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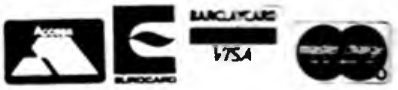

AERO MODELLER

SEPTEMBER 1983

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Page 420

Page 431

Page 440

Cover

"Samba" Claus Maikis' attractive design stunter for 4 stroke motors — could this be a new trend? Plan feature on this model can be found on page 412 of this issue. Inset, "Fred" and "Piper Cub", both these scale rubber models can be found on the free pull-out plan section of this issue. In the right hands both can put up remarkable performances.

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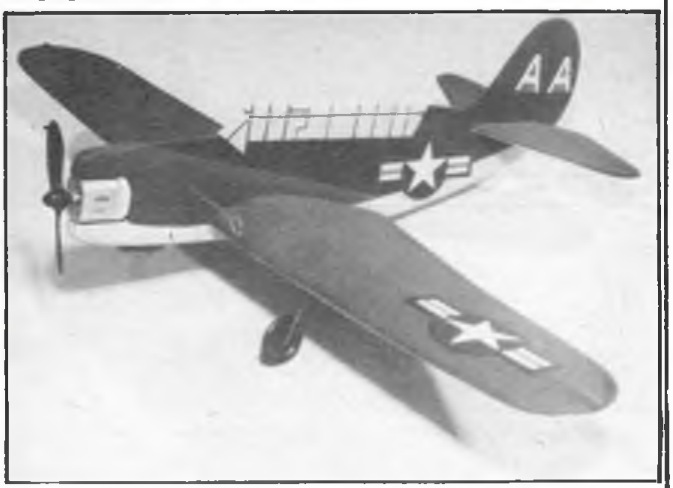

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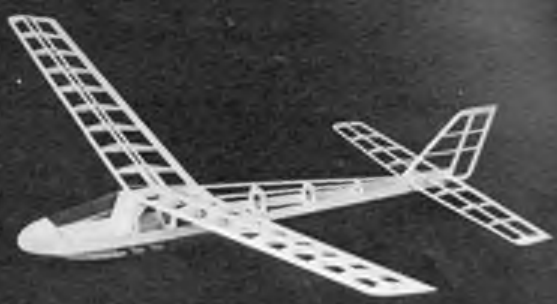

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HEARD AT THE HANGAR DOORS

Typical of almost 1,000 light aircraft at the Cranfield P.F.A. Rally, this Piper Cub, ex-Italian Air Force (below). See "Home Builts at Cranfield". Right, Martyn Cowley ex-Aeromodeller Editor now resident in USA, with A/1 record breaker. See below. Far right, "Castor" again, for explanation see "R. Moore's Castor."

Letter from Martyn, our 'ex-Ed'

By comparison to British Nats, the F/F Champs at Taft has many more events with generally fewer entries — a common problem of many events these days. However from a variety standpoint no other meet compares with indoor events, outdoor, old timer, night flying and catapult glider. Furthest travelling competitors included our own Paul Masterman making his annual pilgrimage, and Canada's Pete Allnut. The US FAI Teams were strongly in evidence — flying each round as a three man unit, under the guidance of manager Roger Simpson, complete with radio contact retrieval and thermal picking crews. They took first individual in F1A, Jim Bradley F1C, Rol Anderson, with Steve Beebe 2nd in F1B. Watch out Australia, these guys mean business. A major spectacle proved to be Bob Meuser's 6.30am unlimited rubber one flight 'Mulvihill' event with close to 30 competitors making unassisted flights of up to 10½ mins — if only Phil Ball or Hipperson had been there! The Wakefield equivalent is the 'six minute club' at 6am. Everyone winds up and flys in dead air trying for a magic '360' sec — believe it or not many top flyers are consistently making 5½ mins. Indoor HLG was a real showdown, imagine the Stoy brothers, of 'Coot' fame, Mike and Stan (who has made a single flight of 93 sec) battling against Ron Wittman the official world HLG record holder at 90 sec and Lee 'Sweepette' Hines — two really dramatic contests with competitors taking turns to have the floor to themselves — ultimately Stan proved to have the 'right stuff.'

My own weekend went almost flawlessly. One mistake in F1A 5th round placed me 8th, having been one of only a handful to max the 1st 7am round. In HLG I made 3 × 2 mins maxes plus 7 fly off rounds each of 2 mins followed by a 1:20 for a 21:20 total beating the legendary Bill Blanchard's 1974 milestone record of 20 mins — dare I tell you I built the model on Wednesday night, before the event!

I had not flown my A-1 for exactly one year since the previous Champs. One test flight confirmed it still flew, I don't believe in over-training. Then followed 5 × 2 min maxes plus fly-offs of 3 min, 4 min, 5 min, 6 min, 7 min and finally 5:48 going for 8, putting 12 minutes on my own National record. All models are now safely back in the box waiting for the lid to be lifted on a calm spring morning somewhere in Australia. I can't wait!

Martyn Cowley — *Simi Valley, California*

Home-builts at Cranfield

Wandering the lines of parked aircraft at Cranfield during the Popular Flying Association Rally, any enthusiast for scale flying models could have been excused if he thought himself transported to heaven. Almost 1,000 individual aircraft visited this Bedfordshire airfield over the first few days of July, and at any time one could see more than half that number at the hallowed grass. We were particularly smitten by the increasing number of Piper Super Cubs which are finding their way to the UK after service in Belgian and Italian Air Forces — each of them operated by groups who find the Cub a remarkably economic way of gaining air experience. We were equally impressed by the large number of aeromodellers around.

Home-built aircraft are a natural follow-on from aeromodelling as was well publicised in the Sunday Express magazine of July 17 were Brian Bray's beautiful Pitts Special was a main feature. The reporter was observant enough to mention Brian's models and those made by his son Matthew.

Learning to fly is a frighteningly expensive business these days. Flying schools quote around £2,200 to take a pupil through 38 hours flying instruction, plus ground training to licence standard. Oxford Air Training School have just announced a scheme which they call a 'potential' pilot training course. Two weeks residence at Kidlington provides the trainee with a minimum of 12 hours flying through to a first solo flight with all ground instruction, board and lodging for £840. The many gliding schools offer similar courses at considerably lower rates for those who want to gain air experience. It depends how serious one wants to be; but just one look at the PFA Rally should have been enough to convince any visiting modeller that private flying is still within the reach of Mr. Average through the Popular Flying Association groups and 'struts' operating light planes which still represents the good old traditional wooden fabric structures.

Plumpton Model Show

If vintage flying isn't your scene, why not pay a visit to Plumpton Race Course near Brighton Sussex where the Plumpton Model Show is to take place on Saturday and Sunday August 20/21. Irrepressible Dave Bishop is the organiser of this 'do' which includes R/C Aircraft Boats and Cars, Live Steam, Microlights, Model Ricketry, Trade Stands, Helicopter Rides and more. Caravans and tents are welcome, contact Show Manager John Blackman, 44 Wilson Road, Tonbridge, Kent. Tel. Tonbridge 351738 for further details.

R. Moore's 'Castor'

Aficianados for the delightful designs produced by the late C. Rupert Moore were a trifle mystified to say the least when a picture of the master and his prototype twin motor *Castor* appeared in our AEROMODELLER photo prize feature on page 180 of April issue. The caption stated that it was a fine model from J. Beresford of Trowbridge, Wilts. An attempt was made to apply a correction to this inaccurate statement (it was the *photograph* that came from J. Beresford) but in the course of going to print, confusion was compounded.

To set the matter absolutely right we are reproducing the photograph again and wish to emphasise that it is of the late C. Rupert Moore displaying his own original Castor, a design which was used as a flying test-bed for the patented Moore drive.

Apologies to all concerned, particularly the Moore family for the embarrassments which have been created and which we now trust are thoroughly cleared up.

Super Gloy Chuckie Champs takes off

The Super Gloy Chuckie Champs, jointly promoted by *Super Gloy* and *DPR Models* has really taken off in a big way, with schools and youth groups all over the country participating in addition to the individual entries at various model shows.

So far the following youngsters have qualified for the Chuckie Championships final at competition heats run by *DPR Models*.

Peter Sillwood, age 12, Stoneleigh, Sunday May 29.

Darren Bellworthy, age 6, Stoneleigh, Monday May 30.

Matthew Hogan, age 12, Free Flight Nationals, May 28, Saturday.

Lee Dolly, age 12, Free Flight Nationals, May 29, Sunday.

J. Williams, age 9, Free Flight Nationals, May 31, Monday.

Anthony Bowyer-Lowe, age 9, Pontins Model Makers Festival, Hemsby, June.

Peter Sillwood, who won the competition heat at Stoneleigh on the Sunday May 29, read about the competition in the 'Aeromodeller,' bought a 'Chuckie' from his local model shop, built it and travelled to 'Stoneleigh' especially to take part in the event!

Similar effort was rewarded for young Darren Bellworthy, age 6, who was very disappointed when he failed to qualify for the finals during the MAP Holiday Week at Filey. Then Darren unfortunately arrived too late to take part in our competition at Stoneleigh on the Sunday, but achieved the best flight

on the Monday to become the youngest finalist so far!

On the first day of the Free Flight Nationals at RAF Barkston Heath the wet weather did not dampen the enthusiasm of the youngsters taking part in the 'Superfighter' Competition using slot-together 'Spitfire,' 'ME109' and 'Mustang' rubber powered aeroplanes. Despite the continual rain, all the youngsters turned up at two o'clock with their models and wet weather gear and took it in turns to run out from the marquee to join David and Janine Rawlins under a huge umbrella to launch their models. It all seemed to add a new dimension to the competition and many onlookers were surprised that anyone could fly under such conditions!

An additional venue at Plumpton Race Course on August 20 and 21 has been added to the list of competition heats providing two more chances to qualify, and it is hoped that a 'Superfighter' competition will be held each day with lots of free kits for the best flights!

Anyone under 13 who has a 'Chuckie' model and is attending the SMAE Nationals R/C and C/L Championships on August 27, '28,' 29 should be reminded to bring it with them, alternatively, why not build a new one on the day in the *DPR Models* Junior Workshop!

The last DPR's own competition heats will take place at Pontins Brean Sands, September 24-October 1.

Don't forget the closing date for entries is September 30, and that *every* finalist will receive an 'exclusive' Supergloy Chuckie Championship T-Shirt and a *DPR Models* 'Rare Bird' kit, with some fabulous prizes for the overall winners! These will be presented at the Championships which will be held at Middleton Hall, Milton Keynes on October 16, 1983.

Finally, an open invitation is extended to all Indoor Flyers to join the finalists for a general 'Fly for Fun Day,' and enjoy the excellent facilities of Middleton Hall, starting at 10.30am. There will be no charge for admission or participation since all costs will be met by DPR, and anyone requiring further details should contact them direct at Unit 9, The Vanguards, Vanguard Way, Shoeburyness, Essex SS3 9QY or telephone (03708) 5110.

Aeromodeller Vintage Day

For many, the highlight of the Vintage modelling year just has to be the Aeromodeller Vintage Day at the Shuttleworth Collection airfield at Old Warden, Bedfordshire. This year's event takes place on August 21 and promises to attract more models than ever before; make sure you are there good and early for a great day.

1946 Bowden Trophy

John Wassell of Hayes and District MAC has written to us to clarify a possible misapprehension concerning 'Vintage Revival' in the July issue. He says: "With reference to the item in July 'Vintage Revival' concerning the 1946 Bowden Trophy winner, I think the majority of readers will get the impression that Alex Wilson designed and built the model in 1946. It is, in fact, a pre-war design and this could be a point of interest to would-be builders, especially those who feel that post-war models are not truly vintage.

A photograph of the same model, being prepared for take-off at Fairey's Aerodrome during the August Bank Holiday contests, appeared on page 663 of the October, 1939 issue of Aeromodeller."

FAI's Fair

Confusion abounds among readers, particularly newcomers, over the identification of those coded categories for various models which form the international competition classes as administered by the Federation Aeronautique International. The abbreviations have become recognised in all the nations which participate in FAI events but to the average Sports flier, they remain so much gobbledegook. Here's what they mean:

Free Flight (F1)
- F1A Gliders
- F1B Rubber powered
- F1C Piston engine powered
- F1D Indoor
- F1E Slope Soaring
- F1F Helicopter
- F1G Coupe d'Hiver
- F1H A/1 Glider

Control Line (F2)
- F2A Speed
- F2B Aerobatics
- F2C Team Race
- F2D Combat

Radio Control (F3)
- F3A Aerobatics
- F3B Thermal Soaring Gliders
- F3C Helicopter
- F3D Pylon Racing
- F3E Electric
- F3F Slope Soaring Gliders
- F3G Powered Gliders

Scale (F4)
- F4A Free Flight
- F4B Control line
- F4C Radio Controlled
- F4D Helicopter

Aeromodeller Vintage Day SAM 35 Events

Event	Model	Event type	Rules
Junior Achilles Competition	'KK Achilles'	Duration	3 rounds
C. Rupert Moore Memorial Trophy	'Jackdaw II'	Precision	Qualify + 3 Flts for % error
Danny Sheelds Trophy	A & T Frame Twin Pushers	Mass launch (hand)	Last down wins
Chobham Trophy	Wakefields Pre 1951	Mass launch (hand)	Highest one after 45 secs wins
Earl Stahl Trophy	12 Low Wing Earl Stahl Designs	Duration	Scale + Flt
C. A. Rippon Trophy	Six Variants of 'Cruiser Pup'	Duration	Best of 3 flights
J. Haggart Memorial Trophy	Power Pre-Dec '48	Precision	As for Bowden Trophy
Fireball Trophy	Control Line Pre-1950	Fun	Vintage performance

What's On . . .

August 20/21 **PLUMPTON RACECOURSE MODEL SHOW.** Radio controlled helicopters, aeroplanes, cars and boats. Camping facilities available. Pre-entry please. Details: Dave Bishop, 17 The Square, Tatsfield, Kent. Tel: Tatsfield 550.

August 21 **SCOTTISH VINTAGE EVENT.** Scottish aeromodellers will have their own vintage event concurrent with the Aeromodeller Vintage Day on August 21. Site for the event is Newbigging and is open to all Scottish vintage enthusiasts. Further details may be obtained from Bruce Duncan, Burngrange Farm, Burrelton, Perthshire, Scotland. PH13 9PL. Tel: 08287 374.

August 21 **AEROMODELLER VINTAGE DAY.** Venue: Old Warden, Biggleswade, Beds.

August 21 **COLCHESTER MAC.** Mini fun 100's contest. % Scoring. Best of 3 out of 4 rounds plus fly off. Trophies, spot prizes and champagne for longest flight of the day. £1.50 + freq. + 2 to: Caroline Close, Broadfields, Wivenhoe, Colchester, Essex.

August 27/29 **CONTROL LINE & RADIO CONTROL NATIONALS.** Venue: Barkston Heath.

AUGUST 27/28/29 **INDOOR NATIONALS.** Cardington. (Note: Hangar entry fees are £2.00 per flyer and £1.00 each for spectators). Sa: 35cm film Manhatton Bostonian CO. Duration. Sun: E2B pairs final (AGM Trophy) E2B Individual (Houlberg Silver Medal). E2B Open 1.2 gram to SMAE Rules. Mon: Microfilm to current FAI rules class F1D (Aeromodeller Trophy). Open Microfilm (Humbrol Trophy). Contact: Laurie Barr. Tel: 0628 25595.

August 28/29 **EUROPEAN CHAMPIONSHIPS TEAM TRIALS PART II.** F1A, F1B, F1C. 7 rounds. Contact: Dave Hipperson. Tel: 01 207 0179.

August 28/29 **PENN MODELS FLYING DISPLAY.** Venue: Weston Park, Weston-under-Lizard, on A5 between Shrewsbury and Wolverhampton. Contact: William Melrose, 37 Sandringham Road, Stafford. Tel: 0785 51016.

August 29 **LUTON OMAS.** 4 Fly In. Venue: The Bowl, Milton Keynes.

September 4 **SMAE INDOOR EVENT.** RAF Cardington. (Contact Laurie Barr, Tel: 0628 25895).

September 4 **ROLLS ROYCE ANNUAL SCALE RALLY.** Venue: RR Airfield, Hucknall, Nottingham. Details: SAE to P. Knight, 10 Newfarm Lane, Nuthall, Nottingham. Tel: Nottingham 383551.

September 4 **5TH AREA CENTRALISED** *KEIL TROPHY. TEAM OPEN POWER (PLUGGE POINTS). A/1 GLIDER. GUTTERIDGE TROPHY. F1B WAKEFIELD.* Area Competition Secretary.

September 4 **ROLLS ROYCE ANNUAL SCALE RALLY.** Venue: RR Airfield, Hucknall, Nottingham. Details: SAE to P. Knight, 10 Newfarm Lane, Nuthall, Nottingham. Tel: Nottingham 383551.

September 11 **ULSTER C/L CHAMPS.** Venue: Craigavon, Co. Antrim.

September 10/11 **R/C NATIONALS.** Venue: Ballintaskin, Calary, Co. Wicklow.

September 11 **NORTHERN GALA.** *HAMLEY TROPHY. OPEN POWER. CMA CUP. OPEN GLIDER. CATON TROPHY. OPEN RUBBER.* Contact: Northern Area Secretary.

September 11 **LEE BEES MAC** *OPEN C/L STUNT (F2B). CONTEST (NO NOVICE).* SMAE members only. SMAE card required for entry to airfield. Venue: HMS Daedalus, Lee on Solent, Hampshire. Signposted from sea front. Entry to contest £1.00, on field from 10am. Top judges and trophies. Contact: Mick Harvey. Tel: Stubbington 665232.

September 11 **SMAE INDOOR EVENT.** Contact: L. Barr. Tel: 0628 25595.

September 11 **SMAE NORTHERN GALA** *C/L A. FAI GOODYEAR TEAM RACING. COMBAT and AEROBATICS. F/F O.R.O.P.O.G.* plus supporting Area Events of *VINTAGE DURATION, A1 GLIDER, C'dH and ½A POWER.* Venue: Church Fenton. Contact: John Godden, 14 Foster Close, Morley, Leeds, LS27 9NH. (SMAE members only and restricted car parking).

September 11 **SHUTTLEWORTH MODEL GROUP SILENT FLIGHT OPEN DAY.** No diesel, glo plug or petrol engined models. Everything else welcome — rubber, glider, CO, electric, compressed air, etc. Gates open at 9am. Contact: Mick Staples. Tel: 0223 241978.

September 11 **WROUGHTON OPEN DAY 1983.** Static displays and working demonstrations of agricultural machinery, fire fighting, space science and transport of all sorts, shapes and sizes. Venue: Science Museum, Wroughton Airfield, Nr. Swindon, Wilts. Contact: Miss Emma St. John Smith. Tel: 01 589 3456 Ext. 562.

September 18 **CONTROL LINE A COMBAT COMPETITION.** Venue: Dewsbury. Contact: B. Temperal. Tel: 0924 270690.

September 18 **OPEN RUBBER TROPHY** at Barkston Heath. Pre-entries by September 9. Senior £2.00, Junior £1.00. Field entry double. Starts 10am in rounds. Entry: Dave Hipperson, 35 Anthony Road, Boreham Wood, Herts WD6 4NF.

September 18 **15TH TOWNER TROPHY FOR THERMAL SOARING.** Venue: Golden Cross, Sussex. Contact: N. F. Couling, 7 The Green Walk, Willingdon, Eastbourne, East Sussex.

September 18 **2ND ELLIOT CONTROL LINE RALLY.** FAI Teamrace, Goodyear (incl. Class 2), B Teamrace, Carrier, Aerobatics. Venue: Marconi Avionics, Rochester, Kent. Contact: Peter O'Neill. Tel: Sevenoaks 457899.

September 18 **PETERBOROUGH MFC** *4TH ROUND OF CLASS A BRITISH COMBAT CHAMPIONSHIPS.* Venue: River Embankment. Contact: Brian Waterland. Tel: Market Deeping 343722.

September 25 **SMAE C/L TEAM TRIALS.** *F2A, F2B, F2C, F2D.* Venue: Three Sisters. Contact: R. Horwood. Tel: Bristol 48769.

September 25 **ROLLS ROYCE VINTAGE FLY-IN** (R/C assist only). Venue: RR Airfield, Hucknall, Nottingham. Optional Texaco Event. Details: SAE to A. Walker, 5 Farm Close, Belper, Derby, DE5 1RY. Tel: Belper 2990.

September 25 **6TH AREA CENTRALISED** *FARROW SHIELD TEAM OPEN RUBBER. POWER SMAE CUP. F1A GLIDER.* Contact: Area Competition Secretary.

October 2 **HESWALL MAC OPEN STUNT & COMBAT COMPETITION.** Stunt prizes for F2B Novice and Junior. Combat is for slow diesel A and A (Peterboro rules). Venue: Neston Recreation Centre. Contact: Jim Major. Tel: 051 355 4075.

October 2 **PETERBOROUGH MFC** *A COMBAT COMPETITION.* Venue: River Embankment. Contact: Brian Waterland. Tel: Market Deeping 343722.

October 2 **SOUTH MIDLAND AREA SMAE OPEN THERMAL SOARING EVENT. BARCS LEAGUE EVENT.** Entry fee £2.00 + SAE + frequency. Venue: RAD Weston on the Green. Contact: J. Shaw, Alvere, Witney Road, Freeland, Oxon, OX7 2HQ. SMAE Members only.

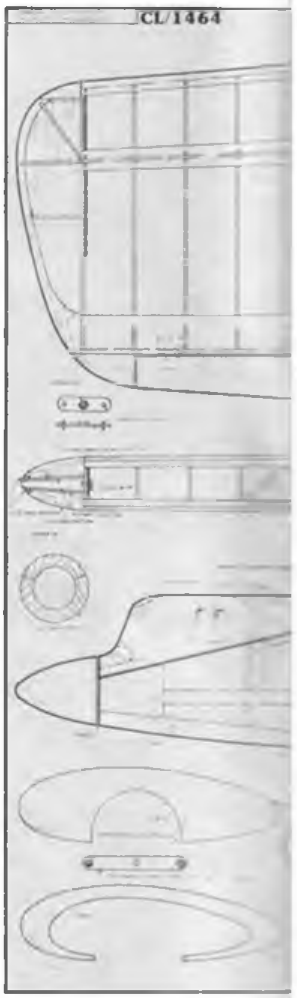
CLAUS MAIKIS offers a quiet revolution in control-line aerobatics with this 52in. (1320mm) span model designed specifically for a .40 size four stroke engine

Samba

I'M IN THAT lucky situation of having a wide range of aeroplanes hanging around my hangar walls, giving me the opportunity to choose the model for the expected weather conditions, set of judges, or my new fashionable dress — white-blue, white-dark red, or white-candy red. So, when designing a new model, I'm not forced to have a special type of aeroplane. The choice is wide open. I may even dare to follow a route which hasn't already been paved with success, but instead is gravelled with adventure, creativity and fun. One reason for a new design might be the new model of my competitor friend, which makes life harder for me. One reason can be my fancy for a certain form, a pretty shape, or an elegant line which I dreamed up during work. Another reason could be just plain curiosity. I think it's mostly the latter which caused me to think 'four-stroke'.

Before seeing Gilbert Beringer's performance with his OS60 FS powered stunter, I wouldn't have considered it possible to fly control-line aerobatics with a four-stroke engine. Half of my (aerobatic) life is a fight against weight and with so heavy an engine, I preferred to forget this possibility. When the OS 40FS appeared on the market, my fantasy started to draw aeroplanes around this engine. But only Beringer's clever design started serious considerations. His model showed that a conventional approach is the wrong one. Usually we design the size of our aeroplanes suitable for the volume of our engine. For a four-stroke engine, the size of the model depends on the performance of the engine, which demands another way of thinking. The weight of the airframe has to be kept even lower than what we are used to, considering the weight of the motor. In my eyes, this calls for a totally new design. Because of the higher specific output of the .40, I chose this size. Nevertheless, I didn't quite trust most of the test reports published about four-stroke engines. All that praise about "high torque at low revolutions" didn't remove my doubts about these engines and their abilities to pull an aeroplane upwards vertically.

First of all, it was clear that I had to forget all I had learned about producing a nice finish (not an easy decision for me). The size of the aeroplane should suit power of the engine, which Graiysner claims to be the same as that of the OS35. So a 35 size model was chosen. With the weight of the 40 FS being almost double that of the 35, the airframe weight would have to allow for 340 gram of engine. This meant that conventional dimensions couldn't be used. As I expected, the need to familiarise myself with the handling — and especially starting — characteristics of the engine, an upright installation was preferred. To be able to build the wing as light as possible, the undercarriage would have to go into the fuselage. In order to compensate for the heavy nose (you can't make it as short as you want, the tank needs some length too) a long and light rear end was necessary. Cut outs in the fuselage sides were considered, but finally were found ugly and impractical. When stringers entered my head, the spark



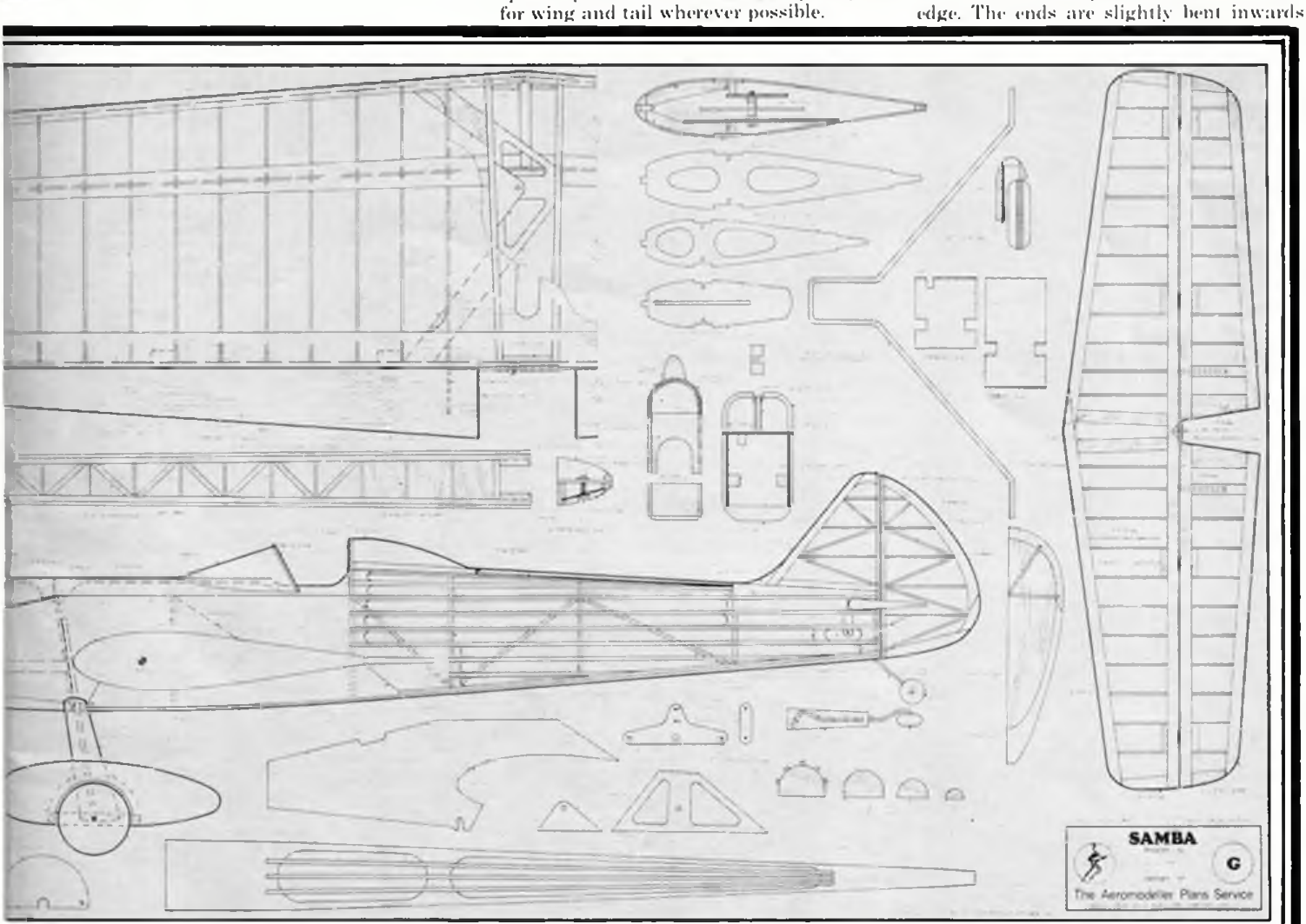
Full size dye-line copies of this plan, shown here at 1/6th full size are available from Aeromodeller Plans Service, PO Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Herts., HP1 4SS, price £3.95, plus 50p post and packaging.

ignited, an old-timer image would kill three birds with one stone. While the stringer construction could save weight, it would also help the nostalgic look, and at the same time allow — no, demand a 'no lacquer' finish.

While I'm not quite happy with every design detail, I feel the general approach was the right way and merely helped to reduce airframe weight. Wing construction looks a little flimsy, but has proved rigid enough to withstand flight loads. Wing sheeting and cap strips were omitted since they usually cost much weight if you don't have excellent wood. Main spar is an upper and lower T-spar, webbed at the inner rib bays, with diagonal struts at the outer bays. There are no tip blocks, just sheet balsa with narrow doublers outboard and a narrow edge block inboard, where a light box allows access to the adjustable line guide. Leading edge is built up from the lightest balsa strip you can get. The groove will accept the rib "tongues", which makes for easy and exact wing construction. Note that the inboard rib spacing is 39mm, outboard 38mm. Thus the outboard wing panel is 15mm shorter. The tip weight box takes about 20gr. of lead ballast. I usually make the ribs by the sandwich method.

The four inner ribs are trimmed by 1.5mm for the planking. The two centre ribs are then glued to 4mm sheet and then shaped again. I prefer home-made flap and elevator horns. The brass horns are silver soldered to the wire, that lasts forever. Build the tail from the lightest balsa, just the main spar may be a little harder. Use cyano glue for wing and tail wherever possible.

Fuselage sides are a bit time-consuming. Cut edges at rear end straight first. Round cut-outs are shaped after stringers are added. Cut out wing outline, but leave this piece in the sheet until wing installation. Use very hard stringers for edges only, medium ones for in between and soft ones for diagonals. When the fuselage sides are completed, assemble fuselage in usual manner. Since I didn't know anything about four-stroke vibrations, I carefully strengthened the former fuselage side connection with triangular blocks. The tail gear floor should be supported by small blocks (not shown on plan). The wheel pants are made of two sheets 6mm tone full shape, one with wheel cutout) and one 15mm centre piece. The brass mount is soldered to the undercarriage. If you want to make the wheel pants removable, I'd suggest strengthening the inner sides with ply doublers, which screw to the brass mounts. Fin and rudder should be as light as possible. Install the rudder with 10° deflection outwards, or make it adjustable. In this case, glue a small ply horn into the block of the rudder and a wire with R C-clevis into planking below stabiliser. Bending the aluminium tube for the windshield can be made easy with a scrap piece of celluloid. With a Dremel or similar, file a slot into the tube. Insert the narrow celluloid piece, bend, then remove celluloid. Only this way the slot will not shut from bending. Now the windshield is formed by heating the celluloid. After cooling, it can be glued into the aluminium frame. The frame is a little longer than the windshield edge. The ends are slightly bent inwards

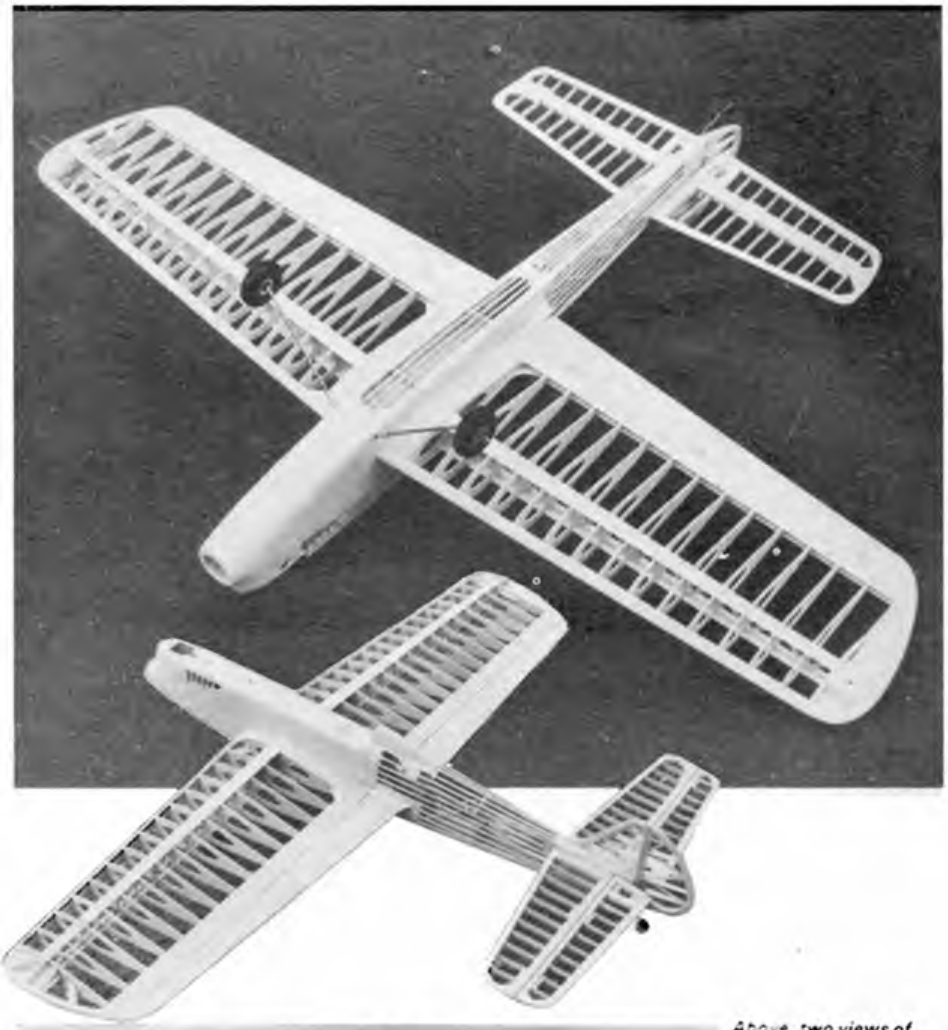


and glued into the fuselage top block.

The strength of the wing and fuselage depends much on the covering. I used medium strength tissue for everything. While heavy tissue may give better resistance to falling screwdrivers and sunglasses, medium thickness provides enough rigidity for warps and for flight loads and needs less dope to seal. This saves you a lot of weight. When heavy tissue is filled with dope, it's much heavier and may lose its elasticity. In quickly changing temperatures, tension of the covering can decrease or may even be totally lost. Use a good fuel resistant dope and apply in many thin coats, instead of a few thick ones. A single colour coat on the fuselage front and wing nose can add some more fuel-proofing — the model is usually more 'oily' here — plus that nostalgic image of aeroplanes of yesterday, if you like that.

Using a four-stroke engine is a different job to what we've been used to. While breaking in the engine, take the opportunity to become familiar with its characteristics. I haven't yet enough experience to feel competent to give much advice on how to handle this type of engine. To my knowledge, in this capacity range, the O.S. is one of the most powerful ones. Add to this the availability of spare parts and full service back-up and the O.S. became the only choice for me. I found starting qualities not as reliable as with a two-stroke engine, but I admit I still have to learn. Warm starts are better so this means a short run before your official flight.

As you cannot reach the carburettor, I've installed a choke in my aeroplane which allows me to suck fuel by closing the carburettor during the suction stroke. It's a simple, spring-loaded see-saw with one arm extending from the engine cowling, the other arm bearing a tin plate with foam rubber disc. If the engine is warmed up and primed with six revolutions (close choke only at suction period × every second turn over), it starts at the first flick — sometimes! You'll need all the power the engine can deliver. Using large diameter props didn't give me good results, the engine slowed down too much in the climb. I had better results with narrow blade props like the *Zinger*, or a *Top Flite* 12x5 with narrowed blades. Presently I fly a three-blade prop made from *Zinger* 11x5. This prop also did wonders for my corners: the exit of all bottom corners is straight and level. Since you always fly near top performance, be very careful when tuning the needle setting. It's all too easy to set the engine too lean. It won't stop as the two-strokes do. It will simply drop revolutions and run with a somewhat harder sound, which you will recognise with some experience. While fuel with less oil content is recommended in many test reports, I had satisfying results with a commercial fuel which contains 5% Nitro and about 22% castor oil. Since performance was marginal, I bought a 13% nitro fuel. With this fuel, the flight time dropped from 6.5 minutes to a scant 5 minutes. So this fuel was mixed with pure methanol. As the oil content is still sufficient, you can add up to 50% methanol (to 100% fuel!), depending on how much power you need. As soon as time permits, I'll build a bigger tank and try more nitro. While this usually increases fuel cost, it is — fortunately — no big problem with four-stroke engines. My present tank contains 55ccm (less than 2oz.) of fuel!



Above: two views of the bare airframe. Stringered fuselage construction is all part of the essential effort of weight saving to suit the four stroke type motor. Selection of light grades of balsa, consistent with required strength is important. Left: close-up of the carefully cowled OS 40 FS motor. Note the air intake and the air exit louvres - total area of exits should be 1.5 times the intake size for efficient flow of cooling air.

Probably, this model is not the ultimate aerobatic aircraft. It flies very steady, very soft, but doesn't like hard corners. You'll have difficulties to keep it under 45° in the square loops. That's the risk you take when designing something completely new. A successor could be made to fly better, of course). Another criticism concerns the rear fuselage. While construction strength is fully adequate for flight, it's not enough for 'grabbing' the model here. Imagine, you don't touch a full sheet where pressure is distributed. Each of your fingers presses on ONE single stringer! You won't have to press long!

If you want to beat your arch-rival, please try one of the proven designs of Messrs. Mannall, Tindal, or Draper, to name a few. If you like to have a change from the traditional square dance, why not try a SAMBA?

FREE FLIGHT SCENE

Dave Hipperson reports

SMAE Fourth Area Centralised ... June 12

For the first time that can be remembered, all three winners at an Area event and the winning club in the team event came from the same Area — South Midland. The high standard shown here being just as much a result of the enormous turn out as having the best weather. Nearly half the National entry flew at North Luffenham as Barkston was unavailable.

Chilton returned to form in his number one class and took Coupe d'Hiver again with the only full score and Cooper continued his remarkable performances in the glider events of the Nationals with yet another fly-off win, even though it was cautiously dt'd. However it was his clubmates in Biggles 'B' team that took the Model Engineer Trophy.

The wind elsewhere, particularly in the South, West and far North, made flying very difficult but Bridges at Merryfield managed three maxes and a couple of reasonable back up flights in FAI Power to at least give Stafford Screen a run for his money. FAI Power for the Astral Trophy had an all-time low entry of six. East Grinstead should not be forgotten either, they did particularly well to take second and third in Team Glider at Ashdown Forest — a site that hardly lends itself to towing and the fancy footwork this entails.

SMAE Fourth Area Centralised Free Flight —

Model Engineer Cup — *individual results 91 flew*

1 J Cooper	Biggles	9 00 + 6 20
2 N Lee	East Grinstead	9 00 + 4 43
3 J Williams	Freebird	9 00 + 4 26
4 M Howick	East Grinstead	9 00 + 3 29
5 W Bates	Biggles	9 00 + 2 36

Coupe d'Hiver — *no trophy 33 flew*

1 M Chilton	EPS	10 00 + 2 19
2 G Ferer	Leicester	9 42
3 J Brookes	Clee Mac	9 38

FA1 Power — *Astral Trophy 6 flew*

1 S Screen	Birmingham	14 57
2 N J Bridges	Cheltenham	12 36

Model Engineer *Team Glider*

1 Biggles B. Bailey, Lavis, Parry	26 19
2 East Grinstead B. Howick, Stevenson, Taylor	25 19
3 East Grinstead A. Lee, Boxall, Cherry	24 39

Plugge Cup Positions after 4 events

Anglia	863
Biggles	858
Birmingham	784
East Grinstead	750
Crookham	688

South Coast Gala ... June 18, June 19th ... Beaulieu Heath

Not since 1969 has this event been staged and then in rather watered-down form on Chobham Common. For its revival, the organisers had taken some trouble to retrieve the trophies long associated with the event and they were presented to the Open winners. It was these that were flown on the first day and in the strong lift/light breeze conditions that so often coincide with major events held on Beaulieu. The fly-offs for these had been scheduled for mid-afternoon after which the first FAI rounds were to be run. By early afternoon the breeze had increased to some 15mph and the fly-offs were put right back to 8pm which is perhaps where they should have been in the first place.

The first FAI rounds produced high scores in all three classes but then the real surprise came with the dramatic weather change that coincided with the second of these two rounds. Over a period of half a minute or less the wind dropped to 5mph or less and swung sufficiently to necessitate a move of control. This drop had come in the nick of time for the Open fly-offs which were now blessed with beautiful calm. It wasn't until nearly 9pm that they got underway but it was very pleasant to use all the available daylight for a change.

Obviously Glider was tricky but Pete Williams flying fairly early on, managed to contact lift for a little over three minutes. Those who followed were to be in action again almost immediately in Rubber and it might have been this that effected their towing patience. The Rubber fly-off was rather more spectacular with an early flight from Kaynes looking high but descending rapidly on the glide. Carter flew next and the eventual second and third placers together almost ½ minute behind him. Carter's climb was high and a slow descent gave him a winning 8½ plus whereas the runners up, who might have just missed the best air, had similar times a minute or so less. Power went to Peers flying early and gliding very slowly in the tail of the good air that had benefitted the rubber flights.

The next morning offered an early re-start to FAI — the final five rounds commencing at 6.30am and even earlier for those interested in Newham Beaumont's Champagne fly-off for FAI Glider, Wakefield and C'dH. Most took a shot at this and all were impressed with the most amusing framed certificates that Newham had produced especially for the occasion. The FAI models at least showed there was lift even this early. However it certainly proved a useful test for man and machine if only to practice towing or winding and launching in a very limited period. Someone managed to wind break and replace five Coupe motors and still launch inside the five minute deadline. You try it!

Quite soon after this, the breeze began to increase and although very clear and warm, it was obvious that we were in for a windy day the wind fortunately blowing in one of the best directions. Phil Uden topped Wakefield, his only lost time being on the two flights the previous evening. John Williams had sweet revenge over Pete Williams in FAI Glider and FAI Power proved rather a fly-over for Screen. With the wind, came enormous thermals and the Mini classes were very much at their mercy. The high totals in C'dH from Neil Cliff and Pete Michel both representing lost models. Rodgers' winning total in ½A Power comprising four straight maxes and a disasterous 58 seconds to finish off with. Many had been the victim of the enormous sink patches that lurk around this venue when the sun shines.

There had been some teething troubles with this adventurous Gala but the general idea of mixing the starts and running some events over the two days maintained interest well. The sad fact was that too few people came — far less than expected. Barbara and Ted Tyson who gave up another weekend to run the event deserve your attendance in vast numbers next year. Beaulieu is an ideal site in mid-summer, lots of space, no crops and usually fine sunny weather to enjoy even if you drop a flight. Make a note for next year.

South Coast Gala, June 18 & 19 ... Beaulieu...

Results

Open Glider *(7 flew)*

1 C P Williams	Richmond	9 00 + 2 06
2 D J Wain	B&W	9 00 + 2 06
3 J Carter	Falcons	9 00 + 2 04

Open Rubber *(8 flew)*

1 J Carter	Falcons	9 00 + 8 37
2 D Hipperson	Grantham	9 00 + 7 40
3 D Wain	B&W	9 00 + 7 24

Open Power *(8 flew)*

1 R Peers	Falcons	9 00 + 6 14
2 P Harris	Birmingham	9 00 + 6 06
3 S Screen	Birmingham	9 00 + 5 29

Champagne Fly-offs *6 00am Sunday (22 flew total)*

F1B	I Kaynes, Croydon	4 09
F1A	D Wain, B&W	4 12
CdH	Stafford Screen, Birmingham	2 41

A/1 Glider *(4 flew)*

1 G Madolin	Crookham	8 05
2 K Smith	Crookham	7 42
3 C Pudney	Southampton	7 04

C d'Hiver *(7 flew)*

1 W N Cliff		9 25
2 P Michel	Croydon	9 11
3 P Carter	Croydon	8 19

1/2A Power *(8 flew)*

1 L Rodgers	Swindon	8 58
2 P Harris	Birmingham	8 39
3 D Wain	B&W	7 51

FAI Glider *(8 flew)*

1 J Williams	Freebirds	19 45
2 C P Williams	Richmond	17 45
3 D May	S Bristol	16 25

Wakefield *(7 flew)*

1 P Uden	Crookham	20 42
2 I. Kaynes	Croydon	19 16
3 J Barnes	Liverpool	17 18

FAI Power *(3 flew)*

1 S Screen	Birmingham	11 20

Andrew Crisp reports

Oxford MFC Spring F/F Rally Port Meadow, May 22 1983

Holding a competition on a relatively small water-bordered field is always a bit of a gamble, as is banking on a dry day in our rain sodden spring of 1983. As luck would have it, Sunday May 22nd when the Oxford MFC Spring Rally took place, was neither too windy (I think only one model was lost, and that on dethermaliser failure), or too wet, as there were only a couple of small showers which held up the proceedings.

The contests, apart from HLG, were held in five long rounds which maintained interest throughout the day and 'spread out' the weather, so to speak. Entries were respectable in A/1 (or should it be FIH? and Coupe d'Hiver, considering it was the week before the Nationals, but rather low in HLG and Vintage, which is surprising considering all the publicity which has been

given to this growing movement. It seems that Vintage enthusiasts like to build replicas of machines that were contest models in their day, yet fight shy of using them for the purpose for which they were designed, when an opportunity is created for them.

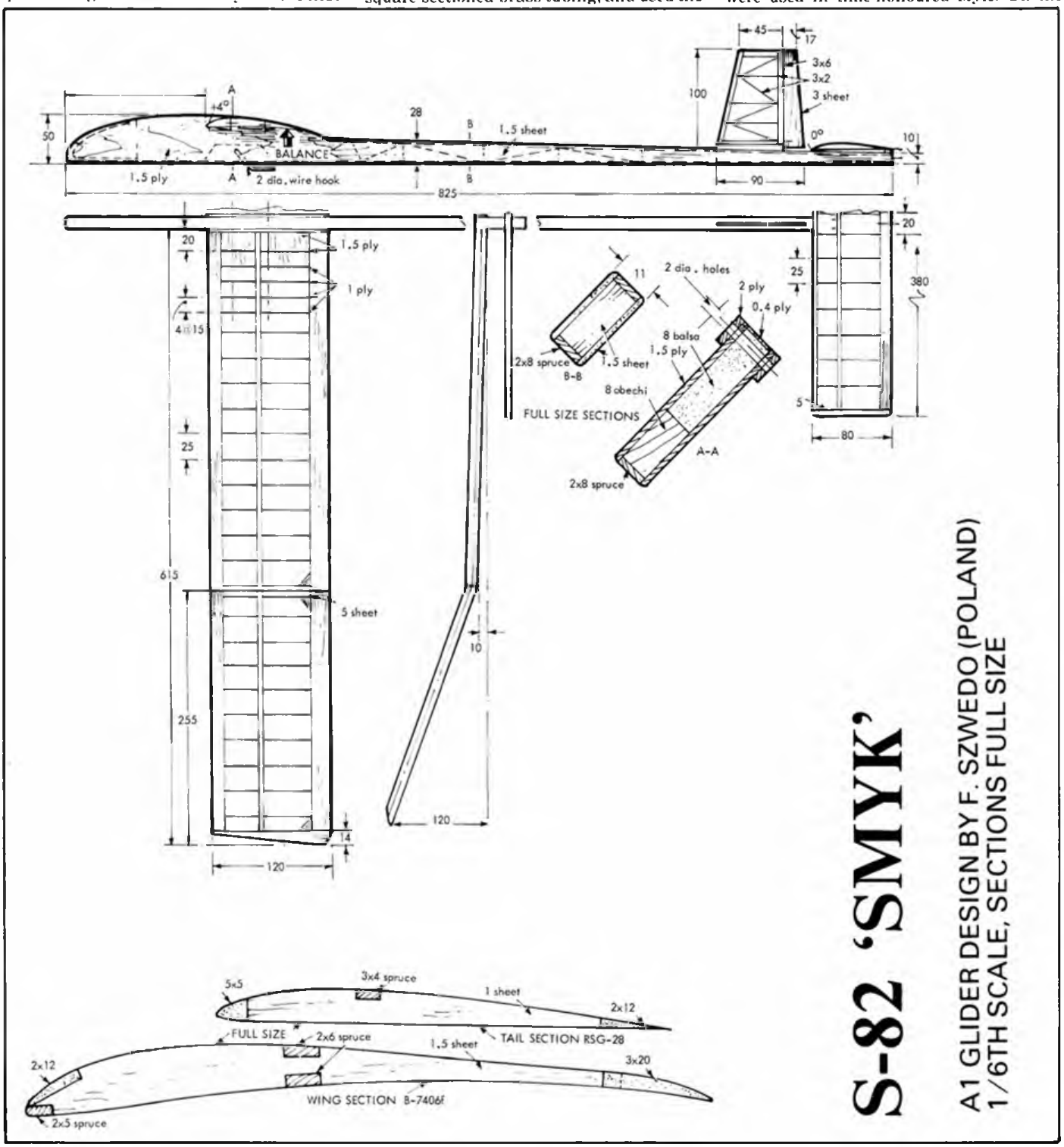
The light wind coming from the west over Wytham Woods gave no flying problems but the mild turbulence it produced made lift picking difficult. A flight would often start well, particularly in C'd'H and then the model would be dumped down quicker than intended on the glide.

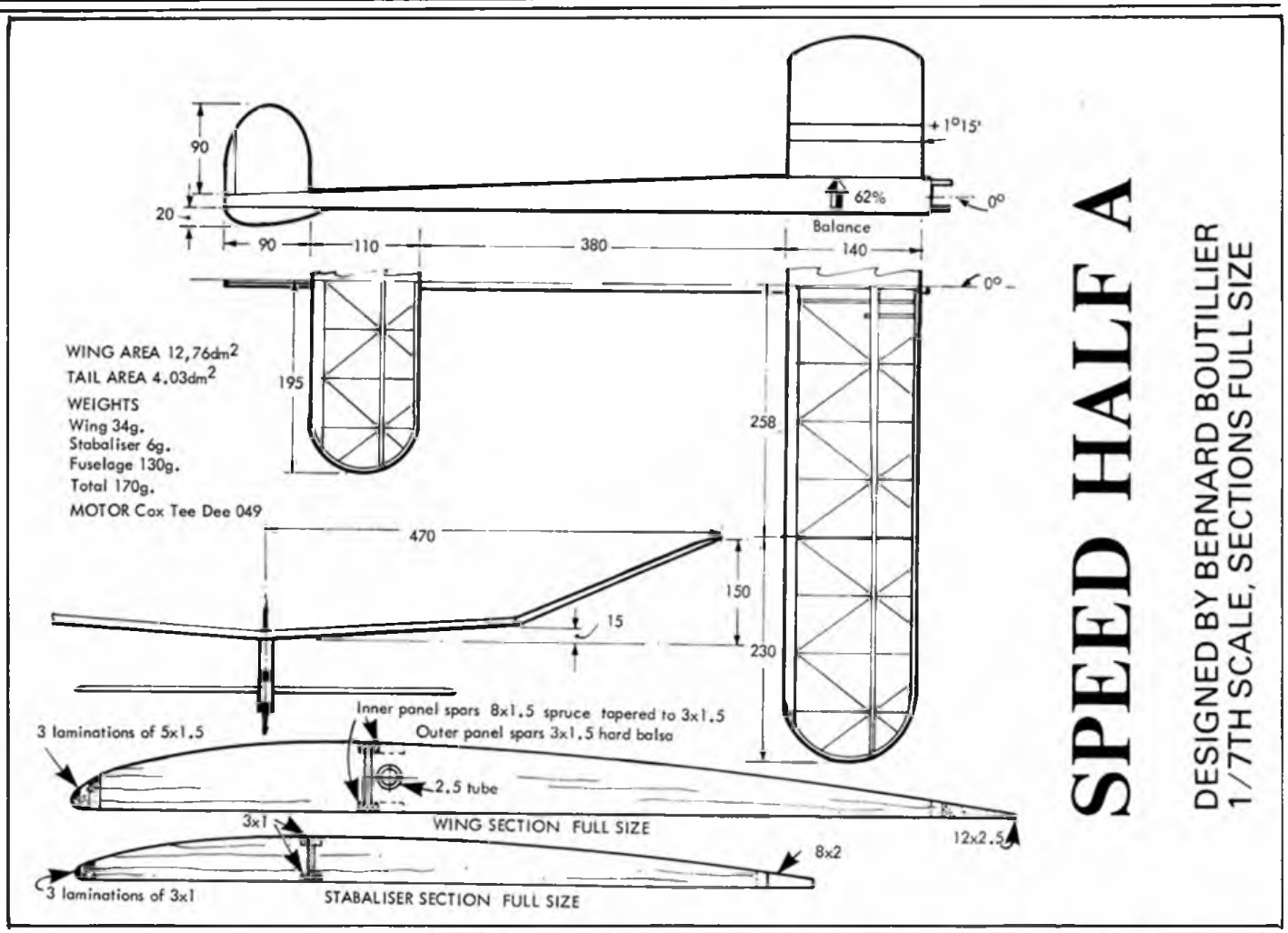
A/1 saw a runaway victory for Ken Smith of Croydon with four maxes sandwiching a 1:09 on the third flight. His model featured a simplified 'Russian' circle-tow unit and went away very positively in lift which was quite strong for such a dull day. On the first flight he had a mid-air collision at great height with another glider. Both soared on unharmed to make their maxes. Gary Madelin of Crookham started modestly with sub-max flights, but sneaked through at the end to beat Martin Dilly into third place by one second.

Coupe d'Hiver rubber had a cliff-hanger finish. Dave Greaves who had flown 'on rails' all day looked set with four maxes in four flights. On his last he hit turbulence and was down in 1:20. Maxes at the final stage allowed man-of-the-meeting Martin Dilly and Pete Harris of Birmingham to pass him into first and second places.

The winner used two models of French influence, both with built-up fuselages and outrigger props. The prop hubs of Peter Harris' models were neatly fashioned from square-sectioned brass tubing, and used the 'freewheeling folder' system which predated the now much used 'Montreal Stop.' Third placer Greaves prefers not to cover his prop blades and carves them (from block) very thinly. This allows them to flex to higher pitch on the first burst and gives a very long, efficient run. His models climbed powerfully and for a long time — 40 seconds plus.

Vintage was won by protagonist Pete Michel despite a series of unfortunate mishaps. He dethermalised early on his first two flights with his 'Isis' (incidentally Houlberg's original made its initial flights on Port Meadow which is bounded by the River Isis, as the Thames is known in Oxford). He then changed to a beautifully made GB3 which produced a text book ROG and ensuing flight. Yes — take off boards were used in time-honoured style. On the





next flight the wind got under the left wing and wound the model in damaging the multi-stringered nose. Pete also flew Rene Jossien's 1951 low-wing 'Ailebas' in C'd'H. This was eaten by a horse on landing!

As some consolation his vintage flights were enough to push all-rounder Gerry Johnson (radio too!) of the FACCT club into second place. Gerald used a high climbing KK 'Senator' and Bjorn Anderson's Wakefield from the 1938 Frank Zaic Year Book. Its gargantuan fuselage was the nearest thing I have ever seen to a free-flight whale.

Hand launched glider went to Dave Brawn, late of Biggles but now transferred to Anglia for an undisclosed fee. His recent sojourn in Papua New Guinea was commemorated by using two coins of that country attached to the nose of the model for ballast. The wing of the conventionally proportioned glider was interesting, being horizontally laminated from $\frac{1}{16}$in. sheet which gave a pretty contour-line pattern effect when sanded to the airfoil section.

Right and above: Geoff Lefevre promoted a novel indoor invitation meet in a converted barn adjoining his Norfolk home. Several top indoor modellers constructed special models to match conditions in the 10 × 7 × 5 Metre building.

Results

A 1 Glider		
1 K Smith	Croydon	9 09
2 G Madelin	Crookham	8 36
3 M Dilly	Croydon	8 35
Vintage		
1 P Michel	SAM	5 11
2 G Johnson	FACCT	4 08
3 B Roberts	Coventry	3 55
Coupe d'Hiver		
1 M Dilly		9 44
2 P Harris	Birmingham	9 37
3 D Greaves	B&W	9 29
HLG		
1 D Brawn	Anglia	2 34
2 R Woodruffe	Swindon	1 05
3 E Burge	Coventry	

PHOTO-PRIZE MODEL NEWS

with Fliar Phil

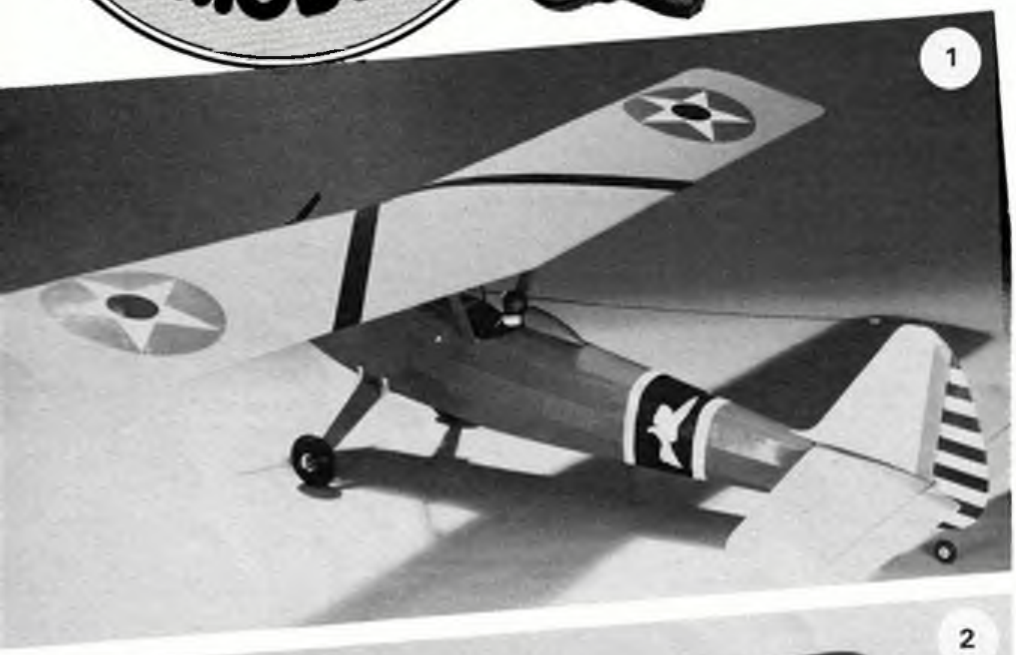
WIN A COSINA SLR CAMERA

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

ALL OF US aerobods know how a certain brand of 'sunshine' cornflakes, is supposed to give us that morning 'get up and go' feeling! For Fliar Phil however, nothing fills him with more zest than a packet of your excellent model photos arriving on the breakfast table. Manfully avoiding any 'corny' gags then — let's dip into this month's offerings.

Photo 1

Our first photographic gem is a good example of how simple, but effective markings, plus a pilot, can transform a good model into a real 'eye catcher.' Ronald Hastie of Sussex has done this with his 'Barnstormer 63,' using a 'between the



wars' US colour scheme. Model is Enya 35 powered, with Futaba R/C.

Photo 2

Flair Phil has seen models that 'struggle to get aloft,' but this photo from Mr. Youngs of Norwich, has captivated the power of flight inherent in Norman Ashford's C/L stand-off model Arado-66c. Power from a throttled Super Tigre 46. Colour scheme is Eastern Front 1944.

Photo 3

Somewhat puzzled as to the identity of this model. Fliar Phil quotes from Claus Maikis of Deautschland's notes: "Inspired by Be2, but very freely" "Translated" into a fully aerobatic C/L model. Claus adds, "flies quite well — but glides like a brick!" Span 44in. Engine HP40.

Photo 4 (winner)

This superbly posed C/L F27 Fokker 'Friendship' comes from Keith McDermont (UK address Stockton on Tees). Keith wrote on the back of the photo "Which is the model?" Fliar Phil's guess is that it is the one on the front! From an APS plan. Span 48in. Weight 2¼lb. Power: two 1.5cc PAW's. Undercarriage retracts. Excellent flights on 60ft. lines. Finished in Gulf Air livery. This month's winner. Thanks for all the other pics too Keith.

Photo 5

A 'first' for this feature. An 'own design' *electric* powered glider by Dick Blenkinsop of Warwickshire. Features Graupner motor and folding prop assembly. Power seven Saft cells. Span 72in. Weight 61.5oz. Best flight, so far, 46 minutes from four minute motor run. Fliar Phil *must* add the charming young lady is Dick's daughter Nicola. Very nice!

Photo 6

'Veron kit' fans will recognise this beautifully built 'Hawker Tomtit' photographed by Don Baker of West Midlands. The pilot and passenger add a great touch of realism. Span is 52in. Weight 5lb 5oz, with two function R/C. An impressive photo of an impressive scale model.

Photo 7

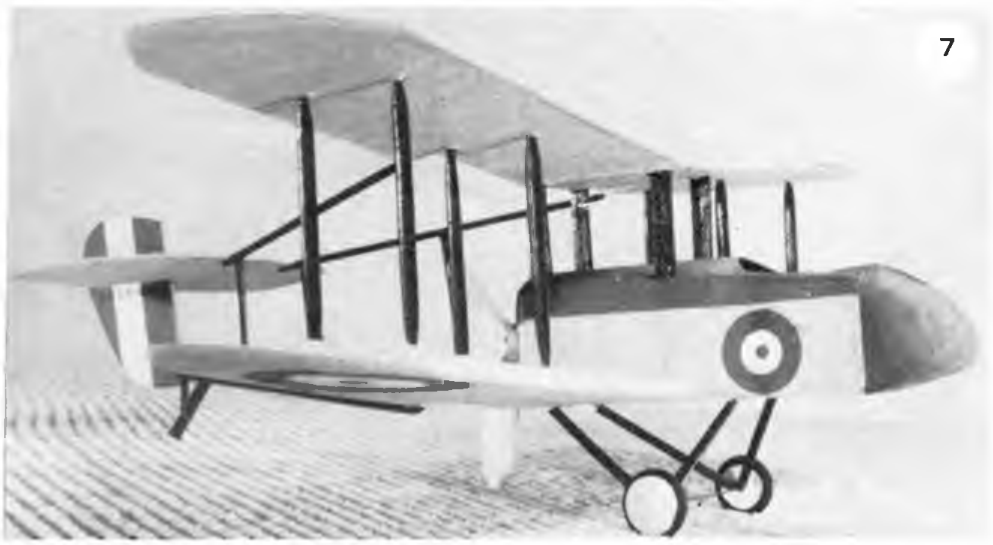
A well-constructed model DH2, scaled up four times from a 1/72 Revell plastic kit. It is rubber powered. (Rubber power still has its adherents in our hobby, despite the overwhelming influence of R/C, in this push-button age!). Happy landings K. Malcolm of Lancs.

Photo 8

That runway looks inviting! — *and* the quarter scale R/C 'Firecracker' built from a PFM kit, and powered by an OS Gemini twin, looks just ready to use it! It was built by Graham Pugh of Moreton-in-Marsh, for clubmate Ken Crocker. (Lucky Ken!). Enjoyable flying to you both.

Well that's it for now. Guess you are impatient to enjoy all the other 'goodies' in this month's issue — so FP won't keep you! Look forward to being with you again next month.

Ray Malmström



SCALE DAYS

OLD WARDEN 1983

Arthur Evans never shrinks from the 'difficult' - his Gnospelius Gull demands 22g piano wire drive to twin props from the central rubber motor. Left: Barry Hotham's bright blue / white Bf23 flies well, if unpredictable, from Model Builder plans. Top centre, 'Spirit of 1916' as Camel chases the Chas. Newman Pup, a neat pair, and above Harry Perrens prepares to release his Rearwin Speedster, forever a nice kit subject with all the right proportions. Left, below: reappearing for its annual OW outing, this 'Prince of Wales' Airspeed Envoy is a show stopper if not exactly outstanding for its negative rate of climb. Yes, the plan (FSR 126) is still available on request, price £2.45 incl. post.

Above right: Richard Grainger's Bleriot XI took top honours for its consistancy (see inset) and excellent construction. CO2 makes it possible. Below: recognise it? It's from a Veron Kit believe it or not! Graham Simkins takes matters seriously and worked hard on this one, altering a few shapes, fitting a near scale prop on the Telco CO2 motor and decorating the N. A. Harvard in early trainer scheme. See the wheel well interiors at right on this showcase model - which flies!

For 18 years Old Warden and its enviable weather record has been the Mecca for flying scale enthusiasts. But oh — how the character of this has changed since 1966! Those fortunate enough to have made the annual pilgrimage, will have wonderful memories of the fantastic progress made possible through interchange of experience and information that can only be acquired at such meetings. In the beginning, Old Warden wasn't even split by a fence to divide the car park from the airfield, in fact there weren't too many cars at all. Instead, the coach park took in several dozen club chartered charabancs.

This year, the car park simply couldn't cope, nor could the overflow site! Such is the charm and appeal of Old Warden. It was the biggest, and the best yet, with an International flavour. Those who tried, gave up when they reached 200 in their count of *different* R/C models. Over 500 flights were made from the R/C area and that in itself is an impressive record. An influx of profile scale models enhanced the Control line circuits to another record attendance with some spectacular flights — and crashes! The C/L Wellington and Hampden were specially impressive, a match for the big Dutch R/C Lancaster. One wonders why we don't see more multi engined C/L models of World War II bombers? But against the eulogies for these models which are less weather dependent, Free Flight suffered from an unkind breeze which tended to spread the participation along the lea of bounary hedgerow. It was not until later in the afternoon that these delicate and more fragile models could be exposed. In the calm of a beautiful evening, free of all the powered model activities, the free flighters began to really enjoy themselves. The popularity of CO_2 was never more obvious, and the forthcoming revival of those popular KeilKraft scale models will add to this stimulus.

Chris Bradford's 'Wellington' nestles into the close cropped grass at Old Warden (top) and that background makes it look just like a wartime scene at nearby Tempsford. Three Kings Club was out in force - they support all the Shuttleworth do's, the Gladiator, Martlet, Tutor and Bulldog are typical. Miles Magister (Mick Staples) and Handley Page Hampden (Ron Truelove) resting between flights. The Hampden bent its landing gear - true to scale as ever! Below is Wal's Waco the smart red/white American biplane by Wally Cordwell which seems to go on forever.

Below left: Profile scale in foreground at Control line pit scene indicates the growing support for scale on-lines. Hopefully we'll see even more at the Nats? Potential is enormous as seen in this variety of Skyraider, Ilyushin Il-2, Beagle Pup, etc. Lastly, the neat free flight Pitts by Ken Fordham for free flight, waiting for the wind to drop.

SMAE Control Line, May 1st Croydon

Despite very gloomy and unpromising weather, eight fliers braved the elements to attend this contest at the Three Kings Club's flying site at old Croydon Aerodrome. Light drizzle with the constant threat of worse to come, however, did not dampen the enthusiasm of those who came to watch, help or fly. The enthusiasm of some never fails to amaze. Dave Kenny travelled all the way from Blackburn the day beforehand only to have his caravan get stuck in a poorly drained site due to relentless overnight rain. After an expensive rescue he only just made it to the event as the last of the first round flights were being completed.

A dozen or so models materialised, but not all were brought specifically to fly in the competition. This particular site with its twin tarmac circles which are easily cordoned off for the sake of contest flying, is modest as general flying sites go, but quite ideal for control-line events. The short section of tarmac used was originally the only portion of hard runway ever constructed on Croydon's grassy acres and it has probably seen more take-offs and landings through the efforts of Three Kings members than it did when the aerodrome was in active use!

Two twin-engined models were flown in the contest; Ron Truelove's large and well-known *Handley-Page Hampden*, and John Roberts' *Douglas Dakota* built from the A.P.S. plan (CC/765 price £3.60 + 45p p&p) by Maurice Bodey. Those who have seen it will know that the *Hampden* is a most impressive model with its slow, quiet and realistic flying characteristics and many working features such as retracting undercarriage, flaps and bomb release system. Unfortunately, the gremlins seemed to be eagerly at work — they like damp conditions — and Ron's transistorised control system ceased working properly soon after take-off when the wheels were retracted on its first flight. After numerous attempts, to no avail, to get the wheels down, the *Hampden* had to be gently brought in for a belly landing on the grass verge, thankfully with little more damage than grazed paintwork to the underside. The combination of wet grass and soft earth did have its uses after all. During the process of sorting out the problems later, the flight control batteries became so drained that it was wise not to risk the model again and so Ron retired after only having partially completed one flight.

In contrast, John's *Dakota* in military colours and without working features apart from the throttles to the twin Enya .09s, flew steadily, though rather too fast to be realistic, on two flights to take a deserved third place overall. John's son, John Junior, was also enjoying a taste of contest flying with a *Fokker DVIII* modified from the Veron Kit which has already seen a few sorties in the hands of other Three Kings flyers. The 54" model is powered by a throttle equipped Merco 61 to which John Senior has fitted an own design steel silencer that was so effective on tickover that it was difficult to hear the motor running while the model was taxiing due to the noise the tailskid was making on the tarmac.

Having recovered from his journey, Dave Kenny elected to fly his unusual twin

Above: seen at the SMAE Control Line Scale event, Croydon, Dave Kenny's Webra 61 powered, 64in. span Spitfire had performance to spare on 60ft. lines. Note flaps, deployed for touch-and-go. Right: Bob Yeowell with crop spraying Piper Pawnee has found an ideal control line scale subject which coped well with the rainy conditions at Croydon.

cockpit *Spitfire IX - UT1* in Soviet markings. This particular subject was part of a 1945 lend-lease arrangement with the Leningrad School of Flying and several other fighters originating in the West were used in the same way. Dave's model is large, at around 64" span and powered by a Webra 61 Blackhead, it had more than enough power to complete wingovers, proper 45° laps, and mild aerobatics in Dave's hands.

Adding further to the variety at this meeting Bob Yeowell of Wroughton in Wiltshire entered a most interesting *Piper Pawnee* crop-sprayer built to 1:10 scale. This model is 43½" span and the engine is a throttled O.S.20. It really is an ideal subject for Control-line scale and Bob has installed a 230cc tank ahead of the front cockpit bulkhead, which is in turn connected to the two perforated spraying bars at the wing trailing edge, so that scale spraying can be carried out. The system works simply through gravity feed and centrifugal force and despite the water load being pigmented with blackcurrant juice (!) the spray pattern was clearly visible but not quite as dense as required. In the interests of simplicity no switching system was used, the entire load was being distributed from the moment the model was released for take-off until the tank ran dry.

The *Pawnee* flew extremely well with excellent take-offs and landings and it had a lively performance when the liquid was all gone, easily capable of wingovers and true 45° line angle laps the model weighed only 38oz. complete with fuel and load.

Two other models had motor problems, namely Derek Bird's *Scottish Aviation Bulldog* and Wal Cordwell's rebuilt (again!) *Acro Tutor*. This left Geoff Burkett's large and aerobatic *Hanriot HD1* to make the highest flight scores and the second highest static score to win by a reasonable margin over the *Hampden*.

Scale Markings

One item of marking on aircraft that can be quite a challenge to do for the first time is a set of civil registration letters and there are several ways in which these can be done.

Results		*Flight*	*Bonus %*	*Static*	*Total*
1. Geoff Burkett	Hanriot HD1	858	10	830	1774
2. Ron Truelove	H.P. Hampden	748	10	895	1718
3. John Roberts	Douglas Dakota	665	10	510	1241
4. Bob Yeowell	Piper Pawnee	717	5	350	1103
5. Derek Bird	S.A. Bulldog	333	0	750	1073

Above: young John Roberts flew this control line conversion of the Veron Fokker DVIII kit with great confidence at Croydon SMAE event. Merco power is more than adequate - installation close up shown above right reveals special welded mild steel silencer which is very effective.

Right: same typical registration letter templates used in technique described in text - suitable cases for treatment are the author's Miles Satyr and Peanut Scale SE5a, Westland Wood pidgeon.

Whether the model is very small or very large, the most laborious way of painting them is to use full masking methods and a spray gun or airbrush. The problem with this method is that the full shape of the numeral or letter has to be cut out of the masking medium before being attached to the model and certain letters such as a 'G' or an 'S' can be quite difficult to maintain in correct shape during this process as one peels the masking film from its backing sheet.

The method of applying such letters I have found to be more reliable than any other on models of widely differing sizes is as follows:

First of all draw the required items very accurately on thin card of approximately the same thickness as postcard. In doing so be sure to study the shapes of the letters or numbers very carefully in order to get them exactly right. The shapes of individual letters are far more subtle than most people imagine and occasionally the lettering on full-size aircraft will have been applied either very hurriedly or simply put on by a barely competent painter. The result is that small inconsistencies can appear in the shapes of separate versions of the same letter.

Light civil aircraft are usually the types on which this kind of carelessness is to be found. The registration letters on the fuselage sides of the full-size *Miles Satyr* are a typical case in point. In the two sets of letters the four 'G's' are all slightly different in shape, as are the two 'A's', the two 'B's', the two 'V's' and even the two hyphens! After having been photographically enlarged to the correct size for my own model, the letter shapes were cut out carefully using a new scalpel blade and a straight edge where applicable. This is a fairly straightforward job, but the edges of each template should then be lightly sanded to make sure that they give a smoothly blended outline. Working only on one letter at a time attach it to the model using three or four small pieces of Blu-Tack (available from a good office supplies shop). Now, using a 0.3 or 0.4 Rotring or similar draughtman's pen, carefully trace around the letter making sure to keep the pen at 90° to the surface. Hold the letter steady as you go.

Assuming that the surface underneath is well doped and sealed it will be several minutes before the Rotring ink has dried properly. This has the advantage that any small mistake or smudge can be quickly wiped away with a piece of damp tissue which should be kept handy during inking. When dry remove the card and repeat the process with the next letter. It is best to work only on one letter at a time since they can easily be knocked out of alignment accidentally if one is not too careful.

Having completed the outlines to all letters one simply has to fill in with solid colour by hand with a small paintbrush. This may sound rather daunting but in fact is much easier than you may imagine if a decent sable-haired paintbrush is used and not the cheapest version you can find in a model shop. A specialist artist's material suppliers will have a wide range of sizes, and numbers 00, 3 and 6 should be capable of catering for letter sizes on models from peanut scale up to 36-48" span. If you have doubts about your own skills, practise with some poster paints on some cartridge paper beforehand to build up your confidence. The easiest paint to use on the model itself is matt black enamel thinned slightly with white spirit. A pen nib of 0.3 or 0.4 size is thick enough to give quite a wide edge to allow for painting errors and a 0.6 is even better if large letters are required. The width of the pen line should be taken into account when cutting the template of course.

Once painting is completed it will be seen that the ink leaves a glossy outline, whereas the enamel gives a semi-matt surface. Sometimes a second coat of enamel is necessary to get the required density of colour. To even out the degree of gloss and to also seal in the enamel the entire set of letters should be sprayed over with a mixture of 50/50 dope/thinners. Provided that the ink and enamel have been allowed to dry thoroughly beforehand, i.e. 24 hours, this will have no adverse effect upon them. The spray coat should be quite light. One great bonus of this technique is that the most challenging part, the inking and the brush painting, can be done in comfort indoors in a warm room whereas spraying cannot.

Although coloured inks are available that are specially formulated to be free flowing and easy to use in one of these pens, it is extremely difficult to match these up to enamel colours. As well as this, inks other than black tend to be too transparent in nature to enable them to be used for our purposes. If your registration letters are coloured, a full film mask is probably the best method to use. It is never worth the risk of putting any medium other than the correct ink into a technical drawing pen of the Rotring type.

For a simple or lightweight model, black tissue paper letters are a quick and reliable means of marking and they can be applied over colour doped surfaces with relative ease. Good adhesion without spoiling the painted surface underneath is the aim and this can be achieved by pre-coating the tissue beforehand on a separate frame with a coat of slightly thinned dope. Cut the letters out — the doped surface makes this slightly easier than if it is not doped — then holding each in place on the model, lightly stipple through the tissue with thinners being careful not to let it overlap the edges to spoil the paint alongside. Once dry another coat of 50/50 dope/thinners over the tissue only will seal the letter nicely in place. This technique can be used successfully even over the most lightly applied silver finish without too much risk of disturbing the silver pigment. Like many other model-making techniques it is always a good idea to try it out on a practice piece beforehand if only to build up one's confidence before tackling a new model.

Brown Junior Revisited

Fifty-two years ago, there occurred an event which was to change the face of model flying. Early in 1931, William Lykens Brown, of Philadelphia, Pennsylvania, USA, a 19-year-old student of Frankford High School, designed a small model petrol engine for use in a model plane. This very first Brown engine, much smaller than its famous successor, the Brown Junior, had a bore and stroke of $^{11}/_{16} \times {}^{3}/_{4}$ in., giving a swept volume of 0.278cu. in. or 4.56cc. According to contemporary data, the engine turned a 9½in. dia. propeller at 2,500rpm and weighed 14oz. complete with spark ignition equipment.

Bill Brown constructed this and his other early motors in his father's home workshop. Not unexpectedly, however, fellow modellers wanted Bill to make engines for them also and so, to satisfy this demand, the first 'production' models of the 10cc Brown Junior were built at Walter Hurleman's machine-shop in Philadelphia, beginning in the spring of 1932. Bill, himself, enrolled at Pennsylvania State University as a mechanical engineering student in September of that year, but interest in the Brown Junior, following Maxwell Bassett's string of contest successes with the engine during 1932-33, subsequently persuaded Bill and his father that they should form a company to manufacture the engine on a volume production basis. In 1934, following the formation of the Junior Motors Corporation, Bill returned from university to take charge of production. In due course, engines were produced at the rate of about 5,000 units per year and, incidentally, the UK became the Brown's best export market.

Over the following years, the basic design of the Brown Junior remained unchanged. A simple layout, it had a very light diecast silicon-aluminium crankcase with bronze bushed main bearing to support the one-piece counter-balanced crankshaft. A ringless steel piston, hardened and ground, ran in a one-piece machined steel cylinder with integral head. Porting was of the orthodox three-port two-stroke type, i.e. mixture was drawn into the crankcase from an intake pipe at the rear of the cylinder, conveyed to the combustion chamber through a transfer passage at the front of the cylinder and spent gases were then expelled through ports at the rear, above the intake ports.

In 1936, Bill Brown foresaw the need for a smaller engine than the existing 10cc model and, having developed a lighter ignition coil that would work on only two pen-cells, he began work on a new baby engine of only 2cc. By this time, other manufacturers had entered the field (Baby Cyclone, Gwin-Aero, Forster, etc.) and, over the next year or two, confirming Bill's views, a number of 'small bore' engines, as they were popularly called, began to appear and, subsequently, to attract a keen following.

In 1936, however, Bill Brown's long-term view of the market was not supported by the Junior Motors Corporation 'establishment'. In a statement of policy, issued as a result of a meeting on 25th September 1936, it was declared that the company would not pursue the development of a smaller engine. It was felt that the introduction of a smaller motor would only result in a reduction in sales of the existing Brown Junior and that all efforts should therefore be bent towards the development of the latter.

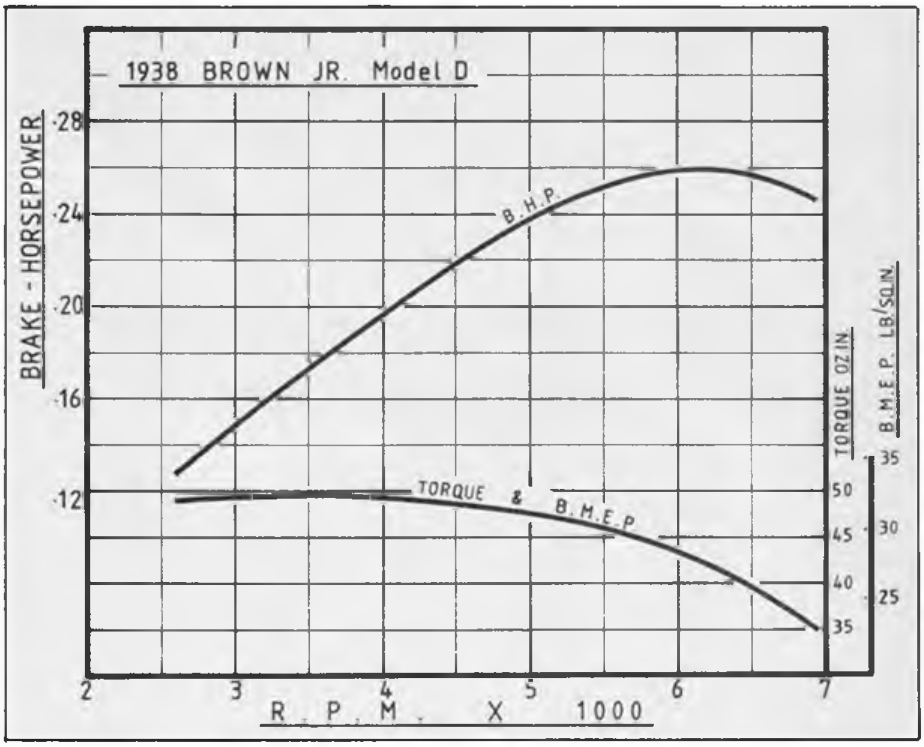
The upshot of this decidedly short-sighted decision, was that Bill and his father eventually resigned from the company. Bill continued the development of his 2cc engine independently and eventually put it into small scale production himself under the name Lykens-Brown. At about the same time he also returned to his old university to work, among other things, on its new wind-tunnel. The Lykens-Brown, which was packaged and distributed by the Megow company appears to have been a victim of the war, but during that time, Bill invented the CO_2 gas cartridge powered motor. This was subsequently mass produced (for about 15 years) by the Herkimer Tool and Model Works alongside their glowplug and diesel engines. Nowadays, Bill and his son Dave produce CO_2 engines, including a twin-cylinder unit and a 'world's smallest' engine of only 0.021cc, at their own small factory, Brown Junior Motors Inc., Pine Grove Mills, Pennsylvania. (See April 1983 'Engine News').

In 1957, to mark the 25th anniversary of the appearance, on the market, of the first Brown Junior, we conducted a dynamometer test on a 1938 model and this was published in the USA in *Model Airplane News* and also in AEROMODELLER's one-time rival *Model Aircraft*. The original production model, later known as the Model B, had, as already noted, a ringless steel piston and remained little changed throughout the period of its manufacture, but, to compete with other makers offering less expensive engines, two cheaper models were introduced. The first of these, in 1937, was the Model C and this was joined, in the following year, by the Model D. Both these engines had aluminium pistons with two compression rings and a simplified carburettor in which the choke control was omitted. In addition, in the Model D, a forged aluminium alloy connecting-rod replaced the machined steel rod of the earlier models. In April 1939, all three models were given a minor face-lift which included an improved contact-breaker assembly and a translucent fuel tank.

The test motor — the only Brown in our possession at that time — was an early Model D but it was in good condition and performance was well up to expected levels. The results of the test figures obtained are to be seen in the accompanying performance curves.

Since the earlier reports were published, we have obtained one of the more 'classic' Browns in the shape of a 1936 Model B and this is shown in the photographs.

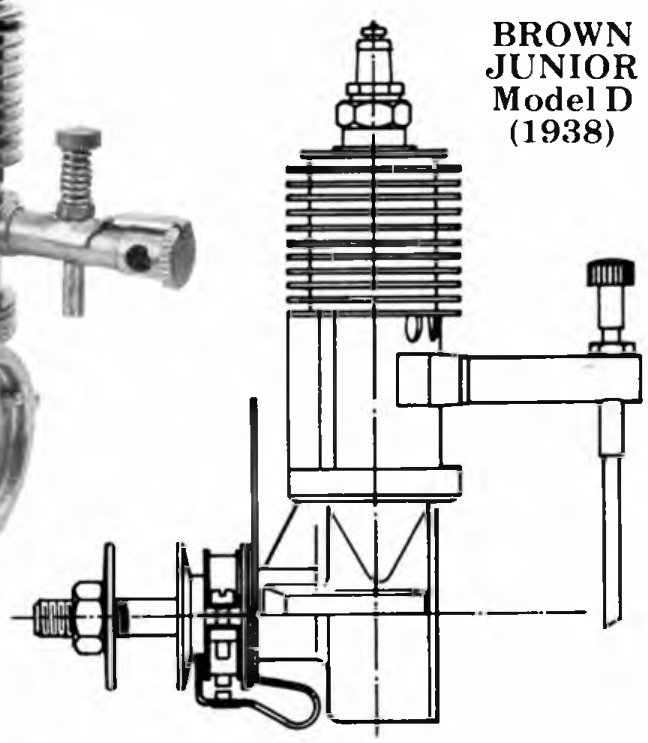
Back in the 1930s, model aircraft engines were usually operated at speeds of between a half and a third of those common today. Four or five thousand rpm, using 14 or 15 in. — sometimes even 16in. — diameter props were usual with the Brown. At that time, of course, all power-driven models were slow-flying types and there was little demand for high propeller speeds or high power outputs. Most 10cc class engines were nominally rated at 'one-fifth horsepower', although most of them would produce a peak output of around ½hp if fitted with a smaller prop and allowed to rev up to over, 6,000rpm.



As the performance curves indicate, our Model D produced just on 0.26bhp at 6,200rpm. Maximum torque was nearly 50oz. in. at 3,500rpm. The rpm recorded on a rather club-like 14×6 prop was 5,400, a 13×6 was turned at 6,500 and a home-made 16×8 at 3,250. Incidentally, the minimum speed recorded on the latter, by using a combination of retarded ignition and mixture strength adjustment (no throttle control, of course) was 1,150rpm.

The recommended fuel for the Brown was a low-octane white (i.e. unleaded) gasoline and SAE 70 motor oil in a proportion of 4:1 for the first eight to ten hours of running time, after which the oil content could be

BROWN JUNIOR Model D (1938)



Outwardly, the low-priced Model D was identical to 'B' and 'C' except for simplified carburettor assembly.

Top of page Brown Junior ran on 'petrol' mixture and was supplied complete with fuel tank (not shown), plus ignition coil and condenser. Above: the famous Brown Junior engine that started it all, back in 1932. Volume production began in 1934 and continued until WWII. This is a 1936 Model B.

Below: parts of Brown Model B. Note long steel conrod, ringless steel piston and spindly-looking crankshaft. Cylinder and head were made in one piece with brazed-on intake manifold and transfer passage.

gradually reduced from 20 per cent down to 14-15 per cent. We used a 4:1 mixture of SBP-4 petroleum spirit and the heaviest Castrol oil available (Grand Prix of SAE 60 rating), which suited the engine very well.

The Brown handled easily. The procedure for starting was to open the needle-valve to the approximate running setting, retard the ignition, choke the intake and begin flicking the prop until the engine fired. Provided that the plug and contact breaker points were clean and properly set, the engine would start promptly. The intake was then uncovered and the needle-valve and ignition timing adjusted for full power.

By modern standards, the working parts of the Brown look a bit flimsy but, of course, being relatively lightly stressed (maximum bmep, for example, as indicated by our performance curves, was only 32.5lb. sq. in.) the engine could be made very much lighter than today's 10cc motors. The Model B, less fuel tank and ignition system, checks out at only 200gms or just over 7oz. These early engines needed to be as light as possible because of the ignition equipment (coil, condenser and batteries) that had to be carried and which weighed more than the engine itself.

Brown Juniors are now highly prized collectors' items, and justifiably so. Bill Brown did more than anyone else to put power driven model aircraft on the map.

Back to basics

The following letter, received a while back from a reader living in the Grampian region of Scotland, raises a basic but important point that comes up from time to time, especialy from modellers resident in fairly remote areas at home, as well as abroad. He writes:

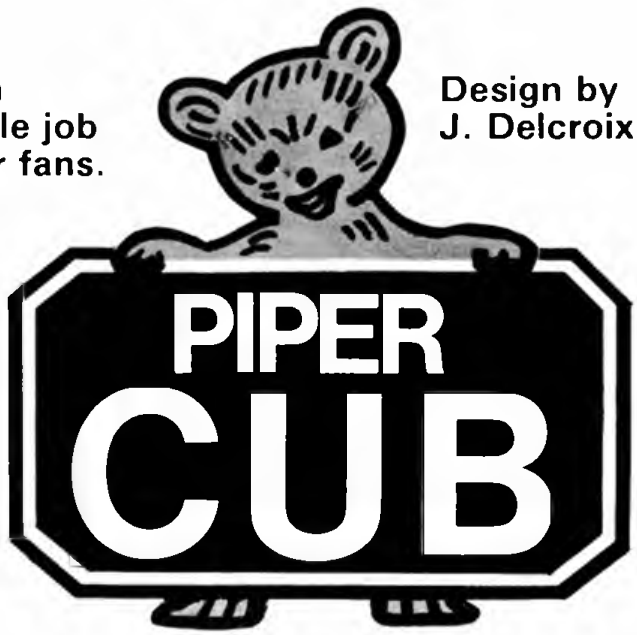
"After some years' absence from the craft, I've decided to take up aeromodelling again with an eye to building an 'old-timer'. I've decided on a diesel engine for the power plant, probably one of the Indian Mills reproductions for a start. My past experience, however, has been exclusively with glow-plug engines, so I'm at a loss when it comes to the question of fuel for a diesel unit. I would be grateful for any information you could provide concerning formulae, mixing procedure and mail order suppliers of ingredients for diesel fuels. I'm sorry to trouble you with such a simple problem but my rounds of the hobby shops in this region seem to indicate that aeromodelling has become a lost art in the Northeast of Scotland. Plenty of air space and nothing to fill it with . . . "

The basic ingredients for a model compression-ignition (diesel) fuel are kerosene (paraffin), lubricating-oil and ether. Ordinary domestic paraffin is quite satisfactory. DERV (diesel engine road vehicle fuel) or TVO (tractor vaporising oil) offer no advantage. However, it is a good idea to pass the kerosene through a filter paper, before mixing, to make sure of removing any foreign bodies that it may have picked up in storage. For the lubricating-oil, castor-oil or a castor-based oil, such as Castrol M, is generally preferred, although, for general purpose use with an engine like the Mills, ordinary heavy-grade (e.g. SAE 50 — not multigrade) motor-oil can be used. Of course, with a small, economical engine like a Mills 75, the simplest solution may be to buy a bottle of castor-oil BP from a pharmacist. It may also be possible to get the ether from the same source. Technical ether to B.S.579 is what is required, but the anaesthetic quality (more expensive) can be used if that is all that is readily obtainable.

CONTINUED ON PAGE 439

Lightweight high performance scale job for rubber power fans. Choose your wood, pick your Pirreli and enjoy yourself with this 26in. span gem.

Design by J. Delcroix



THOSE ELEMENTS which make the Piper J3C-65 'Cub' such an all-time favourite with aeromodelling enthusiasts are not difficult to pinpoint. Simple lines and sports model proportions, a good sized tailplane helps too and not too many of the compound curves which make lightweight rubber models difficult to construct. 'Cub' fuselage structures can present difficulties, but follow the instructions and you should end up with a true shape. The same can be said for the flying surface outlines and although laminated shapes are shown, you could cheat a little and cut the profiles from sections of sheet balsa.

As with any small rubber model, weight, or lack of it, is a prime requirement for a good flyer and although cyanoacrylate glue looks an expensive proposition, only a tiny amount is used and it sure is light! Choose your wood carefully to keep the model light, construct the airframe true, make a good job of the covering and this little gem is a sure fire flyer.

Fuselage

Lay a sheet of polythene or cling-film over the plan and build the first basic side. Don't put pins through the wood, place them on either side. Note also that the $\frac{1}{16}$ × $\frac{1}{16}$in. balsa is on edge. Now, either lay cling-film over the first side and construct a second directly on top of it, or remove it from the plan and using the same pin holes, build a second side.

As both sides are completed use a sanding block to sand one surface smooth. This will ease finish sanding of the fuselage. Make up a set of fuselage top frames 3-9 over the plan in the same way as the sides were produced. Cut four spacers to fit between the sides at stations 4 and 5 to length shown on the plan. Assemble the basic sides with spacers at stations 5 and 6, then pull in and glue the rear fuselage together. Add all of the top frames, stringers and wing root facing ribs, windscreen supports and the tailplanes de-thermaliser stop wedge.

Refer to the top view of the fuselage and cut out and shape the upper nose block. Cut out the side cheeks, lower block and the plywood nose former and the lower front spacer shown at Station 2. Pull in the sides at the front and fit the ready shaped top block and the lower cross spacer, followed by side and bottom blocks. Sand the front face flat and glue the ply nose former in place. Laminate a nose block from layers of cross-grain balsa and lightly tack glue in place. The whole nose can now be finish carved and sanded. Complete the basic fuselage by adding cabin window shaping pieces at the rear of the cabin, scrap soft block fairing between the front ends of the wing facing ribs and filling in the undercarriage mounting area in the fuselage bottom.

Tailplane and fin

Find a piece of stiff cardboard and cut out templates for shaping the curved laminated outlines. Sponge household ammonia onto the wood to soften it, then form carefully round the templates layer by layer, holding in place with small pieces of masking tape. Once dried out, the laminations can be glued together with cyano and the framed shapes made up. You can make the fin and rudder separately, but if you do decide to hinge the rudder for trimming purposes, remember only tiny offsets will be needed — it's big! The tailplane is made in two halves joined with stub dowels fitting into paper tubes. Roll the paper tubes from tissue around waxed lengths of this dowel or piano-wire.

Wings

Make a template without spar slots and cut out 22 ribs from $\frac{1}{16}$in. balsa and two from $\frac{1}{8}$in. Block together and sand to shape. Cut out the spar slots while the ribs are still sandwiched together making them a good fit on the chosen spar stock. Rough carve and notch the trailing edge and prepare the building board for construction. Pin down the scrap $\frac{1}{8}$in. wedges which are used to build in the necessary washout on both panels. Note the 'thick' end is outboard. Fit the ribs between leading and trailing edges trimming one rib for each tip panel to suit. Add both spars.

Once glue is hard, remove both panels and add the $\frac{1}{16}$ × $\frac{1}{16}$in. diagonal bracing, strut reinforcements, locating dowels and 22swg pianowire hooks on the facing ribs.

Carefully carve and sand the wings all over and put to one side.

Make up the struts reinforcing the bond between 22swg fittings and balsa by wrapping with tissue. Find a light rubber band and fit the uncovered wings onto the fuselage using the band through the holes in the fuselage facing ribs to hold the wings firmly against the fuselage sides. Offer up the struts and with the fuselage flat down on the workbench, adjust the wing hooks until the dihedral is correct. You will need to prop the wings up approximately 4$\frac{1}{2}$in. from the board. When you are satisfied that all hooks are properly positioned, cyano them in place reinforcing the bond by use of either cyano and baking soda or micro balloons, 'Zap Gap' etc.

Finishing stages

Shape the wire undercarriage and fit the balsa fairings, dummy shock absorbers, etc. and cover with tissue. Drill the rear underside of the fuselage to take the dethermaliser line and fit the aluminium guide tube. Glaze the cockpit area with thin acetate sheet not forgetting the roof light. Make, but do not fit yet, the dummy engine.

Mark out the propeller profile onto $\frac{3}{16}$in. balsa, cut out and then mark front and rear profiles onto the blank. Use these lines to guide, carving the blade to section shown. Splice in the $\frac{1}{8}$in. dowels and make up the hub as shown. The half washer soldered onto the face of the brass nose block bush acts as a free-wheel clutch. The propeller shaft is shaped from 16swg piano wire. Drill the propeller hub a tight fit on the propeller blade dowels. This system allows experiment with prop pitch for best performance.

Covering

The original model was covered all over with yellow Jap tissue. Use dope for fixing and surgical spirit to initially shrink the tissue. This system is very 'gentle' rarely pulling anything out of shape, several treatments usually being needed to pull out all the wrinkles. Four coats of 50/50 dope, thinning mix all over should proof the tissue nicely then thinners can be used to bond on the black tissue decorations. Once covered and doped, the undercarriage, dummy engine, tailwheel and dethermaliser sniffer tube can be fitted and the rubber motor made up from a 20in. loop of $\frac{1}{16}$ square rubber (approx. 10 grammes).

Flying

Assemble the model and fit the dethermaliser line including a short length of rubber band to tip up the tail. This can be cyano glued to the top of the tailplane up onto the fin and is very unobtrusive. You will need a pin in the noseblock for the DT band. Check the balance point and add Plasticine as necessary. Slight right rudder off-set and right side thrusts are needed. Try a hand launch and tweak the tailplane if necessary to achieve a reasonable glide, then with 100 turns or so, try the power-on performance, adjusting side and down-thrust as necessary as you build up to around 800 turns maximum. Target weight is about 60 grammes, the 65 gramme original was lost after a 993 sec. OOS flight and a second model was built weighing in at 63g. Always use the dethermaliser on any flight with more than a handful of turns, and either wind outside the model or use a winding tube. Enjoy your 'Cub.'

FRED

A peanut scale replica of Eric Clutton's famous homebuilt light aircraft

By Siegfried Glöckner

FRED is the abbreviation for Flying Runabout Experimental Design. The aircraft is designed for recreational weekend and evening flying, not as a fast cross country plane.

Its thick high lift wing section (Goettingen 535) gives the plane safe stall characteristics, but not high speed. Except for high stressed parts like cabane struts, landing gear, hinges, etc., the aircraft is built from wood. Recommended engine is a 1500cm³ Volkswagen engine or equivalent power plant.

Fred can he towed behind a car and stored in one half of a double garage, thus saving hangar fees. The horizontal tail and rudder are detachable and fit inside a small car. With the wings folded alongside the fuselage, 'FRED' can be towed on his own wheels behind the same car to the owner's garage.

The model

The P-Nut version of 'Fred' is built in conventional manner and needs no detailed description. Some perhaps unorthodox construction sequences are thoroughly described.

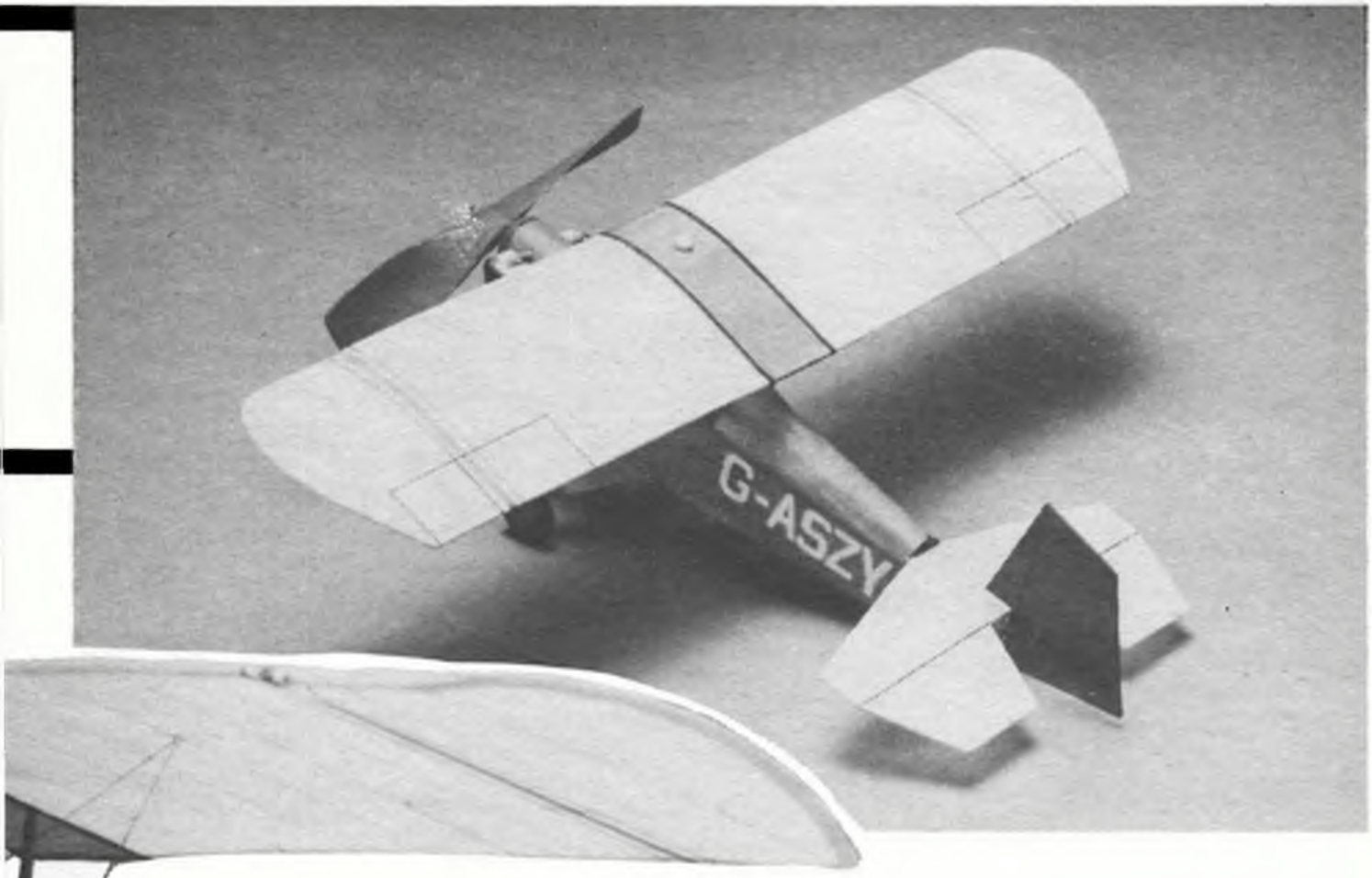
Fin and Stabiliser: These are built from 1mm square balsa strip over the plan.

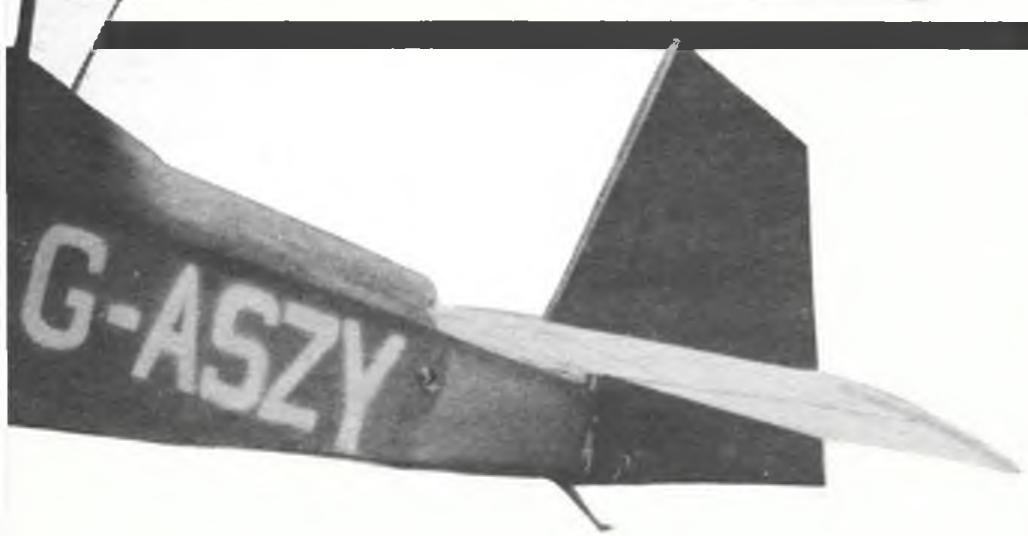
Wing: Wingtips are laminated from 0.5 × 1 mm balsa strips to be light and strong. Note thicker ribs W2 at centre section. Drill holes for cabane attachment into W2 before they are glued into wing construction. The centre section is to be sheeted with thin balsa, 0.4mm thick, from leading edge to the spar to simulate the fuel tank. Do not forget rigging point attachments.

Fuselage: Construction is from 1mm square balsa. Build the right fuselage side on the plan, cover it with clear plastic (household) film. Build the left side on the right fuselage side to get two identical fuselage sides. Note the front end: the top longeron extends to the nose former F1, the rest of the nose area is filled with 1mm sheet balsa, cut to size. Add rigging point reinforcements.

Glue F1 between fuselage sides. Glue fuselage sides at rear end together. After glue has set add F2 to F6 between fuselage sides. Glue 1mm square balsa spacers between bottom of fuselage sides, take length of spacers from plan. The fuselage's top is sheeted with 0.4mm balsa. Note that the formers F1 to F6 do not extend to the outer edges of the top longerons. They are slightly undersize so that the sheeting will be flush with the fuselage sides. Cut the top sheeting slightly oversize. Glue the sheeting to the top of the formers at first, then fold around formers. Take a sharp balsa knife and cut the planking along the top longerons so that the sheeting will fit to the formers with no overlap at the fuselage sides.

Now glue sheet to top longerons. Glue F7 to top of F4, cut sheet for the headrest from 0.4mm balsa, the cut the 0.4mm balsa sheet





oversize and shape it to fit to the fuselage's top to form the headrest.

Landing Gear: The highly stressed parts are built from bamboo (see plan). Glue fairing to lower wheel strut (note wood grain direction). Wheel axle is a short piece of 0.8mm dia. steel wire, bent to shape over the plan and glued to lower wheel strut with epoxy or high viscosity cyano glue. Glue reinforcement F8 on bottom of fuselage under former F3 (see plan). F8 is needed later for landing gear attachment.

The wheels are cut from light balsa, doped and painted.

Noseblock and Engine: These parts are cut from light balsa, sanded to shape doped and painted. Exhaust pipes were made from thin plastic tubing, bent to shape over the flame of a candle.

Covering: Cover model with your favourite paper. I used Micro-X tissue but did not dope it. The tissue was shrunk with a light water spray from an airbrush. Add registration markings and windshield.

Assembly: Wing, tailplanes and fuselage have to be covered before assembly. Engine, wheels, landing gear must be ready for installation and painted.

Cut cabane struts from bamboo, and sand to shape. Glue together the two sticks of the front cabane struts at correct angle. Glue front cabane struts to fuselage.

Glue rear cabane struts to wing centre section. Push front cabane struts into drilled holes of centre section and add some glue to joints. Now check incidence between wing and fuselage, if correct, glue rear cabane struts to fuselage. Glue stabiliser to fuselage, note incidence between stabiliser and fuselage. Glue rudder in place.

For installation of the landing gear you have to poke small holes at the forward side of F8 at both fuselage sides (see plan). Glue lower L.G. struts to F8 at correct angle. After glue has set install upper L.G. struts. Install wheels and secure them with small drops of glue to the axles. Make wheel hubs from paper or thin balsa.

Glue engine in place.

Bend small wire hooks for rigging points (six pieces) and glue in place. Make rigging from thin thread.

Flying: 'Fred' is a stable reliable flyer. My first model weighed 17 grams. With a North Pacific prop and 1/8 Peck rubber it managed to fly for 35 seconds. The second model, weighing 6.8 grams flies a lot better. With a self-made balsa prop and a loop of 1/8 × 15 in. Peck rubber flights around a minute are standard. The model on the photos was 4th at West Baden in Modern Class in 1982 and 5th in 'Duration' at Flemalle/Belgium in 1982.

'Fred' has no bad trim characteristics. Both models I built flew 'from the building board', and needed only fine tuning for higher performance. The second 'Fred' which weighs 6.8 grams has the ability of circling very tight, which has some advantage at smaller indoor contest sites.

To everyone who intends to build a 'Fred' I wish a lot of fun and many long flights.

From THE HANDLE

Two views of the Kjaergaard filler/backplate. Photo above shows the induction drum removed. Very well made unit based around an injection-moulded body for Nelson or B.G. motors.

Needham Team Race Products

Ed Needham, the Pitman half of the newly formed Clarkson-Needham team, has been selling a range of useful team-race related items for over a year. These deserve a mention as they are well made and are consistently available — a merit not always shared by some 'cottage industry' items. Clockwise from the top left of the accompanying illustration are the nine items currently on offer:

1. Male tank valve for G.Y. £2.50
2. Male tank valve — small for FAI £2.50
3. Venturi threaded ½in. × 32tpi £1.50
   available 3.0-3.6 mm
4. Venturi threaded ⅜in. × 32tpi £1.50
   or 8mm × 0.75 sizes 3.4-4.0 mm
5. Delrin insert for Nelson R.V. for 50p
   ⅜in. 8mm Venturi
6. Spinner nuts for Nelson, Cipolla 60p
   or Oliver engines
7. Prop driver for Cipolla engine £2.00
   knurled front
8. T.R. Wheel 1¼in. diameter £1.50
   with circlip retainer
9. T.R. wheel 1¼in. diameter but £1.50
   with hexagon bar bush and 6BA bolt

Ed always has his well filled goodies box at British domestic comps. Postal orders are welcome but please include extra to cover packing and postage. I suggest 50p on UK orders and £1 to £1.50 on overseas airmail orders. Ed Needham, 100 Lowfield Road, Stockport SK3 8JR.

Kjaergaard Integrated Filler and Backplate

Mentioned some time ago but not previously illustrated is the Kjaergaard item. The unit, which is available for either Nelson or B.G. engines, is intended to replace the original induction and tank filling systems by integrating these into one. Such systems have been 'standard' on the one-off specials as produced by Soviet aces like Onufrienko, Suraex and Krasnorutski.

The Kjaergaard backplate has a body moulded in plastic phenolic type material. A bronze bush, pressed in, forms the bearing surface for the induction drum. The sliding plunger incorporates the functions of needle valve, filling the tank and stopping the engine by cutting off the supply of fuel. The Venturis can be changed very quickly and easily as these are not used to clamp the filler system in place as is found with many alternatives.

My initial reservation was that the intake drum had a diameter of ⅜in. (8mm) compared to the ⅝in. of the standard Nelson item. However, if the 5cc tank sticks in F2C, then the reduced diameter may help in trading speed in exchange for increased range.

Integrated filler-backplate, US$90; Spare carbs, 2.8-3.7 mm in 0.1 increments, US$5.

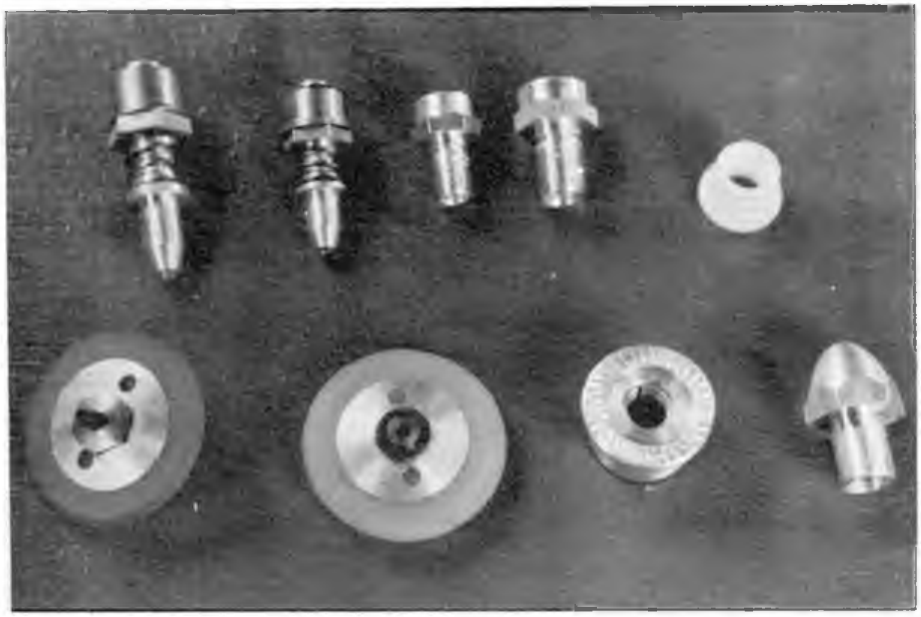
Enquiries to J. Kjaergaard, Dalgas Alle 107, 7800 Skive, Denmark.

British Diesel Combat Champs — 2nd round

The second round on May 8th drew an entry of 20 including some of the best combat flyers. Early drizzle gave way to a calm, dry afternoon.

Approximately half the entrants flew foam models and for the first time ever, nobody flew a plain bearing motor. Apart from the ubiquitous Oliver Tiger, there was a sprinkling of Super Tigres, Rossi diesels and MVVSs.

The experience of the competitors showed in the fact that despite the high entry, an



Left: Needham Team Race Products include the valves, venturis, wheels and prop nuts shown here. Widely available at U.K. events.

11.00 a.m. start and a two life system, the competition finished at 5.30 p.m.

Paul Vallins used an interesting idea on his model. Pressure fuel feed is banned in Diesel Combat but Paul used a conventional FAI model with fuel fed from an unexpanded toy balloon. He claims the balloons don't give up at the sight of diesel fuel and this idea is likely to lead to even more people using old FAI models since it isn't even necessary to fit a mustard tin tank in the pacifier pod.

Mike 'Whacker' Whillance (Manchester) had achieved his quarter final position by beating Nigel Whitchell (Peterborough) who has freshly returned to combat flying, and then P. Stanley (Morton) and Tim Bartram (Cosmo).

Neil Gill had defeated Paul Vallins in round 2, while Pete Tribe (Cosmo) had beaten Jeff Sizer in round 2 and Rob Roy (Peterborough) twice in rounds 1 and 3. Rob actually did the round three draw himself. How unlucky can you get!

As you might expect Vernon Hunt had progressed steadily, beating Jeremy Wilson (Cosmo), young R. Scully (Wharfedale) and Jeff Sizer.

Jeremy Willows (Lincoln) flying his second competition, achieved his quarter final place by defeating Brian Waterland, Nigel Witchell and Mark Jarrett.

Showing how important it is to keep off the ground, the quarter final bouts between Coe/Hember, Jones/Whillance and Gill/Tribe were all decided on ground time with one cut each. Vernon Hunt defeated Jeremy Willows 184 to 122 points when a mid-air put Jeremy's plane out.

The semi-finals therefore saw a bout between Dave Coe and Mike Whillance. Mike suffered the disaster that befalls all combat flyers when he removed all Dave's streamer in one go. Dave then took two cuts to win.

In one of the shortest bouts of the day (30 seconds) Vernon Hunt went straight through Neil Gill's model (an MVVS powered ex-FAI foam 'Panic').

The fly-off for 3rd and 4th between Neil Gill and Mike Whillance went to a refly in which the inner tip of Neil's 'Butterfly' crumpled after a slight mid-air, Mike winning on ground time.

The happiest man of the day, without doubt, was Dave Coe who after ten years of trying, finally made the final! In a close fought bout (two cuts all) Vernon and his built up model ('Warlord 2') emerged victor on ground time over Dave and his 'Revolution'.

Results:

1. V. Hunt (Morton)
2. D. Coe (Lincoln)
3. M. Whillance (Manchester)
4. N. Gill (Peterborough)

After two rounds the championship positions are:

1	M. Whillance	7 points
2	P. Tribe	6 points
3	D. Coe	
	N. Gill	5 points
	V. Hunt	

Goodyear Racing SMAE 2nd Centralised Event — May 1st, 1983 — Hullavington

Performances in this event are becoming faster and faster, as was shown with a new record time being set for the heat time by Catlow/Jephcott at 4mins. 3.2. secs.to be

Above: Dave Coe makes a final at last! Still the ultimate goal remains - win one! Left: first three at Diesel Combat Champs 2nd round event. L to R Dave Coe (2nd) Vernon Hunt (1st) Mike Whillance (3rd). Right: winner Vernon Hunt with his Warlord II.

Facing page left: Ed Needham (L) Dave Clarkson (R) with record-breaking 'Boo Ray' Goodyear design - drawings next month! Facing page: Bob Horwood (L) Tim Andrews (R) 3rd place at Hullavington with 'Argander' Right: John Catlow (L) Peter Jephcott (R) with 'Ol Blue' 2nd at Hullavington.

broken in the same round by Clarkson Needham who put in a 4mins. 0.36secs. Well done, Dave and Ed.

Dave and Ed were using a 'Boo Ray' which was powered by a F.I. Rossi running on crank case pressure, which was fed by a tank having sufficient capacity for over 100 laps. Thus, it was not necessary for refuelling at any of the pit stops. (A technique earlier adopted by John Green and Brian Malcolm).

Participation at this particular competition was a little disappointing and was probably due to a culmination of indifferent weather reports and a little confusion over the date and venue at which the competition was to be staged.

Unusually for an SMAE centralised event, the competition was based on the three round system with the fastest three teams in any one round going into the final. At this particular event, nearly all the teams were to take advantage of this additional round as the events of the day were to prove. After the first Round, three of the teams were well in front with Tim Andrews/Bob Horwood and Dave Clarkson/Ed Needham sharing top honours with equal times of 4mins. 10secs. These were followed by Thorpe/Pegg with a 4mins. 17secs. These teams were an appreciable degree faster than the rest of the field.

Round 2 saw a few teams improve their situation but with no one threatening the top three teams, who understandably chose not to fly.

John Catlow and Peter Jephcott, who had suffered all sorts of problems during the earlier rounds, then proceeded to take advantage of the extra round and put in the time of 4mins. 3.2secs. in the first heat of the third round, hence with this time and two 4mins. 10secs. of Andrews/Horwood and Clarkson/Needham and with Thorpe/Pegg threatening an improvement on their 4mins. 17secs., the final placings were far from decided and there was a flurry of activity by those who had not flown yet to try to improve their positions.

Dave and Ed then proceeded to put in the 4mins. 0.36secs. but none of the other teams managed to break the 4mins. 10secs. barrier and so the final featured Clarkson/Needham, Catlow/Jephcott and Andrews/Horwood.

For the final, Andrews/Horwood decided not to use their Nelson powered 'Argander' which they had used in the earlier rounds, as it was proving to be somewhat 'twitchy' and opted for a safer, slower Rossi powered 'Argander' and therefore this part of the proceedings lost some of its sparkle and ended with a first for Clarkson/Needham followed by Catlow/Jephcott with Andrews/Horwood in third.

Elliot Club Goodyear Event 22nd May 1983 — Rochester

Many competitors, but sadly few from the more Northern areas of the country, turned up to a reasonably warm and dry day with only a moderate but at times gusty wind, not the unfavourable weather that has been the norm for the last few meetings at this venue, but a very welcome change.

Competition was not quite as fierce as it had been at the earlier centralised meeting but the racing was nevertheless good with clean races being run on an efficient basis under the keen eye of Gordon Yeldman.

Two rounds were run with the fastest three teams in any one round going forward to the 200-lap final.

The first round put Andrews/Horwood in pole position after a faultless race but with a surprisingly low time of 4mins. 25.8secs. and closely followed by Toogood/Ward and Wharton/Gennard.

The second round saw Catlow/Jephcott improve considerably on their first round time to put in a 4mins. 17secs. and easing Wharton/Gennard out of the final. The final was a relatively incident free event apart from the second pit stop of Messrs. Toogood/Ward and Andrews/Horwood who both came down together and very close to each other and ending up with a miscatch for Andrews/Horwood. The race did not appear to be a particularly fast affair but as the watch showed, Catlow/Jephcott had improved on the existing record by a second to come in at 8mins. 31secs.

SMAE 2nd Centralised Goodyear Racing — May 1

1	Catlow/Jephcott	Ol Blue	Rossi F.I	4mins 17secs	+ 8mins 31secs
2	Andrews/Horwood	Argander	Rossi R.I	4mins 26secs	+ 9mins 8secs
3	Toogood/Ward	Miss San Bernadino	Cox F.I	4mins 31secs	+ 166 laps
4	Rudd/King	Miss San Bernadino	Rossi F.I	4mins 33secs	
5	Wharton/Gennard	Lil' Quickie	Nelson F.I	4mins 39secs	
6	Green/Malcolm	Miss San Bernadino	Rossi F.I	4mins 52secs	

A note of warning: Toogood/Ward had the great misfortune to write off two models, both of which were due to line failures. They were using single strand lines but they had bound and soldered these to form the loops and the lines had broken at the binding. There is nothing wrong with these lines, but as with any carbon steel lines, soldering can cause a change in the structure of the steel and leave it in a weakened condition. The answer — bind with cotton and Araldite. The procedure is as follows:

(1) Polish the end of the line in which you require to form the loop with wire wool to remove any swarf from the surface of the wire and degrease using cellulose thinners or any suitable solvent.

(2) Form a loop on the end of the line leaving a free length of excess wire of about 2in., starting at approximately 1¼in. from the end of the loop, bind the two parts of the line together for about ¾in. with strong thread, but do not cut it off. Fig. 1A.

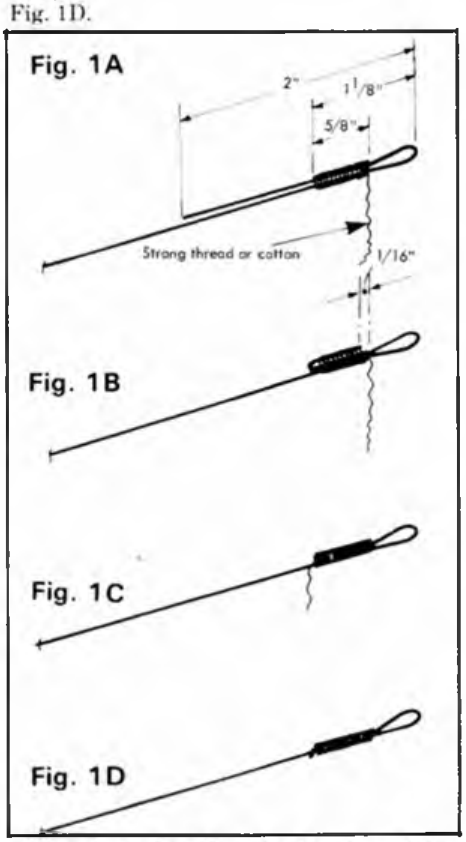
(3) Smear the binding with Araldite.

(4) Reverse bend the free end of the wire back towards the loop.

(5) Cut off the excess wire approximately ¼in. before the end of the first stage of the binding such that the wire is lying parallel with the line. Fig. 1B.

(6) Bind in the free end of the wire and continue binding over the original binding and again smear with Araldite. Fig. 1C.

(7) Tie off the binding and cut off any excess thread and finally smooth out the Araldite using 'wetted' figures and set aside to dry. Fig. 1D.



The above describes the forming of the loop which is to be fitted onto a button of a button type bellcrank. It is strongly recommended that a section of plastic tube or even better an eyelet made from small bore brass or aluminium tube should be fitted onto the wire before forming the loop at the handle end of the line. This protects the line from sharp or tight bends or kinks around the clip on the handle and will considerably extend the life of the lines.

CALCULATING THE CORRECT BALANCE POINT

by Rene Jassien

I CANNOT imagine and this has been true for the past 25 years, that I could go to the flying field with a new model and not know, within a few per cent, the proper location of its correct balance point, taking into account its design and peculiarities and I must say that 'my' early formula for establishing position of the centre of gravity was proven back in 1966. It was successful almost every time: a little 0.5mm shim here or there and the model was adjusted in five or six launches.

Only DOMINO, a Coupe d'Hiver on which I had used thin and very cambered airfoils, had required a second test outing due to warps from dampness. Moving the centre of gravity forward a few per cent and the addition of a turbulator enabled DOMINO to place fourth in the 1959 Coupe d'Hiver, its first competition. That year, my faithful AILBASS placed second to prove it was still in good shape in spite of its six years of age.

Here is my *old formula*, as a reminder:

$$C\% = \frac{K \times TA \times TM \times PS}{WA \times WA}$$

C% = position of CoG in % of mean chord.
TA = Tail Area in dm²
WA = Wing Area in dm²
TM = Tail moment (between Wing TE and Stab LE).
PS = Projected Wing Span

K is a coefficient to be chosen according to the wing position i.e. 53 to 58 for a low wing, 60 to 65 for a medium wing, 70 for a wing on top of the fuselage, and 80 for a parasol wing.

New trends since the 1960's

Various changes in the Wakefield rules, especially the reduction of rubber allowance, the use of new Coupe d'Hiver design criteria: large area with a short powerful climb and the reliable launch of gliders into lift, prompted a change in the trimming methods for models. As a general rule and apart from FAI Power, the centre of gravity crept forward noticeably. The reasons can be analysed thus as follows:

In Wakefield, before the shortening of the motor run (due to reduction of motor weight), a high altitude was reached by means of a long run and a good glide was obtained by using a rearward CoG (or was that a misconception?).

Nowadays, one tries to get the best from the 40g motor and in the interests of a good climb, the CoG is moved forward. Following that, the model stays in the thermal it was hopefully launched into.

A forward CoG for a Wakefield model has become common and only on fly-off type models is the more rearward CoG to be found, the modeller then trusting the model more than the conditions.

For Coupe d'Hiver, the CoG is found to be most forward of all classes. From the 70 to 80% of the 50's, it has now moved to 50 to 65 per cent.

Two main reasons for this. First the typical wing area has enlarged from 9dm² to 14 or 15dm² and sometimes 19dm² (Super Trumal: 48 per cent) or even 24dm² (Super Outdoor: 39 per cent). This means that the relative tail area is reduced and makes a forward CoG necessary. Second reason, the large areas mean less camber in the airfoil hence a forward CoG again. With a fixed wing area and weight the Wakefield model did not require a change in camber.

In FAI Power, the reduced motor run and the ability to climb high, allowed the retention of a rearward CoG. The use of variable incidence tailplane also permits this by making a flat bottomed airfoil react like an undercambered one. In this model class, the calculations for the CoG position will have to rely on different coefficients.

Two years of reflection, calculations and checks based on successful models made me come to the conclusion that two coefficients were to be introduced instead of just one as in the early formula. I also proved that the Tail Moment as used heretofore had to be replaced by a dimension I call the Great Moment, (GM) which is not the distance from the wing trailing edge to the tailplane leading edge, but the distance from wing leading edge to tailplane leading edge. (See figure 1).

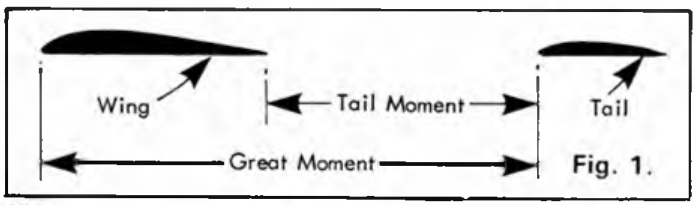


Fig. 1.

The two coefficients to use are related, one to the wing characteristics, the other to the tailplane characteristics.

I am too much of a perfectionist to write down my ideas without a thorough checking. The final formula detailed below has been checked on over 50 models designed by serious modellers with excellent results. The criticism of flyers using a CoG position more than six per cent away from the result of my calculations will not be easily accepted: the formula is not at fault, the model may well not be at the top of its form! The largest variations in Wakefield and Coupe d'Hiver are found on older modellers' models, who have retained the habit of a rearward CoG (are they right or wrong?), amongst them are Goublaire, Wantzenriether, Jossieu, and the most devious of all, Pierre Serres with 5.7 per cent on his Coupe d'Hiver 'ALTUS.' On Wakefield models the largest difference found was 2.6 per cent.

The formula for calculating the best position for the centre of gravity is:

$$C\% = KA + \left(\frac{KT \times TA \times GM \times PS}{WA \times WA}\right)$$

In which C% = distance in % of the CoG from the wing mean chord LE.
KA = Numerical coefficient for the wing KA = 20 + A + B + C.
KT = Numerical coefficient for the tail KT = 25 + D + E.
TA = Tailplane area in dm².
GM = Distance from Wing LE to Tail LE in dm.
PS = Projected wingspan in dm.
WA = Wing area in dm².

(For scale models, delete the fuselage width from both wingspan and area).

The coefficient KA (KA = 20 + A + B + C)
A: varies with the wing position relative to the fuselage axis use values as shown

A =
+ 2 for low wing
+ 3 for medium wing
+ 4 for wing on top of fuselage
+ 5 for small cabane or large dihedral
+ 6 for high cabane

B: varies with the camber of the airfoil off the wing use

B =
+ 0 for symmetrical airfoil
+ 1 for semi-symmetrical airfoil
+ 2 for flat bottomed airfoil
+ 3 for undercambered airfoil
+ 4 for highly undercambered airfoil

C: depends on the class and the use of the model

	Scale and Peanut Coupe d'Hiver Saint Class	FIA (Glider) FIB (Rubber) HL Gliders	FIC (Power)
Rough weather or good climb	- 6	0	+ 6
All weather or medium climb (HLG outdoor)	- 4	+ 2	+ 8
Calm weather or good glide (HLG indoor)	- 2	+ 4	+ 10

The coefficient KT (KT = 25 D + E)
D: varies with the type of fins used:

D =
+ 0 central fin
+ 1 small tip fins
+ 2 large tip fins

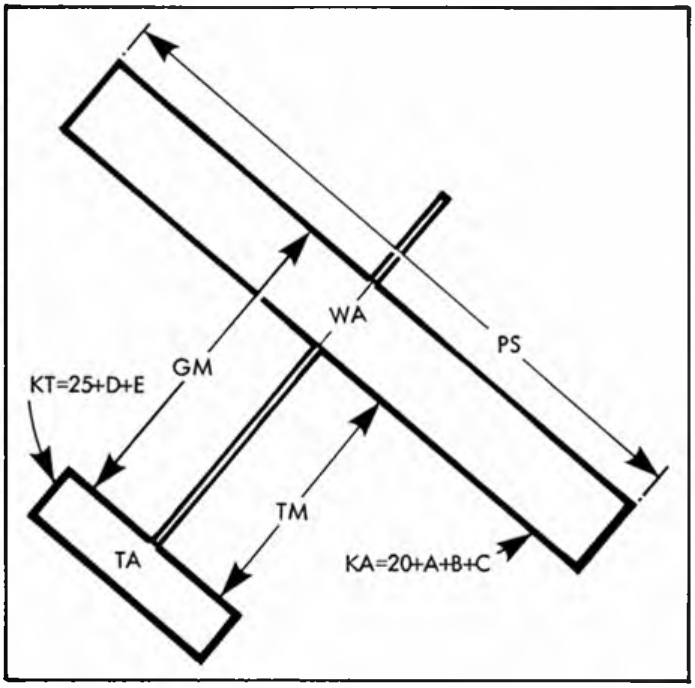
E: varies with the tailplane airfoil section used:

E = + 0 for symmetrical	+ 0	If model is
+ 1 for semi-symmetrical	+ 1.5	very well built
+ 2 for flat bottomed		
+ 3 for undercambered	+ 4.5	
+ 4 for highly undercambered	+ 6	

An example of the calculation

The models are the Wakefields of B. Boutillier and J. Petiot who placed first and second in the 1977 French National Championship. The are both very competent modellers and one can trust that their models are well adjusted.

GOTH-ELAN by B. Boutillier Centre of gravity as used: 75.4%. WA = 16.14cm² TA = 2.81dm² GM = 8.64dm. PS = 17.3dm. Mean chord 95.5mm KA = 20 + A + B + C KT = 25 d + E.
KA? A: wing on small cabane, +5 B: highly undercambered airfoil, +4
C: All weather Wakefield, + 2 KA = 20 + 5 + 4 + 2 = 31
KS? D: Central fin, + 0 E: flat bottomed airfoil, + 2 KS = 25 +0 + 2 = 27



$$C\% = 31 + \left(\frac{27 \times 2.81 \times 8.64 \times 17.3}{16.14 \times 16.14} \right) = 31 + 43.33 = 74.53\%$$

Actual CoG: 75.4% Calculated CoG 74.53% . . . not bad?

LA FLECHE by J. Petiot Centre of Gravity as used 75%
WA = 15.8dm² TA = 3.6dm² GM = 8.03dm PS = 13.5dm
KA? A: wing on top of fuselage, + 4 B: highly undercambered airfoil, + 4
C: All weather Wakefield, + 2 KA = 20 + 4 + 4 + 2 = 30
KS? D: Small tip fins, + 1 E: undercambered airfoil, + 3 KS = 25 + 1 + 3 = 29

$$C\% = 30 + \left(\frac{29 \times 3.6 \times 8.03 \times 13.4}{15.8 \times 15.8} \right) = 30 + 45.33 = 75.33\%$$

Actual CoG: 75% Calculated CoG: 75:33% . . . not bad!

On these two fairly different models, the CoG was located within one per cent. Using this formula the designers will be happy to save time and the neophytes will save a few mistakes.

Here are a few of the checks done on proven models

Class	Model	Modeller	Year/ Country	Actual CG	Calculated CG
Wake	Grozebul	L. Dupuis	French Champion 1976	68%	68.3%
Wake	Ka Bu Ki	Paik Chang Sun	World Champion 1975	67%	68.39%
Wake	Mini Ostrogoth	E. Gouverne	Marigny 1976	75%	75.15%
Coupe d'Hiver	Gadjet	A. Meritte	French Champion 1967	58%	58.38%
Coupe d'Hiver	Pam 80g	A. Landeau	Coupe d'Hiver 1967	67%	65.56%
Coupe	Ailbass	R. Jossien	Coupe d'Hiver 1954	54%	53.29%
FIC	Slo-Poke	Ch. Martin	USA	65%	67.36%
FIC	BE-35	Verbitsky	USSR	67%	67.68%
FIA	Multi 77	H. Motsch	BDR	57%	56.07%
FIA	Multi 77	Y. Deton	France	60%	59.04%
Wake	Groovy Tuna	J. Davis	USA 75	68%	69.4
Wake		D. Grenves	Marigny 75 GB	76%	76.7%
Indoor	The Time Machine	P. Andrews	World Champion 1972	72%	71.54%

CONTINUED FROM PAGE 425

A suitable formula for most model compression ignition engines is 25 per cent oil, 30 per cent ether and the remainder paraffin. The Mills will run quite satisfactorily on this. However, it helps to include a small percentage of a suitable additive to smooth combustion and enable the engine to run on a lower compression setting. Such additives are known as cetane number improvers and the two best ones — the only ones we would recommend in fact — are amyl-nitrate and isopropyl-nitrate. Both these compounds are used as cetane improvers for full-size diesel engine fuels. Small engines, particularly those that do not normally run faster than 9,000-10,000rpm, such as the Mills, do not need more than 1% of either of these two additives. For larger, more powerful modern model diesels, 2 to 3 per cent may be necessary.

Mixing these fuels presents no difficulty. Castor-oil and paraffin will not mix together, but ether, in addition to providing the self-ignition constituent, acts as a stabiliser and produces a homogeneous mixture. Needless to say, the greatest care must be exercised in handling ether which is extremely volatile and highly inflammable.

This leads us to our correspondent's final question about the mail order supply of ingredients. The Post Office regulations in regard to inflammable liquids are such as to exclude the postal transmission of ether, amyl-nitrate, isopropyl-nitrate or, for that matter, model engine fuel of any kind, or any constituent thereof, other than lubricating oil. The solution, therefore, is to try to obtain materials, other than oil and paraffin, through a local pharmacist. Failing this, the only answer, generally, is personal collection or road or rail delivery from one of the model shops handling such materials, all of which, incidentally, are available to both home and overseas markets from the UK model fuel specialists, Model Technics Ltd., Vanguard Way, Shoeburyness, Essex.

Mystery engine identified

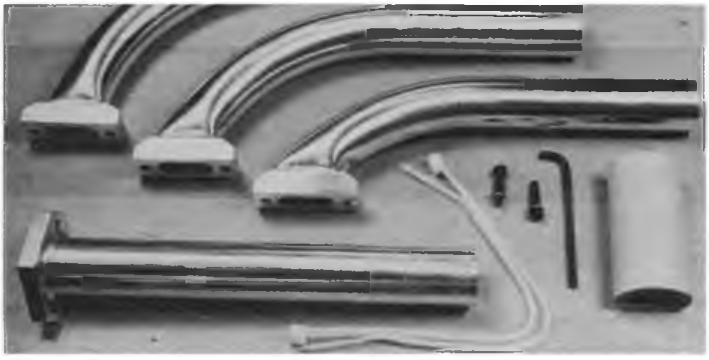
The 'mystery engine' featured in the July issue drew responses from two readers. First, we had a phone call from an old acquaintance, Ian Russell, who identified the engine as a French 'L.C.' This was confirmed, a few days later by a letter from one of our Swedish correspondents, Sten Persson, who wrote:

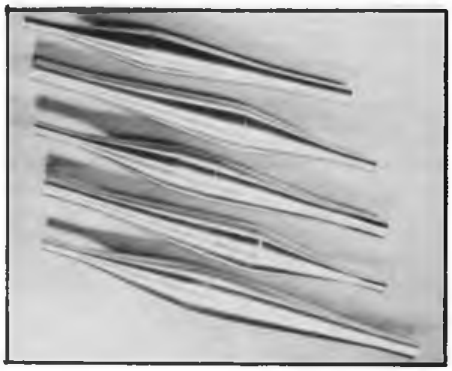
"I think I can help you identify that mystery petrol engine. It is a 1940 French L.C. engine, probably the L.C. 10cc *Spécial*. It was made in three versions, differing from each other only in size: L.C. 3cc *Bébé*; L.C. 7cc *Normal* and L.C. 10cc *Spécial*.

"According to a contemporary French magazine, the *Spécial* weighed 275gms and swung a 14.5 × 8 in. prop at 5,000rpm, its peak output being 0.32bhp at 6,500rpm. I have had the 7cc and 10cc engines in my collection and they were soundly built and appeared to be of high quality"!

Correction

A couple of typographical errors crept into the April 1983 issue of 'Engine News', page 172, concerning private importation and Customs & Excise regulations, which resulted in the wrong information being conveyed. Beginning with the bottom two lines of the second column, this should read ' . . . *dues on* one of his own imports were assessed. In this instance, as the two small engines concerned were valued *at less than* £70 . . . '





Left: intended for use with tuned pipes (see July issues) Irvine Engines stock a range of approximately 80 different header pipes. Just four of these are shown here. Right: omitted from July issue due to lack of space, Irvine Engines' new tuned pipes for 3.5cc to 10cc racing engines.

SPACE MODELS & ROCKE

PETER FREEBEY INTRODUC THE EXCITING NEW FIELD OF SPACE MODELLING IN THE FIRST PART OF A REGULAR SERIES

Above left: Rocket with parasite boost glider streaks upwards on medal-winning flight in European Space Modelling Champs in Czechoslovakia. Above right: author with novel design . . . canard boost glider is released when parachute is deployed. Facing page: R/C boost glider by J. Taborsky of Czechoslovakia . . . rocket pod is ejected at apogee! Below left: Final preparation of scale model of Mercury Redstone by Yugoslavian space modeller Milan Radie. Below right and facing page: Author's model of British Aerospace Skua just prior to its record-breaking flight to over 2100ft. at World Champs in Czechoslovakia.

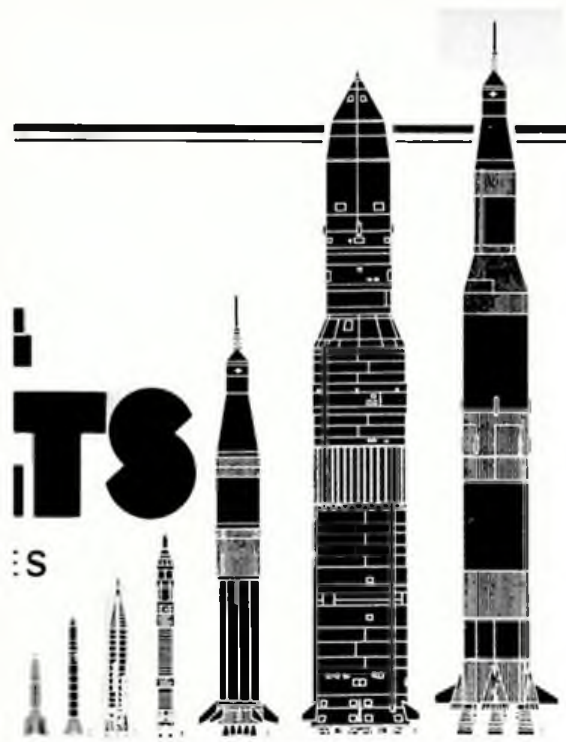
SOME YEARS AGO it was known as model rocketry, which quite simply means the building and flying of small rocket powered models. But and this is a big BUT ... only using pre-packaged, commercially made model rocket motors. For many years (possibly over 1,000 years in the case of the Chinese) people have had a fascination for rockets and have worked hard at perfecting rocket motors of all types, shapes and sizes. Sadly, far too many people have either killed themselves, lost eyes, limbs or just plain burnt themselves badly. There is no escaping the facts: to attempt to make your own rocket motors is probably one of the silliest things you could do with a life that you only have the opportunity of using once! In fact, in the USA such people are known as basement bombers ... a significant sobriquet.

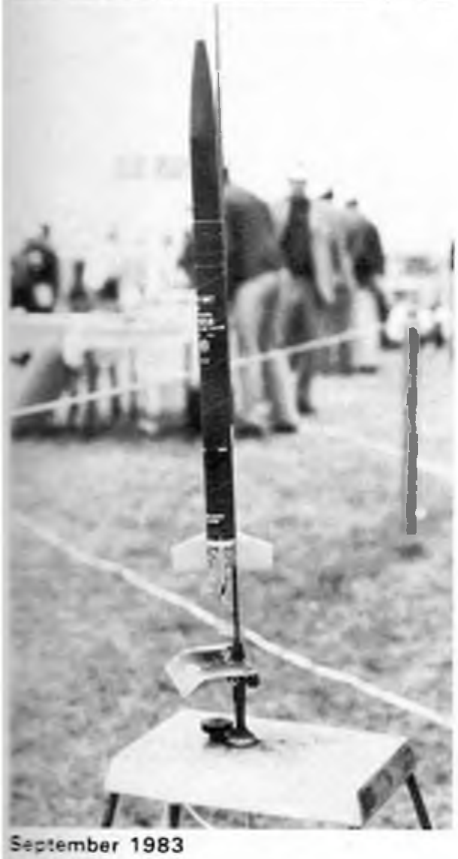
Anyway, back to model rocketry, or rather what has now become known as SPACE MODELLING ... these models use *only* pre-packaged motors, they are flown using a pretty simple but effective safety code that makes their use not only very safe, but also easy to build and enormous fun to fly. Why should a safety code make models easier to build you ask? Well, for a start we make our models only from lightweight materials such as paper, balsa wood, thin plastic card, straws etc. We don't use metal, so there are none of the difficulties that the full size rocketeers have with welding/soldering etc. Using such light materials lets us set an absolute maximum weight for our largest models of 16oz ... and that can produce a fully detailed model of a Saturn V of over 3ft. in height and still be within our weight limit. Most models come out between ¼ to 1½oz which makes the cost of construction fairly cheap ... you can cut an awful lot of fins from one sheet of 1/16 balsa!

The basic construction of a model rocket has remained the same now for many years and has proved itself in literally millions of flights around the world. The body of the rocket is simply a very light paper tube, the fins are usually made of balsa but plastic is quite common in a number of beginners' kits. You also see some models with card fins but these can distort with even the lightest landing so I would not recommend this type of construction. The nose cone is commonly either balsa or a hollow plastic moulding ... card can be used usefully here but it is more difficult to form into anything other than a straight cone shape.

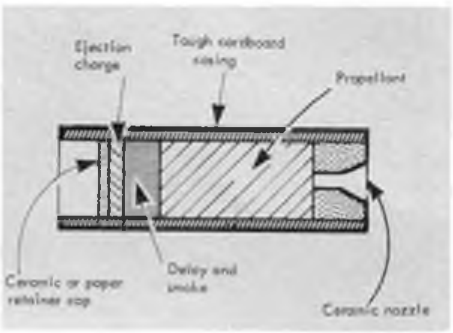
How do we get this to fly?

First we need a rocket motor. In a rather simplistic sense these are rather like a 'Guy Fawkes' rocket without the stick but there the similarity ends! Our rocket motors give us three important attributes. *First*, they have to supply the motive power to thrust the model vertically upwards against gravity. *Second*, having given the 'push' required to get the model moving, they have to provide some means by which to ensure that the model can be SAFELY brought back to earth. This they do by firing a retro-charge, *not* out through the exhaust nozzle, but up into the body of the rocket! Has the man gone mad you say ... no, not at all; the nose cone is removable and can easily be blown out, with the package immediately behind the nose cone ... what package? yes you've guessed, it's a parachute and the nose cone did not get blown away, it was attached to the body via an elastic shock cord.

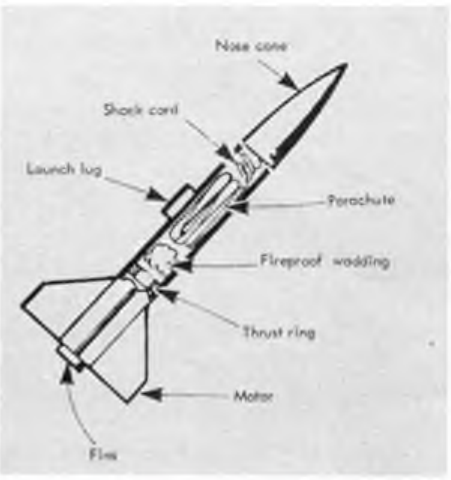




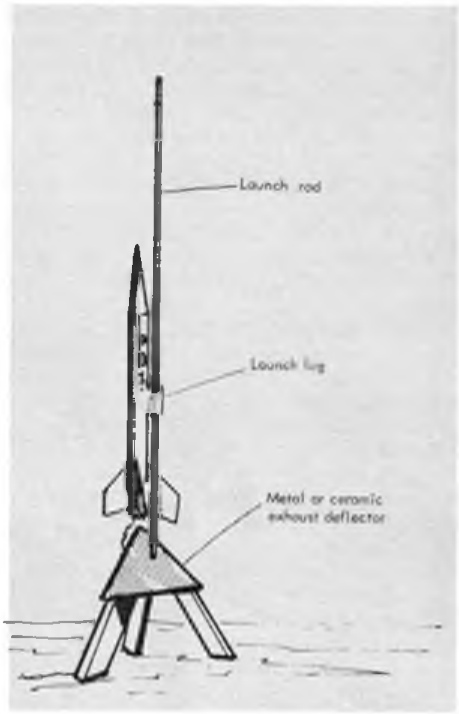
So now we have our model floating safely back to terra firma ready for its next launch. But what was the *third* thing our rocket motor had to have? Well, if you accelerate your model upwards with the initial thrust of the motor, it is going to be travelling at its fastest at the moment that the propellant ceases to burn. Now that would NOT be the best time to eject our parachute would it ... no, let the model coast on up for a few more hundred(3) feet and then deploy the parachute ... more height, more duration and more fun! So, our third portion of the rocket motor (albeit the second part in real time) is a delay to enable just this to happen. As a plus, the delay charge produces smoke whilst it is burning so helping us to keep track of where the model is. The basic form of rocket motor is going to look something like this:



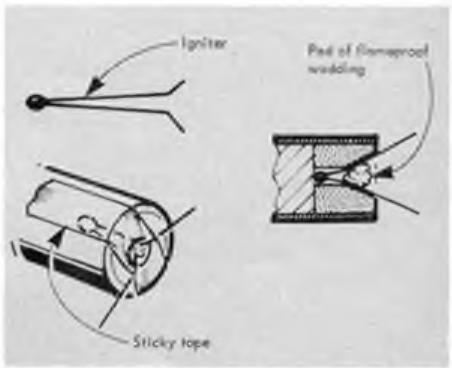
Our flying space model now has almost everything that it needs to fly successfully: nose, shockcord, body, parachute, fins, motor. It needs only three more items and we can try our first launch. First: just in front of the motor must be a motor stop or thrust ring for the motor to 'push' against. Without this, the model would probably not lift off but the motor would travel straight through the model, punching out the 'chute and nose cone as it went! Secondly, how are we to launch our model safely upwards on its course towards the stars? Think about the moment of ignition ... there is going to be a point in time when the motor will just produce enough thrust to move the model, BUT the rocket requires a certain forward velocity for the fins to have the necessary aerodynamic stabilising action. If that initial movement tilts the model it could go any which way but up! To support our model and keep it travelling in the right direction for those first few vital milliseconds we guide our model up a vertical launching rod. This is simply achieved by cementing a short length of paper tube (or straw) vertically



along the centre of the body tube ... The launching rod slides easily through this 'launch lug' during lift-off. Finally we need a little fireproof wadding directly beneath the parachute, so that the brief burn of the ejection charge does not damage this vital part of our model (parachutes are commonly made of very thin plastic).



How do we ignite our rocket motor when all is assembled at the launch site? We certainly don't light the blue touch paper and retire to a safe distance! The blue touch paper technique is not always reliable on 'Guy Fawkes' night either in the time it takes to cause ignition or in actually causing ignition at all! No ... for a number of reasons, principally those of safety and overall control of the launch, we use electrical ignition. With most motors that you buy you get an electrical ignitor. This consists of a short length of nichrome wire with a very small blob of a material similar to a safety match stuck to the middle of each length. This is pushed up inside the rocket motor nozzle, against the propellant and held there with a small strip of sticky tape or with a small pad of flameproof tissue.



Two mini croc-clips are attached to the ignitor wires AFTER the model has been slid onto the launch rod. Various types of launch controller are available which enable you to check that all is connected properly before you get to the moment you have been waiting for ... lift off. BEFORE

that final moment you must check to see that nothing is in the air anywhere near you. You don't want that light plane pilot to think your rocket is a distress signal do you? The local model aeroplane club will not appreciate small holes being punched through the tissue of their models either! It is vital to perform these last minute visual checks because, although it is highly unlikely that you could damage either a hot-air balloon or a hang-glider, both are silent flying and their pilots would be understandably put out to have your prize model literally flying past their noses!

You have checked for air clearance . . . 5 . . . 4 . . . 3 . . . 2 . . . 1 . . . IGNITION . . . LIFT OFF. A perfect launch and your model streaks skywards. Watch it VERY carefully, these models are fairly small and the initial acceleration is quite rapid. Now the parachute pops out and the model quietly drifts downwind . . . lands and is retrieved and 'preped' (prepared) for its next flight . . .

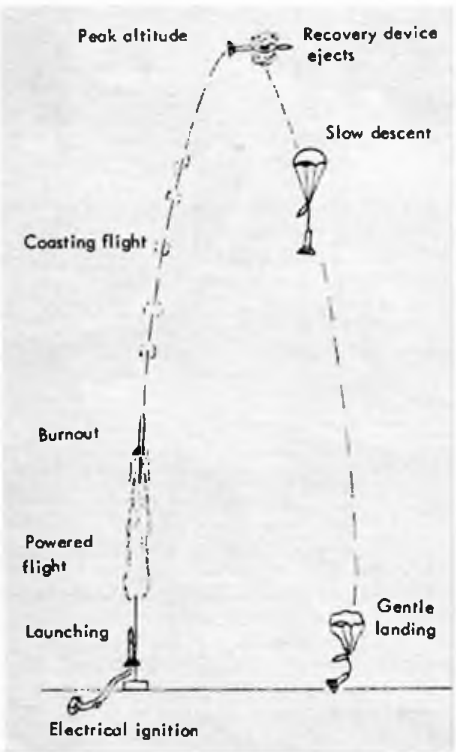
Space modelling is easy to get into, follow the simple instructions that come with most kits and you can join the growing band of space modellers in Britain. For many years space modelling has been frowned upon by the authorities in this country. But at long last they are taking a new look at this growing activity. Thanks to the British Space Modelling Association the archaic and anomolous regulations that have hitherto affected model rockets are being reviewed. So perhaps we will soon see this country take its place alongside America, Bulgaria, Canada, Czechoslovakia, Poland, Rumania and many others in accepting and encouraging this fascinating aspect of aeromodelling.

In this article we have only touched on the beginnings of one type of model . . . there are others: swing wing gliders that must ascend like a rocket and descend as pure gliders, payload models, scale models, R/C models and many others.

Up to now, there has been no manufacturer of model rocket motors in this country but even now this might be changing. If that happens then not only will materials (motors and kits) be available in the local model shops but hopefully the price will move down to a more reasonable level (imported goods always seem to cost far too much!).

For those interested in learning more about the British Space Modelling Association write to: 15 HIGH STREET, DITCHLING, SUSSEX, BN6 8SY . . . Please enclose an SAE.

Left, Small boost glider to a design much favoured in Eastern Europe.
Below, British competitor John Wheddon discussing his boost glider design with Yugoslav official S. Pelegic.



Typical safety code (American National Association of Rocketry)

1. Construction — My model rockets will be made of lightweight materials such as paper, wood, plastic and rubber without any metal as structural parts.
2. Engines — I will use only preloaded factory-made model rocket engines in the manner recommended by the manufacturer I will not change in any way nor attempt to reload these engines.
3. Recovery — I will always use a recovery system in my model rockets that will return them safely to the ground so that they may be flown again.
4. Weight Limits — My model rocket will weigh no more than 453 grams (16oz) at lift off, and the engines will contain no more than 113 grams (4oz) of propellant.
5. Stability — I will check the stability of my model rockets before their first flight, except when launching models of already proven stability.
6. Launching System — The system I use to launch my model rockets must be remotely controlled and electrically operated, and will contain a switch that will return to 'off' when released. I will remain at least 15ft. away from any rocket that is being launched.
7. Launch Safety — I will not let anyone approach a model rocket on a launcher until I have made sure that either the safety interlock key has been removed or the battery has been disconnected from my launcher.
8. Flying Conditions — I will not launch my model rockets in high winds, near buildings, power lines, tall trees, low-flying aircraft, or under any conditions that might be dangerous to people or property.
9. Launch Area — My model rockets will always be launched from a cleared area, free of any easy to burn materials, and I will use only nonflammable recovery wadding in my rockets.
10. Jet Deflector — My launcher will have a jet deflector device to prevent the engine exhaust from hitting the ground directly.
11. Launch Rod — To prevent accidental eye injury, I will always place the launcher so the end of the rod is above eye level, or cap the end of the rod with my hand when approaching it. I will never place my head or body over the launching rod. When my launcher is not in use, I will always store it so that the launch rod is *not* in an upright position.
12. Power Lines — I will never attempt to recover my model rocket from a power line or other dangerous place.
13. Launch Targets and Angle — I will not launch rockets so their flight path will carry them against targets on the ground, and will never use an explosive warhead nor payload that is intended to be flammable. My launching device will always be pointed within 30 degrees of vertical.
14. Prelaunch Test — When conducting research activities with unproven designs or methods, I will, when possible, determine their reliability through prelaunch tests. I will conduct launchings of unproven designs in complete isolation.

Alex Imrie's VINTAGE CORNER

Peter Bull's attractive 'Buccaneer Standard,' an R/C version of the 66in. span Bill Effinger design from 1937 that was originally kitted by Berkeley Model Supplies (see text).

Irish 'Buccaneer Standard'

Peter Bull of Kilkenny is a keen radio modeller who has been bitten by the vintage bug. In a recent letter he gives the following details of a 'Buccaneer Standard' that he has built from a Ben Buckle kit. '... powered by a Merco 35 glow plug engine, the model has Skyleader three channel radio working rudder, elevators and throttle. The extended exhaust pipe keeps the model clean and after four months of use, the finish is still like new. Covered in nylon, the wings and tail unit were sprayed with yellow car cellulose and have the leading edges scalloped in blue, executed with Humbrol enamel, with white trim applied by means of a small brush in a pair of compasses. The fuselage is also finished in blue and all individually fitted windows have borders of thin white plastic. The windscreen slope was changed to accommodate the 3oz fuel tank made up from one-and-a-half 2oz. mustard tins which gives an endurance of 30 minutes, enabling 20 touch and go landings to be done at one filling.' Peter has made a set of floats for this model and is currently trying to get his local club interested in seaplanes and flying boats, having obtained permission to use a nearby suitable small lake. he also has a 20-year-old 'Mermaid' 5cc diesel powered flying boat which was originally fitted with a single channel rubber driven escapement, and he intends to restore this model to flying condition (see below).

'Mermaid'

It appears that there is a growing interest in vintage waterplanes, (see the Joe Ott 'Kingfisher' in last month's column) and readers might like to know a little more about the flying boat mentioned above by Peter Bull.

'Mermaid,' is, of course, the well known design by Dr. J. F. P. Forster, who kept interest in petrol models going in this country during the dark days of the 1939-45 war (and its associated four year ban on power flying) with his keenly read column in this magazine called 'Petrol Topics'. Dr. Forster was a most enthusiastic petrol modeller before the war and after meeting Colonel C. E. Bowden he became intrigued with the latter's experimental waterplanes. The flying field used by these two 'petroleers' at Porlock in Somerset was in close proximity to the Bristol Channel and this presented a real hazard to their free flight landplanes, while the vast unobstructed area of the sea simply called out for model aircraft that could take-off from and alight safely on the surface of the water.

C. E. Bowden was the then current holder of the power driven rise-off-water record, and, he had established this 30.4 seconds flight with a 'very curious looking flying boat' which had a large, almost flat-bottomed pontoon hull. In January 1939 Dr. Forster undertook to design and build a petrol-engined flying boat, his chief incentive to do this was "... to try and show Colonel Bowden the 'errors of his ways' by producing a machine bearing some sort of resemblance to a scale model, which was capable of getting-off the water unassisted, and possibly breaking that ridiculously low record of his..."

The model that resulted was powered by a Brown Junior, had a wingspan of 6ft. 9in. and weighed 4¼lb. Wing tip floats were not deemed practicable and the model used sponsons for stability on the water. Known as 'P6', the design underwent various modifications during extensive flying and these included varying the height of the thrust line (or power egg) above the wing, increasing the area of the sponsons to further improve water stability and raising the location of the tailplane. The latter was necessary to prevent it contacting the water and becoming waterlogged.

Lessons learned from 'P6' were later incorporated into a completely new design, this being a 6ft. span model with wing tip slots, powered by a 6cc Baby Cyclone. The outline of the tail unit was changed, and the hull swept upwards at the stern to place the tailplane even further away from the water. This machine, which was 'P9' in Dr.

Above centre: Arthur Fox made this three channel R/C version of 'At Ease' designed by Charles Tracy and Willard Meyers from drawings in the 1938 Zaic Yearbook. Eight feet span beauty is powered by a Kalt four stroke and is expected to be ready for this year's Vintage Day on August 21. Above: 'Mermaid' ready for covering, summer 1941. (See text) Plans for this practical vintage flying boat are still available from MAP as WP/162X price £2.50 plus 45p postage. Left: Dr. Forster's 1939 flying boat in its original form, seen here with inverted 6cc Baby Cyclone, the forerunner of 'Mermaid.' (See text). Right: despite frantic search we could not find a 'Cloud-Dozer' photo for last month's Vintage Revival. Here is Silvio Lanfranchi with his Ohlsson 60 powered example at the Northern Area Daily Despatch Rally at Woodford in 1947.

Forster's stable was named 'Mermaid' and when the *Aeromodeller Plans Service* first released drawings for this model in April/May 1941, the prototype was still under construction and was not actually finished until June. As a result, the illustration used to advertise the plans was that of the earlier 'P6' which then became generally known as 'Mermaid,' while the published Aeromodeller design automatically became 'Mermaid II.' Plans for this model are still available from Aeromodeller Plans Service as WP/162X price £2.50 plus 45p postage. Further improvements brought about a parasol flying boat named 'Neptune' built in 1945, whose hull bottom was based on that of the full-size Dornier Do18. This model was exhibited at the Dorland Hall Exhibition, and later in 1946 Dr. Forster produced 'Mermaid III' which combined the best features of 'Mermaid' and 'Neptune.' 'Mermaid III' was never published, but 'Neptune' was fully described in a two-part article in Model Airplane News in June/July 1946.

Premier Cruiser

Despite the large number of vintage plans available to modellers, there are always a few builders who desire to make a vintage model, for which plans have not yet surfaced from the past. Such a design is the 'Cruiser' designed by C. A. Rippon and kitted by his company, Premier Aeromodel Supplies. This was an extremely handsome low-wing strut-braced monoplane of 47in. wingspan, which was also available from Premier as a full-size working blueprint.

In a recent letter Alan Wiggs of Radlett writes: "... I have recently been passed a programme for the 1937 Northern Heights 5th Gala Meeting at the Fairey Aerodrome at Heathrow. This shows that on that occasion there was a contest for this model design, so several must have been built. However, I don't think Premier continued the kit after the war. 'SAM 35 Speaks' has carried requests for, or comments about this model over the past year, but none of them have produced any plans. We now have some members wishing to build the 'Cruiser' and threatening to scale-up the 'Cruiser Pup,' which as you know does not have the features of the 47in. span 'Cruiser.' The 'Cruiser Pup' competition at Old Warden on Vintage Day in August give me an excuse for airing this request for plans of the 'Cruiser.' If we don't soon locate an original 'Cruiser' plan, I fear that we will find that there will be a number of hybrid designs flown by former 'Cruiser Pup' contestants who wanted to have a go at the larger 47in. span version."

The 'Cruiser' contest mentioned by Alan was held on 20th June 1937 under the following rules:

The models flown in this contest must have been constructed by the entrant from the designs published in 'The New Model Aeroplane Manual'.

Competitors will be awarded up to a maximum of 60 points for fidelity to type, workmanship and finish, which will be added to the average duration of three Rise-Off-Ground flights.

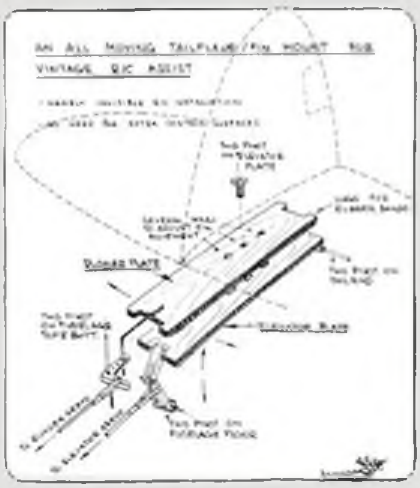
Any serious deviation from the design will render the entry liable to disqualification.

The New Model Aeroplane Manual contains a very detailed description amounting to 17 pages on building this 'advanced balsa model', with a complete list of materials required and a working drawing showing the component parts. Although the drawing is not dimensioned (possibly to compel contemporary would-be builders to purchase full-size drawings) a scale could be made using the wheel diameter (2in.) as a key and the plan enlarged photographically.

The 'Cruiser' is, of course, a completely different machine from the 'Cruiser Pup' and would not be eligible for the 'Cruiser Pup' event. In any case it is now rather late in the day (or month!) to build a 'Cruiser' in time for this year's Vintage Day, but readers are asked to 'cast around' and hopefully an example of the original full-size plan might yet be found. If not, looks like a job for one of our devoted draughtsmen, how about it?

Swiss tips

Ernst Schlachter from Switzerland has kindly submitted the drawing reproduced below of an all moving tail unit for use in R/C Assist which precludes the necessity to alter the tail unit structure by hinging the control surfaces and thus spoiling the tail end of a vintage model with protruding push rods and ungainly horns. He does not claim to be the originator of this idea and in fact has not tried it himself, but it certainly is appealing, and his sketch is self-explanatory. Ernst also tells us that he found a foam spray for cleaning alloy car wheels to be extremely useful for cleaning old engines, and



Right: Ernst Schlachter's all moving tail unit for R/C Assist. (See text). Below: the master at work! Bob Copland helps to repair Ken Young's model ... on Gussie Gunter's box! Irish Nationals 1947.

suggests that you look around in your car supplies shop or garage for a British equivalent.

Transatlantic model

Some years ago investigators were undertaken into the feasibility of crossing the Atlantic Ocean with a powered model aeroplane. However, long before this it appears that a successful crossing had been made with a small hydrogen balloon. The aerostat in question was released at a church fete at Caterham in Surrey on 21 May 1930, bearing a label requesting that the finder return it, stating where found. The label was returned from New York postmarked 4 June 1930, the finder, a Mr. M. J. Israel saying that the balloon landed on the roof of 107 West 86th Street, Columbus Avenue. This feat is all the more remarkable when one remembers that the prevailing wind over the Atlantic is Westerly! As far as the writer is aware the proposed model aeroplane crossing was never attempted.

Vintage plans galore!

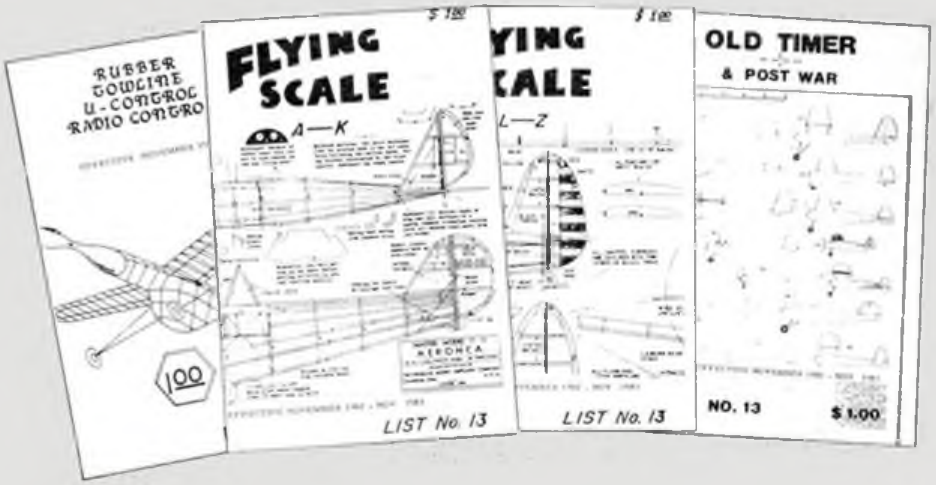
The 13th issue of John Pond's catalogue is to hand, this Bumper Edition comprises two sections on Flying Scale, one on Old Timer and Post-War power models, and one on Rubber, Glider, Control-Line and Radio Control. These individual parts are priced at US$1.00 each and when ordering all four parts UK residents are requested to include US$2.00 for airmail postage. There are thousands of vintage plans in what must be the world's most comprehensive range. Each model is listed with origin of plan, designer and wingspan. As I have mentioned before in this column, John's compendium of vintage models is a most valuable research tool for the true enthusiast. Also available on a limited basis are the two wall charts of famous models of yesteryear by Paul Plecan at US$2.00, mailed flat, or US$3.00 rolled in a tube. Order direct from John Pond Old Time Plan Service, P.O. Box 3215, San José, CA 95156, USA.

'Toreador'

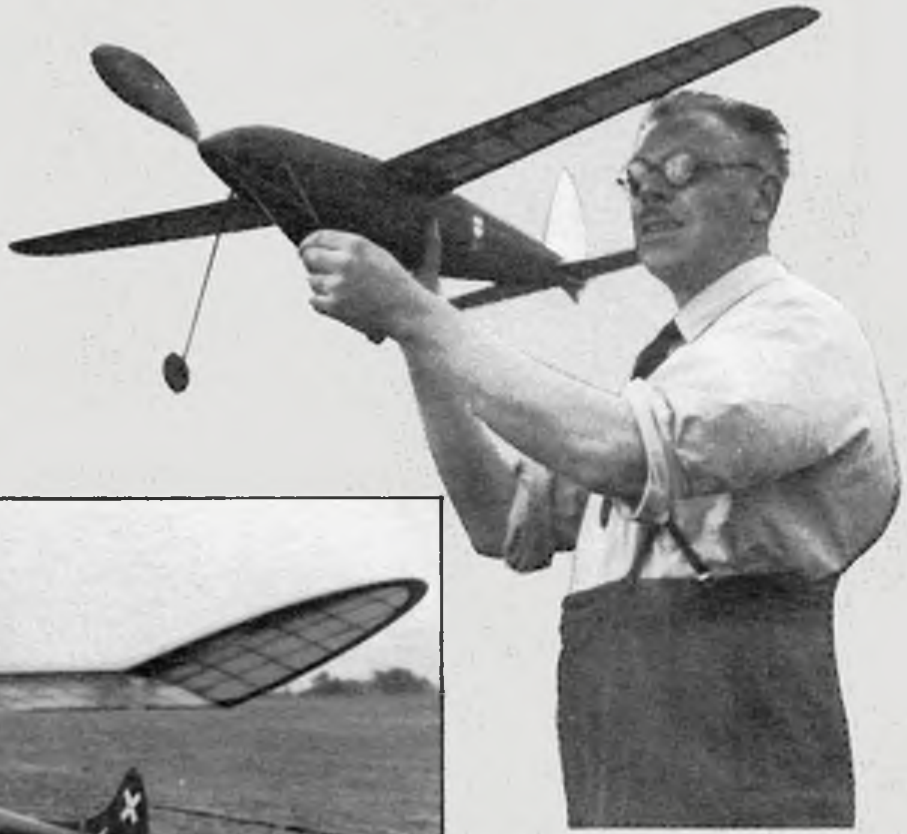
This 56in. span pylon design by Claude McCullough was described in 'PLAN-BOOK', one of the excellent 'Model Aviation Series' books by Ian Allan Ltd. who also supplied the full-size plans. George Blair of Edinburgh writes to tell of the competition successes obtained by Joe McMaster of Glasgow, whose 'Toreadors' were "... always immaculately finished, usually modified by planking the fuselage and adding diagonal bracing to the wing. The opposition tended to give up when they saw the terrific spiral climb that the 'Toreador' was capable of when powered with a Frog 500."

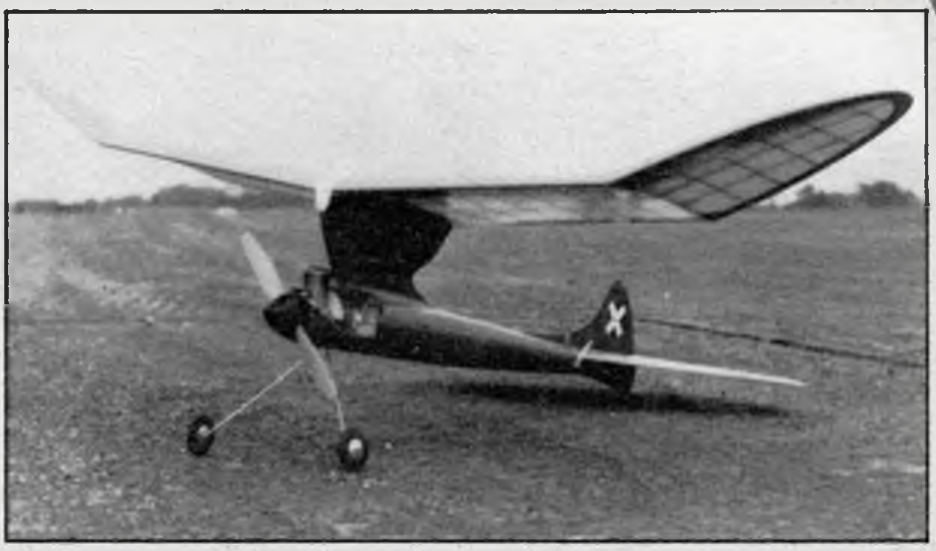
A few years ago George obtained a copy of the plan and built the model shown. He continues "... unfortunately my trimming technique could not have been as good as Joe's and the model had a very short life. Luckily before it crashed, John Mayes of Bristol took the photograph that is reproduced here."

The writer can confirm that the 'Toreador' was a hot ship indeed, and built one himself in 1949 powered by the long shaft Amco 3.5cc diesel. He was, however, no luckier than George and has seldom seen a model reduced to 'instant kit' state in such small pieces!



John Pond's plans lists (see text) offer the most comprehensive listing available. A labour of love that was over 20 years in the making.





Above: P. T. Capon with his 'Krusader' Wakefield model at the British Nationals in 1947. Plans for this model are available from MAP as MA20 for £4.40 plus 45p postage. Left: George Blair of Edinburgh made this nice example of Claude McCullough's 'Toreador,' but wrote it off during trimming flights. (See text).

SHOP TALK

NEW MODEL HOBBY PRODUCTS REVIEWED

Comet rubber power models

A vast range of rubber powered free flight models from the Comet stable are now available from J. Perkins (Wholesale). These attractively packaged kits cover the whole spectrum of scale and functional designs between 11 and 31 inches span.

One of the smallest models in the range is a 12in. span *Fokker DVIII at a cost of £2.45*. Unusually for a kit of such a simple nature, this one features die-cut fuselage formers, wing ribs and those frame parts with a complex shape. Strip balsa is supplied as a die-cut sheet. Building instructions are extremely clear and printed,with accompanying photographs, on the detailed plan. The kit is completed by a 3½in. plastic propeller and thrust button with pre-formed motor hook, rubber motor, turned wooden wheels and lightweight tissue covering material.

The *Meteor* is one example of a more functional kit from the Comet range. A 21½in. span model, the Meteor has die-cut components and a sheet of die-cut balsa strip, although a warning note points out that the cutting has to be completed before the parts can be removed. Rubber motor, plastic prop, wooden wheels and tissue covering are all included, plus self adhesive decorative markings and a small sheet of glass paper. There's also an information sheet giving covering tips on one side and flying notes on the other. This attractive little sportster costs £4.95.

Largest of the Comet kits is a 31in. span *Piper Cherokee* 235, £14.95 which may be adapted to .020-.049 glow motors if desired. This model features a cardboard rubber motor tube which also supports the main fuselage formers and the wings employ diagonally interlocking ribs with spanwise stringers between spar and leading edge. As in the Meteor kit, the components are partially die-cut and the hardware includes plastic prop, wooden wheels and rubber motor. Two vacuum-moulded sheets of parts are supplied, a clear sheet carrying the bulged windscreen and windows and a white sheet with mouldings for cowlings, spinner, wheel parts, seats, pilot and tail beacon. A large sheet of paper self-adhesive markings with registration markings, instrument panel, trim lines and the whole fin. The large plan carries the step-by-step instructions with drawn illustrations and also gives hints on equipping this model with a glow motor for control line or radio control.

New Sanwa two function radio

Many aeromodellers venture into the exciting world of radio control by building and flying one of the numerous two-function models available. The new *Sanwa FM2* radio control system distributed by Irvine Engines, is an excellent, low cost system for controlling such a model. Operating on the popular 35 MHz frequency band, the dry-cell (non-rechargeable battery) system consists of a twin stick transmitter, receiver, battery holder and two general purpose SM-394 servos.

The system as supplied, is completed by the necessary transmitter aerial pennant to match the crystals supplied, replacement servo output discs, servo fixing screws and optional ratchet attachment for the left hand control stick to convert from elevator to throttle command. Everything that you need to go radio control flying, in fact, apart from a suitable model to wrap around the system. The Sanwa FM2 is available from Irvine Engines stockists, price £59.95 in 'dry' battery form, while rechargeable nickel-cadmium battery packs and chargers are available separately price £36.95.

De Luxe Materials epoxy

De Luxe Materials (Models) have increased their range of modelling adhesives and finishes by inclusion of an epoxy finishing and laminating resin under the name of 'Aeropoxy'.

'Aeropoxy' is a low viscosity resin with a pot life of one hour and a full cure time of 36 hours ideally suited to glass skinning or epoxy/glass laminating.

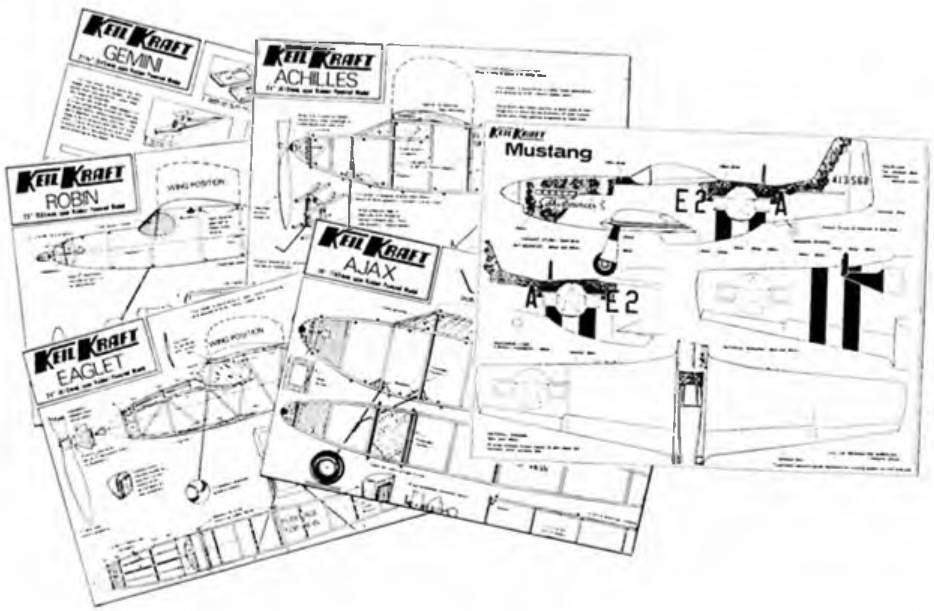
In common with most epoxies of this type, mixing proportions are critical if good results are to be obtained; full instructions are included and a measuring cup to simplify this aspect. Each pack of 'Aeropoxy' contains 300gm of resin and 300gm of hardener. Price of the 'Aeropoxy' pack is £4.99, available from *Irvine Engines Ltd.*, stockists.

Electric RTP Accessories

Ballards, the recognised specialists in Electric Round-the-Pole models, have a new kit in the form of a 508mm span profile scale model of the *Curtiss Helldiver* designed around their 4551 motor. All parts for the sheet fuselage and built-up, flat bottom section wing are supplied die-cut and the kit's prefabrication extends to pre-formed undercarriage wires, plastic wheels, cup washers, covering material, 'stars and stripes' transfers and a tube of balsa cement.

The instructions are supported by clear diagrams on the simple plan. The *Helldiver* kit costs £3.95 from selected model shops or direct from Ballards.

Ballards also supply a full range of equipment for the Electric RTP enthusiast, one of the most recent items being a controller designed for use when models will be flown continually at one power setting such as at an exhibition. The solid state electronics of the unit have a maximum rating of 4 amps or 50 volts and the manufacturers will advise of any alterations needed for currents higher than this. Cost of the No. *4541 Controller* is £14.95.

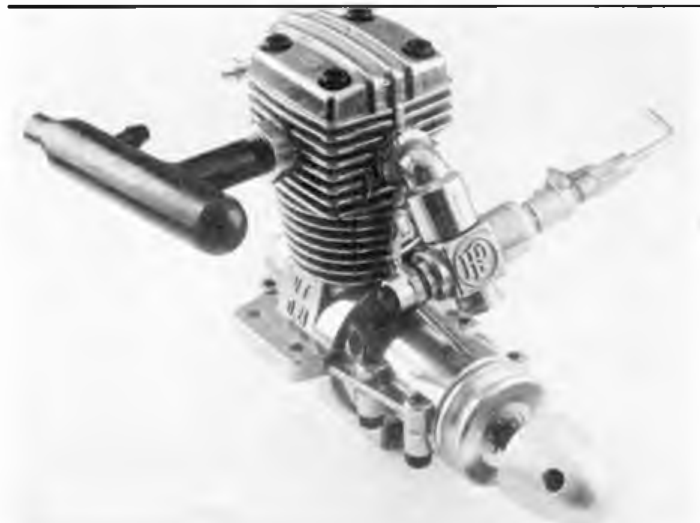


Keil Kraft alive and well . . .

Whatever happened to Keil Kraft(?) we're often asked about "The Greatest Name in Model Kits" as the old Keil Kraft company styled themselves.

Well, Solarbo closed down the famous Keil Kraft factory in 1982, but not with the intention that this would be at the cost of the KK name, because since then a lot of effort has gone into the re-styling and impending progressive re-launch of the Keil Kraft range of model kits with new look boxes with up-to-date plan styling.

Some of these kits are available now, notably five well known and much loved rubber powered models, the Gemini, Eaglet, Robin, Achilles and Ajax. The Gemini and the Robin feature pre-cut parts and a simple construction, so would make ideal subjects for the new-comer to the hobby. Ajax, Achilles and the elegant little Eaglet have balsa sheets printed with part outlines and require cutting out. Basic details of the models are: Gemini, 21½in span, £3.95; Robin, 23in. span, £3.95, Eaglet, 24in. span, £3.95, Achilles, 24in. span, £3.95 and Ajax, 30in. span £4.95. Four of the Keil Kraft gliders have also been revitalised, the 30in. span Cadet, 40½in. Invader, 36in. Conquest and 51in. span Caprice, at retail prices £3.95 and £4.95 respectively. Each and every one of these rubber powered and glider kits have flying qualities that have been proven time and time again over the years and the new look kit boxes will no doubt attract many modellers to these well established designs. This is not all to expect from Keil Kraft this year, however, for they are also repackaging the rubber powered Flying Scale Models that have attracted so many younger novices. First six models chosen for re-introduction are the Mustang, Spitfire, Hurricane, Stuka, ME109 and Fw190, these kits each costing £2.99. Wing-spans vary but average out at about 18in. Each of the kits contain (where appropriate) plastic pro-pellers, plastic wheels, rubber motors, wire for undercarriage and motor hook and clear glazing or cockpit canopy. Keil Kraft kits are distributed by Model Aircraft (Bournemouth) Ltd. and are to be found in all good model shops.



HP21 VT

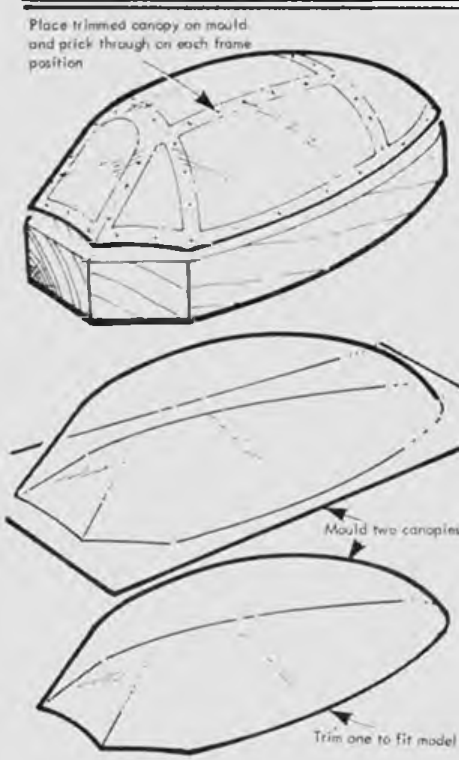
If you are tempted by the idea of a 4 stroke powered control-line model after reading Claus Maikis' feature in this issue, but fancy something a little smaller, this small capacity (3.5cc) 4 stroke could be just the thing. Of course its use is not confined to C/L or even R/C although it does have an R/C throttle fitted, this could be either open or a plain needle and jet assembly substituted.

This beautifully engineered motor employs an ABC piston/cylinder assembly and a rotary, bevel gear driven valve in the cylinder head. A small silencer is provided which incorporates a pressure nipple which, coupled to a nipple on the valve gear cover, provides lubrication to the valve drive gears, and indirectly, the crankshaft bearings. A further nipple is fitted to the front bearing housing which taps the resulting positive pressure in the crankcase for fuel pressurisation.

A tiny version of the familiar H.P. twin needle carburettor is supplied, the manifold can rotated through 360° allowing choice of carburettor positioning. The manual supplied provides plenty of practical detail on starting and running the motor. The *H.P. 21 VT* is available through *Ripmax Models* Ltd. stockists price £79.95 including silencer.

Aeromodelling Technology

PRACTICAL MODELLING IDEAS FROM AEROMODELLER READERS

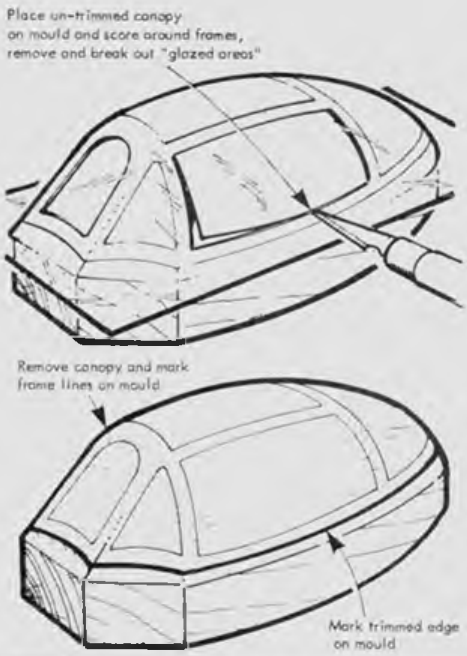


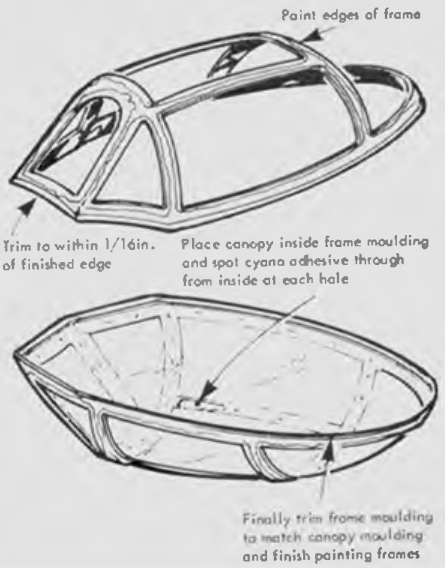
Representing canopy framework on small models from Richard Staines

Produce mould in the usual way and make two canopies by whichever method is preferred. Trim and fit one of them to match the fuselage contours, replace on the mould and mark around it to fix the bottom edge of the framing. Remove from mould and then draw the cockpit framing onto the mould using the outline marked as a reference. Fit the second untrimmed canopy onto the mould and deeply score the framing on this.

Remove from moulding and by flexing, the separate 'windows' can be removed leaving a framework. Note at this stage do not trim the lower edges of this framework to the outline marks but leave approximately $^{1}/_{16}$in. too large. Replace the 'canopy proper' on the mould and pierce a row of holes along the centre of all the frames. Now the interesting bit. Carefully paint the edges of the framework, let dry. It does not matter if paint gets onto the inside face, but keep it to a minimum. With both mouldings off the original mould, place the canopy proper inside the frame moulding in alignment and then, using the thinnest cyano available, spot through from the inside of the canopy at each pinhole until you see that the adhesive has run between the two layers of acetate, thus neatly fixing the frame in place. Trim the lower edges of the framework to the canopy and bend as necessary to give the thickness and fit to the fuselage. Fix in place with either dope or cyano in the usual manner and paint the framework which is very easy due to the fact that the edges had been previously painted and no masking is required. I also find that subject to the type of material the canopy and framework are moulded in, cellulose thinners can also be used in place of cyano.

With the thin acetate used for other canopies, I have never experienced any problems getting a fit. If the method is used on a larger model or thicker acetate, I would suggest taking the second moulding in the framework over the mould whilst the first, i.e. canopy proper, is still in place.

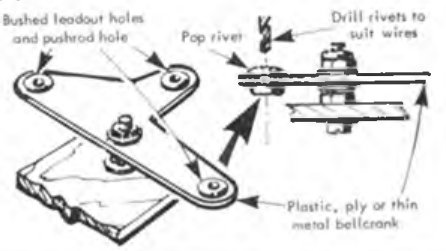




Bushing bellcranks from Bill Daniels

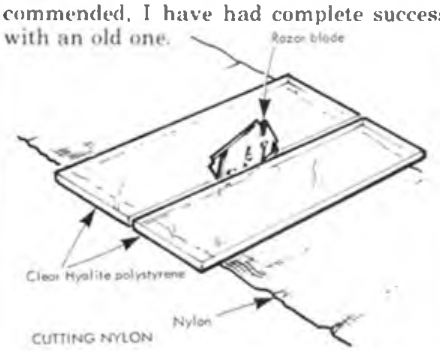
Regular A.T. column contributor Bill Daniels uses bushed bellcranks since he discovered this very simple method of doing the job. Bushing the holes will prevent wear occurring which destroys the precision of the controls.

First select what size rivet you are going to use for the leadouts and pushrod. Then drill out the bellcrank to fit the outside of the rivets. Insert the rivets in the holes, these are then pulled up tight onto the bellcrank. When the rivet is pulled up tight onto the bellcrank, tap the pin out. This leaves a bushed hole which provides at least double the bearing area of a normally drilled bellcrank.



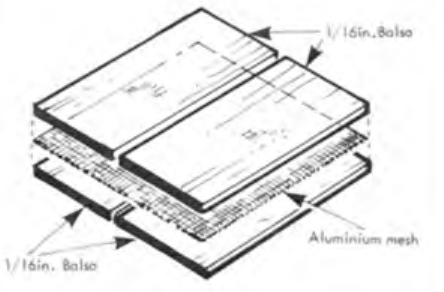
Cutting Nylon for covering from P. A. Scorey

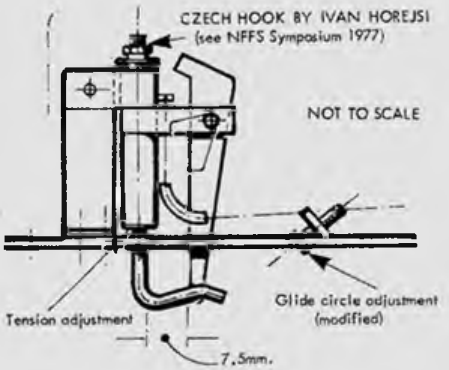
The cutting of nylon can be immensely simplified by dying the material under two small sheets of clear Hyalite polystyrene (a proprietary trade name for clear sheet sometimes used for double glazing and obtainable at D.I.Y. shops) holding them firmly down and running a razor-blade between. At all times the cutting process is clearly visible and the material does not pucker. Whilst a new razor-blade is to be recommended, I have had complete success with an old one.

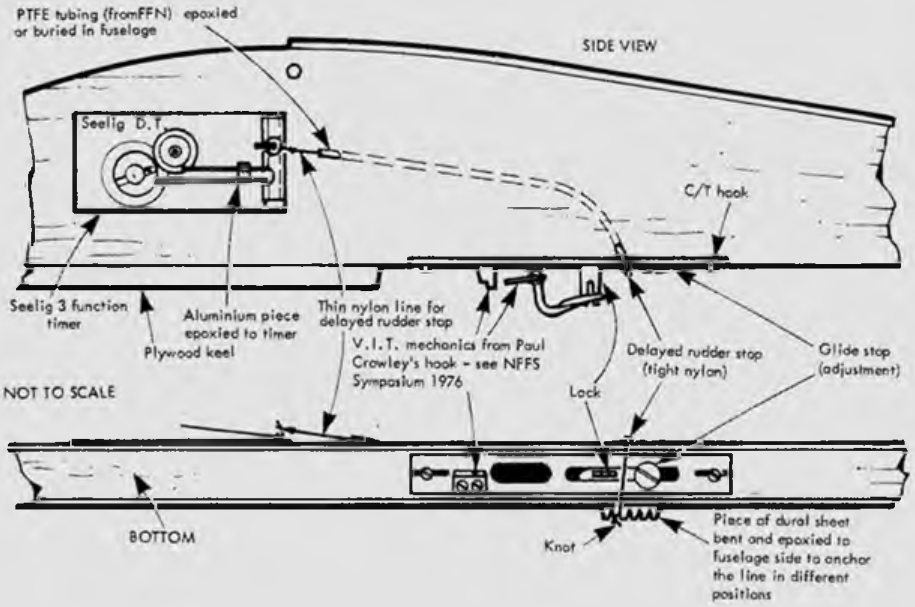


Trim Tabs from P. A. Scorey

Trim tabs can easily be made using aluminium mesh sandwiched between layers of Balsa, epoxied and then covered. They can be bent up and down repeatedly with no ill effects and stay firmly in position.







Delayed rudder action system from Javier Abad

Here is a simplified system to provide a delayed rudder action to be used with circular tow hooks in F.A.I. free-flight gliders (class F1A). Javier Abad of Santa Cruz de Tenerife devised it a few years ago, but it was the appearance of Ivan Herejsi's system at the Burgos, Spain World Free-Flight Champs (published in Aeromodeller February '82) which prompted Javier to provide details of his own method, which he considers to be lighter and simpler.

All the rudder stops are at the hook, except the circle tow mode stop, which is at the rudder. The nylon line is tight, while hooked to the timer and because it is anchored to the other side of the fuselage, it stops the lock on its way back to the glide setting until the line slackens when the timer releases it.

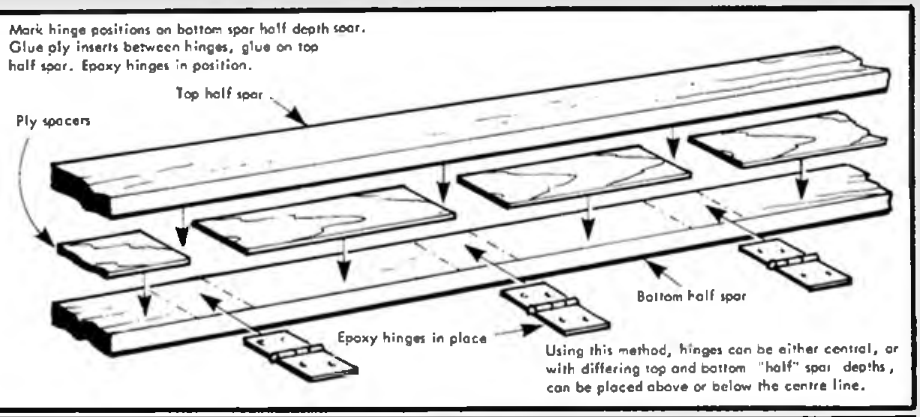
Upon release, the lock moves back until reaching the glide stop and the system is adjustable by changing the (knotted) line from one notch to another.

The small aluminium piece on the Seelig timer is a trick to keep the secondary arms of the timer always in the same position cancelling the lateral movement.

Control Surface Hingeing from J. T. Robson

Cutting accurately position slots in the trailing edges of wings or tailplane for hinge fitting is a tricky business. Little gadgets are available but cost pennies. A simple tough solution is to build in the slots. The method illustrated has the bonus of producing a stronger laminated trailing edge into the bargain.

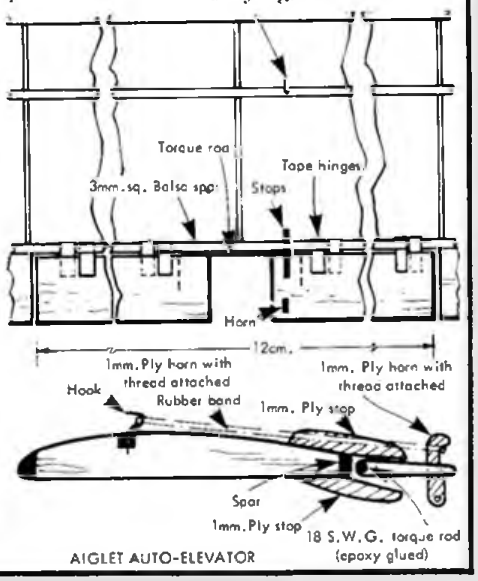
Use 0.5 or 0.8mm ply to form spacers, and suitable thickness ½" wide balsa top and bottom. This system can be used for either built-up or sheet wing/tail surfaces.



An Auto Elevator for bungee launching from Douglas McMillan

Returning to aeromodelling after an absence of 20 years, I was intrigued to discover the bungee launch technique, which I have successfully used to launch radio-controlled gliders. However, my attempts to launch small free-flight gliders by this method failed because the models climbed so rapidly that they stalled off the line, even with the use of very weak rubber and moving the towhook forward. It seemed that a mechanism to apply down elevator during the launch was required, so I modified my A.P.S. 'Aiglet' to incorporate an 'auto-elevator' triggered — like the auto-rudder — from the towhook.

The accompanying sketch shows the constructional details, the actuating thread being led through a hole in the starboard side of the fuselage (the auto-rudder is on the port side) to the auto-rudder trigger mechanism on the towhook. This simple device permits 'down elevator' to be applied during a catapult launch, and careful adjustment of the stops will allow both a steady climb and a well-trimmed glide. In a moderate breeze the model will stretch the rubber at the top of the launch and the release is smooth. Whereas I would not claim that this device will give as good a launch as a conventional tow, it certainly allows the single-handed modeller to have a pleasant afternoon's flying.



AIGLET AUTO-ELEVATOR

Model Shop DIRECTORY

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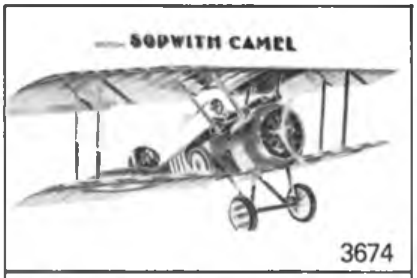

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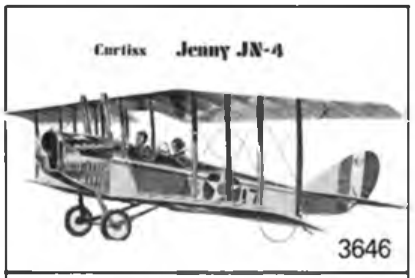

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APPENDIX - Links to the free plans

The magazine contains two pull out free plans not included in this document.
Anyway:

The Piper CUB plan is available at :
https://outerzone.co.uk/plan_details.asp?ID=3453

The Fred plan is available at :
https://outerzone.co.uk/plan_details.asp?ID=1092