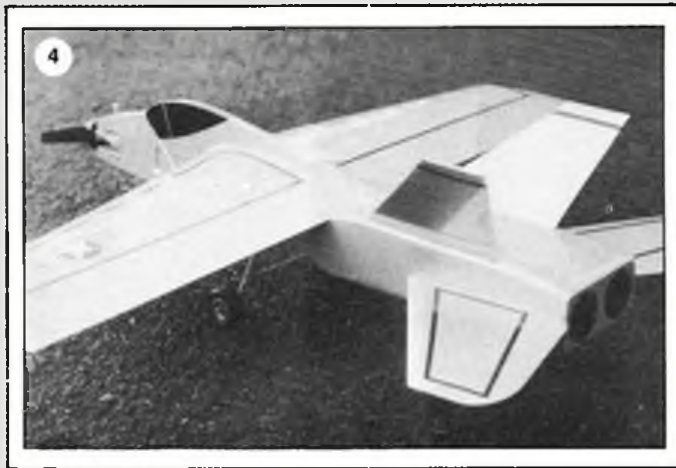
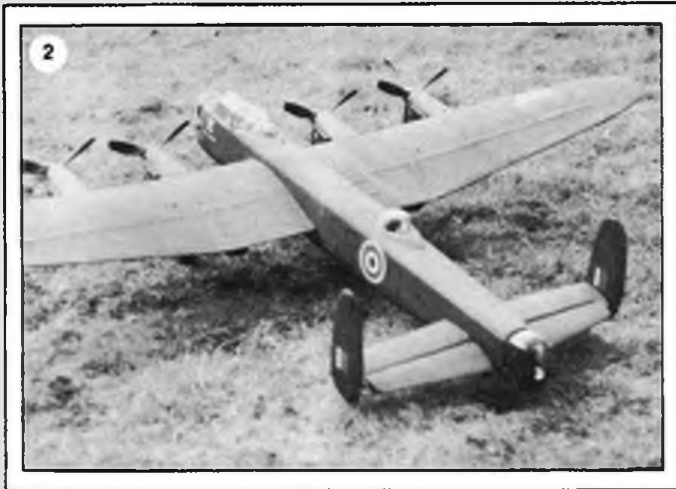


Photo 4

Thank goodness there are still aeromodellers with that touch of creative genius. One of them is Peter O'Dell of Hinckley, Leicestershire. Unable to find something different for a C/L model, Peter came up with his 'own design' based on the McDonnell-Douglas F.18 'Hornet'. Peter has produced a C/L model of elegance and distinction. A good flyer too! Details: Span 38in; power O.S. Max 35.

Photo 5

If you think there is a touch of the "exotic" about this photo with its palm tree

background you would be right! It comes from Surabaya, Indonesia. The model is a Mercury 'Mallard' with an Elfin 2.49 up front, built by Mr J G Clements in the Phillipines, who says 'I have read *Aeromodeller* for many years, think it has the right mix and look forward to many more years of enjoyable reading'.

Photo 6

The crew of this Albatros C.1 of the Imperial German Military Aviation Service seem to be in trouble, harried by Sopwith Pups! Photo sent by Colin Cousins of Morpeth, Northumberland. The Albatros C.1 is from a D.B. Kit; the Sopwith Pup from Dave Boddington's plan. Both are

controlled by Futaba R/C. The Albatros has Laser 75 power, the Pup a Merco 49. The clever 'composite' photo is by Leo Stevenson. Congrats to builder Colin and photographer Leo!

Photo 7

An 'action shot' of a slope soaring Tornado F Mk2. It comes from Mr R M Green of Walsall, West Midlands, and well displays the deadly lines of a Tornado in flight. Slope Soaring scale models seem somewhat of a rarity, so many thanks Mr Green for this excellent example.

Well, if you would like YOUR photo in this feature, you know what to do! Good luck!



Summer fun with the **Skylark II**

by H. J. Pridmore

We take a fresh look at this delightful 30 inch semi-scale sportster from 1947

THEY DON'T COME much prettier than the Skylark II, a 30inch sportster by HJPridmore first published in the November 1947 *Aeromodeller*, when the design's suitability for winter flying was highlighted; but we think there's a distinct flavour of summer about this pleasant little craft. Peter Michel, who was asked to build a 'revival' prototype, reports:

The Skylark II is a well-engineered little job that goes together easily, yet there is enough work in it to satisfy the modeller who enjoys a good build. Here are a few notes on construction, with the emphasis on pitfalls to avoid...

Fuselage

Use rock-hard longerons and light spacers. The longerons will need to be steamed to shape, not only before pinning to the plan, but in the drawing the sides together at the nose on assembly. Distortion is the penalty for omitting these two steps. The plan stipulates 1/32in sheet for covering in the nose section - a daunting task in view of the acute curvature in this department. The problem was overcome by planking with 3/8in strips of light 1/16in sheet sanded down to about 1/20in and cut to the template accompanying this article. Moisten the outside of each strip, mould to

approximate curvature with the thumb, and use plenty of good old-fashioned balsa cement. Easy! The double-curved dorsal formers aft of the cabin are best left unslotted until assembly because the stringer positions as indicated on the plan are a little adrift. Another snag is the recommended use of 1/64in sheet to fair the tail assembly into the fuselage. For reasons that will become apparent the writer substituted light block, carved and sanded to contour - a task that is considerably easier than it sounds.

Wings

No real problems here, and the root assembly - a complex piece of geometry - goes together beautifully, as per plan. However, it is advisable not to notch the trailing edge - a practice fashionable in vintage days, but which weakens the wing at its most vulnerable point. Spruce was used for the leading edge to counter any bowing-in tendency.

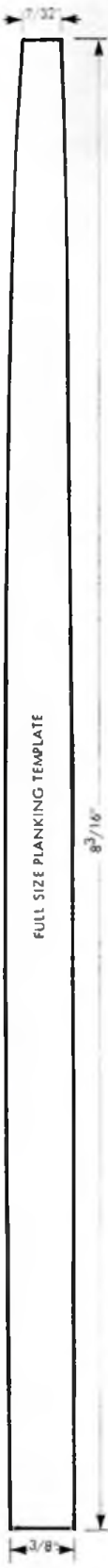
Propeller and nose block

If you have to hand a 10in paulownia prop of medium pitch, you are laughing. If not, carve one to the block shown from jelutong, which is beautiful material. Failing *that*, a piece of cedar prised from the garden shed will give a pleasing finish... The plan says that a spinner may be added if desired, but if the nose-block is shaped to the contours of

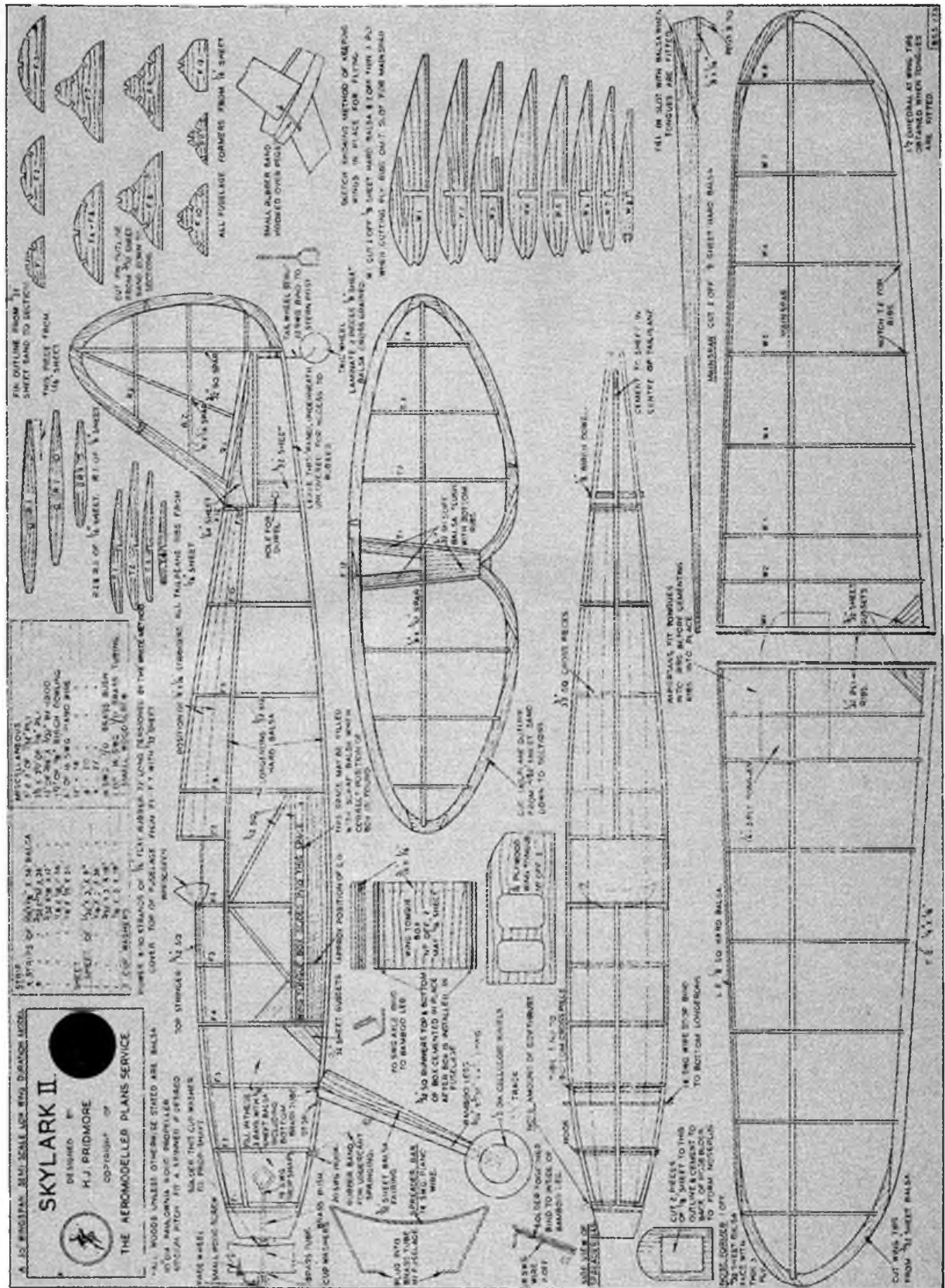


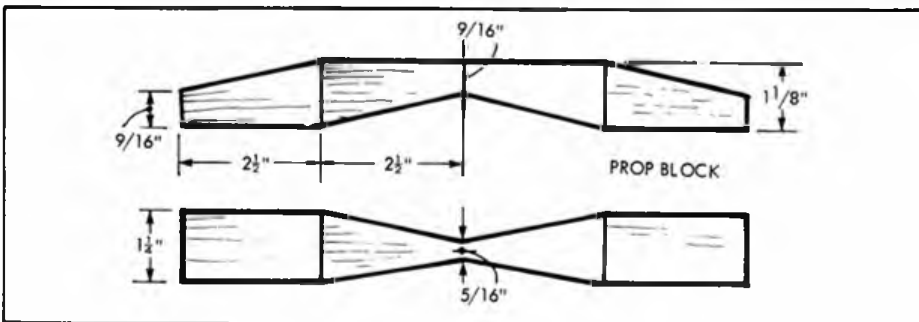
Heading photo: with a soft whirring of its prop, Peter Michel's replica heads into the blue (photo by Derek Ridley). Left: Robustly built in the tradition of M R Knight (according to its designer) the Skylark II is a winner whichever way you look at it.

Full size copies of the Skylark plan may be obtained from Aeromodeller Plans Service, Wolsey House, Wolsey Road, Hemel Hempstead, Herts quote plan number D273 when ordering.



FULL SIZE PLANKING TEMPLATE





the fuselage in the normal manner, there just isn't room for one! In any case, who wants to mar the elegance of a propeller carved in the classic 'cross over' style?

Tailplane and fin

The tail assembly on the original was a permanent fixture. It was decided, however, to make the units detachable so that the model would pack easily into a small box. The block, dowel and tube method used was that described by Dave Hipperson in the July 1985 edition of *Aeromodeller* (p.399).

Wheels

The problem here was that 1/8 inch celluloid wheels, or even lightweight plastic ones, were unobtainable locally; so a couple were knocked up from 1/4 inch rings of 1/8 inch balsa

cyanoed to discs of 1/8 inch ply and sanded to shape. The centres cut from the rings were sanded cone-shape and glued into position. Bushes were cut from aluminium tubing and cyanoed.

Covering

The very deep rib section and the position of the spar means that unless special precautions are taken, the wings are virtually certain to bow upwards; one of the ugliest blemishes that can be inflicted upon a nice little model. So with this in mind, the wings were covered with lightweight silk, which does not shrink up nearly as fiercely as tissue. The silk was applied damp - not soaking wet - and received one coat of clear dope and one of banana oil, both well thinned. The result was a pair of unbowed

wings and a pleasing translucent finish. Spurred on by this success and by the knowledge gleaned from SAM 35's Yearbook No.3 that there is little weight difference between doped silk and doped lightweight tissue, the writer covered the rest of the model in silk as well. This added just 0.3oz, or 12.5 per cent of the weight of the complete model - a very acceptable figure in anybody's book.

Warps

Experience with C.A. Rippon's Cruiser Pup, a design similar in many respects to the Skylark II, suggested small amounts of wash-out on the port wing and wash-in on the starboard wing. These warps, which should be steamed, measure 1/16 inch at ribs W.7.

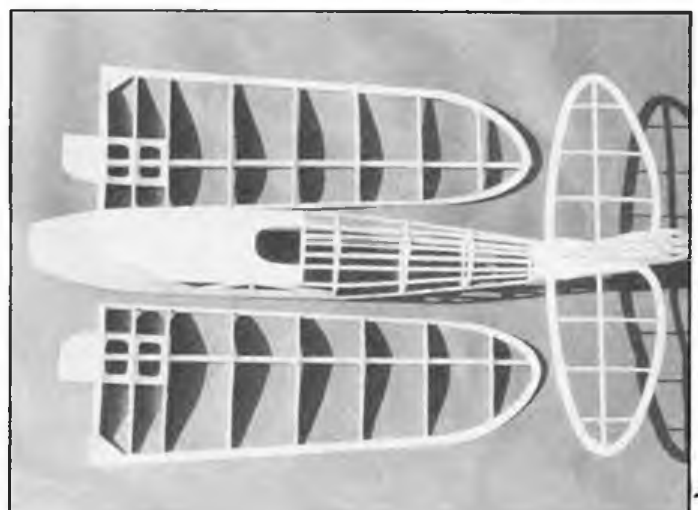
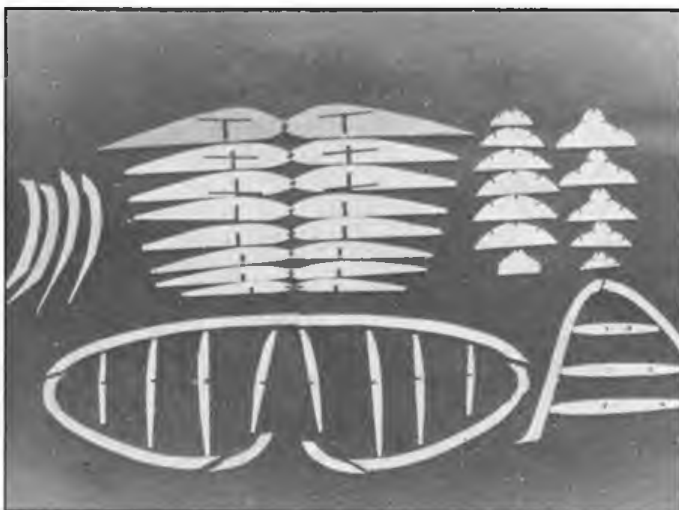
Flying

The completion of the model coincided with a calm and sunny morning in mid-March. Too good to miss! So to save time, a coupe d'hiver motor of ten strands of 1/8th FAI was re-made into one of eight strands, and installed in the model. Although weighing only 10gm (.35oz) - much lighter than that used by Mr Pridmore - this little motor seemed to have been made for the job. On half turns it will take the Skylark II up to 50ft or so, and on 500 turns the model is good for one minute plus. The balance point worked out at 2 3/4 inch as measured back from the leading edge under rib W.2 and the only trim needed was a shim of 1/64 inch ply sidethrust in addition to the amount shown on plan. Only three flights were needed to establish a stable nose-up right/right pattern. The glide is surprisingly floaty and the model should be flown with great caution on days when there is strong lift about. It is a fine flier, make no mistake about it; and it will disappear in a thermal with the best of them if you don't watch out...

Extras

The Skylark II will ROG easily from short grass, even on half turns, and land on its wheels with an assurance that the writer has not seen in any other model of so small a size. Points like these, and its delightful appearance, make the Skylark II an experience not to be missed.

Top: All perky and ready to go again! The basically straightforward structure is clearly visible through the silk covering - much stronger than tissue and not much heavier. All-up weight is just 2.9ozs. Above: Get carving! Prop blank to the dimensions shown gives excellent results. Below left: A kit of parts - all the shaped components ready for inspection; and at right: all there is to it! The Skylark's skeleton awaits wheels and prop.



Over 40~ with a **BULLET**



Aeromodelling? There's no immunity from it, according to David Wilkinson...

The APS Bristol Bullet is still available as plan FSR226 (£3.25 plus 55p post and packing). If the mechanical complexities of the Moore diaphragm are too great, you could always modify for a point-eight diesel...

ISUPPOSE, on looking back, there were more than the usual quota of 'ifs' - if I had not been walking past a local model shop; if the day had not been particularly fine and sunny; if I had not suffered a sudden flush of nostalgia for my lost youth; if I had not had the rare luxury of a few spare quid that the wife didn't know about...

Anyway, there I was, strolling through town on this balmy July morning. The thought must have crossed my mind that

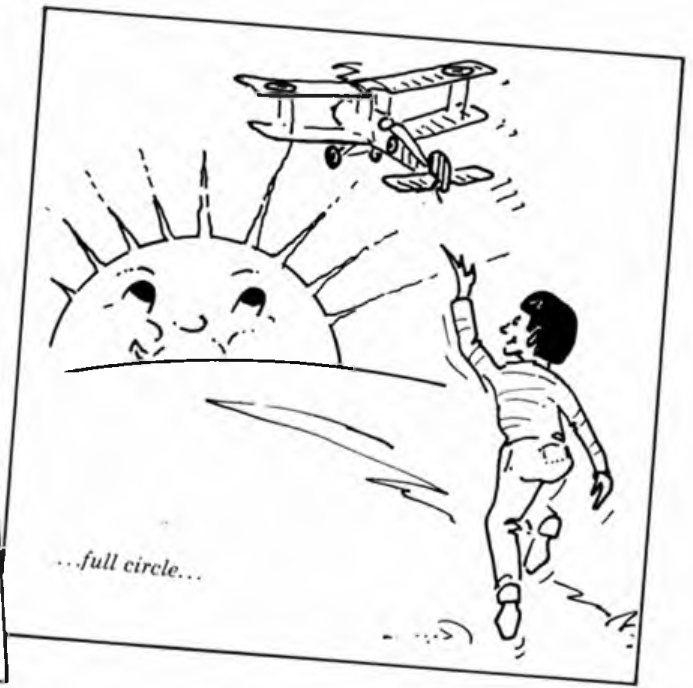
here was a nice day to fly, provided, of course, a lapsed aeromodeller of many years possessed anything to fly. Maybe, in my approaching middle age, I had a momentary gold vision of myself as a young shaver (remember how the summers of our youth are always and without exception, golden?) galloping after a wayward Keil Kraft Ace. Whatever the reason, before you could say 'modelling knife' there I was, exiting from the shop clutching a neatly

wrapped Mercury Mentor.

Now, it's important to mention that, in the beginning, the Mentor was intended to be a 'one-off,' merely to be built with a view to utilising the rare and particularly fine spell of summer weather. Nothing permanent, you understand. However, with a hobby as potentially addictive as ours, the best laid indulgencies of mice and men...

The 'one-off' situation lasted about ten minutes, or to be more precise, until the first longeron was cut. Thereafter, it was downhill all the way. My Mentor (partially built in a caravan at Filey - yes, even holidays were not getting in the way of my indulgence!) was duly finished, flown, and chased after on the local heath, performing beautifully in spite of a slight banana-shaped fuselage invoked by a careless choice of balsa.





The model flew on through golden summer into russet autumn, requiring only a change of rubber and the occasional tissue patch by way of maintenance. Until, on one such russet late autumn day, with a brand-new skein of rubber, the Mentor rebelled against all recognised laws of trimming and flew OOS, last seen heading for a distant housing estate. Name and address on model? Of course not!

So, Mentor-less, but with the flush of success upon me, I determined I should build a scale free-flight model, and furthermore, that it would be rubber-powered, figuring that what was good for me in my golden youth would serve me just as well in mature manhood - even though I had never before attempted a scale rubber job, and had no ambition to try any other type of flying. Probably I'm as parochial as the Parish pump when it comes to change, but in my opinion, there's no finer sight than a rubber model - quiet, graceful, gently circling in the warmth of a summer afternoon - at one with the elements, so to speak.

By now, I was feverishly through a newly-acquired Plans Handbook. Hard-bitten readers will recognise this as the 'looking for a subject' syndrome. This malady affects the judgement, so that instead of choosing a nice straightforward design, easy to build and fly, the victim drools over the many fine

(and often complex) designs available, is hooked; and straightforward designs go out the window. The 'looking for a subject' has developed into 'the acceptance of a challenge'.

The challenge in my case, proved to be Eddie Riding's Bristol Bullet, complete with Moore diaphragm. A harmless enough choice, some would say, but quite involved for a born-again beginner. Well, hadn't I always had a soft spot for biplanes, particularly WW1 types?

Eagerly awaited, the plan arrived, and was given several 'coats of looking at', to the extent that I jotted down what I considered, as a middle-aged novice, to be problem areas. Method of rigging, wheels, and dummy engine spring readily to mind. Meanwhile, to keep the adrenalin flowing, a second Mentor was built and still survives, together with a CO₂ Puffin, which has given great pleasure both in building and flying, once I remembered that CO₂ motors run backwards as easily as the correct way!

Apace with all this, the Bristol Bullet takes shape. I have built what I consider to be a most satisfactory pair of wheels using the method described in RG Moulton's 'Flying Scale Models', an invaluable reference work. Every problem has been surely surmounted, so much so that only the dummy engine, cowling, and diaphragm

remain to be overcome, though these are problems enough! Indeed, the model is virtually complete apart from these remaining tricky items. However, coward that I am, I shall sub-contract the propeller carving to my brother, who is something of an artist in this field.

When the balsa dust has settled, and I eventually arrive jelly-legged at the flying field, I shall endeavour to remember those immortal and reassuring words, again from 'Flying Scale Models' "...if the model has sufficient power, is built carefully, and assembled correctly, it is bound to fly..." For sure, my heart will be in my mouth when the model takes to the air for the first time, but whatever happens, it's mine, I built it, and as every aeromodeller will tell you, that's what really counts.

What, then, are my feelings when I think of my return to this most satisfying of hobbies? Sadly, the model shop where I bought the original Mentor is no more, forced to close like many other small businesses in these trying times. Yet, as I experience once again the fulfilment of manufacturing 'kits of bits' from a plan, and as I accumulate enough plans to keep me busy for a lifetime (isn't that half the fun, anyway?) maybe I owe that genial proprietor a huge debt of gratitude for being in the right place at the right time.



See bipes, tripes, multis and much, much more at the

Old Warden Scale Weekend

21 & 22 June
Bring a scale model - and fly it!

FREE FLIGHT SCENE

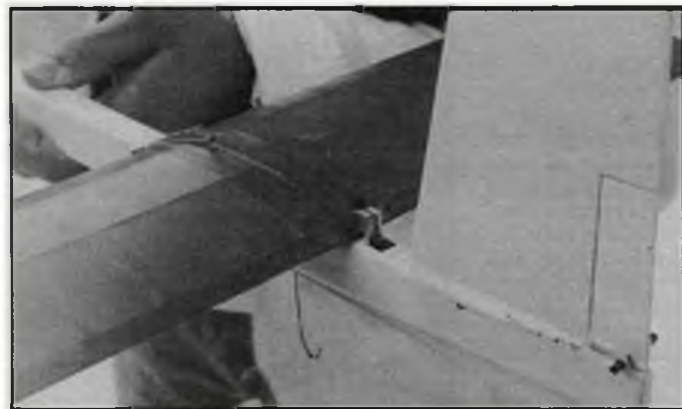
with Dave Hipperson

Too Heavy Stafford Screen's winning $\frac{1}{2}$ A

With power flying appearing to be on the ascendant, at least for the time being, this might be the moment to bring you details of the most successful $\frac{1}{2}$ A design of recent years. Stafford has developed this alongside his first love, F1C, incorporating many of the FAI models' features. Even though it is the result of less than half a dozen prototypes, nothing has been sacrificed for reliability. Surfaces are quite conventional and of sturdy construction. Hence the model is quite heavy at nearly 7 $\frac{1}{2}$ oz but perhaps not overly so considering the large wing - over 270sq inches - and exceptional motor/prop combination. I recall some robust winners in past years, particularly Graham Head's excellent late 60's Ramrod 250 which was quoted at over 8oz! Certainly no one would argue - particularly after they have been beaten by this model - that a little bit of extra weight isn't more than compensated for by trim consistency. A similar sentiment was expressed by Joe Flynn last year when we presented his pair of $\frac{1}{2}$ A models. Joe reckoned a model smaller than this would have to be 6 $\frac{1}{2}$ oz at least.

Naturally, much of the contest success comes through Stafford's detailed approach to everything, even though he admits to finding TD 049's somewhat trying on occasions. I know other $\frac{1}{2}$ A flyers who might be less polite in describing the little beasts! The props are his own, either glass or sometimes carbon fibre 5 $\frac{1}{2}$ x 2 $\frac{1}{2}$; and more recently, and to the same specification, a folding unit, but the idea of going the whole hog with a prop brake as well was discarded for weight reasons. Stafford does stress the importance of a very high performance motor, and his are extensively re-worked in the USA. Such treatment is hardly cheap, but my experience of current Cox motors would suggest that some work is vital, if only for the sake of reliability and starting. Those lucky enough to have old unworn motors may well find they are good enough.

Close up of Too Heavy's tail shows details of twin triggers for VIT and D/T. Note also the sharpness of construction!



It's pretty light really! Stafford Screen's $\frac{1}{2}$ A Too Heavy is held by his daughter Susan. Robust construction means reliability - a vital component of all competition models; see drawing overleaf.



Both flat bottom and the slightly undercambered section shown here have been used, Stafford favouring the undercambered version although he is still quite derogatory about the glide, describing it as only 'average'.

The CG is already at a fairly rearward 72-75%, so VIT movement is quite small. The tail moves from + $\frac{1}{2}$ ° to -2°, activation being achieved by a double trigger arrangement. This is preferred as it involves no high-tension hold down lines, and thus reduces the chances of any bending loads on the fuselage and wear in the lines which are so often the cause of inconsistent power trim and sudden failure. He has toyed with the idea of the 'hunt' transition from power to glide and although very confident of this arrangement for F1C he doesn't view it a practical proposition to guarantee the vertical climb necessary for a proper pull out on a $\frac{1}{2}$ A model, which is so much slower-moving than the F1C. Even with all this performance - must be almost double the max off a full 7 sec run - it is still necessary to pick the air carefully, particularly in fly-offs, so Stafford always uses a starter for a quick launch. It would, of course, actually be impossible to start the motor manually when it's fitted with the folder!

SMAE 1st Area Centralised Event - 2/3/86

It was reasonable to expect a below-average attendance for this meeting after nearly five weeks of freezing weather throughout the country. On this day the

North had far the best of it, tempting results from Scotland and allowing Alan Jack, flying F1A, to make a winning full house in the dead conditions prevailing at Brunton, Newcastle. Further South the wind was fresher but flyable, apart, that is, from Ashdown Forest which was still bearing the brunt of the depression moving off over Europe; no one flew anything there. There was little activity at Beaulieu or Merryfield for the same reason.

Power was totally dominated by the Barkston flyers, Peers taking the Frog Senior with a new and very light 40 model which climbed very fast and out-glided his nearest rivals Harris and Screen who also D/T'd at around 5:30 to make sure they didn't win. Power times somewhat further down were very respectable too and it was most encouraging to see so many people reverting to flying in this class despite such cold weather - perhaps it's the thought of using FAI Supplies rubber in the winter! Certainly at Barkston numerous people flew power as a second string; Phil Ball his PAW Slow Open model, Chris Strachan a fast $\frac{1}{2}$ A, and John Carter made three very positive maxes with his Rossi 09 model which even survived a hasty fuselage repair after an annoying motor cut early on in the climb of the last flight.

It was also very much business as usual at Driffield in the light drift where Steve Fielding topped everyone (including the Rubber contestants) in Power and Chas Plant scraped into the points once again using his reliable OS 35 Slow Open model. Phil Ball

Now to the front end - a very neat set-up, with tidy, short piping to the engine. TD049 drives a folding prop.



SMAE 1st Area Centralised Event 2nd March

Results

F1A - No Trophy (45 flew)

1 A. Jack	Tynemouth	12.30 + 2.25
2 B. Lavis	Biggles	12.25
3 D. Neil	Anglia	12.25
4 E. Drew	B&W	12.18
5 P. Owens	Liverpool	12.10
6 B. Nicholson	Liverpool	12.02

Open Rubber - No Trophy (22 flew)

1 P. Ball	Grantham	7.30 + 6.45
2 D. Hipperson	Grantham	7.30 + 4.37
3 C. Strachan	Biggles	7.30 + 4.28
4 J. Pool	North Yorks	7.30 + 4.15
5 L. Auckland	North Yorks	7.30 + 4.00
6 R. Pollard	Tynemouth	7.30 + 3.56

Open Power - Frog Senior Trophy (17 flew)

1 R. Peers	Falcons	7.30 + 6.23
2 P. Harris	Birmingham	7.30 + 5.54
3 S. Screen	Birmingham	7.30 + 5.47
4 J. Bailey	Biggles	7.30 + 5.05
5 S. Fielding	Morley	7.30 + 4.37
6 C. Plant	Darlington	7.30 + 4.24

Plugge points after one event:

Biggles	239
Liverpool	218
B&W	217
North York	213
Birmingham	174

regained his form in Open Rubber with his old faithful 360sq incher to take the flyoff comfortably; his clubmate managing only a slightly underelevated flight.

SMAE 2nd Area Centralised Event - 16.3.86

Chris Chapman's exile to Cornwall seems to have done his flying no harm at all as he managed to place profitably in both Rubber and F1C at the 2nd Area Meeting. Doubtless his Bristol & West Club would have dearly loved more F1C flyers like him to boost their Plugge points, as they certainly had the weather. Whilst the rest of the country suffered wind or poor visibility (often both, and always at the crucial moment), Merryfield, although wet until lunchtime, had calm warm conditions thereafter right through to the flyoffs. This allowed Derek Wain to capture the much coveted Gamage Cup from Carter and Ball who were hampered by low cloud and cold at Barkston Heath. Former World Champ Elton Drew made a similar impression on Open Glider, this time heading an incredible clean sweep for Bristol. Perhaps the glider flyers at Beaulieu were the most unlucky; after a fair day and half a dozen full scores a thick sea fog clamped down for the flyoff and models were virtually out of sight at the top of the time. Despite the calm, gliders disappeared almost immediately, for they all contacted lift!

Paul Bond, determinedly chasing Plugge points for Anglia, topped the list for F1C flying at a breezy but clear Sculthorpe where, incidentally, all eight participants flew F1C - surely a record? This pushed Birmingham's Pete Watson down to an unlucky 2nd after a day of consistent effort at a hazy Barkston. Birmingham was well represented here and although their usual mentor Screen suffered a freak glide spin on his first flight they all persevered to the end despite rather risky conditions. Very pleasing to see Ray Monks back amongst the leaders.

It is hoped that what must have been a dozen or so models lost in the murky flyoffs were eventually located. I know at Barkston

SMAE 2nd Area Centralised Event 16th March

Results

Open Glider (no trophy)

1 E. Drew	B-W	7.30 + 5.54
2 R. Audley	B-W	7.30 + 4.18
3 C. Sharman	B-W	7.30 + 3.14
4 J. Cuthbert	Grantham	7.30 + 2.69
5 K. Smith	Crookham	7.30 + 1.42
6 C. P. Williams	Richmond	7.30 + 1.34

Open Rubber for Gamage Cup

1 D. Wain	B-W	7.30 + 8.04
2 J. Carter	Falcons	7.30 + 5.36
3 P. Ball	Grantham	7.30 + 5.35
4 R. Peers	Falcons	7.30 + 5.25
5 C. Chapman	B-W	7.30 + 5.13
6 B. Bow	B-W	7.30 + 4.45

F1C (no trophy - Plugge points)

1 P. Bond	Anglia	12.30 + 4.30
2 P. Watson	Birmingham	12.30 + 3.54
3 R. King	Morley	12.05
4 R. Monks	Birmingham	11.34
6 C. Chapman	B&W	11.17
6 A. Wells	Anglia	11.12

we made a sorry sight plodding around in the gloom and pouring rain at the end of the day. You would hardly have noticed any dampening of the Falcon Club's spirits, however. This outfit - surely aeromodelling's equivalent of the SAS - searched for John Carter's model until hours after dark and eventually found it by torchlight!

Pacific Championships, Carterton, NZ - 6-9/2/86

Whilst British aeromodellers froze through the harsh February Martyn Gregorie jetted off back to his roots in New Zealand and brought us details of their Pacific Championships. This was an Open FAI meeting also incorporating various domestic team events and was run on the site used regularly for the New Zealand Nats - basically sheep pasture and clear retrieving in all directions. For most of the four days the calm sunny weather kept temperatures in the low 30's; hot but bearable. All FAI events were run to FAI rules; that is poles, static timers, seven flights, etc. The 7am start, one hour after dawn seemed to give most problems to the glider flyers and little trouble to the Rubber and Power men. Both our reporter and Vin Morgan, fresh from his 4th World Champs placing, dropped just one second each in this round but made amends later. Those that met Rob Peters whilst he was over here last Summer will be pleased to see that he collected 1st in Glider and a 2nd in Wakefield! He has recently had a lot to do with administration of the New Zealand Nats; hopefully at this meeting he was free to concentrate on his own flying-it certainly looks that way.

America was represented at the top of both F1B and F1C. Chuck Dorsett was ably assisted by a large US support team, not the least effective being Doug Galbraith who somehow actually managed to commandeer the farmer's own motor bike for high speed retrieval. Then Hardy Brodersen topped F1C the following day with the only full house, closely chased by local man Ian Weston after he dropped a few seconds on his first flight before getting his act together. Doug Galbraith, most impressive right through the day, looked all set when an enormous hole and flat climb virtually halved his last flight score!



Taking the strain - Pacific Champs double placer Rob Peters is seen here winding his F1B. He was second in this event; first in F1A.

Martyn then went on to California and took 17th in F1A at the Max Men 14 flight FAI marathon at Taft. The real battle in that class, however, was left to the father and son team of Mike Fantham and Pete Allnut. These two got to the 5 minute fly-off - some achievement after all those elimination flights. No Bob White in the F1B top three - he was 5th; and the Canadian Dave Sugden dominated F1C after an incredible eighteen contest flights. Our thanks to Martyn for all the above information.

Pacific Championships: 6-9th February

Results

F1A (20 flew)

1 R. Peters	NZ	1237
2 V. Morgan	AUS	1196
3 M. Gregorie	UK	1156

F1B (20 flew)

1 C. Dorsett	USA	1260
2 R. Peters	NZ	1208
3 B. Keegan	NZ	1170

F1C (7 flew)

1 H. Brodersen	USA	1260
2 I. Weston	NZ	1244
3 D. Thomas	AUS	1209

P30 (10 flew)

1 W. McGarvey	NZ	360
2 I. Scott	NZ	303

A1 Glider (16 flew)

1 D. Ackery	NZ	566
2 S. Scott	NZ	558 + 60
3 R. Wallace	NZ	558 + 31

Max Men 14 flight FAI: Taft, 15/16th February

F1A (25 flew)

1 M. Fantham	UK	2160 + 240 + 300
2 P. Allnut	CDN	2160 + 240 + 131
3 J. Dona	USA	2160 + 230
17 M. Gregorie	UK	1855

F1B (26 flew)

1 B. Critchlow	USA	2160
2 P. Croley	USA	2157
3 R. Wiehle	USA	2146

F1C (16 flew)

1 D. Sugden	CDN	2160 + 240 + 300 + 360 + 420
2 R. Simpson	USA	2160 + 240 + 300 + 360 + 230
3 T. Kerger	USA	2160 + 240 + 300 + 168

Vanishing Point

Developments at Barkston Heath, and to a lesser extent Driffield, during the Gamage Cup Area meeting in March highlighted for the first time the rules governing what time-keepers can do at the discretion of the Contest Director. Not surprisingly a few loop-holes showed themselves. Now we know the possibilities it might be worth considering whether we want contests decided like this.

The current situation - and these rules have been in existence for a few years - allows for a CD at any SMAE event to waive the 10 metre rule. That is to say, he may waive the time-keepers' movement restriction of 10 metres after moment of launch. On the surface this would appear sensible, and I remember that it was brought in after a spate of foggy SMAE meetings in low wind where models could have been easily timed to the ground if the time-keepers moved under them; but they were not allowed to. Thus, in conditions of calm and fog this facility in the rules might make for a meaningful comp where otherwise one would have been impossible. However, at Barkston on 16th March a stiff breeze and haze meant that time-keepers had to fairly sprint downwind to guarantee seeing the models for even 2½ minutes. In the circumstances this worked satisfactorily and had the additional benefit of allowing those with the watches to keep warm for a change! However, by the time of the fly-offs things became complicated, as more careful

scrutiny of rule 3.1.8.3 showed that in *any* circumstances the time-keepers could be down-wind virtually as far as they liked before the launch! So, with the waiving of the 10 metre rule on top of this, the way was open for an extraordinary situation to develop. Contestants were able to position their time-keepers half way across the drome before the fly-off. By the time models were being launched the visibility and deteriorated further, the wind had dropped (or appeared to have done so) but it was raining! As models took the air, downwind time-keepers clocked on and dashed off further to see as much of the later part of the flights as possible. This way most models were seen for twice as long as they would have been had the time-keepers remained at the launch point. There was certainly talk of the fittest amongst them recording the best time, although to be their credit, certainly at Barkston they played fair; witness three models going OOS at virtually the same moment. It would have been so easy for any one of them to have used 'imagination' for another 30 secs or so but they didn't.

However, when the 10 metre rule is waived something else occurs which is much more far-reaching. Because nowhere in the rules does it say that a contestant can't time his own model, it follows that once there is no 10 metre movement restriction on the time-keepers, contestants can time their own flights *and* run after them - that goes for the comp flights too! Surely that is putting a too much temptation in the way - isn't it?

It would seem logical that there should now be a rule specifically *precluding* contestants ever being *their own* official time-keepers and furthermore not allowing the 10 metre rule to be waived in the case of fly-offs. I think that would close the loopholes simply and effectively.

Whilst on the subject of time-keeping; judging from comments and suggestions floating around at that fly-off it would appear that few contestants are aware that if they have two or more official time-keepers then the final readings on their watches have to be *averaged*. From what I heard I would have to suspect that it was more likely the case that the *best* time was being taken rather than the average. People are being too loose about who are their official time-keepers. They don't have to have more than one unless the CD insists, but if they opt for a group job then they should accept that if one of the group loses the model very early then it must adversely affect the final average result of the others. Personally I prefer the 'all eggs in one basket' arrangement and have actually turned down offers of help. My wife, Sue does the time-keeping and she has excellent concentration. There is always the chance that she may make a mistake and lose a model; it has happened. Nevertheless, her record is good, and a back-up might reduce the final score. . .

There's a lot to considered here; but I don't think enough of you carry a copy of the rules, let alone study them.

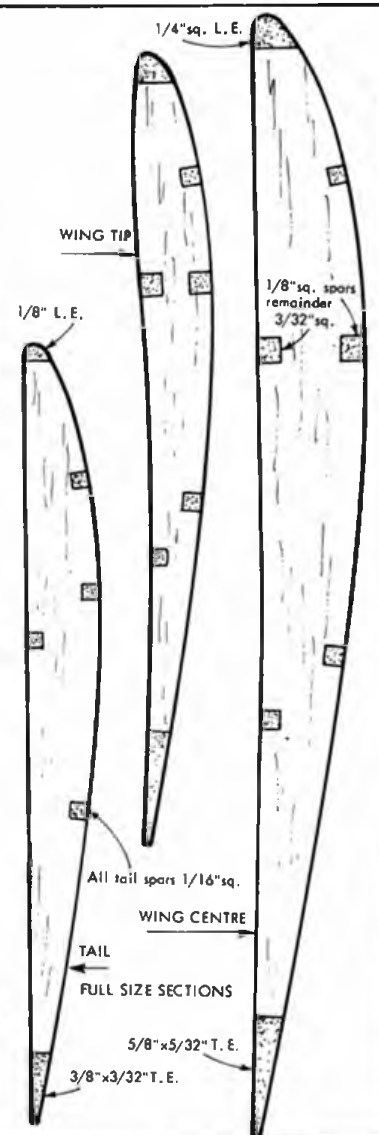
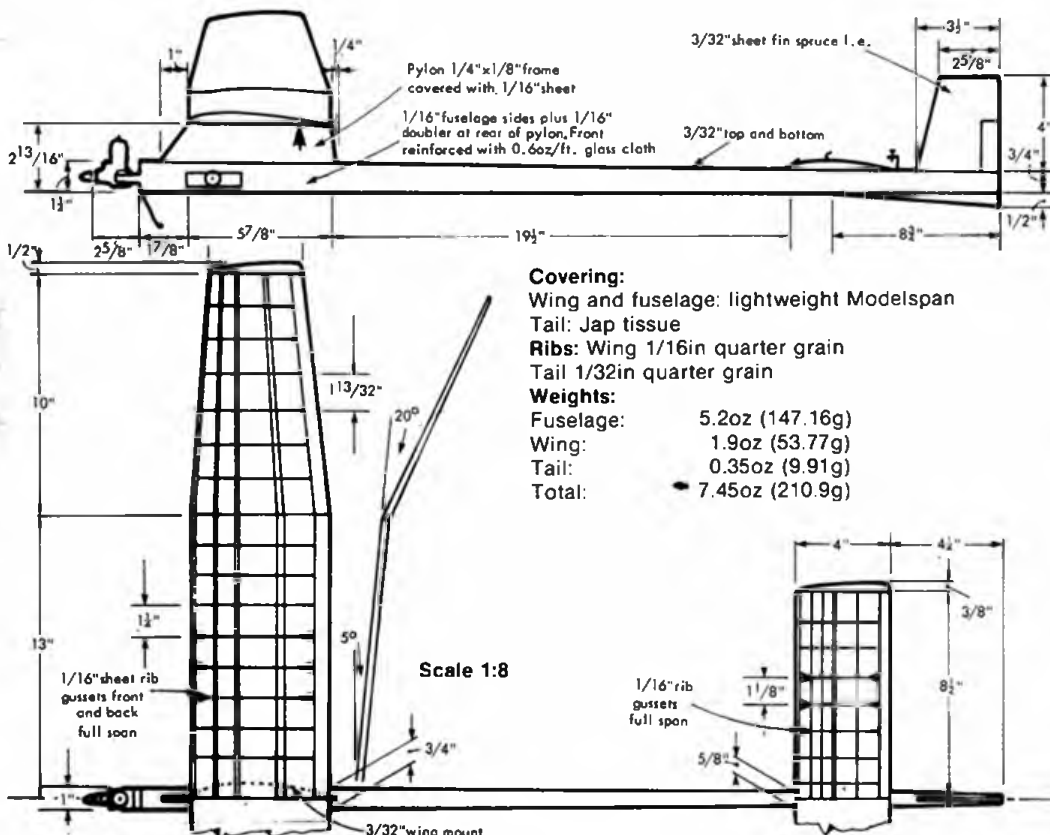
Too Heavy: 1/2A Power winner by Stafford Screen

Motor: tuned, pressurised Cox TD049. **Timer:** modified KSB - flooding off.

VIT: activated by twin triggers in tail. **Thrustline:** 0-0 degrees.

Incidences: Wing + 1½ degrees; tail + 1 degree (power), - 2 degrees (glide).

CG position: 72-75%



Yesterday's Wakefields

-a class for tomorrow?

THIRTY-FIVE YEARS AGO the specification of the international competition rubber driven model changed. The name 'Wakefield' was retained for models designed to the subsequent regulations, and still today models compete bi-annually for Lord Wakefield's trophy. But it is that type current thirty-five years ago that we know and respect as the 'Vintage Wakefield'. Let us look at its specification as recorded by Just Van Hattum in his 1950 *Aeromodeller* Annual article:

1950 Wakefield Rules

Wing Area: 200sq.in. plus or minus 10sq.in. area measured on actual span and chord without allowing for dihedral. In other words - the actual visible area of the wing.

Tailplane Area: Not more than 33% of wing area; same method used as for finding wing area.

Fuselage Cross-Section: Area not less than the figure given by: (total length of completely rigged model) squared,

Cut short in its prime, the pre-51 Wakefield is analysed by Martyn Pressnell who speculates on how it might have developed — and could today...

and the result divided by 100; ie $L^2/100$.
Weight: Not less than 8 ounces ready to fly.

The fuselage cross-section rule was the most significant feature of the specification. It fixed the proportions of the fuselage, and gave models their characteristic chubby appearance. Fuselage surface area was of the same order as the wing wetted area and, therefore, produced significant skin friction drag, with the risk of a wide body wake behind the model. Thus the fuselage cross-section rule had a limiting effect on performance, as well as introducing a requirement for good aerodynamic design and light

structural principles. Models were required to take off from the ground.

Airframe weights in the order of 4½ozs could be achieved, leaving 3¼oz for rubber, although as much as 5oz could be accommodated by twin motors driving return gears within the generous fuselage cross-section. Duration of the best models, at about 4½ minutes, was contained within the 5 minute maximum score used in competitions. Although return gears were favoured by some experts such as Evans, Warring and Gorham in the United Kingdom, and Ellila of Finland won the World Championship in 1949 and 1950 with models equipped with gears, their



Main picture: Martyn with his Copland's Wakefield built from the APS plan, illustrating the classic streamlined style. Below left: John Gorham, National rubber champion in 1950, with his Ghost. Note the feathering prop and cut-away fin to 1/2p-tall D/T. Colour scheme, wing fixing and absence of a turbulator suggest this was one of the earliest versions. (Photo: Ron Moulton). Below right: Ron Warring remained faithful to the same basic layout for many years, seen here in 1952 form.



frame component. The full streamliner (as exemplified by Bob Copland), simple box or cabin styles (such as Korda or Marcus), diamond boxes and many other derivatives were to be seen. Each could be combined with high wing mounts, shoulder mounted wings in one or two pieces, straight dihedral or polyhedral, and the usual variety of tail units. These could be assembled in a vast range of configurations. If I was asked to select the best design of the day, my vote would probably go to John Gorham's 'Ghost' Wakefield for consistent contest success in this country, although it never qualified for World Championship status. It bore such a strong resemblance to Ted Evans' Vanstead that it is not easy to separate the two, both being flown magnificently on one motor or two. The Ghost design continued to be used beyond 1950 without significant alteration of length, and it was arguably the most developed of the vintage line.

Motor length

Now to develop my arguments it is necessary to become technical. Clearly it is desirable to put long motors into short fuselages, and the classic way to do this is by cording the rubber motor. There have been a few occasions when trying to achieve this, that I have overcorded a motor and ended up with a motor almost as long as the uncorded rubber. Clearly an optimum number of cording turns exists, and to investigate this an experiment using FAI rubber has been carried out, the results being seen in Fig. 1. Virtually the same results have been obtained for 12, 14 and 16 strand motors. Motor length can be reduced to 75% of the uncorded length by winding on cording turns to 2.6 per inch. Suppose the motor length is 40in: use 104 cording turns, ie 52 turns wound on each side of the motor, and it will be found to cord to 30in long.

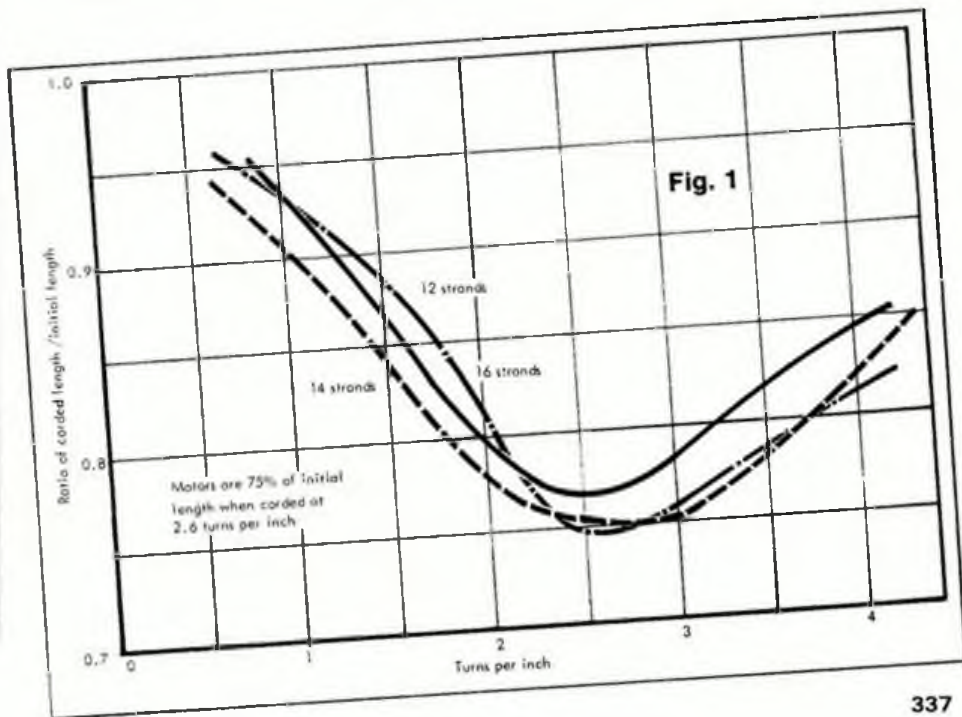
On the question of winding, my preference is to wind on the cording turns in the backwards direction. This has the effect that the unwinding motor reaches the corded state without going slack in the fuselage. It is sometimes suggested that this deprives the motor of some maximum turns, but I know of no evidence for that, and the advantage mentioned is quite conclusive in my opinion.

supremacy was not conclusively established. Following the rule change referred to, fuselage length was not restricted by relating it to the fuselage cross-section, and the potential advantages of gears evaporated in consequence. Thus in 1951 the development of geared rubber models virtually ceased, leaving the technology encapsulated as it were, at that period of time.

Now, thirty five years on, the Vintage Wakefield is again a centre of interest, and the solution of its design problems, as well as its performance capability, is under close scrutiny. One wonders how the type might have evolved if development had not stop-

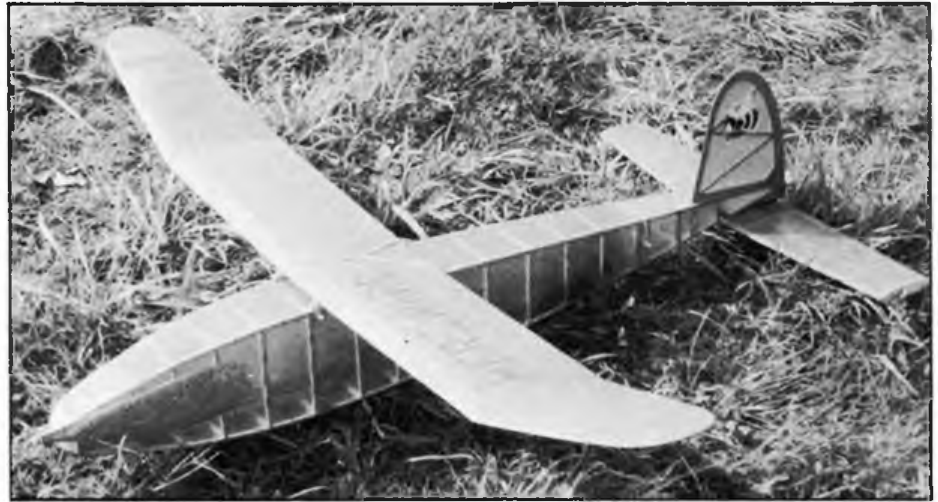
ped when it did. There is little to go on - Warring's ultimate model flew with several geared motors, intended to achieve a run in excess of five minutes - but was it a success? Hewitt tried large diameter propellers, which folded down to half diameter, before feathering. The folding propeller, although well tried in the USA and elsewhere, was not favoured by many British experts of the day, its use being clouded by concern about the centre of gravity shift, notwithstanding the use of 33% tailplanes.

Unlike the modern breed of Wakefield, there was great variety in the styles of model to be seen, as principally typified by the fuselage, the largest and heaviest single air-



Roughly speaking, 'FAI' motors are equivalent to 'Pirelli' motors with two less strands in the FAI. The result is that a sixteen strand FAI motor has become virtually untenable in a Vintage Wakefield. The twelve strand motor which never seemed quite enough in Pirelli is now attractive from the point of view of power output, but is somewhat lengthy. For some models, therefore, fourteen strands becomes an attractive compromise, but it does present some problems in make up and cording. Fourteen strands can be made up as three loops and a single strand in each side of the motor, with a loop for the peg knotted separately in each single strand. This arrangement cords symmetrically, but my experience is that motors tend to break at the knots tied in the motor. An alternative 14 strand arrangement has proved better, namely using four loops in one side and three in the other.

An alternative or additional technique for shortening the motor in the fuselage is to use a propeller stop, which comes into operation retaining some motor turns. This is certainly a waste of stored energy, foreshortening the flight by about the time it would take for those turns to unwind, perhaps five or ten seconds. However, this method is not foolproof because bunching of the motor is unpredictable, and virtually uncontrollable. A certain number of retained turns will coil a motor over its entire length and this is the only safe number of turns to retain. However, to consistently achieve this is not thought possible. I would venture to say that 3½oz of rubber is about the



A Marcus Hereward built by Eric Thomas; surely a classic example of simplicity in the 'functional rectangular' style. A good choice for the Vintage Rubber enthusiast today.

maximum single skein that can be used without serious risk of bunching. Higher weights are used, and the risk of centre of gravity shift due to bunching is presumably thought tolerable by some competitors.

Centre of Gravity

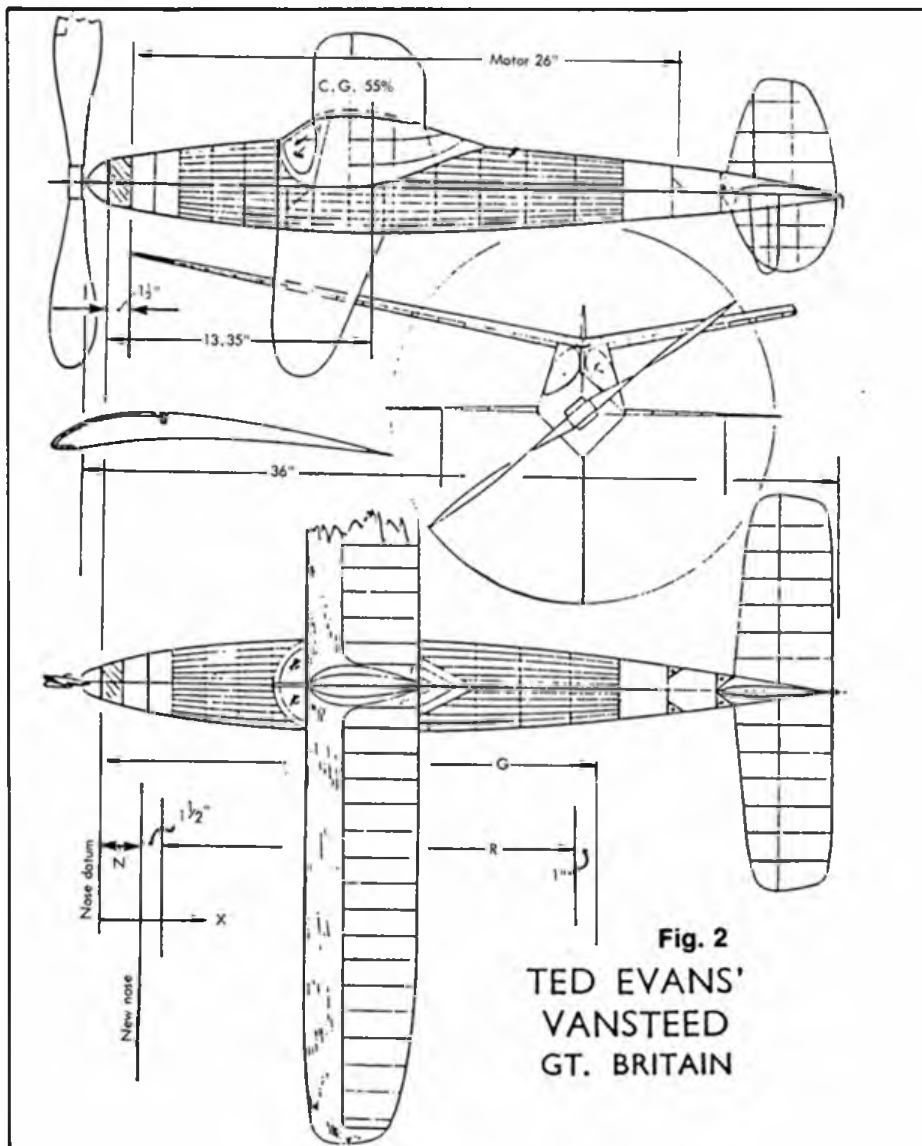
The centre of gravity of the rubber motor is invariably close to the CG of the model itself, because the rubber represents a big proportion of the total weight, and in the nature of things the propeller mass tends to balance the tail unit mass. Where the

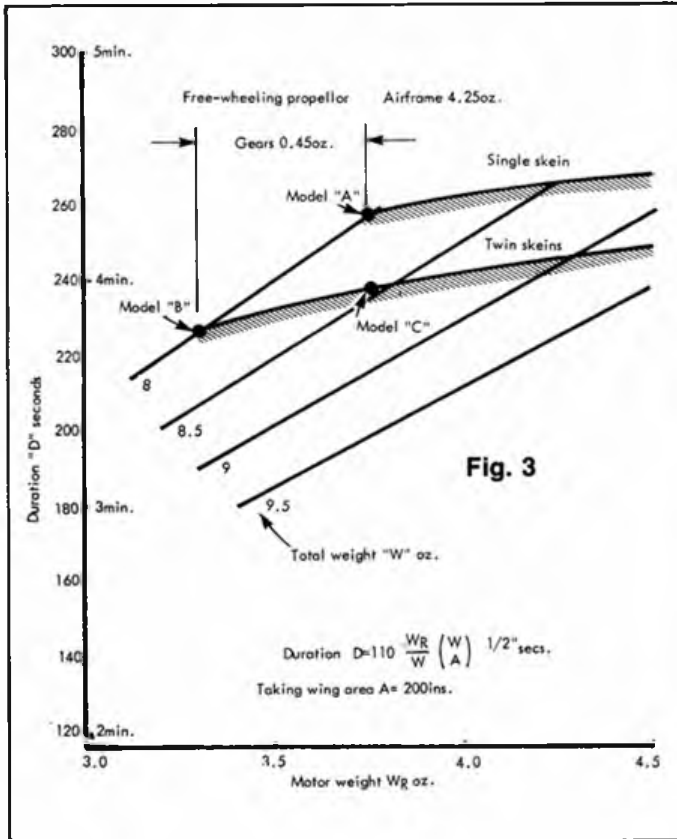
fuselage carries rubber close to the back end, the effect is to shorten the tail arm, and increase the pitching inertia of the aircraft: both destabilising effects.

An effect of using twin motors is to reverse this trend, because the greater mass of rubber can be located further forward. Indeed it becomes feasible to shorten the nose relative to a single skein model while maintaining or improving the tail arm, and saving on fuselage cross-sectional area requirements. To study this the Vanstead has been used as a geometric datum, see Fig. 2. (This is gratefully credited to the 1950 Aeromodeller Annual). On enlarging the drawing it became clear that two rear peg locations were installed and at the nose the fuselage is deeper than it is wide; evidence of the provision for a twin motor system? Laurie Barr kindly provided a weight breakdown for his contemporary Vanstead, and this can be compared with the weights achieved on my own models, an APS Copland Streamliner, and an Earl Stahl Gypsy, summarised in Table 1.

The streamline fuselage is usually regarded as heavy, but my version weighs 1.85oz, being some 0.15oz lighter than the weight claimed for the original. This is possibly due to the extensive use of cyanoacrylate adhesives in the wound formers and general assembly. Copland's two piece sparless wing is also heaviest on account of its sturdy leading edges. The single bladed propeller assembly of the Gypsy is the lightest, and the single main leg, wheel-less undercarriage of Vanstead is lightest. Vanstead achieves the least airframe weight at 4.70oz.

Knowledge of the weights of contemporary open rubber models suggests that several of these component weights can be improved, and these are used for three potential designs summarised in Table 1 also and referred to as 'A', 'B', and 'C'. 'Model A' uses a single skein motor of 3.75oz (100gm) with a 4.25oz airframe, to operate at the minimum permitted all up weight. The weight of return gears has been variously quoted down to 0.25oz, but my own assembly using nylon gears with all additional associated fittings for a twin skein model, was 0.45oz which I regard as realistic. This has been incorporated in 'Model B', with a corresponding reduction in rubber to 3.30oz to maintain the same AUW. 'Model C' reinstates 3.75oz of rubber, and thus makes the total increase to 8.45oz. A geometrical evaluation of these models has been carried





Eric Smith with his Themis Wakefield, designed to be the ultimate, and described in Aeromodeller. Notice feathering prop, tip-tail D/T and beautifully faired wing mounting.

out, together with an evaluation of relative performance to see what can be learned.

Using Vansteed as a guide (see Fig. 2) its centre of gravity was calculated to be at 55% root chord, 13.35in aft of the nose datum precisely as specified on the plan supplied by the Model Centre, Northampton. Minor attention at the nose and tail can reduce the overall length to 36in and this is adopted for 'Model A', which otherwise maintains the CG position and tail arm measurements. Retaining these same key dimensions,

'Model B', with rear mounted return gears, is able to reduce its overall length to 33.9in. All of this is summarised in Table 2, together with the required fuselage cross-sectional areas, where 'Model B' requires 82% of the area for Vansteed. If this advantage is to be optimised, it becomes apparent that locating the gears at the front will shorten the fuselage more. In that configuration 'Model B' requires 74%, and 'Model C' requires 78% of the area of Vansteed. The saving in fuselage surface area is directly

related to the saving in cross-section area, and this theme is further examined.

Performance

The duration capability of a rubber driven model can be represented in relation to the rubber weight ratio WR/W , and the wing loading W/A , by the formula given in Fig. 3. The factor of 110 converts the result into 'seconds' of duration and is approximately correct for Wakefields with

**TABLE 1
WEIGHT COMPARISON
(ounces)**

ITEM	COPLAND	STAHL GYPSY	VANSTEED	NEW 'A'	DESIGNS 'B'	'C'
Fuselage	1.85	1.69	1.55	1.40	1.40	1.40
Wing	1.34	1.16	1.20	0.90	0.90	0.90
Tail/Fin	0.43	0.70	0.35	0.50	0.50	0.50
Prop	1.15	1.03	1.25	1.00	1.00	1.00
U/C	0.48	0.49	0.35	0.35	0.35	0.35
Gears	-	-	-	-	0.45	0.45
Airframe	5.25	5.07	4.70	4.25	4.70	4.70
Rubber	3.00	3.00	3.75	3.75	3.30	3.75
TOTAL	8.25	8.07	8.45	8.00	8.00	8.45

**TABLE 2
FUSELAGE GEOMETRY
(inches)**

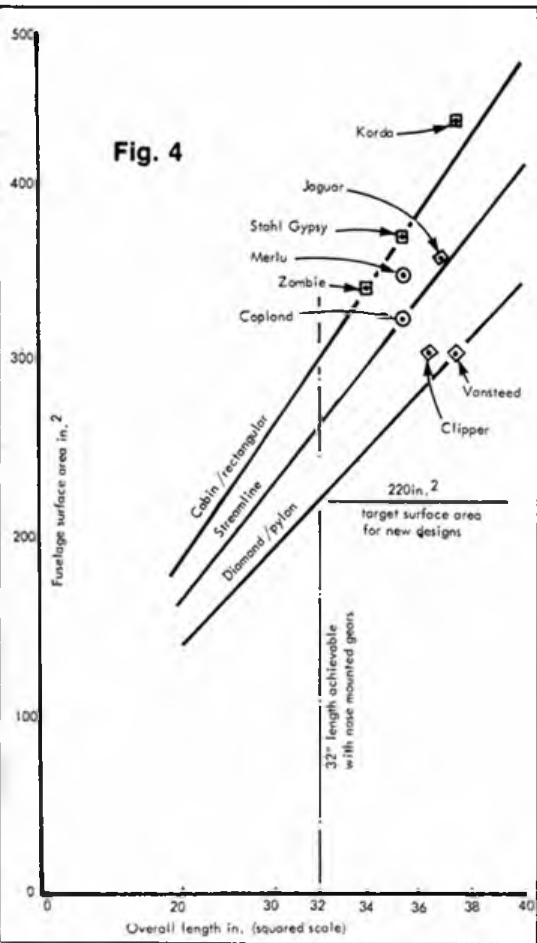
MODEL	VANSTEED	A	B	C	
Gears Location	-	-	REAR	FRONT	FRONT
CG Location	55% C	55% C	55% C	55% C	55% C
Motor x No. strands	1 x 16	1 x 16	2 x 12	2 x 16	2 x 12
Corded Length	30	30	17.6	-	20
Slack Length	4	4	Nil	Nil	Nil
Gears 'G'	-	-	22.18	3.74	2.93
Nose 'N'	0	0	2.08	3.74	2.93
Hook To Peg 'R'	26	26	17.6	17.6	20
Overall Length	37.5	36	33.9	32.3	33.1
Cross-Section In ²	14.1	13.0	11.5	10.4	11.0
Cross-Section %	100%	92%	82%	74%	78%

**TABLE 3
DIMENSIONAL STATISTICS**

MODEL	JAGUAR 1946	CLIPPER 1948	VANSTEED 1950	COPLAND	MERLU 1949	GYPSY 1942	KORDA	ZOMBIE V
PROP. TYPE	F. WHEEL	F. WHEEL	FEATHER	F. WHEEL	D. FOLD	S. FOLD	S. FOLD	F. WHEEL
Wing Area	195 in ²	201	214	202	207	198	206	205
Tail Percent	33%	34%	32%	32%	32%	34%	33%	32%
Overall Length	37.0 in	36.5	37.5	35.5	35.5	35.5	37.5	34.0
Peg Length	25.0 in	25.0	26.0	26.5	26.5	25.5	26.0	23.5
Fuselage Type	Diamond	Diamond	Diamond	Streamline	Octagonal	Cabin	Cabin	Rectangular
Basic Area	277 in ²	282	288	324	347	368	434	340
Pylon Area	80 in ²	22	16	-	-	-	-	-
Total Surface	357 in ²	304	304	324	347	368	434	340
Cross-Section Req.	13.7	13.3	14.1	12.6	12.6	12.6	14.1	11.6
Actual x-section	14.9 in ²	14.4	13.8*	14.9	13.2	14.4+	14.9+	12.7

* Includes section within wing

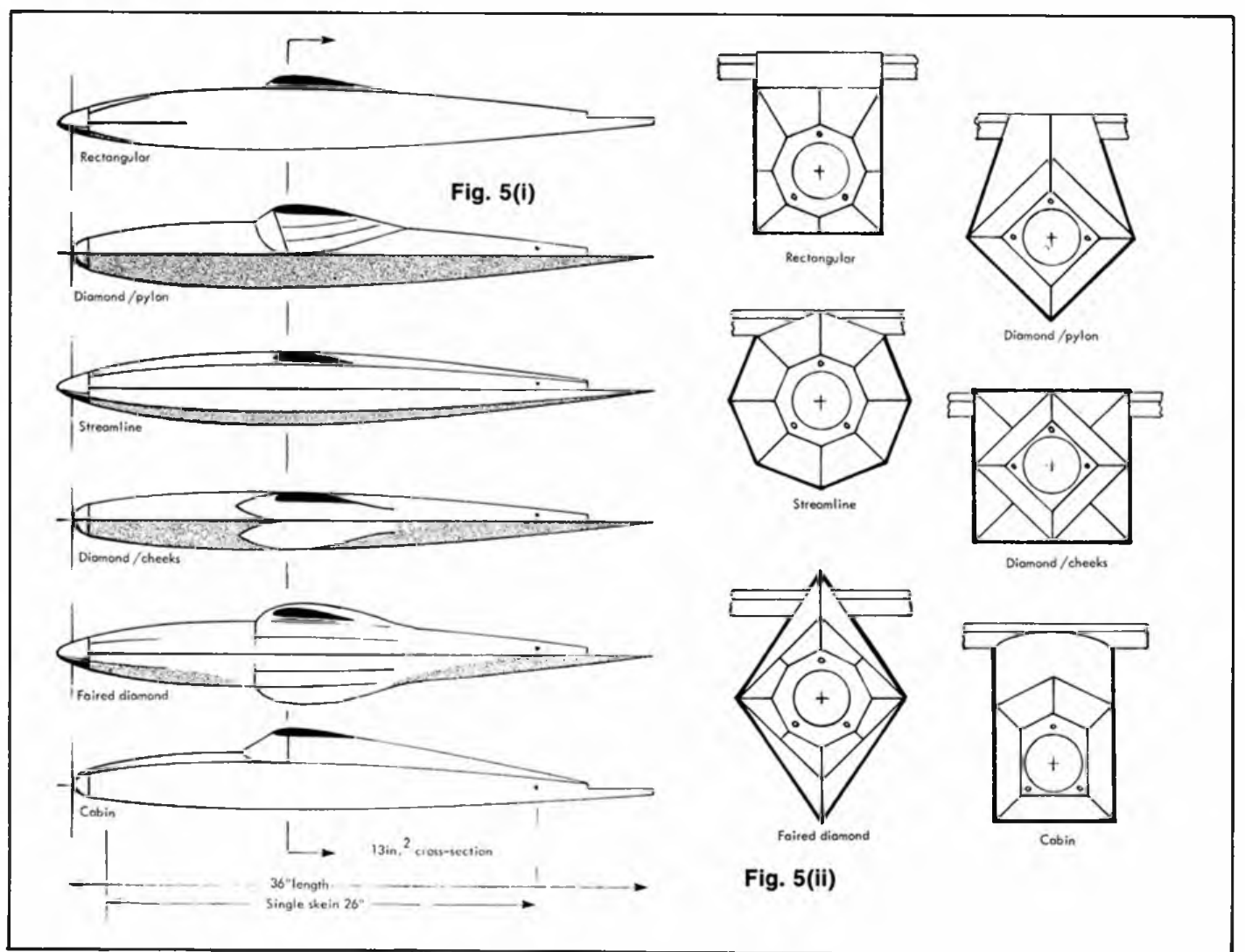
+ Excludes section within wing



Above: Concentrating hard on the camera, Ted Evans displays his Clipper of 'diamond/cabin' layout. Exquisitely designed, as were all Evans' models, this was a development of the successful Vansteed. Right: Aarne Eillis, Wakefield Cup winner in 1949 and 1950, entered this model in 1951. A development of the 1950 design, it sustained damage before the contest and finished well down the field.

coarse pitch free-wheeling propellers. It has been plotted for models of various total weight, showing the cut-off lines for single-skein and twin-skein models exceeding 8oz total weight. 'Model A' represents the best duration attainable for a single-skein model of 8oz AUW, at 4min 18secs. The performance increases rather slowly by adding more rubber; 4.5oz of rubber would produce 4.5 mins duration, which is possibly unrealistic because of the bunching problem. 'Model B' with twin skein is at a disadvantage, located on the diagram 15 seconds below 'Model A'. 'Model C', with the same rubber weight as 'A', is 10 seconds behind, but without the bunching risk. The estimated duration does not allow for the effect of fuselage cross-section in terms of

weight saving, or drag reduction. These might well give the geared model the real advantage. Fuselage drag is certainly an important consideration. Fuselage surface area is typically between 300 and 400 square inches, and thus represents about 40% of the total wetted area of the model. The fuselage shape, with its edges and corners, and extreme length in the flow direction, is more drag producing than this figure suggests. The plans of eight models have been examined and their fuselage surface areas estimated. The details of the models are given in Table 3, and it is surprising to find that seven have significantly greater cross-section than their lengths demand. However, it would be difficult for models built in accordance with the published



Vansteed plan to show compliance. The Clipper and Vansteed achieve the least wetted area, using a minimum diamond box fuselage with a local bulge of area at the wing pylon. The unique 'belly' shape of the earlier Jaguar design does not come out well, because the bulge has a narrow triangular section, producing a good deal of surface area for its enclosed area. The Copland Streamliner has 10% more wetted area than the diamond/pylons, and the rectangular section models up to 20% more.

The evidence is further presented graphically in Fig. 4, and herein lies strong evidence for an explanation of the performance of the Vansteed/Ghost style of model. It is recognised that a pylon or local cheeks added to a square or rectangular box could have the same order of advantage, and the precise choice could well be associated with the accommodation of the skeins of rubber, and with purely aesthetic considerations.

Fuselage styles

The fuselage, then, is a component most significantly influencing performance of the vintage Wakefield, and the optimisation of its style is an important aspect of design. Principally one is concerned with saving weight, minimising surface area, and providing clean aerodynamic shape, while containing sufficient rubber. Fig. 5(i) is a summary of styles as seen in side view, some of which are quite familiar, and which would be suitable for 36in long, single skein models such as type 'A'. The pure aesthetics of the styles will make the greatest immediate impact. Who can fail to admire the streamliner - but to set about building one is another proposition. For simple tastes the 'Rectangular', possibly with a nose fairing is attractive (Voodoo), while for the purist it must be a 'Cabin' style.

The advantage of the diamond styles has been explained, but isn't a wing pylon a little bulbous; will the airflow reattach to the fuselage behind it? The 'Diamond/Cheeks' and the 'Faired Diamond' spread the additional cross-sectional area into four or two fairings respectively and seem to give much better-blending lines. It is difficult to visualise the three-dimensional shape from the side view alone, so please also see Fig. 5(ii) displaying the maximum cross-sectional shapes. These were drawn to the same cross-section area; 13sq.in would suit the 36in length. The diamond shapes remain attractive, and the 'Faired Diamond' seems simple to construct, lending itself to the fitting of one or two-piece wings.

Geared models

The implications of going for double-skein models are not too drastic; the cross-section rule provides ample space, but sections at the nose and rear fuselage need to accommodate the necessary winding tube positions. Fig. 6 illustrates styles suitable for Models 'B' and 'C'. The rear return gears are connected to motors one above the other for 'Model B', which seem to fit well into a slender rectangular section with side cheeks below the wing to provide 11.5sq.in of cross-section. The tail arm and CG position are the same as shown previously for 'Model A'.

'Model C' is illustrated in Fig. 6 in conjunction with the 'Cabin' style, containing front mounted gears. Two equal gears are driven by the motors, to turn a third gear on the propeller shaft of about half the former

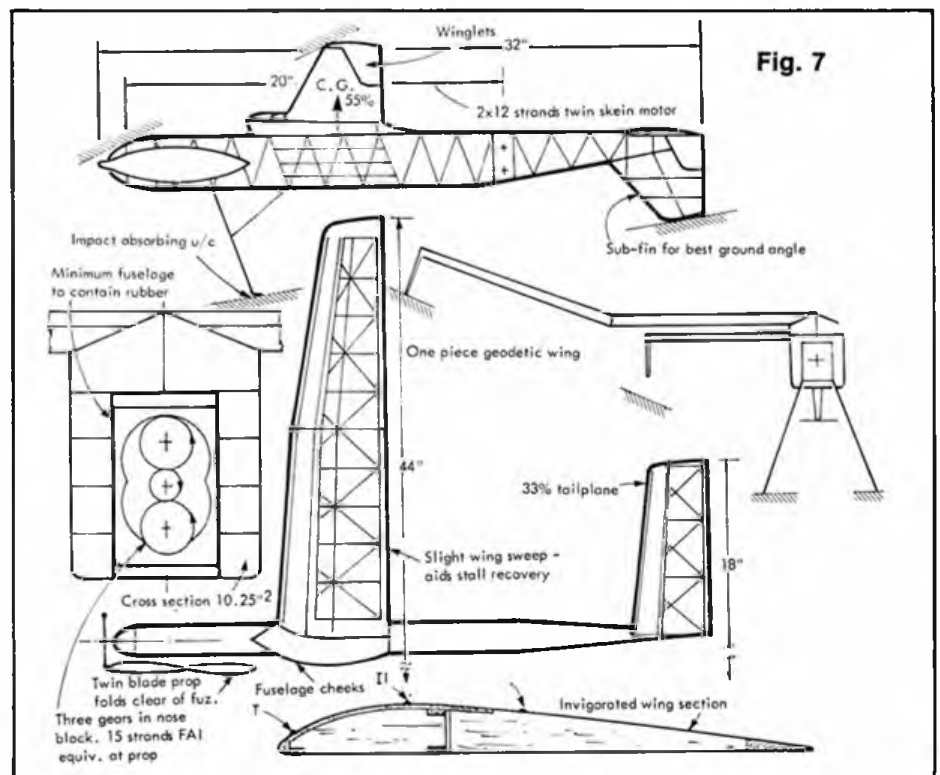
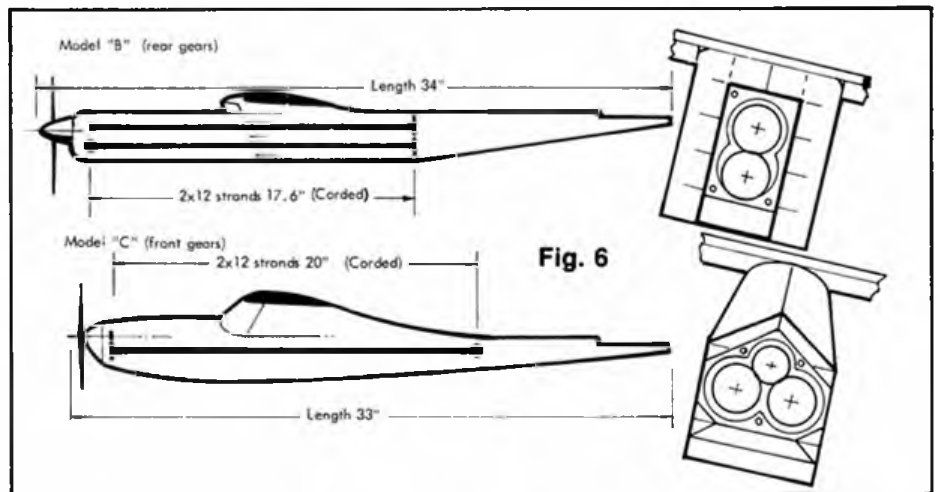


diameter. The fuselage cross-section is 10.9sq.in, tail arm and CG being maintained as before. Of course the gear ratios may be selected to achieve useful effects; for example, available nylon gears can make a pair of twelve strand motors, equivalent to a single 15 strand motor at the propeller shaft.

Wakefield had development not halted in 1951 - it is perhaps not possible to do that. But I think it has been shown what tremendous scope remains for development within the specification, although I have hardly touched on wing or propeller design. Personally I hope a way will be found to allow this to continue within the vintage framework, and perhaps one day to see re-instated a World Championship for models conforming to the 1950 rules! A 1986 design is shown in Fig. 7. Food for thought?

In conclusion

The object has not been to establish what would have happened to the Vintage



MIND THE LINES

with
Ron Prentice

At the handle

I have been an avid reader of Andy Brough's vintage C/L column since it began some twelve months ago. I have always found that in spite of his professed youth and lack of competition success (these autobiographical details appeared in the July '85 column) he manages to make the feature interesting and true to the vintage spirit. I have, of course, known Andy for several years; and recently while chatting on the 'phone, he mentioned that he was terribly busy at work and was finding difficulty in making time to write this column. It came as no great surprise, therefore, when I was asked if I would care to share the column in order to take some of the strain off his shoulders.

Unlike Andy, I was fortunate enough to participate in the beginnings of control line in this country, way back in 1947. At that time I was 15 years old and had already been a modeller for six years. I had begun with solid 1/72 scale models, and graduated first onto K.K. Ajax and Achilles rubber jobs and then to Mick Farthing lightweight gliders (whenever balsa was available - the war was on!). After the war I put my name down on the waiting list at my local shop for a Mills 1.3 diesel, but managed to buy one from a model shop at Leyton in East London before my name came to the top. Like so many modellers of the period I learned to fly

Unmistakable - Henry J Nicholls and his Yulon 30 powered prototype Mercury Monitor. Look at those shades - It must have been a sunny day! Banner on the loudspeaker car reads 'another Aeromodeller service'...

on a K.K. Phantom. Most of this early flying took place on the Tottenham Gas Company's sports field and I shall never understand why people in the surrounding houses did not complain about the constant noise.

Having absorbed the basics I joined the West Essex club and soon discovered that to be able to perform aerobatics the model must be built very lightly and have a low wing loading.

As the West Essex club was at that time the leading aerobatic club it was not long before I had taken my first steps in stunt flying with the aid of the more experienced members such as Sid Sutherland, Dennis Allen, Ken Muskutt, Ken Marsh and Len Steward, to name but few. Thanks to the unfailing help of these stalwarts and many hours of practising, I was soon able to fly the complete stunt schedule of the period, and began to take part in competitions. Although I did not compete in the event, I attended the first Gold Trophy competition in 1948 and remember very well the high wind taking its toll of numerous models. First away in the preliminary round was Henry J Nicholls flying a modified de Bolt Bipe. He was followed by Mike Booth flying an ED Comp Special powered model called The Barge. The entrants flying in their preliminary round were required to make their models take off and achieve level flight, climb, dive, wingover and one inside loop. It's quite amazing to think that some entrants could only just about manage this. How times have changed...

Pete Cock, the eventual winner, struggled through the schedule, crashing several times, fortunately breaking only props. The engines used in the competition were mainly American Super Cyclones (seven examples), with Italian Super Tigre diesels (two), ED Comp Specials (two) and a solitary Mills 1.3 Mk2 making up the number. In August 1948 I took first place in C/L stunt at the All Herts Rally at Radlett. I subsequently placed in many events during 1949, 50 and 51, by which time I was flying large models such as the de Bolt Stuntwagon powered by an Atwood Glo Devil. Soon after this I turned at first to radio control and then to



playing the double bass in various jazz bands, and gave up modelling for many years.

Old Time Stunt at the Nats?

I have just had a phone call from Richard King, who organises the C/L events at the Nationals. He tells me that the SMAE C/L sub committee would like to expand their events at the Nats and are considering staging an Old Time Stunt event to SAM rules. Richard wanted to know whether such an event would be a viable proposition. I told him that the O.T.S. event at the Aeromodeller Vintage Weekend was a very popular attraction and that the ones run by Peter Martin at Rubery Hill, Birmingham, were also reasonably well attended!

It would be helpful if anyone interested in taking part in an O.T.S. event at the Nats could write to me and let me know. If there is sufficient interest, it could certainly be arranged. My address is: Ron Prentice, The Mill, Ash Priors, Taunton, Somerset TA4 3NQ.

A Mercury masterpiece

One of the sleekest of the early stunters was the Mercury Monitor. This short coupled, low wing design was a very popular kit back in the late 40's and early 50's. It was originally designed by H J Nicholls for the Amco 3.5 diesel, but other prototypes were powered by the Mk1 Yulon 30 glow motor,

Far left: The first ever advertisement for a line-controlled model (January 1940) included this graphic portrayal of the Stanzel G-Line system. Left: November 1944, and the new development is a Tee stick control, plus a third line for engine control. Right: Engines too noisy? Try 'about eight strands of 1/8th' - Stanzel's Shark P-60 was rubber powered! Duration of flight must have been low...

"G" LINE FLYING
Sensational - New - Thrilling

GAS POWERED SUPER SPEED PLANES FLOWN UNDER FULL CONTROL
NOT RADIO CONTROLLED
Protected By Patent Pend.

TIGER SHARK SPEED DEMON

\$4.95 KIT COMPLETE

The Super Streamlined TIGER SHARK, "G" Line Speed Plane, roars through the air at the unbelievable speed of from 50 to 75 M.P.H. Due to the inherent "G" Line Flying Stability, engineered into this design, the Shark is unusually stable and easy to control. May be powered with any 1/7 or 1/5 H.P. Motor.

THE SUPER "G" LINE
Is Different

DIRECTIONAL CONTROL STICK

This latest system, "teed" design makes control line flying more fun than ever! The Improved Control Stick is a short T-shaped rod with a handle at one end and a crank at the other. With this stick in the operator's hand the model will fly in approximately the level in which the stick is pointed. Flipping the Control Stick higher causes the model to climb, pointing it down causes it to dive. A most useful line can be used and is held in the operator's free hand.



A pic from the vaults - builder unknown, but the model is the Kell Kraft Hornet, a be-spatted device advertised as a team racer. This one might have been relatively quick; that looks like a Yulon on board!

used so effectively by Brian Hewitt, winner of the 1949 Gold Trophy, in his Stunt King. In the accompanying photo, Henry J Nicholls is shown with his Yulon 30 powered model. Although perhaps not the greatest flyer, Henry was an innovator and through his efforts, C/L flying took great strides forward in those early days. As an interesting footnote on the Monitor, Henry told me recently that the original sketches for this design were done in a few minutes on a paper napkin in a cafe near his well known shop in Holloway Road.

In the beginning...

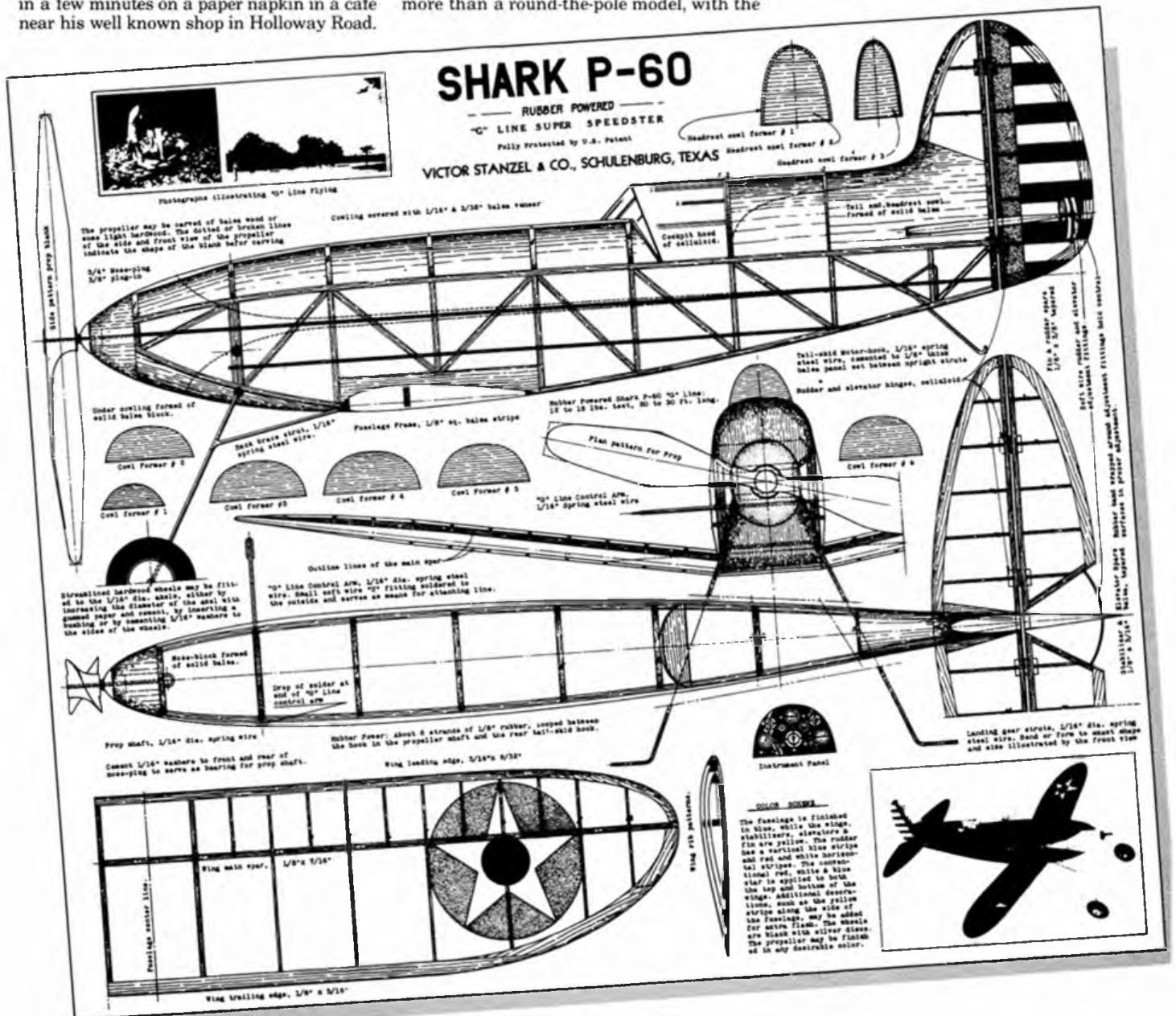
The model that started it all... The first ever control line models both appeared in the USA in the year 1940. The very first, invented by Victor Stanzel, was a racy, low-wing model. It was tethered by a single line from a brace ahead of the right-hand wingtip to the extremity of a pole which was held in the controller's hands. The Shark, as the Stanzel design was known, was little more than a round-the-pole model, with the

variation that because the pole was not static the operator could have some measure of effect on the flying attitude by elevation or depression of the rod. The Shark had rigid surfaces without provision for adjustment. It was trimmed nose heavy and the point of attachment was arranged both to yaw the model and to retain firm line tension; also to ensure that the lightly loaded model had no tendency to lift out of control.

Naturally this method of control had its limitations and in November 1944 Victor Stanzel announced his Super G-line Shark. This was a big improvement, using a 'T' shaped handle via two lines running through pulleys right back to horns above and below the moveable elevator. In addition a third line was used for engine control.

In my next column I shall feature the Jim Walker Fireball.

Lastly, a correction to Andy's April column: he mentioned the range of vintage C/L Kits that I produce, but somewhere along the line the names of the Mercury Marlin and Marlin Mite became corrupted. No doubt everyone has already spotted this!



SCALE MATTERS

Free flight with Bill Dennis

Some new models

During a recent visit to Nottingham I was entertained by Mike Hetherington and fellow members of the Nottingham 'Scale Staffel' with a view to surveying some models built over the winter.

Last year Barry Hetherington was seen with at least four versions of the Ballanca Aircruiser; well, now he's got another one. The latest is a floatplane, 22in span and 60 grams or so in weight, for a standard Telco. It has full scale structure and it seems very bulky for its high aspect-ratio wing, but by all accounts it flies very well. I particularly liked the two paddles strapped to the floats!

Barry's other model was a Stinson SM 6000 for indoor use. In contrast to the Bellanca the structure was very much simplified to reduce weight to about 20g and this is reflected in its flight performance.

Doug Hunt brought along a couple of models. The first was a Keil Kraft Chipmunk rubber model which may be used in the mass launch event at the Old Warden Scale Day. With careful construction and a light coat of paint these little models can look very attractive and with a decent propeller their flight performance will surprise anyone who built one of these as a youngster. In fact, Doug seems to be working his way through the entire range anew! Interestingly, the Chipmunk finished up close to the minimum weight limit for the contest (see Feb *Aeromodeller*). I hope you are all beavering away on your models for this event in June. One slight problem which may hinder your choice of subject is that of availability; some of the Keil Kraft range have been repackaged, but those most often seen in the shops are the fighters from WW1 and WW2. The Veron Tru-Flite kits have been very rare finds, but I came across a small pile in a Nottingham model shop so perhaps they are being re-issued. If you really are stuck for that certain contest winner, Doug may be able to lend you a plan - contact him at 167, Morley Road, Ceddesdon Derby. An SAE will be appreciated.

Doug's other model was a replica of a very early Frog Hornet Moth. This rubber powered model is 11in span; it is the pointed-wing version, and is built entirely of very thin ply with large cutouts. I'm not exactly sure when this model appeared but the price tag of 3s 6d must have been a great deal of money for such a small and simple aeroplane in the 1930s...

For me the prize model there was a Peanut 1914 Bleriot Parasol by Paul Briggs. Paul's technique is to build a simplified version to check out the flying performance before doing the 'real' one. The first model has a duration of well over a minute so Paul could be onto a winner. Apart from the spoked wheels and fuselage bracing, the most impressive feature was the scale wing structure. These Bleriotics had very thin



Two views of Barry Hetherington's Bellanca Aircruiser floatplane; 22in span and Telco powered. Note the scale structure; model weighs approx 60 grams but flies well. Characterful aircraft must be an interesting sight when airborne.

wings with multiple spars and this had been reproduced by glueing individual pieces of 'spar' between each rib. I can't help feeling such a model is wasted on the Peanut class.

Paul has also started a large version which could be used for the Open Indoor class, or outdoors on a calm day. The shaped forward panels have been very nicely vacuum-formed, and the undercarriage is fully sprung in the correct manner.

On a slightly more mundane level Mike introduced me to a material called Purlboard. This is available in 8x4ft sheets from builders' merchants, and consists of 1in thickness of dense foam faced with stout card on each side. Since pins are easily pushed into it, it makes ideal building boards for smallish models. By cutting it and the model plan into small pieces, construction can be carried on quickly without waiting for a component to dry before it can be removed.

Lympne Trials event

I have just received some information about this contest, which is to be run by Butch Hadland and sponsored by SAMS. It is open to models featured in the Aeroplane Monthly series on British Ultralights. Scale should be between 1/24 and 1/12, and the craft may be powered by either rubber or CO₂. The 3-views and photos in that magazine are all that is required for documentation. The date for the event is 28th September at Watford Leisure Centre, beginning at 10am. It is anticipated that this could become an annual event; and there will be a Trophy and substantial prizes.

The rules being used are similar to those for Peanut, namely a simple 'yes/no' static section, and a flying section that scores duration only, although here it is the best two from nine flights that count. Again, as in Peanut, the entrant's position on each

section is aggregated and the lowest total wins. There is also a third 'precision' element which involves a timed lap around two tethered balloons spaced twenty feet apart!

All in all, it should be quite a fun event. If you want more detail at this stage I suggest you write to Butch at 26 Tithe Barn Drive, Windsor Road, Bray, Berks SL6 2DG. Most of the aircraft eligible are fairly obscure so the full list is reproduced here with the relevant issue noted. (Photocopies available for an SAE from *Aeromodeller*. . . Ed). If you want a quick model, a full size plan of a 1/12th Parnell Pixie for CO₂ was published in the January '82 *Aeromodeller*.

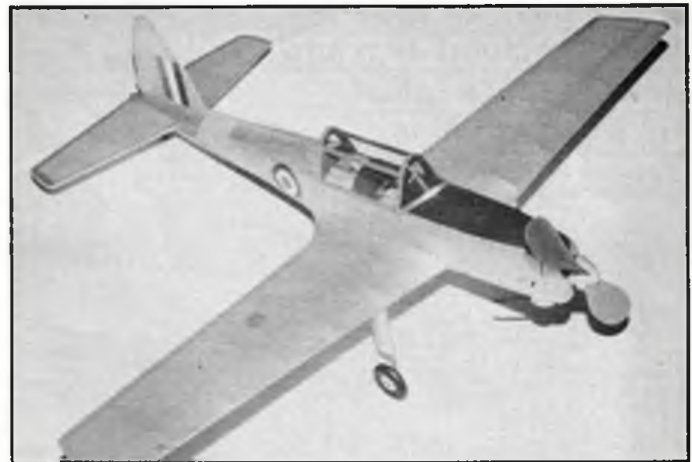
The author confesses...

I must admit that I have done little building of scale models this winter as I have been busy constructing some duration models. In fact I've become hooked on Open Rubber. If any of you scale modellers feel you need a change to recharge your batteries I can heartily recommend a go at duration modelling. Firstly, I found it challenging to take up a new branch of the hobby as a beginner; and secondly, they're a great bunch of people, always ready to help.

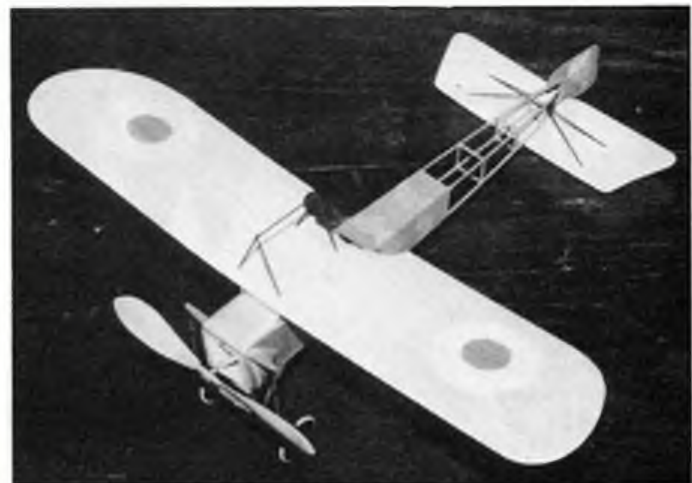
However, don't fall for the idea that operating a F/F duration model is a simple chuck it and run affair. First, there is all the paraphernalia involved in getting the model into the air - winding tubes, stooges, portable meteorological stations etc. Then you have to chase after it - bicycles, binoculars, walkie-talkies, compasses. Finally, having found the model you have to get it out of the tree and get back alive - poles, bow and arrows, climbing irons, chainsaw, flares, emergency rations and salt tablets. Some of these peoples' model boxes are better-made than my scale models, and I seem to have spent more time assembling some of this gear than actually building. However, the best part is that after all this effort my enthusiasm has again returned for that most absurd branch of our hobby in this climate - F/F Scale!

British Ultralight References

Aircraft	Aeroplane Monthly
ANEC I	Sep 84
ANEC II	Jun 85
Clipped Wing ANEC IA	Sep 84
ANEC Misse! Thrush	Jan 79
Austin Whippet	—
Avro Avian	—
Avro 558	Jul 84
Avro 560	Aug 84
Avro 562 Avis	Aug 85
Beardmore Wee-Bee	May 85
Blackburn Bluebird	—
Bristol Brownie	Jul 85
Cranwell CLA-2	Aug 80
Cranwell CLA-3	Aug 80
Cranwell CLA-4	Dec 78
DH Genet Moth	—
DH 53 Humming Bird	Apr 85
English Electric Wren	Oct 84
Gloucester Gannet	Nov 84
Gnosspelius Gull	Mar 79
Hawker Cygnet	Oct 85
Pander (Holland)	—
Parnell Pixie II and IIA	Oct 80
Parnell Pixie II	Oct 80
Peyret (France)	—
Poncelet (Belgium)	—
RAE Hurricane	Dec 84
Sayers Handley Page	Mar 85
Short Satellite	Nov 85
Supermarine Sparrow	Sep 85
Vickers Vigeat	Feb 85
Vickers Vagabond	Dec 85
Westland Widgeon I	Feb 86
Westland Woodpigeon	Apr 86



Doug Hunt's Keil Kraft Flying Scale Chipmunk. Standard K.K. propeller has been replaced by a more efficient type - an essential modification!



An absolute gem - Paul Briggs' 1914 Bleriot Parasol Peanout is the product of much painstaking effort. Bleriot's in warpaint are seldom modelled...



The fully sprung undercarriage and vacuum-formed panelling of Paul's as yet unfinished 'large' Bleriot. Attention to detail is remarkable.



Indoor rubber Stinson SM6000 by Barry Hetherington - a light and able flier thanks to its simplified structure.

**Fancy a control liner
with a dash of the past
about it? Build Jym and
Dave Leddy's latest
for 1.5cc engines**



Vintage? No-it's NOTWUN!

GUILDFORD MODEL FLYING GROUP is probably like many other aeromodelling clubs in the country in that a high proportion of its members are devotees of radio control. Control line modelling had all but died out in our group; but recently there has been a small but significant revival. The Group has been lucky to have had an influx of younger members, although none as yet with any C/L leanings.

It was one Sunday morning that we took our latest vintage control line model to the field. With pride we placed the model (a Barnstormer by Ted Buxton, dating from 1948) amongst the predominantly plastic-and-foam R/C jobs. 'Doesn't that look old fashioned, mister', was the remark we most remember. The conversation down at the local hostelry that night centred on talk of vintage looks and it was from the doodles that Notwun emerged.

Wing

The shaped trailing edge, cut from 3/16in sheet, and the 1/8in hard balsa spar are

pinned down onto the plan. Onto these are glued the 1/8in ribs with rib R1 tilted very slightly inwards. Add the 3/16 x 3/16in balsa leading edge and when dry glue on the 1/4in balsa tip and the 1/8in gussets. Remove this wing panel from the plan and pin the trailing edge and main spar for the second half on the plan. The first wing half can now be butt-joined to these but remember to pack the tip by one inch. The second half can now be completed with the ribs, leading edge, tips and gussets. When the assembly is completely dry remove from the plan and sand to shape. The 1.32in centre section covering can now be added.

Fuselage

The fuselage is built on a 3/16in hard balsa crutch. Make this on the plan and allow to dry thoroughly. Remove from the plan and add all the formers except F4 Upper, taking care to ensure they are square. We found this easier to do if the crutch was placed on two wooden blocks at the appropriate height above the building

board. This depends on whether or not an undercarriage is attached to former F3. Add the 1/8 x 1/8in balsa longerons.

Securely glue in the bellcrank mounting and the 3/8 x 3/8in bearers. The bottom of the fuselage can now be planked with 1/16 x 1/4in strips and the soft block added between F1 and F2. It may be easier to drill the engine mounting holes before the block is finally glued in place.

Tail unit and final assembly

The tailplane, fin and rudder are all cut from 1/8in balsa sheet and glued to the top of the fuselage crutch.

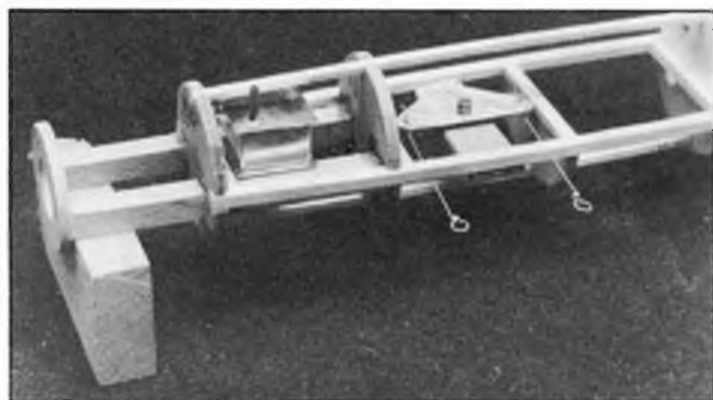
Now add the bellcrank, push rod, lead outs and elevator horn and ensure that all is working smoothly. After the fuel tank has been positioned glue the wing into place (taking care here) followed by former F4 Upper. The upper 1/16 x 1/4in balsa strips should now be added to the top, and soft balsa block glued to the tail area.

Finishing

After careful shaping and overall sanding the model may be finished as required. The prototype was finished with heavyweight tissue on the wings and lightweight tissue on all the sheet surfaces. The wings were clear doped and the whole model was given several coats of sanding sealer before being completed with enamel paints and fuel proofer. A commercial canopy adds the final touch.

Flying

Balance on the front leadout and fly on 30-35ft lines. The prototype has been flown by several different pilots from beginners to experts, including one R/C enthusiast who had never flown control line before. He enjoyed himself! We hope you do, too...



Above: Vintage or not, the sleek lines of Notwun are timeless. Left: The bare essentials. Horizontal crutch ensures accuracy - try your planing skills!

POMILLO



Got a spare small diesel, glow or CO₂ motor? Then try this little charmer by Vic Smeed, designed originally for the Allbon Bambi.

Above: Yes, that's a prototype Bambi ready to provide the urge. CO₂ conversion shown on plan. Below: Just right for small field fun, Pomilio has simple but attractive lines. Designer Vic Smeed examines his handiwork; model dates from 1954.

THIS LITTLE MODEL was possibly the first free flight design for the Bambi engine, and in fact the original model in the photos is fitted with a prototype Bambi - note the knurled screw compression adjustment, modified for production engines. The reason for the model never having been published was that the late Eddie Keil was considering kitting it, but the initial interest in tiny engines (there were also the Kemp 0.2cc Hawk and the .32cc Kalper) did not develop into a mass market at that time and very few kits were ever produced for the weenies, though of course the Kalper had enough power to fly most of the .5 - .75cc kits.

Experience has shown that designs (several were published in plan form) for the Bambi are ideal for conversion to modern CO₂ power and there are examples of tiny diesels resurfacing after languishing in drawers for twenty years or more. There are also many Cox .010 engines around, plus the .020, which latter should give this model quite hot performance! A suggested nose for CO₂ radial mount engines has been added to the drawings.

Balsa knife ready...

Construction is simple, even if the fuselage is a little different from usual. Its ancestry goes back to machines like the Banshee and perhaps more directly to Ray Acord's Champion, which used sheet cruciform crutches covered with nylon or silk simply draped on and attached to the crutch edges, producing a very light but remarkably strong and stiff structure. This model takes the method a little further by using thin sheet covering in the 'handling' area and tissue for the remainder, enabling a notional cabin to be incorporated if required. The result is a slightly "different" looking model which most people seem to find quite pleasing.

One of the crutches has to be in two parts; it doesn't really matter which one, though if it is the vertical one it may lead to economy in cutting and it means that the upper part of the fuselage may be constructed with the horizontal crutch pinned to the sections of former. However, cutting the full profile and attaching the horizontal crutch one side at a

time is just as easy. It is, in fact, fairly difficult to get the structure far out of alignment, provided the parts are accurately cut and their positions marked.

Positioning the front bulkhead for radial mount of CO₂ motors needs to be fairly accurate to ensure that the thrust line is close to that intended, and this is a matter of accurate cutting of the crutch ends. If CO₂ power is intended, incidentally, the grade of balsa selected throughout can be softer and therefore lighter than should be used with glow or diesel engines.

The 1/32in sheet fuselage covering can be applied (grain vertical) though the bottom of the cabin front may be easier and stronger in card. Sand all over and check that everything has been completed ready for covering; this applies especially to the short lengths of 1/8in sq under the tailplane leading edge which are easy to overlook and thus leave a weak spot.

Select your tissue...

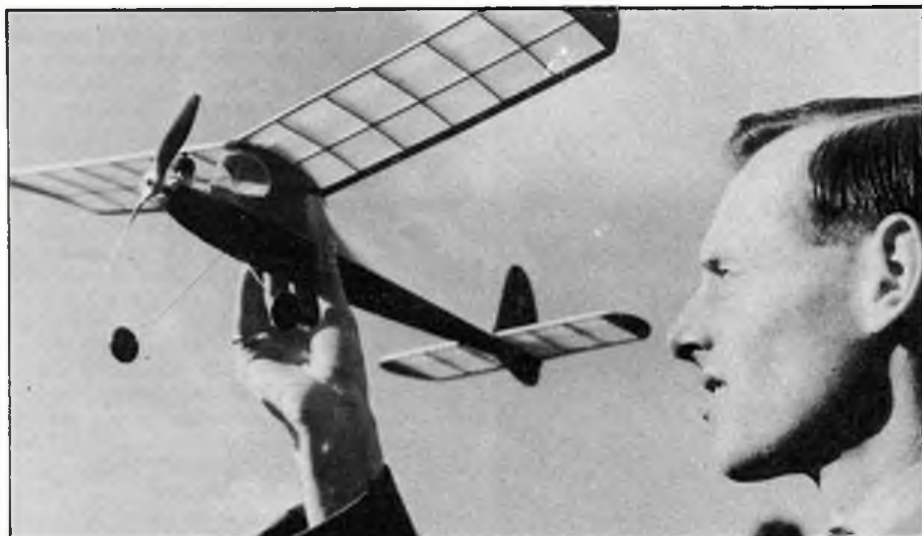
Lightweight Modelspan is adequate for the fuselage but heavyweight can be used. It can be attached dry or wet, but in the former case water shrinking will be required. Four

panels will be enough; stick the upper ones to the tail end first and work forward, trying to keep any looseness running down from the after end of the wing platform to a minimum. It's actually surprising how much will shrink out with water and dope, but the pieces of tissue are in any event so small that a second attempt would hardly break the bank. If the edges are stuck down evenly a smooth and pleasant shape will result.

The wing and tail can also be covered with lightweight Modelspan or, for a CO₂ version, Jap or similar tissue. Both structures are fairly sturdy and warps should not be a problem.

Ready to go...

There is little to say further, except after doping, fuel-proofing etc assemble the model and check that it balances on the line of the centre (top) spar before trying hand-glides. Depending on the amount of power, slight down and/or right thrust may be needed; the safest pattern is wide left power turns and wide right glide turns, but you can experiment. Little models like this tend to bounce!



F1B Wakefield Technicalities

The up-to-date stories behind the models that most impressed Martyn Cowley at the 1985 World Championships.

Reiner Hofsass' Espada

The scientific development of the Espada design has followed the evolutionary quest for a highly efficient Wakefield. Reiner's design can be traced back to 1965 when he first built a high aspect ratio solid balsa wing A1 glider. His model was inspired by the work then being done by Schmidt, Puttner and Laszlo with their now famous SPL A2 glider of similar proportions and construction. In 1966 he built his first Wakefield in this style and immediately found dramatic improvement in climb speed and glide performance. Experiments in a water tunnel using potassium permanganate dye to evaluate performance of airfoils down to Reynolds numbers of 20,000 helped validate improvements from 3D triangular turbulators (cut into the airfoil, not added on externally).

An excellent new book entitled 'Profil-polaren Fur den Modellflug, Band 2' has just been published; authored by Proff. Dieter Althaus of the Institut fur Aerodynamik, Universitat Stuttgart, the book, which sells for about \$25 (£16) includes complete wind tunnel test results of Reiner Hofsass' Espada section with and without 3D turbulators, plus other test data on Bob White's F1B section, Koster's 66 section, and the Benedek B 7406f and B 6456f. For the serious Wakefield flyer this research is an invaluable reference.

Until the '85 Champs at Livno, Reiner's Espada was certainly better known as the design flown by fellow West German Lothar Doring to his remarkable double Championships wins in 1981 and 1983. Now Reiner and Lothar have added a further remarkable double by placing 1st and 2nd with their Espadas in '85! Lothar's Espada was first published in the February 1981 *Aeromodeller* (p.89) with further details appearing in March '82 (p.129). The two

Right: World Champion in F1B after more than eleven hours of competition, culminating in an 8-minute fly-off; Germany's Reiner Hofsass is justifiably delighted. Below: Reiner's portable chart recorder plots temperature and windspeed from sensors at the pole and the twin unit, which radios back information from 50 yards upwind.



models flown at Livno by Reiner are essentially identical, with only minor differences in panel lengths and airfoils compared to Lothar's models. The only significant changes are a flat bottom tail aerofoil and an unusual triangular fin aerofoil. Reiner uses a slim triangular section fin with a sudden oblique rudder angle at the TE. The whole fin is offset to give right turn, but if the model speeds up in lift the angled TE works like opposite left rudder, keeping the turn from tightening.

Reiner flew his model A, which uses a higher cambered aerofoil and glides more slowly, throughout the event until it was lost in round 10. For the last two flights he used his model B; this has a less cambered aerofoil which Reiner says is more sensitive to trim adjustments. The propeller diameter is 640mm (25.2in) on model A and 600mm (23.6in) on model B, both having a helical pitch of 750mm (29.5in). Reiner favours a thin flat-bottom propeller aerofoil as being less critical to flight trim when motors of varying power are used, yet still producing thrust at very low power near the end of the run. Rubber used was 14 strands of 6mm (1/4in) 1982 Pirelli in the morning and for fly-offs, giving a typical prop run of about 38 seconds, and 24 strands of 3mm (1/8in) FAI supplies at midday during the heat.

Anyone attending the event at Livno could not have failed to notice the winning

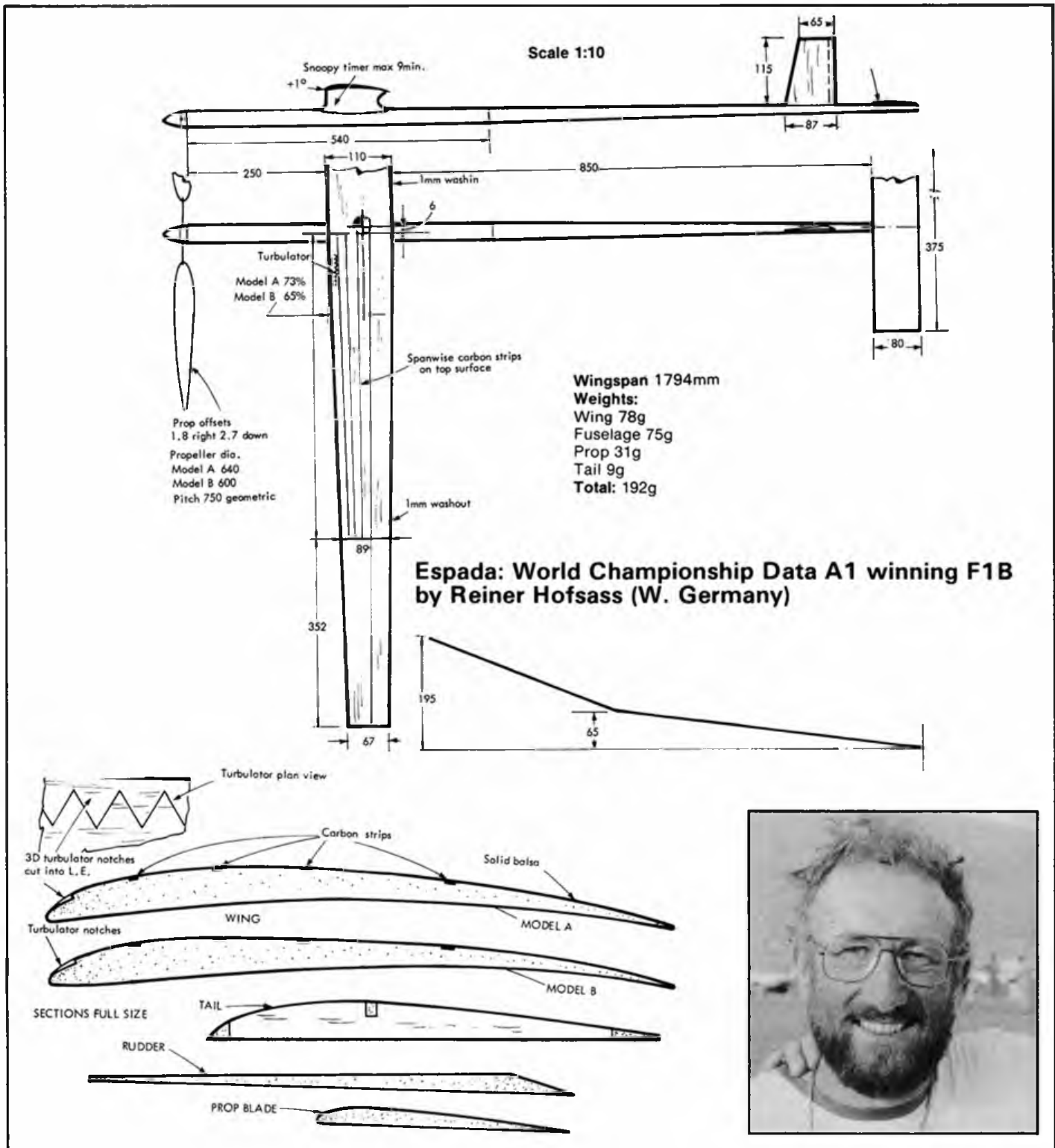
pair practising continuously throughout the preceding week. Every ten or fifteen minutes both would launch together in air predicted by their twin thermal detectors. Inevitably the Espadas would circle lazily overhead in huge thermals followed below by Reiner and Lothar vigorously discussing technique and thermal conditions, and chuckling excitedly at the performance of their models above. They must have put up literally a hundred maxes before the event - and they were definitely having lots of fun.

The last word on this incredible performance must go to Reiner who modestly said of the ultimate nine-minute fly-off, 'but Lothar's last flight showed more than mine the performance of the Espada, because he flew in the same air as the other two competitors from the Far East, and his model out-performed them both!'

Thermal detectors

The winning story, however, does not rely solely on model development. Lothar Doring's flying tactics, and indeed his previous two Championship victories, have relied heavily on his consistent ability to pick lift using electronic thermal detecting equipment. The technique uses the results of a thermister to record rising temperature and an anemometer to record dropping wind speed as an indication of thermal activity. Lothar's system uses a second 'twin' unit





some 50 yards upwind to establish the size and movement of the thermal.

This year Lothar used a radio signal to transmit information back from the upwind unit, thereby discarding the cumbersome long wire connection. In addition, Lothar's paper trace printer at his pole position also picked up additional information from Reiner's unit, giving a wider picture of how the thermal was developing.

It would be an injustice to both these top flyers to suggest such a system was infallible. The experience and skill it takes to interpret such readings and pick that exact moment to launch is the essence of all competitive Free Flight. However, if you are a serious Wakefield flyer the writing is on

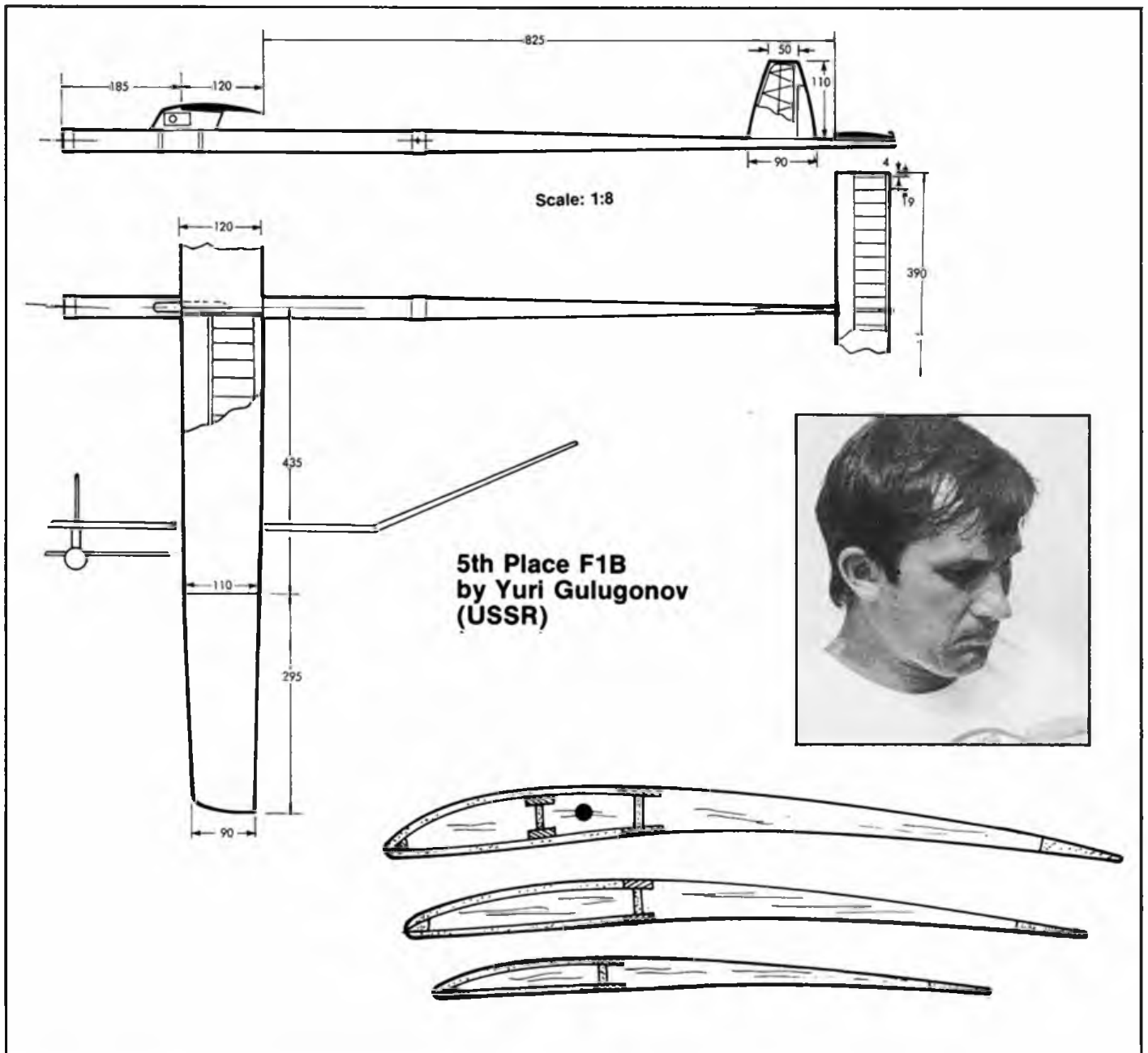
the wall!! Every World Championship since 1979 has used this twin upwind system and the previous two events in '77 and '75 were won by the North Korean who also depended heavily on thermal information relayed from upwind. If you seriously want to win the Wakefield trophy, I can think of no better advice than to invest in similar equipment and start practicing as soon as possible.

Andryukov's Vari-pitch DPR

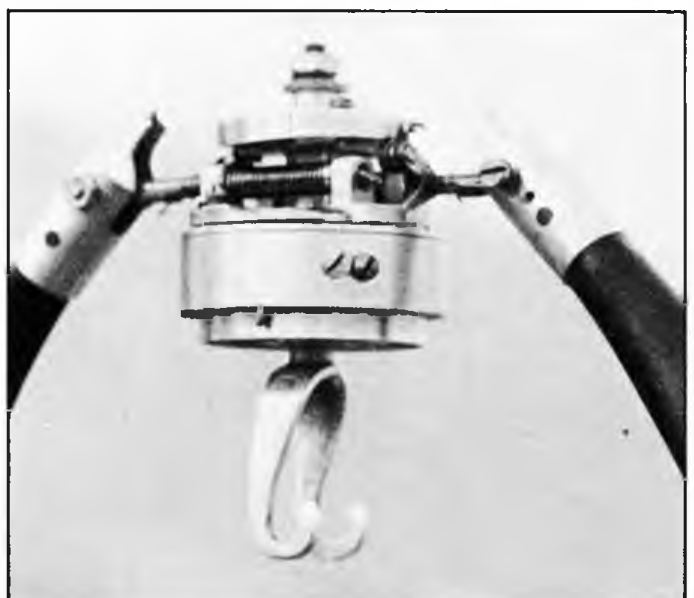
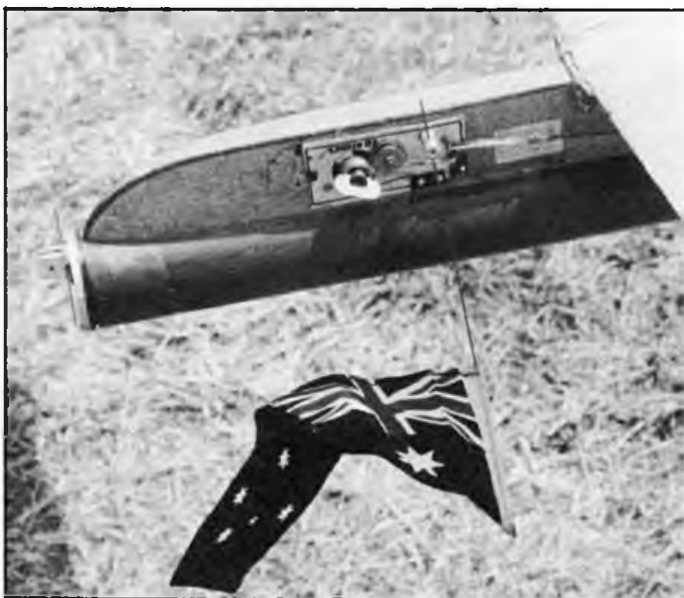
Double European F1B Champion, in 1982 and 1984, Aleksander Andryukov is the genius behind Russia's new young Wakefield Team. Aleksander in particular has taken a fresh new look at the Wakefield

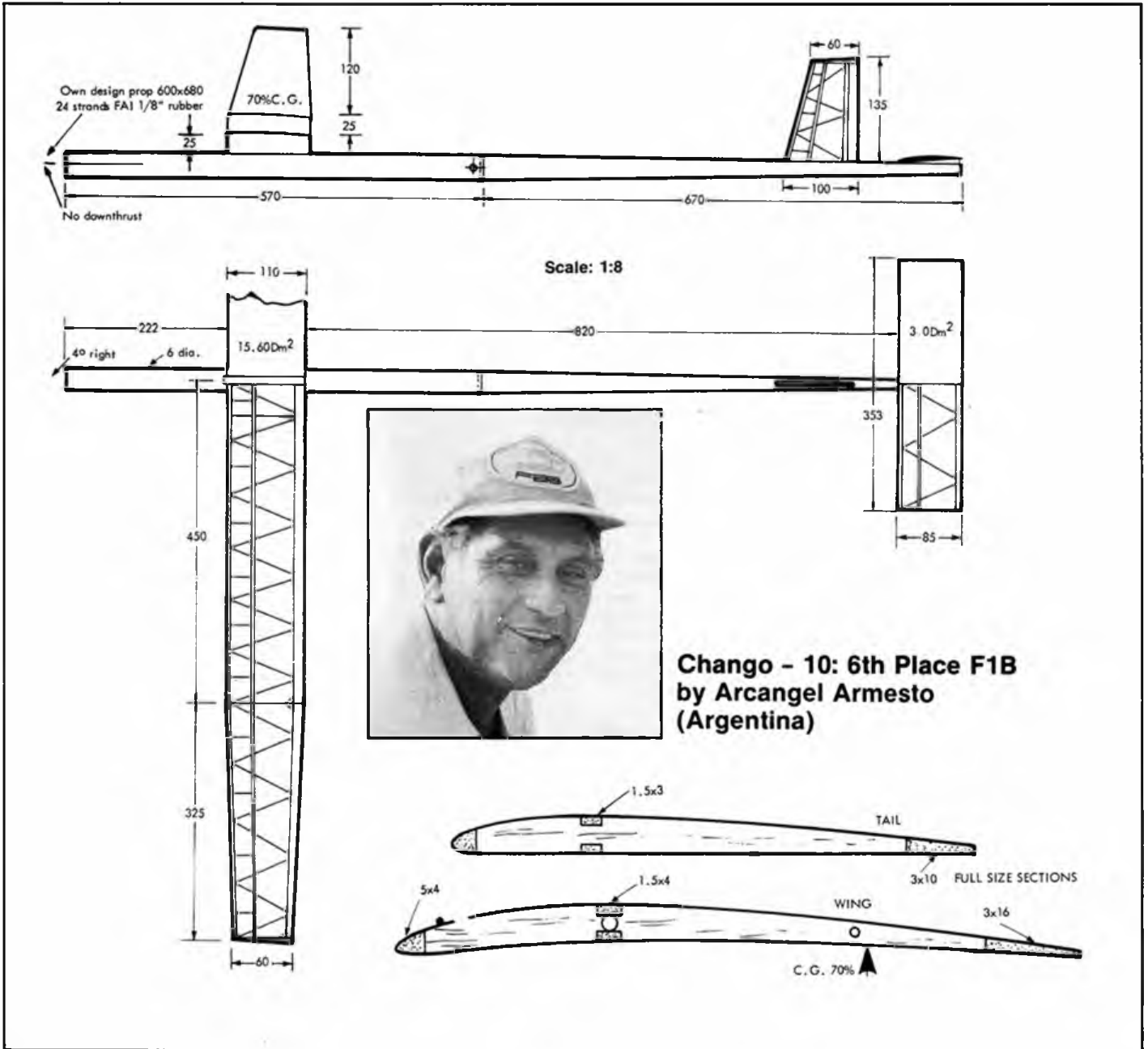
class, with the intent of maximising energy stored in the rubber by using a delayed propeller release (DPR) combined with an energetic javelin-type launch to achieve the highest possible climb altitude. His ingenious DPR mechanism first appeared at a Championships in Spain in '81. This original mechanism, which incorporated prop blades held open but feathered flat in pitch during launch, was described first in the March 1982 *Aeromodeller* (pages 129-132).

Now Aleksander has refined the engineering to incorporate variable propeller pitch, operated by a cam driven by rubber torque, which allows the propeller load to be varied in harmony with the torque curve of the

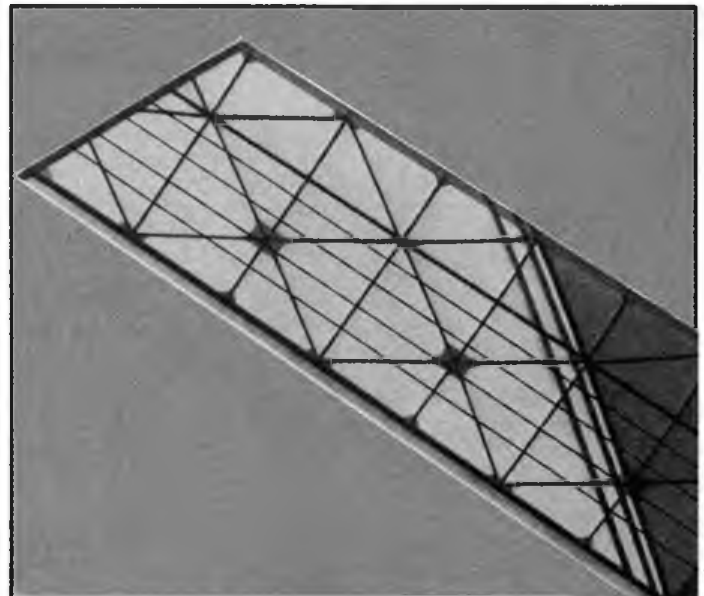
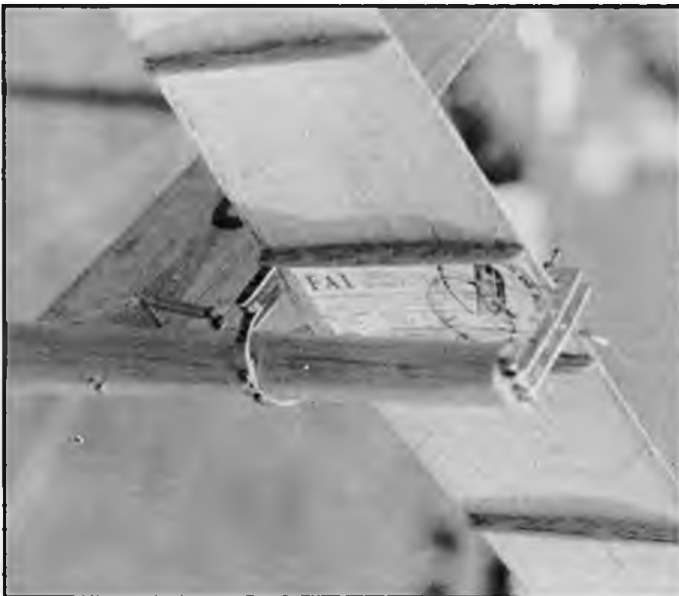


Left: Stylish forward pylon houses Seelig timer on Australian Alan Edwards' model. Flagged pin acts as reminder to start timer before launch. Right: Chinese prop hub on Wenyi Zhang's fourth place model had identical features to that used by the Russians. Climb rate was outstanding.





Left: Curved plate sheet balsa tailplane with lightweight aluminium fittings on Dieter Siebenmann's model. Right: Extensive geodetic structure, using carbon fibre roving to cap each rib, on Anselmo Zen's DPR model. Spanwise stripes at rear are invigorators, which are much favoured by the Dutch.



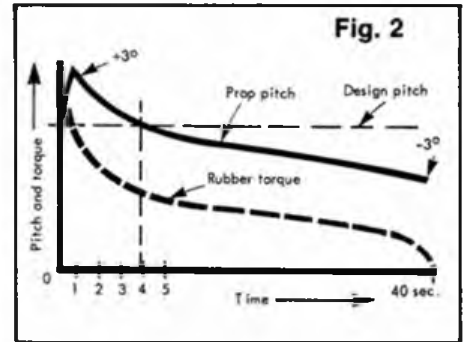
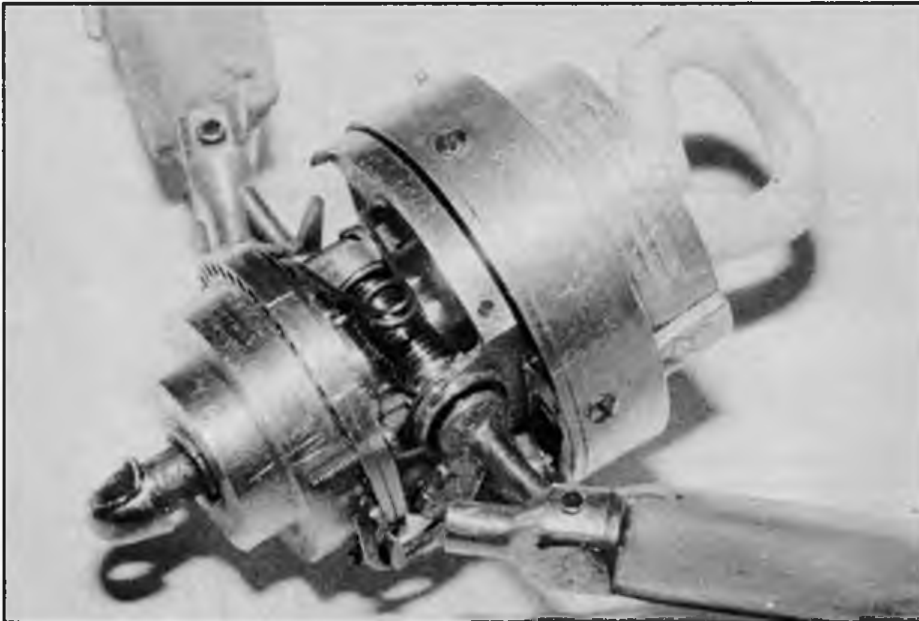
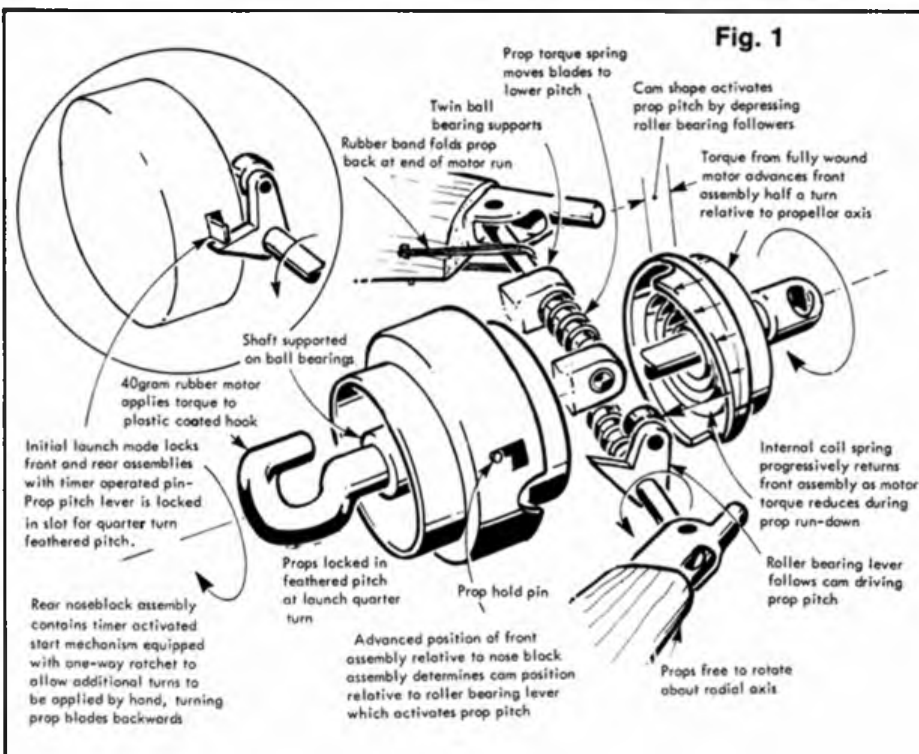


Fig. 2
Left: Engineering masterpiece from Russia's Aleksander Andryukov. Hub incorporated cam-operated variable propeller pitch with fully feathered delay prop release for javelin launch (assembly shown in exploded form below).



rubber during the motor run down. In essence, the initial fully-wound-motor torque advances the prop pitch cam. As rubber torque drops during the flight, an internal coil spring returns the cam, and the propeller pitch is controlled by a roller bearing lever following the cam. This now allows any propeller pitch to be selected at any time during the prop run, simply by appropriate choice of cam shape (Fig 1).

The models flown by Alek and his Russian team mates typically use a DPR of about 0.8 sec, enabling the model to be thrown near-vertically to a height of about 20ft before the propeller starts. Initially the pitch increases to +3° above design during the first half-second of prop run, then the pitch reduces to normal after almost 4 seconds; finally the pitch progressively reduces to -3° throughout the remaining prop run, which is 38-42 seconds total, as power diminishes. A clockwork timer starts as the model is released to trigger the DPR

and operate other model functions. The auto rudder moves right and tail incidence increases by 1° after about 4 seconds. The inboard wing incidence also changes, being +1/4° during climb and flat during glide (Fig 2).

At the 1985 Model Engineer Experts' Forum top British flyer Ron Pollard speculated that the Russian DPR system is a necessary means of releasing the prop blades in order to achieve the near-vertical climb patterns of today's fast-climbing low-drag Wakefield. It is in combination with these other model design and flight trim considerations that DPR mechanisms are most effective.

Aleksander's design certainly reflects the ultimate engineering example, incorporating ball bearings on all-moving shafts, although he concedes that a simpler plain bearing version would be an acceptable solution for others to try. His mechanism also includes a one way ratchet on the prop

stop, which allows additional hand turns to be added to the fully wound motor, to maintain the torque, while waiting for a thermal!

Alek's propeller blades weigh 14gms; diameter is 600mm (23.6in) with a pitch of 680mm (26.8in) at the root, 760mm (29.9in) at 80% radius and 630mm (24.8in) at the tip. The complete noseblock assembly weighs 52gms (1.8oz) although his latest for a new model weighs only 46gms (1.6oz).

Following his lead many other modellers were flying models equipped with various prop-holding or DPR mechanism. Hofsass' model released the blades at launch; Wenyi Zhang had the full DPR vari-pitch mechanism; Anzelmo Zero had DPR. In '85 probably one in five competitors had some form of prop-hold mechanism - by '87 I expect these numbers to have doubled.

Wenyi Zhang's cam-operated wing

The Chinese Wakefields have used a variety of cam-operated variable incidence mechanisms for several years now. As outright Team Champions in '83, together with many placings in the top ten, the Chinese can rightly be regarded as having the right approach to Wakefield design.

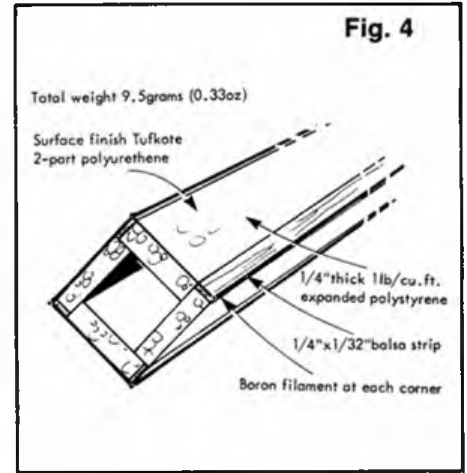
The distinctive models of Wenyi Zhang, which have vertical fins at the wing tips, virtually dominated all but the final round of the fly-offs. Wenyi uses a timer-operated cam to raise the wing trailing edge for the initial six seconds, corresponding to the peak torque of the rubber motor. The auto rudder is connected to the wing by a line, to give similar movement. The shape of the cam can be changed, and may be tailored to the power curve to control the climb immediately after launch (Fig 3).

It should be noted that the period of wing incidence control and other timer operated VIT systems occurring within the first few seconds, is markedly different from the Xenakis VIT system, which uses the torque actuation from the rear motor peg to change incidence during the longer mid torque run down. Certainly Wenyi Zhang's models were very impressive during climb.

Rubber AG-85

There could hardly be a more fundamental crisis facing Wakefield flyers today than the shortage of the motive force - rubber. For more than a decade the availability of Pirelli, universally acclaimed as being the best, has been uncertain. Now it seems it will never be manufactured again.

Despite the availability of a different type of rubber in the USA (sold by FAI Supplies, Ed Dolby, PO Box 3957, Torrance,



C.A.90510, USA and Champion Models, George Schroedter, 880 Carmen Ct, La Verne, VA 91750) some countries literally had no rubber for teams. Czechoslovakia, East Germany and Cuba did not enter F1B this year and even Russia and North Korea appeared to be using old, weak supplies, as witness Andryukov's tragic no-flight in the fly-offs. The Chinese do have their own supply, but according to sources in the West who have made tests, it falls well below Pirelli standards.

The only hope right now seems to lay in the hands of Giulio Gastaldo in Italy, who apparently has traced the original formula and manufacturing techniques used by Pirelli. He had already one batch prior to the Champs, designated AG-85. Holland's Anzelmo Zeri had tried some, and found it did not compare with the older Pirelli which he used in the event.

This new rubber has the characteristic ribbing of Pirelli but with an additional texture that may help trap lubricant. The exact manufacturing process of rubber strip involves many variables which contribute to its ability to store and return energy. Now Giulio is continuing his experiments; and the first good news is that his AG-85 batch of 1 x 3mm (1/8in flat) is improving in quality with age after 6 months storage. A new batch of rubber is planned for later this year,

with 1 x 6mm (1/4in flat) to be produced. Price will be about £20 per kilo, so watch for an announcement when this new rubber becomes available.

Wakefield structures

The ongoing search for higher performance using thinner wing sections, the higher climb rates from better propeller/rubber combinations and the recent introductions of very hard javelin launches, have all put tremendous demand on the construction of F1B wings. Thinner section and faster climbs often aggravate torsional instability, resulting in wing flutter; and a hard launch can simply break a weak wing a half.

Once again, modern composites are being used very effectively; but a Wakefield wing, being much smaller and thinner than, for example, a glider or power model, makes their construction more complex. The solid balsa winged Espadas use inset carbon caps 0.1 x 2.5mm (0.004 x 0.1ins) chordwise to maintain aerofoil profile and spanwise for improved stiffness in bending.

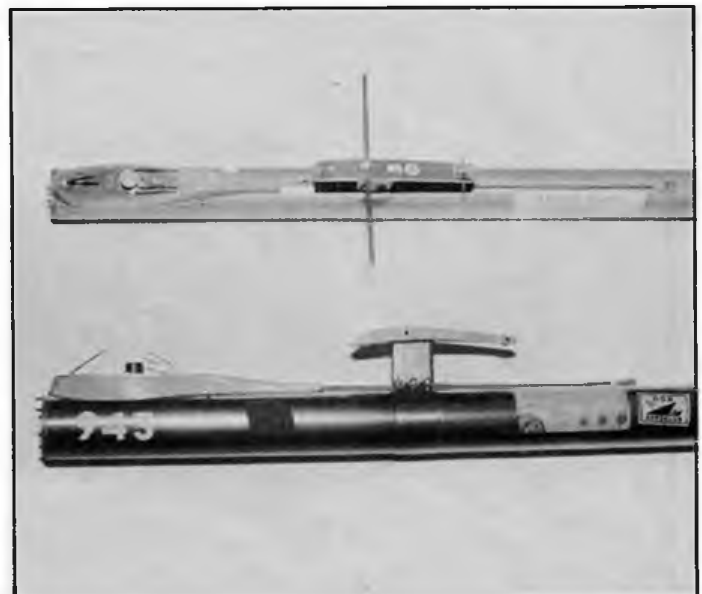
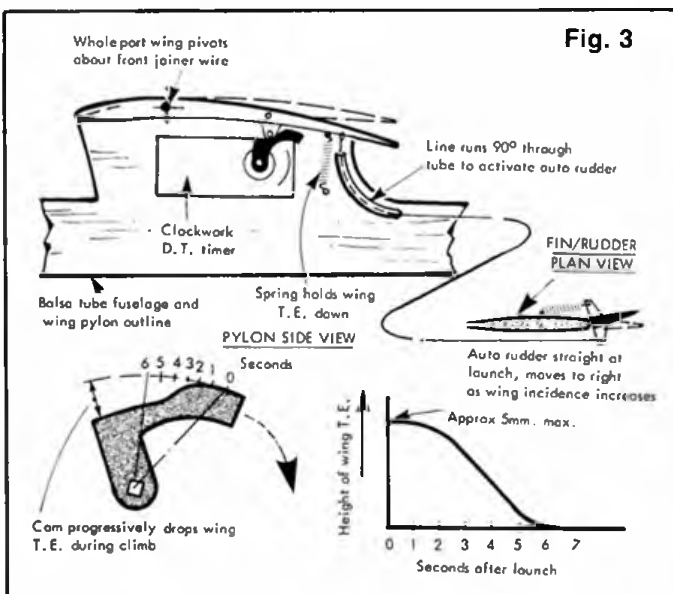
The Russian models also use carbon caps to reinforce wing spars, and they even have individual carbon caps on the top and bottom edge of every rib, wings typically weighing 48-50gms (1.75oz). They also lead the growing trend towards leading edge

sheeted D-box structures, as commonly used in F1A design. Eugeny Garban had taken this method one step further using balsa sheet skinned with .015mm (.0006in!) hard aluminium foil in the same manner as Russian F1C models. Gorbans' wing was incredibly rigid, practically unmovable if twisted by hand, and for a total weight of 44gms (1.55oz) was quite the finest example of craftsmanship at the Championships. His tailboom with fin weighs 13gms (.46oz) while the tailplane built with indoor quality balsa and Mylar covered tipped the scales at just 2gms (0.07oz)! A World Class model indeed, but not one to fly in a typical British Trials.

Others were tentatively experimenting with plastics. Britain's Ivan Taylor, out of luck at this event, uses 16Kg/m³ (1b/cu ft) expanded polystyrene foam for tailplanes. He also uses 6mm (1/4in) thick EPS foam sheet for a hollow box tail boom with 1.5 x 6mm (1/16 x 1/4in) balsa corner caps, for a total weight of only 9.5gms (Fig 4). His all-sheet wings have large-diameter holes filled with the same lightweight foam at the tips, again saving weight. Only Switzerland's Francois Tapernoux had gone all-plastic, using foam wings with .2mm (.008in) carbon spar caps covered with 36gm/m² (1.06oz/yd²) Kevlar cloth at 45° for a wing weight of 71gms.



Above left: Seelig timer activated prop start on Rob Peters' (New Zealand) model is typical of the growing trend towards prop hold or delay mechanisms. Below right: Exquisite craftsmanship of Eugeny Gorbans' models is apparent here. Note streamlined timer mounting and slim aerodynamic pylon on aluminium tube fuselages.



VINTAGE CORNER

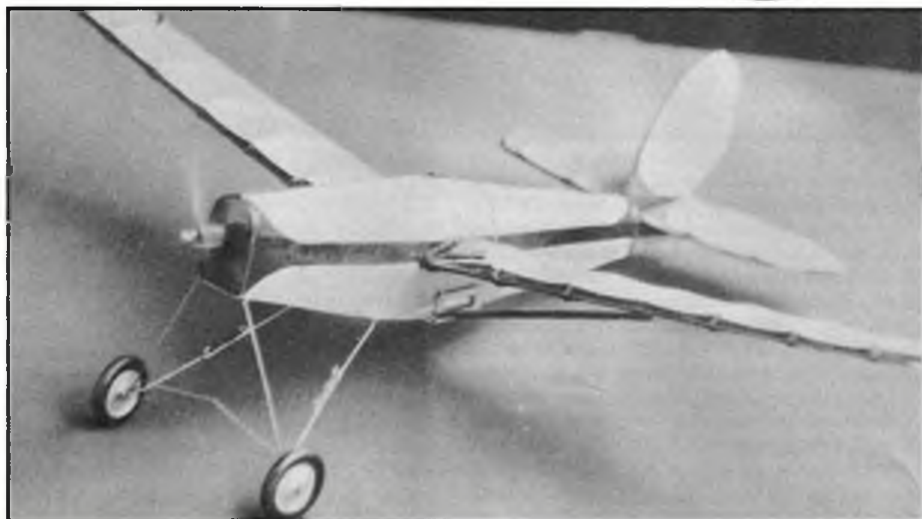


Alex Imrie tells the story of that aeromodelling institution known simply as The Model Shop



Behind the counter

Ask any vintage modeller worth his salt what "The Model Shop" means to him and almost certainly, if he is an old hand, he will answer "Keelbild kits" or "MS airwheels", since these are two areas of speciality in which this famous Newcastle-upon-Tyne model business excelled "way back then". But they produced so very much more: kits for all types of model aeroplanes, ready-to-fly examples for enthusiasts who found building difficult, ship kits and fittings, hand carved rubber and power propellers, and accessories of every sort including items for power modellers. They were not merely stockists of engines but made their own at one time. Not all of this is in the past tense, for the business is still going strong today, some 62 years after its founder entered the commercial world of model aviation.



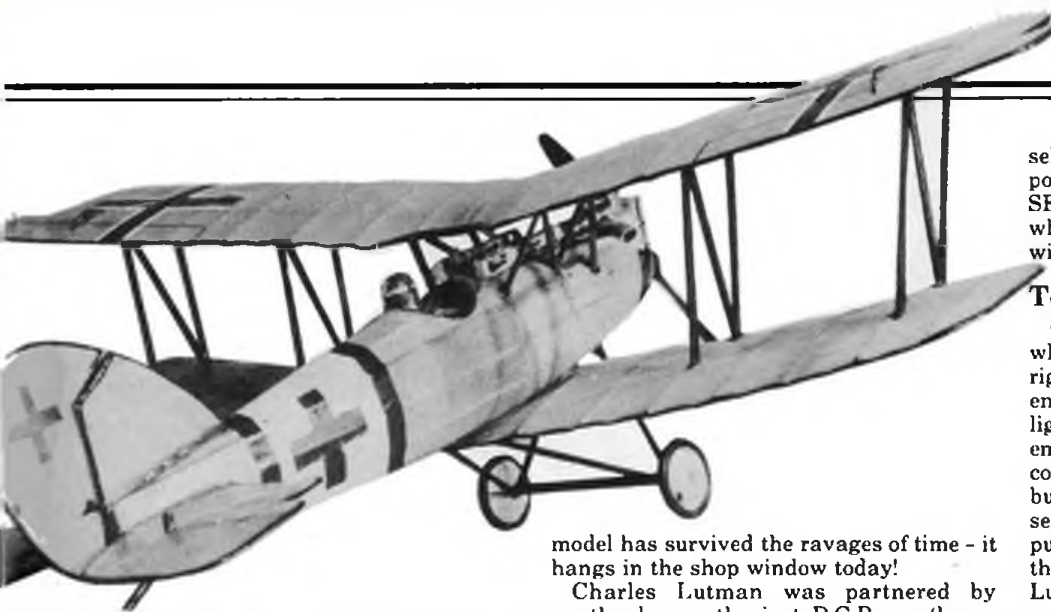
Early days

C W Lutman was an air-minded fitter working in the Ashington coal-mines. His thoughts, when he was hundreds of feet below the surface were often thousands of feet above ground level! He was a keen model builder, and when he found himself out of work in the mid-1920s undertook to build and sell model aeroplanes - a



Top: One of the early Hawk models from the early 1930s. This is the mid-wing Super-Hawk of 39 inch span. Completed model cost £2.50; the kit £1.00. Middle: the 24 inch Arrow Active, designed by D G Brown (the B in the LAB logo) was a nice representation of Alex Henshaw's machine. We are particularly keen to locate a plan - can any reader help? Bottom: A satisfied customer sent in this photo of his nicely-made Hercules Air Liner. This 48 inch model, also designed by David Brown, was available from 1934. The kit cost £1.25; the model ready-to-fly sold at four guineas (4.20).





selling at 1/6 each (7½p) were particularly popular and included such favourites as SE5, Sopwith Camel and Fokker Triplane, while a larger-sized series of up to 21 inches wingspan cost 5/6d (27½p) each.

Tommy Kennedy

One of the customers was R P Spencer who had worked on the design of the large rigid airship R 34 and was at this time engaged in designing his own two-seater light aeroplane. To assist him he had employed a keen aviation enthusiast on a contract basis to draw up the design and build a model of the prototype, and consequently sent him to The Model Shop to purchase materials. It was in this way that the young TR Kennedy first met Charles Lutman and became one of the part-time workers who churned out many MS items. Tommy Kennedy has vivid memories of making scale guns of the Vickers, Lewis and Spandau types and dummy pilots in 3/4 and 1/2 inch scales, often working through into the early hours of the morning to meet the deadline for delivery. These items were, of course, hand made, but it was really mass production since large numbers were involved. The 3/4 inch scale pilots carved in balsa, complete with helmet and goggles and suitably painted sold at 1/8d each (approx 8p).

When expansion meant that a workshop was obtained in Handysides Arcade in Percy Street, Charles Lutman, recognising the natural gifts of some of his "helpers" engaged, amongst others, Tommy himself and another two youngsters, Gordon Graham and Harry Clark, as full-time modellers. At first work consisted of cutting strip and sheet balsa from baulks of timber, making and tubing the cement for use with balsa by dissolving small scraps of celluloid in acetone, bottling dopes and thinners, and designing, drawing and building prototype models - in fact, everything connected with kit production. In the workshop employees did not at first specialise in any particular

model has survived the ravages of time - it hangs in the shop window today!

Charles Lutman was partnered by another keen enthusiast, D G Brown (hence the logo of L & B Models) and they were both responsible for the early designs using variations of the Hawk name, which were mostly of hardwood construction, but they were soon to concentrate on the new fangled balsa wood, a material that many experts "down South" proclaimed was completely unsuitable for the British climate! Using this material lightweight Fairy Hawks appeared in both cabin and duration versions of 36 inches wingspan; and a larger high-wing cabin model of 48 inches span designed by D G Brown and named the "Hercules" Air Liner not only won the Premier Award at the 1934 Newcastle MAC Exhibition but on its first outing turned in a fine flight of 2 minutes 30 seconds, so there was no doubt about the suitability of balsa for flying models.

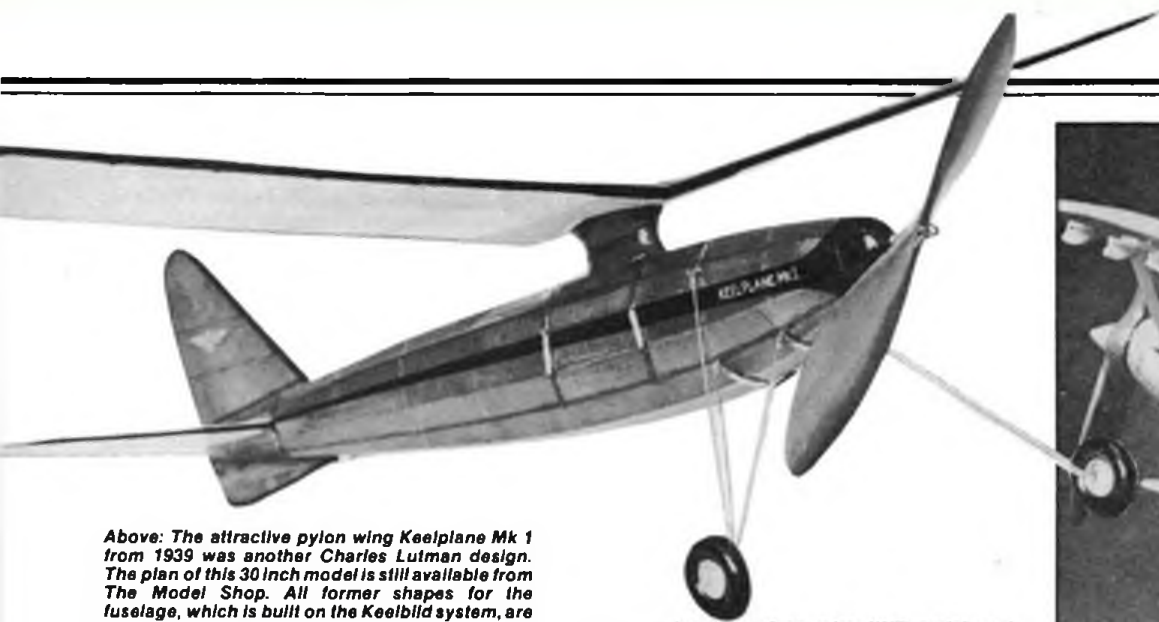
Early in its existence The Model Shop was fortunate to obtain the sole UK agency for a large range of kits manufactured in Canada by Wilder Radio Ltd of Montreal. Known by the name of "Homebuild", these were of balsa and tissue construction and were probably the first really cheap flying scale kits to appear on the British market. The smaller models of 12 to 15 inches span

somewhat difficult job in the depressed and unemployed North-East at that time.

Information is lacking on how successful this enterprise actually was, but it was obviously promising enough for him to rent premises in Newcastle-upon-Tyne in the early 1930s when a shop catering for the model maker was opened at 2 College Road. Many of the items sold initially were made at home by part-time workers, and even the boss and his wife spent their evenings making components for the 36 inch wingspan "Silver Hawk", a single-surfaced low-wing monoplane with birch and plywood fuselage, birch wings and piano wire tail unit, the whole covered in silk; oiled variety on the wings and tail unit and silver-doped natural silk on the fuselage. This model was sold ready-to-fly at a time when almost all other machines of this class were of the stick type. The Silver Hawk was also sold as a construction set and could have either a single rubber motor or could be fitted with gears. The model weighed 5½ ounces and was capable of flights of around 60 seconds, no mean performance; but its greatest attribute was its strength. One such

Top of page: Also sought are plans for Charles Lutman's Pfalz D.XII. The kit for this 22 inch span model, which weighed only 2¼ ounces, appeared early in 1935. It had a good flying performance but was said to be slightly more difficult to build than the Arrow Active and Hawker Fury produced a few months earlier. Below left: This mid-1930s photo taken in the workshop at Handysides Arcade shows Charles Lutman with a Boeing P-12 and Harry Clark on the lathe that was used for turning balsa cowlings and hardwood wheels. Note the Hawker Fury and Miles Hawk Major suitably arranged in the foreground. Below right: Founder of The Model Shop, C W Lutman, with his 21 inch span prototype model of the Flying Flea, which when it appeared in 1935 was the first commercial model of this quirky machine.





Above: The attractive pylon wing Keelplane Mk 1 from 1939 was another Charles Lutman design. The plan of this 30 inch model is still available from The Model Shop. All former shapes for the fuselage, which is built on the Keelbild system, are shown on the plan. Right: This beautiful 27 inch wingspan Hawker Demon is the prototype pioneer TR Kennedy, complete with Lewis gun, Holt wing



tip flare brackets, fuse wire W/T aerial and displaying the blue and red marking of No 23 (Fighter) Squadron. The plan for this fine model is still available.

job but were continually changing around; thus all became versed in the different tasks. However, Harry Clark did specialise later when he became the airwheel expert.

Keelbild

Once installed in the workshop with materials to hand a programme of balsa kit manufacture was commenced and this saw the appearance of flying scale models of the Hawker Super Fury, Arrow Active, Pfalz DXII and the Lockheed Vega in wingspans varying from 22 to 36 inches. They were all built on what became known as the "Keelbild" system, which was really a modification of the method used by Cleveland Model Supplies, an American manufacturer whose products were reaching this country in increasing numbers. Cleveland models with circular or oval cross-section fuselages were built by pinning down the central stringer to the plan and gluing half-formers and stringers in position before removing the assembly to glue the other half-formers and stringers in place to complete the fuselage. Tommy Kennedy noted that this method did not

always give a distortion-free structure and he began to use a deep bottom keel cut from 1/8th sheet balsa to which full formers were slotted and glued, the keel thus becoming a jig that formed an enormously strong fore and aft girder throughout the length of the fuselage. Further, an early catalogue says "...because in each case, the nose is filled in with 1/8th balsa, to which the wings, cabane struts and undercarriage are attached, they are strong and sturdy and unlike most scale models will stand any amount of hard usage."

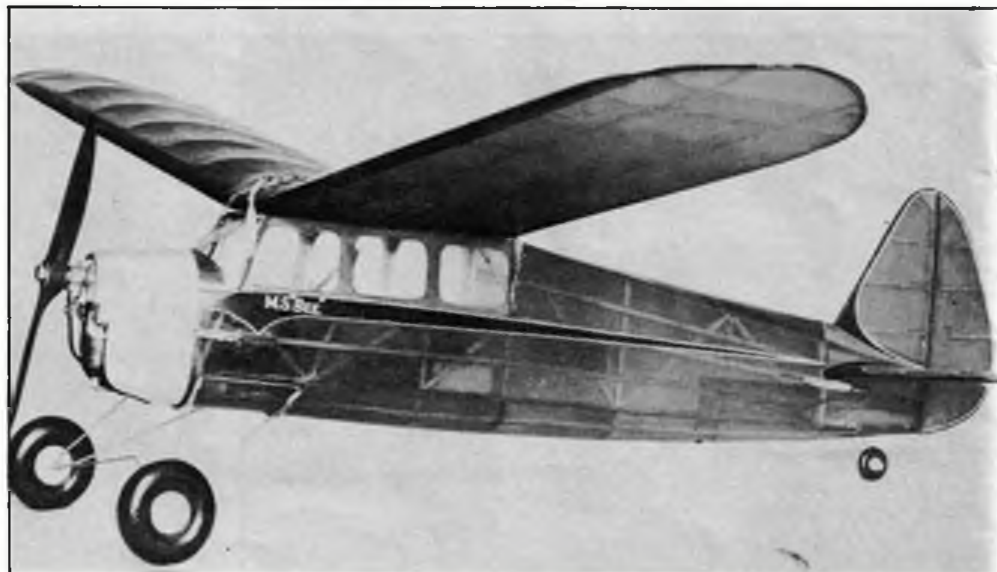
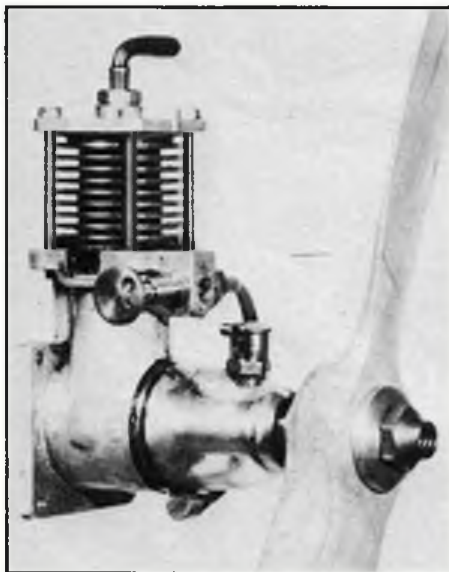
As we all know these features were universally adopted and are commonly used today, but when initially employed in the early 1930s they were a revelation that made Keelbild models "different" from the generally flimsy structures usually associated with flying scale models.

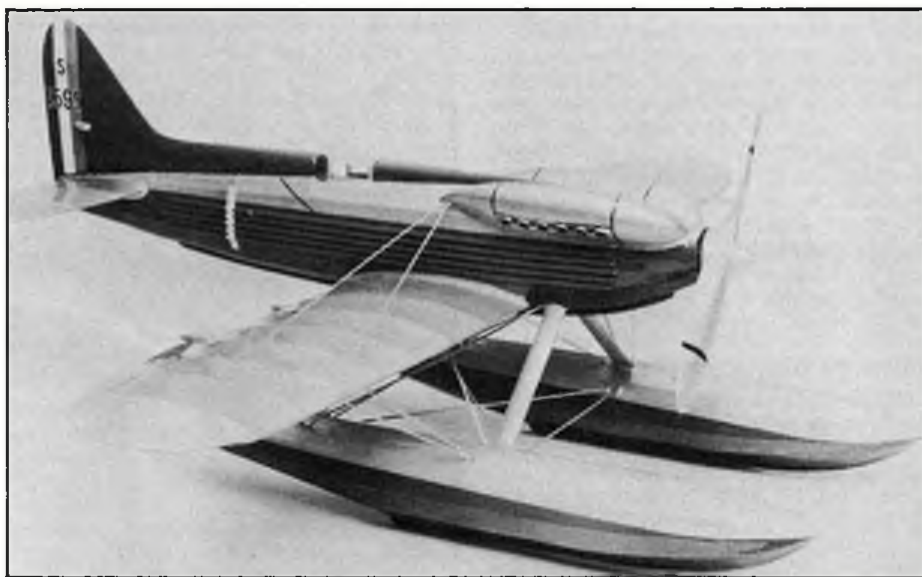
Model Shop kits soon earned a sound reputation and were distributed via such well known houses as Kanga Aero Models, Hamleys and Model Aircraft Stores, as well as being sold abroad. Other types followed in rapid succession and smaller and cheaper kits were produced on the same principles,

including the Comper Swift, Hawker Super Fury, Gladiator, and Supermarine S6B, whose wingspans ranged from 15½ to 18 inches. Later an even cheaper range at 3/- each (15p) appeared. This included the Hurricane, Spitfire, Magister and, of course, the Hawker Fury, a firm Kennedy favourite that The Model Shop made in all sizes! However, Tommy's *piece de resistance* was without doubt the 27 inch wingspan Hawker Demon. This had involved much research since accurate details were not easily obtained, and the design was started by using the basic drawings for the Hawker Hart from James Hay Stevens' book *Scale Model Aircraft*, added to which was information gleaned from photographs in the aeronautical magazines.

Initially sold in plain red boxes, the deluxe kits contained all necessary materials including a hand-carved flying propeller, dopes and even a dope brush! Because of the dopes, kits had to be sent by rail, a process which proved inconvenient for many customers, so dopes were later excluded in order that the normal postal service could be used. Also by this time attractive colour

Left: Amongst the rash of diesel engines to appear in the late 1940s was the MS 1.24cc engine. Not widely distributed, it has become a collector's item today. Note the "supercharged" manner of mounting the intake to take advantage of ram effect from the slipstream! Right: The original MS Bee is shown here, equipped with a Synchro Bee petrol engine of 2cc capacity. This 47 inch span model (plans still available) designed by C W Lutman resembles the Bassett Cardinal in shape but is constructed in an entirely different manner. Note the detachable tail unit.





cartons wrapped in cellophane were being used for kit packaging, and making the art colour separations for printing became yet another task for Tommy Kennedy!

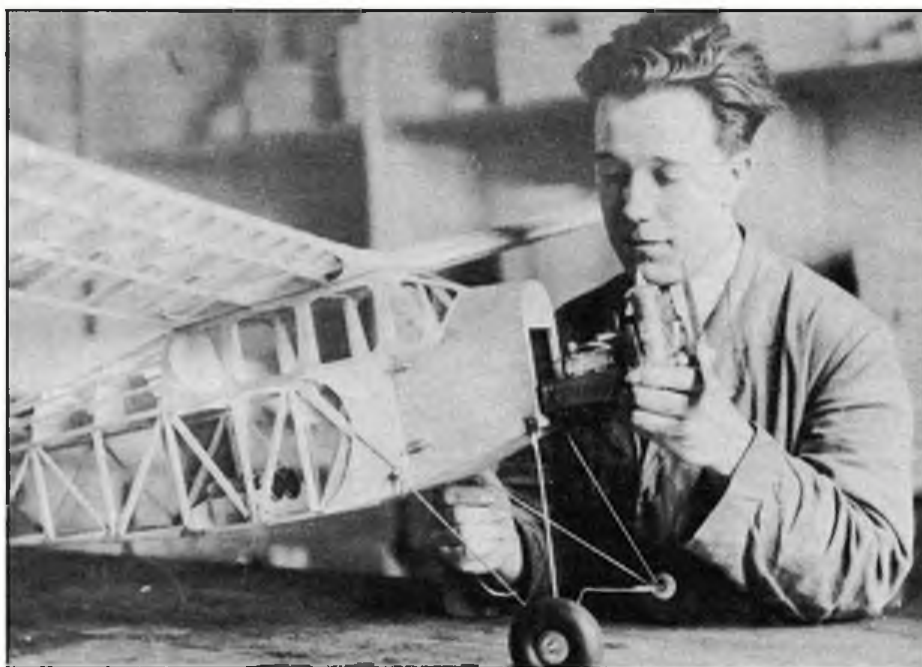
Petrol models

With the increase in popularity of the power driven model the shop became the agent for the American petrol engines Synchro Bee (2cc) and Synchro Ace (9.25cc) and entered into the supply of all types of gas model accessories including their high quality airwheels in a range of 4½ to 2½ inch diameter. Eventually they produced their own petrol model kits; the MS Privateer Junior (54 inch span), MS Privateer (66 inch span) and the MS Bee (47 inch span). These models were designed by Charles Lutman but Tommy Kennedy did the drawings and built the prototype models. C W Lutman entered these machines at various pre-war power competitions and achieved some success with them. He was President of the Newcastle-upon-Tyne MAC and was a regular attendee at all club functions. Not only was this good for business, but C W Lutman was seen as a benefactor of the movement in the North-East and was responsible for keeping interest level at a high pitch.

The war and after

Some of the pre-war kits remained available into the early war years but eventually, due to the non-availability of materials for flying models, The Model Shop (like many other model businesses) had to concentrate on solid models. They made a full range of 1/72nd scale cockpit covers and transfers that were a boon to aeromodellers forcibly "grounded", and in league with this activity The Model Shop was under contract to manufacture aircraft recognition models for the Services. Tommy joined the RAF in 1940 and served 6½ years as a Fitter (Airframe), being at one time in the desert with No 223 Squadron on Baltimores. Harry Clark also served in the RAF and was employed on aircrew duties as a WOP/AG.

Following their demob these two stalwarts returned to The Model Shop, which was now situated in Ridley Place, and experienced at first hand the post-war boom which produced one of the most industrious periods in the history of aeromodelling.



Top: The Supermarine S6B made from the 7/6 (37½p) kit. Floats were built up on the Keelbild system and when the model had been coated with The Model Shop's own 'Hishine' waterproof dope it could... "take-off and land on water in a most realistic way!" Above: Tommy Kennedy fitting a 1938 Bunch Gwin-Aero petrol engine (7.36cc) into the MS Privateer, which was designed by C W Lutman. A popular pre-war model of 66 inch wingspan, the kit (less engine) cost £3/15/- (£3.75p).

Sales for airwheels reached an all time high; diesel powered sports models were much in vogue and Tommy designed the attractive Hornet and Wasp models for engines up to 1cc capacity. During this period many different makes of diesels emerged, and C W Lutman also tried his hand at engine designing when towards the end of 1947 the MS 2.5cc engine selling at £6/10/- (£6.50p) appeared. This was followed by the more popular 1.24cc version (£5 including propeller) which could be easily altered to inverted running since the tank was situated around the crankshaft bearing. Alas for this bold venture there was fierce competition for better and better engines and the MS range, at first only sold locally, incurred considerable financial loss.

In the meantime Mr Lutman's son Charlie became involved in the business in his spare time (he was employed in full-size aviation as a pilot, an interest most certainly brought

about by the model aeroplane environment in which he grew up). However, changes were taking place in the modelling scene and towards the end of the 1950s kit manufacture was terminated and The Model Shop confined itself to the retail side of the business. This meant the closure of the workshop, and staff employed on kit production were now surplus to requirements (there were no redundancy schemes then) and unfortunately had to be laid off. This was a severe blow to everyone, especially to Tommy Kennedy who had to seek alternative employment for the next 15 years; but he never forgot his allegiance to the company that he had helped pioneer the hobby, and on retirement he was able to go back to The Model Shop in a part-time capacity... the wheel had turned full circle!

So it is that Keelbild kit designer T R Kennedy still works for The Model Shop today despite being over 70 years of age. He

really feels attached to this business in a way that might be hard for present-day workers to understand: the old enthusiasm and loyalty are the factors that drew Tommy back, the same enthusiasm of the 1930s that he shared with Gordon Graham, Harry Clark, Charles Lutman and David Brown (all sadly no longer with us) to make The Model Shop the success it was ...and one could say still is, since this business of long standing is still going strong and is making considerable contribution to the vintage modelling scene.

Vintage plans available

Charlie Lutman and his wife Pat, who run the business today, advise that there is an air of optimism present that will see MS kits back on the market again before very long. Earmarked for early production are the MS Hornet Major and MS Wasp Major, these being enlarged R/C versions - 63 inch wingspan - of the old T R Kennedy designs from 40 years ago. What is not generally known is that The Model Shop are able to supply some 20 vintage plans of their products, and while we cannot list them all here (send an SAE for the full listing) included are Privateer II, Bee, Hornet and Wasp power models at £3.00 each plus postage, Gnat,



Above: The attractive MS Wasp semi-scale biplane for engines up to 1cc capacity designed by Tommy Kennedy. There is also a parasol version named Hornet. Both plans are still available and enlarged versions for R/C-assist, known as Wasp Major and Hornet Major, are available as plans and will soon be killed by The Model Shop. Below: The Keelbild Westland Lysander designed by T R Kennedy which appeared at the end of 1939. The plan was published in Aeromodeller some 13 years ago and is still available from ASP as FSR 1179. Bottom: Doug McHard built this Keelbild Hawker Demon some years ago and occasionally gives it an airing at our vintage meetings. He is seen here launching his masterpiece at Old Warden.



Gnat Mk II and Midge small rubber models at £1.50 each plus postage, Gemini and Albatros gliders, Cobra control-line biplane for 2cc engines, Keelplane Mk I, and Dragonfly rubber models; Viper, a 30 inch span model for Jetex 100 or 200 motors, and the following rubber powered flying scale models: Hawker High Speed Fury, Hawker Fury, Comper Swift, Supermarine S6B twin float seaplane, Spitfire Mk XII and the Hawker Demon. Unfortunately the fuselage formers are not shown on the flying scale plans but steps are being taken to provide these for the Demon and the S6B.

In order that other plans can be added to this range, it would be greatly appreciated if any readers having the following Keelbild or Model Shop plans (and print wood shapes if possible) and who might like to loan them for copying would, in the first instance, contact the writer at 66 Tuffnells Way, Harpenden, Herts AL5 3HG. Plans sought: Arrow Active, Pfalz D XII, Leopard Moth, Flying Flea, Gladiator, Hurricane, Magister, Modified Hawker Super Fury (15½ inch span) and Spitfire (19 inch span).

Registered post and packing costs will be refunded, and all plans will be handled with care and returned as soon as possible.

Present-day readers may not know that the Keelbild Westland Lysander (19 inch span) was published in *Aeromodeller* in February 1973 and is still available as FSR 1179 from Argus Specialist Publications Ltd, price £1.00 plus 45p postage.

Finally, whenever mention is made in this magazine of the non-availability of materials for vintage construction, I usually get a reminder from Tommy Kennedy that The Model Shop is well stocked with all those things modellers fail to find in many model shops that seem to cater only for the present day R/C modeller. Plastic flying propellers, basswood, Japanese tissue, strip rubber in the smaller sizes and more besides are all to be found in the shop that abides by the motto "Your Leisure is our Pleasure" Try them... at 18 Blenheim Street, Newcastle-upon-Tyne NE1 4AZ.



IDIDN'T NEED ASKING twice when Stafford Screen invited me up to visit his workshop to examine his progress with experiments in covering F1C surfaces with aluminium foil. Of course it also gave me a chance for a sneaky look at the workshop of this most meticulous builder. He had some interesting pieces of equipment that one would perhaps not normally expect to find; sheets of glass, an incredible assortment of steel blocks, and a vacuum pump!

As the leading F1C flyer in the UK it seems to have fallen on Stafford to do everyone's development work. Other fliers send him bits to try and materials to use; some even fabricate little items for him almost overnight if he so much as mentions needing something in passing conversation.

Why foil?

However, as far as the foil covering of wings is concerned Stafford is the first in the country and very much the pioneer. Such wings have been a trademark of the Russian, and more lately, Chinese F1C models for sometime. Their advantage is not a cosmetic one - it is simply that a wood wing so covered is immeasurably stiffer than a similar unit with wood and glass-

fibre finish only. Moreover the gain in rigidity is so great that much lighter sheet can be utilised in the wing construction, so the finished product can be as light (if not lighter) than conventional sheet balsa only. Stafford uses very light 4-5lb/cu ft balsa sheet as a base for foil covered wings (Fig. 1).

The foil itself is a little over 1 thou thick; or 0.03mm, to be precise. Sadly it is not available yet in the UK - Stafford's supply has come direct from Verbitsky in Russia, as has much of the basic constructional gen. The 18" wide roll of foil arrives wrapped in *jap* tissue in a beautifully packed metal tube. It is very hard; much harder than anything Stafford has been able to find from domestic sources, and is quite dull in finish. Being so thin it dents very easily and has to be handled with the greatest of care. Furthermore, and just to make life more awkward, it is *very* difficult to cut, illustrating once again how hard it must be, for it's only aluminium after all. One might think that application to a finished sheeted wing would be simplicity itself - slap on a bit of impact adhesive and hey presto. Nothing could be further from the truth! Any imperfections in or on the structure are magnified enormously by the foil - just as good wall-

papering will never cover a badly plastered wall! No, foil covering has to be considered right from the outset of the construction.

The surfaces have to be covered while they are sheet and before they are wings. That necessitates the top and bottom surface wood being selected and cut accurately to width and length and in the case of the tips, taper. From then on each wing panel is considered separately. To be effective the foil has to extend right around the LE as one piece - in effect the ultimate 'D' box - so the top and bottom sheeting have to stick down onto one large piece of foil, spaced just far enough apart to allow for the carbon fibre LE. Stafford established exactly how much gap to leave by trial and error on a few small test sections so as not to waste precious foil. The positioning at glue-up still raised the heart rate somewhat, as an error of a few thou can spoil the alignment and scrap that piece of foil, and the wood.

Neither is the light balsa for the wing sheet a conventional quarter grain but very even *straight* grain. The reason for this is that quarter grain has a nasty habit of bending unevenly which is OK when imperfections can be sanded off before covering, but with foil this is not possible. . .

Covering

The balsa is stuck to the foil thus (Fig. 2). A dead flat, virtually surgically-clean sheet of glass covers the work bench. The sheet of foil - 18" wide by however long necessary - is laid down on the glass, trimmed to length as close as possible to avoid excessive cutting later, and wiped with trichlorethelene to remove any spots of grease that may inhibit adhesion. The glue used is Araldite 2003 warmed enough to run well, or thinned with a little acetone if absolutely necessary. It's slow setting so there is no rush, which is lucky, as what follows is extraordinary.

The glass base is warmed with a hair dryer and the foil is laid over it. The Araldite is smoothed very thinly over the foil with a wide plastic spatula. When completely

FOIL

the opposition

Dave Hipperson reports on Stafford Screen's experiments in aluminium wing covering for F1C models

Left: Stafford's latest F1C shows off its aluminium wing covering. Main advantage is improved rigidity, but a lighter wing can also result. Looks good too - mind you, the way it's done is quite something! Right: Foil-covered tail in place.



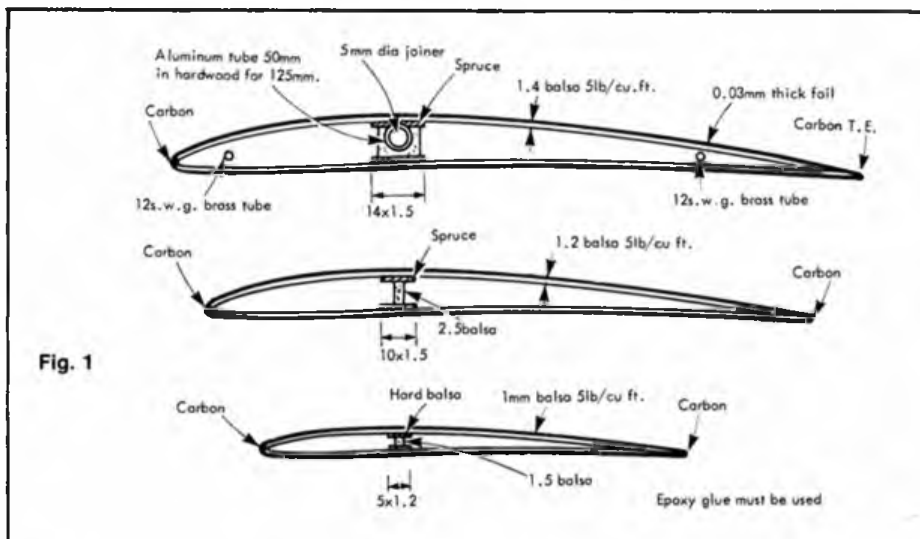


Fig. 1



Small-scale sample of foil and balsa laminate arranged as it would be for wing construction. Note gap to allow fold and leading edge carbon reinforcement.

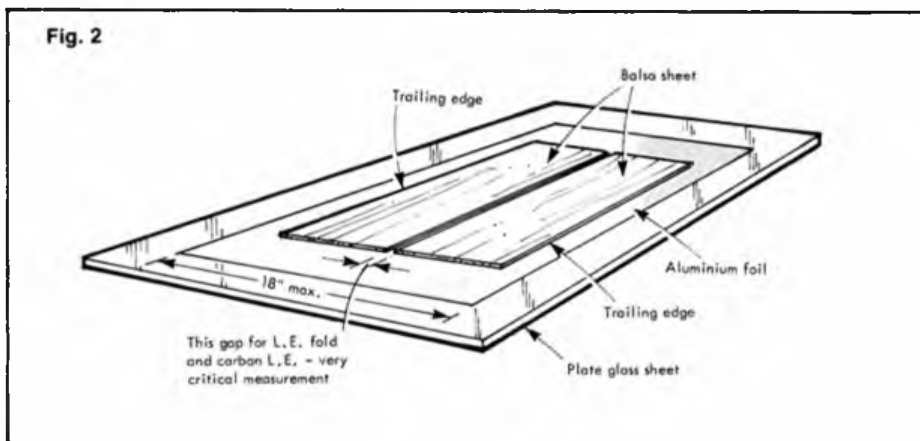


Fig. 2

construction can be. Once again, great care is needed if the structure and glue lines are not to show through the finished surface. The only glue that has proved suitable in this respect so far has been 30-minute Devcon epoxy. As the ribs are stuck in place they are individually held vertically and firmly onto the sheet to take the under-camber shape by that enormous series of steel weights I had spotted earlier (Fig. 3). Remember, no pins are possible. Top and bottom spars and the various webs, etc. are all fitted at this stage.

A carbon tow is then introduced to form the leading edge; it is glued with the same Araldite that did the sheet to all job as it is necessary to have an adhesive of thinner viscosity to penetrate the carbon. Immediately after this another carbon tow is stretched across the back of the section to reinforce the TE. This one has to be kept under tension as the Devcon is coated onto the top of the ribs and the top surface sheeting wrapped over from the front and weighted down as it is rolled on. The tension in the carbon stops the frail filament being distorted or pushed out with the glue at the TE (Fig 4).

Dihedral Breaks

The entire assembly is left to dry, evenly weighted down. The most difficult part is

covered, top and bottom balsa sheeting are positioned exactly and tacked at each corner with tape to stop them moving whilst the glue sets. It's now that the vacuum pump comes into its own. The glass/foil/glue/balsa sandwich is covered by another heavy gauge polythene sheet. This in turn is covered by a layer of stiff foam rubber and over the entire heap goes another polythene sheet, this one sealed down onto the glass along all its edges and a pipe lead into the vacuum pump. This set up is then evacuated down to almost 1 atmosphere and the pump is left running for six hours in this condition! After that time the coverings are removed and any surplus glue that may have squeezed out of, or through, the balsa is cleaned off. Everything is replaced and the vacuum re-established for a further 12 hours; so after some eighteen hours the balsa/foil panels can be lifted off the glass. The procedure is repeated for each wing panel and the tail plane.

The droning of the vacuum pump is not that popular with the other members of the Screen household but Stafford has convinced them that it's a worthy sacrifice for them - the lack of sleep that is!

Assembly

With assembly come other, unique problems. Stafford uses a slightly under-cambered section so the first step is to place the bottom surface sheet on a jig former to the shape of the undercamber. These formers were constructed to order by Joe Maxwell. They follow the precise under-camber contour including the washout and

the tapering of the tips. Without them this construction would be impossible; or at the very best Stafford would have been limited to a flat bottom wing. Once again each panel is dealt with separately.

First, the ends of the foil are trimmed off. This is in itself difficult as the material is so hard. A brand new scalpel blade is used and the foil must be cut down onto the glass, if distortion of the cut edge is to be avoided. Needless to say, this consumes scalpel blades voraciously. With the bottom surface tacked in place over the former, the rib/spar

Stafford Screen's most recent covering effort - immaculate. Root of wing shown at top; below is tailplane on which leading edge recess for mounting and pivot are clearly visible. Hooks at wing LE and TE allow halves to be bound onto fuselage with rubber bands. Two-piece wings are a new departure for Stafford.



Fig. 3

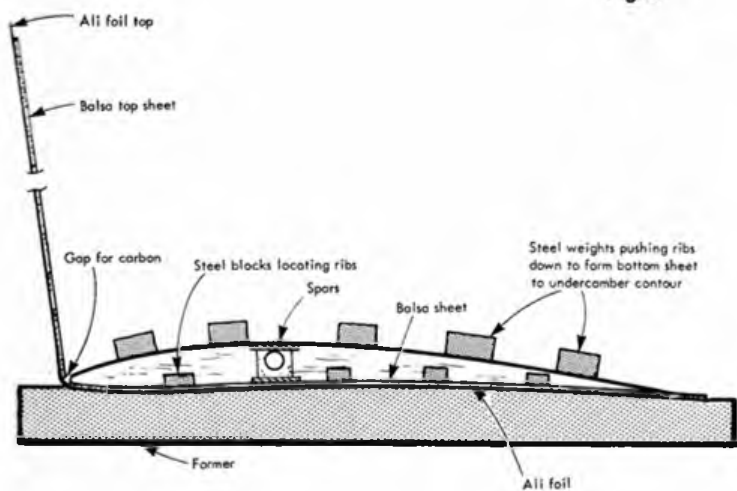
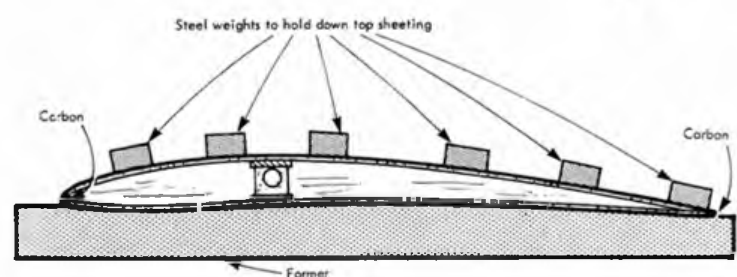


Fig. 4



A part of the workshop showing finished foil-covered wings with an identical balsa pair. The idea is to rough-trim the model with balsa wings and replace by foil wings for last trim flights and contests.

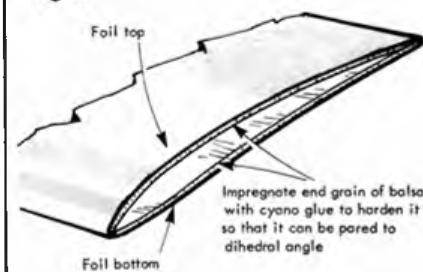


still to come; that is, the trimming of the finished panels to exact length and chamfering for the correct dihedral. As I explained, the foil can only be cut with a scalpel but now in wing section form it can't be pressed down onto glass, can it? What Stafford does is to impregnate the end grain of the balsa sheet at the edge to be trimmed with cyano so that it becomes super hard (Fig. 5). The foil/hard balsa laminate can then be pared with a scalpel, but it is still a very ticklish operation for there can be no quick strokes of glass paper to finish off - it's got to be pared down to an accuracy of a fraction of a mm! Finished panels are then

butt jointed together and the joint itself covered with a narrow band of epoxy impregnated glass fibre which when dry is painted silver.

An enormous amount of effort, true - but surely the only way to construct longer, thinner and more efficient wings with sufficient rigidity to resist wing flutter. It will be interesting to see if this technology gives Stafford that little extra necessary to catch the world's best. I am sure he would be very interested in hearing from anybody in industry who might have access to suitable foil, or with any further ideas on improvements to assembly methods.

Fig. 5



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FROM THE HANDLE

CONTROL LINE NEWS

Racing with Jim Woodside

New FAI Team Race heat record?

I have heard through the grapevine that a new World Record for 100 laps has been set by the ace Soviet team Barkov/Suraev.

The venue was Kiev and so I suppose the occasion was the Russian Championships. Well, to keep you in suspenders no longer: the reported time was 3:17! This represents an airspeed of 17 seconds/10 laps if we assume a total lost time of twenty-five seconds for a dead start and two stops. On the evidence of what many of us witnessed at the chilly 1985 European Champs held here in England the time is quite in order. The airspeed on this occasion was 17.4/10. Warm calm conditions would easily knock off that odd 0.4 seconds. Again I can only assume that the engine was Vladimir's own 2.5 diesel and that the model was the very light carbon-fuselaged CB16 (latest version of the CB14). By the way, CB in the Russian alphabet are Suraev's initials.

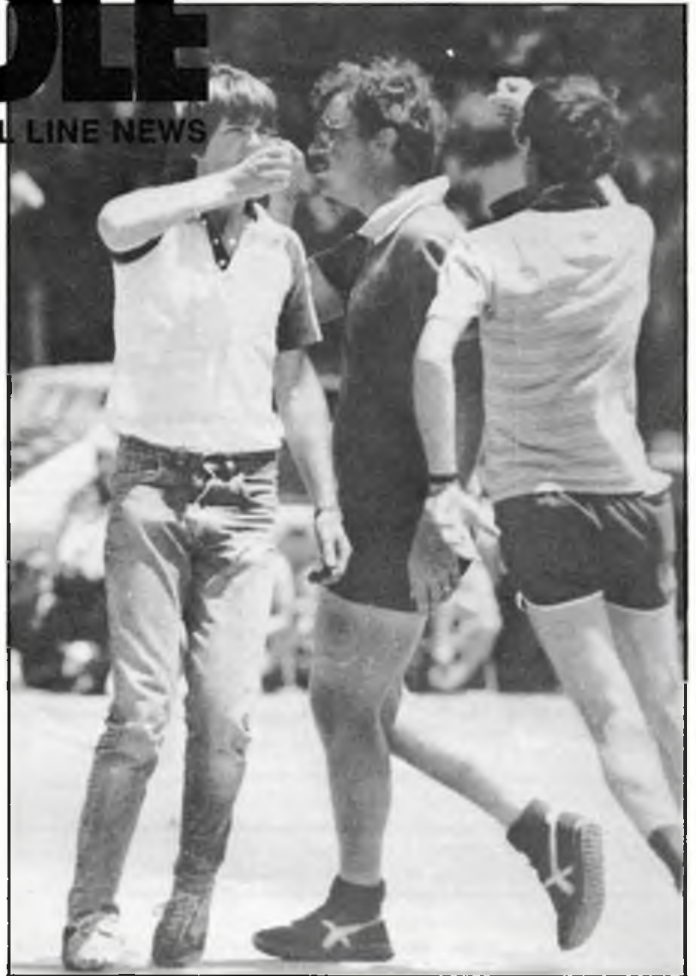
Congratulations to both enthusiasts.

39th Australian Nationals, 1986

Try this for size - FAI Teamrace at the 1986 Australian Nats started at 9.30am on 1st January! What about the legendary sinking of Foster's Lager? Rather sounds like masochism to me. Still, twelve teams mustered on the billiard smooth basketball court to fly in hot, almost windless weather (sob, sob).

Clear leaders after round one were father-and-son team "Fitzgerald squared". Son Rob had imported some European ideas such as tiny props and high revs, although I am not sure about the reported huge cooling inlets being all that wise. The second round produced no "sub-four" times. As the seeded nine lined up for the semis the hard luck story must go to the highly talented

Concentration during the F2C final at the Australian Nats; from left to right, eventual winner Rob Fitzgerald, Graeme Wilson and Andrew Nugent (2nd and 3rd respectively).



Georgiadis/Prior team. Denies is one of the finest builders of T/R models and Theo makes superb equipment to go in them. Sadly, a distance of 1000 miles now separates the two and practice sessions are out. Their Cipolla powered, Dave Campbell fuselaged models had the best airspeed in the low 19s, using low pitched props (6.5") of 160mm diameter. Lack of match practice kept their time at around 4:33. Not wiring on the tank-filling system tubing was a 'hidden' fault which caused much grief. The top three places were closely fought with only seven seconds covering them. Interestingly the fourth placed team used a Nelson steel-lined motor. I have a special affection for this marque as it gave me my own first sub-four minute time.

In the final all three teams seemed evenly matched in the air but finally Tom Fitzgerald's quicker stops gave them victory in a respectable 7:58. John Edwards should be thanked for a well run contest.

Run on the last day of the Nationals, Goodyear, as in the UK, attracted the biggest entry; twenty-three teams. The most popular motor was the .15 glow with Cox, Nelson, Rossi and OPS all in evidence, mostly on pressure.

Winners Hines/Spinks were only marginally slower than Wilson/Lumsden in the heats, while eventual third-placers Turna/Kirton took pole position. British competitors may well remember Norman Kirton who was a one-time Wharfedale M.A.C. member.

Left: The superb Georgiadis/Prior "wing" is based on the Kramerenko design. Fuselage is a Dave Campbell moulding; a Cipolla provides the urge. Right: The neat engine mounting. Pillars are sandwiched between carbon sheets and resin pillars. Very rigid and strong.



Results:

FAI Team Race

1. Fitzgerald/Fitzgerald	S.A.	3:50	-	3:52	-	Final: 7:58
2. Nugent/Nugent	Victoria	4:09	4:15	DNF	3:58	Final: 8:05
3. Wilson/Lumsden	Victoria	3:57	-	4:34	3:52	Final: 8:13

Goodyear

1. Hines/Spink	N.S.W.	6:09	-	4:09	-	Final: 8:46
2. Wilson/Lumsden	Victoria	4:17	-	4:08	-	Final: 8:53
3. Turna/Kirton	W.A.	4:06	-	DNF	-	Final: DNF

All times given to nearest second.

Scottish teamracing

For the 1986 season Neil Munro has taken over the organisation of teamracing in Scotland. Two innovations will be introduced this year. First, the addition of FAI teamrace to the schedule and second, the running of a Scots C/L Nationals.

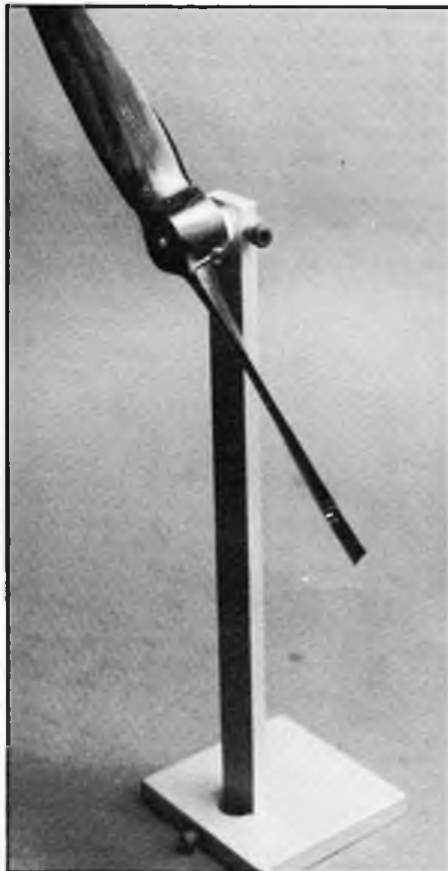
Class II Goodyear will still feature at all meetings and the basic rules will be keenly enforced. Events listed below:

May 18th	Open Goodyear, 1/2A FAI at Newhouse
June 15th	Open Goodyear, Class II Goodyear, 1/2A at Newhouse
July 13th	Open Goodyear, Class II Goodyear, FAI at Newhouse
August 9/10th Nationals	Open Goodyear, Class II Goodyear, 1/2A FAI. Venue to be announced.

Details from: Neil Munro at 30 Lamberton Court, Pencaitland, East Lothian EH34 5BL or telephone 0875 340026.

Goodies from Shadow Racing Products

The Propeller Pitch Gauge and Prop Balance Jig from this manufacturer must be



among the best made and most well-thought-out items ever to be put on offer. Both items can be dis-assembled by removing a single screw; the obvious advantage is that they are truly transportable to a contest. Several people have tried the pitch gauge and all say that it is easy to use.

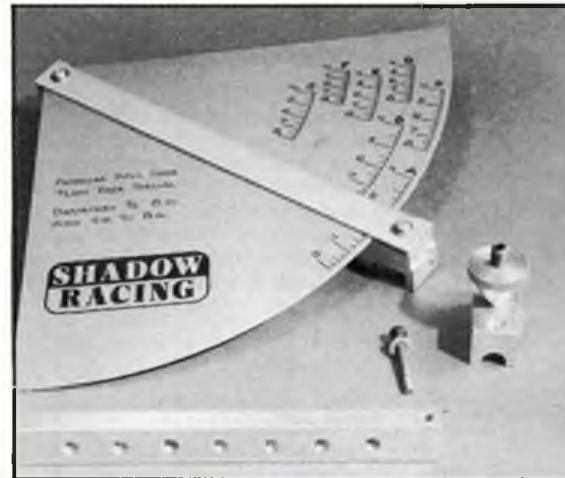
The pitch gauge has three main components:

1. Gauge quadrant, cursor unit.
2. The radial station bar lettered A-G.
3. Prop pedestal.

The station bar is attached at right angles to the sliding rear portion of the cursor by a single bolt. The prop pedestal is then located on a lettered station and the sliding section is adjusted until the edge of the quadrant meets the rear face of the prop. A reading is then taken on the appropriate scale. Very neat and very compact.

The gauge illustrated in the photograph is designed specifically for teamrace and speed size props. However a variety of scales and props bars are available, capable of reading props up to 24in diameter and of much greater pitch. The scales on the Team Race Special are more finely divided than those on 'sports' models in order to facilitate small changes in pitch. Constant use of the gauge will not remove the divisions as they are permanently etched into the plate. Each gauge comes with a comprehensive leaflet which covers not only care and assembly of the item but also gives detailed guidance on the preparation needed to get the best out of any particular prop.

The Prop Balance Jig exemplifies the same elegance of design simplicity displayed in the gauge. Again a single screw



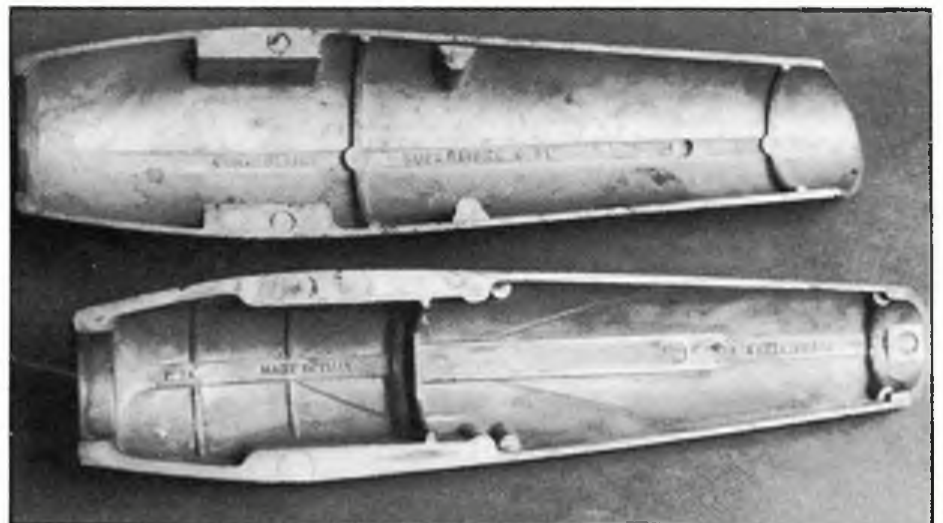
locates the pillar on which pivots a plastic plug which is pushed into the prop hub - be sure, though, to keep a supply of straight pins! As I see it, the chief advantages of this little gadget over the normal cradle-type balance jig is that it allows the prop to be checked at any point around the 360° of possible rotation. This is far more demanding and accurate a test than the usual "horizontal" trial.

Both items may be ordered from Shadow Racing at 3421 S.E. 28th Court, Ocala, Florida 32671, USA. Postage is 20% of order value. Prices are:

1. Pitch Gauges:
 - T/R Special: US\$ 30
 - For props up to 12in: US\$ 40
 - For props up to 24in: US\$ 50
 - "Pusher" scales are available at US\$ 10
2. Balance jig, with 5/16in and 5mm pivots: US\$ 10

By the way, the prop shown is the latest FAI F2C offering from Les Bollenhagen in Australia. Based on the Metkemeijer original it has been de-pitched to about 6° in. at the tips. Very nicely moulded in carbon, the prop is near ready for use as supplied. It's available from Les at Flat 6, 1 William Street, Kilburn 5084, South Australia. Ask for item no. 82; cost is A\$8 (£4).

Top of page: The neat, transportable Shadow Racing T.R. Special pitch gauge. Left: Prop balance jig from the same manufacturer is here fitted with Les Bollenhagen's No. 82 prop mentioned in text. Below: These magnesium pans made by Amato Pratt are available in two sizes (.29/.40 and .15) from Tigre Engines. Note stiffening ribs. Details overleaf.



Tigre Engines magnesium engine pan

When I recently published a piece on the preparation of pans for racing models mention was made of the problems of obtaining the basic item. Mick Wilshe of *Tigre Engines* sent me two items in magnesium for inspection. These finely made castings come from Italy, where they are produced by speed flier Amato Prati. Two sizes are available:

(a) 15 size at £6.00, and (b) 29-40 size at £7.50.

Whilst these pans are of prime use in speed models they can easily be adapted to suit free flight power models. The '15' size, with tapered rear half cut off, could also find a home in 1/2A models.

Obituary: Albert Atherton

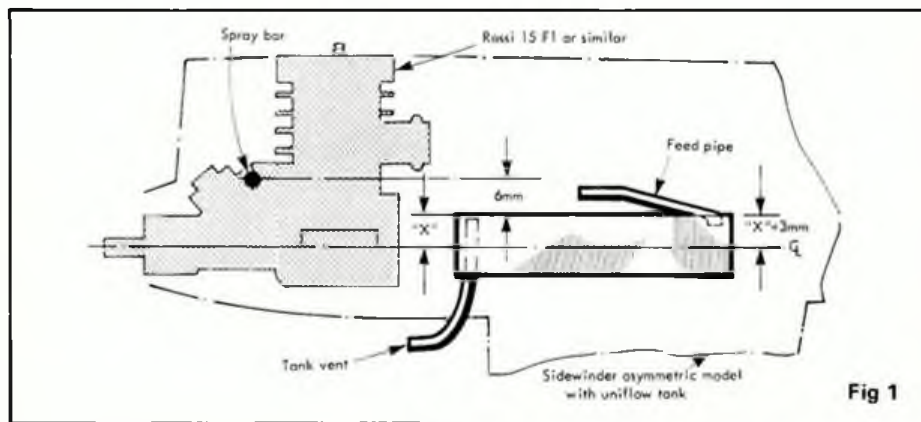
Albert Atherton died suddenly at home on 15th March. Albert was a keen supporter of all branches of control-line flying but aerobatics was his chief love. Never a competitor, Albert devoted many skilful hours to the organisation and judging of major competitions. Chief amongst these were the 1978 World Control Line Championships, the 1980 Gold Trophy and the first two Three Sisters FAI Internationals. Latterly he had judged aerobatics at Centralised SMAE meetings.

Albert Atherton had been a good friend for many years. I will miss his solid powers of analysis and his good sense of humour. The Widnes MAC will also miss the guidance he gave in various offices. May we all extend our sincere sympathies to his widow Charlotte.

Speed with Dick McGladdery

FAI Speed (F2A) examined

FAIs have more performance, size for size, than any other speed class. Spurred by international competition, the FAI motor has been developed to outputs well over



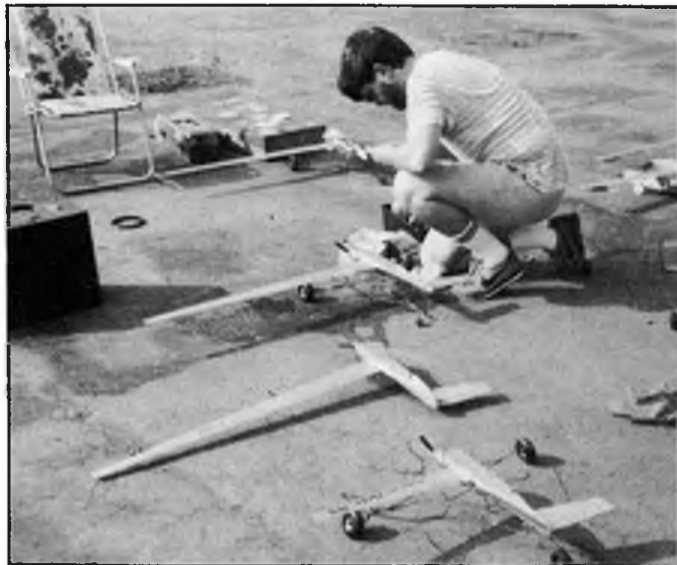
500BHP/litre on straight (methanol/oil) fuel, but in most cases at considerable expense in flexibility. Port timings are commonly around 190° exhaust, 140° transfer and 210-220° induction period, with peak power realised around 35,000 rpm. Pipe length, measured from the glowplug terminal (this is not especially significant; it's just a convenient reference point) to end of rear cone is around 270mm. Below about 25,000 rpm power output is dismal; it would disgrace a sports 1cc motor.

My experience, in common with the vast majority of users, is that useful flying props invariably load the motor such that ground rpm is down as low as 20,000 or thereabouts, meaning that power available for take-off is decidedly marginal, particularly in rough weather. The problem can be circumvented by setting up the dolly to enable whipping to take place whilst the model is still on the ground, and keeping the whip on through take-off until a safe flying speed is reached. At this stage, the motor will normally still be struggling and will appear to be hopelessly off tune. Usually, it will seem that the motor is lean. This can be rectified by whipping, but not too hard, otherwise the tune may swap to 'rich'. If the latter occurs, back whipping will cure (but again, not too much). The trick is to find out just how much positive or negative whip is required to obtain a clean and even two stroke, in which condition the motor will warm up, develop more revs and power and eventually 'come

on the pipe'. This may take as little as a lap or so, but can take ten or more. All the time the motor is warming up, whip must be kept to maximum positive without provoking richening of the tune, and when the pipe finally wakes up, usually the whip being applied will be such that the average pilot can maintain it comfortably at a fast stroll around the pylon. 'Come in' may be presaged by a hopeful 'yerps' from the motor, but it's important not to jump the gun - wait until the pipe kicks in properly, then give it all you've got in the whipping department. This helps the engine up to the peak beyond the dodgy no mans' lands between kick-in rpm (say 25,000) and the stable operating range (say 33,000 plus) - piped engines just don't like running in this transitory rev-band and if loaded down into it, power output invariably deteriorates until the motor drops off the bottom end of the effective RPM range of the pipe.

OK, so it's kicked in for real and you whip like crazy for a lap or so, by which time you should be up to maximum speed. Now you have to get the handle crossbar engaged in the pylon yoke, finishing off the whipping with a sweeping heave ending with the handle just behind the yoke, using the free hand to position the yoke smoothly (we hope) into engagement. Then pray that the motor will continue to pour out the power for the next 14 laps or so (allowing a few for the timekeeper to 'pick you up' after they have satisfied themselves that your handle is

Left: Upright/asymmetric/CFS FAI speed model by veteran Emil Frollich of Germany, seen at Utrecht. Right: Line up of FAI models with Paul Eisner's 180mph Open 2.5cc model - simply an FAI with undersized wing - in foreground at Bicester last year.



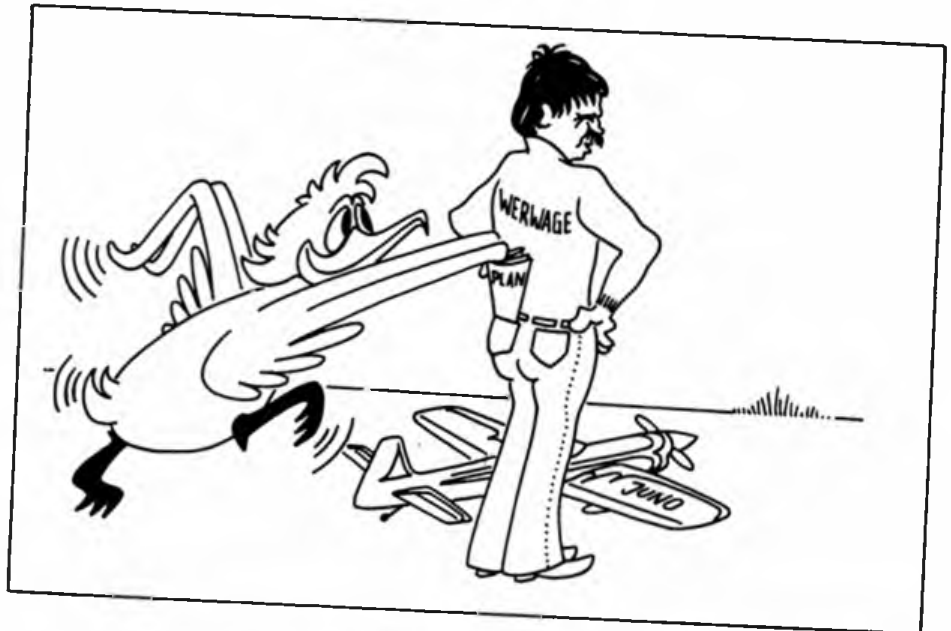
properly engaged).

Like many other FAI flyers, my models are fitted with cut-outs, tripped by full down elevator. I now consider this a necessity rather than a luxury - it enables shutting off if anything goes wrong (like finding the new prop you're trying is a little too big); prevents the suffering of needless protraction of the flight after timing is completed; and ragged running as the tank runs out may be avoided.

'Suction' seems to be the commonest fuel system nowadays, with choke sizes ranging from 6.5-7mm. Tank inset is around 6mm (see Fig 1) but model designs should allow for some variation (say ± 3 mm) to cope with variations. The sidewinder model layout is peculiarly convenient when allied to a suction fuel system, permitting simple construction provided the motor cylinder head is disposed outboard. Some flyers still use CFS (fuel tank pressurised from the motor with a centrifugally activated fuel switch - hence CFS - to augment fuel supply when the pipe comes in) to good effect, commonly with choke sizes of 8-9mm; however I would observe that the last three (at least) World Champs have been won on suction (and the Euro Champs in between), which is good enough for me. Anyhow, the switch is just another source of confusion, takes up a surprising amount of space and is if anything, harder to get results from than suction.

Model design is more or less universally asymmetric, the most striking variation occurring in wing span/aspect ratio. At the bottom end, the single inboard wing spans about 750mm and at the top end, as exemplified by the Hungarians, around 1500mm. It has been speculated that the objective behind the very long wings is to streamline the wire to reduce drag and gain speed, but having seen the Hunkies in action, I suspect the real reason might be to aid take-off; their Rossi Mk III's were incredibly weak until the pipe began to work. Models were not so much released, but rather launched with a stylish ten-pin bowling actions. Even then, the take-off run was nearly a lap, and it looked as if they would have difficulty reaching 70mph, let alone 170. Despite this, they have been the team everyone would like to beat for some years now, and they only just missed first place at the last Euro champs at Three Sisters in '85; an event which was won by Kohanivk of Russia with a very neat medium aspect ratio model, whose apparent simplicity belied its sophistication. The only way-out feature of this model was the in-air rev counter/transmitter - an amazing gadget which enabled his pit crew to monitor RPM in flight and tell the pilot whether or not to engage the handle in the pylon and so go for a timed run. Apart from this feature the model and motor were bafflingly ordinary, but very well-made with none of the scars betraying the continual modifications that my models have had to suffer!

Compared with flying an open '60' class model, FAI might appear relatively tame but it can be as physically demanding in its own way (the pilot has to pull rather than be pulled) and the models are much more manageable. Ideas can be tried with reasonable hope of drawing a logical conclusion, whereas a flight with a '60' is more like a Moon Shot - exciting but expensive. FAI also affords the opportunity to enter International meetings on the continent, which can make for a very enjoyable mini holiday.



Top: How modified designs evolve - first obtain your plan! Above: Henk de Jong's elegant Juno Plus, S.T. G21/46 powered. Sleek model is finished with two-part acrylic car paint. Constructional differences between this and the original Juno detailed in text.

Stunt with Claus Maikis

The reception is invariably friendly and one can have a refreshing change from UK comps and weather. The effort and expense in making such trips is well worth while, even though we get thrashed (I do anyway) at the circle. . .

Input...

A column like this cannot be done by one man alone. Apart from the work exceeding his horizon, it would be a very one-sided affair. Sometimes I talk my friends into sending me some information. In some cases there is not much response. In the case of Henk De Jong (Netherlands) I was pleased to receive a very long letter, crammed full of first class information. So, this time I leave the honours to Henk to tell you in his own words what he has to say.

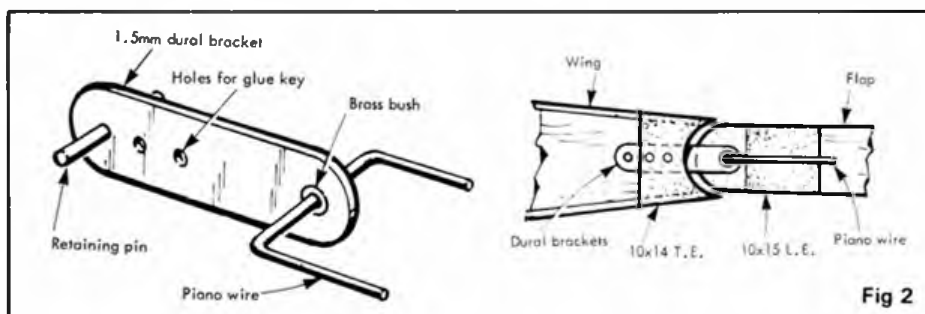
Those who've seen Henk fly will be convinced that this aircraft is worth serious consideration. Henk is willing to send plan copies (magazine size) of his Juno modification, as well as the original *Flying Models* plan if you write to him at Pieter Steynstr 43, 8022 TB Zwolle, Netherlands.

Juno Plus

Modifications to the famous design of Bill Werwage. By Henk de Jong.

From 1981 to 1983 I built a series of three models which were developments of the Derringer design, of the American Bob Whitely. I tried to make each model a bit better, evolving light but strong building methods and adapting the flying characteristics to my own style of flying. I was not satisfied with these models however, so I looked around for another design.

The reason that I chose the Juno was that it was a lot different, being smaller, with a thinner wing, and a swept-forward trailing



edge to the wing. The construction was also different. My previous models used a wing with leading-edge sheeting, and a 3mm wingspan, together forming a so-called D-box. Ribs were 1.5mm x 10mm strips, top and bottom, with capstrips. The Juno wing has no leading edge sheeting with a 10mm wingspar, with 3mm x 6mm rib strips without caps. This, I thought, should make a lighter wing. Several other parts used types of construction that I didn't like, so I substituted my usual construction. The smaller size and weight of the Juno would also give a better weight to power ratio, which means that I could run my engine (*Super Tigre G21/46*) slower and that means less speed-up in windy weather.

When I started to build the Juno I didn't have the full size plan, so I had a friend enlarge the wing centre section to full size from the drawing in *Flying Models* magazine. This gave me the most important part, the wing section. The rest I measured up from the small drawing. At the same time I made most measurements metric and drew up my own construction for the parts I didn't like. These were the following:

The mainspar in the wing looked too strong, so I used 8mm soft balsa, with 1mm ply doublers. I wanted to make the landing gear removable, so I used 8 x 10 x 40mm aluminium blocks with a 3mm groove and vertical hole for the gear leg. The leg is secured with a single 3mm bolt and washer, screwed in a drilled and M3 tapped hole directly behind the horizontal part of the leg.

This aluminium block has to be glued securely in the wing. The 1mm ply doublers are extended down to hold the block and the ribs at that point are 5mm thick. There are also horizontal plates of 5mm balsa, as shown on the modified plan.

Because of the removable wing, I used centre section sheeting. The part of the fuselage under the wing is glued to the wing and the wing is bolted to the fuselage with four M3 bolts through a plywood tongue at the back and a piece of motor mount stock bolted and glued to former F2 at the front. This latter former is the most highly stressed part in the model, so I glue it in with epoxy and strengthen the joint with glass cloth over triangular balsa fillets. I also cover the fuselage up to the cockpit and the wing centre section with lightweight glasscloth and epoxy.

One of the most important changes in the design is one that you cannot see on the outside, namely the control system. I use a big bellcrank, 10cm between lead-outs and 23mm between centre and pushrod. The flaphorn is 30mm high, but adjustable, and the elevator is 25mm high. I used 2mm piano wire for the elevator horn on this model but I

will use 3mm wire with a welded-on upright in my new model. The model uses two elevator horns because of the swept forward trailing edge. Werwage uses a single flaphorn, but I didn't trust that. My flaphorns were made of 2.6mm motorcycle spokes, with a 5mm bolt upright. On this bolt is screwed a little nylon block with a hole for the pushrod. By unfastening the pushrod and screwing the nylon block up or down, the flap movement is adjustable. I used an aluminium tube for the pushrod between the flaps and elevators.

For the flaps and elevators themselves I used my own usual construction, because I didn't like the original. The stabiliser uses geodetic construction for maximum torsional stiffness and low weight.

I make my hinges myself (fit 6). I round off the leading edge of the flaps and elevators and hollow-cut the trailing edge of wing and stabiliser to match. This makes for a hinge line that prevents air leaking from one surface to the other, and that means a more efficient flap or elevator. The hinges are made of a strip of 1.5mm dural, with a bushed hole on one side, through which a 1mm piano wire is bent in a U shape. The dural strip is glued into the trailing edge of wing and stab and when the model is painted the wire is glued into the flap or elevator. See Fig 2.

The size of the tailplane is also changed to 25% of the wing area. This means a span of 72mm, root chord of 17.5cm and tip chord of 12cm.

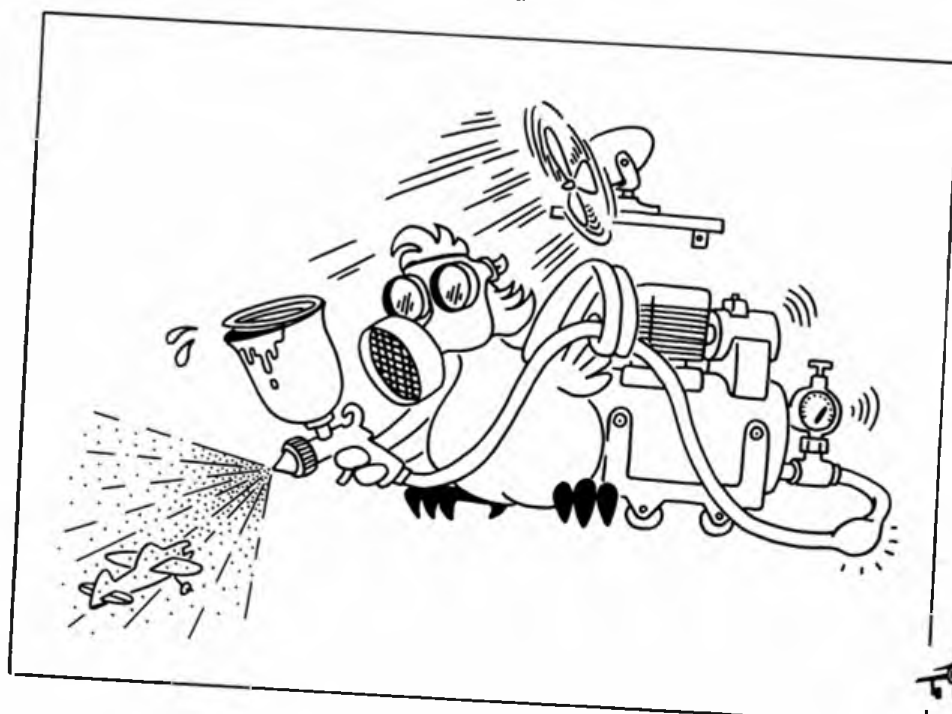
For covering I use lightweight tissue on top of lightweight silk (*Graupner*, 14 gram/m²) on the open area and only lightweight tissue on all sheeted areas. This covering is a lot of work but both stronger and lighter than heavyweight tissue.

After doping I spray my stunters with two part acrylic car paint, which is fuelproof and available in a lot of colours. But it is also very poisonous when spraying, so spray it only in a room with very good ventilation and wear a professional spray mask. If you can smell the paint when you spray the mask is no good!

A word about motor mounting. I have found that in most cases when a motor will not run properly, it isn't mounted properly. I use beech motor mounts, with 2mm dural plates under the motor. I use M5 brass bolts, drilled through with a 2.5mm diameter hole and tapped M3. The head of the bolt is filed down to a thin flange to save weight. The motor mounts are drilled and tapped M4, the M5 bolts with M3 inside are epoxied in these holes and the top of the bolts are filed flat with the top of the mounts. This way you can screw the engine in tight, without distorting the motor mounts. No oil can get into the wood to weaken it.

The rest of the fuselage is not much different from the Werwage version, apart from the removable wing mounting. I use very thin (0.5mm) ply doublers and cover the inside of the fuselage sides up to the wing with lightweight glasscloth to prevent fuel seepage. The top of the fuselage is made of 3mm wood, bent wet over a mould made of styrofoam with a balsa bottom plate, or solid balsa. The 3mm sheet is soaked in warm water with a little ammonia. The wet wood is bent over the mould with bandage and left to dry at least 24 hours. When dry, I add the formers the trim the shell to size, I find this a lot easier than carving a block and it is lighter and stronger.

I was very satisfied with my Juno and I can recommend this design to any stunt pilot. It brought me a twelfth place at the World Championships and I plan to fly it again next season.



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MILITARY SERIES - FOAM	
Will convert to CO ₂	
Zero 20"	5.70
ME109E 19"	5.70
Mustang 19"	5.70
Spitfire 19"	5.70
MICRO MOLD	
Piper Super Cub 24"	7.10
Designed for Telco Turbo Tank 3000	
CO₂ AIRCRAFT KITS - STANDARD	
Starhawk 19"	3.70
Skyranger 19"	3.70
Attacker 19"	3.70
TELCO ENGINES	
Standard	13.95
3000	16.95
6000	17.95

RETROFIT UNIT - Tank Section only for fitting to your own Telco	
3000	9.25
6000	10.45
(To order only on above 2 - approx. 2 week del.)	
MODEL HOB - RUBBER POWER	
Master Low Wing 28 $\frac{1}{4}$ "	12.95
Stinson 31 $\frac{1}{2}$ "	11.50
Nieuport Bi-Plane 24"	12.95
SESA Bi-Plane 24"	12.95
Can convert SES to CO ₂	
FW 190 D11 20 $\frac{1}{2}$ "	12.95
Spitfire IX 21 $\frac{1}{2}$ "	12.95
Can convert above 2 to control line .049.	
CONTROL LINE	
Smousen 24 $\frac{3}{4}$ " (2.49cc)	16.95
Baron 30 $\frac{1}{2}$ " (3.5cc)	25.95
ENGINES PAW DIESEL	
80 STD	16.68
100 STD	16.68
149 DS3	18.40
149 Contest 3	19.55
249 DS3	20.70
249 Contest 3	21.85
19 DS3	23.00
29 DS + Silencer	36.80
35 DS + Silencer 41 40	
80 R/C	21.28
100 R/C	21.28
149 R/C + Silencer	25.30
249 R/C + Silencer	27.60
19 R/C + Silencer	29.90
28 R/C + Silencer	39.10
35 R/C + Silencer	43.70

PAW GLOW	
Paw 149	21.28
249	22.43
149 R/C A/C	27.60
249 R/C A/C	29.90
COX	
Pee Wee 020	19.95
049 Black Widow	21.95
049 Babe Bee	18.95
049 Glowhead	2.95
UNION - SUPERB KITS FOR JAPAN	
Electric Charge Planes, complete with charger pack & motor. Fly very well!	
Cessna 150	19.99
Bellanca Champion	19.99
Sky Hopper	19.99
New Cessna 172 Skyhawk	24.99
FLYING FOAM PLANES	
Zero	5.25
Mustang	5.25
Spitfire	5.25
Cessna 180	6.59
Ryan	12.99
Pussmoth	12.99
Cessna 182 Skylane	16.99
BALSAWOOD FLYERS	
Super Chipmunk	12.99
Piper Cub	12.99
Aero Star	11.49
Try I	11.49
Piper J3 Yellow Cub	14.99
Cessna 150 Omni Flyer	17.99
RADIO CONTROL KITS BEN BUCKLE	
Super Sixty	36.25

Super Scorpion	43.50
Red Zephyr	43.50
Quaker Flash	33.00
Flying Quaker	46.75
Playboy Senior	35.75
Fokker DVIII	36.25
Buccaneer	37.75
Trenton Terror	35.75
Hecat 48"	19.25
Flair Junior 60	31.95
Black Magic	27.90
KEIL KRAFT BALSA WOOD KITS GLIDERS	
Nomad	4.59
Dolphin	3.99
Conquest	4.59
Caprice	10.49
Soarer Baby	6.39
Chief	14.95
FREE FLIGHT GAUCHO	
Gaucho	11.49
FLYING SCALE	
Spitfire	3.49
Hurricane	3.49
Westland Lysander	3.49
FW 190	3.49
ME 109	3.49
Farey Gannet	3.49
Percival P56	3.49
Chipmunk	3.49
RUBBER POWERED	
Pixie	4.79
Gipsy	9.99
Senator	6.99
Competitor	6.99
Ace	7.99
Eagle I	4.79
Achilles	4.79
Ajax	5.99
*Includes Rubber	

CONTROL LINE (KEILKRAFT/VERON/MERCURY)	
Champ	12.99
Phantom	11.99
Ranger	11.99
Colt Trainer	10.99
Nipper	8.99
Radian	9.95
Halo	11.95
Cobra	17.66
Crusader	35.75
VERON GLIDERS	
Phoenix	12.95
TRUEFLITES	
FW190	2.99
ME 109	2.99
SE 5A	2.99
MINISCALE SUPER CO.	
Piper Vagabond	6.99
Dart Kitten	6.95
Sp. of St Louis	6.99
Aeronca	8.99
POWER DURATION	
Cardinal 35"	10.49
Deacon 52"	18.99
Sky Skooter 48"	17.49
MERCURY GLIDERS	
Tiger Moth	14.99
DPR	
Rare Bird	7.50
Hypercub	11.95
New 1986 Aero Models/R.C. Handbook 1.85	
Basic Aeromodelling 5.95	
Above inc P&P	
Arden Units	2.00
6" Balsa Props	0.85
30 Sec. Timer	6.95
Control Line Handle	1.92
Control Line Connectors (2)	0.54

APPENDIX - LINKS to the Plans

The original issue comes with two free plans (Notwun, Pomilio) printed front/back on a pull out banner of four sheets. The banner is not included in this document.

Skylark II (revisited) by H.J. Pridmore

FF Power Semiscale from 1947

https://outerzone.co.uk/plan_details.asp?ID=2356 ...

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Notwun by Jym & Dave Leddy

CL Vintage Style

[https://www.hippocketaeronautics.com/hpa_plans/det ...](https://www.hippocketaeronautics.com/hpa_plans/det...)

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Pomilio by Vic Smeed

FF Power vintage style

https://outerzone.co.uk/plan_details.asp?ID=2357 ...

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