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MAP MODEL PUBLICATION

Col. C.E.Bowden

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AERO MODELLER

January 1985

Volume 50
Issue No. 588

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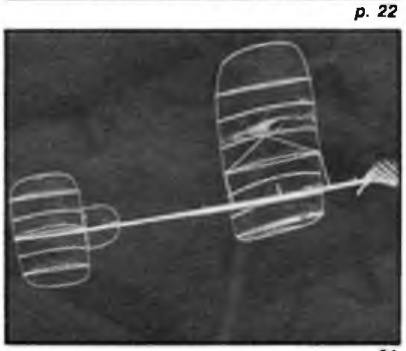

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Lieutenant Colonel Claude E. Bowden with his 'Bowden Contest', a popular beginners model of yesteryear (and today?). This petrol engined model was described in November 1945 Aeromodeller ***and plans are still available from*** Aeromodeller Plans Service ***as PET 225, price £5.30, plus 60p postage and packing.***

Subscriptions

Annual UK subscriptions, £17.50 Overseas £19.00 or $25.00. Send remittance to Model & Allied Publications, Subscription Department, P.O. Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, HP2 4SS. (subscription enquiries Tel 0442 (51740). Change of address: US Postmaster, send address changes to Model & Allied Publications, PO Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Herts HP2 4SS, United Kingdom. USA subscription agent Joseph J. Dalledu, 4314 West 238th Street, Torrence, CA90505.

Aeromodeller Magazine (ISSN 0001-9232) is published monthly by Model & Allied Publications, P.O. Box 35, Wolsey House, Wolsey Road, Hemel Hempstead HP2 4SS, England. Tel: Hemel Hempstead (0442) 41221. Second class postage paid in the U.S. at New York, NY. USA Mailing Agent Eastern News Distributors Inc. 111 Eighth Avenue, New York, N.Y. 10011 **Distribution** to North American hobby and craft stores, museums and bookshops by Bill Dean Books, Ltd., 166-41 Powells Cove Blvd., Post Office Box 69, Whitestone, NY 11357, USA. Tel: 1-212-767-6632. **Distribution** to news stand sales by Eastern News Distribution Inc., 111 Eighth Avenue, New York, N.Y., 1011 U.S.A. Tel: 1 212 255 5620.

Change of address, US Postmaster: Send address changes to Model & Allied Publications, P.O. Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Hertfordshire HP2 4SS, United Kingdom.

AEROMODELLER incorporates the MODEL AEROPLANE CONSTRUCTOR and is published on the third Friday of each month prior to date of publication.

MAP **Model & Allied Publications**
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Aeromodeller is printed in Great Britain by Loxley Brothers Ltd., Aizlewood Rd, Sheffield, S8 0YS. Mono origination by Ebony Typesetting, Liskeard, Cornwall for the Proprietors and Publishers, Model & Allied Publications (a member of the Argus Press Group). Trade Sales by Argus Press Sales & Distribution Limited, 12/18 Paul Street, London EC2 4JS.

HANGAR DOORS

Some of the finalists at Milton Keynes, for the Chuckie Championships...there certainly seems to be enough prizes! See D P R at Milton Keynes.

Yearly pilgrimage

December 31st to January 6th will see people from all over the country and from all walks of life making their way to Wembley Conference Centre — to visit the *Model Engineer Exhibition*.

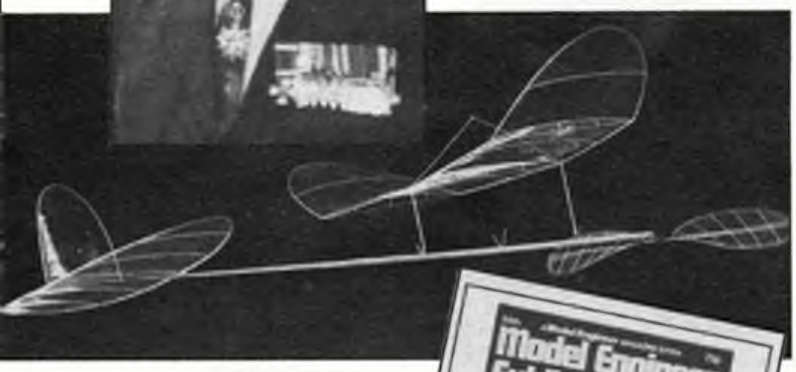
This the 54th *M.E. Exhibition* will be opened by Brigadier Peter Young, D.S.O., M.C. Brigadier Young saw action in many places that stand out in military history. Guernsey, Lofoten, Vaagso, Dieppe, Sicily, Italy and Normandy and it is perhaps not surprising that he was for ten years Reader in Military History at the Royal Military Academy Sandhurst.

The Exhibition has been described as 'the greatest modelling show on earth' and this year's show should not be missed if at all possible. From the aeromodeller's point of view, there are a larger number of model aircraft exhibits than last year and, of course, SAM 35 and the SMAE will both help to uphold this aspect of modelling. One of the attractions of such a diverse collection of modelling interests is the opportunity for a dedicated modeller from one field, finding not only fascination in another's models, but also, that tools and materials intended for, say, the engineer, have application in aeromodelling never thought of by the original users.

For those hearing about the *Model Engineer Exhibition* for the first time, here is a partial list of what you might see: models of locomotives, traction engines, aero engines, hot air engines, tools, ships, aeroplane, cars, merry-go-rounds, clocks, military models, space vehicles, trade stands of all sorts, a model train layout, radio control boat and car demonstrations, flying indoor model aircraft and lectures on a wide range of modelling topics...*whew!*

Of particular interest to the aeromodeller will be the following dates: *Tuesday 1st January at 17.00 hrs,* the Society of Model Aeronautical Engineers (SMAE) will hold an 'Experts Forum' on free flight, speakers include Bernard Hunt, Ron Pollard, Mike Fantham, Martin Gregorie, Ian Kaynes and Stafford Screen. Topics range from design of indoor duration models, Soviet Wakefield design, winning glider contests and current techniques in F1C power models — truely help from the experts.

Wednesday and Thursday 2nd/3rd January at 12.00, 14.00 and 16.00 hrs., are times to be in the Auditorium for Indoor Flying Models — meet the flyers, learn how to start or improve your flying. Microfilm, Scale, Peanuts — they'll all be there. Cost of entry to the *M.E. Exhibition* will be £2.75 for adults and £1.75 for children and senior citizens — where else can whole day for so little...



Far above, Brigadier Peter Young, D.S.O., M.C. will open the Model Engineer Exhibition, where you can see indoor models flying (above)...look out for the posters (right)...see Yearly Pilgrimage.

Plan ahead . . .

Last year our model flying events at Old Warden proved to be more popular than ever. The weather — ignoring the short sharp thunderstorm! — tempted the most lightweight of models out of their boxes on the Scale days and the crowds on Vintage day were a sight that had to be seen to be believed.

1985 will see an even greater number of model flying days under the M.A.P. banner at Old Warden starting on **21st April** with a 'Large Model Spectacular'.

Here a number of fun contests will be organised for these often spectacular models — plenty of fly for fun too!

May 19th provides us with the 'Golden Era Model Festival' for scale and vintage model designs of the 1920's and 30's. Judging would be of the 'Scale Days' format, but competitors (and family!) would be encouraged to dress in a manner appropriate to the period. Perhaps special awards could be presented for the best model/pilot combination?

'Aeromodeller Scale Weekend' will fall on **15th/16th June** and will follow our now traditional format, hopefully without 'the thunder and lightning!

July 7th is the day for yet another new event — the 'Radio Modeller' Fun Fly-In! A general, open fun-fly day but with emphasis on simple competitions for young modellers and specific contests for the *Radio Modeller* 'Trainer', 'Aerobat' and Porterfield 'Collegiate' designs.

To cater for the ever growing popularity of the vintage movement, what was 'Aeromodeller Vintage Day' now becomes 'Aeromodeller Vintage Weekend'! So write a note in your diary *now* to be at Old Warden on **17th/18th August** — build those 'Midges' and dig out that last tin of *Jetex* fuel . . .

For a different sort of competition — look up, on 15th September — at our first 'Display Team Contest'. Contestants (groups of three or more) will be alloted 20 minutes to put on a display based totally on public entertainment.

The form this takes is up to you, but could include: formation aerobatics, combat, bombing sequences or air races. Judging will take into consideration the complete package — presentation, commentary and entertainment value.

With the cost of entry including admission to the *Shuttleworth Collection,* these days at Old Warden must surely represent fantastic value. Model Flying, Entertainment, Education and Pleasant Company — what more could you possibly ask . . .

D.P.R. at Milton Keynes

Sunday 14th October saw the culmination of yet another year's hard work by David and Janine Rawlins of *D.P.R. Models.* Middleton Hall at Milton Keynes was the scene for the 1984 National Supergloy Chuckie Championships. Preceeded by an open Junior 'Superfighter' competition, won by Darren Cox, the 'Chuckie Champs' was fought out by some 40 youngsters who had qualified in heats throughout the country, for this day's finals.

In the under 13's, winner Steven Nottingham (10) managed to get a one second lead over two other competitors, who then had a fly-off to decide the final placings of: Ali Machinchy (8) — 2nd and Matthew Greaves (10) — 3rd. The intermediate section produced winner Lee Dolby (13) who beat Nick Woodruffe (16) into second place by only half a second. Chris Shipton flying consistently throughout the comp. got a well earned third place.

D.P.R. Models and sponsors *Gloy, Micro Mold* and *Richard Kohnstam Limited* should feel justly proud of a job well done. *Aeromodeller* only wishes there were more of you around to support our hobby in such a positive fashion.

Join up

The Royal Aero Club wishes to announce the formation of an individual Membership Scheme; its aim is to encourage air-

mindedness, especially among the young and also to form a focal point of interest for those who for whatever reasons can no longer be involved in airsport, but in which they are still interested. The Membership scheme might also be of interest to those who flew in the war. For a modest £10 per annum the Members will have the advantage of belonging to one of the oldest (1901) Sporting Flying Organisations in the world, receive two Newsletters per year, detailing information on virtually all Sporting Aviation events, be they for Gliding, Hang-Gliding, Parachuting, Parascending, Man Powered Flight, Microlight Flying, Ballooning, Aeromodelling, etc. They will receive an individual lapel pin/badge (suitable for men and women) and a Membership card. Other items, such as ties, blazer buttons, etc. are available for purchase. All those joining now, will have their Membership extended to the end of 1985 — another advantage. Membership forms will be available from the Membership Administrator, the Royal Aero Club, Kimberley House, Vaughan Way, Leicester.

Flying Scholarships

Following the success of the series of **Sir Douglas Bader Flying Scholarships** in 1983, a further six scholarships are to be awarded in 1985 to disabled people between the ages of 17 and 40.

The scholarships will enable successful candidates to attend a residential flying course at a C.A.A. approved flying school and could lead to a full Private Pilot's licence. The scholarships are being endowed by *Nationwide Building Society* (who sponsored two of last year's successful candidates) the *International Air Tattoo,* and *Marshall's of Cambridge.*

Suitable candidates for 1985 will be selected by the IAT Organising Committee to attend flying aptitude and selection tests, after which the six successful candidates will be chosen. The scholarships will be awarded at the International Air Tattoo 85, which is to be held at RAF Fairford, near Swindon, on Saturday 13 and Sunday 14 July 1985.

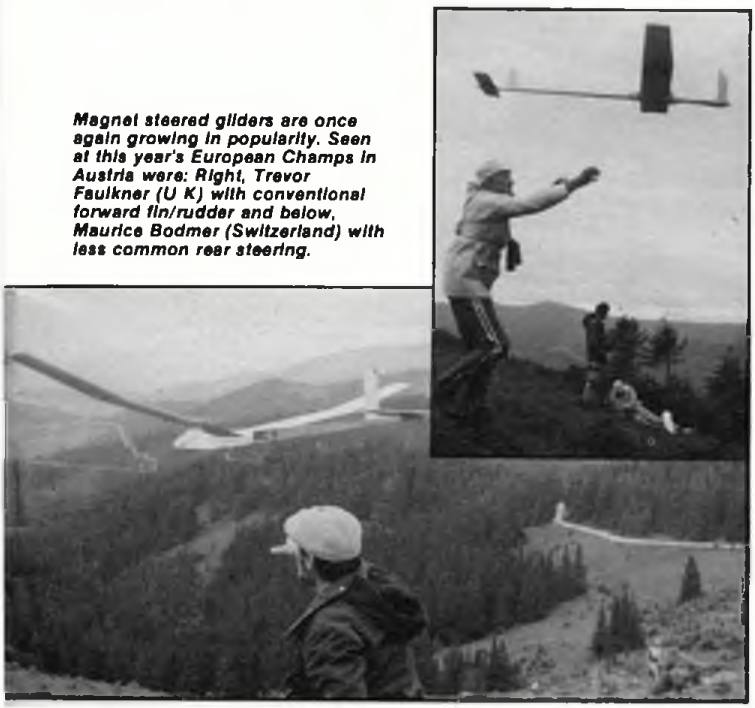
It is intended that these scholarships will lead to a better awareness of the problems of the disabled and how they may be overcome. The closing date for entries is 31 January 1985. Application forms and rules can be obtained from: The Director, International Air Tattoo, Building 91, RAF Greenham Common, Newbury, Berks., RG15 8HL, or: Any branch of the Nationwide Building Society.

R/C Extravaganza?

Paul MacCready of man powered flight fame has now entered the field of palaentology! Prior to the mid-seventies the largest flying reptile was considered to be the Pteranodon — about 7 metres wing span —, the Quetzalcoathus northropi put this in the shade with a wingspan in the region of 11 metres!

Long have ranged arguments on how these flying reptiles made use of their wings — flappers, gliders, soarers, etc... Now Mr. MacCready, and his team plus sundry Palaeontologists/inventors and biologists, is planning to construct a radio controlled version of Quetz...

It is hoped to have it fly from the Smithsonian Institution's Air and Space Museum in Washington — round the Washington Monument and return to the Museum. Hopefully not causing too many heart attacks on the way...sounds crazy, but then so did a cross-channel pedal plane!



Magnet steered gliders are once again growing in popularity. Seen at this year's European Champs in Austria were: Right, Trevor Faulkner (U K) with conventional forward fin/rudder and below, Maurice Bodmer (Switzerland) with less common rear steering.

What's On . . .

Jan 13	**SLAITHWAITE LOW CEILING INDOOR MEETING EZB, HLG, PND, SCALE.** Venue: Slaithwaite, Contact: Bernard Hunt, Tel: 0484 862353. Rules from J. O'Donnell 061-427-3711.	April 21	**LARGE MODEL SPECTACULAR** Venue: Old Warden, Biggleswade, Contact: Radio Modeller, Tel: 0442 41221. Watch large models in spectacular flight: come and fly yours.
Feb 10	**WIGAN LOW CEILING INDOOR MEETING EZB, HLG, PND, SCALE.** Venue: Wigan. Contact: Dave Yates, Tel: Wigan 214725. Rules for J. O'Donell 061-427-3711.	April 28	**S.M.A.E. INDOOR SCALE NATIONALS PEANUT, OPEN RUBBER, CO_2.** Venue: Alumwell Centre, Walsall, Contact: Doug Sheppard, 13, Luckington Road, Monks Park, Bristol BS7 0VT. Pre-entry only: registration 50p, each event £2.00, non competitors £1.00. Send SAE for entry forms.
March 3	**SLAITHWAITE LOW CEILING INDOOR MEETING EZB, HLG, PND, SCALE.** Venue: Slaithwaite, Contact: Bernard Hunt, Tel: 0484 862353. Rules from J. O'Donnell 061-427-3711.	May 19	**GOLDEN ERA MODEL FESTIVAL.** Venue: Old Warden, Biggleswade, Contact: Radio Modeller, Tel: 0442 41221. For model designs of the 1920's — 1930's. Period costume is encouraged!
March 3	**SAMS, INDOOR EVENT, PEANUT, EZB, HLG, CO_2, OPEN — FLY FOR FUN.** Venue: Watford Leisure Centre, Contact: SAMS, Tel: 0438 832011.	July 7	**RADIO MODELLER FUN FLY-IN.** Venue: Old Warden, Biggleswade, Contact: Radio Modeller, Tel: 0442 41221.
March 24	**SOUTHERN AREA — INDOOR ALL SCALE DAY PEANUT, OPEN SCALE + FLY FOR FUN.** Venue: H.M.S. Daedalus Lee-on-Solent, Gosport. Contact: M. Leach, Tel: Emsworth (Hants) 5364. Flying times 1300-1800 hrs. Must register at least one week before event.	June 15/16	**AEROMODELLER SCALE WEEKEND.** Venue: Old Warden, Biggleswade, Contact: Aeromodeller, Tel: 0442 41221.
April 21	**THE GRANTHAM GRAND PRIX — OR, OP, OG, HLG Combined FAI.** Venue: RAF Barkston Heath, Contact: Phil Ball, Tel: 0332 665361.	August 17/18	**AEROMODELLER VINTAGE WEEKEND.** Venue: Old Warden, Biggleswade, Contact: Aeromodeller, Tel: 0442 41221.

Photo Prize MODEL NEWS With Fliar Phil

Now Wood for Winners
100 Sheets of balsa, nearly 200 lengths of strip wood — some prize!

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

Coping with all the hustle and bustle of preparations for the Christmas festivities, Fliar Phil hopes you will find an opportunity to nip into your den and calm shattered nerves (!) with a quiet hour transforming that plan into a 1985 masterpiece. Before looking at this month's photos, F.P. raises his glass and wishes you *"All the Best and Happy Landings in 1985"*.

Photo 1
A fine model "frozen" against an impressive cloudscape. Not an easy photo to get, it comes from Fred Barnsley of Birmingham. The model is a Mick Smith design 'Mercury' belonging to Mr. Shelley of Walsall M.A.C. Data: span 96 ins. power a 1939 *Forster 99*. All lined-up for a real sweet touch down Fred!

Photo 2
Don Ross of Creskille, N.J., U.S.A., comments "modern jets used as all-sheet catapult gliders can be a lot of fun for groups with small fields." How right you are Don! F.P. has had a lot of fun with "catapult profiles". This is Don's B-70 soaring away, carrying 2 ozs. on its 200 sq. in. delta wing. Nice Don — very nice!

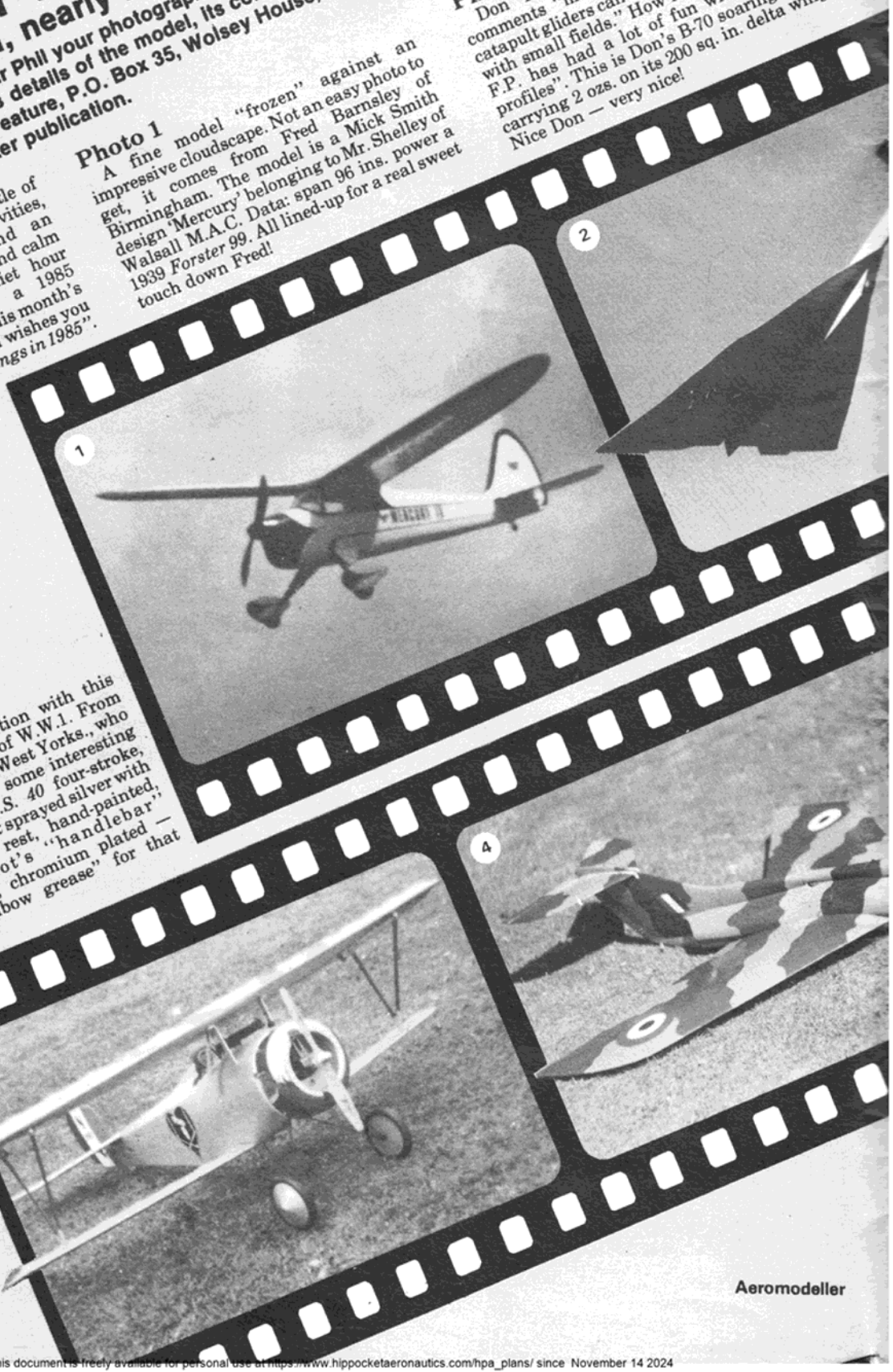
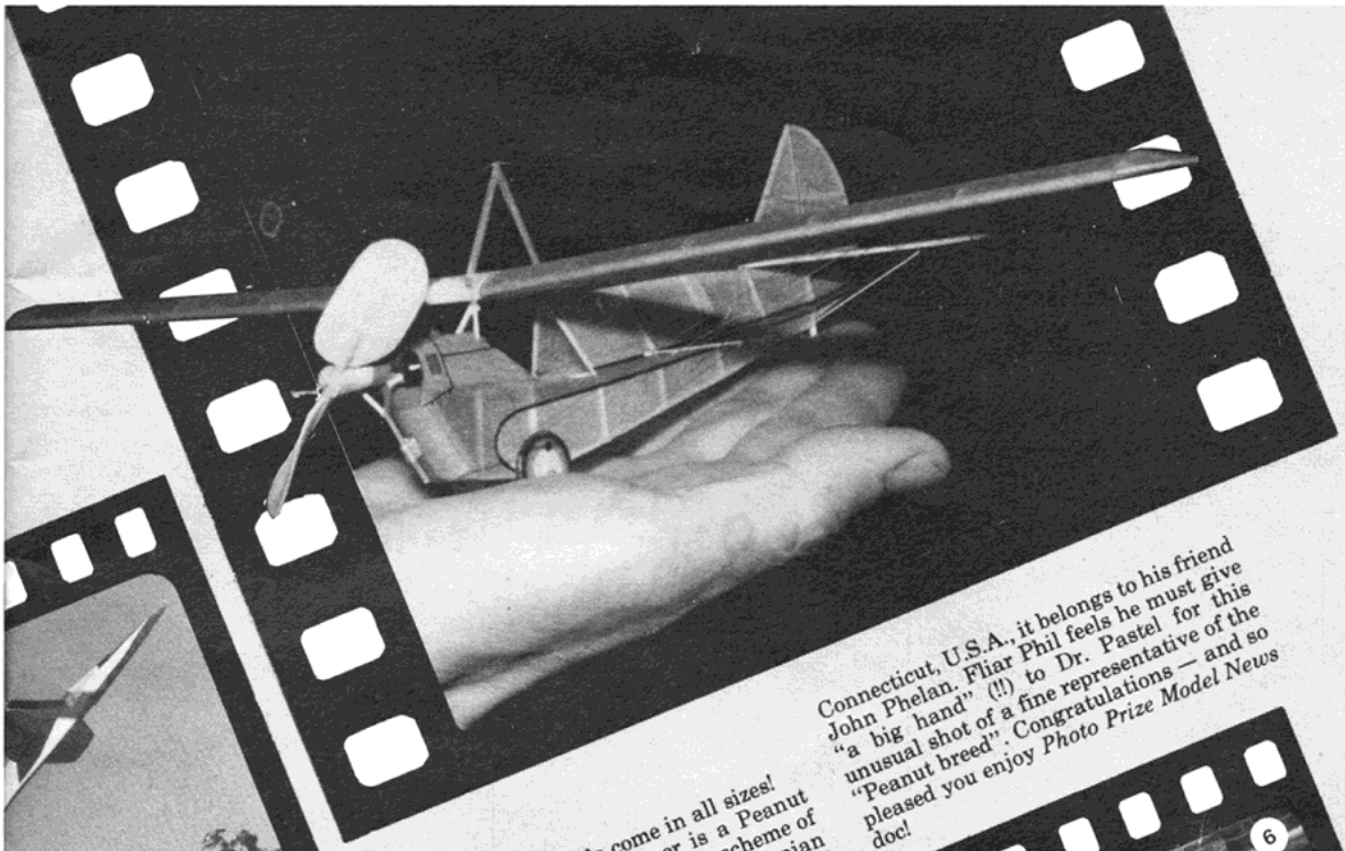


Photo 3
No problem of identification with this model. A *Nieuport* 'Scout' of W.W.1. From Mr. Matthews of Cowling, West Yorks., who provided Fliar Phil with some interesting details. Power is an O.S. 40 four-stroke, covering: white *Solartex* sprayed silver with 50-50 *Polykote*. The rest, hand-painted, including the pilot's "handlebar" moustache! Cowling chromium plated — with plenty of "elbow grease" for that superb finish.



WINNER
Eye-catching models come in all sizes! This month's worthy winner is a Peanut scale *Aeronca* C.2., in the colour scheme of the restored aircraft in the Smithsonian Institute. From Dr. Harvey Pastel of Connecticut, U.S.A., it belongs to his friend John Phelan. Fliar Phil feels he must give "a big hand" (!!) to Dr. Pastel for this unusual shot of a fine representative of the "Peanut breed". Congratulations — and so pleased you enjoy *Photo Prize Model News* doc!

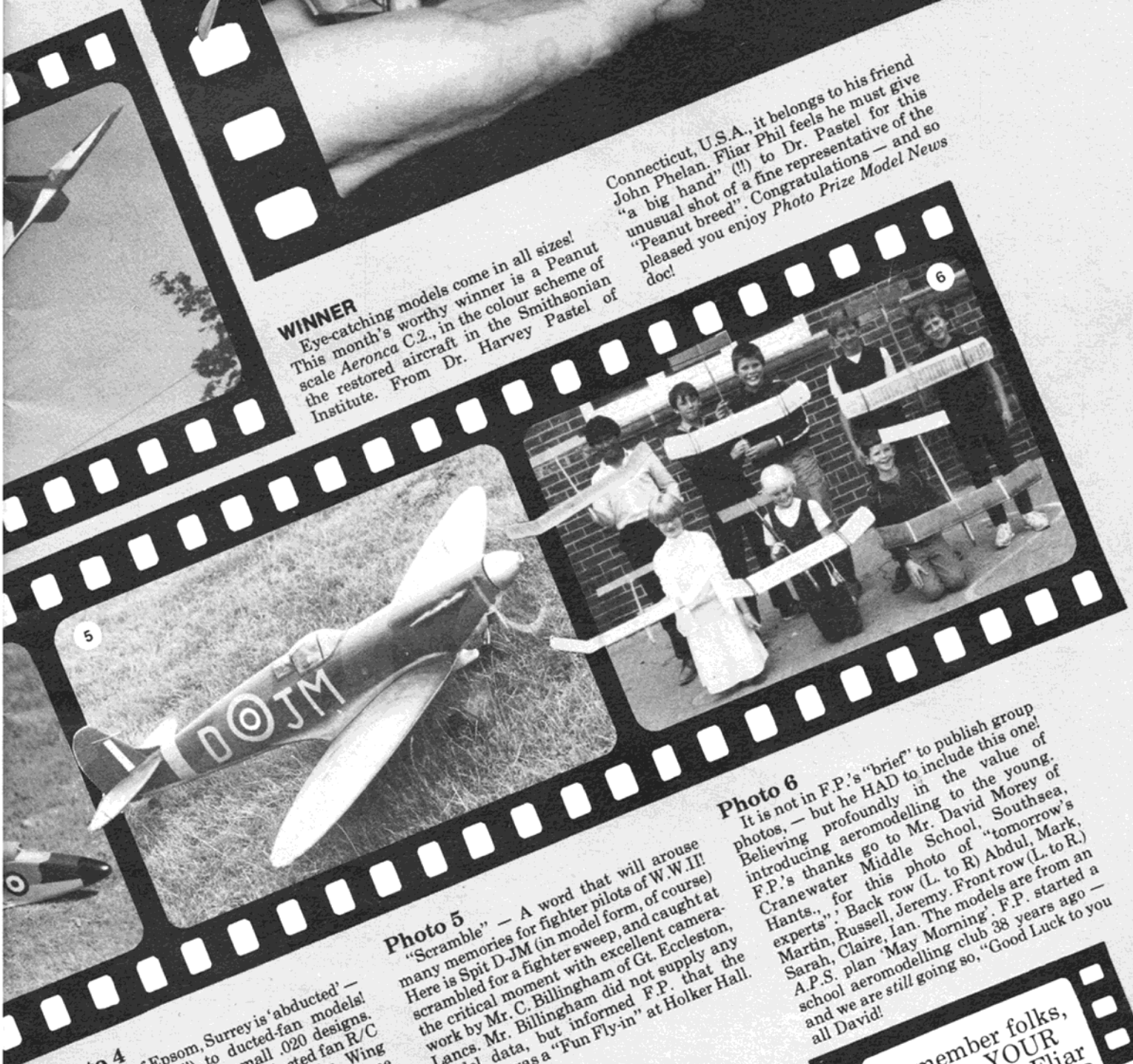


Photo 4
Mr. Eyre of Epsom, Surrey is 'abducted' — (sorry! "addicted") to ducted-fan models! F.P. recalls one of his small .020 designs. This is his latest semi-scale ducted fan R/C model, span 34 ins., weight 2½lbs. Wing area 2.3 sq. ft. Power O.S. 20 driving a home made glassfibre fan. A good-looker, and a very good flyer!

Photo 5
"Scramble" — A word that will arouse many memories for fighter pilots of W.W.II! Here is Spit D-JM (in model form, of course) scrambled for a fighter sweep, and caught at the critical moment with excellent camera-work by Mr. C. Billingham of Gt. Eccleston, Lancs. Mr. Billingham did not supply any model data, but informed F.P. that the occasion was a "Fun Fly-in" at Holker Hall.

Photo 6
It is not in F.P.'s "brief" to publish group photos, — but he HAD to include this one! Believing profoundly in the value of introducing aeromodelling to the young, F.P.'s thanks go to Mr. David Morey of Cranewater Middle School, Southsea, Hants., for this photo of "tomorrow's experts",: Back row (L. to R) Abdul, Mark, Martin, Russell, Jeremy. Front row (L. to R.) Sarah, Claire, Ian. The models are from an *A.P.S.* plan 'May Morning', F.P. started a school aeromodelling club 38 years ago — and we are *still* going so, "Good Luck to you all David!

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

VINTAGE CORNER WITH ALEX IMRIE

A Tribute to Col. Claude E. Bowden

Captain C E Bowden with 'Kanga' on Wimbledon Common in 1932 with some youthful admirers. 'Kanga' in its original state with piano wire tailunit and the 28cc Wall installed upright.

A Pioneer Passes

With the death of Lt Colonel C E Bowden on 9th October last, a true pioneer has passed on. Who amongst us has never heard of CEB? He was, as his friend Dr Forster used to say, the GOM (Grand Old Man) of petrol modelling. Thank goodness he was a "trier", an experimenter who was not easily discouraged, because it was his spadework that did more than any other to give us practical power-driven model aeroplanes.

As the leading petrol modeller in the 1930's he never forgot his own difficulties and was always ready to pass on advice to fellow modellers. He did this by being a regular contributor on the subject in various magazines, including *Model Engineer*, *Practical Mechanics* and *Aero Modeller*, also writing several books that became British aeromodellers' bibles. Many of his designs were described in these journals and constructional drawings were published by various sources. In fact it is impossible to think of power modelling in this country, especially during its formative years without thinking of CEB.

Early days

Attracted to the air at the very beginning of flight, he was soon making model aeroplanes, and at the early age of 14 he organised an active club at Radley College in 1912. Following the outbreak of the Great War, he was commissioned in his local regiment, the Duke of Cornwall's Light Infantry, and was soon in France. His thoughts were, however, still on flying and after experiencing the appalling conditions in the trenches, he lost little time in applying for a transfer to the Royal Flying Corps.

It was not until the Summer of 1916, at the height of the Battle of the Somme that news of his initial interview was received. This was carried out in the field on No 60 Squadron's aerodrome by that unit's CO Major R R Smith-Barry. Naturally, he hoped to be seconded immediately, but, official service channels have a habit of moving at their own speed and 2nd/Lt Bowden was serving in the Near East before his transfer came through.

He was trained in Egypt at No 3 School of Military Aeronautics, learning to fly on *DH* 6 and *Avro* 504K machines, before progressing to single-seater fighters like the *Sopwith* 'Pup' and the *SE* 5a. So he finally achieved the ambition that had long been his aim. Having decided on a military career, he hoped to be able to stay in the Royal Air Force but following the run-down of the Services after the Armistice, he had to settle for a permanent commission in the Royal Army Service Corps, where he specialised in mechanical transport.

This was, I think, our great gain, since if CEB had carried on with full-size flying he might not have devoted himself as much to model aeroplanes as he did. As and when his army duties allowed, Captain Bowden, now stationed at Feltham in Middlesex, indulged in the hobby, was soon a member of the SMAE and a regular attender at Wimbledon Common.

Apart from a brief encounter with compressed-air, which he did by purchasing one of the famous D A Pavely ready-to-fly models, his designs were, of course, all rubber powered. He was fascinated by the biplane, and following the appearance of the 22-inch span 'Pelly-Fry' monoplane, he made a biplane of identical span, driven by three geared motors arranged across the fuselage in a similar way to T H Newell's 'Falcon'. The model was named 'Bumble Bee' and was described in *Model Engineer* in July 1930. This was probably his first published design, and in the text of that early article, we already find a pearl of advice, with the model's first flights of around 50 seconds although not considered outstanding, "...the writer was well satisfied, for his personal experience of the first trials of his home-built machines has been that considerable adjustment is usually required before good results can be relied upon."

The 'Bowden Bee' powered with the 14.2cc 'Atom Minor' broke 'Kanga's' record on its first day out on 6th November 1932.

Also of note are statements in his final paragraph that spell out the appeal that was to remain CEB's main aim in model flying. "...just before landing, the machine almost invariably flattened out completely and did a three-point landing...

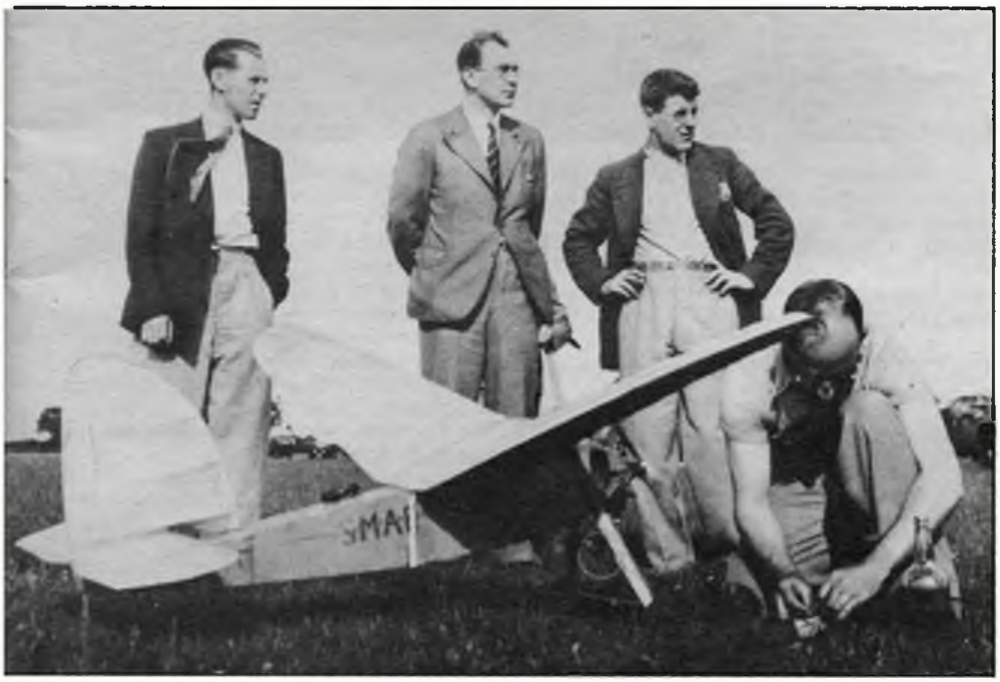
Duration is not everything, and is rather apt to be the greatest object aimed at. Pretty flying qualities, in the opinion of the writer, are most desireable."

Kanga...record breaker

Other general-purpose biplanes followed,

and when Edgar T Westbury made it known in May 1931 that he was willing to provide a small two-stroke petrol engine for any individual or club prepared to build a suitable machine, CEB grasped the opportunity with alacrity!

He quickly produced a 7 feet wingspan cantilever biplane called 'Kanga', which had a short fuselage and correspondingly large rudder, all designed to dismantle quickly and fit in the restricted space



Left, CEB hand-launching 'Monocoque Midget' at Porlock in August 1940 immediately before the wartime ban on flying petrol models.

available in his *Aston Martin* sports car. The engine, a 28cc air-cooled two-stroke boat engine made by that pioneer of small engines Elmer A Wall of Chicago, had been modified and "hotted-up" by Westbury, and it drove a 24 inch diameter propeller of 12 inch pitch at 2600 rpm, providing ample power to fly 'Kanga'.

A clock device was fitted that would throttle the engine down after a time interval of 60 seconds, and a switch operated by a piano wire "whisker" in front of the undercarriage wheels, cut the ignition on landing, thus preventing damage to the propeller. Without any previous test flights, other than short hops made before fitting the clock mechanism, when the ignition was cut by means of a string, which had resulted in some pretty hectic "arrivals", 'Kanga' was taken to *Fairey's* Great West Aerodrome on Whit Sunday afternoon in May 1932, and was officially observed to fly for 71 seconds, thus breaking David Stanger's 51 seconds record made at Hendon in April 1914.

Bee/Blue Dragon...more records

On the strength of the *Wall's* performance in 'Kanga', Westbury then made an engine specifically for model aero use, when he produced the 14.2cc 'Atom Minor' for Captain Bowden. Several models were made for this engine over the next two years, the best known being the 7 feet span 'Bee' and the 8 feet span 'Blue Dragon', both high wing monoplanes of hardwood construction. The 'Bee' broke 'Kanga's' old record on its first day out when it did 86.8 seconds on a cold windy day in November 1932 at *Fairey's* Great West Aerodrome, and in 1933 won the Sir John Shelley Cup with a flight of 8 minutes 42 seconds.

Captain Bowden's army service had taken him to Glasgow where he helped to form an active club, but being based North of the border did not prevent him from attending the London area model meetings. Glasgow to London on the roads of the day was a major undertaking, but he made light work of it and in 1934 'Blue Dragon' won the Sir John Shelley Cup breaking the record with a flight time of 12 minutes 48 seconds OOS.

However, as CEB himself had said "...Duration is not everything...", having solved the basic stability problems of power models, he realised that flights were now limited merely by the amount of fuel carried, and he began to look more towards the experimental side of the hobby.

Jildi Junior

Living in Glasgow had placed him within easy reach of A D Rankine of Ayr, a model engineer who specialised in power boats and their internal combustion engines, and soon CEB was devoting some of his time to petrol-engined speedboats.

After some success with a metre boat named 'Jildi' powered by a 30cc 'Atom III' engine, he put one of his "Rankine-tuned" 'Atom Minors' in a small hydroplane hull made on model aircraft constructioal lines and this combination named 'Jildi Junior' won Class C of the 1934 Model Engineer Speed Boat Competition at 24.78 mph.

This essay into power boat design and construction, naturally led to experimental petrol powered flying boats and it marked the beginning of a lasting association with the water for CEB, which element he was to share with the air over the next 50 years.

Towards the end of 1934 he received a 10cc *Brown* 'Junior' engine from America and fitted this in turn to an autogiro and to a biplane flying boat, but before he could

Left, CEB prepares the 'Blue Dragon' at Fairey's Great West Aerodrome on Sunday 26th August 1934 for the 12 minutes 48 seconds flight OOS that won the Sir John Shelley Cup and broke the 'Bee's' record. R.J. Trevethick standing at right rear.

Major C E Bowden tuning the Ohlsson 23 in 'War Baby' on Longback field near Porlock, model was completed in September 1939.

complete his experiments with these demanding models he was posted to Birmingham. The smaller capacity of the *Brown* 'Junior' meant smaller models, and he made the 'Mouse' biplane and developing monocoque fuselage construction he built a high and a low wing monoplane as well as a biplane using this technique.

CEB soon had an early 6cc 'Baby Cyclone' and this went immediately into a

monocoque fuselage high wing monoplane of 64 inches span and was also used in a monoplane flying boat of similar size. Although these engines were considered to be in the "Baby" class, even smaller capacity engines began to appear almost immediately, and smaller models being quicker and cheaper to build, meant that a steady flow of designs came from his bench. Although hardwood was still used for the main load bearing parts of their structures, an increasing use was now being made of balsa wood.

Apart from all his designing, building, flying activity and marine work, CEB wrote regularly in the magazines of the day and had an enthusiastic following. There was a great demand for his designs, and it was decided to open a model shop in Birmingham in order to make these generally available, and to supply other modelling goods, especially any item for petrol models.

However, as a serving officer Captain Bowden could not engage in commercial activities, so his wife Grace did this under the name of *Kanga Aero Models* at 1 Colonnade Passage in New Street. Kits and plans of 'Kanga Kub', 'Kanga Kite' and plans for the 'Blue Dragon' were sold, and soon numbers of these models were appearing at the competitions.

Above, PLW-6 built in 1936/7 was earmarked for a garden bonfire in 1948 but received a new lease of life as a control-line 'Goat'. Left, in typical attire with regimental tie and ever present Leica with fellow judges T Wickens and F E Wilson at the 1947 Bowden Trophy Contest.

One of the customers was C R Jeffries, who built a 'Kanga Kub' when that model first became available, and this 'Kub' was one of several to fly in the 1937 Sir John Shelley Cup at *Faireys* where it won the event. Another customer was a young doctor from Porlock in Somerset, and when he learned that Mrs Bowden was also from that town, it meant the beginning of his long friendship with the Bowdens. Needless to say the doctor soon gave up his rubber-driven models and "went petrol"! He was to become well known to all *Aero Modeller* readers as Dr J F P Forster who kept interest in power models going during the war with his avidly read column "Petrol Topics".

Petrol Flying Boat record

Despite having built the two flying boats mentioned, it had not been possible to have any of their flights officially observed for record purposes. So, CEB made a third flying boat for the purpose of establishing a record, by utilising a 'Blue Dragon' wing of 8 feet span mounted on a hull with a wide flat bottom like a racing hydroplane. The *Brown* 'Junior' could not cope with the amount of wetted surface area, so the old 'Atom Minor' was hurriedly installed at the last moment. Although seriously out of trim, the model managed to make an officially observed flight of 30.4 seconds rising from the water of Poole Harbour in September 1937 to give CEB another first.

Bowden Trophy

To encourage the development of petrol models Captain Bowden presented his Bowden Trophy for International Competition in 1937, this being the first event in this country purely for petrol powered model aircraft. It was well supported (41 entries in 1938) until the outbreak of war caused its postponement.

The standard of flying was high, governed as it was, by the fairly strict rules necessary for a precision competition. A points system was used and marks were obtained for appearance, engine starting, unassisted ROG, stability in flight, accuracy of flight time and landing. These requirements did much to promote practical, stable models and provided a sound basis for the hobby in this country.

The War and after

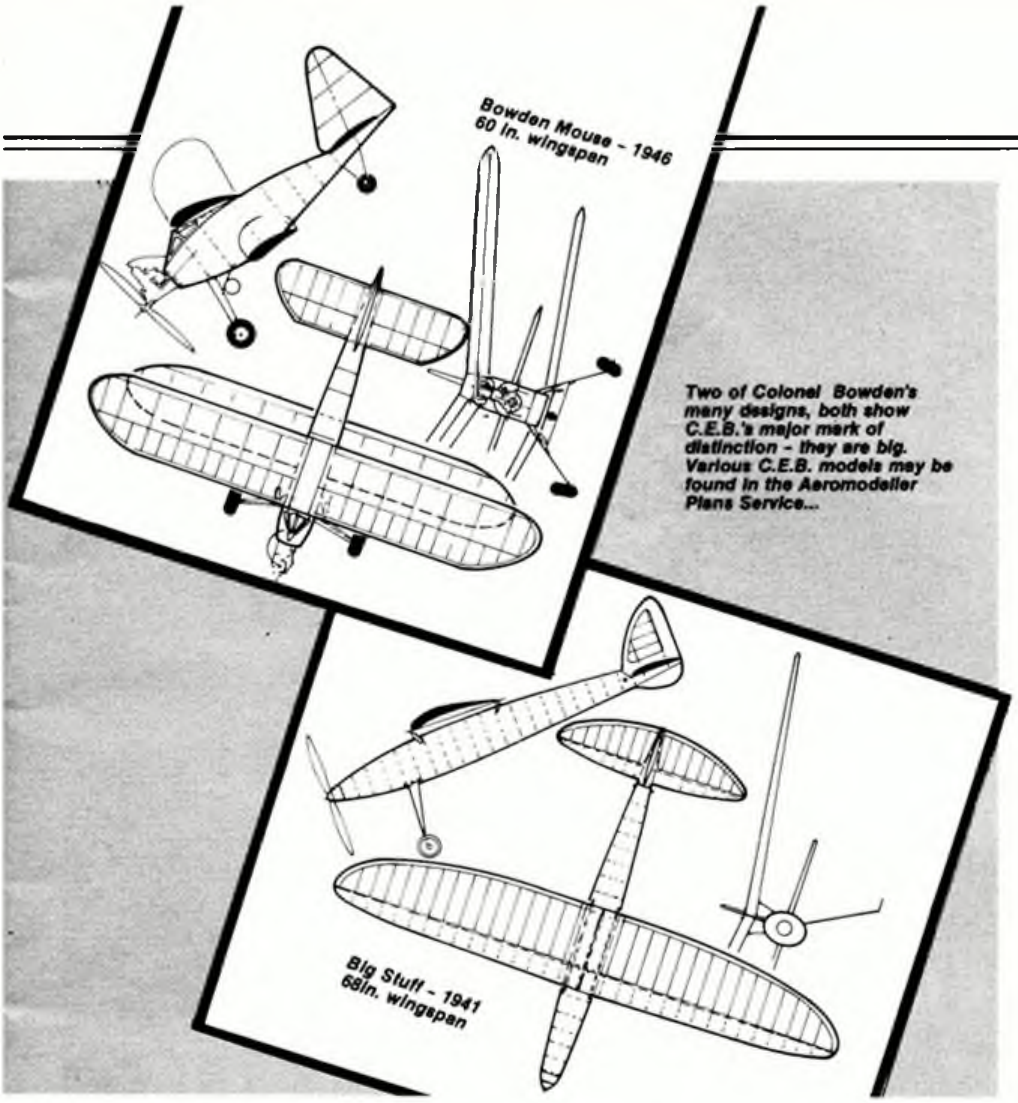
CEB was posted to Gibraltar early in 1938 and promoted to Major, and took some models and materials with him, so his activities continued unabated. Experiments with wing tip slots, elliptical wings and flying boat development all received attention. It was here that he made, amongst others, 'Baby Blue Dragon' and 'Monocoque Midget', two of his most attractive small models.

The outbreak of war found him completing a small polyhedral winged model for the *Ohlsson 23*, and he appropriately named this 'War Baby', it was probably the 38th petrol model that he had built since starting 'Kanga' 7 years before.

Although his building activity was of necessity reduced by hostilities, he still managed to compile some topical articles for *Aero Modeller* and these supplemented Dr Forster's regular feature. He had been promoted to Lieutenant Colonel in 1941 and retired in that rank after the end of WW2 following a period with BAOR.

Freed now from service restrictions, he was able to act as adviser to Mrs Bowden in the model shop in Bournemouth called *BM*

Even CEB experienced "gremlins" sometimes, here he is pondering the innards of his radio 'White Wings' at the first Radio Control Contest at Fairlop during the 1949 British Nationals.



Two of Colonel Bowden's many designs, both show C.E.B.'s major mark of distinction - they are big. Various C.E.B. models may be found in the Aeromodeller Plans Service...

Models, that she had opened in 1945, and also took up his pen on a regular basis to write articles for various model magazines, his *Aero Modeller* column "Petrol Vapour" being an eagerly looked forward to treatise by all power enthusiasts. He had described his elliptical-winged Bowden Contest in the November 1945 *Aero Modeller*, and he now designed a larger version named 'White Wings' and a smaller model of similar shape called 'Meteorite'.

Both of these models were kitted by *Welbeck MA Products* of Preston, and all three machines enjoyed great popularity because of their attractive appearance, simple strong structures, detachable engine mountings, backwards shock absorbing undercarriages and other Bowden foolproof features that made them practical beginner's machines of good performance that have not been bettered, even today some 40 years later.

End of the Bowden Trophy

The Bowden Trophy had been resumed with the 1945 event, and for a period this precision contest enjoyed its pre-war popularity. In 1947 there had been entrants from France, Belgium, Holland, Eire and Palestine so it was truely international, and the number of competitors in the 1948 Bowden Trophy reached an all time high of 72. However, there were changes taking place in the power model movement that would soon affect this "Blue Riband" of power flying.

In 1946 CEB had obtained a German *Eisfeldt* 6cc diesel, apart from fitting this to his 7 feet span 'Blue Goose' flying boat and making the first British diesel flights from water, he demonstrated this engine to various manufacturers in the Bournemouth area. The result was that both *Majesco* and *BMP* quickly produced diesel engines; other manufacturers were also active in this direction, and in a short time a number of reliable British diesels were on the market. CEB had always been intrigued with the idea of a really small power model, but the weight of the ignition equipment imposed a practical limit with petrol engined models. Diesels, when made in the very small sizes meant that at long last he could build a model that "...one could pack into an attaché case with lunch and a bottle of beer!".

In the immediate post-war years there was an ever increasing American influence on the hobby. British kit manufacturers were soon producing pylon models and control-line designs for the popular sized diesels and these models were made in very large numbers. Control-line really caught on, and the free-flight emphasis was on duration, as a result interest in slow stable precision flying as required by the Bowden Trophy rules decreased to such an extent, that in 1952 the SMAE left this event off their Contest Calender.

Colonel Bowden protested and felt that the rules change the previous year making his competiton an International Payload event had not helped the situation. The Bowden Trophy was resumed under its original rules, but by now there was R/C to distract possible entrants as well and finally in the 1956 event there were only 2 entrants who scored any points and the Bowden Trophy was permanently discontinued.

This was obviously a great disappointment for CEB, but he, more than anyone, understood the changes in power flying interest that had brought this about, since he too had secumbed to the lure of control-line and radio control, the latter now being his main interest.

Control line and R/C

His control-line interest after the initial flying of his old free-flight models as "Goats", had produced as much experiment for him as his earlier flying and he had built many stunt, speed and "general-purpose" models powered with all types of engines including jet. His 'Bowden Bullet' had been kitted late in 1948, and he was soon flying his special 50 inch span elliptical-winged control-line flying boat 'Grey Goose'.

During 1949 with the coming of practical radio control CEB lost no time in becoming involved and found this an ideal area for experimentation. The heavy bulky equipment meant a return to large models which he liked, and he made a 10 feet span elliptical-winged deep bellied slabsider called 'Poole Puffin', and another even larger model of around 12 feet span for the *Forster 99* (14cc) petrol engine and used these for his initial R/C experiments.

From now on he produced R/C models as fast as he could turn them out, low wings, biplanes and of course, flying boats. With models of normal configuration tamed, he tried the unusual, annular wings, tandem wings, deltas, tailless, tail first (canard), there was no end to the types of model built. Long before his current building project was completed, he had ideas for a new one, so his building board was never empty.

He still enthused over new power units, and tried them all as they emerged over the years, from *Jetex* to lawn-mower engines, with the introduction of the new generation of 4-stroke engines and electric power he was fully occupied, either fitting these to his existing models or making new models for them! This was one of his most productive periods, unfettered by regular journalistic chores he could spend more time in the workshop and on the flying field.

CEB had always modelled marine subjects and been involved in full-size yachting and dinghy racing, he was a leading member of the Parkstone Yacht Club, and had done much experiment, often with R/C, into types of sail and steering apparatus. He loved the water as much as the air and gave his model boats exciting names...'Jildi Junior'...'Sea Swallow'... 'Flying Fish'...but for me personally there is real romance and nostalgia in other names, the names of his early model aeroplanes...'Kanga'...'Blue Dragon'...'Monocoque Midget.' We won't see his like again...

Discussing the modernised 'Kanga' with the writer during a SAM 35 visit to his home in March 1981.

The line up of national flags from the twenty-four competing nations at the World Champs.

Jozsef Molnar of Hungary taking his engine to pieces for processing, after recording second highest speed in F1A.

CONTROL LINE 1984 WORLD CHAMPIONSHIPS

September 17-22 1984, Chicopee, USA

A full report by Aeromodeller's experts

THIS WORLD CHAMPS was held at Westover Air Force Base in Chicopee, Massachusetts. As the H.Q. of one of the U.S. Reserve Forces, a constant stream of training flights by 'Hercules' and 'Galaxies' could be seen on nearby runways. Such is the scale of Westover A.F.B. that this activity in no way ever compromised the Champs. In fact, there was almost unlimited practice space available to all competitors.

There was some anxiety before the Champs concerning the lack of information and the extent to which hotel and catering services would be used. Would it all be rather impersonal and expensive? All fears proved groundless. By taking over a motel for several days the usual 'campus' atmosphere was amply present, local restaurants provided prices to suit all pockets and, most important, the on-site flying organisation was, in all important respects, first class. However, mostly because of travel costs, the price of attendance was high and this did reflect in a generally lower level of participation than has been the rule for a European venue. Perhaps people weighed the cost of a £400 air ticket against the chances of success and opted to read about it in *Aeromodeller*! Many of us do think of F.A.I. events very much in forms of a European dimension. While it is true that the bulk of competitors at the moment do come from Western Europe other nations will be coming forward with offers to host future Championships. Australia and the U.S.A. have been "new" hosts to F.F. and C.L. Champs in the last two years and it seems likely that China will be bidding to host one of the disciplines in the near future. While the prospect of travel to far flung lands has its appeal, it will certainly raise many financial problems for the nations, Great Britain included, where the cost of attendance has been mostly born by the individual. In domestic terms it seems likely that serious thought will have to be given to fund raising events and that the Sports Council will have to be persuaded into a change of heart regarding the status of aeromodelling.

The weather, which is such an important factor in aeromodelling, did not quite co-operate fully. Temperatures were very pleasant with bright sunshine an added bonus. However, the two qualifying days in F2B and F2C were affected by strong winds. Predictably it was stunt that was most to suffer. No individual scored over a thousand on either of these days. Moreover, the wind's intensity increased as the day progressed, giving some advantage to those who drew an early position. However, the final day was ideal and gave the qualifiers some chance to combat the vagaries of the previous days' weather.

One of the main talking points was the generally excellent performance by the team from the People's Republic of China. Regular readers of *Aeromodeller* will be aware that noted modellers have been invited to China in order to pass on their skills. That the Chinese are proving to be able students is beyond doubt. The U.S.A. have reigned supreme in control-line stunt for nearly twenty years and yet they had to concede first place this year; a remarkable achievement when one considers that the U.S. fliers had the natural advantage of being on their own ground. Similarly, in speed the Chinese fliers placed 4, 5 and 6 with the *Shanghai* 15 just behind the victorious Hungarian team. With an individual 5th in combat only team-race remains to be succesffully penetrated.

F2A Speed

The weather was fine and sunny, but quite windy at times, knocking the edge off performance and causing a few crashes and near misses. In the first round the PRC (China) team made a strong start, Guojun holding 1st at 268 K.p.h. and Yibo, in third place at 266. The fancied Hungarian team, in contrast, was in disarray, only Szegedi showing any form with a 266.8 to split the Chinese for second place. His team mates were in the wilderness, Mult trailing in 8th spot with only 248.7 and Molnar failing to record a time at all. Others in the hunt at this stage were Spahr (USA), 4th with 258.4, Vita (Italy), 5th with 257.60 and Fallgren (Sweden), 6th with 256.7 K.p.h.

In the second round, the pattern altered only slightly, Szegedi put in a crackinng 280.1 K.p.h. which moved him into first place for keeps. Guojun

Right and below right - one man and his model. World Champion in F1B Zhu Younan from the Peoples Republic of China. Model is 55in. span uses an OS45 ABC motor with a homemade, laminated three blade propeller.

Above, fastest man in the circle was Sandor Szegedi seen here with, now much copied, typical Hungarian assymetric, high aspect ratio speed model. Right, Jozsef Mult (Hungary) grits his teeth and hangs on as his model and lines pass the processing 'pull test'.

Above, Chinese modeller Gao Guojon prepares his model in the 'pits' before breaking the magic 260...

and Yibo meanwhile still hung on to 2nd and 3rd places on the strength of their first round times, having no luck in their efforts to find more velocity in this round. Sarrate of Spain came from nowhere to take 4th place with 263.1, Spahr of the USA improved to 262.7 to hang on in 5th and Mult (Hungary) struggled up to 6th with 259.7. The third Hungarian, Molner broke his duck with 230.4, placing him a lowly 19th — no sign here of what was to come! Come the third round, the Hungarian speed machine came right on song, Molnar jumping nearly 50 K.p.h. to take second place with 279.2, Mult picked up nearly 20 K.'s to place 3rd with 277.9 and Szegedi backed up his second round/first-place flight of 280.1 with 279 K.p.h. Yongnian of the PRC hoisted himself from 7th to 4th with 272.5 K.p.h., pushing his team-mates Guojun and Yibo down to 5th and 6th. Saratte of Spain clocked 264.7 to take 7th place, Spahr hung on to 8th with 262.7 from the 2nd round and Bertin of Brazil came from nowhere (two zeros in the previous rounds) to take 9th with 260.1 K.p.h.

The top three places therefore were much as expected, but the Chinese achievement was unexpected. Report has it that the Hungarian team spends three days a week on F2A with assistance from their government, whereas the Chinese enjoy nothing like such support, and are comparative newcomers to speed. However, they were not that far behind the Hungarians, and provided they keep the pressure on, they must ultimately get among the very top placings. Saratte, Spahr and Bertin as "privateers" deserve a special accolade for their achievement in topping 260 K.p.h. on relatively slender resources.

On the technical side, models were almost entirely assymmetric, though one of the Americans was flying a conventional symmetrical model. The Hungarians had their ultra-high aspect ratio winged sidewinders as usual, and there was nothing radically new as regards the aeroplanes generally. Motors also looked much the same, the Hungarians using *Rossi* R15 F1 Mk 3's, (at least they started as such), the Chinese had their *Rossi*-influenced motors and the rest used mainly *Rossi* Mk. 2's and 3's, but there were a few *OPS's* and home-built specials around as well. All the motors and models were essentially similar in design and construction, so it is fairly obvious that the differences in performance are governed by other factors. Probably the most important of these is the fit of the piston and cylinder, and according to the bush telegraph, the critical things are material selection and the profiles (tapers) of these parts. The preparation (or manufacture from scratch in many cases) of these parts demands not only very elaborate machines and measuring equipment, but also prodigious methodical testing of various permutations to establish the optimum. Such is the state of the art in 1984.

F2B Aerobatics

After almost perfect conditions for two practice days with light winds, the preliminary rounds were to some extent turned into a lottery by the wind. The morning of the first round provided perfect conditions until around mid-day when the wind blew up strongly and remained a 15-25 m.p.h. for the rest of the afternoon. The second round followed a similar pattern, but with the afternoon wind more variable, being on occasion quite placid, but then gusting up quite suddenly, dying away for the last dozen flyers.

The organisation was very much a family affair with contest director "Big Art" Adamisin being assisted by son Archie and with wife and daughters acting as secretaries. On the second practice day about a dozen training flights were performed for the judges by Bob Gieseke and Tom Dixon.

Opening contest flight was by Zhu Younan (PRC) with a snappy flight to set the highest score of the round using a 53oz. model pulled by *OS 45 ABC* and featuring detachable wing and home built laminated 3 blade prop. Britain's Tony Eifflaender was next man up with a clean looking flight from the *PAW 35* diesel powered 50 oz. model, but the judges did not appreciate his pattern. Other early flyers taking advantage of the conditions were Bill Werwage, taking second spot in the round only one point behind Younan, Boaz

Right, diesel powered (PAW 35) stunter flown by Tony Eifflaender. Below, three past World Champions, Bob Gieseke, Bill Werwage and Les McDonald, all from the U.S.A Model is Les' latest 'Stileto' powered by modified K. & B. 40.

Right, far right and below, Generally thought to be the best 'paint job' of the Champs – Jim Casales superbly finished 'Spectrum' – letters, numbers and decor in merging rainbow hues!

Below, regular finalist at international aerobatic meetings – Luciano Compostella with his ST 46 'Tango'.

Above, Canadian model by Geoff Higgs (Canada). ST46 power, previously seen at Woodvale in 1978.

Trundler of Israel with his Genesis/Stileto, Claus Maikis (West Germany) with a new detachable wing model and Brian Eather of Australia whose model featured large areas of reflecting glitter on the wings which seemed to flash and accentuate the turns. After the first dozen flyers, the wind was starting to develop and by mid-day was becoming difficult. Geoff Higgs (Canada) almost lost his *ST* 46 powered model (ex Woodvale '78) and just rescued a slack line on a snatch in the hourglass. Billon (France) hammered out a fast powerful schedule with his *OS* 50 powered 70oz. model to maintain tension, but lost accuracy, not so lucky Haim Komornik of Israel lost tension in the overheads to watch the model crash at the judges feet. Geza Egervary almost repeated this, but rescued the plane on a snatch only a few feet from the ground.

Luciano Compostella (Italy) with a new "Tango" with detachable wing handled a heavy patch of wind well, as did Henk de Jong (Holland) with a new "Juno". Jim Casale (USA) flew a very powerful *ST* 60 powered "Spectrum" with 750 sq. ins. carrying only 57oz. to just short of 900 points. British flyer Nev Dickinson flew a steady schedule in the wind and the steady beat of the *Merco* 61 raised favourable comment. Nui Anlin from China saw his model almost explode in the vertical transition of the square eight, with wing and tail collapsing to reveal a structure which we Europeans would regard as much too fragile for windy weather flying, after a flight which had been characterised by very sharp corners and low pull outs. Much fancied flyer Rob Baron (USA) was using a high aspect wing with large flaps area, *ST* 46 motor, but was bouncing and inaccurate in the wind, Salvatore Rossi of Italy was also having an unhappy time. Third Briton Bill Draper used his *Enya* 45 stretched 'Superhawk', but was hit hard in the hour-glass and clover by gusts, with Japanese flyers Yamada and Suemoto, flying before and after, being similarly bounced about. The wind abated a little for the last two or three flights. The round closing with Zhu Younan, Bill Werwage and Les McDonald holding the first three positions, Les flying his 1982 'Stileto' with *KB* 40 and Bill using his 14 year-old 'Miss USA' with *ST* 46. British flyers at this stage, Bill, Tony, and Nev were in 19th, 22nd and 29th places respectively.

The second round started at 0800 hrs. again in excellent flying conditions, but with the wind drift into the sun, the good conditions lasting until about mid-day. Flyers who had flown the previous afternoon were able to redeem their scores and a 100 point rise was typical. However, the order was a complete re-draw and it was a matter of chance whether one obtained a morning flight. Rob Baron was able to show his potential to notch 949 and hold the lead for some time. Nev Dickinson flew a clean smooth schedule in mid-morning and raised an extra 100 points and other large increases came from such flyers as Yamada (Japan), Suemoto (Japan), Mayer (Finland). Tony Eifflaender, flying shortly after Nev, again put in a smooth clean flight, but with only a small gain in score. Claus Maikis called an attempt when he started his motor forgetting to signal and so moved back. After Jim Casale and Salvatore Rossi had taken their share of the conditions the wind suddenly began to ruffle and became quite unpredictable for about three hours. This spoiled Claus' second attempt and then caused problems for Bill Werwage, Boaz Trundler and Les McDonald.

After lunch break Geoff Higgs completed his schedule with a little less excitement than his previous round. Hiam Komornik withdrew and Bill Draper was unfortunate to fly during this period with the unpredictable wind spoiling several manoeruvres and landing to gain only marginally over his first round. Craig Yeoman the third Australian battled through this patch whilst China's Zhang Xiangdong's motor flooded off and died as the model speeded up in the wind. After mid-afternoon, however, the weather quitened and scores again rose. Luciano Compostella now took over top spot with 961. Marc Lavalette (France) and Henk de Jong reached the fly off whilst Nui Anlin now flying his back-up model showed his real potential to score 958. Last man Zhu Younan again in perfect conditions recorded the highest score of both rounds.

Right, powerplant end (ST 60) of Jim Casales' 'Spectrum' – model is 64 ins. span, 750 sq. ins., 50 ozs., and has foam flying surfaces covered with balsa 'veneer'.

Right, 1st semi-final with Stevie Smith anxiously trying to find a slot between the left-handed Grau and an unlucky '3-pit stop' Meikemeyer. Below, Steve Smith and Colin Brown leave the circle as 'World Champions'.

Left, Rob Baron (U.S.A.) placed second overall, scored highest fly-off points using this 'Avanti', 52oz., powered by an OS 45 FSR with 11 x 6in. prop. For the preliminary rounds he had used a model with high aspect ratio and large flap area (30% wingchord!) – powered by a ST 46.

The fly-off was blessed with almost perfect flying conditions throughout, with only a light drift of wind which was initially towards the sun, but which veered away in the opposite direction to the sun's movement as the first round progressed.

Italy's Paulo Sbragia opened the round with his typical fast schedule with the *ST* 46 howling on the 10 x 6 three blade *Tornado*, and with some slightly untidy bottoms. Scores appeared to be again some 50 points up on the previous day and Anlin, flying second, was the first flyer to break the 1000 score with a slightly softer and smoother schedule than the tight turning pattern which had led to the demise of his round 1 model. Les McDonald's flight was a tight pattern to take the lead by 2 points at this stage, but just a little untidy in parts. Brian Eather flew a slow pattern with some shaky pull outs, but still achieved a high score with good geometry. Zhu Younan was beginning to take full command of the contest now, and flew with apparent confidence and ease to record the highest score of the round, although a fast and challenging flight from Casale also came close with a four figure score.

Many fliers were showing some untidiness on pull outs and this may have been caused by flying through their own turbulence due to the lack of wind. Elias Mayer had motor starting problems and used up both attempts to persuade the *ST* 46 to keep going, eventually taking off and losing the landing on over-run. Compostella remained the highest placed European behind the other USA team members, but still ahead of Werwage on aggregate.

The second fly off round was started by Horiuchi of Japan after a re-draw. Rob Baron had changed his model for the fly off after his windy weather problems in the preliminaries and now used his *OS* 45 powered "Avanti", a more conventional layout ship, with a tight but smooth and well controlled flight to reach 1026 points, to remain the highest single score of the contest. More starting problems for Mayer who took two attempts again to start his motor, followed by Younan, who responded to Baron's score with a very clean flight, second highest of the fly off, but good enough to secure the contest. Only a small increase was made by Marc Lavalette who was perhaps trying a little too hard with several very low pull outs with his handsome new "Panter" pulled by *OS* 45 FSR. Lucian Compostella also now seemed to be feeling the pressure and dropped points due to some bouncy pull outs and missed intersections. Slightly untidy pull outs seemed to characterise almost all the flyers, except the leading pair and with little general change in positions as the main contenders all showed slightly reduced scores.

The event closed with an individual win for China with Zhu Younan having flown consistently throughout the contest, and a big effort by America's Rob Baron in the final round but insufficient to make up for Younan's early lead. Consistency had also been a feature of Nui Anlin in third place after his first round mishap, but the closely grouped USA team ensured the Team prize by a clear margin over Japan, the only other country to get their full team into the fly off.

F2C Team Race

The organisers had indicated that fuel components would be available on the site to overcome the problem of transport, this lead to a bout of "Kerosene Hysteria" sweeping through those competitors who did not bring their own fuel. The symptoms were groups of Team Race competitors all muttering "dirty engines, no laps, no laps". However, with the help of the American modellers alternative types of kerosene were found that proved totally adequate.

The weather conditions were generally very good being dry and sunny, the only problem occurring towards the end of each of the rounds when the breeze was fairly strong making a 1st or 2nd choice of take off segment a definite advantage.

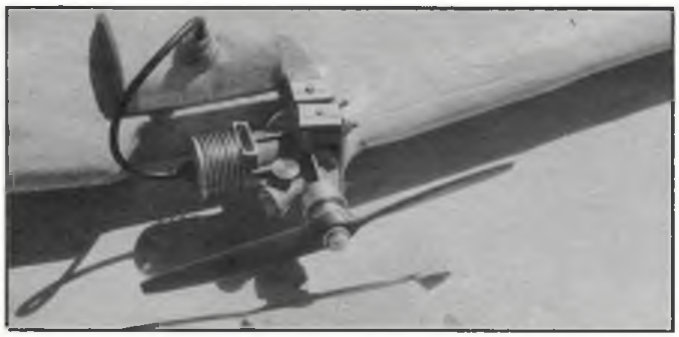
Round 1 opened with the Swedish team of Samuelsson/Axtilius having problems catching the model at each of the pitstops and together with St George/Boys (New Zealand) failing to complete the race Marschall/Grothe, Germany to finish alone in 3:55.9

The 2nd heat saw Smith/Brown (G.B.) matched

Right, World Champion Loet Wakkerman had plenty of flying to reach the finals - almost lost count of the number of re-flights, before he met fellow countryman (below) Fred Meyer to decide the top honours.

Above, Dutch pit crews were always well prepared and ready to go at the 'off' - Arne Koch's models are warmed up...Left, Ernie Buries keeping out of the way of the energetic Chinese flyer Ma Tianyu in the 6th round.

Below, CTM engine on Roland Forstner's model - Schnurle ported with AAC piston - all home made. Performance may be judged by Roland's final placing of 3rd...



Right, Mark Seguoin (Canada) pitted for brother Pierre, using hot glove to assist rapid starting. Also sported radio intercom link with pilot. Similar intercoms were used by the Chinese teams, where a stream of advice/orders seemed to be transmitted...

against their old adversaries Visser/Buys of Holland with the honours going to Smith/Brown who recorded 3:38.65 including a dropped catch and a glide home.

The 4th heat saw the next British team Gray/Haycock in action. This turned out badly for the British team who had plenty of airspeed, but were forced to fly rather erratically to keep clear of Pares/Grau, Spain (3:43.3) and Forbes/Henderson, (New Zealand), this combined with an over-sensitive shutoff resulted in 5 pitstops and a resulting time of 4:01.6.

The 5th heat had all the promise of producing a fast time as the American team of McCollum/Knoppi had been practicing at around 18.6/10 laps, however, John McCollum was judged to be trying too hard and picked up 3 warnings for whipping!, leaving those seasoned campaigners, Nitsche/Kuhnegger, (Austria) to come home first with 3:48.7 against the Swedish team Appring/Hovmark 4:02.87

The next heat included the third British team of Heaton/Woodside flying their *Cippolla* model, matched against Pennisima/Zana, (Italy) and Monaco/Vincente, (Brazil). Again the jury demonstrated that it would not tolerate whipping by disqualifying the Italian team, but a slipped catch at the 1st pitstop and poor restart at the 2nd — kept the British result at a disappointing 3:48.64 in spite of having good airspeed.

The van Uden brothers, (Holland) in the next heat missed an excellent opportunity of ensuring a semi-final place by whipping the model to disqualification instead of an estimated time of 3:35!

Heat 8 saw Albritton/Perkins (USA) suffer from losing a wheel at their 2nd pitstop leaving Kelly/Parent, (Canada) to win in 3:49.68 against Pulido/Pastor, (Spain) with 4:08.34.

Rossi/Rossi, (Italy) had shown impressive airspeed in practice 18.2/10 laps, although they were short on range and would have to settle for 3 pitstops.

Heat 9 saw them with too much compression and they were lucky to receive a re-flight when their opposition retired before 50 laps. However, an over-enthusiastic take-off at their 1st stop in the re-flight caused the model to tip up and stop too far into the circle to be recovered.

Heat 10 brought forward the Metkemeyer brothers flying with an old *FMV* engine — they had the misfortune to crash their new model with the newly designed engine just one week prior to the World Champs. A reasonable airspeed combined with their usual neat flying and pitwork resulted in 3:40.48 and the second fastest time of the day so far.

Heat 11 saw a very careful approach by Delor/Suruge, their *Nelson* was set slightly light and 2 careful landings brought the reward of 3:39.01. Whilst Fischer/Straniak were unlucky and lost their wheel.

Round 2 opened with Visser/Buys again drawn against Smith/Brown, although the race was won by Smith/Brown in 3:42.74 the Dutch team were able to improve their result by almost 1 second which would help their quest for the National Team prize.

Heat 3 brought the fastest heat time of the Champs of 3:36.7 for Nitsche/Kuhnegger whilst Samuelsson/Axtilius hung onto their catches this time to record 3:55.11.

In the next heat the van Uden brothers made no mistake with a 3:38.79 to guarantee a top 9 place and in heat 5 the experienced Americans Albritton/Perkins finished with 3:44.58 and a borderline chance of the top 9.

By the start of heat 9 the breeze was gusting very strongly and this was to prove disasterous to all of the remaining teams attempting to take off from the forward segment. In this heat Meder/Nore, (Finland) blew in on take-off leaving the race between Fitzgerald/Dislers (Australia) 3:54.03 and Pares/Grau 3:59.07.

Heat 10 saw Rossi/Rossi blow in on take-off to complete a miserable championships for a team expected to do so very well. Heat 11 and it was the turn of the fast Americans McCollum/Knoppi to spin in, this left Gray/Haycock who just prior to the race were having all kinds of problems, a relatively easy two up race and they took full advantage to clinch a semi-final place with 3:43.12.

The final heat was a refly between Heaton/Woodside and Pulido/Pastor (Spain), the British team knowing that they would have to crack 3:40 to pinch the Team prize from Holland fell to the front segment bogy and blew in on take-off. This left the National Team prize going to Holland, 11:02.06, Great Britain in 2nd place 11:10.41 with Canada in 3rd place 12:05.24.

Semi-Finals: The 1st race again was Smith/Brown in action with all 3 pilots staying close into the centre spot. It was a fairly difficult race but Steve Smith stayed in control throughout to come home 1st in 2:36.5 followed by Pares/Grau, 3:41.1 and finally Bert and Rob Metkemeyer who needed a compression adjustment after 15 laps and hence 3 pitstops to record 4:09.2.

The 2nd race was a real cracker, the best of the semi-finals with all three teams deserving their applause. Nitsche/Kuhnegger had slightly the better airspeed to record 3:35.9 against Albritton/Perkins who, aided by extremely good pitstops, recorded 3:38.6 with Hans Visser lacking just a little in airspeed in at 3:45.

The final heat of Round 1 matched the second British team of Gray/Haycock against the van Uden brothers and Delor/Suruge and this turned out to be another excellent race. John Gray was unfortunate to be struggling for range and had to take a third stop at lap 97 to finish with 3:49.6 whilst the van Uden's collected 2 early warnings and were fortunate to catch the jury in a somewhat lenient mood as they romped home with the fastest time of 3:34.1 closely followed by Delor/Suruge just outside the top 3 with 3:37.6.

The second round of semi-finals failed to change the top 3, closest were Pares/Grau with 3:38.7 to finish a very good competition for them. Nitsche/Kuhnegger proved their consistency with *Cippolla* engines by beating their previous results by 1/10 second! John Gray and Steve Haycock were trying just that little bit too hard and failed to finish by pulling the model into the circle on take-off at their 2nd pitstop. Two teams were disqualified in this round — Smith/Brown for gliding more than 2 laps, this with a model plucked literally straight from the box having just broken their 2nd *Cippolla* engine of the competition in pre-race practice!, and perhaps predictably the van Uden brothers when the jury decided to re-exert its authority.

As usual the final was preceded with 5 minutes practice for each competitor, Nitsche/Kuhnegger were the first to enter and taking all of their allotted time improved from 20/10 laps to 19.13/10 laps. Next in were the van Uden brothers, they had one tankful only, 19.16/10 laps a bit slower than they had been for most of the week, but they appeared happy. Steve Smith and Colin Brown declined their practice session.

The final started with Smith/Brown and van Uden first away and a fairly slow start from Kuhnegger. As all three pilots settled down in the centre it was apparent that the British team had the fastest model with Steve Smith managing to overtake both of the other competitors in the first tankful, although he did receive his first warning in the process. Steve and Colin's model was circulating at 18.75/10 laps giving them a clear advantage if the engine would hold its setting. At the third pitstop (half way) Colin very wisely took the pressure off the compression and they motored on with a small but definite edge over the other two models, in spite of having 2/3 flick pitstops each time. At their last pitstop Nitsche/Kuhnegger were very unlucky to loose part of their underfin causing their disqualification. It had been such an excellent race with all three teams giving 101% that it deserved to have 3 finishers since too often in the past the final has been an anti-climax.

Clear winners and worthy World Champions were Steven Smith and Colin Brown finishing in a new British record time of 7:17.31, some 12 seconds ahead of the van Uden brothers.

F2D Combat

Registration completed on Monday 17th September, Tuesday was allocated for practice, and from the outset it was obvious Holland and the U.S.A. would be the teams to beat.

Processing took late into Tuesday night and supplied some unusual rule interpretations, particularly on safety lines to engines, streamer hooks, signals and bout procedure, but left everyone in no doubt that the A.M.A. would be running this competition their way.

Competition was due to start at 8.00 a.m. Wednesday, however, a heavy mist meant that flying was postponed first to 9.00 a.m. and then 10.00 a.m., three hours after most competitors had arrived on the field. First bout of the day and involving the British team was V. Hunt (U.K.), and P. Lanfredini (Italy). With Vernon 2 cuts down but with no streamer left a line tangle held both fliers on the ground whilst Lanfredini was still carrying a full streamer leaving the score 248 to 94 in the Italian's favour. E. Burles flew next for the U.K. against L. Silva (Mexico) a clean bout resulting in a win for Ernie 322 to 256. I. Kennedy the last U.K. representative to fly in the first round drew R. Bellis (Australia), having taken the whole streamer early on, Ian was forced to defend for the remainder of the bout, but by the end it was 424 to 224 leaving the Australian the winner. Other notable bouts in the round were Goransson (Sweden) vs. Fluker (U.S.A.) who took 5 cuts to win 288 to 584, and Forstner (FRG) vs. Seguoin (France) with scores 540 to 334. Wakkerman (Netherlands) started as he was to continue with a re-fly against Ougen (France) winning this to give Ougen his first loss.

Round 2 flown Thursday saw good results for the U.K. team with Hunt beating Zheng (PRC) disqualified for an obvious line job literally pulling Hunt's model from the sky. Burles beat Monge (Mexico) by 1 cut to nil and ground time and Kennedy gained revenge on Bruce Bellis (Australia). Richard's brother winning on both cuts and air time. By the end of round 2, 8 fliers had been eliminated Delboni, Lichtenfels and Serafin all from Brazil, Melhuish (Canada), Karger (FRG), Gibson (New Zealand) and Goransson (Sweden). Surprisingly, Fluker (U.S.A.) had also picked up his first loss against Henry (FRG).

Round 3 Friday morning and Burles lost his first life to Henry 2 cuts to 1 with no ground time to either flyer. Kennedy disposed of Tameller (Italy) with ease and Hunt outclassed Quezada (Mexico) to leave the U.K. team with one life each. P. Sigouin (Canada) beat Fluker (U.S.A.) to eliminate the reigning World Champion from the competition. Wakkerman (Netherlands vs. Zheng (PRC) took 4 re-flys to achieve a result, with Wakkerman eventually emerging the winner.

P.m. Friday and **round 4** saw Ian Kennedy and Ernie Burles safely into Saturday with wins over A. Koch (Netherlands) and G. Turner (Australia) respectively. Vernon Hunt had the misfortunate to draw F. Meyer (Netherlands) who, in a bout of almost precision mid-airs removed the elevators from both of Vernon's models leaving the U.K. pit crew John Hammersley and Simon Groom insufficient remains to even attempt a repair. Leaving Meyer to fly out the bout to win.

With twelve flyers remaining for **round 5** Saturday morning, Kennedy drew Rush (U.S.A.) and Burles, Benicassa (Italy). Following complications caused by a change in streamer design and delays while decisions were made as to the validity of the two bouts already flown in the round, Burles beat Benicassa by 440 to 398 after a protest over Benicassa's streamer not being transferred to his second model, Forstner (FRG) beat Gibson (Canada), Wakkerman (Netherlands) beat Henry (France) 388 to 304 after yet another re-fly. Meyer (Netherlands) beat R. Bellis (Australia) 304 to 90 and Tianyu (PRC) beat Tomolleri (Italy) 38 to 52. Kennedy lost to Rush (U.S.A.) in what must have been the unluckiest bout of the competition when a line became disconnected from his first model just prior to the launch signal losing precious time on the ground and allowing Rush to get the edge and emerge the winner.

In **round 6** Meyer and Wakkerman beat Rush and Forstner respectively in very good bouts and Burles beat Tianyu (PRC) in a tight fight 4 cuts to 3 with little difference in ground time.

Round 7 drew Burles vs. Wakkerman and Meyer vs. Forstner with Burles and Meyer losing, three flyers were left with one life to battle for a place in the final — Wakkerman, Meyer and Forstner. In the elimination to the final Wakkerman beat Forstner to make the 3rd/4th fly-off Burles vs. Forstner and the final an all Dutch event with Wakkerman vs. Meyer. In the 3rd/4th fly-off Burles took the whole streamer whilst 2 cuts down leaving Forstner to take 3rd place.

Final: From the launch signal the final was a frantic bout with both pilots trying to take the offensive. In the 4 minutes that followed the crowd was enthralled by excellent close fought combat heightened by the knowledge of each others flying style, the final signal seeing Loet Wakkerman as Champion of the World with Fred Meyer a very worthy runner-up.

Team prize went to Holland by virtue of their individual 1st and 2nd placings with the U.K. taking second place overall and third place being shared between Australian, France, China and Italy.

F2A — Speed

Individual	Country	k.p.h.
1 S. Szegedi	Hungary	280.10
2 J. Molnar	Hungary	279.20
3 J. Mult	Hungary	277.90
4 Z. Yongnian	China	272.50
5 G. Guojun	China	268.00
6 D. Yibo	China	266.00
7 L. Sarrate	Spain	264.70
8 O. Vita	Italy	263.70
9 R. Spahr	USA	262.70
28 R. McGladdery	**UK**	**218.80**

Team Results
1 Hungary
2 China
3 Italy
4 USA
5 Brazil
15 UK

F2B

Individual	Country	Points
1 Z. Younan	China	2007.34
2 R. Baron	USA	1976.00
3 N. Anlin	China	1965.66
4 J. Casale	USA	1930.67
5 L. McDonald	USA	1920.00
6 L. Compostella	Italy	1916.67
7 B. Werwage	USA	1893.67
8 G.P. Sbragia	Italy	1846.67
23 N. Dickinson	**UK**	**832.00**
29 W. Draper	**UK**	**790.00**
31 A. Eifflaender	**UK**	**775.00**

Team Results

1 USA	5935.68
2 Japan	5466.99
3 Italy	4374.34
4 China	5232.33
5 France	5155.67
7 UK	**4643.33**

F2C — Team Race

Individual	Country	Semi-final	Final
1 Smith/Brown	**UK**	**3:36.51**	**7:17.31**
2 vanUden/vanUden	Netherlands	3:34.12	7:29.35
3 Nitsche/Kuhnegger	Austria	3:35	00.00
4 Delor/Suruge	France	3:37.62	
5 Metkemeyer/Metkemeyer	Netherlands	4:09.19	
6 Visser/Buys	Netherlands	3:42.82	
7 Gray/Haycock	**UK**	**3:49.62**	
8 Pares/Grau	Spain	3:38.87	
9 Albritton/Perkins	USA	3:38.58	
10 Heaton/Woodside	**UK**	**3:48.64**	

Team Results
1 Netherlands
2 UK
3 Canada
4 Austria
5 Italy

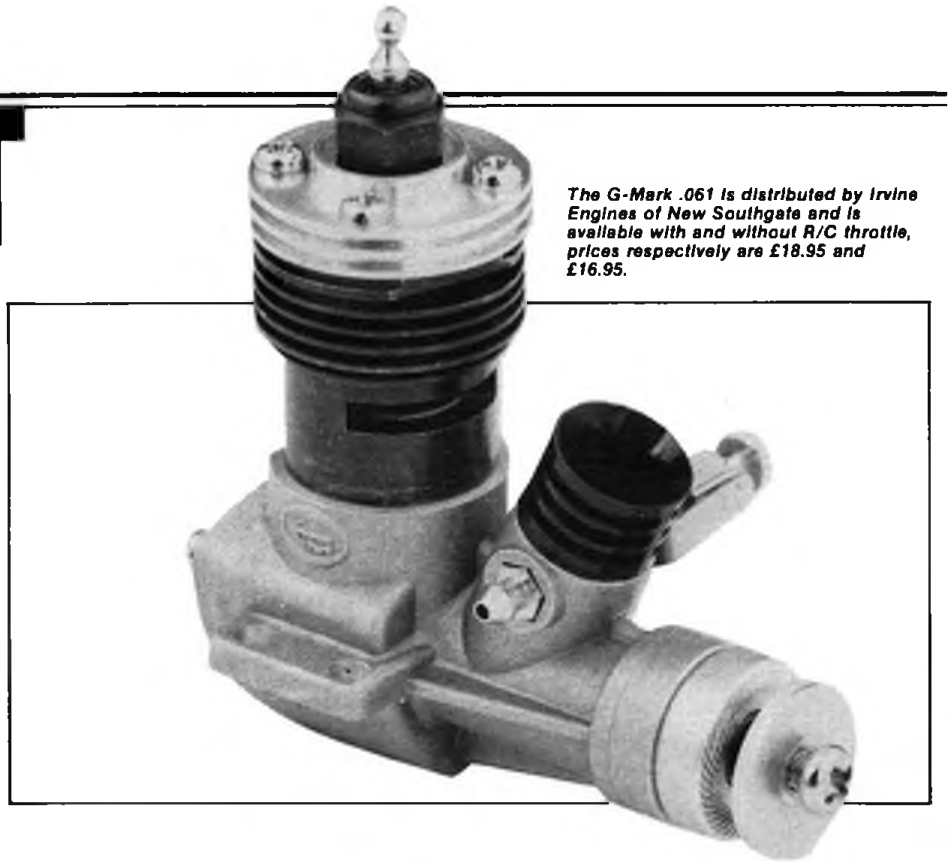
F2D — Combat

Individual	Country
1 L. Wakkerman	Netherlands
2 F. Meyer	Netherlands
3 R. Forstner	East Germany
4 E. Burles	**UK**
5 M. Tianyu	China
6 I. Kennedy	**UK**
7 V. Hunt	**UK**

Team Results
1 Netherlands
2 UK
3 Australia
3 France
3 China
3 Italy

ENGINE TEST

The G-Mark 061 Put through its paces by Mike Billinton



The G-Mark .061 is distributed by Irvine Engines of New Southgate and is available with and without R/C throttle, prices respectively are £18.95 and £16.95.

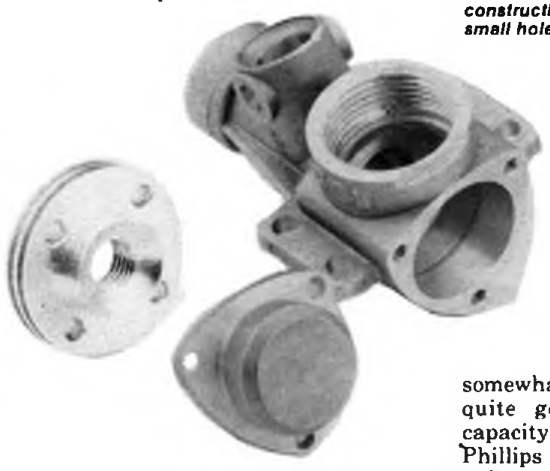
One would think that to occupy ground belonging (almost by combined right of sheer quality and production scale) to *Cox* USA, is not an instinctive first choice, for a launch into model engine production.

In fact, this ignores the depth of the 1980's *G-Mark* range from Japan, which covers a 5-cylinder 5cc radial, 5cc twin, 2cc twin, down through the 1cc engine tested here, to the smallest of their engines to date — the .5cc single. Comparisons between *G-Mark* and *Cox* engines are fairly superficial and limited to constructional styles of cylinder/piston/connecting rod. Elsewhere the manufacturer clearly has a quite different and individual view of modellers' needs.

The *G-Mark* .061 cu.in. glowplug 2-stroke engine has a certain significance, in that its single cylinder is the basis for the 2cc twin and the 5cc radial engines, and thus its performance relates to these unusual mutli-cylinder combinations.

In the form provided by the UK distributor — *Irvine Engines* — the test engine was fitted with the standard open choke carburettor; however, a rotating barrel carburettor is available for radio control throttle operation.

Stripped down prior to running, take care with the back plate gasket as it is rather fragile. Silencer is of neat two-piece construction but with only a rather small hole for priming.



Construction

Crankcase: One-piece lower half and main bearing housing. Has long-life phosphor bronze plain bearing apparently cast in-situ to provide secure keying to pressure-cast crankcase. Bearing is subsequently honed to accept crankshaft.

Cylinder/piston: A steel liner screws into the lower crankcase (similar to the Cox) and uses standard small engine radial porting, ie. 2 transfers opposite each other and 2 exhausts similarly disposed and giving 17° blowdown period. An un-ringed, hardened steel piston incorporates a ball and socket little end. The piston/liner combination gave a good seal both when new and after a number of test runs.

Crankshaft: This is chunkily constructed and is also in hardened steel. Multi-splined at the nose to accept a pressed-in prop-driver. A bronze thrust washer is fitted to withstand end pressures from use of a starter. Crankpin stroke dimension was somewhat oversized at .4175in. to give a quite generous .0638 cu. in. cylinder capacity. Propeller fixing is by a separate Phillips head bolt.

Connecting-rod: Of hardened chrome steel, with plain unbushed big-end and ball little-end.

Cylinder head. Is an Aluminium alloy turning and unlike *Cox* engines is not screwed-in but bolted with four bolts to the cylinder flange. Heads at this small size often use a built-in glow plug element, but here the *G-Mark* provides for a separate glow-plug as used in larger engines. Combustion chamber shape is hemispherical with no squish band. The difficult to measure compression ratio was pinned down to 8.3:1 (6.5 Effective).

Carburettor: Simple spraybar style, locked against rotation and set in the 5.1 mm. bore plastic venturi. A good positive needle valve control was noted.

Performance

The steel piston/liner combination required sensible running-in procedure to produce both more stable and higher power output. Approximately half an hour was accumulated during the monitoring of r.p.m. using a variety of propellers — during which period gains of up to 600 r.p.m. were recorded. Starting itself also improved, though this also reflects user familiarity as much as anything.

Power test 1: Open Exhaust. 25% Nitro. 15% Oil (50/50 synthetic/castor). *Taylor* long reach glow-plug. Suction feed fuel tank. This nitromethane content is recommended by the manufacturer and was used for all operations. The medium heat range of the *Taylor* plug proved satisfactory for the combination of engine size and fuel heat.

Going up the r.p.m. range, torque production only picked up past the 10,000 area — somewhat in line with other engines sharing this non-Schnuerle porting layout.

Maximum torque reached was 6.7 ozs at 13,400 r.p.m. with a severe decline setting in

beyond 20,000 r.p.m. There was some surprise that maximam h.p. for this quite small glow-plug engine was reached at a lower than expected 19,000 r.p.m., though this probably reflects the very conservative timings.

Power test 2: *G-Mark* two-piece silencer. (Fuel etc. as per test 1.) Addition of this quite advisable piece of equipment also proved interesting, because after much cross-referencing and reconfirmation of results, it was not possible to escape from the fact of its superior performance over 'open exhaust', from lowest r.p.m. up to mid-range (16,000 r.p.m.)...significantly the very area of likely useage in general sports freeflight or control-line.

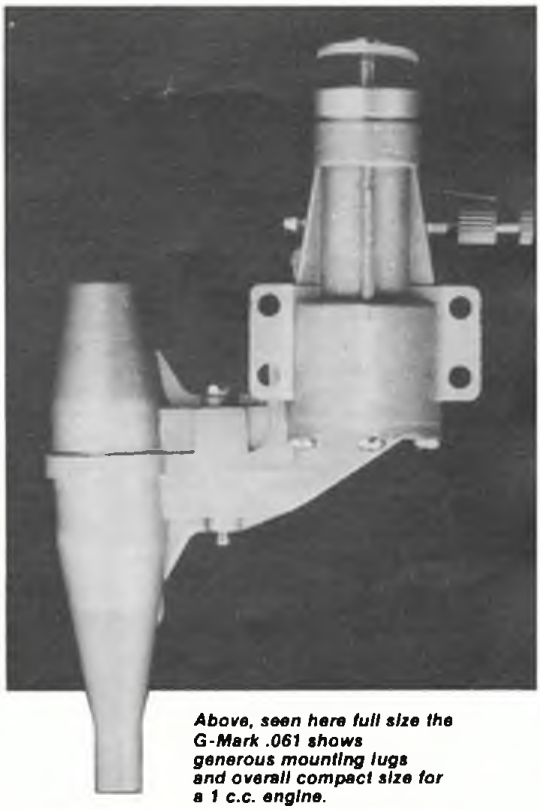
The relatively large silencer volume obviously presented little restriction at medium and low r.p.m.'s where gas flows are modest, therefore some advantageous tuning/resonance effect was occuring and/or the slight back-pressure resulting from the 9.1 sq.mm. outlet was itself beneficial — not an unknown feature of internal combustion engine performance. Subjectively, combustion sound at medium r.p.m.'s appeared 'cleaner' than when in 'open exhaust' (as distinct from being obviously more subdued). Above 16,000 r.p.m. the normal picture re-asserts itself with the ever increasing back-pressure suppressing torque to below 'open exhaust' levels.

User notes

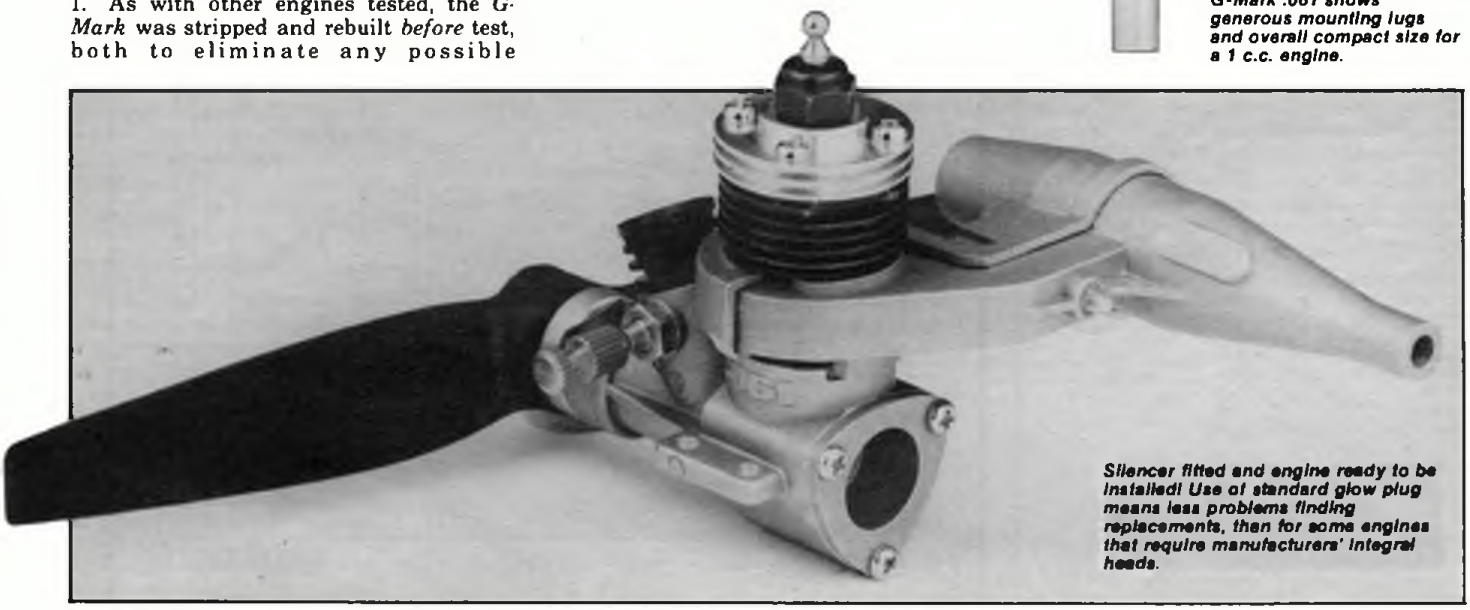
1. As with other engines tested, the *G-Mark* was stripped and rebuilt *before* test, both to eliminate any possible manufacturing swarf and to take note of all dimensions lest mechanical breakage later denied that possibility.
2. The glow-plug gasket should be in good condition and adequately tightened — otherwise compression leaks easily occur.
3. On test engine the cylinder head fitted easily at one orientation *only*, so it is worthwhile scribing alignment marks during initial disassembly.
4. Take care on removing the rear cover as the gasket used is quite fragile.

Cylinder head screws into crankcase - scribe alignment marks to ensure correct fit after future dis-assembly. Crankshaft is hardened steel and of a size to almost eliminate breakage.

5. Use a good fitting small screw driver for the *Phillips* bolts used throughout, as an oversize driver will soon damage the heads.
6. Starting in "open exhaust" was easy...use a very small prime through the exhaust and ensure that the crankcase is clear of fuel. Any excess richness will be troublesome to clear. Ensure a strong mid-orange glow from the plug. With the silencer fitted, rather more problems were encountered. Exhaust priming through the very small hole in the silencer was difficult and ideally that hole needs enlarging to accept small tubing. The alternative of choking the carburrettor to draw fuel through crankcase often caused fuel excess in the cylinder. An electric starter proved useful in this situation but considerable care is needed to prevent dangerous *hydraulic* oscillation occuring, because using a starter very swiftly brings up excess fuel from the base of the crankcase to the cylinder quite unlike the hand-starting method.



Above, seen here full size the G-Mark .061 shows generous mounting lugs and overall compact size for a 1 c.c. engine.

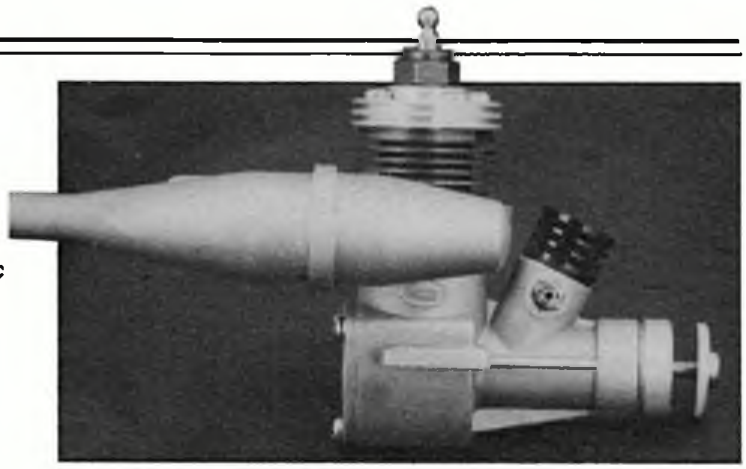


Silencer fitted and engine ready to be installed! Use of standard glow plug means less problems finding replacements, than for some engines that require manufacturers' integral heads.

Best advice (from new) is to flush the engine through with fuel — with engine upside down and plug removed. This is because the original assembly oil used aggravates initial starting. Then, when starting proper is attempted, initially keep the needle valve fully closed, until a first small prime has fired and done its most important job of purging the crankcase of any excess fuel. Following which the needle valve can be opened some 3 turns or so prior to normal starting.

7. Propellers larger than 7 x 4 proved beyond the capability of the engine. Best size for much sports use is around 6 x 3.

8. Two spot checks on 60% Nitro. showed the *G-Mark* to be quite amenable to this 'power-increaser' — which is a particular feature of small cylinder sizes, due to the scale-effect heat loss they suffer, ie. they have a greater amount of surface area in relation to their volume than do larger engine sizes. Thus small engines cope easily with (even sometimes need) the extra heat release of more powerful fuels.



Side view of the G-Mark displays a pleasing overall appearance, plastic venturi means you can replace this in case of damage - or of course, fit the R/C throttle.

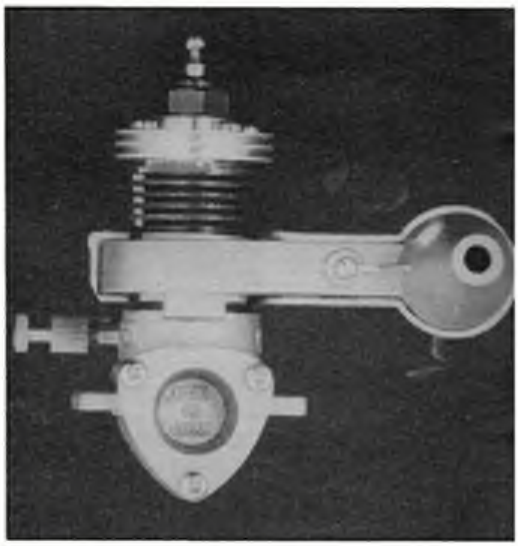
9. Needle valves on small engines are often *very* near propeller discs — so much care is adviseable when adjusting.

10. For the chronically unsatisfied, the engine is strong enough to withstand greater power outputs — by induction area increase/compression ratio increase/and/or hi-nitro fuels — though strictly, cylinder timings would need raising by, say, a 0.020 in. shim between cylinder and lower crankcase, with an associated increase of head insert depth.

Summary

The *G-Mark* .061 (.064?) proved a robust reliable unit — showing little sign of wear or temperament. As presently tuned it makes no pretensions to very high power and for most sports use this could be a positive asset. The silencer provided is particularly useful, easy to fit and somewhat unusually, is a clear plus on performance grounds under normal use.

The idea of using the separate cylinder of this .061 as the basis for their multi-cylinder units seems a particularly happy one and if they perform as well as did this single, they must result in quite viable units.



Engine may be beam or radial mounted (you just need longer back plate bolts). Design allows for pretty 'beefy' model construction, with engine bearers being chamferred to sit 'around' crankcase.

G-Mark .061 Sports engine

Dimensions & Weights:

Capacity — .0638 cu. in. (1,045cc.)
Bore — .441 in. (11.2mm)
Stroke — .4175 in. (10.6 mm)
Stroke/Bore ratio — .946:1
Timing Periods — Exhaust — 135°
Transfer — 100°
Front Induction — Opens 45° ABDC
Closes 50° ATDC
Total — 185°
Exhaust port height — .100 in.
Combustion chamber volume — .143 cc.
Compression ratios — Geometric — 8.3:1
Effective — 6.55:1
Squish band details — Nil.
Crankshaft dia. — .3148 (8.0mm)
Crankpin dia. — .1157 in. (3 mm. nominal)
Crank bore — 5.6 mm.
Crank nose thread — 3 mm x .5 mm pitch
Connecting rod centres — 20 mm.
Mounting holes — 25 x 9 mm x 3 mm holes.
Width between bearers — .76 in. (19.3 mm)
Width — 1.18 in.
Length — 1.8 in. (to front prop. driver)
Height — 1.96 in. (to top of cylinder head.)
Frontal area — 1.24 sq. ins.
Weight overall — 2.6 ozs. (74 gram.)
Weight less silencer — 2.1 ozs. (59.5 gram.)

Performance:

Max. BHP — .133 at 19,000 r.p.m. (Open Ex.)
— .109 at 17,200 r.p.m. (Silencer.)
Max. Torque — 6.8 ozs. at 13,900 r.p.m. (Silencer)
— 6.7 ozs. at 14,100 r.p.m. (Open Exhaust.)

R.P.M. on standard propellers:

	Open Ex.	Silencer
7 x 4 Master	8,582	9,040
6 x 3 Master	15,060	15,340
5½ x 4 Cox (Grey)	15,100	15,410
5½ x 3 Cox (Yellow)	18,310	17,900
5 x 3 Cox (Black)	19,490	18,750

Performance Equivalents:

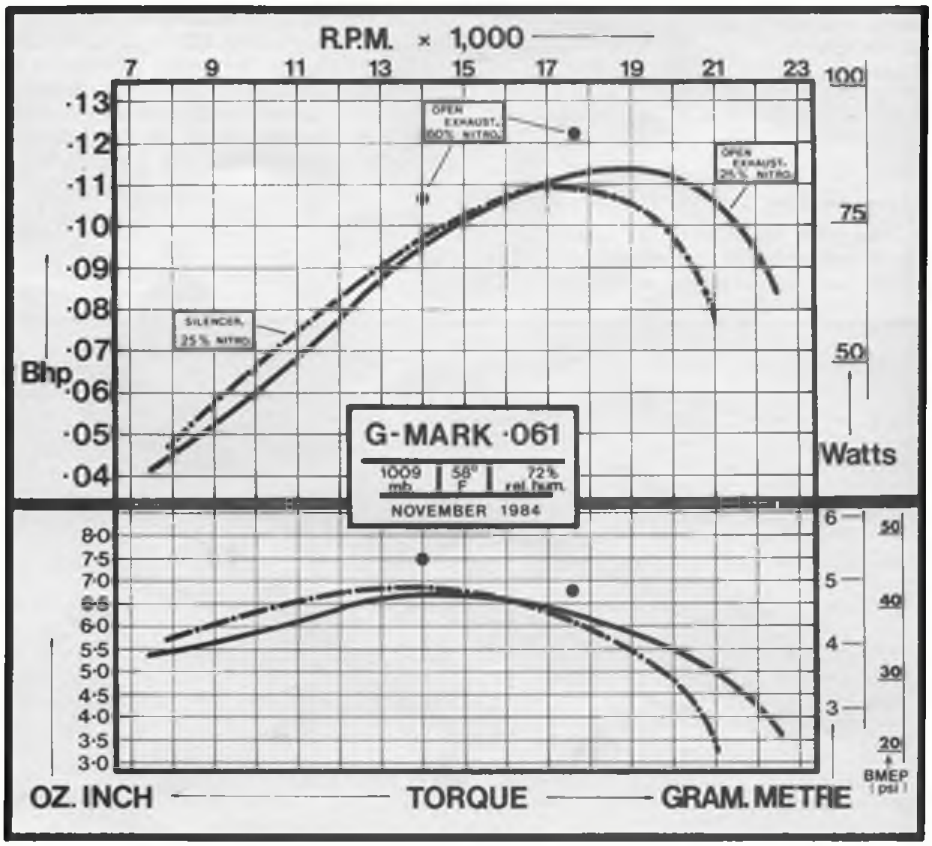
BHP/cu. in. — 1.77
BHP/cc. — .108
Oz.in./cu.in. — 106.6
Oz.in./cc. — 6.5
Gm. metre/cc. — 4.6
BHP/lb. — .86
BHP/Kilo — 1.88
BHP/sq.in. frontal area — .09

Manufacturer:

Kawaguchiko Samitsu Co. Ltd., Yamanashi, Japan.

UK; Distributor:

Irvine Engines, Ltd., Unit 2, Brunswick Ind. Park, Brunswick Way, New Southgate, London N11.



SHOP TALK

NEW MODEL HOBBY PRODUCTS REVIEWED

Sabre saw from Wen Products Inc. is one of the latest battery powered tools to appear on the British market.

Below, the Victrex headlight will provide light where you want it. Right, the latest in a long line of reprints from Frank Zaic.

Wen is now...

Wen Products Inc is an American company producing an impressive range of electric power tools. Of interest to modellers may well be two of their products distributed by *Globemaster Electronics* of Slough, a 9-12 volt portable electric drill and a sabre (jig) saw, running on a similar complete with a battery box (no batteries) intended to hold six 'D' type batteries and also a car cigarette-lighter adaptor. The drill has a ¼in. chuck and judging by the weight and quoted r.p.m. (1200) should prove to have a very useful torque, a chuck key is also supplied. The drill has a comfortable handle which may be removed so that the drill may be held 'pencil-wise' for precision work (why not just hold the drill from the other side — pencil-wise — but with the handle in the air?).

The jig-saw runs at a higher speed, 4000 s.p.,m. (strokes per minute?) and in addition to the battery box and adaptor comes with a couple of sawblades and a hex wrench, with which to attach them. The base (foot) of the saw may be adjusted through 45 degrees either side of vertical to enable bevel cuts to be made and a crude graduated scale is on the base to help you set this up.

Both the drill (Model 2302) and jig saw (Model 2310) are available by mail order from **Globemaster Electronics,** 8A Cherwell close, Langley, Slough at £24.50 each including post and packing.

Got to be useful...

We could not resist this one...although not specifically aimed at the modellers amongst its potential buyers, the 'Multi-Clip' has just got to be useful. As can be seen from its photograph, it consists of a flexible, threaded nylon band, with a nut and a collar for tightening. The size of the nylon band allows an item of about 3 in. in diameter to be gripped securely. Although one could not describe the nylon as *very* flexible, it will nevertheless conform to irregular shaped objects and provide a very satisfactory clamping or gripping action. Two or more 'Multi-Clips' may be joined together to produce an even larger working length/area. Obvious uses could well be opening stiff screw top dope jars, clamping an accumulator to a flight box, portable vice or just securing items to a roof rack.

'Multi-Clip', which has won a Duke of Edinburgh's Design Award, is marketed by *Tridon Serflex* of Thame, Oxfordshire and should be available from *Asda, Halfords* and the better DIY outlets. Cost is very reasonable at about 85p including VAT.

Lights on...

Some tasks in the model room can be difficult to perform — simply because we cannot see what we are doing! We may often be 'in the dark' but not because the lights are out! Indoor modellers especially need good eyesight and lighting conditions to enable them to rig those wings with 1 thou or smaller wires. Some modellers already wear magnifying devices strapped on their heads — perhaps they should go the whole hog and wear a *Vitrex* 'Headlight' as well. These run off four *Duracell* long life batteries and are comfortable to wear and easy to adjust. — Could also be useful if your model flies down a pot-hole! Price, including batteries (and V.A.T.) is a modest £5.99 and is available from a growing range of D.I.Y. shops.

Clamp it, grip it, hold it - use the versatile Multi Clip at only 85p...you can't lose!

Frank Zaic Again . . .

The range of famous Yearbooks by Frank Zaic running back to 1934 and through to 1965, together with his special titles on model gliders and aerodynamics, are now extended by a reprint of the souvenir pictorial from the 12th National Model Airplane Meet held at Detroit. This latest publication sells in the States for $4 and is a direct copy from the original 1939 publication. It contains photos of practically all the famous names in free-flight and, as an added bonus, carries a report on the 1939 Wakefield International. Naturally, it also includes many of Frank's drawings of the leading designs of the day plus a full listing of the Nats results from 1938 and some data on photography of the day. As a souvenir, it was little appreciated when first printed, but we fancy, with the current enthusiasm for vintage which is worldwide, Frank will have plenty of orders. A recent assessment of the 15 Zaic publications to date totalled no less than 1,394 plans for individual models, of which no less than 1120 came straight from the Zaic pen.

Many of the Zaic books are available including 'The National Model Airplane Meet' (£3.99 + 15%) from *SAMS*, 2 The Drive, Blackmore End, Wheathampstead, Herts. *SAMS* 1985 catalogue is still free if you send a stamped (23p) addressed envelope 9in. x 7in.

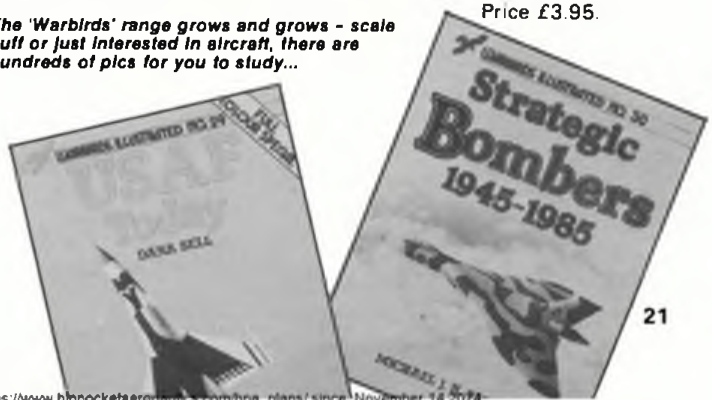
Two from the 'Birds

Two of the latest books in the 'Warbirds Illustrated' series are 'USAF Tdoay' (No. 29) by Dana Bell and 'Strategic Bombers 1945 - 1985' by Michael J.H. Taylor. Both are published by *Arms and Armour Press.*

'USAF Today' has 64 pages and is packed full of colour photographs — text is kept to a minimum and is essentially a pictorial history of the USAF — 1983, price £5.95

'Strategic Bombers 1945 - 1985' has 72 pages, 8 of which are in full colour. As usual, text is minimal to allow for stacks of pictures and covers a fascinating miscellany ranging from the *Boeing* B-29 and the *Avro* 'Lincoln' on up to the present with the American *Rockwell* B-1 and Russian *Tupolev* TU-22. Price £3.95.

The 'Warbirds' range grows and grows - scale buff or just interested in aircraft, there are hundreds of pics for you to study...



WETWUN

Make this amphibious control line trainer designed by Jim and Dave Leddy.

"WETWUN" is one in a series of models designed to encourage younger modellers to try control line flying and *enjoy* the results.

The original idea came from 'Brother Dave'. "What we need is a biplane with floats", said the ideas man, who then thought he was going back to his vintage control-line models. He was wrong! "Wetwun" finally emerged as a one or two wing float plane, with either open or closed cockpit powered by a 1.5cc diesel. The prototypes used the *PAW* 1.49 and an old *A.M.* 15.

Wing

Build one or two, the choice is yours. Cut the spar ½in. x ⅛in. and notch ¼in. deep to accept the 1/16in. ribs. The spar, lower trailing edge and tips are pinned directly onto the plan. Locate and glue all the ribs and when dry, glue in leading edge and upper trailing edge. Epoxy in the ply bellcrank mount on the lower wing only and cover centre-section with 1/16 in. sheet balsa. When dry, remove from the board and sand to shape. The only difference between the two wings is that the lower wing has the ply plate, the upper has two centre ribs.

Rudder Fin and Tailplane

Are all cut from 3/16in. balsa sheet. The two elevators are joined with 14 s.w.g. wire and commercial Radio Control hinges were used on the prototypes. Sand to shape.

At least they float! Unfortunately local ponds were not ideal for full flight testing of the deadly duo's (Jim and Dave) latest fun flyers.

Fuselage

Cut the lower ¼ in. balsa sheet and glue onto this the engine bearers and formers F1 and F2 with the fuel tank in between. With the upper ¼in. sheet glued on top of this box, you have the unit around which the fuselage is built. Now add the fuselage sides, doublers and formers F3 and F4 and join together at the rear. The tailplane and rear top decking is glued on, together with the top decking and side panels. Whilst this is drying, make up the float strut units and secure to the ply plates with glue and thread. These strut units are glued inside the fuselage to formers F2 and F3. The lower wing bellcrank and push-rod can now be fitted. Note that it will be necessary to trim the wing T/E and L/E to clear the float struts.

Floats

These are simple box units and should be made completely except for the centre top decking. If you ever intend to fly from water use balsa cement in construction, a lesson I learnt to my cost some years ago! The wing, fuselage and floats can now all be assembled and left to dry thoroughly. Finally, complete the cross grained sheeting on the floats and fuselage and add the fin, rudder and sub fin. Sand ready for finishing.

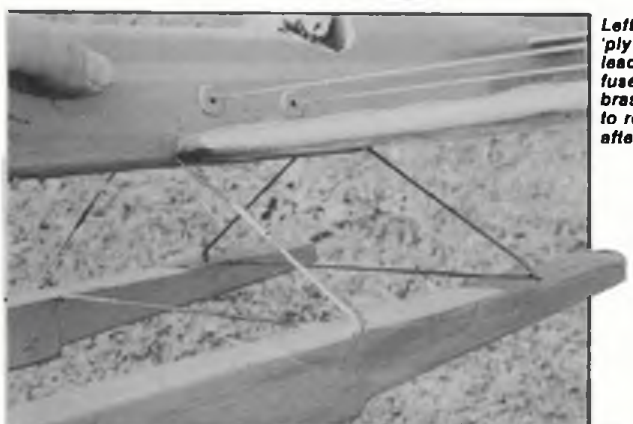
Finishing

The prototypes were covered on sheet surfaces with tissue and sanding sealer. One had tissue covered wings and the other used *Solarfilm*. Install the engine with side thrust and you are ready to add the second wing if the biplane is your choice.

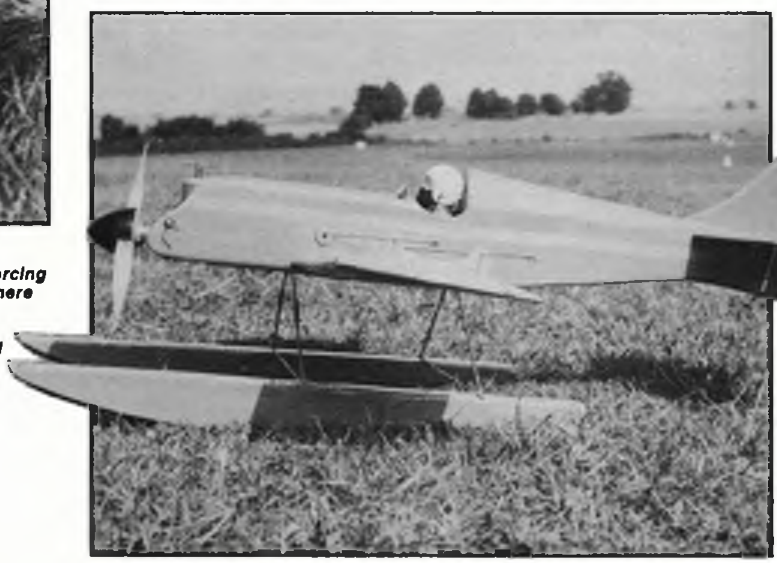
Flying

With the centre of balance on the front lead-out at the fuselage "Wetwun" is a pleasure to fly and will take-off and do 'touch and goes' on grass. We are still looking for a suitable water site, but feel with a good 1.5 cc engine on 35ft lines it should be no problem on water...

Left and below, both biplane and monoplane versions of 'Wetwun' show the 'brothers Leddy' love of the vintage look.



Left, note reinforcing 'ply washers' where lead-outs enter fuselage and brass tube used to repair u/c after prang!

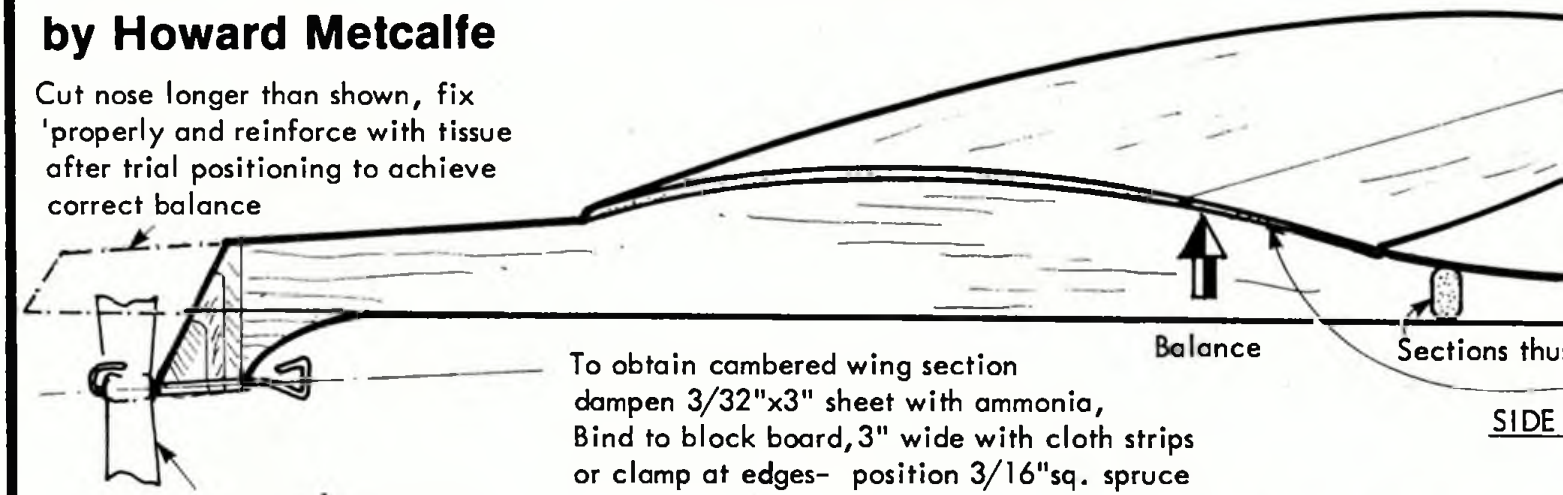


Sole Plate

by Howard Metcalfe

PORSTMOUTH ALL SHEET MODEL — 1

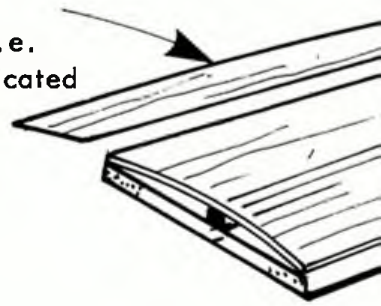
Cut nose longer than shown, fix 'properly and reinforce with tissue after trial positioning to achieve correct balance

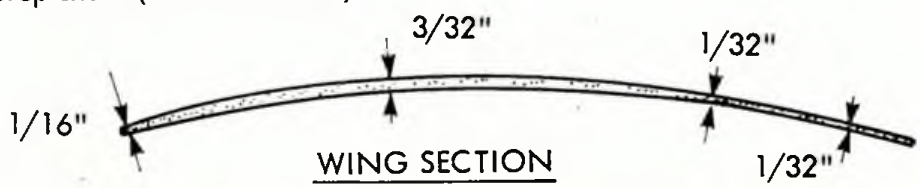


7" dia. Peck prop $2\frac{1}{2}^{o}$ downthrust
Brass tube bearing reinforced with several layers of tissue
2 thrust washers cut from beer can
1 thrust washer sut from Super Glue spout
"S" hook on prop shaft (view from rear)

To obtain cambered wing section dampen 3/32"x3" sheet with ammonia, Bind to block board, 3" wide with cloth strips or clamp at edges- position 3/16"sq. spruce down centre.
When dry, butt join 1/32"x1" strip flap to t.e. then plane and sand down to thicknesses indicated

SIDE





WING SECTION

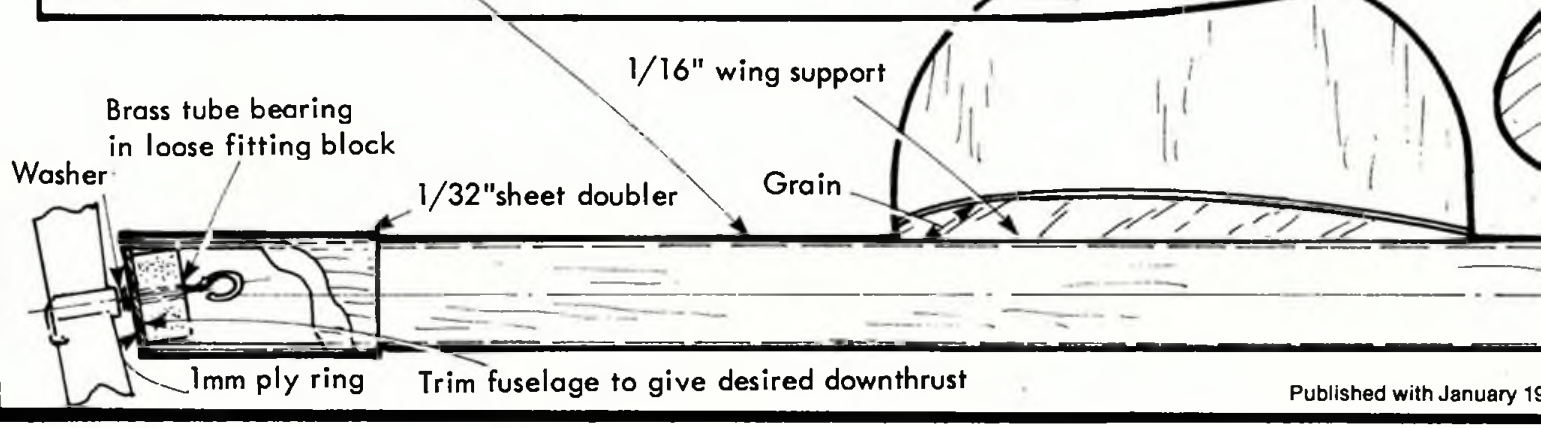
AB 1

by Derek Knight

PORTSMOUTH ALL SHEET MODEL — 2

WING HALF 1/32"sheet

FUSELAGE soft 1/32"sheet wrapped around 1/2" steel former which has been well waxed with candle. Cyano butt joint along lenght. When set, dampen fuselage to aid removal if tight.



Published with January 19

SCALE MATTERS

Control Line with Vic Willson

Bernard Sexton's Martinsyde 'Semiquaver' seen at this year's British Nationals. Limited 'options' tend to penalise this fine model.

My intention, during the winter months, is to explain some of the basics of Control Line Scale based on my experience with buildinng and flying this class of model during the last ten years or so. Hopefully this will encourage people who are "on the brink" to build that long dreamt of scale model and may also help people who already have this class of model, to improve its performance.

Generally speaking, support for the class has remained fairly static in recent years, with entries in the Nationals (Knokke No. 2 trophy) averaging about 10 models and entries in other S.M.A.E. events usually around 6. However, as shown by the number of models flown at such events as the 'Aeromodeller Scale Day' at Old Warden and various 'fly-in' type events staged by clubs like Three Kings and High Wycombe, interest in this type of model is far from dead.

The motives for choosing this class of scale model are various, i.e. easier to trim than Free Flight (especially if low wing prototypes are your preferred subjects) or require less space to fly (and are generally cheaper) than Radio Control models. Also some models that even for the acknowledged expert would be impossible as a Free Flight subject and 'difficult' even as a Radio model are ideal for Control Line. Models of multi-engined military types (Lancaster, Halifax, Fortress, etc.) with operating mechanical functions are ideal for competition work and public displays where very often unsuitable sites such as school playgrounds, etc. preclude the flying of Radio models. A large crowd round the C/L circle can be easily controlled by ropes and are able to see at close quarters everything that takes place.

'Bricks on strings' the detractors will proclaim, but anyone who has been fortunate enough to fly a correctly trimmed model with smooth elevator and throttle controls will know that great pleasure can be derived from flying a Control Line Scale model skilfully.

This Bristol 'Bulldog' by Mick Staples came second at the Nats this year - having previously won in 1983.

Control systems

That brings me to what I regard as probably the most important aspect of this type of model and one that is all too often neglected; the control system...

All Control Line Scale models have the elevator operated mechanically by some form of bellcrank connected to two lines (stranded wire, except for the very smallest and lightest models) operated by a control handle held by the flyer.

This system, handle, lines, bellcrank (and the pushrod and elevator horn) is the heart of any model no matter what other gadgets are fitted, i.e. electronic controls for throttle, undercarriage, bomb drop, etc. If the basic control system is badly designed or poorly made and installed, the model will never reach its full potential and may well be unpleasant to fly even if it is aerodynamically sound.

Within the scope of the control system is incorrect 'gearing', i.e. handles too small or large, bellcrank size and elevator horn length. In a future article I will try to explain the relationship between these interrelated items and also my 'ideal' set-up which gives smooth progressive control. Avoiding the stiff over-sensitive layout often encountered on models where the builder has concentrated so much on the scale details, that as long as two lead outs are connected via the bellcrank to the elevator, that is good enough!

Remember, that for full control of a C/L model, line tension is essential. However, this does not mean a model that tries "to pull the flier off his feet"! On the contrary, if the model is correctly set up it may have a very light pull on the lines. The less the line tension the more important it is to have as little frictrion as possible in the control system.

We have all seen the model with elevator hinges gummed up with paint, etc. or piano wire lead-outs through small diameter tubing, which as soon as they are knocked become bent and bind in the tubes — as soon as the lines go slack these models cannot be controlled by the flyer!

I regard throttle as the *sine qua non* of a C/L Scale model as it enables realistic take-offs and landings and the flight speed to be kept to scale like proportions.

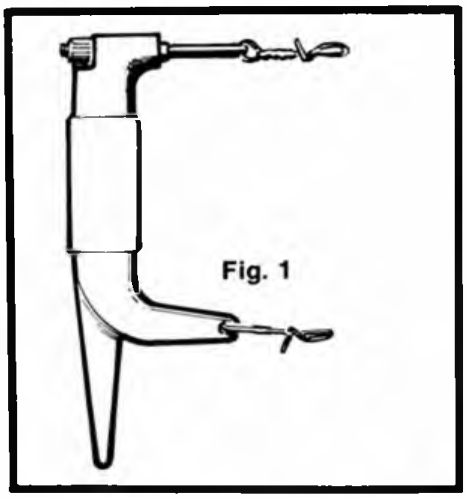
Small biplanes screaming round at team race speeds are probably what originated the "bricks on strings" acronym.

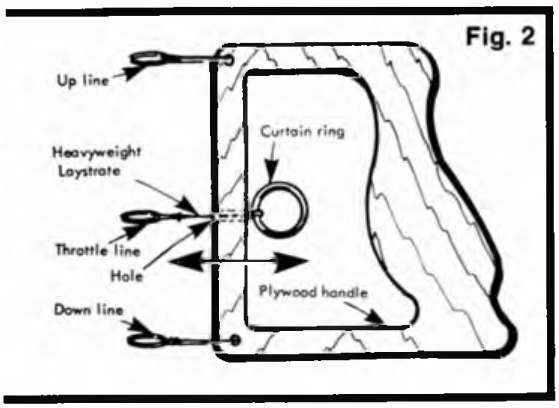
This obviously introduces a certain amount of complexity to the model, but if the throttle system is included at the design stage there is surprisingly little extra effort involved. As a starting point there are some commercial three-line handles and bell-cranks available, but of dubious merit.

Having rambled through these observations, I will be more specific and start with the handle and bellcrank. Later, to the lines, push rod and elevator horn, followed hopefully by further aspects such as selecting a prototype, documentation, size/weight and scale, engines, commercial items, materials and construction, finishing and painting, flight testing and trimming, and competitions (whew!). If space permits, I will also cover more advanced subjects such as electrical and electronic control systems, working functions, i.e. retractable undercarriages, flaps and bomb dropping.

Handles and bellcranks

Everone is familiar with the conventional type of two line control handle which will preferably have some adjustment to compensate for any inequality in length





between the up and down lines (Fig. 1). However, in its standard form, this is only suitable for models fitted with basic elevator only control.

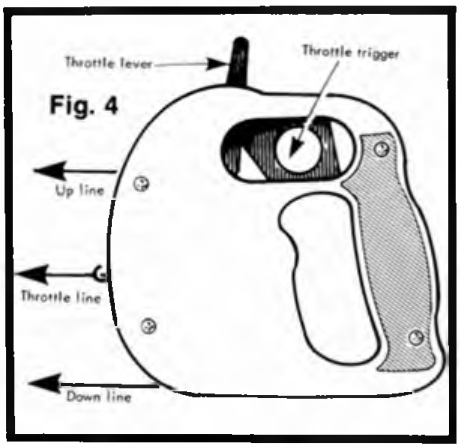
For models fitted with a throttled engine the simplest method of control is by means of a third line which shares some (if not all) the flying loads with the up and down lines.

The choice of handle and bellcrank is very much a personal one and the recommendations given here are unashamedly biased by my own experience. The simplest form of three line handle I have used was developed by that genius of practical aeromodelling, Mick Reeves, and consists of nothing more complex than a conventional handle (plywood) with a bridge piece in front of the hand grip, a curtain ring and a piece of lightweight "Laystrate" (Fig. 2). The first or second finger of the flying hand is inserted through the curtain ring to pull the third line (the pull of the model will reverse the pull on the line, via the bellcrank).

My personal favourite is shown in Fig. 3 and consists of a conventional handle with the third line operated by a "squeeze" control held in the free hand, this means that operation of the third line cannot affect the hand controlling the model, but does mean that signalling of manoeuvres in competitions is quite difficult unless the connecting cable is quite long!

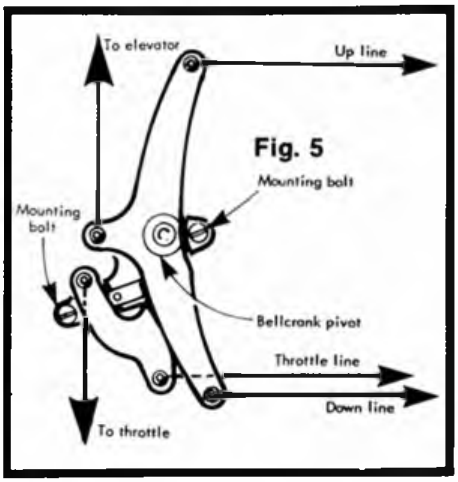
The handle shown is very basic and uses a bicycle brake cable clamped to the handle with a nylon undercarriage 'saddle' and a home-made "Squeeze" unit constructed of brass tubing and piano wire, with elastic bands for a return spring. No doubt the craftsman in metal and wood will produce their own 'Rolls Royce' versions!

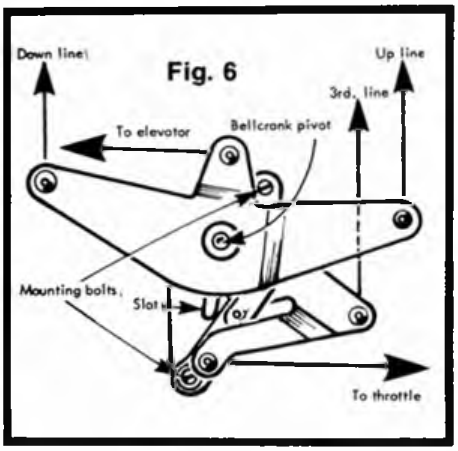
Another popular idea is a single handed "squeeze unit". Of more complex construction it works extremely well, as anyone who has seen Chris Bradford fly his *Nieuport* will testify.



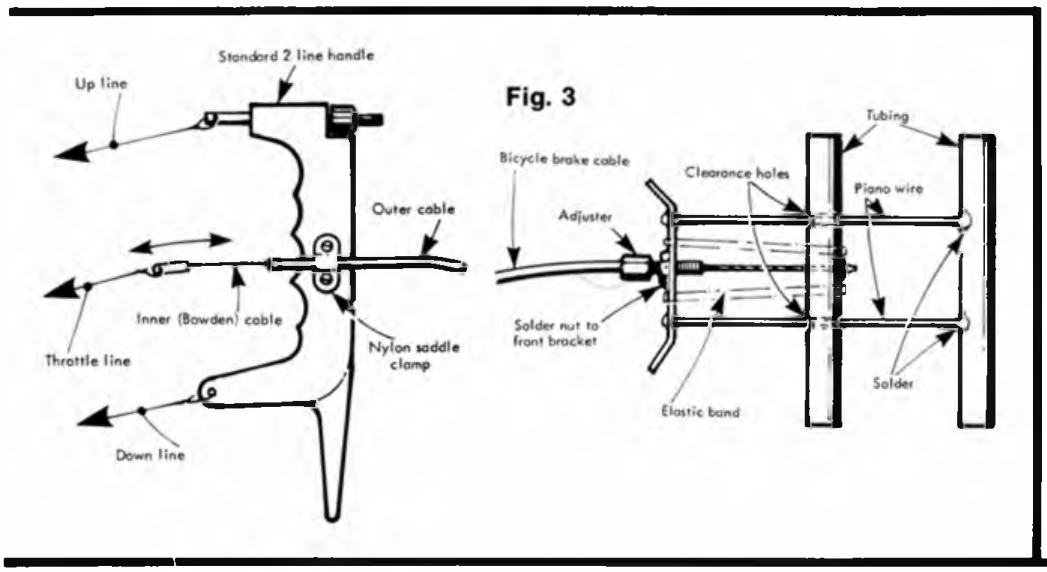
Finally (Fig. 4) we have the handle used by the majority, purely I suspect because it is the only one commercially available. This unit in its 'out of the box' form tends to be stiff and unwieldy to operate and the geometry of the design (when paired with the matching bellcrank, Fig 5) results in a control system that has been, if not the downfall of some scale models, at least the 'Achilles heel.'

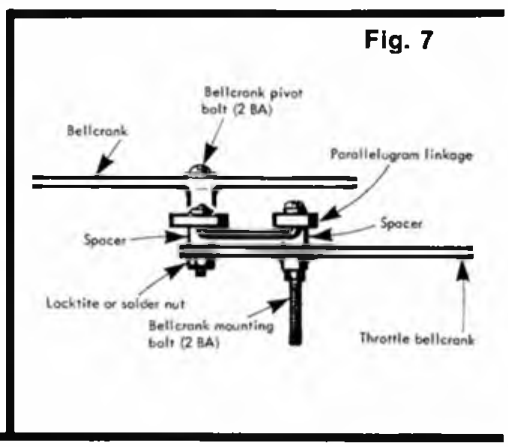
Smooth operation of the third line using one finger through the trigger hole is virtually impossible (pushing with a bent finger a very unnatural action). Most users of this type of handle will be observed with the left-hand operating the lever sticking up from the top of the handle, but having both hands on the handle does tend to cause the model to wander, as movement of the throttle lever causes the handle to react in the opposite mode, thereby affecting the elevator.





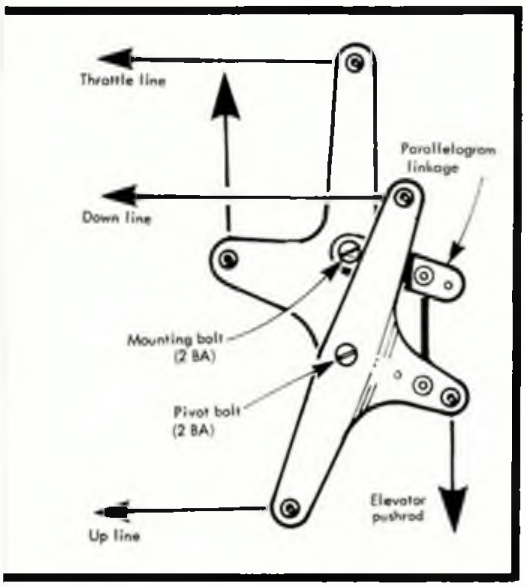
These handles were originally available under the 'J. Roberts — Flight Control' banner (manufactured in the U.S.A.), with the exterior casings moulded in red or orange plastic. However more recently, what appeared to be a mechanically identical handle appeared on the market with blue plastic mouldings under the name of *G. & S. Model Products*. In addition to this handle a





new bellcrank was introduced which although using the original *Roberts* layout has a usefully increased movement from the third line and is constructed of much better materials, being stronger and smoother in operation than previous models (Fig. 6). (The last known supplier of these units was Leon Ryktowski, L.R. Products, 7787 Archdale Avenue, Detroit, Michigan 48288, U.S.A.).

The parallelogram bellcrank that I use in conjunction with my left-handed squeeze control is shown in Fig. 7. This can be very easily made by anyone with a drill and soldering iron and is a design which as far as I can trace, originated in Czechoslovakia.



In Fig. 8 dimensions are given for a bellcrank suitable for the largest of C/L Scale models likely to be encountered (I flew a 10 ft. 6 in. span *Fournier* RF 4 weighing 11 lbs. using this unit), but it is quite suitable for the more normal 40 - 60 ins. span size of model, as the dimensions can be simply scaled down for smaller models.

The basic unit is a standard commercial 3 in. bellcrank with the additional plate and link made from dural. The only critical point is the accuracy of the parallelogram as if this is not correct the unit will bind when moved.

The design enables almost unlimited throw for the third line control, i.e. throttle and depending on which side of the third line plate the lever is located, the movement can be reversed to suit any type of installation without the need for extra bellcranks and linkages.

All the handles and bellcranks described here can be interchanged, but in some cases there may be problems with the range of movement. They all rely on the three lines sharing the flying loads and if designed and installed carefully it should be possible to arrange for all three lines to be of equal length.

Finally, by way of a warning to anyone who has been flying with a *Roberts* handle for several reasons, check the internal parts for wear, especially where the lead-outs are attached to the handle links.

As can be seen in Fig. 9 (courtesy Wal Cordwell!!) the up line has worn almost right through the metal and the next "snatch" on the lines will break the connection — result full down elevator!

Fig. 8

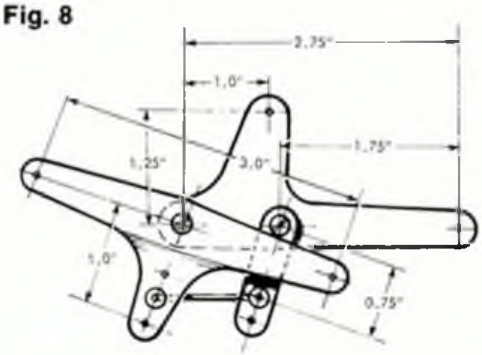
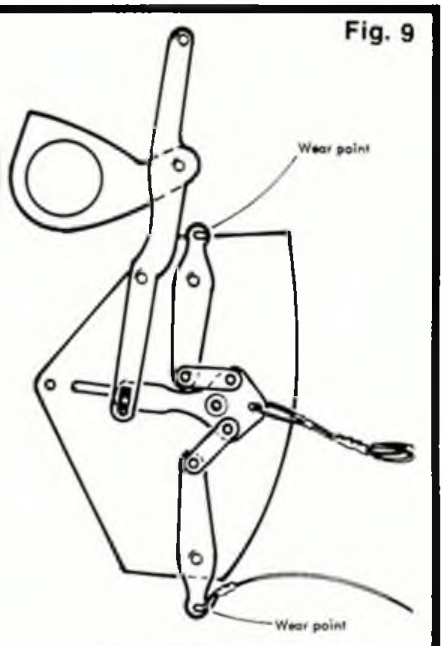


Fig. 9



Lifting Microfilm

Bernard Aslett removes the mystery from producing good microfilm

THE ADVENT of microfilm covered EZB's has, by most opinions, produced a vastly improved model. The extreme low weight of this covering material (in even thick sheets) allows a commensurately heavier wooden structure, which now handles the aerodynamic loads so much more efficiently.

Stimulated by the Northern Area Indoor *circuit* and also the 'Flyrod' contests, many modellers are being encouraged to build EZB's and it is only natural in pursuit of greater performance, that they look to microfilm covering.

This article emphasises the *lifting* of microfilm, as it may be said, "anybody can pour it". In explanation, successful lifting requires technique and without it, strong men have been known to be reduced to tears plus an excursion into Anglo-Saxon phraseology. Having made this fundamental distinction it will be later admitted that good pouring techniques, undoubtedly contribute to success. Before discussing technique it would be appropriate to look at what equipment is required.

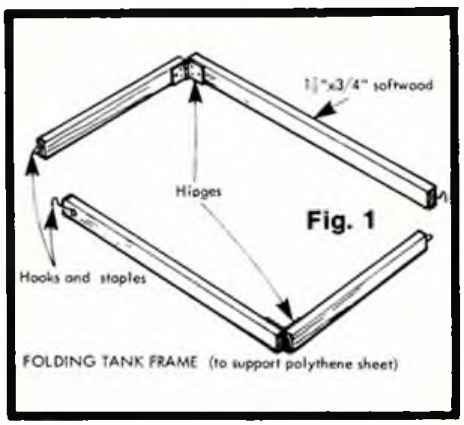


Fig. 1
FOLDING TANK FRAME (to support polythene sheet)

Tank

This can be quite unsophisticated. A wooden outline 1¾ ins. x ¾ ins. set on edge and forming a rectangle, with a fairly thick (.008 ins.) polythene sheet laid inside is quite satisfactory. Setting it on a table top avoids the need for a separate base. The size of the tank should be as large as can be conveniently accommodated to allow for a future need for large sheets of microfilm, but 50 ins. x 28 ins. will cope with sheets up to 40 ins. x 12 ins. Storage convenience can be gained by hingeing two opposite corners, whilst fixing of those remaining can be made with a "hook and eye", or similar, (fig 1). The polythene should be stored in a roll to avoid folds which in time would cause cracks and leakage — at this point it might be helpful to reflect that 4½ gall of water, to provide a depth of approx. 1in. is required in the suggested 50 ins. x 28 ins. tank and this will weigh 45lbs! Sudden tank failure would be the cause of instant unpopularity! Clear sellotape to each side of the polythene sheet is effective in repairing small leaks...

Fig. 2

Pouring Vessel

Requirements — anything to produce a thin steady stream. Several favour the Ron Green approach, using an aluminium 35 mm cassette case. A hole of .108 ins. dia. is made towards the bottom, allowing a one handed technique (fig 2). Some film solutions may require a larger hole, to avoid producing too thin a film. American Erv Rodemsky, the 1980 World Champion, favours a plastic bottle with a spout of two, telescoping brass tubes (fig 3). The length of the smaller dia. tube is altered to control the thickness of the film.

Frames

Having created your 'film', this has to be removed (lifted) from the surface of the water. This is done using a *frame*, these are chosen to suit the size of the wing, stab, etc., to be covered, but 20 ins. x 10 ins. should adequately cover one EZB and not be too large to begin with. Frame cross section of ⅜ ins. x ⅜ ins. balsa is suitable and should be constructed to form a flat rectangle that sits easily on the water.

Film Solution

Desirable properties, dryness and stability. There are several quite good solutions commercially available (see *Aeromodeller* ads) although the perfect film is somewhat like a pot of gold at the end of the rainbow. Straight *Humbrol* clear dope has produced surprising success for some, although it is not consistent from can to can. It would not be appropriate to close this subject without due tribute to Erv Rodemsky, who has been quite tireless and uniquely knowledgable in the search for a perfect solution. It is probable that no one else has applied himself so consistently, and for so long to this particular task.

Technique

Preparation: The water temperature should be consistent with the last successful pouring temperature...70° - 75°F will suit most solutions. If pouring on consecutive evenings, re-check the water temperature. Dust and small fragments of old film can be effectively removed by drawing a sheet of absorbent (news)paper across the surface. The surface ripples should then be allowed to settle.

Pouring: For consistency of film colour across any one sheet (and thickness — see table), a smooth/steady pass of the pouring vessel is made down the *length* of the tank, at a height of approx. 2ins. If you are new to this technique (or out of practice!), dummy passes, holding a stop watch, will allow you to check if your speed of pass is consistent (1.5 sec. for the 50 ins. tank has been found suitable).

The film should now be examined for suitable colour (and admired). It now

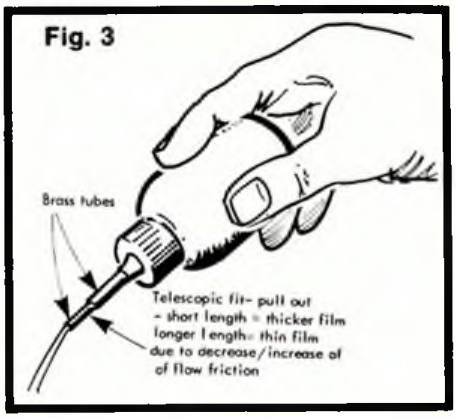


Fig. 3

requires time to allow rapid boiling solvents to evaporate — 8 mins. is suggested. This is unlikely to be time wasted. Apart from improved success rate, the frame surface to be laid on the film can be prepared with an adhesive — Cowgum, Uhu-stick and Scotch Spray Mount have all been used successfully. The sheet of film can again be admired whilst selecting the area of best colour to be taken — it is important to note (and exclude) weak spots from the frame coverage. The prepared frame is now lowered so that it is approx. ½in. above the film and one edge is then allowed to make

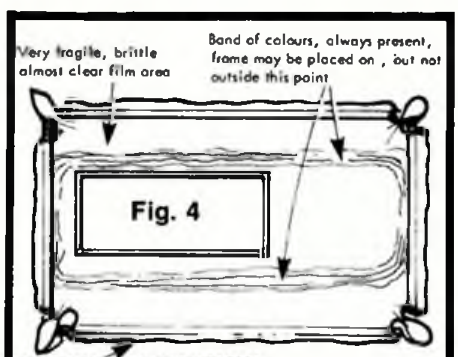
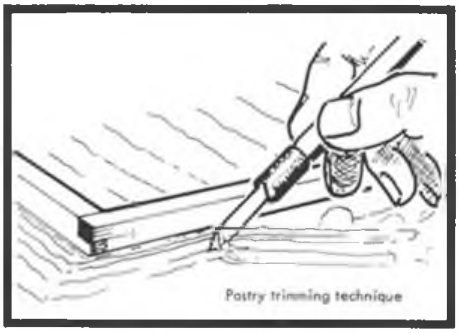


Fig. 4

contact. Without delay, the frame is released to drop lightly onto the film — it is then lightly touched on top, both along edges and ends, to ensure good adhesion. Fig. 4 illustrates the position at this stage.

The frame is now pushed in turn to the sides/ends of the tank to gather up the surplus film. This incidentally indicates the dryness/stickiness of the film, in that *dry* film tends to resist this gathering up procedure. Some will now flop this "excess" over the top of the frame prior to lifting, others tear the excess away. More preferable (to preserve the adhesion of the desired film) is an upwards "pastry trimming" action using a long bladed knife (fig. 5).

Lifting: The critical stage has now been reached, and great emphasis needs to be placed on smoothness and care. Fig. 6 illustrates the technique. It should be noted that the frame plus film displaces water such that the bottom edge may be ⅛in. below the surface. Drawing this frame across the tank will create a "bow wave" and turbulence, which is thought to greatly contribute to breakage. If the leading edge is raised up just to the water level, a smooth and steady movement in the direction of the dotted path, will lift the film (allowing air underneath) and avoiding much of the problems described. The frame is now held over the tank for ½ - 1 min. for drainage. For the first 10 min. or so the film is at its most fragile, and most breakages ("popping") occur in this period. It should now be moved to a temporary storage, propped upright at a shallow angle and allowed to dry out completely. Moving with the plane of the film parallel to the direction of movement at all times, avoids air pressure forces on the film. Temporary storage should be near, but out of influence of movements due to the lifting procedure. After 24 hrs. the film is by



Pastry trimming technique

comparison much stronger and should now be moved carefully to permanent storage (e.g. draughtfree loft).

The frames can be suspended employing a Bulldog clip and panel pin, ideally waiting for the film to indicate maturity by slackening. It would appear though, that use often occurs due to need, rather than any other factor. Carefully record the date of pouring, film solution and colour, frame number and eventually airframe for which it was used. These details can be invaluable, in light of a films good/bad performance.

No discourse on microfilm could ignore, not only the beauty of the colour range, but its significance in respect of thickness and hence weight. Many subjective opinions have been given to describe a particular colour, e.g. Apple green rose!! A shortened table is given showing an interpretation of the most important range of colours.

The physical thickness of microfilm is somewhat academic, and is usually related quite simply to its particular colour in the recognised order. It is intriguing to examine the few serious attempts that have been made to give an accurate assessment. The colours are produced by a well recognised physical process called Interference and are a natural property of any thin film. In the Nov 1963 INAV Bill Bigge gave information which has been extrapolated below:-

Red Violet approx. .000008 in. = 0.2 micron = 2000A°

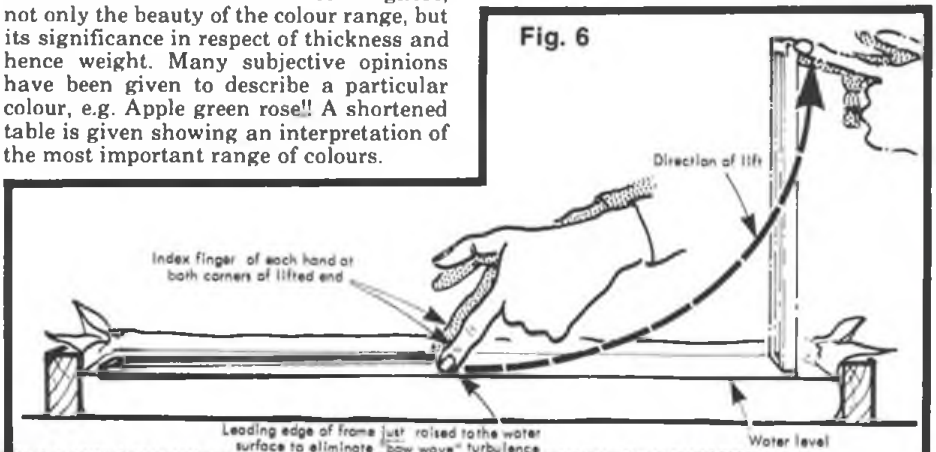
Blue Violet approx. .000010 in. = 0.25 micron = 2500A°

Table I

Colour	Comments
Clear/Cloudy	Brittle, unuseable
Silver	for very light coverings — fragile
Gold (brownish tinge)	for light coverings
Reddish Violet	commonly called Mauve -*
Blueish Violet	commonly called Blue -*
Gun Metal (greyish)	rather transient colour
Light Green	rather transient colour
Bright Yellow	Not to be confused with Gold
Red/Green	Thick and durable for EZB

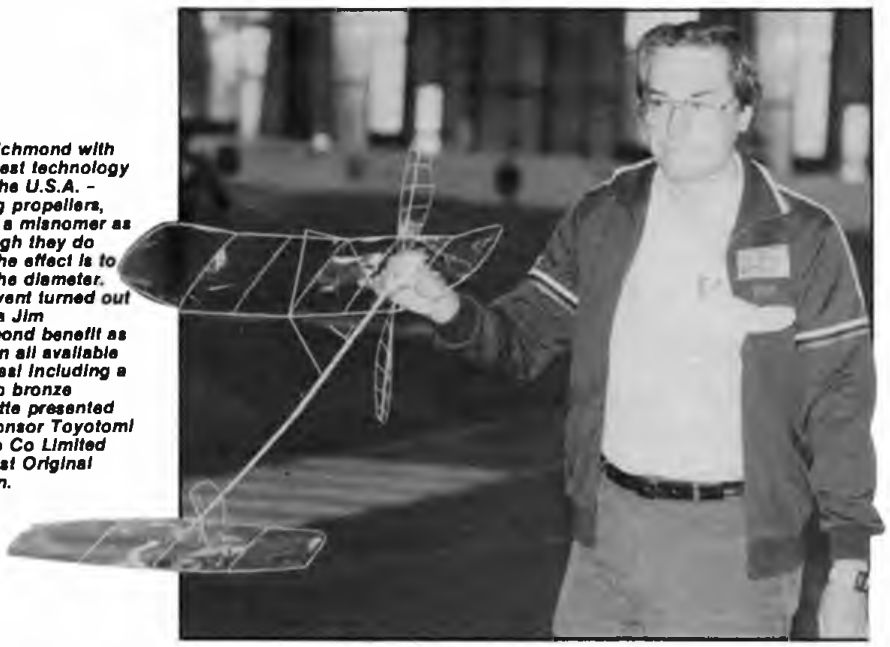
* Range most frequently used for F1D

Fig. 6



THE CHAMPIONSHIPS were held at the International Exhibition Hall at Nagoya, Japan, 150 miles west of Tokyo. This was the first World Championships for model aircraft to be hosted by the Japanese Aero Club, who were very ably assisted by C.B.C. staff. (C.B.C. T.V. were one of the sponsors). Travel arrangements had been organised by the Japanese Travel Bureau, (JTB) but the central collecting venue of Paris turned out to be so inconvenient for the European modellers despite the apparent low price, that only Peter Freebrev (F.A.I. Jury) and I made use of it. In my case, this was forced on me by events and I would not have chosen it otherwise. The package was far too short timewise. This at a stroke eliminated what would have been one of the main benefits, namely a special pallet in which to put the model boxes.

Despite the odd arrangement of having to collect the airline tickets on the day of departure in Paris, and the overnight hotel booking which wasn't, Peter and I made the plane to Tokyo with 30 minutes to spare and eventually arrive at the hotel some 19 hours later! Some damage was inflicted on my

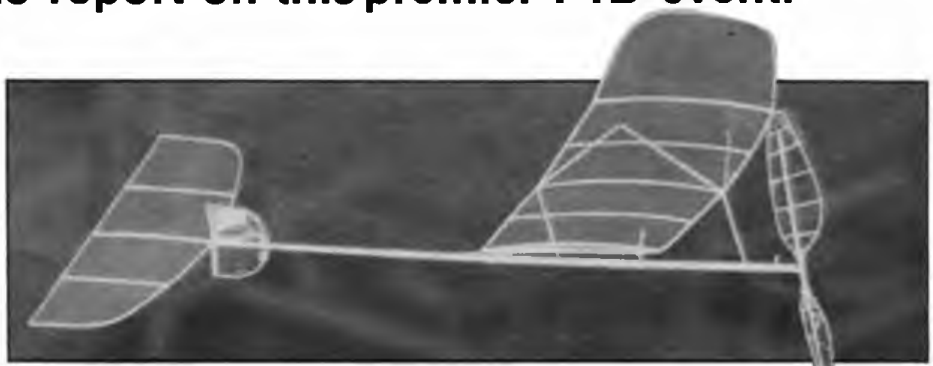


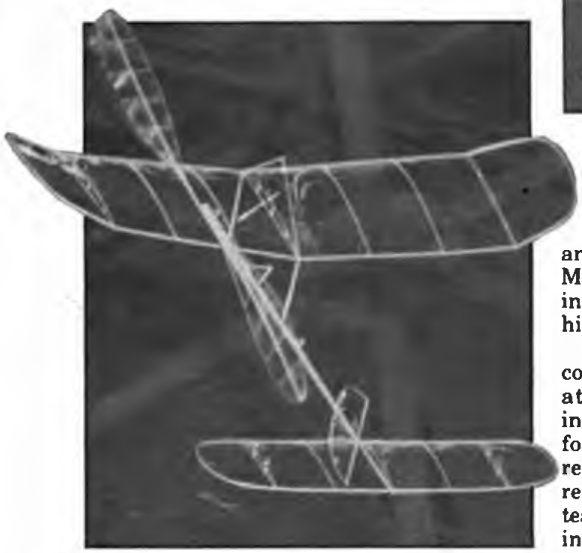
Jim Richmond with the latest technology from the U.S.A. - folding propellers, rather a misnomer as although they do fold, the effect is to alter the diameter. The event turned out to be a Jim Richmond benefit as he won all available trophies! including a superb bronze statuette presented by sponsor Toyotomi Kogyo Co Limited for Best Original Design.

1984 Indoor World Championships

October 16-18. Nagoya, Japan: Bob Bailey-san relaxes between rounds to report on this premier F1D event.

models, resulting in two unusuable wings (my patching microfilm being of inadequate quality) but enough models were left for the contest. This occurred despite all precautions that I could think of (handling not included) with 2 in. of polyurethane foam all around the box making it very cumbersome,





Above and left, Jim Richmond's 'Flim Flam' sporting its variable diameter propeller on the left 22in. and 'folded' above - 18ins.

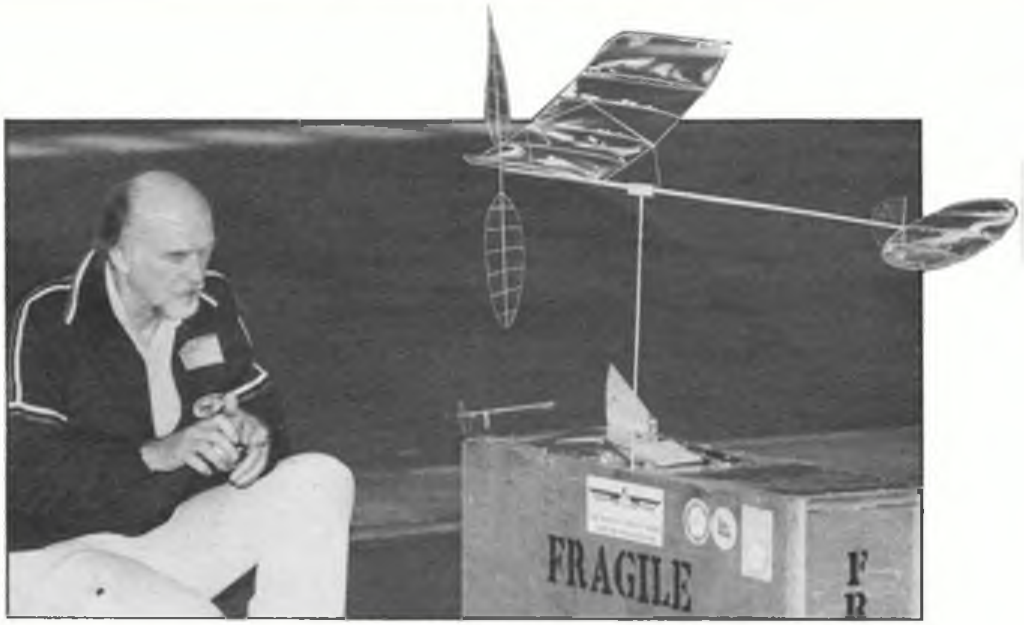
and too big to take in French taxis or the Metro! The box size complicated travelling in Paris greatly and I had to request JTB to hire a van to take me to the airport!

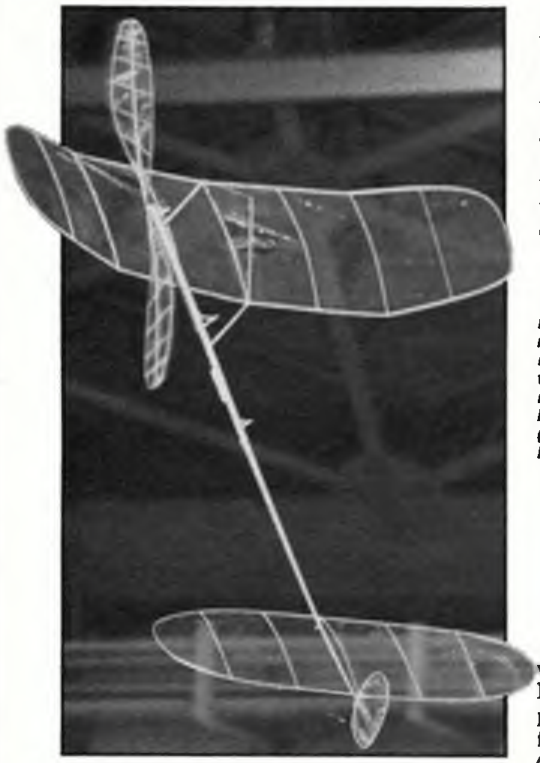
The next day saw 'The Nagoya Festival' consisting mainly of a large and very attractive carnival. By the Mayor's invitation, all competitors and supporters followed the floats. Since, for a variety of reasons, some financial, I was the only UK representative, I acted as flag bearer, UK team and general bottle washer all rolled into one! Jorgen Korsgaard of Denmark and I were the sole representatives from our two countries and were expected to act also as team managers. However, the Finnish team manager very kindly offered to brief us after the team managers' meetings at the end of each day's flying.

Practice day started with severe turbulence at up to 30 ft. height, making trimming difficult for those using half motors (half full length motor with ballast to make up the required weight). By mid-afternoon the air had settled down nicely at a comfortable 22°C and most competitors

were being reasonably careful on full motors. Fortunately drift was fairly low and there were few hang ups. Practise flying finished somewhat early to allow for the reception, back at the hotel, with the Mayor and representatives from the sponsoring companies (40-45 minutes drive from the Exhibition Hall). CBC were there in force for TV coverage. Traffic of rush hour proportions was present for about 20 hours per day, resulting in a slow journey each way. The practice day was important because the opportunity for useful testing afterwards was very limited, being 1 hour on each of the first two contest days and zero on the last day.

The reception itself consisted of a buffet meal with many hot and cold Japanese dishes immaculately set out. Refreshments included, among the normal aperitifs and *Sapporo* beer, warm saki served in a small



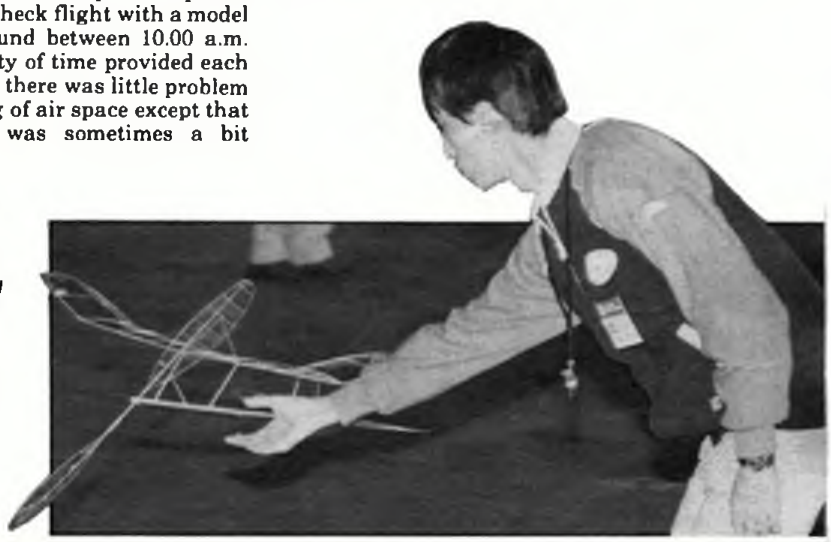


wooden box (about 4 ins. square) made from eucalyptis wood whose scent added a subtle flavour to the saki. The immediate reaction on receiving this box was "how is one supposed to drink out of this"?! — straight out of the box! — a very pleasant 'do' and one of the few chances to relax during a very hectic trip.

Rounds 1 and 2

On to the first contest day — into the hall by 9.00 a.m. involving an early breakfast at the hotel (£5 a throw) enabling us to stoke up well, for the conditions were good (21°C) without the turbulence that upset the practice day. The one hour practice period permitted a quick check flight with a model before the first round between 10.00 a.m. and 2.00 p.m. Plenty of time provided each team kept moving; there was little problem with over-crowding of air space except that the launch area was sometimes a bit crowded!

Above, Cezar Banks (U.S.A.) winds on for the 'big one' - bounced around the rafters for over 37 minutes.



Left, Bob Bailey's model never really got up to the roof, but had very slow let down to record 34:32. Right, Hideyo Enemoto (Japan) launches for best flight of 31:59.

The Americans really set the pace with what turned out to be their best flights; Jim Richmond used a variable diameter propeller which forms a 'Z' at the hub as it folds, taking about 4 ins. off the diameter (from about 22ins. diameter on high torque to 18ins. diameter at low torque). A thin elastic band causes the 'Z' to close-up at a predetermined torque; the change-over causes the model to climb again if the propeller 'flips' early. A good increase in flight time is possible, the result for Jim's first flight with the changeover at around 18 minutes was 39:51 despite not using all the available altitude.

Rob Higgs (Canada) produced a very nicely judged 34:49 with the model nudging the horizontally mounted banners in the roof several times. No problem with drift; I launched after the sun had come out while I was processing the model and the drift took it into the side where it hung — exit model used at the trials to qualify — not an encouraging start! Jorgen Korsgaard, flying in his first World Indoor Championships, had a fine start with 33:30. One of the Canadians had the misfortune to set his variable pitch prop to 50 ins. pitch instead of 40 and as a result the model went almost exactly nowhere!

For the second round, the drift had eased right off, I changed to another model with a very slow revving propeller and which also needed a lot of torque to get altitude. No matter that it stopped around 10 ft. short of the catwalk, the let down was good enough for my best time of 35:25, despite stalling in from 4 ft. altitude. Dieter Siebermann (Switzerland) had launched almost exactly at the same time, but the model got full height and nudged the banners at the top several times and went on to his best of 36:35.

Jorgen going great guns, put his model over the top of the catwalk for a very useful 33:24 — consistency! He was in 3rd place at the end of the first day with Jim Richmond holding the lead.

Boyd Felstead (Australia) had over-cooked considerably but his model hit the side of the cat-walk again and again, which saved it from certain death and got away with it for a fine 31:52.

Left, Bezman Nicu (Roumania) did not manage to reach normal form in what for him is a very low ceiling hall, only managed a best flight of 24:10.

Rounds 3 and 4

Day 2 dawned cloudy and wet — at Cardington it could well have been an excellent day for staying in bed! However, it wasn't cold, but felt decidedly damp and the hall was waterproof, which was just as well since the drizzle continued virtually non-stop all day.

Mike Thomas (Canada) kept the 'Thomas tradition' going by attempting to open up one of the vents with his model — this failed and he had to be content with it circum-navigating the centre pivot of the catwalk at least 10 times — he got away with it, and then collided with Cezar Banks (USA) at about 35ft plus. Mike elected to take his 29:47, but Cezar chose to refly — result 37:03 to give him the lead — for a while. Bob Randolph (USA) also had a collision and elected to refly — two for the Americans in the same round!

I decided to leave the 'best' model in the box for the next day, hoping for an improvement in the weather. The choice of replacement model didn't work too well since the first flight was underpowered; I changed the elevation which made things worse and despite the model's clattering the catwalk several times, the 30:32 was of dubious value.

The conditions were in fact much better than I had anticipated — Cezar Banks' 37:03 in the third round followed by Jim Richmond in the fourth. Jim's model was at 40 odd ft. with 28 minutes on the clock with the prop still on large diameter. Suddenly it flipped to small diameter and what had been a superbly slow let down became the cruise — the model just stayed and stayed and stayed. After an incredibly long time, the model eventually landed at 37:36 to give Jim an unassailable lead. By this time it looked as if nobody could catch the Americans for the team or individual placings.

Meanwhile, Richard Blackam was advancing the Australian cause with an excellent 33:43 despite lowish altitude, using a variable pitch prop of very neat construction — a just reward after a disastrous first day with two hang ups.

Richard Blackam from Melbourne, Australia launches for a 33:37, several flights tried to bore their way through the roof (in true Australian style!)

Rounds 5 and 6

On to the final day, glorious hot sunshine (by UK standards anyway) and an excellent day's flying in prospect. Because of the sunshine I anticipated quite a lot of trouble with drift and switched from the Japanese balloon which I had had available, but not really used, to my own nylon balloon, described by Mike Thomas as a garbage bag. The balloons provided by the organisers were big, but rather too heavy, so were relatively unresponsive to the steerer's directions.

The Americans had simplified steering greatly by having as part of their balloon lines a 20 ft. length of polythene tubing of about 1 in. diameter kept inflated by a small toy balloon. This tubing certainly ensures that the line cannot get caught between the propeller or fuselage and may help to prevent 'scrambling' of wings. (To be investigated next year at Cardington in oh so many months' time). I was not the only one with a 'plastic' balloon; Cezar Banks had a nylon 'flying pillowcase' which certainly worked well.

I got out my 'best model' again, but it was being capricious by deciding to stall on the power burst, so I didn't get the desired altitude. I had to steer the first flight and kept the model on the line for almost a minute before I could disentangle the line from the propeller. The second flight did the same stall despite a little more tail lift, but the motor which was supposedly thicker in the cross-section than I had used earlier didn't 'do the business' and got me my back-up of 34:32.

Surprisingly, not many people improved on their scores — Jim Richmond had a tail slide, wing buckle, with the prop jamming under the leading edge to have the model dive in. However, Jorgen Korsgaard had changed to a bigger propeller and was rewarded with a magnificent 35:10 to finish, and move him up by at least six places. The best flight of the round (37:32) came from Pentti Nore (Finland) which was far above what he had achieved earlier and pushed me down to 5th after holding 4th for sometime. As I said to him afterwards, he won the same amount as I did — nothing! It does seem rather a pity that no certificates or anything are awarded for any of the lower places.

Despite a bit of reshuffling in the lower places, the top three places were never seriously in doubt.

However, it was a very interesting Championships with a very high standard of flying made possible by good hall preparation. The contest ran very smoothly with a good press attendance and a fair sprinkling of spectators. Results were instantly available via an *IBM* computer, showing individual, team and best flight rankings. A great improvement on what has been the norm.

Finally, each competitor and team manager was presented with a *Toyotomi* paraffin (kerosene) stove. Because of its size, mine is on its way from Japan by sea since I couldn't manage to carry it with my other luggage!

The presentation of the cups and medals took place somewhat unusually, in the Exhibition Hall after the flying had finished. The Nagoya Police Band played enthusiastically while people were packing models away. The only anthem which got an airing was the "Stars and Stripes" — seem to have heard that before on TV at various odd hours of the day and night earlier in the year! A buffet banquet followed straight afterwards — a very pleasant relaxation although it would have been nice to have had a wash and brush-up first, to get the rubber lube off! Still it was a nice chance to unwind after what had been a hectic trip to say the least. Erv Rodemsky (F.A.I. July member) organised a party afterwards back at the hotel and that carried on until the small hours — a pity we had to get up at 5.20 a.m. the next morning for the trip to Kyoto for a spot of sightseeing before boarding the plane back to Paris.

All in all, a too short, but worthwhile trip — we could have done with another couple of days at least to relax — despite the claim of cheapness by the Japanese Tourist Board, it was no cheaper than an Apex fare from the U.K!

Results

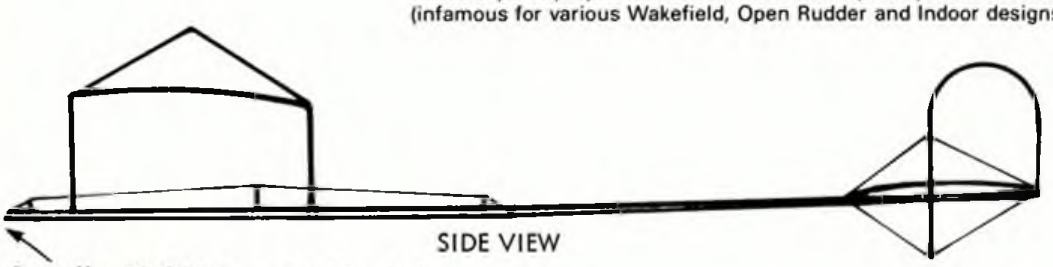
Individual

	Name	Country	round 1	round 2	round 3	round 4	round 5	round 6	best two
1	J Richmond	U.S.A.	39:51	33:02	33:53	37:36	30:19	8:50	1-17:27
2	C Banks	U.S.A.	37:40	5:09	37:03	36:52	32:42	19:39	1-14:43
3	R Randolph	U.S.A.	36:35	12:47	35:29	7:20	5:25	6:58	1-12:04
4	P Nore	Finland	15:53	32:50	28:51	31:19	10:44	37:32	1-10:22
5	R Bailey	Great Britain	9:43	36:25	28:36	30:32	34:00	34:32	1-09:57
5	R Butty	Switzer-land	16:43	33:03	6:30	35:07	8:41	34:46	1-09:53
7	D Siebenmann	Switzer-land	15:30	36:35	31:23	33:06	30:40	14:56	1-09:41
8	S Kujawa	Poland	1:37	34:42	25:06	32:34	17:31	34:42	1-09:24
9	R Czechowski	Poland	8:40	34:49	28:42	31:54	34:33	6:12	1-09:22
10	P Aurel	Rumania	34:21	9:01	33:06	30:18	8:26	34:33	1-08:54
11	J Korsgaard	Denmark	33:30	33:24	11:29	25:25	32:18	35:10	1-08:40
12	O Rodenburg	Holland	30:22	37:40	0:31	27:49	28:04	28:42	1-08:02
13	R Higgs	Canada	34:49	29:48	26:35	27:39	0:23	33:05	1-07:54
14	R Blackam	Australia	7:12	8:12	33:43	31:42	33:47	8:26	1-07:30
15	E Ciapala	Poland	22:16	34:22	31:50	29:09	28:42	8:42	1-06:12
16	M Aurel	Rumania	1:40	34:37	25:50	8:23	14:03	30:43	1-05:20

Team

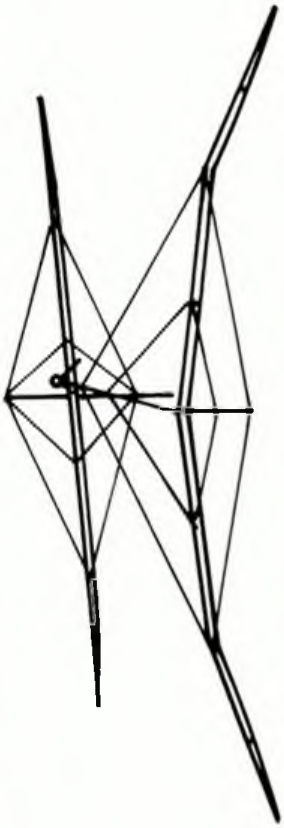
1	U.S.A.	3-44:14
2	Poland	3-24:58
3	Switzerland	3:17:22
4	Finland	3-14:28
5	Canada	3-06:56
6	Rumania	2-59:47
7	China	2-58:47
8	Holland	2-56:05
9	Australia	2-54:30
10	Japan	2-51:51
11	Great Britain	1-09:57
12	Denmark	1-08:40

Free spirit holds the World Record for F1D category 1 (ceiling less than eight metres). A novel variable pitch prop is used. This was developed by Ron from original concept by Mike Thomas (infamous for various Wakefield, Open Rudder and Indoor designs).



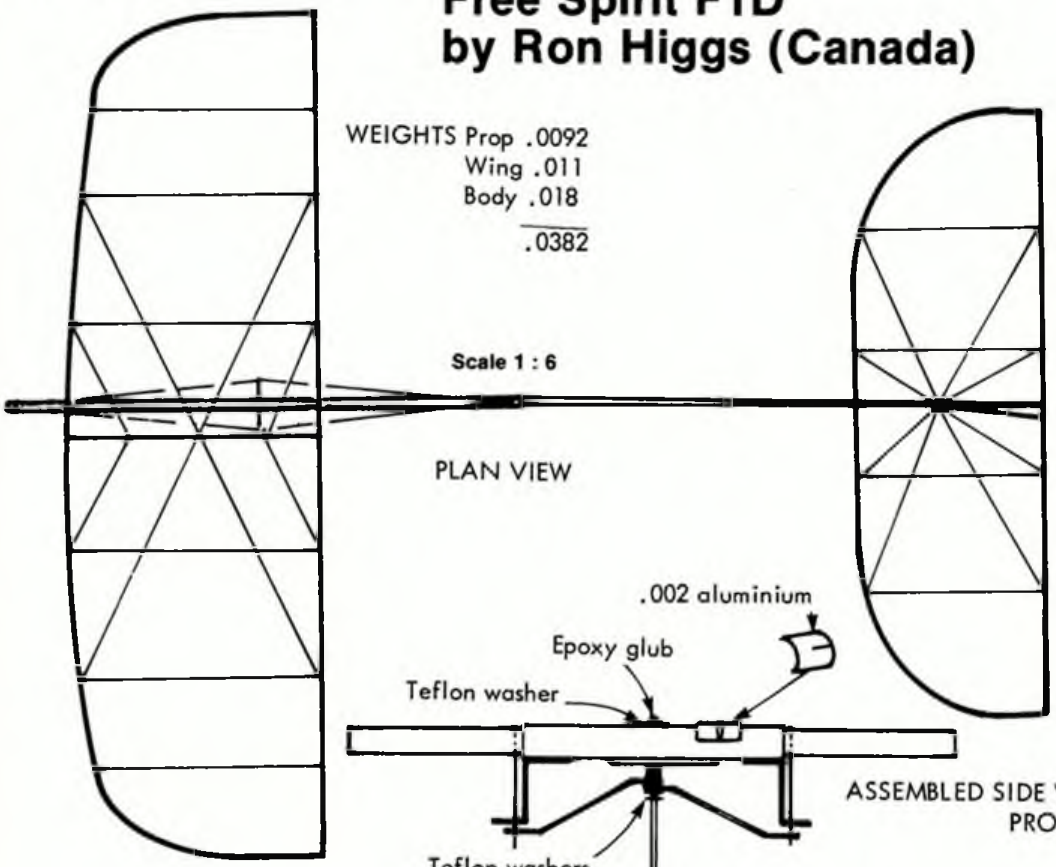
Propeller 22.25"dia., variable pitch (see below)

Free Spirit F1D
by Ron Higgs (Canada)

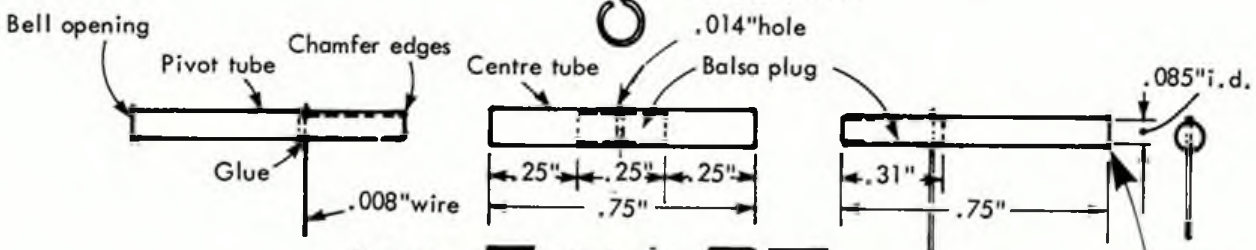


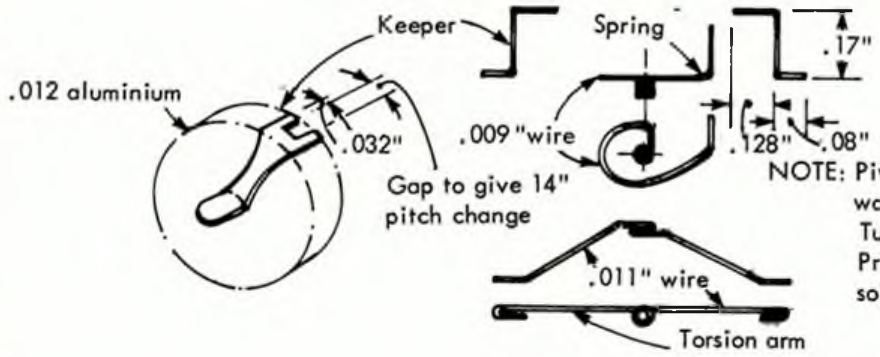
WEIGHTS Prop .0092
Wing .011
Body .018
.0382

Scale 1 : 6



ASSEMBLED SIDE VIEW OF PROP HUB





NOTE: Pivot and centre tubes are .004" thick wall of paper.
Tubes to be a slip fit (without binding)
Prop shaft, torsion arm and spring are soldered together

AEROMODELLING TECHNOLOGY

Practical modelling ideas from Aeromodeller readers

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Adjustable tension torsion spring
D. Ackery — New Zealand

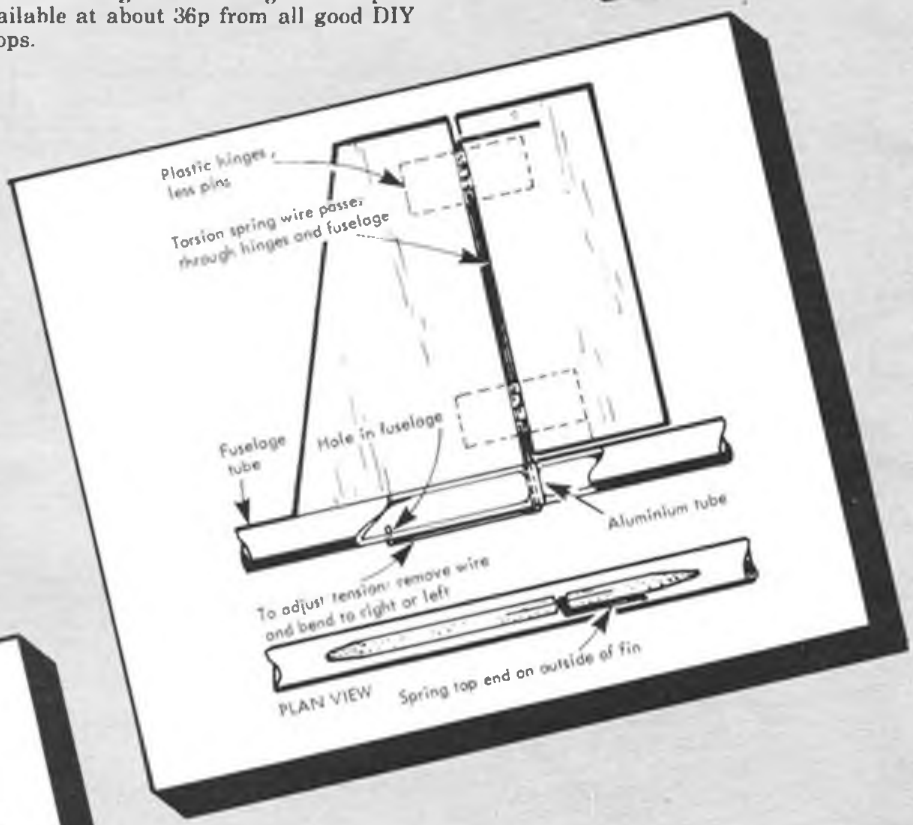
Free flight gliders need some sort of spring to move the rudder from straight tow to the glide position. Most people agree that a torsion spring is better than a rubber band or an external coil spring. The problem with a torsion spring is that it is difficult to glue it all together, with the spring under tension, and then if the spring tension is not right it is difficult if not impossible to adjust. Usually the only choice is to make a new rudder. Also, for circle tow models it is useful to be able to adjust rudder tension to allow for drag in the hook and timer start mechanism and also to adjust flying characteristics for certain weather conditions. Tension is adjusted by pulling the spring out from the bottom of the fuselage and bending left or right to either increase or reduce tension. Other advantages are that the spring can be easily replaced if it gets tired and the rudder may be easily changed for a different size or shape if you wish to experiment.

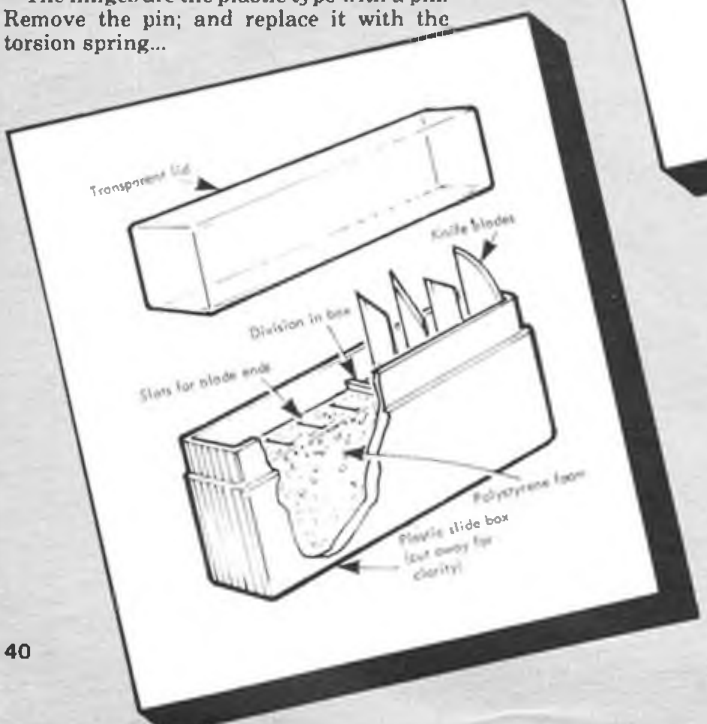
The hinges are the plastic type with a pin. Remove the pin; and replace it with the torsion spring...

CO_2 charger leakage
P. Harvey — Henlow

I had been having an abnormally high rate of gas leakage on inserting the cartridges in the charger. At least four chargers gave the same trouble. This pointed to a problem with the cartridge. Perhaps the new type of cartridge now available since *B.O.C.* bulbs disappeared from the market, was not quite to the same dimensions as previously. Although no such differences were noted, the leakages continued, so a solution was sought...

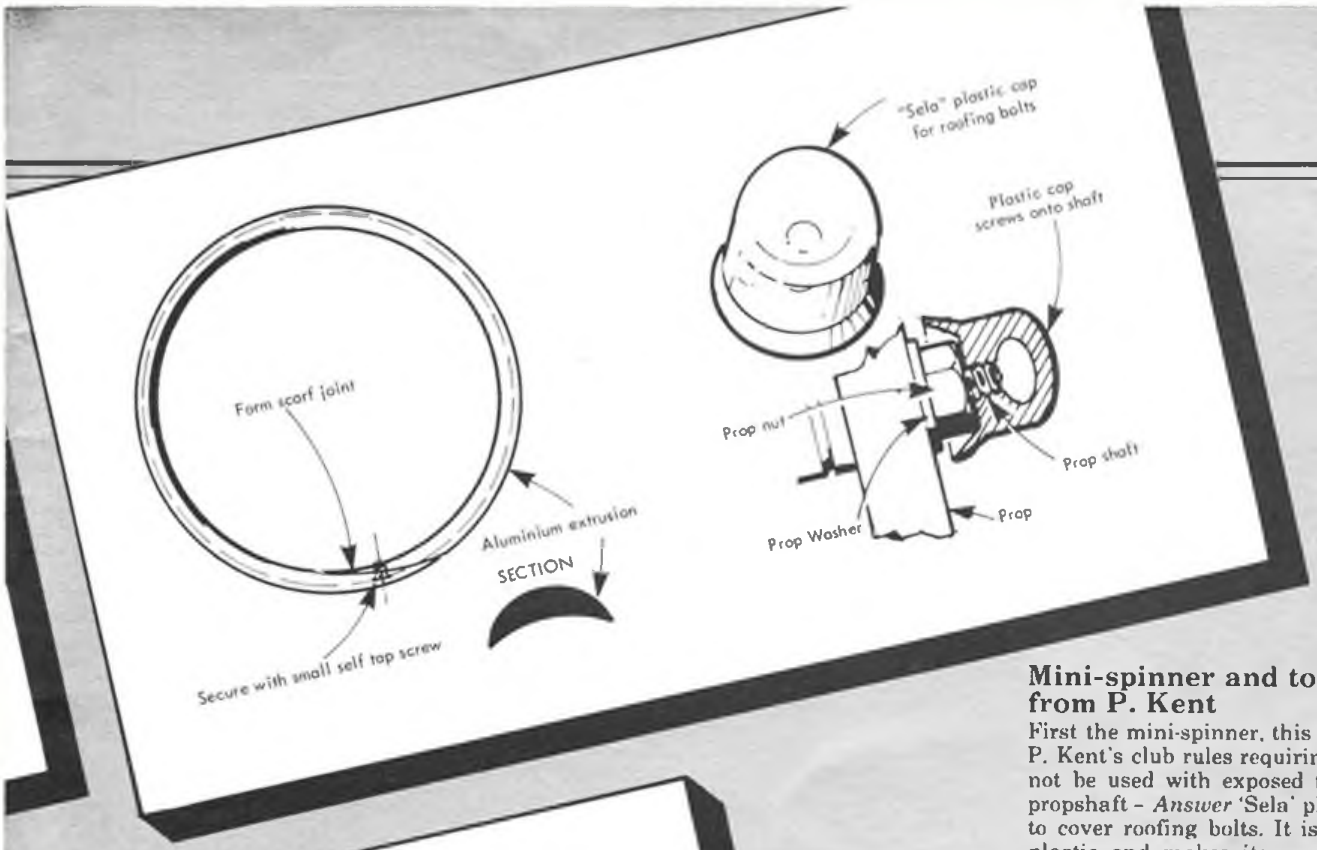
Leakage from CO_2 *Sparklet* type bulbs in *Telco* type chargers was completely cured by wrapping one or two layers of plumbers PTFE tape around the neck of the bulb before inserting it in the charger. The tape is available at about 36p from all good DIY shops.





Storing modelling knife blades
G. Gilfillan — Edinburgh

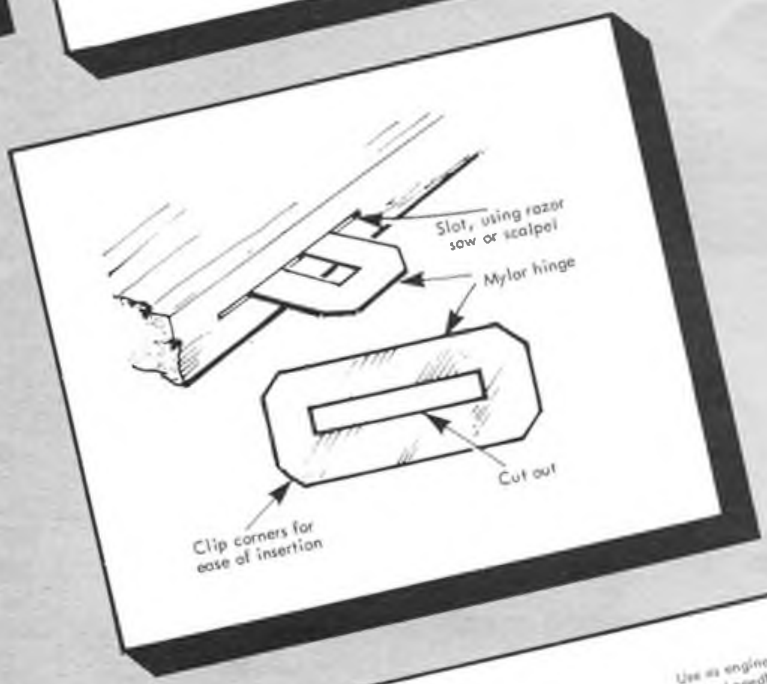
Interchangeable blades for a modelling knife can be kept safely and ready for immediate use in the rectangular plastic box in which 35mm colour slides are returned after processing. All that is needed is to press a piece of polystyrene foam ¾in. deep into each half of the box. Cut slots in the foam into which to push the handle ends of the blades. The transparent box lid enables you to identify the kind of blades in a particular box.



Mini-spinner and tough tyres from P. Kent

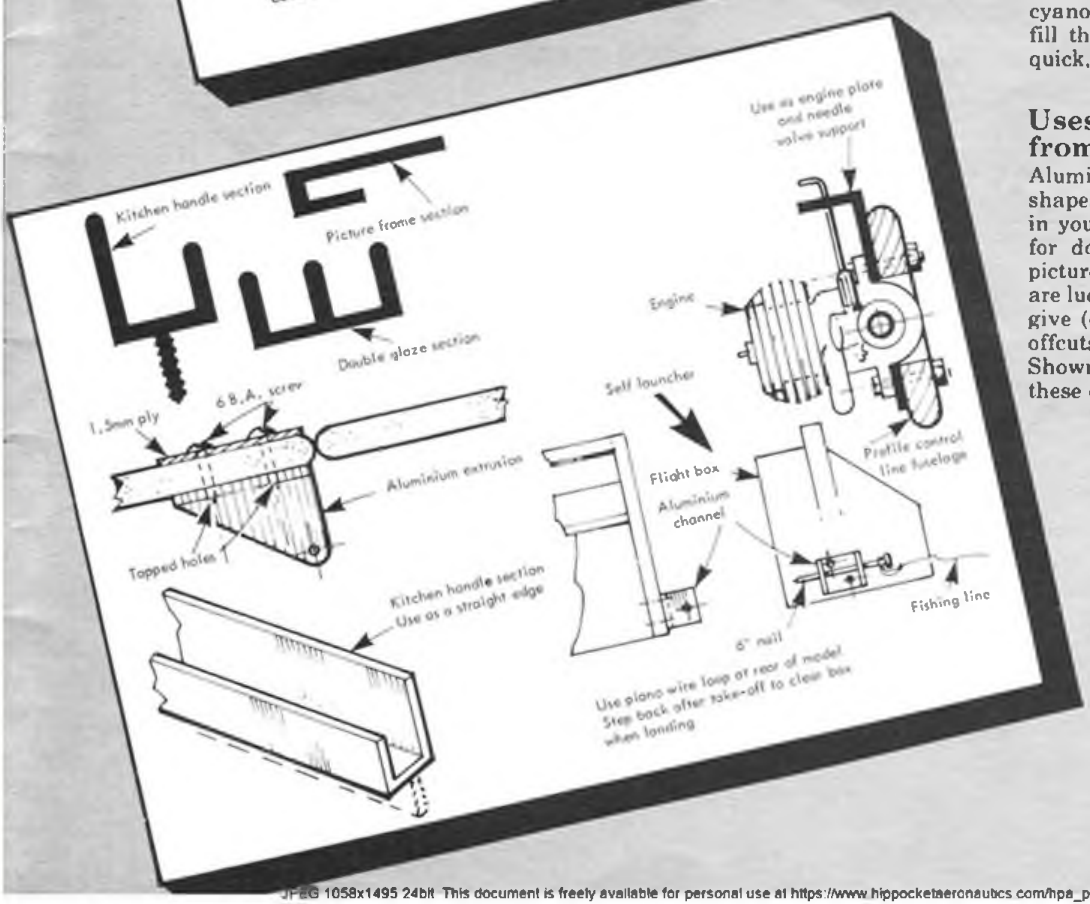
First the mini-spinner, this arose from Mr. P. Kent's club rules requiring that engines not be used with exposed threads on the propshaft - *Answer* 'Sela' plastic caps sold to cover roofing bolts. It is made of clear plastic and makes its own thread when screwed onto the shaft. When you buy one (about 7p) you even get a 2in. screw to go in the spares box as well!

Secondly, having got fed up with making wheel rims (for spoked wheels) out of 1/32in. ply wrapped round formers and then glued with P.V.A. Mr. Kent took another trip to his D.I.Y. shop and got some half round aluminium extrusion used for fixing floor coverings. This is easy to manipulate into the shape required and produces a very tough wheel assembly.



Mylar hinge mod from C. R. Steer

One of the easiest ways to secure mylar hinges without pegging them, is shown here: Assemble the hinges using PVA or epoxy adhesive for foam wings or a cyanoacrilate glue on balsa. The glue will fill the slot, locking the hinge in place — quick, easy and what is more, accurate...



Uses for Aluminium extrusions from B. Daniels

Aluminium extrusions come in numerous shapes and sizes. Many types will be found in your local Do-It-Yourself shop, intended for double glazing, kitchen handles and picture framing, to name but a few. If you are lucky, the smaller D.I.Y. shop may even give (or sell at silly prices!) a selection of offcuts that they would otherwise discard. Shown here are just a few of the uses where these extrusions have come in handy.

Simple Jigs for rubber powered propellers from K. Fordham

For rubber enthusiasts wishing to experiment with several different propellers, perhaps this method of jig making will seem less tedious.

First cut out the two end templates, mark the vertical line on both. Glue mount these at their end stations on the baseboard. Next draw a thread taut over these angles and secure to the base at either end. This line, dead parallel to base, represents the blade's centre line. The intermediate triangles can now be slipped into their respective stations until each just touches the thread guide.

If folding propellers are required, erect two light metal 'L' brackets at the hub end, both drilled, say 1/16in. at thread height from the base.

With the prepared blade laid correctly on the jig, pass a length of wire through both brackets to accurately align the hinge bush in between.

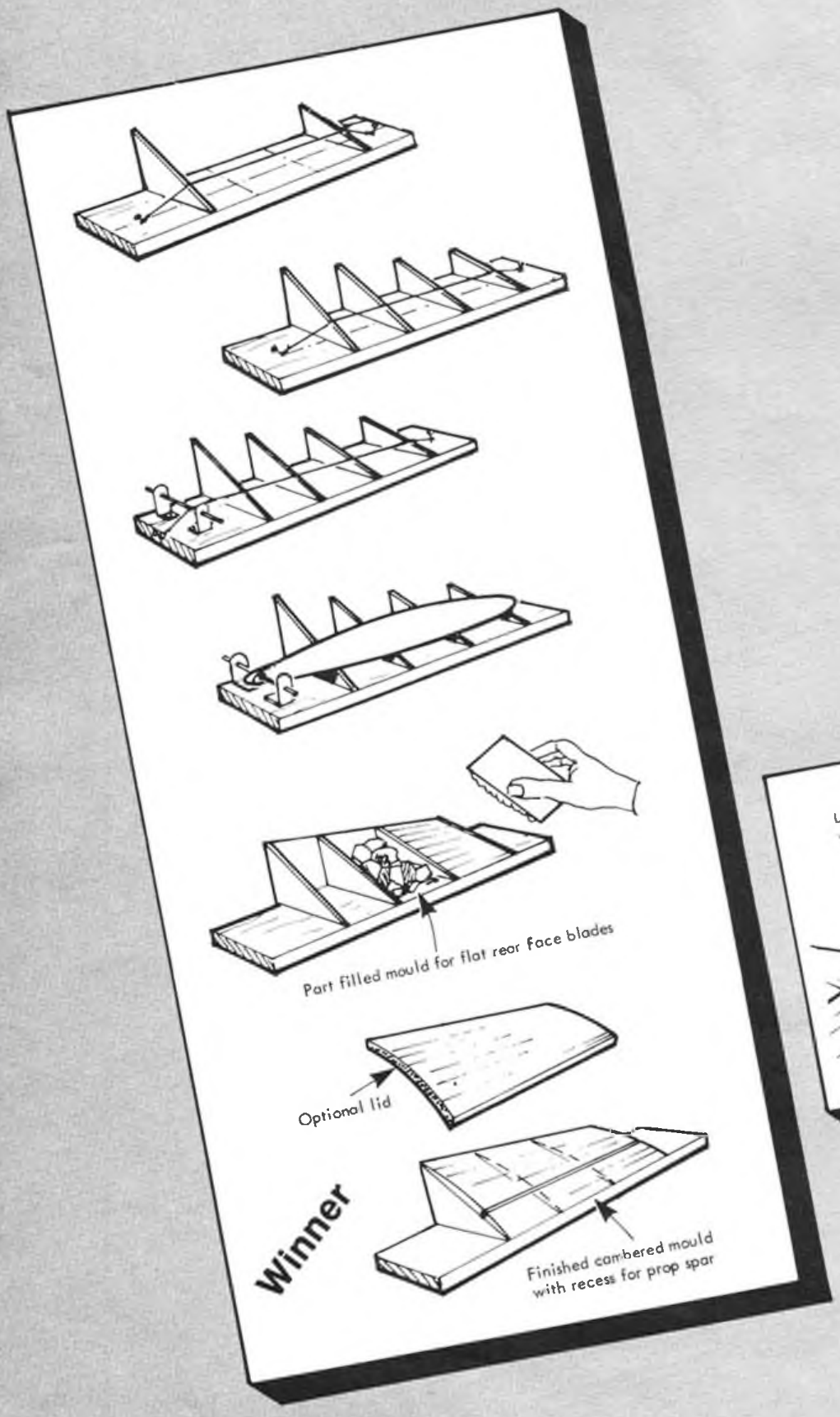
Allowance can be made to accept skew hinge systems too.

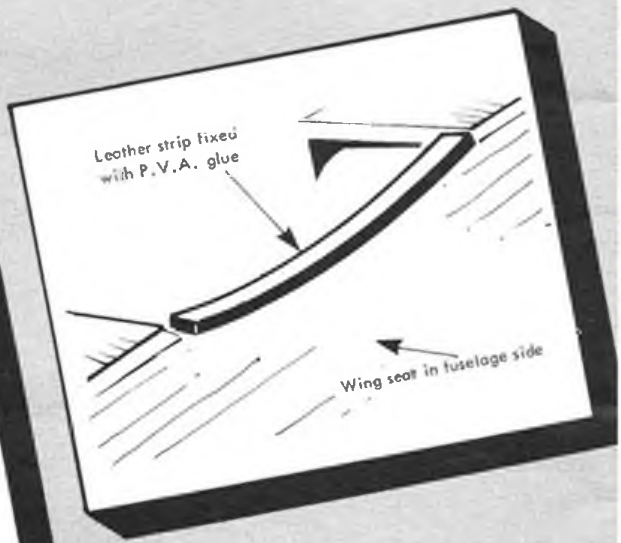
To convert into a solid mould for laminating or indoor blades, I found ordinary 2 part car body filler ideal.

Fit a card or balsa sheet backing to the angles then part fill the spaces with expanded foam oddments if wishing to economise. The mix is then wiped into the upper spaces with a hand held plastic scraper (mine is approx. 4in. × 3 in.). Once this "knack" of applying the putty is acquired the result is quite smooth. With an even flowing twist throughout the mould's length and hardly needing any dusty sanding. Setting times are short at room temperature.

To continue this method for cambered indoor sheet props tack glue a soft 1/16 sq. wood strip along the previous thread line. Apply one filler coat along the full length of mould but this time *flex* the scraper between thumb and fingers to produce an even cambered surface with a one direction smooth stroke. Any defects occuring however can soon be filled again, one of its advantages! Once set, the wood can be cut out to reveal a nice slot for locating the subsequent propeller spar.

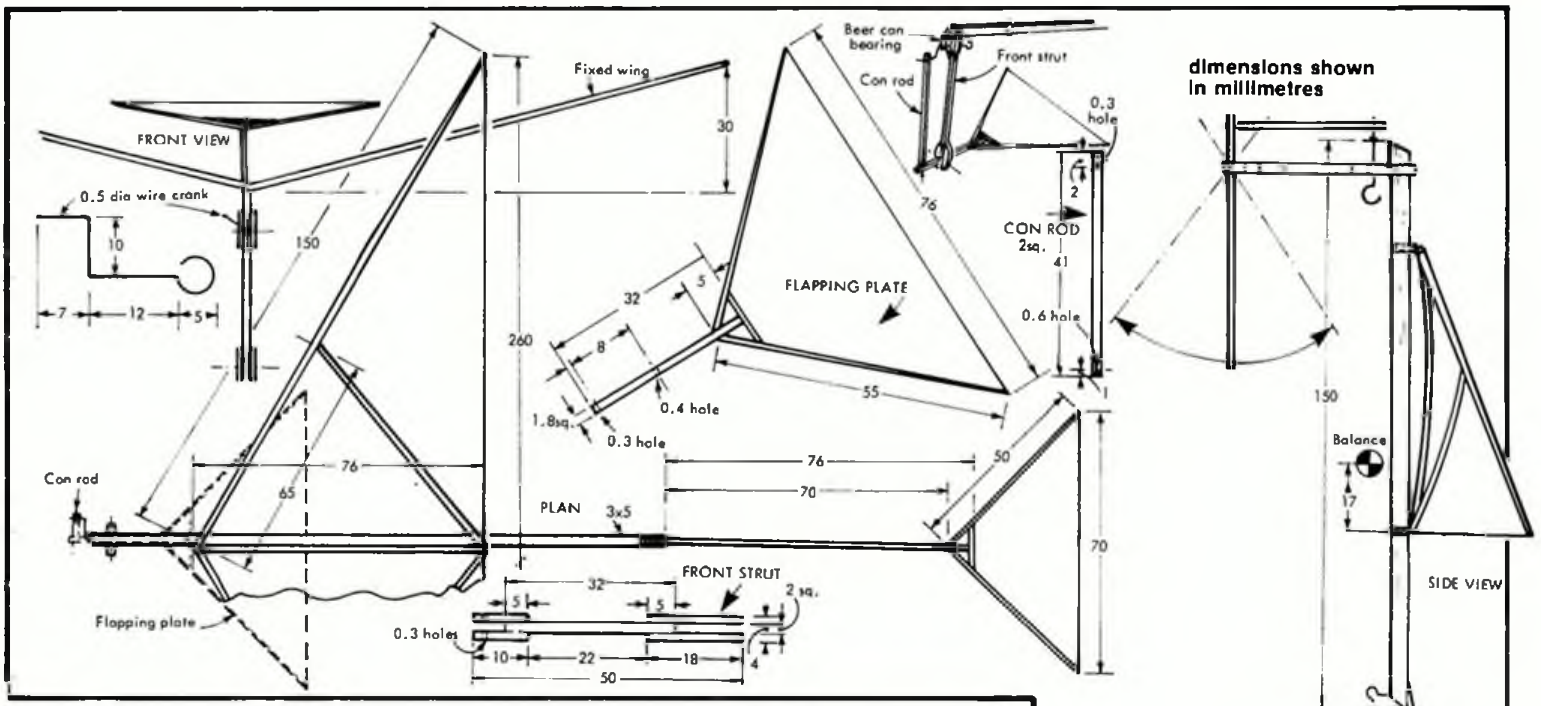
A further step could provide a part female mould cover quite easily by applying a thin film of releasing agent and spreading further coats of filler across the face of mould. Some glass cloth matting added will give strength and a thinner "lid". With this de luxe version any type of sheet blade, however delicate, can be held securely while being formed.





Wings and hatch cover seatings from R. R. Lewis

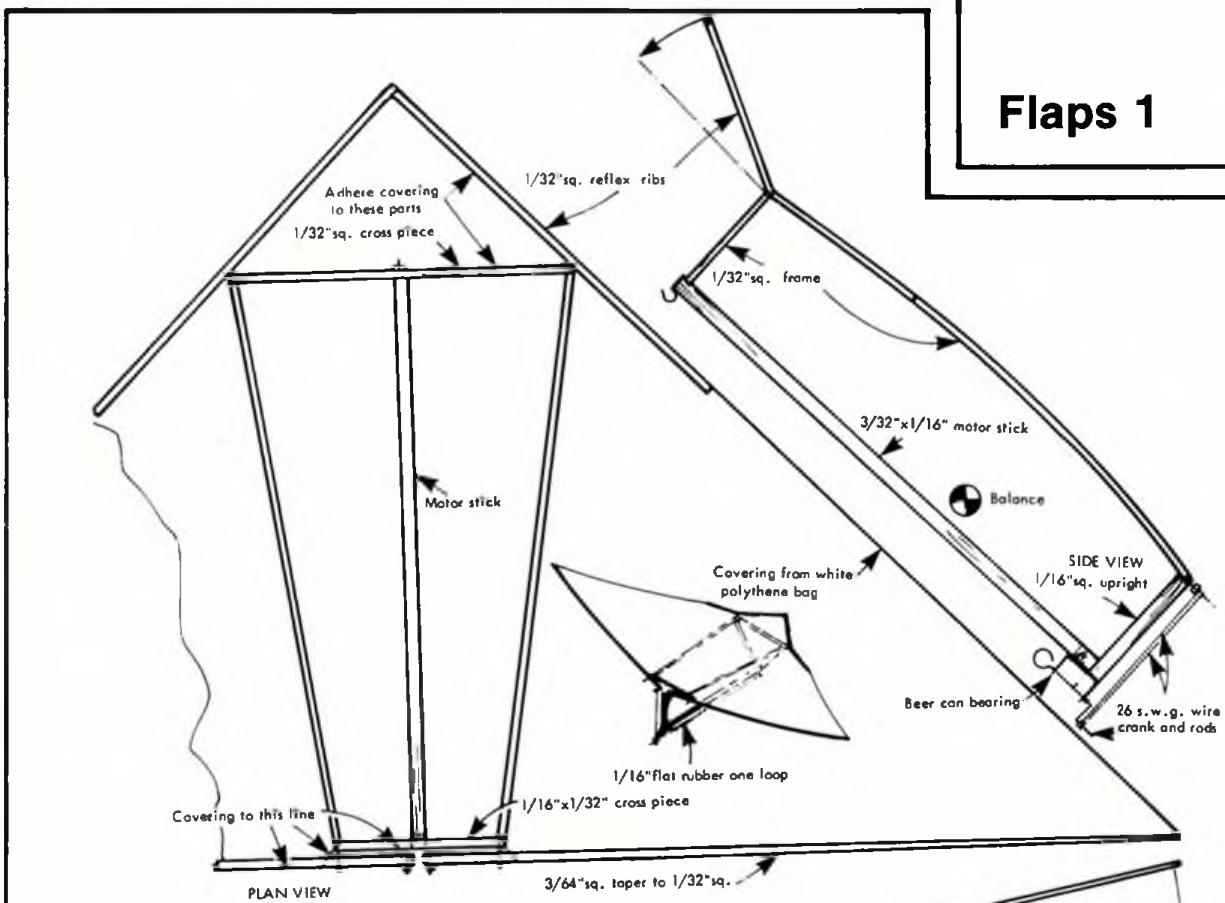
For some years I have been using strips of leather as wing or hatch cover 'seatings'. It may be applied to both wing and fuselage if so desired; it sticks well with P.V.A. glues and does not go 'squishy' and slide about as does some of the sticky backed foam available ... can be bought from local cobblers or leather shops for a few pence.



FLAPPERS — two novel designs by Shoji Murata

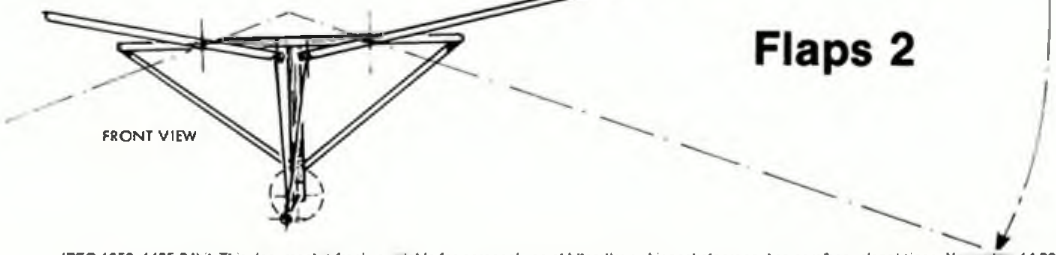
Most ornithopters try to copy the wing movements of a bird, 'Flaps 1' above uses a slightly different approach! Although all the flying surfaces are made from a flexible material — it is the flapping plate beneath the wing that provides the motive power! Below, 'Flaps 2' shown full-size, is more orthodox (!) using flapping wings (the tail also flexes somewhat!). Experiment and let us know what durations you achieve...

Flaps 1



Full Size

Flaps 2



AT THE LAUNCH PAD

with John Wheddon

Rocket Engine Selection

At first sight of the lists of engines available from manufacturers there appears to be a bewildering variety and it is worthwhile to examine the reasons for this. As we discussed previously, engines are classified by the total impulse produced and by average thrust. Fig. 1 shows the theoretical result of plotting a graph of thrust versus time for a C5 engine. This type of graph (which is often supplied with packs of engines) is known as a Thrust/Time Curve.

The total impulse of the engine is represented by the area beneath the curve and is 10 Newton-seconds. Burn-time is 2 seconds and the average thrust is 5 Newtons. Hence the C5 classification.

Actual results of plotting a thrust/time curve for a C5 engine are shown in Fig. 2. This provides useful information about the engine, showing how the thrust reaches a peak of 22 Newtons in 0.3 seconds. Then thrust drops rapidly until a 'plateau' figure of approximately 4 Newtons is reached. This is known generally as the "sustaining thrust" and in the case of our C5 is maintained for a further 1.5 seconds. Complete burn-out of the propellant is achieved at 2 seconds. Given this amount of information about the engine it is possible to select the most suitable type for a particular rocket. As a rule of thumb heavier rockets require higher average thrust engines. One manufacturer, *Centuri*, supplies a series of B engines as follows:- B4, B6 and B14. The maximum recommended lift off weights for these engines are 140g, 155g and 180g respectively.

However, the peak thrust value which is shown in the Thrust/Time curve is very important too because this governs the initial acceleration imparted to the rocket.

There are occasions when scale modellers for example like to demonstrate a realistic launch — which really means a slow one! Boost-gliders, especially the larger ones can benefit from the use of a more 'gentle' boost given by a lower average thrust engine. These are alternative terms of course — in reality we are considering the difference between, say, a B4 with a burn time of 1.25 seconds and a B14 which delivers the same total impulse in 0.35 seconds.

The final variable in engine selection is the choice of delay. Generally speaking, larger, heavier rockets stop going up sooner than their lighter counterparts and consequently need a shorter delay time to ensure a safe recovery.

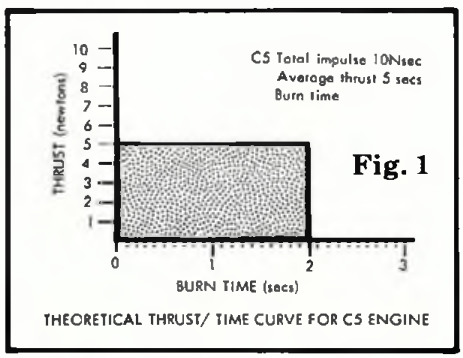


Fig. 1
THEORETICAL THRUST/ TIME CURVE FOR C5 ENGINE

'Basics of Model Rocketry' is another of Kalmbach's specialist books for the model builder. It features easy to read and understand text, together with plenty of clear photos and diagrams.

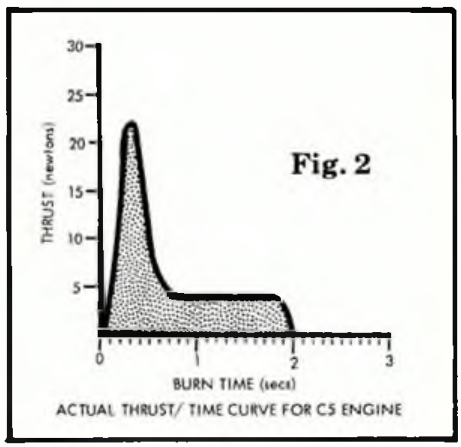
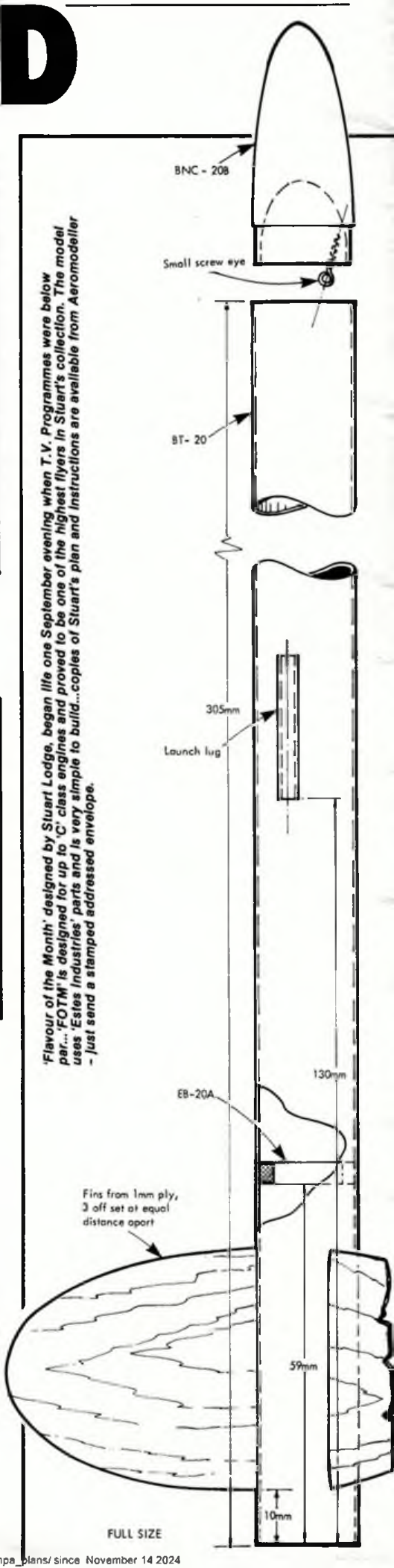


Fig. 2
ACTUAL THRUST/ TIME CURVE FOR C5 ENGINE

Another Good Book

"Basics Of Model Rocketry" by Douglas R. Pratt" published by *Kalmbach Books*. This is an excellent book written in a very straightforward, easy to follow style by a well-known American rocket flyer. Well illustrated with lots of clear drawings and photographs, the book starts by explaining the assembly of a standard kit for the novice. In later chapters more advanced techniques are described and the reader is left with a good understanding of the wide range of activities involved in model rocketry. The book is available from the usual *Kalmbach* suppliers and also from *Pegasus Models*, Caston, Attleborough, Norfolk, NR17 1DG at a cost of £5.50 plus £1.00 post and packing.

'Flavour of the Month' designed by Stuart Lodge, began life one September evening when T.V. Programmes were below par... 'FOTM' is designed for up to 'C' class engines and proved to be one of the highest flyers in Stuart's collection. The model uses 'Estes Industries' parts and is very simple to build...copies of Stuart's plan and instructions are available from Aeromodeller - just send a stamped addressed envelope.



RACING with Jim Woodside

Contest Report

Fast times at the Northern Area Flying Rally, held at R.A.F. Dishforth on 7th October.

One of the last events of the 1984 calendar held on a day of strong winds and cool temperatures nonetheless produced some of the best (unofficial) times of the year.

Alan Hill and Stuart Metcalfe of Sheffield C.L.A.M.S. recorded, what I believe, to be the first U.K. sub 3:30 time in F2C. Airspeed of 18:2 to 18:5 seconds for 10 laps yielded 3:29 in a two up race. Sadly the engine destroyed its liner in the final when the rear ballrace cage collapsed. Certainly the *Cipolla* is capable of delivering high airspeed but is fragile in some parts of the design. However, I am told that a revised crankcase to incorporate stronger bearings is to be made. Also a more substantial piston will be designed to give added support to the small end gudgeon pin.

As Dave Clarkson was ill Ed Needham "borrowed" Martin Sladdin to wield the handle in Open Goodyear. Using the now familiar pressure fed *Rossi II* this scratch team put in a 3:42 (!) heat which they followed up with a 7:45 final. Suffice to say that both of these would have been records had they been achieved in a S.M.A.E. comp.

At the end of the day Heaton — Woodside put in a couple of good times in 1/2 A team race. In a fairly easy two-up race they recorded a 3:30 heat which included two pit stops (the present record stands to Horton — Haworth with a single pit stop race of 3:24). However, the three up final was completed in 7:15; a full twenty seconds inside the present official record.

Finally, thanks to John Horton and Don Haworth for performing the organising.

Results

G.Y. T.R.				
1. Sladdin Needham	Novos/ Stockport	3:42	7:45	
2. Pegg Thorpe	Hamilton	4:04	8:38	
3. Whorton Gennard	—	4:06	8:42	
F.A.I. T.R.				
1. Wilson Gardner	Novos	3:42	7:46	Nelson
2. Sladdin Ross	Novos	3:36	RTD	Nelson
3. Hill Metcalfe	S.C.L.A.M.S.	3:29	RTD	Cipolla
1/2 A T.R.				
1. Heaton Woodside	Shartson	3:30	7:15	FMV
2. Langworth Broadhead	Wharfedale	4:09	9:15	Oliver
3. James Howard	Grantham	3:51	9:25	Oliver

Class II Goodyear

Time for a change in the engine rule?

As I do not compete in Goodyear events I hope that my remarks have the disinterested detachment of the outsider. I cannot but notice that most of the teams who appear in Class II finals are the same ones that reach the open finals. Obviously these experienced operators would tend to get the best from any given set of rules, but what is disturbing is the large and sudden gap which separates the experts from the novice — as much as three minutes for a 100 lap race.

As the rules stand at the moment only sports engines such as the *PAW, ED* 'Racers', etc., are admissable. Splendid as these engines are for their intended purpose, they do *tend* to fall short in two important areas of racing : horsepower and restarts. The former of this pair means dull racing through lack of m.p.h. and the second to disillusionment.

However good quality diesels of reasonable price are around and by no means difficult to obtain. Chief amongst these are *Olivers* Mk III and IV, *ETA's, Rivers* and the *Frog* 2.49 B.B. In the past year, I have seen and bought examples of the *Oliver* and *Rivers* for between £7 and £15. Certainly any of the aforementioned engines would greatly improve the quality of racing for the average or novice team in Class II. An additional benefit would be the dis-incentive to the experts to improve the performance of their engine by those subtle but undetected tweeks. Also there must be hundreds of the older generations of ball race diesels "resting" in boxes which, if they were legalised, just might tempt out a few 'new' teams into Class II.

If the S.M.A.E. felt that the introduction of more sophisticated motors would only start the usual performance seeking/cost spiral then they could curb this by insisting on nylon props and/or squeeze bottle filling.

As I stated at the beginning I have no personal axe to grind. However, I do have the best interest of C/L racing at heart and feel that this matter deserves an airing. Opinions please.

'The Wharfedale 1000' for class B team racers was held for the twenty-fifth time this year. The entry list could well be used as a 'Who's Who' in racing...

The winners of the Wharfdale 1000 were Sladdin/Campbell - here Martin Sladdin holds on tight to break the class 'B' 1000 record with a time of 39:37.

Notable F2C Models No. 3

Kobus 12 by J. & R. van Uden: 2nd place at 1984 Control-line World Champs

Although superficially 'Kobus 12' looks like a contemporary straight taper flying wing model it does, in fact, incorporate some unique features which commend it to our attention. Additionally there are many constructional niceties which are worth incorporating into any design.

I believe that Johan van Uden works at the *Fokker Aircraft Works* and it is obvious that more than intuition has gone into creating 'Kobus'. The chief problem to be addressed was the need to fly most tail-less designs with permanent up elevator. This in turn results in extra unwanted drage and also reduces the power of the elevator during critical manoeuvres such as overtaking or hopping over another model during landing. In order to improve elevator efficiency (i.e. good response to small deflections), then the C.G. needs to be moved backwards. To compensate for this 'Kobus' employs a long root chord to increase longitudinal stability. Finally, if some small amount of up-elevator is needed to keep a wing flying then why not build it in? The root section is thus reflexed at the trailing edge by 2 mm.

As an observer of 'Kobus' in action the thing that impressed me was the way in which the *Nelson* engine ran with almost no misfire (i.e. with a high compression setting) without any symptoms of overheating. The brothers say that considerable amounts of experimentation went into the development of their cooling system. Certainly the results seem to say that it works. The crux of the 'Kobus' approach is to extract the hot gases as quickly as possible and not to allow these gases to interfere with the air cooling over cylinder barrel and head. A rectangular duct fabricated in thin aluminium directs the exhaust from the rear exhaust *Nelson* to an exit in the fuselage side. Vanes (called *geleider* on the plan) in both the exhaust and cylinder head ducts help direct and extract gases as fast as possible. Obviously these

measures are tailored to the special needs of rear exhaust motors. Users of side exhaust engines should find a normal straight through system adequate.

Finally, it should be noted that the model was designed around the *Nelson* Mk100 — the magnesium lightweight motor of about 110-120 grms. When using heavier motors the van Uden brothers advise employing a straight leading edge to combat the shift forward in the C.G.

The small scale reproduction below gives sufficient detail for experienced builders to construct a version. However, should you require a full size drawing to study then these are available at the cost of 10 Dfl. from the Royal Dutch Aero Club: K N V V L, Afd modelvliegen, Josef Israelsplein 8, 2596 AS Den Haag, Holland.

Class 'B' with Jeff Smith

Wharfedale 1000

Although this report is now a bit dated — we could not fit it in before — *Aeromodeller* feels that the Silver Jubilee of the Wharfedale 1000 should not go unremarked!

Interest in the event was reflected by the number of sponsors, to whom all concerned are truly grateful: Gloy, Flying Models (Leeds), Solarbo, X-Acto (Humbrol), Badger (Morris and Ingram), Javis Mfg. Co. Ltd., and SP311 (Smith and Gibbs).

The Wharfedale 1000 Silver Jubilee Class 'B' Team Race was held on 12th August 1984 at R.A.F. Dishforth...Brilliant sunshine, fifteen entries and hairy chested team racing. What more could you ask for? Not only a record entry (in modern times, anyway) But two records broken as well. Martin Sladdin established a new class "B" 1000 record with a time of 39:37 a worthy effort even if his timekeeper did note that there was a liberal amount of "arm" in use. Sadler-Russell broke the diesel record with a time of 43:58 and eight pit stops. They ended up in this race a little lonely as the other two teams experienced some carnage. In fact the model of Sandy Sanderson (Jones-Sanderson) ended up in so many pieces that they couldn't be counted and the engine was found in the next circle. In the same race as Martin Sladdin the McPeak-Kijo team had just about everything happen to them. They had a leadout break which they repaired during the race after which the model burst into flames burning a hole in the side of the cowling and blowing a hole in the tank. After this the model ran better. It seems that the tank liked large doses of fresh air!

As only five teams completed the whole race it meant that there were a lot of early retirements. The usually reliable team of Wilson-Gardner broke their plug lead and both Robinson-Owen and Fitzgerald-Pickles lost the use of their elevator push rods. The most spectacular retirement and flight came from Taylor-Banks-Yealdham who flew a vintage model in the shape of a "Double Dice" powered by a *McKoy* 29.

This must have been one of the noisiest models to fly and it was *not* slow. As befits its age it didn't have a fuel shut off and Chas Taylor (of glow plug fame) brought the model in for stops with great skill. He said that he *and* the model were vintage and so it was a truly vintage entry. Anyway things came to an end at 787 laps when the prop decided to part company with the engine (in mid air) and the piston decided it didn't want to move any more. Very sad...

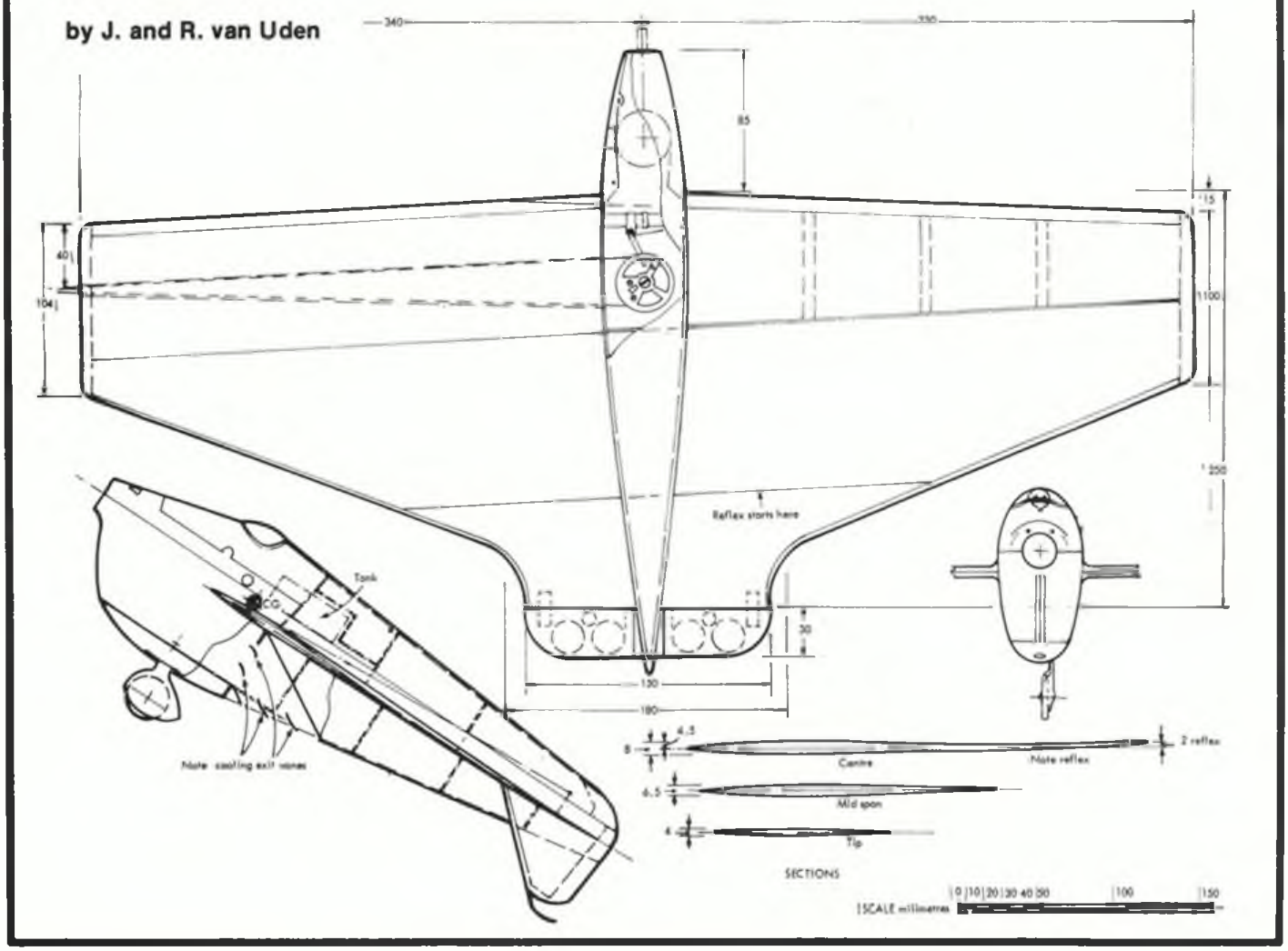
The whole competition ran smoothly and moved along at a brisk pace starting at 12.00 and finishing at 4.00 maybe this is a record too.(!)

Results

1.	SLADDIN-CAMPBELL	39:37	
2.	SADLER-RUSSELL	43:58	(diesel)
3.	HORTON-HOWARTH	45:12	(diesel)
4.	SMITH-HUDSON	49:21 66	
5.	FITZGERALD-WILLIAMSON	49:36	
6.	McPEAK-KIJO	845 laps	
7.	TAYLOR-BANKS-YEALDHAM	787 laps	(vintage)
8.	TAYLOR-BANKS-YEALDHAM	711 laps	
9.	JONES-SANDERSON	191 laps	(diesel)
10.	FITZGERALD-PICKLES	163 laps	
11.	WILSON-GARDNER	128 laps	
12.	ROBINSON-OWEN	56 laps	(diesel)
13.	ILLINGWORTH-ILLINGWORTH	26 laps	
14.	HOULTON-CROSS	scratched	
15.	COPLEY-TEMPORAL	scratched	

Korbus 12

by J. and R. van Uden



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APPENDIX - LINKS TO THE PLANS

The original issue comes with four free plans (the Wetwun, and 3 simple indoor models) printed front/back on a folded pull out banner of four sheets. The banner is not included in the document..

Wetwun by Jym and Dave Leddy
CL Amphibious Trainer 1.5cc
https://outerzone.co.uk/plan_details.asp?ID=8602 ...
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Simply Indoors Models by H.Metcalfe, D.Knight, T.Butterworth
Sole Plate, AB1, Nine Inches
https://www.hippocketaeronautics.com/hpa_plans/det ...
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Free Spirit F1D by Ron Higgs
Reduced plan of World Record Holder for Cat 1 Detailed sketch of variable pitch prop
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Flappers by Shoji Murata
Two novel ornithopter designs: Flaps 1 and Flaps 2
Document Page: 36

Flavour of the Month Rocket by Stuart Lodge
Presented in AT THE LAUNCH PAD
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Korbus 12 by J. & R. Van Uden
CL Team Racer presented in FROM THE HANDLE
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