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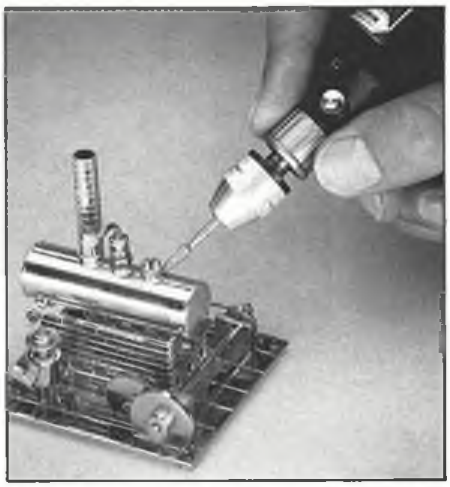

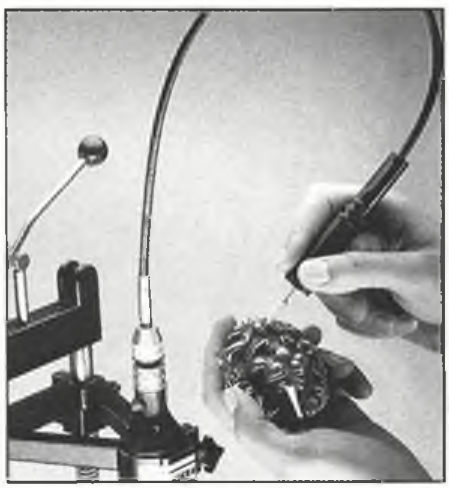

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AERO MODELLER

December 1984

Volume 49
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Cover: **Britannia Airways supplied the picture of the Boeing 767, it's their simulator we are offering a ride on as prize in our great free competition on page 621 of this issue.**

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HANGAR DOORS

Live it up . . .

The S.M.A.E. annual Dinner and Prize Giving will be held on 24th November at The Post House, Leicester, just off the M1 motorway (junction 21). Cost of tickets is £10.50, so if you are a member of the S.M.A.E. and would like to meet other aeromodellers on the dance floor rather than on the flying field . . . live it up . . . Write NOW, send your money and enjoy a good evening out. The dinner menu looks good, and there's dancing (yes, bring the wife or girlfriend) until 1.00 a.m. and a private bar for those who talk too much and need to lubricate the throat.

Send your cheques or postal orders to S.M.A.E. Ltd., Kimberley House, Vaughan Way, Leicester — do it NOW. 24th November is not far away.

Congratulations . . .

New World Champion — Stevie Smith and Colin Brown hit the jackpot with a 1st in F.A. I. Team Racing at the recent Control Line World Championships in the U.S.A.

September in Chicopee, Massachusetts, U.S.A.. saw the C/L World Champs flown at Westover Air Force Base. With nineteen nations taking part and fairly good weather throughout, most classes were closely fought battles all the way.

The U.K. had high hopes for both the combat and team racing classes, but performance on the day is never something to be forecast lightly! Although we only managed a forth place individual (Ernie Burles) in combat. The rest of our team had scored highly enough to ensure 2nd Team place.

In Team Racing some sparkling performances from Nats winning team Smith/Brown gave us a very real chance with Gray/Haycock also reaching the semi-finals. At which point we already knew that the U.K. had won the 2nd Team prize.

In a dream of a final Stevie and Colin showed their undoubted class to bring home the 'gold'.

We're sure that all our readers would like to add their voices to ours at *Aeromodeller* in congratulating the 'golden pair' on their achievment — coupled with a sincere wish that they repeat that magic moment at the next World Champs!

Look out for a full report next issue.

All Balsa Machine

The S.M.A.E. Southern Area always an active aeromodelling community, have recently obtained the use of H.M.S. Daedalus at Lee-on-Solent, Gosport, for some of their indoor flying activities. See What's On for dates as they become fixed next year. In addition to the normal indoor events a new simple class is being promoted — *All Balsa Machine* — rules for this are very straightforward and are:

1) Models must be of all balsa construction.

2) No tissue covered open framework.

3) Maximum wingspan 24ins.

4) Only commercial plastic props to be used.

5) No restriction on rubber or prop sizes.

These models seem to be pretty popular and are very easy to build. The best times are creeping up to the two minute mark, watch these pages for plans in the near future!

S.M.A.E. Award

The **Arthur Mullett Trophy** is not presented every year, and is for outstanding service to model flying. One area in which Britain lags sadly behind some other countries is in schemes to encourage young people to take up model flying. One can only wonder why no British model manufacturer has gone some way towards organising an event like the *Graupner*-sponsored 'Kleine Uhu' contest in West Germany. This 'one model' event for under-15s has been held annually for 29 years, has had mopeds, R/C equipment and aeroplane trips as prizes and attracts entries of around 60,000 people every year!

The Trophy for 1984 goes to David and Janine Rawlins of *DPR*

Lieutenant Colonel C. E. Bowden

Claude Bowden, doyen among power modellers, passed away peacefully, just two days short of his 87th birthday on the 9th October, after a long illness.

Whenever power-driven model aircraft are talked of, and particularly concerning their early development, the name of Claude Bowden invariably arises. His interest in model aircraft grew from 1912 when at school, then through the First World War years and he began by building rubber-driven models. One of his designs for a small biplane first appeared in the Model Engineer of July 1930. It may well have been through this connection that he came into contact with another noted model engineer, Edgar T. Westbury, who aroused aeromodellers in Britain to develop petrol-driven models. It was Claude Bowden who took up the challenge and this biplane "Kanga" captured the British record for endurance in 1932, — the record that had stood for 18 years. He held the record until 1937 with his next two models, the "Bee" and the "Blue Dragon" each of which used the Westbury "Atom Minor" 14.2cc engine.

Claude Bowden was also keen on marine subjects and he developed a series of model flying boats, one of which established a British record for endurance, rising off water. His model powerboat "Jildi" attracted a great deal of attention because of its high performance on a relatively low engine power.

In the late 1930's his wife Grace opened a model shop in New Street Birmingham with his advice, trading under the name of "Kanga Aero Models", producing kits and blueprints of his designs. In 1945 Grace created BM Models at Bournemouth, producing kits for the "White Wings" and "Meteorite" among others.

From about 1933 he became a prolific writer on powered model aircraft. Articles and series such as "Petrol 'Plane Topics" were published in "Aero Modeller" and "Model Aircraft" over some 20 years. Author of a number of books ranging from Petrol, Diesel and Glowplug to Jet Reaction engines, he also recorded the History of Model Aircraft.

His military service in the Royal Army Service Corps during World War II brought promotion to Lieutenant Colonel, and hence forth he was better known as *the* Colonel among aeromodellers. During the war he never ceased to write on petrol-driven models and after hostilities ended he produced a whole series of new models. Many successful designs were amongst them. Experiments with unorthodox shapes were also his special favourite, from Deltas to Doughnuts, though some would have to steep dihedral characteristic and Woolworths distemper finish as a permanent unorthodoxy.

Apart from his model aviation activity, Claude Bowden was a staunch enthusiast for power-boats, sailing, motor-cycling and motoring. A valued member of a number of clubs concerned with these activities, his appearance whether in a classic Lagonda, on the Scott Squirrel or a super racing yacht was always memorable.

Claude Bowden did more than anyone in Britain to launch and further the development and interest in powered model aircraft. He was a man of quiet nature but tough determination. His willingness to divulge the results of his work with models enabled and encouraged others in this field to be more ambitious with their models and hence progress was achieved.

In recent years he welcomed visitors to his home near historic Corfe Castle and to those with any interest in model aviation he was always delighted to show to them his models, all of which he had kept in the rambling estate of storerooms and outhouses.

The passing of Claude Bowden is a great loss to aeromodelling, in which he was a true pioneer with great foresight.

His original aim, that the beauty of flight, not necessarily the performance in terms of speed or duration, was the essence of aeromodelling, is fully recognised by the expanding vintage model movement as an inspiration they endeavour to follow.

To his widow, Grace, and to his family, we extend our deepest condolence.

Models in recognition of the work they have done with young modellers via the 'Chuckie Championships' for several years. Their build-and-fly workshop sessions at the Free Flight, Radio Control and Control Line Nationals have shown a lot of youngsters that there is more to life than dyeing their hair and buying clothes. This has let them discover that model flying is *fun*, as they compete in the 'Chuckie' heats, and hopefully, in the finals at Milton Keynes. Congratulations, David and Janinel Without a constant input of young modellers our sport will wither, so programmes like the 'Chuckie Championships' are vital.

S.M.A.E. Fun-Fly in '85

Several people at the Ever Ready National Model Flying Championships this year asked about the possibilities of a fun-fly event next year. Now the new and very active Mid-West area of the SMAE are looking at ways of running this. Naturally there would be problems fitting a lot of extra flying into an already very heavily-used set of frequencies, but the possibility is there. Likely format is for the event to be a 4-part one, — touch and goes, time of flight, limbo and longest glide; it would be open only to people who have not placed in the top five of a national R/C contest for the past five years. It would start at club and Area Level, with 8 people going forward from eleven SMAE Areas to the finals, held over three days at the National Championships. If the contest (whoops! sorry!! — 'event') can be fitted into the already tight R/C schedule full details will, of course, be published in time for you to give some thought to what sort of aeroplane to build for this SMAE Fun-Fly.

Membership Renewal for 1985

S.M.A.E. Affiliated clubs and individual Country Members will shortly be getting membership details for the new year. Actual costs and other details are, of course, decided by your club delegates at the Annual General Meeting at Leicester in November. Whatever they do decide, make sure that your membership and its inclusive third party insurance that covers every type of model aircraft except jets is renewed promptly to assure continuity. If by chance your particular club is not yet SMAE-affiliated, a line to the SMAE, Kimberley House, Vaughan Way, Leicester will bring your immediate details.

Competitors' Licences

Barrier or Necessity?

In 1983 the Full Membership fee for the SMAE was £12.50. As you know, this year it has been drastically cut to just £5, but those wishing to fly in any of the wide range of SMAE contests have needed a competitors' licence at a charge of £10. (*free* for under-16s).

Last year they would have had to be Full Members at much the same cost, but somehow the extra step, especially if it is delayed till well into the contest season, seems to be a bit of a psychological barrier to some people.

But if the aim is to continue to ensure that R/C, F/F and C/L contests are self-financing then the money has to come from somewhere; already there is an *entry fee* that is paid by competition licence holders for each event they wish to fly in, and season tickets are available to reduce the cost for those taking part in several contests in a year.

Most sports, whether tennis, angling or motor racing, require a licence to be held by their competitors; *RAC* members, for instance, in general require only the get-you-home and other motoring services, but if they wish to take part in motor racing they must hold an *RAC* competition licence. In addition to their normal membership.

In the U.S.A. membership and competition entry fees (to their Nats) come out to about four times the equivalent cost we pay here. The service that the average member receives is not so very different from what we have.

And, of course, they have the option of subscribing to a very good glossy magazine (*Model Aviation*) published by the A.M.A.

Comparison between modelling in different countries is always difficult, but the U.S.A. is the most interesting because like the U.K. (apart from a potential *and* actual, larger membership), they are one of the very few countries that does not have a national aeromodelling association subsidised by external funds!

So much for being one of the leaders (?) of the free democratic West?

One answer, of course, is to increase the entry fee for each contest. Some people only compete in the Nationals, and it has been suggested that they should not be required to hold a competitor's licence. But clearly they must enter for a fee that ensures that they are not being subsidised by those who compete frequently. Tell us what you think . . .

What's On . . .

Nov. 25	**WIGAN LOW CEILING INDOOR MEETING EXB, HLG, PND, SCALE** Venue Wigan Contact Dave Yates Tel Wigan 214725 Rules from J. O'Donnell 061-427-3711	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
Dec 2	**AEROMODELLER COUPE D'HIVER INTERNATIONAL — 80 and 100 gm classes** Venue RAF Henlow. Further Details Aeromodeller, PO Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Herts	Feb 10	**WIGAN LOW CEILING INDOOR MEETING EXB, HLG, PND, SCALE** Venue Wigan Contact Dave Yates Tel Wigan 214725 Rules from J O'Donnell 061-427-3711
Dec 9	**FALCONS F/F/ GALA — Open G/R/P, Vintage.** Venue RAF Lyndholme Contact D R Peers Tel Crewe 60893	Mar 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
Dec 16	**SOUTHERN AREA — INDOOR MEETING — HLG, EZB, Peanut, Open Scale, All Balsa Machine & Fly For Fun** Venue HMS 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	March 3	**SAMS INDOOR EVENT — Peanut, EZB, HLG, CO** Open Fly-For-Fun Venue Watford Leisure Centre Contact SAMS Tel 0438 832011
Dec 16	**WIGAN LOW CEILING INDOOR MEETING EXB, HLG, PND, SCALE** Venue Wigan Contact Dave Yates Tel Wigan 214725 Rules from J O'Donell 061 427 3711	April 28	**S M A E INDOOR SCALE NATIONALS, Peanut, Open Rubber, CO.** 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

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.

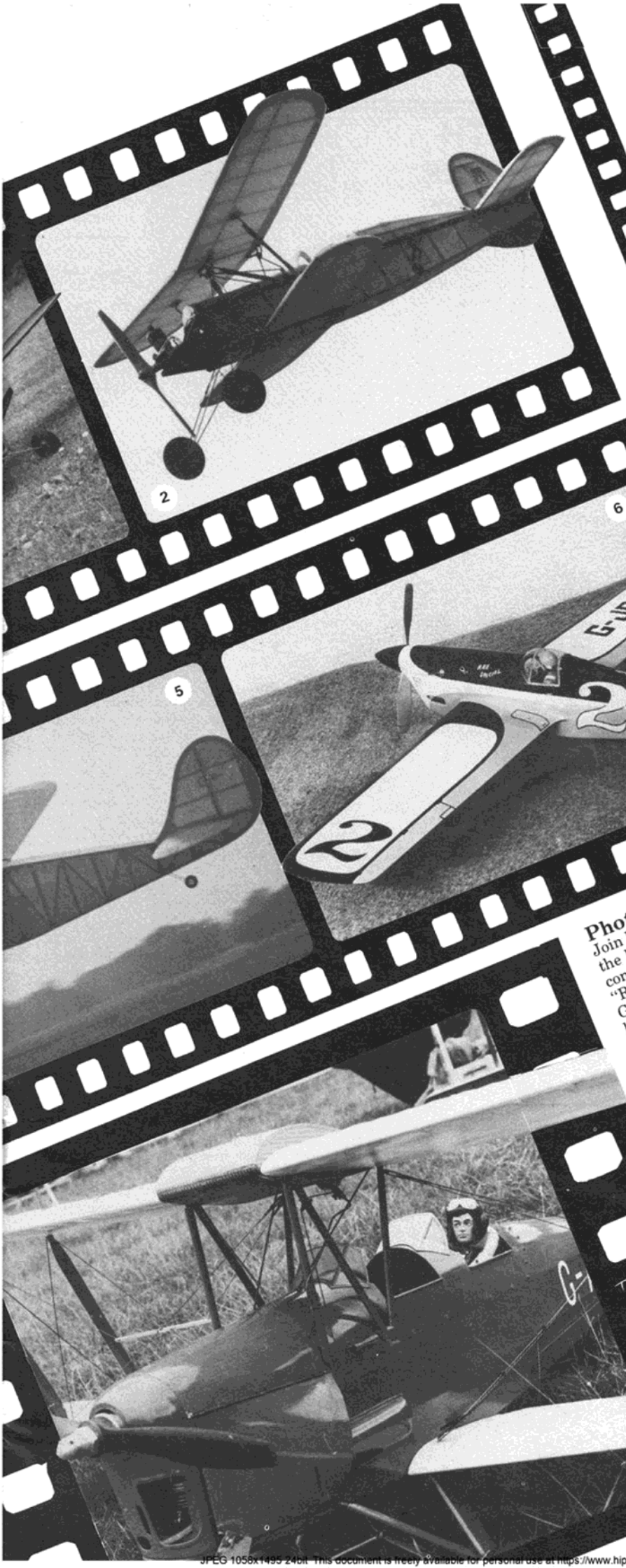
WITH THE INDOOR flying season now in full flight, dust becomes dislodged from rafters and cobwebs float down from ceilings, as indoor lightweights spiral lazily ceiling-wards. Lower down, electric powered R.T.P. jobs are attempting to break the sound barrier! All great fun! But from the delights of indoor flying, let us enjoy the delights of this month's selection of fine models.

Photo 1
Some models have that extra "touch of elegance" that makes you look more than twice! Such a model is David Boddington's 'Mini Eros'. Built from Dave's plan, this photo comes from Mr. P. Creffield of Maidenhead, Berks. Power is a *Mills* .75 Mk. 2. Span 42 ins. Weight 11 1/2 oz. On its third test flight it flew over half a mile! Looks like Mr. Creffield is due for some cross-country running!

Photo 2
A fine "ground-to-air" shot of the popular "Pinnochio", (from an A.P.S. plan). The man behind the camera was Rodney Elliott of Bristol. Coming in to land "dead stick", the power up front comes from a *D.C.* "Merlin". Biplanes ARE nice — Happy landings, Rodney.

Photo 3
With its name prominently displayed there is do doubt about the identity of this "Southerner 60". Built from a *Ben Buckle* plan the photo comes from Roger Brown of Northampton. Fliar Phil *must* add a quote from Roger's letter; "The only compromise, for an old man who cannot climb fences, is a single channel servo operating a small trim tab, just to keep the model in the field". Power: An *original* E.D. "Comp. Special".

Photo 4
Every so often Fliar Phil receives a photo of an outstanding "different" model. This photo from Roy Ashby of Kent, shows his beautifully constructed *Savoia* 'Marchetti'. (The original was entered, but did not fly, in the 1929 Schneider Trophy). Rubber powered it features two 2:1 ratio step up gearboxes driving two 8 in. dia. left and right hand carved props. F.P. cannot recall ever seeing a rubber powered model of Italy's famous racing seaplane. Thanks Roy.



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

Photo 5
The calm peaceful air of a summer's evening is the time most aeromodellers like best (AND it seems to please their models too!) Avoiding the temptation to get "all poetical" Fliar Phil feels that the spirit of evening flying is evoked by this photo from John Kemp of Sandy, Beds. It shows his "Jenny" free flight model getting nicely away from a hand launch. It is a *John Coxall Models* design, spans 6ft. and is powered by a *Cameron* 23 petrol engine.

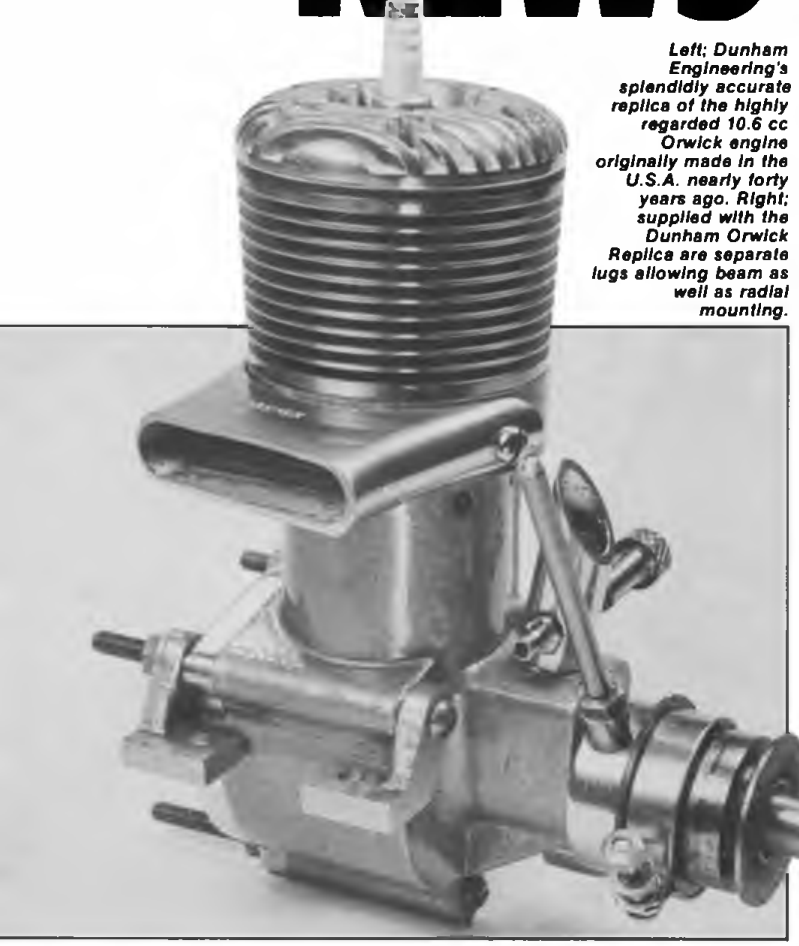
Photo 6
Join F.P. in looking back to the "fifties" and the halcyon days of team racing. A potent contender in the team race circuit was this "Riveter". Well decorated and flown by Gordon Rae of Gt. Malvern, Worcs., who kindly sent Fliar Phil this excellent photo. Power to "get in front" of the opposition comes from a 5cc *Eta*.

Winner
This photo is probably the best "close-up" of a model 'Tiger Moth' Fliar Phil has seen (and he has had the pleasure of seeing quite a few!). The photo (taken at Holker Hall, Sept. '84) comes from Mr. C. Billinghan of Lancs.

Skilled work with the camera reveals every detail — and there is plenty of that! Great praise must also go to the builder and flier of this "Tiger". — Dave Womersley. Flying this "Tiggy", Dave came second in Scale at Samlesbury in July. Well folks its this months winner!

Keep those indoor jobs climbing into the rafters! Take care - be seeing you!

ENGINE NEWS WITH PETER CHINN



Left; Dunham Engineering's splendidly accurate replica of the highly regarded 10.6 cc Orwick engine originally made in the U.S.A. nearly forty years ago. Right; supplied with the Dunham Orwick Replica are separate lugs allowing beam as well as radial mounting.

APOLOGIES to all those faithful readers who have looked in vain for the usual *Aeromodeller* engine article during recent months. The main reason for this has been that most manufacturers, these days, are concentrating on the production of engines for radio-controlled models and, with the enormous interest in four-stroke R/C motors at present, all available time has had to be directed towards testing and reporting on these for *A.M.'s* companion magazines *Radio Control Models and Electronics* and *Radio Modeller*.

One area where there is no shortage of material appropriate to *Aeromodeller* pages is the world of vintage and vintage replica engines and this brings us to the main item in this month's article, the Dunham Orwick, a replica of a notable American engine that is now being produced in the U.K. by Dunham Engineering of 12 Lawns Avenue,. Orrell, Wigan, Lancs.

Regular readers will recall that Dunham Engineering's first venture, into the manufacture of vintage type engines, was the Replica Mechanair described in the December 1982 *Engine News* column. The original Mechanair petrol engine was made in Birmingham, immediately after the Second World War. The Dunham Replica Mechanair was a far better engine than the original. This was due, not only to the availability of better materials, but also to a painstaking and commonsense approach, to the problem of producing replicas, by Alan Holmes and his two sons who operate Dunham Engineering. They identified the shortcomings of the original engine and corrected them to evolve a more serviceable, more powerful and better finished engine which, nevertheless, preserved the basic character of the original.

The Orwick engines were not so well known as most American motors of the period — even in the United States. Henry Orwick made engines for his own use as far back as the mid nineteen-thirties and began manufacturing complete engines, in small quantities, in the early nineteen-forties. His engines were rarely advertised and they became known largely through their contest successes in the hands of a few pioneers of control-line stunt flying, notably Bob Palmer and J.C. ("Madman") Yates. Early production motors had a bore and stroke of 1.0in. x $^{15}/_{16}$in., giving a swept volume of 0.736 cu. in. (just over 12cc). Later, to bring the engine into line with a rule change in America, the bore was reduced to $^{15}/_{16}$in., lowering displacement to 0.647 cu. in. The '64' (or '65', as it was known in some quarters) was manufactured, with sundry modifications, between 1945 and about 1954 or 1955, the majority being produced in 1946-47 when the Orwick competed successfully with other, better-known, spark-ignition engines of the pre-glowplug era, such as the Atwood Champion and Super-Cyclone.

The Orwick 64 was more expensive than its rivals, but it was a well-made engine and the Dunham Replica most certainly upholds this tradition. As already mentioned, several modifications were made to the original engine during the period of its production, but, externally, the Dunham Replica is virtually identical to the 1946-7 model Orwick on which it is based. Internally, there are a few minor changes, all of them in the interests of improved durability and/or performance. For example, a large window has been cut in the transfer side of the piston skirt and cylinder to aid gas flow and scavenge hot gas from the piston interior, in the interests of improved cooling and performance. A taper collet is used to install the prop-driver/contact breaker cam, rather than a square on the shaft, and the combustion chamber has been modified.

Like most of the engines designed forty or more years ago, the Orwick is a plain (bushed) bearing motor with a ringless cast-iron piston running in a crossflow scavenged steel cylinder having integral cooling fins. All the Orwicks were originally designed for radial mounting via three extra long machine screws which passed through the crankcase and the backplate, front to back. However, later, they could also be installed on beam mounts by means of four separate lugs as shown here on the Replica.

Orwick crankcases were sand cast and painted green and this is also a feature of the Replica, which has an attractive stoved two-pack acrylic finish. The one-piece crankshaft has a $^{7}/_{16}$in. (nominal) diameter main journal and runs in a $1^{7}/_{16}$in. long bronze bearing. It has a $^{5}/_{16}$in. OD hollow crankpin and is counterbalanced by web cutaways plus an integral crescent bobweight. The gas passage through the shaft is opened up slightly to 0.315in (8mm) and mixture is admitted through the circular valve port and bearing aperture common to engines of the period. Measured valve timing of the engine examined was approximately 60 degrees ABDC to 50 degrees ATDC. At the front end, the shaft is reduced to 0.315 in. dia., where it is fitted

with a 7/8 in. OD steel prop driver incorporating the contact breaker cam.

The cast-iron piston has a straight deflector on an otherwise flat crown, the periphery of which is generously relieved. The fully floating gudgeon-pin has a diameter of 7/32in. and is fitted with brass pads. The machined alloy conrod looks slim by modern standards, with relatively thin-walled eyes, but bearing lengths are generous (3/8in.) giving ample bearing areas. Making an interesting comparison with the ringed aluminium piston of modern engines of similar size, the piston weighs 22 grammes or nearly 26 grammes with its gudgeon-pin.

The cylinder, excluding its upper and base flanges, has nine fins, providing a large cooling area. By mid nineteen-forties standards, the diametrically-opposed unbridged rectangular transfer and exhaust ports are quite large. Port timings of the Replica, according to our measurements, are: exhaust 140 degrees; transfer 126 degrees. The cylinder also has four small (1/8in. dia.) circular ports, two at the front and two at the back, which register with similar ports in the surrounding casting. These are uncovered by the piston skirt at the top of its stroke, opening the crankcase to atmospheric pressure for a period of about 110 degrees of crank angle to provide supplementary air induction for improved breathing.

The cylinder is topped by a machined aluminium cylinder head having a bowl shaped combustion chamber, surrounded by a narrow (approx. 2.2mm) squishband, interrupted by a slot for piston deflector clearance. Compression ratio, as measured, is a nominal (full stroke) 8 to 1. The head is secured by six screws, just two of which pass through the fins to secure the complete cylinder assembly to the crankcase. Both the cylinder fins and head fins have polished edges which impart an attractive appearance and a pleasing contrast with the metallic green enamelled finish of the crankcase.

The original Orwicks were fitted with 3/8 in. and, later, 1/4 in. Champion sparking plugs but these, as with other plugs made by the sparking plug companies (e.g. AC, Autolite, KLG, Lodge, Pacy) during the heyday of the model petrol engine, have not been manufactured for many years. The Japanese NGK sparking plug company has come to the rescue with the ME-8 1/4-32 plug, as fitted to the Replica Orwick illustrated here, but this is rather expensive and Dunham Engineering are also offering an alternative cylinder-head, threaded to take a commercial 10mm short-reach plug, such as the NGK CM-6.

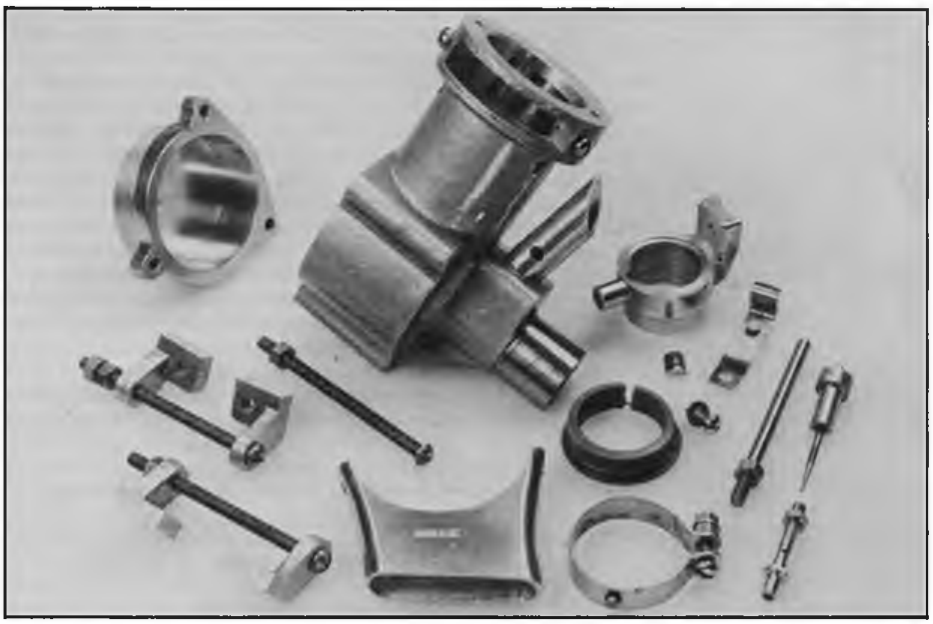
The contact breaker assembly closely follows the design of the original Orwick unit. It has a neat cast aluminium body that can be rotated around the crankcase nose, for manually adjusting the spark advance, by means of a lever. The lever, which is threaded into a boss and secured with a locknut, is also used to adjust frictional resistance by means of a small brass shoe that bears against the machined surface of the crankcase nose. The fixed point of the contact breaker is fitted to a brass band surrounding an eccentric plastic insulator ring that can be rotated to adjust the point gap. The moving point is attached directly to the spring that engages the cam fitted to the crankshaft.

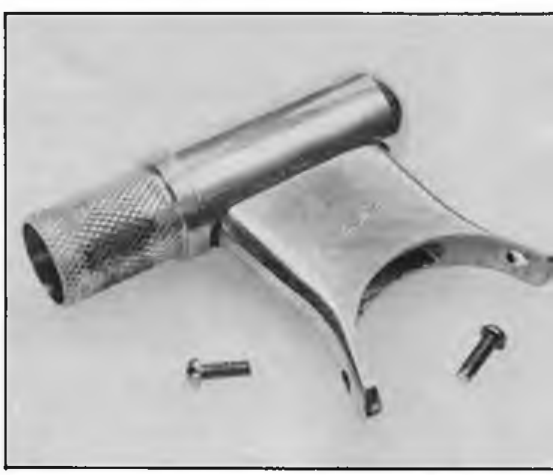
The Orwick Replica comes complete with an accurate reproduction of the cast aluminium exhaust duct fitted to Orwicks of the middle and later periods. However, in order to meet present day requirements, Dunham Engineering have produced an adaptor to facilitate silencer installation. Dunham can also supply the ignition equipment for the engine, i.e. coil, condenser, plug lead and clip.

In comparative tests against an original Orwick, Alan Holmes advises that he has been getting around 1,000 extra rpm with his Replica, turning approximately 9,000 rpm on 12 x 6 props. Some time in the not too distant future, we hope to run some personal checks on the Orwick Replica's performance with a view to plotting a power curve.

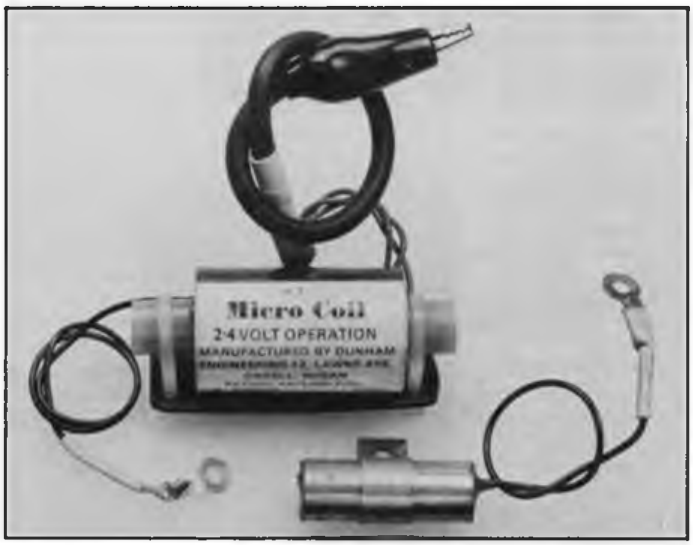
The nominal bore and stroke of the Orwick 64, as already noted, is 15/16 in. x 15/16 in., producing a swept volume of 0.6471 cu. in. or 10.605cc. Checked weight of the Replica examined was 365 grammes (12.9 oz) bare, or 418 grammes (14.7 oz) including all ignition equipment except battery.

Not surprisingly, this well executed British version of a truly 'vintage' American engine has attracted the interest of many American 'Old Timer' addicts, and a goodly number of Dunham Replicas have been exported to Australia where vintage models and engines also have a keen following. (For the benefit of *Aeromodeller* readers in the U.S. and Australia, the Dunham agents in their respective countries are:
Striegler's R/C Supply, 5831 McKnight, Houston, Texas 77035, and Owen Engines, Box 264, Fairy Meadow, 2519 New South Wales.)





Above left; Dunham Orwick crankcase and contact breaker parts: case is stove enamelled green like original. Below left; minor modifications to Dunham Orwick include transfer windows in piston and cylinder and slightly modified combustion chamber. Below; special Dunham exhaust duct with right-angled outlet to facilitate fitting silencer to Orwick Replica.



Left; available for use with the Orwick and other spark ignition engines, Dunham's lightweight ignition coil and condenser.

Davis-Cox CO_2 Conversion

As most readers know, prior to the Second World War, all model internal combustion engines were spark-ignition petrol motors, with the Americans as the leading manufacturers of the type. Production stopped in the U.K. in 1939, but carried on in the U.S.A., for another couple of years, before declining as the need to devote all appropriate resources to war production became more urgent. In Continental Europe, strangely enough, model engine production — admittedly on a small scale — continued, in most countries, throughout the war and it was here, practically unknown to the rest of us, that the model compression-ignition engine or so-called 'diesel', was developed.

The diesel caused an immense stir when it became known to British modellers at the end of the war and, with engines from Switzerland, France, Belgium, Italy, Czechoslovakia, etc., as examples of what could be done, it was not long before the U.K. was awash with compression-ignition engines of every size and type, good and bad. What was not widely recognised, at that time, was that the levels of development and performance that had been reached in the U.S.A., when production there was resumed, were immeasurably higher than in 1939. The Americans were unimpressed by diesels. By U.S. standards, they lacked high-speed performance and the only thing in their favour was that they did not need the extra weight and complication of a spark ignition system. When Ray Arden introduced the original model glow-plug in 1947, this put the final nail in the diesel's coffin, so far as the U.S. was concerned. Despite subsequent progress in diesel design on this side of the Atlantic and efforts by one or two well-established American manufacturers, during the 'Fifties, to interest American modellers in modern diesels, the glowplug continued to reign supreme.

Today, however, while the popularity of glowplug engines outstrips that of diesels almost everywhere, compression-ignition actually enjoys more recognition in the U.S. than it has ever done in the past.

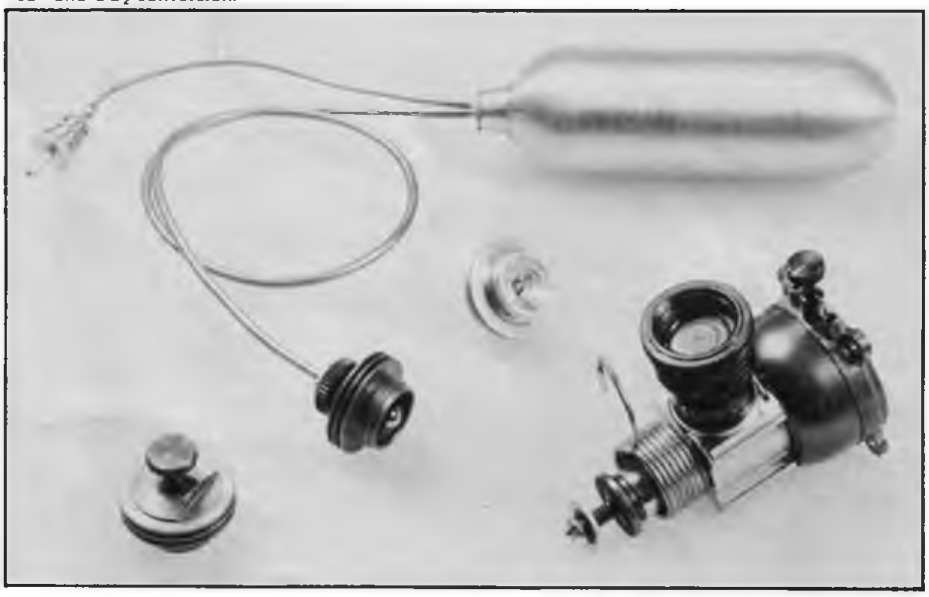
This is all due to the efforts of one man, Robert Davis, of Milford, Connecticut, who, in 1976, introduced a unique type of diesel conversion head for the Cox 049 engines. This was followed by heads for both smaller and larger engines, including one for the 6.5cc O.S. Max-40FSR. We had one of the latter on test in 1979. It was a totally new experience. Gone was the unacceptable roughness of all big diesels of yesteryear. Gone was the lack of throttle response. It did not improve the standard glow 40FSR's peak power output, but it did enable it to turn, quite safely, much larger props than could have been achieved with glow ignition. This has been the big point in favour of the Davis diesel conversions, which are now available for some of the largest glow engines, enabling them to turn the larger diameter props that produce the extra static thrust often necessary to unstick a heavily loaded scale model.

Bob Davis now makes diesel conversion heads to fit over forty different engines and, having worked up from the smallest (.16cc Cox TD 010) to the largest (44cc Tartan Twin!) in diesel conversion he, last year, turned his attention to something quite different, a CO_2 conversion.

This is for the .33cc Cox Pee-Wee and Tee-Dee 020 engines and is therefore a bit larger than the various British and American CO_2 motors available at present and in the past. It consists of a replacement cylinder head with the usual ball valve, a 10cc CO_2 tank, filler nozzle and copper tube, ready assembled as shown.

The conversion, of course, changes the character of the Cox 020 engines completely. From being fiery little 20,000 rpm machines, using tiny (4½ inch) props, they become quiet and docile performers that can turn astonishingly 'large' size props. Bob Davis claims 6,000 rpm on an 8 x 4 and 2,000 rpm on a *10 x 8!* The head, empty tank and plumbing weighs only 17.6 grammes (0.62 oz). A Pee-Wee 020, fitted with the complete CO_2 conversion, as shown in the photo (but less the starter spring which is unnecessary) checked out at just 40 grammes or 1.41 oz. The conversion is made by Davis Diesel Development Inc., Box 141, Milford, 06460, U.S.A.

Left; unique CO_2 conversion of Cox Pee-Wee 020 is by diesel conversion specialist Bob Davis. Below; basic Pee-Wee 020 with its glow head removed (centre) and showing alternative Davis diesel head and CO_2 conversion.



AT THE LAUNCH PAD with John Wheddon

Model Rocket Engines

Model rocket engines, which are the most important part of our models, have been developed in several countries during the last 25 years, notably in the United States and Czechoslovakia.

Contrary to some opinion the hobby did not gain immediate acceptance by the various authorities in the U.S. and Canada and strong representation repeatedly had to be made before clubs and individuals could launch model rockets.

The reason for this was concern for the safety of participants and onlookers and central to the issue was, of course, the rocket engine and its contents.

Consequently, enormous effort went into the design and manufacture of safe model rocket engines. The sport's governing body in the U.S., the National Association of Rocketry (NAR), set up a most stringent series of tests which include exposure to fire, impact and crushing — duplication of almost every form of possible abuse! Approved rocket engines now on sale are proven to be capable of safe operation, transportation and storage.

The engines are remarkably simple in concept and design, but, of course, the manufacturing process has to be carefully controlled to ensure the correct propellant weight, composition and packing.

The cross-section of a typical model rocket engine is shown in fig. 1.

Most engine casings are made from cardboard tubing, although some specialised high-performance engines have fibreglass cases. The nozzle is specially designed to give the best performance and is usually cast from a ceramic material. The propellant is a combustible chemical, specially formulated by the engine manufacturer. It burns very rapidly indeed as we shall see in some more detail later. On the other hand the time delay charge is a slow burning charge which provides tracking smoke and allows the rocket to 'coast' upwards to it's maximum altitude, as it slows down to a speed at which the recovery system can be deployed satisfactorily. The last portion of the engine is the ejection charge which operates at the end of the time delay. Ignition of this charge results in a rapid burst of gas which blows the nose-cone off the rocket and deploys the parachute or streamer, or operates some other mechanism for recovery. These stages of operation are illustrated in fig. 2.

Rocket engines are supplied in a wide variety of power values, burn times and delay times. The power produced by an engine is expressed as total energy which is the thrust multiplied by the burn time and is usually quoted in Newton-seconds. The NAR system of classifying engines into power groups is recognised internationally and is shown in Table 1.

Table 1

Class	Total Impulse in Newton-seconds
1/4A	0-0.625
1/2A	0.626-1.25
A	1.251-2.50
B	2.51-5.00
C	5.01-10.00
D	10.01-20.00
E	20.01-40.00
F	40.01-80.00

Table 2

	Size Length x Dia. (mm)
'Standard' A.B.C.	70 x 18
'Class D' 'Mini'	70 x 24
A only	40 x 13

All of the information which we need to know about an engine is printed on the engine casing in a code form which is widely used by engine manufacturers. The code which is a really useful shorthand form would look like this:- *B3-7.*

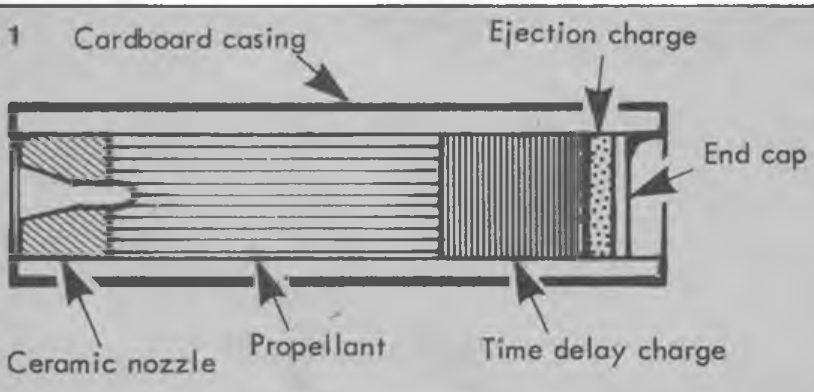
This indicates engine in Class B Total impulse of 2.51-5.00 NS Average Thrust of 3N Delay Time of 7 seconds.

From this information the burn time can also found, i.e. $^5/_3$ = 1.66 seconds

Engines are made in a variety of sizes; the sizes are standardised in the more ordinarily used power range of classes A-D as listed in Table 2. More powerful engines in E and F classes tend to vary in size because these are special purpose items, often featuring advanced propellants and the modellers who use them build rockets specially to suit them.

Above, typical U.S. made model rocketry power units. Note absence of blue touch paper, electric ignition necessary.

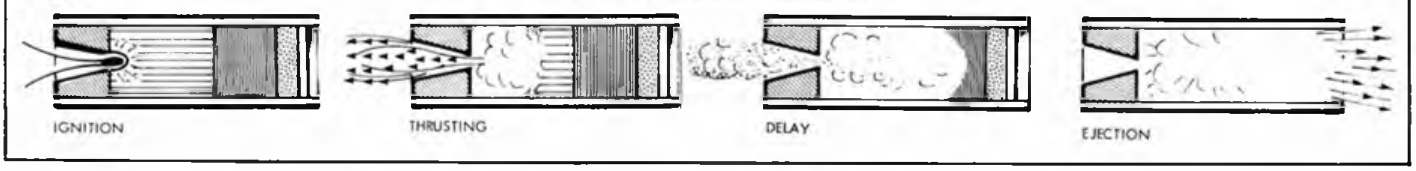
Fig 1



SECTION THROUGH A TYPICAL MODEL ROCKET ENGINE

Fig 2

MODEL ROCKET ENGINE OPERATING SEQUENCE



IGNITION	THRUSTING	DELAY	EJECTION
Electrically operated ignition system heats ignitor in the nozzle and "starts" engine	Propellant charge burns rapidly and gases expand through the nozzle to produce thrust.	After exhaustion of the propellant the delay charge produces a smoke trail whilst the rocket coasts up to maximum altitude.	At the end of the delay the ejection charge ignites and operates the rocket recovery system.

VINTAGE CORNER WITH ALEX IMRIE

Aeromodeller Vintage Day 1984

"We have yet to discover such enthusiasm as that displayed by aeromodellists . . . Periodically they meet in large numbers and indulge in what amounts almost to an orgy of communal model flying." So wrote *Flight* in the summer of 1934 about the Northern Heights Rally. Now 50 years on, these words could equally sum up any of our meetings, but especially the annual Aeromodeller Vintage Day at Old Warden.

We are generally blessed with good weather for this event, but August 19th this year was a scorcher! Blue sky all day, not a cloud in sight and sizzingly hot with only light airs that hardly stirred the windsock. I just do not believe Danny Sheelds when he claimed to have brought the good weather with him all the way from Baltimore, USA! The regular attendance of Danny at our meetings is appreciated and he is rapidly becoming part of the furnishings at both Old Warden and Barkston Heath.

With the passage of each year more and more enthusiasts attend this major meeting,

Above, two Vipers. Len Fisher (left) and Tony Turner with their beautifully built semi-scale four rubber motor geared "Interceptors" designed by C. Rupert Moore.

Above., F.B. Thomas designed "Candy II" described in September 1947 Aeromodeller, this Saito 30 four-stroke powered yellow and black example was one of two made by Jim and Dave Leddy from Guildford.

Left., rubber-driven 48 inch wingspan "Curtiss Robin" made by Peter Norman, from the 1935 Comet kit plan.

and the car park fills up quickly on Vintage Day. Despite arriving early, there are all sorts of diversions to prevent one actually getting onto the aerodrome. Trade stands with vintage emphasis means a hasty scan of old engines, magazines, books and other goodies in case one was missing that golden opportunity (this year I bought an airwheel from John O'Donnell)!

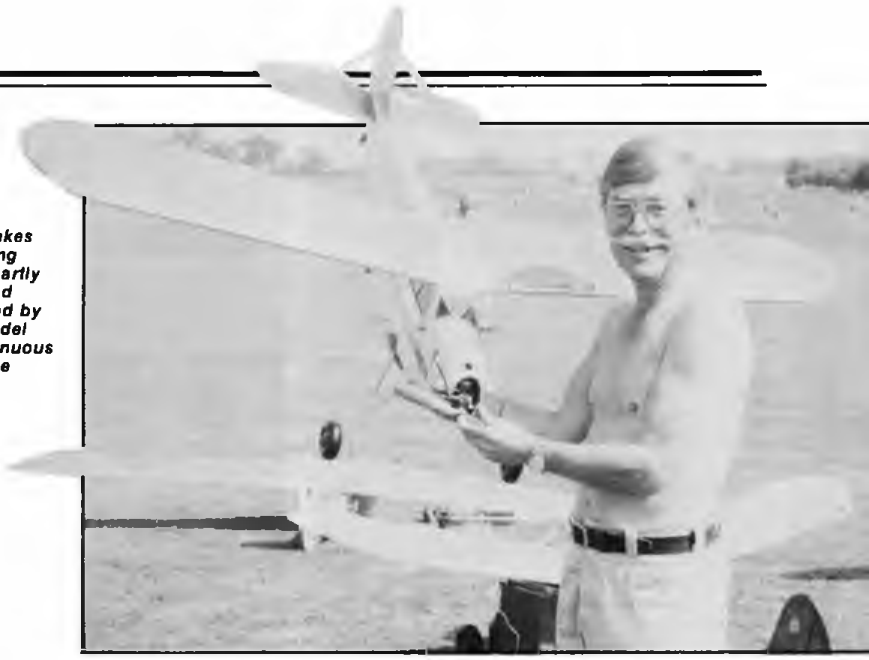
Then, meeting modellers and being up-dated on their own vintage doings is a pleasant though time consuming activity, so by the time MAP's tent is reached, the forenoon is fairly rushing past and all the while brightly coloured models are either climbing, with exciting exhaust notes, into that azure Old Warden sky, or screaming around solitary modellers with outstretched arms. How can one possibly see it all?

It is always a great pleasure to meet the old-timers, men who really contributed to the hobby in the past (some of them still active at it). How could we have known all those years ago when we read of their activities that we would actually get to know them and be able to listen to their stories first hand? Here was H E White, designer of 'Dryad', that beautiful rubber-driven twin-motor flying boat, himself one time holder of the British rubber flying boat record. Trevor London, down from Yorkshire, designer of the 'Halifax Rapier' and one of our top power duration men in the immediate post war years, P T Capon, designer of many Wakefields including 'Krusader' and Bob Copland, (nuff sed), who never seems to miss Vintage Day. The same goes for fellow Northern Heights' member Ken Tansley, and there were many others. It was a privilege to be in on their conversations, familiar names were bandied about...Bunny Ross...Silvio Lanfranchi...Eddie Keil...Vanderbeek...Mid-day has gone, no doubt about it, this should be a two day event, one day for just being here, the other for flying!

Mind The Lines

Control line was well patronized this year, the flying circles being in use all day long, over 70 control-line models were seen, either in action or in the pits, these included 'Devil Bat', 'Stuntwagon', 'Hot Rock', 'Demon King', 'Ringmaster', 'Foxstunter', 'Voetsak', 'Scout Biplane' and many others. I particularly like Jim and Dave Leddy's pair of 'Candy IIs', one powered by a *Saito 30* four-stroke and the other with a *PAW 29* diesel. Tom Jolley's blue and yellow *Fox 35* powered 'Curtiss Swift' was also most impressive.

Ron Prentice was running the *SAM 35* stunt event and his entry board boasted some 12 entries. Although I was unable to follow all the flying through, what I did see was thrilling enough, and the support for this type of vintage flying means that control-line is back with a vengeance. All thanks to Mike Beach's forethought in introducing the Fireball Trophy some years ago and Ron Prentice's efforts via his column in the *SAM 35* magazine. Geoff Clarke, the hard working editor of *SAM 35 Speaks* managed to coax 75 mph out of his *Mercury* 'Midge' in the speed event. Hopefully, his vertigo will not affect the next issue too much!



Right., Ralph Noakes and his good flying "T.D. Coupe", smartly finished in red and silver and powered by an OS 25 this model has been in continuous flying use over the last four years.

Two (or more) Of A Kind

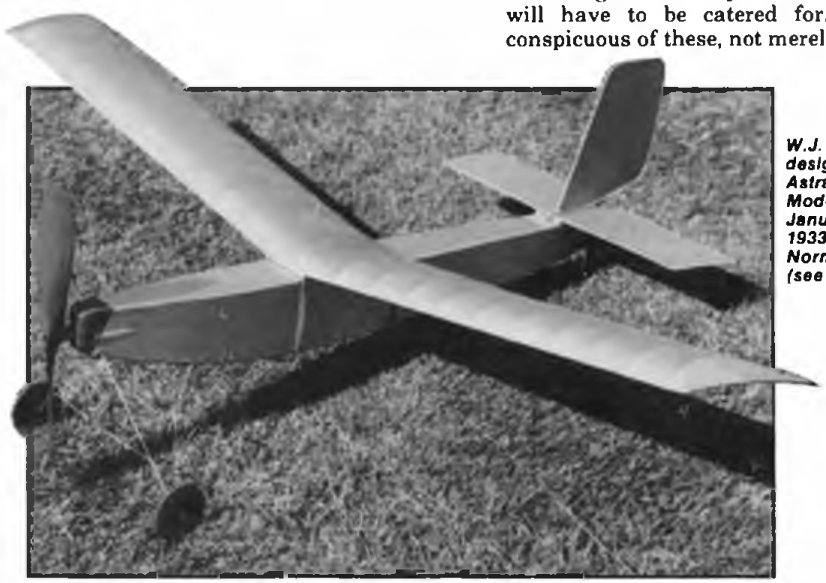
It is quite common to see several examples of a particular model on Vintage Day, but there was nothing common about the two Rupert Moore 'Viper II' models present this year. We had seen Tony Turner's example last year, but now it was joined by a 'Viper' complete with French cockades made by Len Fisher from Leicester. The low stable circuits of these models to the whirr of their four-geared motors was a joy to behold. Len had also fitted the airscrew brake which stopped the propeller in a horizontal position, the idea of which was not only to reduce the risk of damage, but the reduction in drag compared to a windmilling propeller enhanced the duration.

There were three 'Ladybird' rubber-driven biplanes, made by Messrs Lindsay Smith, Tony Hansell and Brian Downham. This attractive H J Pridmore design was described in the April 1948 *Aeromodeller* and the examples seen were all good flyers: rubber duration with a difference.

On the R/C Assist flight line were several 'Red Zephyrs', 'T D Coupes', 'Premier Lions', 'Super Buccaneers', 'Quakers', and around ten examples each of *Keil Kraft* 'Falcons' and 'Buccaneer Standards'. However, for sheer weight of numbers our old friend the *Keil Kraft* 'Junior 60' held top place, no less than twenty were to be seen during the day, powered by a variety of engines.

One Of A Kind

In all areas, control-line, R/C Assist and free-flight there were a number of Vintage Style models. They really looked the part, but being unable to identify them, enquiries revealed that these were comparatively recent designs. From the number of models in this category, interest in Vintage Style modelling is obviously on the increase and will have to be catered for. The most conspicuous of these, not merely because of its 10 feet 8 inches wingspan, was Jim Shelley's beautifully built high wing cabin monoplane designed in 1965 named 'Mable's Dream', but now enlarged and powered by an *OK* 'Twin'.



W.J. Plater designed "Ad Astra", described in Model Engineer January/February 1933, flown by Norman Peacock (see text).

Simon Rogers from Plymouth had his British Class A Record Holder rubber-driven flying boat with him. This twin motor design by M Rainer was described in *Model Aircraft*, Feb 1948, and plans are still available from *MAP* as MA 41 for £2.75 plus 50p postage. Simon's model was very nicely built, and although I did not get its actual weight, it felt ultra light. Using unlubricated motors he only put a small number of turns on to demonstrate the great flying characteristics of this unusual model,

Below., Patrick Robarts (aged 10) from Sevenoaks with his Keil Kraft "Phantom", top junior flyer in the Fireball Trophy event.

it made a fighter like climb from a hand launch then cruised around like a duration model!

When I saw the ancient all-silver rubber-driven monoplane that Norman Peacock had with him, I was transported back to 1930 in a thrice! (There I was on tiptoe, my nose resting on the edge of the bench with its gorgeous muddle of glue, wire, spruce and birch watching my father make such models from the pages of *Model Engineer*!) This was W J Plater's 'Ad Astra', silk covered, made from strip hardwood, plywood and wire, it came from the collection of a Mr Bontoft. Designed in 1929 the twin-geared model is of 48 inch wingspan and weighs 9.8 ozs without rubber. Norman uses a less powerful motor than that originally fitted, and enjoys some sedate flying which includes realistic ROGs from grass surfaces.

As a matter of interest it was Norman who lost one of his models at Chobham in August 1977 and had it returned some four years later due to the efforts of John Coates as related in the October 1981 and February 1982 issues of Vintage Corner.

R/C Wakefield

What is probably the first of its kind, Professor Wilfred B Heginbotham's R/C 1938 'Chasteneuf Wakefield', flew for the first time in public at this meeting, the model's landing resulting in a spontaneous round of applause from onlookers. Wilfred had already built the same design in 1938 and now 47 years older, and not wanting to chase the example that he has recently completed, decided to fit R/C! He has kindly supplied the following details:

"The model has turned out to be 72% overweight at 13.8 ozs, this burden could be reduced by approx 2ozs by more careful construction. At this time there is only 2.75 ozs of rubber in the machine i.e. 12 strands *FAI* 38 inches long. I have been cautious because I feared bunching problems, but with experience the rubber load could now be increased to 3.25ozs and this I intend to do. The rudder trim tab as designed by Chasteneuf is used as the rudder and the elevator is contained within the stabiliser profile as per the original and general control response is excellent.

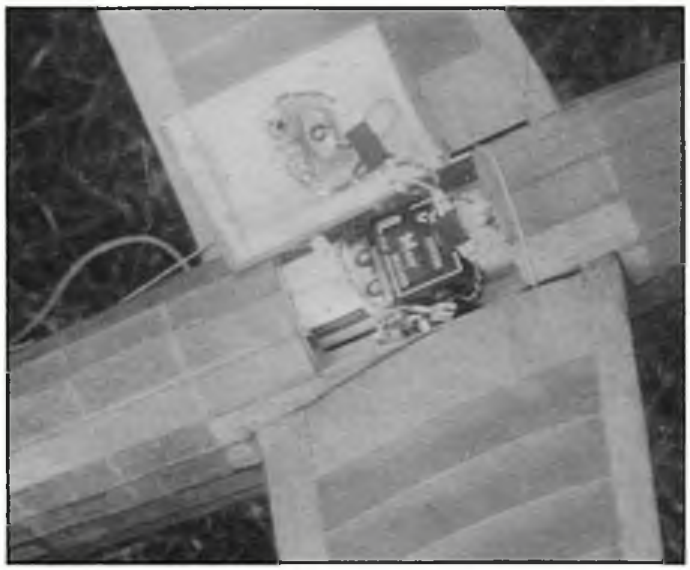
"The free-flight pundits predicted troubles with torque control but rudder power is completely adequate. Still air performance is of course not sparkling and is around 60 to 80 secs in still air with full turns (at Old Warden 75% turns were used). The receiver is a *Century Systems* micro receiver on 35 MHz and has proved to be very reliable indeed. The servos are *Cannon* micros and the airborne battery is four 100 mAH nicads. All this fits in between the wing boxes and control runs are single monofilament lines with spring return on the control surfaces." A true milestone indeed and a great credit to Wilfred, stand back and see the flood of similar models now that Professor Heginbotham has shown us how.

Above., R/C assist Flight Line, amongst the usual types can be seen lone examples of Weathers' 'Westerner", Russell's "Cyclonic" and "Vulcan", Korda's "Champion" and a giant Bill Dean's "Slicker".

John Haggart Memorial Trophy

Why vintage enthusiasts will not complete the simple questionnaire required by this competition — giving brief details of their entry, is a mystery to me. Experience this year showed a distinct dislike of such formality, entry on the field was more popular, although this gave little chance of other than a very general processing of the entries. However, in the sort of flying undertaken there is possibly little need for more. There were fourteen entries, but as in previous years the gremlins were certainly about. Some contestants dropped out when engines (whether diesel or petrol) proved generally difficult to start, and despite flying from the lawn like surface of the

Left., Close-up of the O.K. Twin in Jim Shelley's "Mable's Dream" (see text) A weak point of this engine lay in the crankshaft, but Jim has already modified this component to provide a reliable unusual vintage power plant.



Right., Micro receiver and servo installation between the wing boxes of the R/C 1938 "Chasteneuf" built by Professor Wilfred B. Heginbotham (see Text)

aerodrome's mown grass runways, ROG performance effectively reduced the field still further. It appears that most modellers ignore ROG throughout the year, yet hope that their models will successfully ROG in the competition.

As previously mentioned in this column ROG is easier with thin section wheels, also wheels must spin equally freely and undercarriages must be carefully aligned. Nevertheless, some good ROGs were made and nice controlled flying resulted. Especially impressive was the powerful steep turning flight of Brian Ferrett's 'Premier Lion' (*Frog* 3.49), Noel Barker's 'Kanga Kub' (*Ohlsson* 23) and J Kay's 'Twin Cyclone' (*ME* 'Heron'). C Banyan's 'Junior 60' made some beautiful take-offs after one of his attempts had ended up inside Peter Michel's sunshade, which only a few minutes before had been sheltering his Wakefield model! As it was, Peter's 'Peerless Panther' escaped serious damage from the propeller of the *PAW* 15 which continued to run under the parasol. A target of 45 seconds total flight time was set and each entrant could have three flights. Results show that there was more control over duration this year and the event was won by Dick Hardwick with a *Mills* powered 'Coronet' (44.9 secs), runner-up being John Kemp with his *Frog* 1.75 petrol powered 'Little Vagabond' (45.8 secs). In third place was Peter Michel flying his *Mills* powered 'Peerless Panther' (46.5 secs).

Other Events

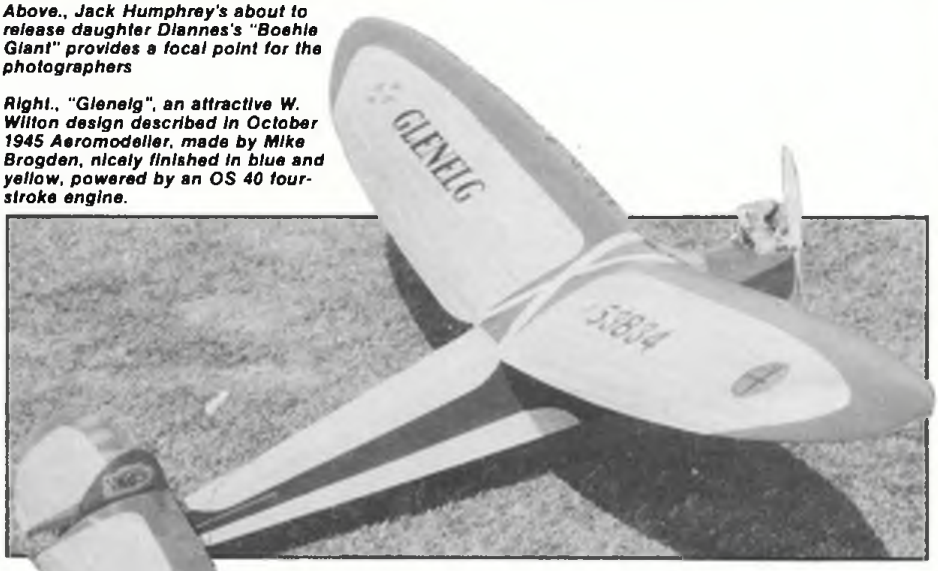
Most of the *SAM 35* competitions were flown in the usual dispersed manner, and from the number of these, this is the only way to hold them in order to ensure that competitors can enter the various events. Although I witnessed a number of fine flights by individual competing models it was not possible to be in on all the action, or to experience the excitement of leading position changes as the competitions progressed. Final results are given in the listing at the end of this report.

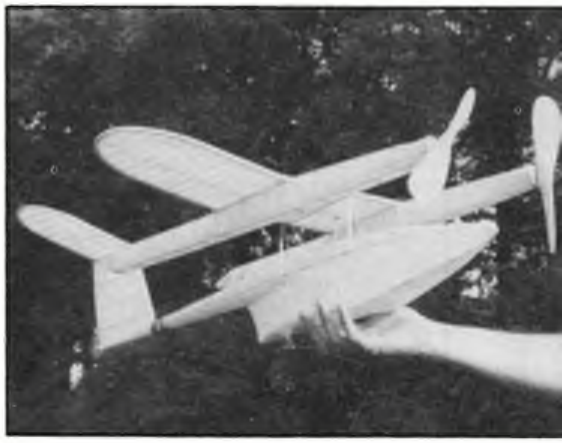
News of models lost at the *SVAS* Meeting held on 22nd July was obtained. Tony Penhall had received a telephone call from the finder of his 'Black Magic' and collected it immediately. Ian Potts, who had to suffer a month of waiting, managed to get his 'Kanga Kub' down from the trees. But there were some losses too. Jack Law's 'Slicker' fuselage could be seen but not retrieved, he got the wing down and organised Dick Hardwick (master model retriever) to collect the fuselage next day. Brian Ferrett's 'Pacemaker' hung in the branches most of the day but was eventually rescued.

Once again Aeromodeller Vintage Day lived up to its expectations and left us with a whole host of memories...Dianne Humphreys' 'Boehle Giant' landing in the car park (hopefully without damage)...seeing the high straight flight of the CO_2 powered 'Flying Flea' G-ADXS...plenty of lift in the air...even the 10 tissue parachutes shot into the Old Warden sky by that rare pyrotechnic that Roger Brown had been impatient to try, were reluctant to descend...the beautiful electric 'Puss Moth', just like a big 1934 *Frog* model complete in blue and orange livery registered G-AAXY...all these thoughts will stay with us for a long time. The standard of modelling was very high and the general spirit and atmosphere prompted much nostalgia, long may this eagerly anticipated annual event continue.

Above., Jack Humphrey's about to release daughter Diannes's "Boehle Giant" provides a focal point for the photographers

Right., "Glenelg", an attractive W. Wilton design described in October 1945 Aeromodeller, made by Mike Brogden, nicely finished in blue and yellow, powered by an OS 40 four-stroke engine.





Above., British Class A rubber driver flying boat record holder built by Simon Rogers from Plymouth. The performance of this machine has to be seen to be believed (see text).

Results

Fireball Trophy
(Vintage C/L)

1	M A Callaghan	Stuntwagon
2	P Roberts (Junior)	Phantom

Northern Heights Trophy
(Construction)

1.	R Parham	Zaic Wakefield

Keil Trophy
(Best KeilKraft Model)

1	D Tappin & D Whitehouse	Falcon

Rupert Moore Memorial Trophy
(Jackdaw Precison)

1	P Siddall	1.59% error
2	D Knight	2.84% error
3	K Fordham	19.05% error

C A Rippon Memorial Trophy
(Cruiser Pup Duration)

1	B Faulkner	4.04
2	C Strachan	1.21
3	R Brownson	1.02

Junior Achilles
(Duration)

1	M Kemp	2:33
2	R Kemp	2:13
3	C Loxton	1.14

Chobham Trophy
(Vintage Wakefield Mass Launch)

1. P Michel

Danny Sheelds Trophy
(A Frame)

1 P Siddall
2. D Sheelds

Lancastria Speed Cup
(C/L Speed Midge)

1	G Clarke	75.6 mph
2	D Roberts	72.0 mph
3.	S Betney	69.7 mph

Earl Stahl Contest
(High Wing)

1	V Dubery	Taylorcraft Grasshopper
2	K Miller	Taylorcraft Grasshopper

Earl Stahl Contest
(Low Wing)

1	D Knight	Miles Magister
2.	R Oldridge	MIG 3

Power Duration Contest
(10 Seconds Engine Run)

Pylon 1	T Hall	Lanzo Swayback
Cabin 1.	E Redfern	1/2 Buccaneer

SAM 35 C/L Stunt Event

1 M Taylor
2 R Prentice
3 T Jolley

Frog Vanda Glider Competition

1 R Walden
2 G Smith

Chuck Glider Event

1 M Benns

John Haggart Memorial Trophy
(45 seconds Precision)

1	Dick Hardwick	Coronet	44.9 seconds
2	John Kemp	Little Vagabond	45.8 seconds
3	Peter Michel	Peerless Panther	46.5 seconds

FREE-FLIGHT EURO CHAMPS

Report by G.B. team manager Martin Dilly

Held at what must be the world's best site for free-flight, — a short grass-covered dry lake bed about 5 miles by 14 and absolutely flat, — this year's European Free-Flight Championships at Livno, Yugoslavia attracted entries from 20 national teams (plus one from China, flying outside the actual contest). It also showed that British glider flyers are a force to be reckoned with; Mike Fantham, Steve Philpott and Brian Baines, flying in very un-British conditions, gave us a team score that put Britain into second place, just 13 seconds behind West Germany and ahead of the USSR team of Lepp, Tchop and Isaenko.

F1C flyer Stafford Screen, surely one of the most thorough and well-prepared competitors in Britain, had his work rewarded with a second place behind the USSR's Evgeny Verbitsky, who finally broke his 'always a bridesmaid' jinx, though Chen Zhijian of China, flying as it were — outside the contest, returned the highest score.

Stafford's place was not without cost, though — a probable timer failure cost him a *Rossi* model that appeared to clear a 4,000 foot mountain on the edge of the flying field. An epic search with two people climbing the 45° slope for three hours non-stop and two others working their way by car along bare rock hairpin bends onto the escarpment top failed to find the model. But did reveal unfenced 150 ft. deep potholes, snakes, crevasses in the limestone and a bear's lair, as well as a rare insight into the awe-inspiring limestone scenery of Bosnia. The earth tremors were on another day...

A few notes on the developments and lessons learned at Livno may be more interesting than a round by round report on this fun-flying par excellence. An aspect of the weather that we found difficult was that very often thermals that were clearly assisting models a few hundred feet up were not connecting with the ground.

A model launched under such indications, or even a well-zoomed glider, would not necessarily find the lift. Although the windspeed was never a problem, we were faced with the rotor effect, when a rolling 'sausage' of air could move down from the mountain ranges either side of the valley; the locals knew about this, and it could have accounted for some of the bizarre wind shifts and apparent signs of lift that led to sink.

By far the most popular means of lift detection was mylar streamers; I did not see a single bubble generator or anyone using 'fluffies' at Livno, but several teams, including our own, used thermistor/anemometer equipment to detect a steady rise in temperature and a drop in windspeed. We did have a tendency to launch too soon, while the lift was still building; doubtless the low windspeeds prevented some of our flyers from realising just how slow these builds were, and it is certainly a test of nerve when you are waiting for a good patch with only a minute or so left in the round, as happened to Dave Greaves on his final Wakefield flight.

Double World Champion Lothar Döring was using a neat and professional looking chart recorder unit to display the traces from his upwind-located sensor, but at times 'up-wind' was pretty meaningless. The Dutch favoured a static temperature sensor which transmitted a radio signal to a small hand-held receiver which had a rising and falling tone modulated to indicate the temperature changes, and could be used near the flyer. However, Stafford Screen did say that the F1C day was the hardest contest he had ever known for picking lift. The flying conditions were different each day which made for a highly interesting contest.

At any top-class event such as this, everyone learns something, and Stafford Screen had a heart-stopping lesson on the fatigue life of rubber bands during a test flight with his "bunter". As the engine cut at the top of the climb the wing came off and the fuselage descended vertically from 600 feet into the earth of the lake bed. The first problem was removing the fuselage from the earth. The carbon fibre folding propeller blades acted like the barbs on a whale harpoon and opened up as the fuselage was tugged. In the end Stafford cut a divot out of the earth with an aluminium comb to extract the engine. Thorough washing revealed that the only damage was three small cracks on the fibreglass cowl; the engine r.p.m. after the impact was a few hundred up on the pre-crash figure, too. It seems that some of the bands, previously used, had been weakened by the ultra-violet in the sunlight and had allowed the wing to lift slightly during the bunt transition and this had let the rest of the bands slip back off the rear wing band peg.

Even world champions have occasional problems, though. Andras Meczner of Hungary, surely the most experienced F1C flyer in the world now, had a 31 second flight after his tailplane stuck in the power position, leaving Oszkar Maczko as the sole Hungarian fly-off participant. All the team are still using spiral climbing aircraft, rather than bunters, and indeed bunters are still in the minority.

New European F1C champion Evgeny Verbitsky, now on the 48th of his series of superbly-engineered aircraft, has changed to a top-exiting exhaust, saying that it directs the sound and the exhaust away from him when he adjusts the engine and launches. The wing is still fully-skinned with hard-rolled aluminium, the tailplane only uses this material on the leading edge D-box, the rear half being covered with silver *Monokote* for lightness, as the moment arm has been slightly lengthened.

Tom Koster, who finished sixth, was using a flapper, metal winged, and had a *Seelig* clockwork timer rather than the sophisticated electronic multi-function one that he has been developing recently. An all-flying fin used a very low drag adjustment via flush grub screws in its surface that butted against a fixed vertical blade in the fuselage projecting into the thickness of the fin.

Also using aluminium wing skinning, but only on the centre panels, the Chinese F1C flyer Chen Zhijian was launching cross wind deliberately, apparently to avoid the problems caused by a frontal wind upsetting the vertical position of the aircraft before

F1C winner Evgeny Verbitsky of the USSR and new model with top-exiting exhaust.

British glider team took second place at Livno; (L to R) Mike Fantham Steve Philpott and Brian Baines.

Dave Greaves winds at Livno using a stooge system.

Our top-placing glider flyer Mike Fantham with Evgeny Verbitsky (centre) and Lothar Döring (right)

the bunt transition. He was also using a rigid bladed glass propeller instead of a folder.

Fritz Gaensli of Switzerland was using a variable pitch propeller and a torque-sensing variable incidence tailplane to control the nose-up pitch tendency at the start of the climb on his Wakefields. However, the Soviet Wakefields are still most impressive, particularly in the climb. It does surprise me that, several years after we first saw how they were achieving these rates of climb, no British flyers, as far as I know are using a prop-start-on-launch system, I am sure that this is a useful way to go, if only because it allows a far more energetic javelin launch than if the flyer is trying to release the propeller with one hand before pulling his arm back and throwing the model. The additional few turns at high torque form a useful bonus. Flyers like Alex Andrjukov get a climb like a ½A power model for a good part of the prop run; most of the rest of the field have at best a few seconds of steep climb before dropping into a shallow spiral upwards, but Ron Pollard was certainly impressive in the first fly-off round. This compensated for a heart-stopping third round time of 3:0.53 secs.

In glider our major crisis nearly occurred before the contest; Mike Fantham was taken to hospital at Livno with acute stomach pains and suspected appendicitis just 32 hours before the start of the F1A event. After blood tests and exploratory poking about he was driven back the 25 miles to the hotel up in the mountains and back again to hospital on the morning of practice day. Further tests showed that things had calmed down again, so he spent the day resting while I flew his gliders to check the trim after the flight from Britain. By contest time he was reasonably fit and we breathed again.

Both Mike and Steve Philpott maxed out and, with Brian Baines, got us the team silver medal. Our flyers' styles varied; Steve preferred to tow off more or less upwind and find his own lift without using other models as indicators, while Mike preferred to at least keep within range of other likely-looking models. Brian, on the other hand, usually waited on the ground until he felt the air was right and then towed and released fairly quickly.

We used CB-equipped runners with each flyer, both to watch for possible line tangles and to pass on information on other models in good-looking air. On one of Steve's flights the radio was vital; he had started to tow before I had checked that the timekeepers had noted the model details and knew it was a contest flight. Some minutes into his tow I realised they were not watching the model and did not consider it an official flight, so we used the radio to get Steve to abort the launch, while we flew the next team member.

An increasing number of glider flyers are taking advantage of the clear definition in the FAI's new Sporting Code and towing with a wrist loop instead of keeping the line attached to the winch. As long as they then use a timer start system that does not require a hard pull to extract the timer start pin, it is possible to release the whole line at the peak of the zoom and thus gain some extra altitude as the glider drags the line up with it, until it finally blows off the unlatched towhook. A system like John Bailey's ultra-simple addition to the Isaenko-type hook (F/F Scene, Dec. 1980) is ideal, or else use one of Tom Koster's electronic timers; quite a number were in gliders at Livno.

The Czech team had a distinct handicap; at the last minute one of their glider flyers was unable to get an exit visa, so it was left to Ivan Horejsi and Ivan Crha to cope. Andres Lepp and eventual two-in-a-row winner Cenny Breeman had a towing collision. World Champion Matt Gewain was at Livno doing a recconnaisance in case the World Champs are there next year. A Turkish team was competing, the first for a decade or more at a Champs.

Probably the matter that most concerned competitors was the very high cost of entry, and the fact that the organisers' refusal to separate contest entry and food/accommodation costs was in breach of the current FAI Sporting Code. The official Yugoslav hotel guide lists the full board charge at the Adria-Ski Hotel where competitors were housed at $17-19 per day. We were there for six nights, which could cost $114. Even allowing for the fact that the contest fee would have to cover the cost of timekeepers, banquet, coach transport (which was not needed by many people) and so on, the $300 which each team member had to pay seemed grossly excessive.

A lot of the potential problems that crop up at any Championships had not been thought through by the organisers, and their unpreparedness was revealed at a team managers' meeting that only took place after pressure from the team managers. There will clearly have to be some changes before the December CIAM meeting accepts any offer the Yugoslavs make to host the 1985 World Championships at Livno. Their plans reportedly involve accommodation at Bugojno, another 20 miles of mountain road further from the flying field than this year's hotel. While Livno is certainly a fine field, Mostar, where the 1980 Champs were held, is excellent, and has the advantage of college dormitory-type accommodation much nearer the field. The town itself has 394 hotel beds available, too; how about it, Yugoslav Aero Club?

Results.

F1A Glider

1.Cenny Breeman	Netherlands	1260 + 240 + 300 + 360 + 407		
2.Ivan Crha	Czechoslovakia	1260 + 240 + 300 + 360 + 157		
3.Radoje Blagojevic	Yugoslavia	1260 + 240 + 300 + 297		
6.Mike Fantham	G.B.	1260 + 240 + 300 + 285		
11.Steve Philpott	G.B.	1260 + 240 + 191		
26.Brian Baines	G.B.	1232		

F1A Team

1.West Germany				
2.Great Britain		3765		
3.Soviet Union		3752		
19 teams competed		3745		

F1B Wakefield

1.Alexander Andrjukov	Soviet Union	1260 + 240 + 300 + 316		
2.Mirsad Kepatanovic	Yugoslavia	1260 + 240 + 300 + 205		
3.Evgeny Gorbanj	Soviet Union	1260 +240 + 265		
4.Ron Pollard	Great Britain	1260 + 240 + 233		
23.Roy Miller	Great Britain	1192		
36.Dave Greaves	Great Britain	1145		

F1B Team

1.France			3751	
2.Soviet Union			3705	
3.Poland			3636	
6.Great Britain			3597	
16 teams competed				

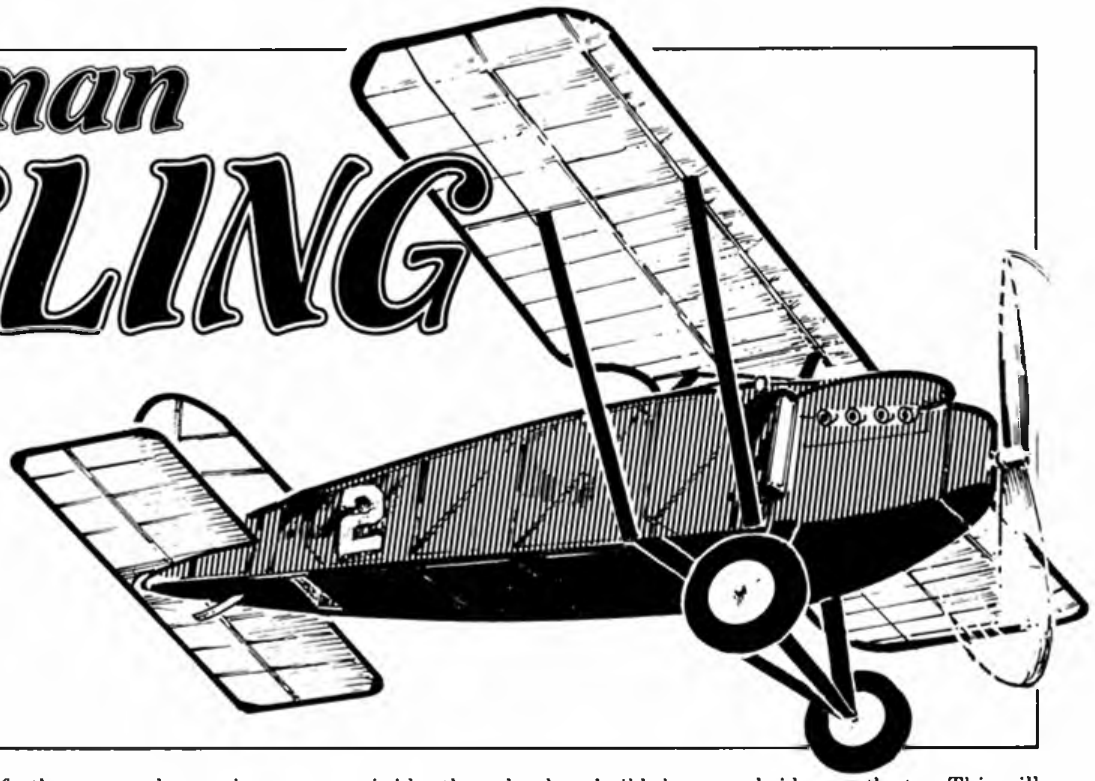
F1C Power

Chen Zhijian	China	1260 + 240 + 300 + 360 + 406		
1.Evgeny Verbitsky	Soviet Union	1260 + 240 + 300 + 360 + 323		
2.Stafford Screen	Great Britain	1260 + 240 + 300 + 360 + 277		
3.Werner Kraus	Austria	1238		
21.Alan Jack	Great Britain	1180		
30.Pete Harris	Great Britain			

F1C Team

1.Soviet Union			3780	
2.Poland			3734	
3.Czechoslovakia			3716	
5.Great Britain			3678	
17 teams competed				

Waterman GOSLING



A.J. Taylor's design for an 18in span rubber power scale model

THE 'GOSLING' is one of those aeroplanes that you either like or dislike. It is however a fine free-flight scale subject. Captain Dave Stott of the Flying Aces Club of Bridgeport, Connecticutt designed a beautiful peanut scale model of the 'Gosling' in 1966. The author built one several years ago and has had many hours of fun, flying it both indoors and out and this prompted the thought that if it were scaled up perhaps even more enjoyment could be had.

The one and only 'Gosling' was designed and built by Waldo Waterman in 1921 for the *Mercury Aviation Supply Company* and was sponsored by Cecil B. DeMille. It was built for the sole purpose of flying in the International Air Tournament race to be held in Los Angeles on July 16th and 17th 1921. The race was restricted to aircraft powered by the standard 90hp *Curtis* OX-5 engine. The 'Gosling' finished second at an average speed of 136 mph, only 1 mph slower than the winning *Pacific* 'Standard C-1'.

The 'Gosling' was mostly of wood construction and had a slab sided plywood covered fuselage. Wing and undercarriage struts were of tubular steel faired with balsa and wrapped with pinked edge tape. The undercarriage was rigid, the shock-absorbing system being the war surplus tyres! After initial flight tests the cylinder fairings were removed to cure overheating problems. In the interests of simplicity they are retained on the model.

Construction

Fuselage: Commence construction by cutting out the two forward cowling sides from 1/16 in soft, straight grained sheet balsa — note that the grain direction is vertical. At the same time cut out the inner shelf.

Pin down one cowling side and build a fuselage side onto it from 1/16in square balsa. The longerons should be firm springy strip and it is advisable to soak them in water so that they retain the appropriate curves. Glue in the uprights and diagonals from 1/16in square medium balsa (PVA glue should be used here). Leave overnight to dry. Without disturbing the side already built, remove all the pins, carefully lay a sheet of *cling film* over the side already built and build the second side over the top. This will eliminate the cut fingers trying to separate the two sides with a razor blade!

When dry and set remove both sides from the plan and on the inner faces of the cowling sides mark the line of the shelf, cement in the shelf, curving the cowl sides inwards, but make sure all is square. Leave to set hard. Soft 1/16in sheet balsa top and bottom complete the engine cowling.

Working slowly and carefully backwards from the cowling to the tail, cut and glue in the cross braces, making sure that the structure is square from all angles and does not develop a 'banana' twist either side of the centre line.

Fill in the cockpit area with 1/32in soft

Below., simple layout of the "Gosling" makes for a good introduction to rubber power scale. Note easy to obtain plastic propeller.

balsa. Bend the main undercarriage legs from 20 or 22 swg wire and cement firmly in place. Add all the reinforcing gussets where shown, and insert the small aluminium tubes that the cabane wires plug into. Tack cement a block of very soft balsa to the tail end of the fuselage and carve and sand to the shape shown. Note that the bottom of the last fuselage bay is filled with 1/16in sheet crossgrain. A 1/32in ply former is cemented to the front face of the cowl.

The nose block is made from a piece of hard balsa laminated to 1/32in ply, the plug is hard 3/16in or 1/4in and must be a firm fit into the cowl face. A hole for the propshaft bearing is drilled square to the back face of the nose block and the propshaft bearing is glued in (the original used a *Peck Polymer* nylon thrust button and propshaft). This completes the basic fuselage construction and it can now be covered with lightweight black tissue, water shrunk and doped.

Finally make up the rest of the undercarriage fairings from hard 1/16in. sheet. Wheels were made of balsa laminated to a 1/32 in ply core and bushed with aluminium tubes. The headrest was carved from very soft balsa as was the cockpit coaming.

Above.. simple scale detail enhances this finished appearance no end, exhaust pipe could be made from a variety of lightweight materials.

Wing: Wing structure is entirely conventional. All ribs except the two centre and the ribs that carry the struts are 1/32in balsa, centre ribs and strut ribs are 1/16in balsa. Pin down trailing edge and two lower spars. Cement in all ribs except the two centre ones, when dry cut leading edge, spars and trailing edge on the centre line. Prop up wing to dihedral indicated and glue in centre ribs and upper spar. Add all the gussets. When set, carve and sand leading edge and trailing edge to correct aerofoil. The wing is covered in red lightweight tissue, water shrunk and given two coats of dope. Pinning down between coats to avoid warps.

Tailplane and Fin: The construction of these two items is quite straightforward. Note that the spars in both should be very hard, and that the ribs should be cut as square as possible to avoid warps — particularly in the tailplane. Tailplane and fin are covered with red lightweight tissue and given two coats of dope.

Cabanes: The cabanes are made from 22 or 20 swg wire faired with soft 1/16in. sheet, covered with black tissue and epoxied into the aluminium tubes set into the fuselage ensuring that they are vertical. When set the 1/16in. diameter diagonals are added.

The radiator is made from scraps of balsa and card. The front and rear faces being covered in gold, silver, paper from a cigarette packet. All other surfaces being painted matt black.

Cylinder fairings and exhaust pipes: The cylinder fairings are carved from very soft balsa. The exhaust pipes on the original were short lengths of aluminium tubing. There is an awkward curve on the edge of the cowling where the fairings fit, but patience and a little filling will conceal any small gap.

Assembly

Firmly cement the 1/32in ply tailskid in a slot cut in the last bay of the fuselage (you did remember to fill it in?) Drill two holes in the centre ribs where the ends of the cabanes stick up. Fix wings using two drops of epoxy, ensure that all is square and leave to set. When set measure the distance from the strut 'rib' to the appropriate point on the fuselage. Cut struts to exact length from hard 1/16in balsa — sand to aerofoil section. Cut strips of black tissue approximately 1/2in wide and cover struts by winding from one end. Dope well and when dry cement into position. Remove the little tail cone and cut a groove right across deep enough to hold the tailplane spar. Cut another groove from the top to take the fin spar stub. The groove for the tailplane spar should be exactly horizontal and that for the fin exactly vertical in relation to each other and the faces of the tail cone.

Insert tailplane into the groove and offer up to the fuselage. If everything is square recement the tail-cone containing the tailplane to the fuselage. *Do not cement* the tailplane. The fin spar is trimmed until the fin sits on the fuselage top, then cement into the tail-cone. Finally attach the radiator and wheels.

Flying

The original model was fitted with a 7in *Keil Kraft* plastic prop and with a single loop of 1/4in rubber approximately one and a half times the length from hook to rear peg. The model was balanced on the line of the wing top spar. The author always trims his models with a short motor and just a few turns, so that some indication of the natural turn is evident from the first few flights. Needless to say the legendary calm air and long grass should be located, for all test flying. As these are not often found, it is probably better with a small model such as this to try low powered R.O.G's. As the model rarely gets high enough to do any real damage if something is seriously wrong.

This particular model showed the same flying tendencies as the peanut scale 'Gosling', i.e. a slight nose up banked turn to the right probably due to slight extra drag of the radiator.

The prototype 'Gosling' flew round a two lap pylon course in the 1921 race and probably did not fly at any great height. The model has been trimmed to try and emulate this sort of flight pattern. The natural right turn has been emphasised slightly with a 1/32in ply shim to give one or two degrees right thrust and judicious tweaking of the whole tailplane ensures that as the rubber goes into the 'cruise' it is flying fairly level at about 12 to 15 feet high. The model generally lands with just a few turns remaining on the motor. When the model has been trimmed a drop of cyano will fix the tailplane permanently.

Left., the radiator on the fuselage side is a prominent feature of the "Gosling".

Mini replica of a popular design of the '30's. Designed for CO_2 power by Noel Crane described by Phil Smith

Comet II

TO THOSE WHO were at the Aeromodeller Vintage Days at Old Warden, many and various were the fascinating Vintage replicas of pre-war 'Gas-powered' pioneering planes of the late 30's — but one particular 'Gas' propelled little beauty' the *Telco* Co2 powered mini-replica of the 'Comet II' built by Noel Crane of Poole in Dorset' was particularly attractive.

Noel is lucky enough to have all the references for a perfect miniature, for he still has his original *Veron* 'Comet II' built in 1937! This model flown in pre-war days with a *Brown* 'Junior' petrol engine, was in fact built by Capt. S. T. (Tommy) Grant, D.F.C., R.F.C. and his son Derek Grant. Tommy was for many years a member of staff at *Veron* at their original address at Hankinson Road in Bournmouth. In those days, the firm sold 'ready-built's' as well as their kits all neatly packed in plywood boxes!

The original design of the 'Comet II' must of course be credited to A. E. Brooks, the General Manager of *Veron*, though the plans and kit art-work were created by Bill Forster, the active modelling Secretary of the company, who incidentally was responsible for the drawings of other *Veron* designs, notably the 'Sky-Rocket', featured in the *Model Aeroplane Constructor* — precursor of the *Aeromodeller* — back in the year 1937!

It is interesting to note that Tommy Grant chose to build Noel's "Comet II" utilizing 1/32 in. ply for formers and sheeting, with Red Deal (Oregon Pine) for all structural members, except that the wing mainspars were full depth hard balsa (that new-fangled building material), also sheeting the tailplane and fin with 1/32in balsa — earlier versions were not sheeted, being usually just silk covered.

So Noels' model is a compromise, having top and bottom spars, but in balsa — and a fully sheeted fin. Derek Grant, now retired, has confirmed much of the detailed data by which the author has built an accurate full size replica. Seen with Noel Cranes miniature in the accompanying photograph.

The building of this 23in span 'Mini' relies much upon accurate and precise cutting out, shaping and assembly. Noel's model is powered by the *Telco* Turbotank 3000 which makes installation a 'doddle', though the standard *Telco* 1000 with separate tank and charging nozzle can easily be adapted. The *Telco* instruction data gives detail installation details, though it must be stressed that with this motor, the tank must ALWAYS be installed upright. There is ample room for this to be packed in front of former 'B'. With balsa longerons and members, the only deviation from the original construction is the use of plywood formers. Select your balsa very carefully.

Construction

The most accurate method of reproducing plywood formers, balsa outline members and rib sections is to pin-prick outlines through the plan, pin-pricks at least ten to the inch. Straight edges on ribs and formers are best cut along a steel straight-edge. If fitting the 'Turbotank', the front 1/16in. ply former 'A' has the centre circle cut out to 11/16in. (17mm) diameter to accommodate the tank, or, if fitting the standard *Telco* 1000, leave intact.

Cover the plan with waxed or greaseproof paper, not only to protect it from building adhesive but to ensure the building of successors to this fascinating little model!

Steam the lower longerons to form the only curve, all other joints and changes of angle are scarf-joints, Use P.V.A. glues. Build two accurate identical sides using the same pin locations either side of members (never through). Join fuselage sides with Formers 'A', 'B' and 'C' to which top edge and bottom edge crosspieces have been accurately cut to match the corner cut-outs. Use rubber bands to 'clamp' whilst drying, checking for squareness with set-square and alignment end-to-end over the plan. A 'whiff' in kettle steam will permit the scarfed top longerons just aft of Former 'C' to be pulled in for the even taper to the rear. Cut all crosspieces in matching pairs for top and bottom. Do not omit the two gussets in the nose structure for the undercarriage tubing.

If fitting the *Telco* 1000, mark and drill two holes for attaching the motor. Secure the nuts to the rear of the ply bulkhead with epoxy-glue to permit the 10 B.A. bolts to be screwed and un-screwed for thrust adjustment. The tank is best secured by inserting into a close fitting hole in a block of polyurathane foam, itself neatly fitted into the space before former 'B'. The tubing to the motor can be coiled to reduce length as required and lead out to the motor cylinder via the 'windshield'. Attach the charging nozzle to a small 1/16in ply mounting plate set just aft of the nose former on the port fuselage side. Fix the nozzle with the two bolts (or screws) provided in the *Telco* kit.

The fuselage front may now be sheeted with medium quality 1/32in. balsa sheet, as detailed on plan. Noel's model had very neat windows cut out with curves reamed out with sand paper wrapped around dowel. Cellophane was stuck behind each cut-out including the front windshield. Non-purists may ease the detailing by painting on after covering and doping!

Neatly drill holes either side of fuselage to permit insertion of two lengths of 20 s.w.g. aluminium tubing for undercarriage wire location. Push through and fix with epoxy glue, the gussets in these areas strengthening the undercarriage attachment. Also use epoxy to fix the wire tail skid.

Cut out 20 ribs for mainplanes from light quarter grained stock, using a 1/32in. ply template pin-pricked out from section on plan. Cut slots in trailing edges — these are unusually deep, 5/32in. but are very efficient! Pin trailing edges in place, also lower spar. Fit all ribs, canting the two base ribs to allow for dihedral. Add top spar (both spars have centre-section extensions) then slot in the leading edge. Join two diagonally-grained tip pieces together on the flat — but set 'off' the board between the trailing edge and the raised leading edge — see dotted aspect on rib section drawing! Top and bottom spars may now be 'cranked' and 'scarfed' to brace the tips.

Plate-gussets for the mainspars are detailed on the plan as well as scarfed gussets for the level centre-section. Glue in place offcuts of leading and trailing edges, all this whilst supporting each wing tip 3in

Continued on page 627

RACING with Jim Woodside

Three Sisters Gala

For the first three years of its running this excellent event was billed as an international contest for FAI class models. However, the meeting stayed very much a domestic affair and so it was decided to open the meeting to S.M.A.E. classes. I think most people welcomed this change as it made the two day event more a "mini-Nats". It is likely that the new format will continue into future running of the event.

Saturday 30th June

Goodyear and ½ A were run on the three round system with the fastest three times going into the final.

Results

½ A T/R — six entries

1.	Heaton/Woodside, Sharston	3:4	7:47	Sesqui
2.	Hill/Metcalfe, SCLAMS	3:48	8:02	Oliver
3.	Horton/Haworth, Wharfedale	3:39	RTD	Special

G.Y. T/R — ten entries

1.	Schofield/Needham, Stockport	4:05	8:27	Rossi FI
2.	Andrews/Horwood, S. Bristol	4:12	9:29	Nelson
3.	Cotterell/Ward, Bilston	4:15	RTD	Rossi FI

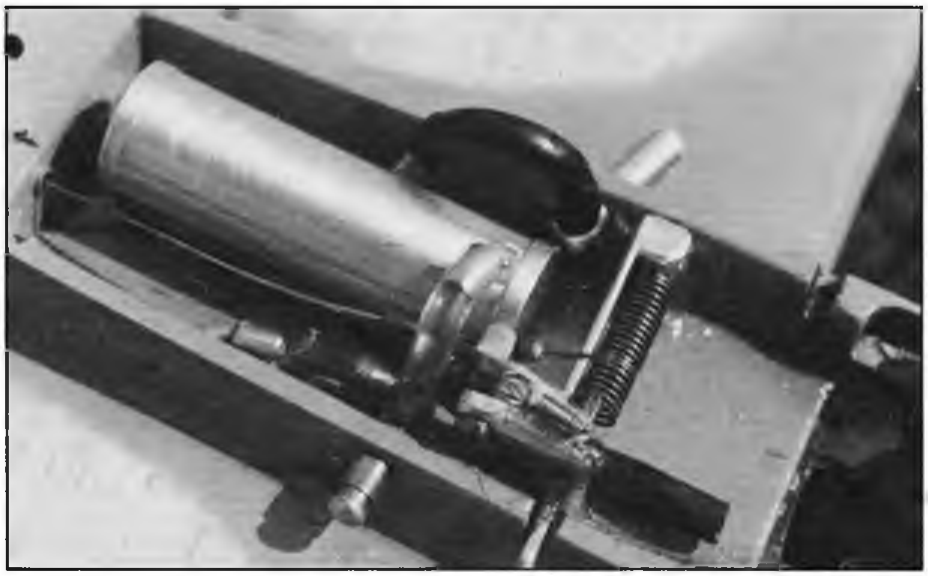
Sunday 1st July

F.A.I.: The fact that there were nine entrants meant that all teams would go through to the semis. As a result there was some demand for a three round contest. However, the organisers took the view that the numbers were merely co-incidental and that the event would be run to the F.A.I. Sporting Code. Thanks are extended to Graham Bryant for his third stint as foreman of the jury.

FAI T/R — nine entries

1.	Sladdin/Ross, Novos	3:40	3:41	7:28	Nelson
2.	Smith/Thorpe, Feltham	3:41	3:42	7:35	Cipolla
3.	Oddy/Horne, Grantham	3:46	3:49	8:31	Nelson

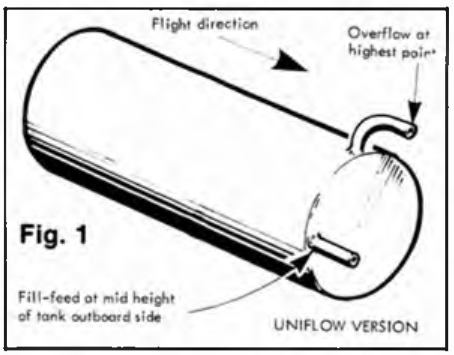
The organising committee do feel the new format to be a welcome improvement. There are now no less than ten different control line events on offer. We look forward to your support in 1985.



Above; Don Howarths circular tank set up as reguflow. Thumb operated valve in the foreground opens overflow while the tank is filled through the vent. Spring loaded device is a simple rat trap fuel stop.

Tanks for team-race models

At some time or other most of you will have suffered the problems associated with a leaking tank: a lean needle, variable laps, etc. Certainly this past year I seem to have more than my fair share of this malady. The obvious way to reduce leaking seams and corners is to reduce their length and number. The traditional front feeding tank has about 8 in. of seam and eight corners. I was thus impressed by the simplicity of the tank used in the ½ A racer of Don Haworth which placed first in the 1984 Nats. The basic tank is no more than a length of aluminium tube onto which end caps have been fixed with slow set epoxy Vents and feed pipes are similarly fixed with epoxy in positions to suit one's system. In the accompanying photograph the piping is for a reguflow system in which the tank is filled through the vent pipe by opening a valve attached to the tank's overflow pipe. The Soviet team of Kramarenko — Kutnetsov used a circular plastic tank (directly built into their filling and priming system) in the model they used to win the European Champs in 1983. This proves the worth of these 'simple' tank designs and so I will be trying one next season. See Fig. 1.



It strikes me that cigar tubes might provide a ready made source of lightweight tubing. Those with access to a lathe could taper turn the body which would obviate the need to set a parallel sided tank at an angle across the fuselage long axis in order to make it front feeding. It would also be advisable to bake the tank in a warm oven for twenty minutes in order to fully cure the epoxy.

A second area in which I have experienced trouble this year has been with a very lean, unreliable engine run, during the critical first few yards of take-off. Once airborne the engine run was acceptable. I will not bore you with the intermediate steps, merely say that the solution to the problem was in the positioning of the tank overflow. In both of the tanks sketched below (fig 2) the filling system used is the single fill-feed variety as commonly used on *Nelson* type engines. For reasons I cannot explain, the lean take-off problem does not seem to affect systems with separate fill and feed, i.e. *Bugl* and *Cipolla*.

In the case of my own models the tank overflow is connected by rubber tubing to a

Below; tank and filler are both held in place by the carburettor body on Hugh Lorimers integrated system. Wire loop is the cut out trip mechanism.

Below; Hugh Lorimer uses perspex to fabricate his tank, the overflow has "I" connection to prime the exhaust when tank overflows.

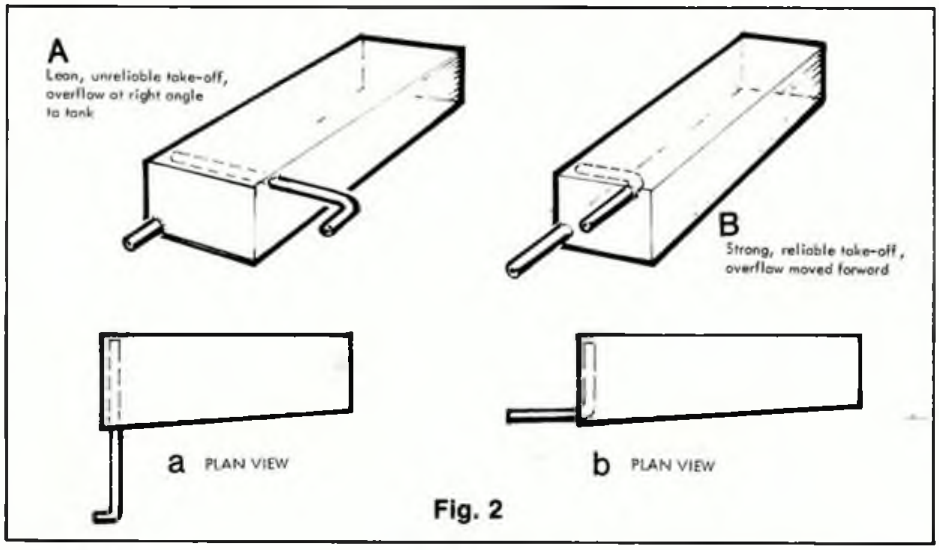


Fig. 2

pipe glued into the fuselage just below the filler valve. John Daly drew my attention to the positioning of the overflow on Goodyear model tanks, which is substantially as in fig 2b and for similar reasons. My thanks to John for directing me in the right direction.

The message is clear. If you are having trouble with a thin take-off try moving the position of the tank overflow forward. In the first instance an extension piece of fuel tube would be sufficient to illustrate an improvement. Can anyone provide a scientific explanation for these empirical solutions? I for one, would like to know why.

Finally in this section is an illustration, Scots enthusiast Hugh Lorimer's fully integrated tank and filler system. Apart from the valve slider and the needle valve from a *Rossi* the unit is fabricated from perspex and assembled with *Tensol* cement. The unit is light, reliable and gives maximum access to the 7 cc tank capacity. As no piping is used the engine stops almost immediately on operation of the shut-off trigger. The engine, by the way, is one of the latest *Cipollas* using lugs designed to mount direct to the fuselage.

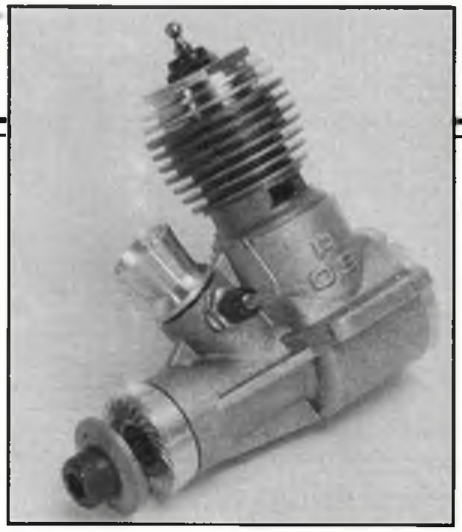
Engine review: Rossi 09

My thanks to long time racer Chris Coote of the South Bristol M.A.C. for this review of the new *Rossi* 09 engine. Built very much along the lines of a robust *Cox* at a reasonable price it provides a good quality motor for small control line models such as mini-Goodyear and ½ A Combat. Certainly the parentage is first rate which means it might well be worth investigating.

This new engine from *Rossi* is in marked contrast to their other motors in that it is a very simple plain bearing, non schneurle ported engine aimed at the lower end of the market. However, the finish and fits are what we have become used to expecting in their larger engines and the performance is excellent for such a simple motor.

The construction follows closely that which was pioneered by *Cox* for small glow motors. The cylinder is machined with integral fins and twin opposed transfer ports which nearly overlap the similar twin exhaust ports. This screws into a substantial gravity die-cast crankcase incorporating a stub for the separate aluminium carburettor choke. The piston is a light weight steel type, hardened only on its bearing surface and uses a peened ball and socket little end to connect to the thin steel con-rod. The hardened crankshaft runs directly in the case material to give a simple plain bearing. This is despite the fact that the crankcase has a ball race type housing cast on the front end, perhaps this is for future development! The cylinder head is a conventional aluminium turning screwed directly into the cylinder and sealed with a thin copper gasket. A conventional glowplug is used, so the cost of replacement is reasonable. One nice feature is the use of a stubby crankshaft with prop attachment via a standard M5 bolt screwing into the crankshaft nose, this should make it nearly impossible to damage the shaft in a crash.

The standard carburettor choke is 6.5mm dia. obstructed by a standard rather large 4mm *Rossi* spraybar, giving an effective chok area of some 7sq. mm. Running on 5% nitro fuel my engine appears to peak at about 20,000 r.p.m. giving approx. 0.2b.h.p. Typical prop r.p.m. figures my optical tacho are: 7x4 Topflite — 14,000; 6x4 Cox 15,700; 6x4 Topflite 19,800.



Below; the new Rossi 0.09 cu. in. motor in pieces as a whole. Parts show a marked similarity to the Cox.

Obviously more power is available by opening up the choke and using more nitro. A quick check on 20% nitro showed about 1500 r.p.m. more on fast 6x4 props (circa 20,000 r.p.m.) and *Rossi* claim 0.5 b.h.p. at 19,000. I feel that my motor at least will have to run quicker than this to give such power!

My motor came from Turbofan of St. Johns Road, Clevedon, Avon and at the time cost £19.50, very reasonable for the quality and performance produced.

VINTAGE with Andy Brough

Vintage Control Line

Whilst it may not be apparent from most vintage reports, vintage control line interest is increasing rapidly especially if the recent Aeromodeller Vintage Day at Old Warden is anything to go on. A rough guess at the number of control line models would have to exceed 100 and this including most types of model: speed, stunt trainers, but very few scale.

Understandably, the majority of models were of the stunt variety and a stunt comp. to the 'old' AMA schedule was organised and proved popular. I expect this branch of vintage activity to grow significantly provided the competition doesn't become too serious and the earlier British style stunters are encouraged perhaps by extending the dates for British designs up to 1955(?)

Its very surprising to me how many people reproduce some of the very early models that motor sedately round and round, but its certainly a safe way of running those old spark motors!

One area pretty much neglected until this year was speed. This was one of the most popular activities for 'roundy roundy' types in the late 40's and early 50's, so with this in mind earlier on this year, I decided to run a one design speed comp., namely 'The Midge'. Unfortunately, the venue was the free flight Nats and we all know what the weather was like then. The event was therefore postponed until Aeromodeller Vintage Day. This was a great success not just in terms of the entries, nine, but in the way that all those who took part thoroughly enjoyed themselves. The speeds were pretty poor really, even by vintage standards, but this was lack of practice in most cases. It was very fitting that the winner, Geoff Clarke, used an Allbon Javelin in his 'Midge', which is the motor shown on the plan.

Do build one for next year as the event will be repeated, but as a word of warning increase the size of the elevator because in its original size The 'Midge' seems lacking in control at anything but full bat.

The rules are:

1. Model must comply with the 'Midge' drawing (except elevator).
2. Any 1.5cc plain bearing diesel.
3. Line length 35ft. — lightweight Laystrate

The results of 'The Midge' comp. at Old Warden. Best flight of two. the winner receiving the "Lancastria" Cup originally presented to the Lancacshire M.A.S. in 1935 by C. Greenhalgh (Alwyn's father). The event was run by the Whitefield Club.

Vintage Speed

Best time for ½ mile (6 laps)

1	G. Clarke	11.9	(75.6 mph)	Javelin
2	D. Roberts	12.5	(72 mph)	PAW
3	S. Belney	12.9	(69.7 mph)	PAW
4	J. Noble	13.0		Elfin
5	K. Reeves	13.2		PAW
6	R. Prentice	14.2		AM 15
7	P. Michel	14.3		PAW
8	A. Brough	14.4		PAW
9	K. Garbut	5 laps		PAW

½A TEAM RACE
Dave Clarkson

Dave Clarkson
1984 Nationals: ½ A Team Race

A healthy number of entries, a new heat record and one of the best finals in recent years meant that ½ A Team Race at this year's Nationals was a fine competition. The weather certainly helped as ½ A models are the most sensitive to wind (of the various forms of control-line racers), because of their small size, low weight and relatively small power.

Fast times in the heats and semis were anticipated before the Nationals, as many teams had exceeded last years winning times. We were not to be disappointed for no less than four teams bettered the existing SMAE heat record of 3:50.

Team	Time	Motor
Horton/Haworth	3.38	Haworth Special
Heaton/Woodside	3.40	1.5 cc FMV
Clarkson/Needham	3.42	much modified Sesqui
O'Neill/Bollen	3.48	much modified Webra

Horton/Haworth's heat time of 3:38 is of course a new SMAE heat record. Note that all of the motors named are far from standard production items. Sadly, the schnuerle *Oliver* 'Cubs' of Hill/Metcalf, Rudd/King and Wilson/Campbell, all of which would have been most competitive last year, were outclassed by the specials. Even the diesel converted *Webra* 'Speedy' of Davies/Banks (last year's winners and previous heat and final record holders) was short of pace. It seems that to compete now in ½ A team race you need a rather special motor.

The three qualifiers for the final had quite different models and motors. Horton/Haworth were using a very high aspect ratio elliptically winged model of 900mm span which featured a tiny tail incorporating a great deal of anhedral. Its motor was made entirely by Don Haworth and includes disc-valve rear-induction and an AAC piston/liner assembly. Heaton/Woodside had a small bore *FMV* motor in a very attractive model with eliptical wing and tail.

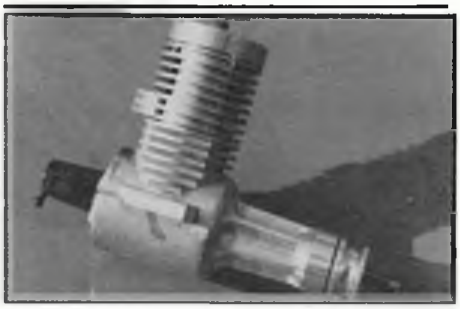
Clarkson/Needhan's model had a rather basic straight taper wing and tail with an underfin and a motor based on the Australian *Sesqui* parts. In fact, only the crankcase, backplate and induction drum were original; the shaft and head being made by Ed Needham and the ABC piston liner assembly by Don Haworth using a 'small insides' *Nelson* piston. All three teams had different race plans too, with Horton/Haworth going for 40 laps, Heaton/Woodside, 33 laps and Clarkson/Needham 50 laps.

In perfect weather conditions and with probably three of the best 1.5cc motors in the world — the final record seemed certain to fall. This was not to be, for in the race Horton/Haworth's motor was set a little undercompressed and their amazing 105 mph airspeed was not often seen. In contrast, Clarkson/Needham's motor had a little too much compression giving a very hot motor at each pitstop, resulting in 7 flicks, 7 flicks and 11 flicks respectively, which meant too much ground time. Meanwhile, Heaton/Woodside had a lovely setting and were going well until their fourth stop which inexplicably took almost 25 seconds and with it their chances of victory. Still, it was an exciting race and a quick one too, but one is left wondering what it might have been...

Nationals ½A

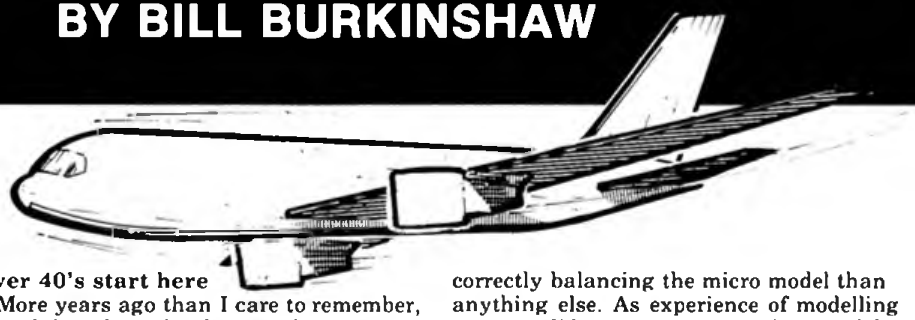
Results

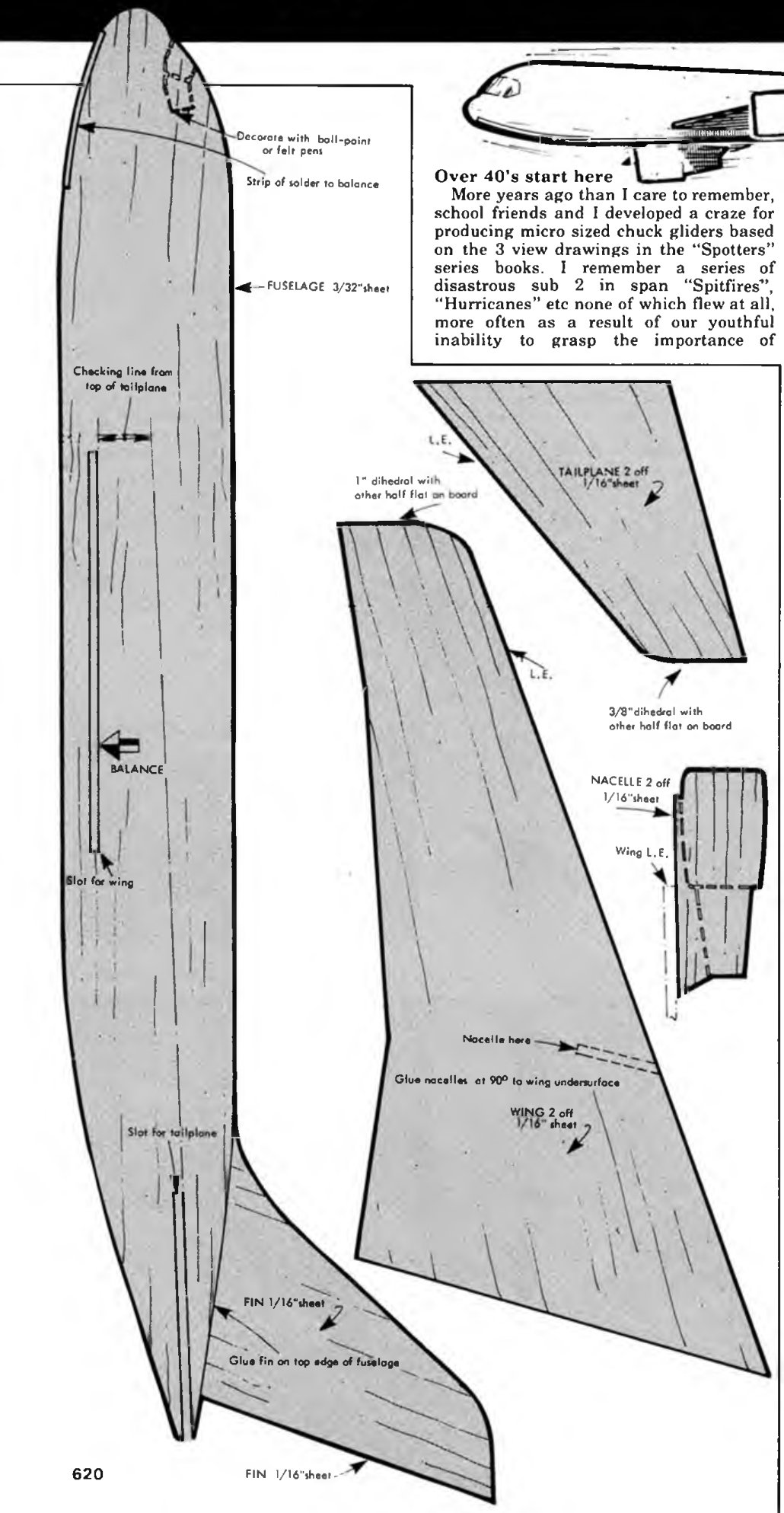
1	Horton/Haworth	7.38
2	Clarkson/Needham	7.47
3	Heaton/Woodside	8.05



Above; Don Haworths purpose made ½A motor took 3rd place at the Nats. Below; vintage control line at Old Warden attracted 9 entries to a "Midge" event.

767 SIMPLE SHEET BALSA CHUCK GLIDER BY BILL BURKINSHAW





Over 40's start here

More years ago than I care to remember, school friends and I developed a craze for producing micro sized chuck gliders based on the 3 view drawings in the "Spotters" series books. I remember a series of disastrous sub 2 in span "Spitfires", "Hurricanes" etc none of which flew at all, more often as a result of our youthful inability to grasp the importance of correctly balancing the micro model than anything else. As experience of modelling grew, so did an appreciation of some of the finer points of design and such scale chuck gliders became more successful.

The advent of big jets such as the "Comet" provided a whole new source of exciting outlines for micro chuck gliders but by this time other interests had taken over and little advantage was taken of the challenge presented. This *Boeing* 767 chuck glider was produced as an "off-the-cuff" response to that little rule in the competition in this issue for a go on the Britannia Airways Simulator, preventing employees of the publishers entering the contest. If I couldn't fly a "767" one way, there was certainly another way I could have a go!

Now I would be the first to admit that flying my '767' does not quite have the appeal of a pukka simulator, but it can get you outdoors for fresh air and exercise and believe you me, there is a challenge in getting such mini gliders to fly half reasonably.

Under 12's start here!

The *Boeing* 767 is an ultra modern "Big Jet" flying the airways every day to exciting places carrying business people and holiday makers swiftly in comfort to their destinations. Big jets fly very fast and only need small wings so this simple model cannot be an exact scale replica, otherwise the wings would be too small for a slow flying model chuck glider.

To make your own *Boeing* 767 you will need some $\frac{1}{16}$in. (1.5 mm) balsa wood for the wings and tail and some $\frac{3}{32}$ in (2 mm) balsa for the fuselage. Of course glue is a must, either P.V.A. white glue, balsa cement or quick-set epoxy are all suitable.

1) Put the plan over the balsa wood and prick the shape of the parts through. Also prick through the markings onto the wood.
2) Colour the panel lines, windows, doors etc with fibre tipped pens. You can of course choose your own colour scheme.
3) Cut out all the parts — fuselage, 2 wings, 1 tailplane and fin.
4) Join the wings together, propping up the tip of one wing by 1in. (25mm) until the glue has set, similarly join the tailplane halves with $\frac{1}{16}$in. (4mm) dihedral.
5) Slide the wings and tail into place and glue. Add the fin.
6) Add a piece of cored soft solder to the nose as shown.
7) Now try a gentle hand launch. If your '767' rears up then plunges down, add some more weight — push pins into the nose. If it dives straight down remove a little of the solder.
8) When the '767' glides reasonable from a gentle launch try a hard *banked* launch. With the correct angle of bank the '767' will climb rapidly to around 25ft (8 metres), then glide down. With too small an angle of bank, '767' will loop the loop. Have fun!

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1 The competition is open to all UK and Eire readers except employees of Argus Specialists Publications Ltd., their printers and distributors
2 As long as an original cross-word from the magazine is used for each entry there is no limit to the number of entries per person. Photocopied cross-words will not be accepted.
3 All entries must be postmarked before 31st December 1984
4 The prize will be awarded to the first correct solution drawn
5 No correspondence will be entered into about the competition results, the judges decision is final
6 Winners will be notified by post and the results will be published in a future issue of the magazine

CROSS-WORD CLUES
(All Down. L to R.)

1) Kiln Stabilised
2) British top '20'
3) Aeromodeller Plans
4) Regular Scale in A.M
5) Aeromodeller belongs to?
6) Have you read the Indoor report
7) Not a quiet corner for the oldie
8) Model across the water
9) 100 and 80 look the same

The answers to all of the above clues can be found in the pages of this magazine

BALLARDS R.T.P. HELLDIVER

Ian Peacock reviews a profile scale electric R.T.P. model kit.

THE VERY MENTION of the subject of R.T.P. brings back much nostalgia, not that, at my tender age of 21 and a bit, does my memory go back to the great Dorland Hall days!

In fact since the halcyon days prior to WWII, electric round-the-pole (R.T.P. for short!) flying has ebbed and flowed through a series of high spots and doldrums but looks as though it will be with us for ever.

I was a pupil of Harry Butler (of R.T.P. fame) and was involved in much flying of this type of model in the '60's and '70's.

After Harry's early retirement due to poor health *Keil Kraft* picked up his product range, yet somehow never seemed to provide the sparkle that had accompanied Harry's success at the pole. However, as with previous declines, a rise to popularity inevitably follows and school clubs thrive again with the great H.B. tradition now firmly in the hands of David Ballard from Tunbridge Wells. A large slice of the H.B. range is now available with improvements and re-designs cropping up from time to time. Amongst these is a *Ballard* original in the form of a kit of parts for the *Curtis* 'Helldiver'.

Quite why the 'Helldiver' was chosen escapes me, for in profile form, the more well known aircraft, or should I say, more easily recognised, tend to be a better bet. The 'Helldiver' was a continuation of a long line of successful *Curtis* produced naval dive bombers and saw sterling service in the hands of the U.S. Navy and Army Airforce in most theatres of the Second World War. Yet, strangely it does not share the glory with such universally recognised names as 'Mustang', 'Corsair', and 'Lightning' to name but three.

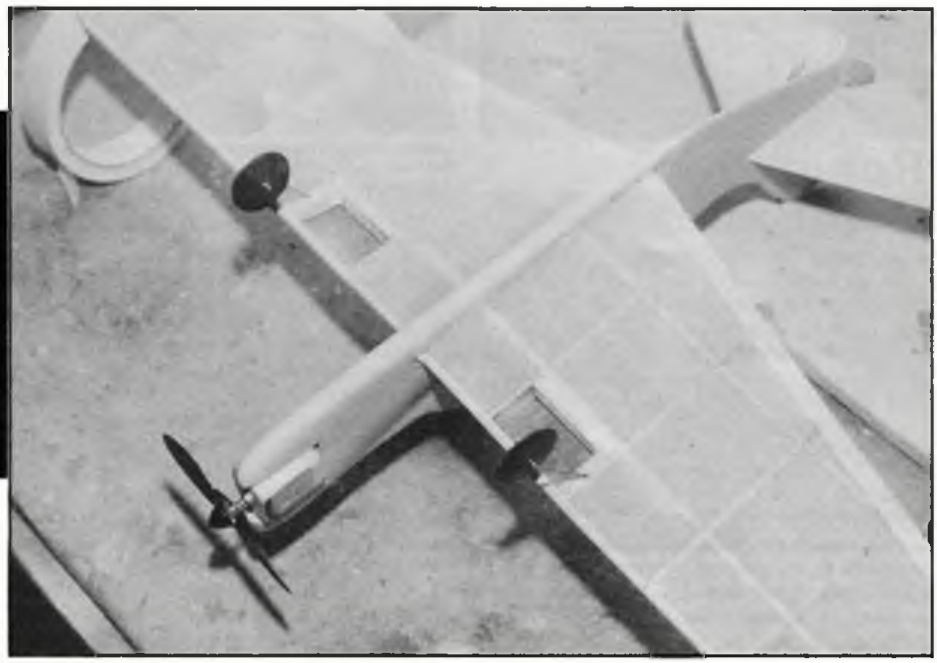
Nevertheless *Ballards'* model makes up into a pleasing replica of the real thing as can be seen from the photographs. I gather from David that this was his first venture into kit production, and being somewhat new to the problems, the initial batch of kits were below the standards he had set and he had to recall them and start again. It seems that this was a lesson well learnt for the kit as presented today is as good as we have come to expect from the U.K. manufacturing trade!

Construction is not difficult and should be within the reach of almost anyone with just a small amount of experience. The kit features die-cut parts but on the sample we built, the die-cutting was not as good as it might have been. Wood quality was mixed with some light and some heavy. A little effort expended to grade wood or select hardness for the job in hand would be an improvement for the future. However, grade of timber aside, half an hour with a knife had all the parts ready to assemble. Assembly itself took only an evening, even taking into consideration that wing ribs require some trimming to obtain a correct fit. Wing halves are built directly over the pictorial plan which is quite clear and well illustrated.

The fuselage, is a profile, based loosely on scale (but more than adequate for the job) and is die-cut from 1/8in sheet. It features traditional tapered doublers (also of 1/8in sheet) and requires the minimum of sanding to reach a finished state. Tail surfaces are die-cut from sheet and require only sanding to reach the assembly stage. Rudder and elevators are adjustable and wire/paper bag closures are recommended. (It would have been a nice touch to have included one in the kit!)

Light-weight tissue is provided to cover the wing and there is ample, for the enthusiasts to cover the fuselage and tail assembly if they so desire. I gave the bare wood a light coat of *Hobbypoxy* finishing resin, rubbing well down, rather than follow the tissue, dope, sanding sealer route, but either method is acceptable. Alternatively one could colour the fuselage and tail with felt tip pens, adding panel lines etc. with ballpoint pen and ruler. When covered and doped, the wing is fitted through the die-cut hole in the fuselage which is somewhat undersize (deliberately, to allow it to be trimmed out to fit the wing — as, with

Below., inside view of the "Helldiver" airbrush used to good effect to make this simple model a deal more realistic.



Above left., L.H. wing assembled onto spar soon to be followed - (as in above right) with R.H. wing. Spar halves are joined with a balsa doubler dihedral brace. Left., close up of the motor, line attachment and power connection. Note very simple propeller fixing on motor.

youngsters and novices building it the wing may well vary in size by the odd fraction of an inch!).

Because of the design of the undercarriage, it is recommended that it be fitted after wing/fuselage joining and this brings with it the recommendation to remove the tissue from the underside of the wing in the relevant bays. Refer to the plan for the *correct* bay to remove, for the instructions call for the *wrong* bay to be cut away. The U/C legs are pre-formed from about 18 swg piano wire and in theory fit directly into the bay as shown. Ours were not the most perfect fit and small off-cuts of scrap balsa were used to re-inforce this area prior to re-covering and re-doping. This is not a bad way to overcome the U/C problem and is really only a minor irritation. A light coat of colour dope and a few discreet panel lines added with the ubiquitous airbrush had the 'Helldiver' ready to receive it's transfers. These appear to be a standard proprietary transfer set. There is no pictorial reference to where they go, nor do they match the box art. Furthermore, none of my reference works show 'Helldivers' with this style of marking. However, one does not suppose that the purist will build this style of model and to the average R.T.P. flyer, a transfer is a transfer, whether it be right or wrong.

There is no tether hook provided and the instructions suggest straightening out a paper clip. This was thought to be too flimsy for trimming, so a new hook (only a few seconds work) was made from 18 swg piano wire.

Ballards recommend two types of electric motors, one for beginners and one for the more experienced. We tried one of each. Unfortunately, even after careful checking that there was less than 12v *at the motor* (allowing for volt drop down the line it is *essential* to monitor the voltage *at the motor*, and with the *motor running* to boot!) neither of these motors lasted long enough to adequately assess the performance of the "Helldiver". We are unsure whether this is common to all, or whether we have been unlucky in obtaining a bad sample. Conversation with other R.T.P. orientated clubs does tend to suggest that care should be taken when running these motors at the upper voltage limits. We would welcome letters from readers who have anything to say on the subject.

However we carried on by the simple expedient of dragging out a ten year old *Harry Butler* FT26D which made the 'Helldiver' really power-on! Initially some difficulty was experienced in trimming the model and despite lines of only 12 feet length, a goodly amount of tip weight was required. Even then the model has a tendency to Dutch Roll.

Half a dozen trimming flights got the measure of most of the problems and now the 'Helldiver's' performance is satisfactory. The position and flexibility of the undercarriage make it almost impossible to land without bouncing — I feel that 16 swg legs would be a lot better.

Altogether the kit goes together reasonably well, takes only a short time to build, and looks and flys quite satisfactorily. Performance is not in the sparkling category that prototype versions led one to expect. However despite this, we have very little in the way of new model kits appearing for this fascinating branch of the hobby, and every little helps. The 'Helldiver' is a welcome addition to the existing stable and it is to be hoped that as his experience grows David Ballard will continue to turn out more and better kits.

As to my sample — now that the review is complete, it will be rapidly fitted with an arrestor hook so that it can join my 'Corsair' profile model in the thrills and spills of carrier deck flying!

Left, no not the result of a poor landing! But a view of the completed model showing how the addition of pseudo undercarriage wells can improve the overall impression of scale appearance.

INDOOR NAT'S '84

Report by Bob Bailey

CONTRARY to the format used on previous years, the Nationals were held over a normal weekend instead of over a Bank Holiday. This change was to some extent forced on the Indoor Technical Committee since at the time of fixing the indoor programme, the date of the Free Flight Nationals was not known and a clash was to be avoided at all costs!

Saturday

The weather was good, but the attendance could have been better. Whether it is shopping day or what, the attendance on the first day has usually been a bit thin.

EZB has generally the best support these days — it was nice to welcome Doug Barber from the East Coast of U.S.A. (Lakehurst county) over for a fortnight's holiday. He, ably assisted by Mike Colling, is campaigning for U.S. EZB rules similar to ours — they have gone back to unrestricted weight, no boron etc., bracing and, I believe, paper covering. Precisely what we have abandoned!

He had problems getting the height in Cardington, which is nothing unusual for the first visit, but gradually got things right. It was one of those odd days when nobody except Bernard Hunt really got it all together — it was certainly 20 min. weather as he clearly showed us. Laurie Barr managed a 20 this time having just missed it by one second earlier in the year. I was somewhat surprised to end up third, with flights which indicated that rather more was quite possible!

Since there were 7 experts and 7 novices, a **Pairs Event** was cobbled together (drawn from the hat) and the combined times of 'novice' and 'expert' taken. Dave Yates and Tom Jolley were the most consistent and only just piped Robert Jones and myself into second place. Their turn now for the large shield (not quite as big as the Farrow!).

Peanut duration, which has been very well supported during the Northern Winter circuit and reasonably so at Cardington, has made great strides during the year. At the start of the season, 4 min. was the time to beat, but Brian Kenney and John O'Donnell have been showing how it should be done. I suspect that much of the performance increase has come from stuffing longer and longer motors into those very short fuselages — motors up to 3ft. long have been used. Those tiny 6 in. diameter props rev like mad, so 3000 turns at least is needed to get much over 4 min. However, 5 min. has come and gone, models have nearly reached the catwalk — somewhat higher than Wigan or Slaithwaite and one was seen to try for a spot landing by diving straight in as soon as the turns run out; it still gained 3rd place for Ken Bates! John O'Donnell (heard that name somewhere) came out on top with a superb 5:35 to beat Brian Kenny on this occasion.

CO_2 (Indoor) has not been that well supported in recent years due to a combination of factors. With the short season at Cardington (4 months), it is difficult for most people to put the required effort into more than two or three classes to be competitive, so CO_2 has stayed in the background. CO_2 has been dominated by recognised Free Flight men rather than the indoor fliers. However, Dave Hipperson was 'doing the business' with his normal efficiency and pushed his models to the limit (at least altitude wise) and all but took the indoor record of 7:28 from Ian Dowsett (who turned up later in the day and didn't really get tuned in). Reg Prentice from Somerset in his first attempt at CO_2 in Cardington managed to edge Ian out into 3rd place with some good flying.

Above; Dave Wolstenholme fits the rubber piston into his Peanut Duration - models such as these now capable of approaching 6 min. flights.

Sunday

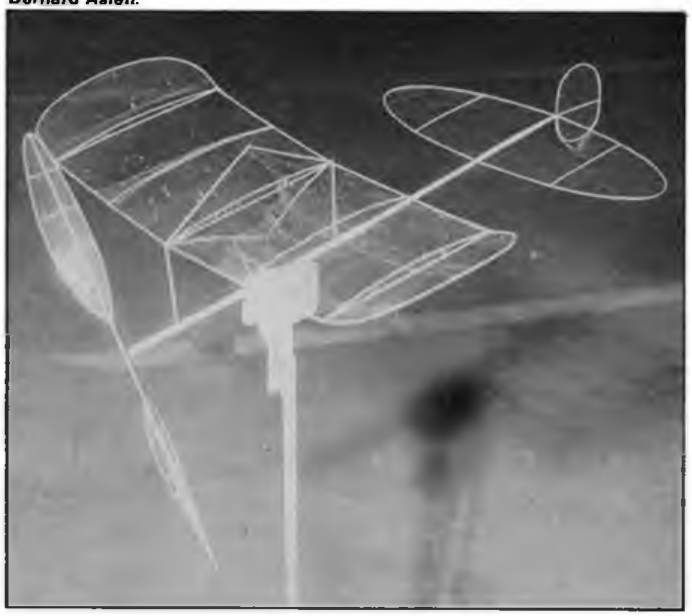
Microfilm plus all-in EZB was the order of the day. However, there was a lot of drift — making flying difficult. **All-in EZB** was run on an index basis with flights being measured as a percentage of the existing records for Novice Flyrod, Open EZB and Novice EZB, opening up the event to far more people than would otherwise have been the case.

Ken Bates won the overall index with 11:22 and 79% of the Novice Flyrod, followed closely by Dave Yates with 76% of the Open Record. Doug Barber was doing better this time and followed up with 73% of the novice EZB record.

F1D had only 2 entries — I did not swell the ranks due to preparing for Japan and it was potentially a good day for wrecking F1D's. The scores reflect this. **Open Microfilm** had only one entry from Bernard Aslett who, with a very modest 32 min. flight didn't have the trim on his model quite right!

Below; Dennis Davitt releases his Microfilm covered EZB.

Below; a record breaking flight of 27.02 from this 35 cm class model by Bernard Aslett.



35 cm again had only two entries. Bernard Aslett and Laurie Barr, the only two to fly the class in recent years. Bernard has a new model with a 5½ in. chord wing (aspect ratio less than 3) which had indicated something special by doing 20 min. virtually on its first flight! He warmed up with a 23:33 which didn't get very high but corrected this on the next go which went up all the way and eventually hit and hung, but not for long — it fell off and continued serenely on — then hung on the centre catwalk again. Again it fell off before the vital 10 seconds were up and continued to hit again and again and hung a third time. Couldn't get away with it surely but yes — it did. As it came down it drifted to the side, and the irregular pattern after dead sticking at a great height made it difficult to decide whether or not to steer...it was not necessary and made a new British record of 27:02 — the highest recorded time anywhere, beating Mark Diela's U.S. record of 26:32. A magnificent highlight in what was otherwise a poor day for the Microfilm events.

Results

EZB 14 entries

1.	B Hunt	21:15 + 21.14 = 42.29
2.	L Barr	17:11 + 20.20 = 37.54
3	R Bailey	18.32 + 18.44 = 37:16

Pairs 7 entries

1.	T. Jolley	30:46)
	D Yates	34 42) 65 08
2.	R. Bailey	37:16)
	R Jones	27.25) 64 41

Peanut Duration 6 entries
best flight

1.	J O'Donnell	6 38
2	B Kenny	4:25
3.	K. Bates	4.10

EZB Index

1.	K. Bates	Novice Flyrod	11 22 = 79%
2	D. Yates	Open E2B	13:17 = 73%

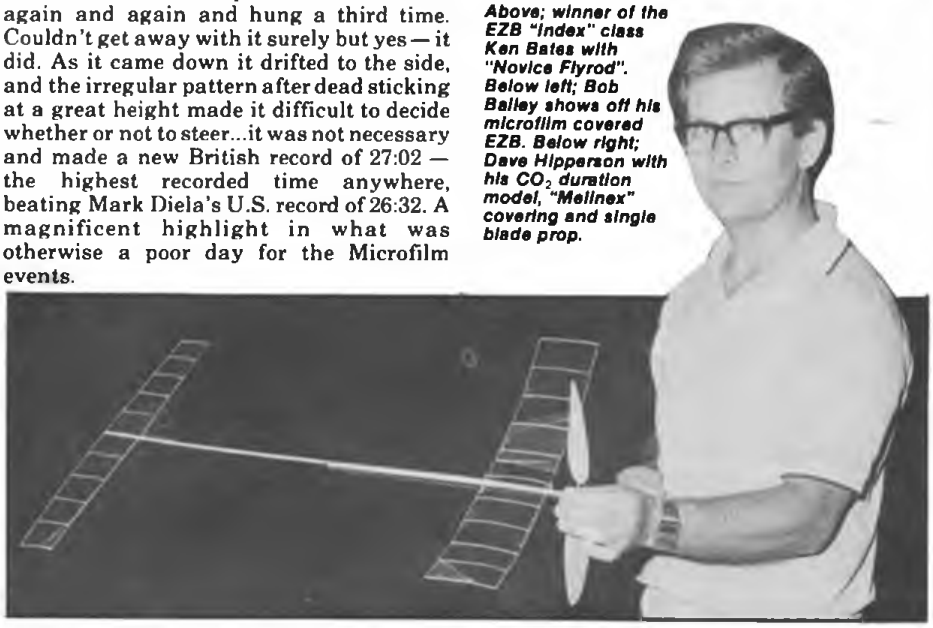
35cm 2 entries

1.	B. Aslett	23 33 + 27:02 = 60:35
2.	L. Barr	22 06 = 22 06

F1D 2 entries

1.	D. Morley	31:36 + 27 05 = 58 41
2.	D Pymin	17:58 + 29:18 = 47:16

Above; winner of the EZB "Index" class Ken Bates with "Novice Flyrod". Below left; Bob Bailey shows off his microfilm covered EZB. Below right; Dave Hipperson with his CO_2 duration model, "Melinex" covering and single blade prop.



SCALE MATTERS

Right; the authors A.W. "Argosy" seen at Barkston Heath. It is finished in the Blue/Silver colour scheme prior to delivery to Imperial Airways. Below; the stern face of competition scale modelling Barrie Hotham - winds the General Aristocrat at the Nats.

Free Flight with Bill Dennis

Some years ago the Scale Committee laid on a CO_2 event at the Nationals, but there was little response, so it has lain fallow as an outdoor class. Indoors, CO_2 has attracted a small but growing following, but to me it has always seemed a difficult type to fly in confined spaces. Ambient temperature and humidity have a great effect on power output, and this, combined with a lack of facilities for trimming means that models can be short on duration, or crash into ceilings and walls.

However, outdoors on a warm day the CO_2 model is a very attractive proposition, with its cleanliness and easy starting. Anticipating that these conditions would prevail at this year's S.M.A.E. Nationals, Charlie Newman initiated an unofficial CO_2 contest to be held during a lull in the rubber and power flying. Because of his R/C judging commitments, Charlie handed over the running to John Blagg, and considering the very short notice, the entry of eight was encouraging. Also, the range of subjects tackled was much wider than, say, the power event, where biplanes rule. An advantage of unofficial competitions is that frequently prizes are given! — In this case generously donated by Roy Scott (*Micro Mold*), Michael's Models and Richard Granger.

Two points arose from this event. Firstly, a large proportion of the models failed to achieve the qualifying time of 20 seconds, — a repetition of what was seen at the Indoor Scale Nationals. Is 20 seconds really too long, or are the models being built too large or heavy? Given that conditions at the Nationals were perfect, I am surprised at the low durations attained. While nobody likes to see a model clocked off just short, there has to be some minimum time in order to see a meaningful flight. Perhaps a flexible qualifying time is the answer, reducing to, say, 15 seconds in very cold conditions. It is too late now for a rule change for next season, but the Scale Committee will review the position in the light of future evidence.

The other point to emerge was that the maximum weight of 120g may preclude the multi engine type which is being seen in increasing numbers. I can only assume that this rule referred originally to indoor and has simply been carried over, but I can see no reason for it to apply outdoors, and the S.M.A.E. Technical Committee will consider this also.

There will be an official CO_2 event at next year's Nats. so start thinking about it now, bearing in mind that the most important feature of the model is that it can fly for 20 seconds! I have already decided to have a go myself and this very morning have built the entire fuselage of a *Hanriot* HD-1. I chose a biplane for the usual reason of flying performance, plus the fact that I know I am incapable of building a monoplane light enough! It is a long time since I have built such a small model, with 1/16in. square and my palsied hands shook a little. I have now given in to modernity, and used cyano exclusively, with good results.

The secret with CO_2 would appear to be, as always, to build a light model with a low wing loading — the two are not necessarily synonymous.

This means that it can be flown on a low power setting, in which mode a decent *Telco* should be giving a motor run of up to a minute. As soon as the weight goes up, so must the power, with the result that flying time falls inversely with speed. High flying/landing speeds mean that the attractive concept of a one piece model is no longer practical , etc., etc!

Twins

The model I flew at this year's Nationals was an *Armstrong Whitworth* 'Argosy'. My first multi-model was the *H.P.* 0/400 which flew very well for 3 years. Flushed with success, I followed this with a *Gotha* G IV which was literally a flop. Thus chastened I stuck to singles for a while, but eventually I succumbed to the urge to do another twin. Another reason is that in contests, such models attract a 10% flight bonus, and as I knew several aircraft were being built by modellers with much better skills than my own, I needed all the help I could get!

With the experience of two models behind me, I started casting around for a suitable subject. Since this type of model involves a lot of building, and is relatively vulnerable to

John Blagg entered this beautiful Telco powered Blackburn "Blackburn" at the Nats - good flier but 2 tanks needed for duration.

heavy landings, I had a fairly strict set of criteria which, rightly or wrongly, I felt necessary to guarantee success. Light wing loading of around 7.5oz per square foot means a biplane — they fly better anyway — and engines mounted midway between the wings and closely spaced to reduce any effects of asymmetric thrust.

The other major attribute I was looking for was a twin or triple fin layout, since I suspect the problem with the *Gotha* was inadequate effective fin area on its single vertical surface. It is noticeable when trimming these models that small deflections of outer rudders in the slipstream have a great effect, while the centre can be moved 10° to 20° to no avail.

The 'Argosy' seemed to fit the bill fairly well, the only doubts I had concerned the short moment arm. There were, however, various structural problems to overcome which are common when building a model to a small scale, where struts, etc., become very thin. The biggest headaches were the tail surfaces which were knife-edged even on the full size. It was quickly apparent that the usual sandwich method would be hopeless, as I needed edges 1/32in. thick. In the end I built them from solid, soft sheet, and represented the 'ribs' by tissue paper. Some careful sanding of the tip contours carried off the illusion, and the finished product was quite effective. The drawback is the weight — 3oz., which cost me 4oz. of lead in the nose! Unfortunately, in a heavy landing, the inertia of the top plane tends to cause the whole edifice to fly apart!

The rear fuselage is built up, while the front is 1/8in. sheet. The full length windows are an obvious weak spot, but hefty spruce window pillars seem to have done the trick — surviving a "nose-ender" from 30 feet with no damage. The engine cutout timer is carried in the nose behind the knock-off nose cone.

The wing structure is conventional, but the main spar in the lower centre section was doubled up, with 16 s.w.g. wire epoxied between two lengths of 1/8in. x 1/4in. spruce. This spar takes all the landing loads, and if it breaks, the whole centre section is ruined, which can be very depressing. I considered all manner of springing systems for the undercarriage, but none were satisfactory; in the end I simply arranged for the main legs to swing backwards in tubes. They were held in position by replaceable 18 s.w.g. rear links which bend in a heavy landing. In any case, most landings are taken on the chin!

The engine nacelles were too narrow to allow a vertical engine mounting, so the *Mills* .75's had to be put in sidewinder, which tends to make vibration worse. The engine cutouts are the very simple system of cables pulling on the fuel lines and kinking them at the intake. Once the various lengths have been arrived at, this is a very reliable method.

After a little trimming the model flew very well, in either left or right hand circles. Both engines run anticlockwise, and have 1° down and 2° sidethrust. The C.G. is well forward and in spite of the short moment arm, the model is very stable, with a very gentle stall. I intend to finish it for next year!

Right; the only 3 who returned 20 sec plus flights at the Nats L to R: Street (2nd) C. Newman (1st) N. Hannan (3rd).

Comet II — continued from page 616

above the board. Enormous dihedral was also a feature of early 'Comets' too! Enclose the leading edges from spar to spar by wrapping completely around the nose with very soft 1/20in. balsa sheet. Damp with a cloth on the outer surface before wrapping, glueing and temporarily pinning whilst setting. Obstinate balsa sheet can be 'encouraged' by brushing with ammonia — but keep your nose and eyes out of the way! Finally, sheet the centre-section top and bottom. Note that like Noel's original model, the ribs are not stepped or recessed to give flush fitting of the leading edge sheeting! When dry and set, smooth to streamline all the edges of the tip pieces. Continue with separate sheeting top and bottom at the tips.

The cambered tailplane is a 'must' and cannot be replaced with a flat structure. The 1/32in sheet ribs are a bit fiddly but the effort is rewarding. Pin-prick the complete tailplane outline onto 1/32in. very light balsa sheet joined edge-to-edge (3in. sheet is not quite wide enough). Outline pieces are cut from light 3/32in. sheet and are glued in place for leading edges, but cut slots for ribs in trailing edges before laminating down in place. Ribs are fitted, stepping *onto* leading edge, slotting *into* trailing edge. Top spar is slotted into place, butt-jointed at centre with scarfed strengthening gusset. Top sheeting of 1/32in. is laid between leading edge and spar, damping on outer surface to aid temporary curvature. Also sheet over centre-section. Allow to set completely hard before lifting and sanding all edges.

The fin is straightforward, 1/16 x 1/8in. strips laid flat and neatly jointed, then covered both sides with 1/32in. soft light balsa, bringing total thickness to 1/8in. Sketch shows how 1/16in. dowel pegs are fitted for rubber-band retention with small washers epoxied to ends. Note small reinforcing discs of 1/32in ply both sides of fin. Smooth leading-edges to 'round' and trailing-edges to 'streamline'.

Undercarriage wires are all 20 s.w.g. — shown full length on plan. Join the front and rear wires by wrapping with fuse-wire and touching with solder. Noel used miniature coil spring tensioners with open looped ends engaged around small washers soldered to the legs and brace struts — just like his original! But we non-purists will probably use rubber-bands!

Cover all surfaces with lightweight tissue. Noel used coloured lightweight *Modelspan*, red for the fuselage, yellow for all flying surfaces. Use tissue-paste adhesive (*not* dope or P.V.A.), water-shrink, and when dry apply two thin coats of clear shrinking dope on fuselage, one on wings, tail and fin.

Fin is glued centrally above tailplane, then wide securing pegs permit alignment of the fin to create trim for gentle turns during flight. 'Wet-and-dry' abrasive paper is glued both to top of tail-bay and the underside of tailplane to prevent movement, once a setting has been made.

The *Telco* Turbotank 3000 is secured by four bolts screwed in from the front with rear nuts anchored with epoxy glue. A small amount of downthrust is shown on the plan, and a minute amount of right sidethrust (against torque) would be advantageous, though the fin is very dominant. The model should balance very slightly nose down in normal gliding attitude, when supported under the wings on the balance line shown. One might expect the high lift tailplane to require a rearward C.G. but Noel assures us that this is not so — probably because of the large longitudinal dihedral (angle between wing and tail) which gives the model a steep and somewhat stepped climbing angle just like the original petrol-powered 'Comets'. There is no incidence under the mainplane, the large camber produces enough, but 1/16in under the leading edge of the tailplane as seen on the plan.

Flying

Glide test only in very quiet conditions over reasonable terrain. A small quick partial charge is suggested for first trim flights. A compromise torque and rudder setting to give a wide circular flight to the right on both power and glide. Adjustments may be made by loosening the motor securing bolts and packing with slivers of post-card or 1/61in ply. A model should never fly one way under power and the opposite on the glide!

With full charges, when trimmed, ensure that you are fit and in good 'breath' — for you are certain to find yourself enjoying quite a few long runs after this endearing little model, just as we of the older generation enjoyed hareing off after our pioneering free-flight 'Gas-powered' originals in the good old 'thirties'.

But Happy Landings!

Going Solo

Part 9

Practical advice on trimming free flight models by John Watters

THIS MONTH we shall deal with the serious business of getting your model into the air, and down again, in one piece. This model may well be the biggest, or heaviest that you have built, and it may seem quite a daunting task, as you are going to launch your pride and joy with gay abandon into the air, with what seems little or no control over it's behaviour...Not so!

This type of model as any other, must be free from warps (or twists). Check both the wings and tail surfaces for any sign of warps and remove them. A method I have found quite effective, and which does not either scald you, or set the wings on fire, is to use an ordinary hand held hair dryer (gently heating whilst twisting in the opposite direction to the warp).

If this is your first introduction to a model powered by an I.C. engine (Internal Combustion), you should, as mentioned in the previous article, get used to starting it before fitting it into your model. Depending upon what type of motor you have, there will be differences in the types of fuel tanks supplied. Most engines of the size used for free flight sports models will have a clear plastic tank bolted onto the rear of the crankcase.

These tanks are perfectly adequate for the type of flying and length of motor runs required. If for whatever reason you have a motor without a tank, obtain the correct one for your motor, or one of the types commercially available for free flight. Don't install a metal tank — you will never know how much fuel it has in it.

The static trimming of a powered model does not really differ from the way in which you trim any other type of model. With the model assembled, including the engine, the first thing to establish is the point of balance, or centre of gravity. With free flight sports models of the "Tomboy" style, the balance should be in the region of 30% of the wing chord, measured from the leading edge. In the "Tomboy's" case balance on the main wing spar.

Try your model for balance by placing a finger under each wing on the bottom spar. There is no need to balance your model at the wing tips, about half way along each wing panel will do. (Fig. 1).

It is more likely that your model will be nose heavy, and will require some ballast added to the tail, use either small amounts of lead or plasticine to obtain the correct balance. Having established the correct balance, glue or somehow fix the ballast into the fuselage. The balance will be correct when the model is level or ever so slightly nose down, when supported under the main spar. Get someone to hold the model for you, or prop it up, so that you can get a good view from the side. (Fig. 2).

With the model assembled and balanced you are ready to check out how it glides. For glide and initial power checks we need, 'long grass', not that long that you get lost in it, but long enough to cushion your models if it lands awkwardly. Before you make your test glides, check again — are the wings and tail straight, are the elastic bands sound. A poor elastic band may hold a wing on, but it may well break when flying loads are applied. For test gliding, you ideally need a day when the wind is light. It is better to wait for a good day, than risk damaging your model.

When you have the right conditions, hold the model at shoulder height, and with a gentle action, launch the model into wind, aiming for a spot about 50 ft. in front of you. From this launch, you should observe how the model behaves (Fig. 3). If you are not sure that the resulting glide was good — maybe as a result of your poor launch — glide the model again and check your launch action.

When satisfied that the model, and not you, is at fault, you must now correct the 'trim' of your model. If your model dives (Fig.3) — a steep glide, probably landing on its nose, placing a piece of hard 1/32in. sheet balsa (or ply) under the trailing edge of the tailplane (Fig. 4). For a stalling guide — the nose of the model rising steeply after launch, and then dropping, (Fig. 3) and repeating this action, or crashing down nose first, pack up the leading edge of the tailplane (Fig. 4).

With all trimming, start with 1/32 in. thick packing, increasing by 1/32in. as you progress. You should *never* reach a stage when you are needing 1/8 in. packing under the tail. Something else is wrong, re-check the centre of gravity.

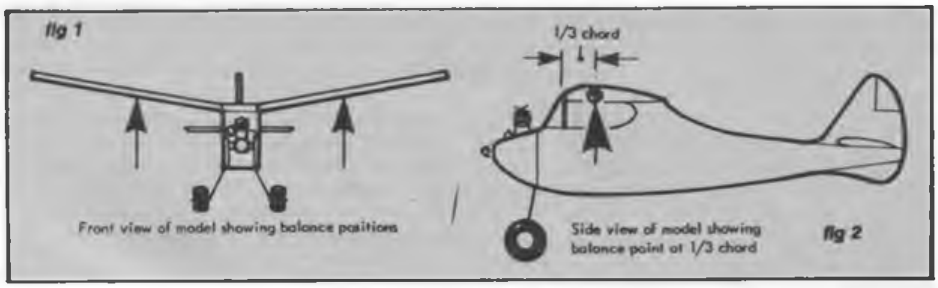
If the clearance you have left at the bottom of the "Tomboy's" tail fin — to allow the tail to pass through — is not sufficient, enlarge this cutout to allow the tailplane to be raised when adding packing (Fig. 5). Aim for a glide with a slight turn to the right, by adding a small amount of right offset on the trim tab.

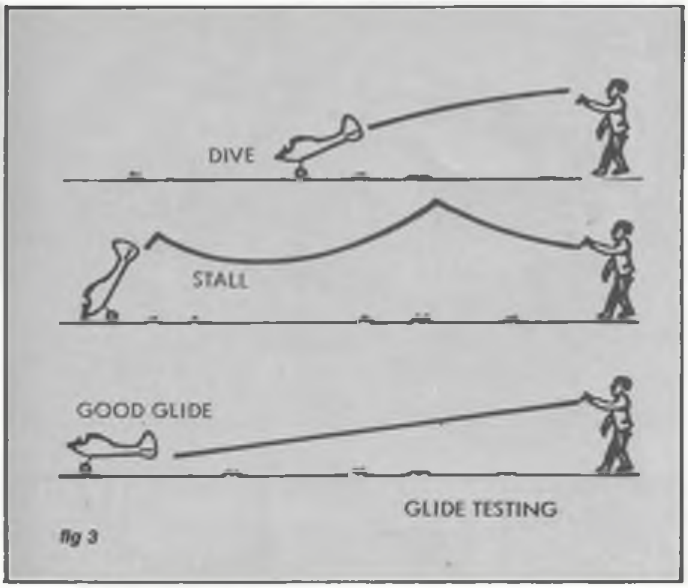
When you are satisfied with the glide, glue any packing you have had to use, either to the fuselage, or the underside of the tailplane, and either mark or make a note of the trim tab offset.

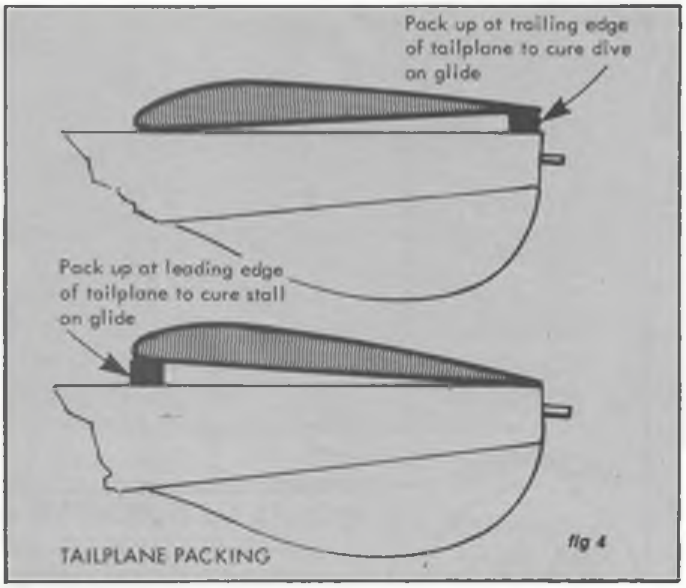
If you are using a diesel engine, the first power flights should use low power. With the older diesel engines, which had large stroke to bore ratios, the speed could be controlled down to almost a tick-over. Modern small diesel engines and glow motors, do not run quite as smoothly at low speeds. To overcome any extra speed, *and* reduce the power, put the propeller on the wrong way round — with the name or size moulded on the propeller facing the engine driving plate.

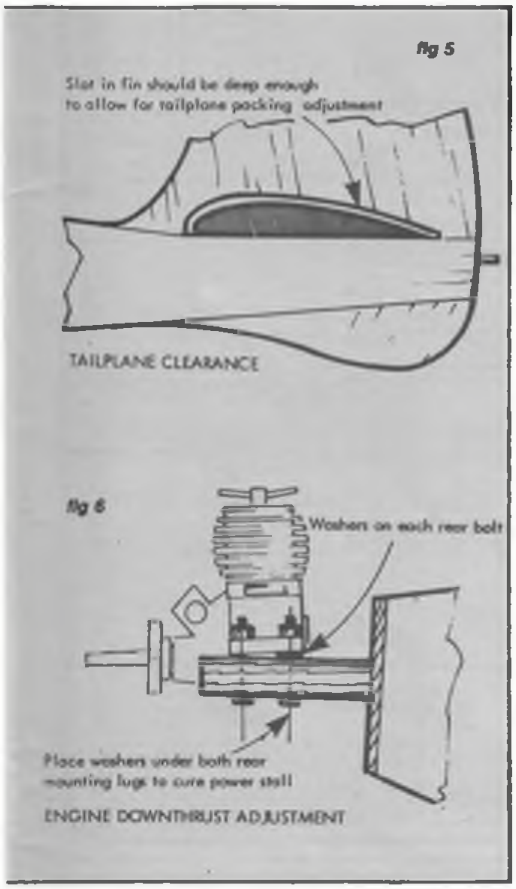
Before you actually fly your model, using the engine, an understanding of the effects and forces on your model with the engine running, will help you to understand power trimming. If you are used to flying and trimming rubber models, you know that because of the large torque, (twisting) effect of a fully wound up motor, the model would like to turn to the left, if allowed. If this left turn is not trimmed out (by right turn) it will produce an ever increasing spiralling turn into the ground.

An I.C. engine produces a similar force on the model. The left turn caused by the engine, will get tighter with increased engine speed. If the model is allowed to turn sharply to the left, the torque produced by the engine, would again send the model into an ever increasing spiral, from which there









usually is no recovery.

To oppose this effect the engine in the model is off-set slightly to the right. The amount of offset is usually not more than 2° for a model like the "Tomboy".

For the first power 'hops', fill the tank and start up the engine, tune the engine to run fairly slowly. Don't be tempted to launch the model with the tank full, let the fuel run down in the tank until there is about 10 seconds running time of fuel. Remember that there will also be fuel in the feed pipe.

With the engine running, hold the model at shoulder height, and launch with a smooth action, into wind — it any — and watch the flight pattern. With low powered flights, you are looking for a long shallow, straight, or slight turn to the left or right. Then repeat the flights with slightly increased power, but still keep the fuel level low. Build up the power until the model starts to climb in wide gentle circles.

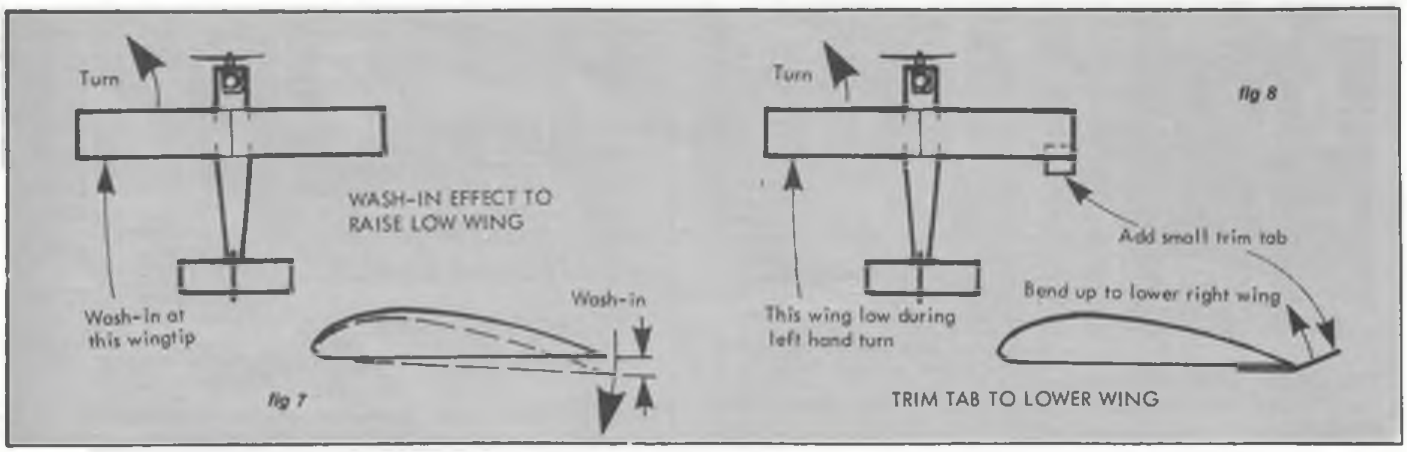
As you build up the power, you may notice the model starting to go through a series of stall and recover manoeuvres, or even stall and not recover! This may be cured with a little downthrust — remove the motor, and add a small washer under the rear engine mounting lugs. (Fig. 6). Only add one washer per side at a time, until the stalling is corrected. This adjustment is only for power stall trimming, any stalling tendencies after the engine has cut, is glide trimming.

A tendency for the model to turn sharply to the left under power should be corrected by offsetting the trim tab slightly to the right, or by increasing the engine offset.

If you have achieved a stable flight pattern and your model is flying with one wing low, i.e. the inner wing in the direction of the turn, either add some wash-in to that wing, (Fig. 7) by inducing a slight warp of about 3/16 in. (use the method described for *removing* warps) or alternatively add a small aluminium trim tab to the opposite wing. This trim tab, should be turned up (Fig. 8.) The latter method is preferable as adjustments may be made on the flying field.

If you have built your model neatly and without any warps, there should be no reason why it should not fly well and give you long service. Taking care of your model when it is not flying can also be just as important. With this, or any other model you make, find a box to keep it in. A cardboard box is quite adequate (look in your local supermarket). If you cannot find a box big enough, or the wrong shape, glue two boxes together or cut them up to the right size, P.V.A. is an excellent adhesive for cardboard. More damage can be done to a model when handling it at home, or getting it in and out of cars, than in a weeks flying!

In concluding, let me say that this aspect of modelling is most rewarding when done successfully, the main points to remember are; be patient, trim by small degrees, check and re-check, fly safely, and if you are not a member of a model club, join the Aeromodeller Accident Protection Scheme. Good luck, and don't forget to put your name and address somewhere on your model, just in case you hook that big thermal.



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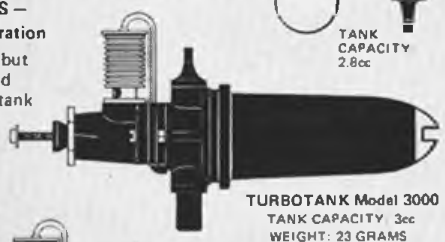

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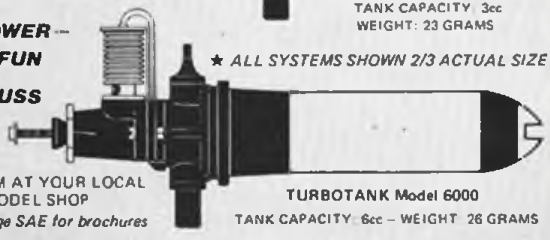

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FSP/1143 **Price £1.65**

HANDLEY PAGE H.P.42 *by Cpl. S. Newton.* The famous *Hannibal* airliner. Very detailed drawing for this 65 in. (1651mm) span model uses two 0.8-1cc engines.
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BRISTOL BULLDOG *by P. J. Allnutt.* A 1/12th scale model which uses some spruce and ply in its rib for rib, stringer for stringer construction. Full colourings and markings. Canadian competition winner. Span 33¾ in. (857mm). Engines 1-1.5 cc.
FSP/762 **Price £3.25**

BLACKBURN 1912 MONOPLANE *by A. M. Finucane.* 1/8th scale, 48 in. (1219mm) span, pioneer monoplane; flies as well as its modern counterparts with 0.8-1 cc motor.
FSP/567 **Price £3.96**

JODEL D9-BEBE *by Hoh Fang-Chiun*
Neat replica of famous French light plane with fixed rudder. Detachable 38½ in. (978mm) span wing, super flyer. 0.5-0.8 cc motors.
FSP/691 **Price £2.10**

SUPERMARINE SPARROW *by G. F. Elsegood.* 1/12th scale of 1920's light racing aircraft designed by R. J. Mitchell; 34 in. (864mm) span model features scale rib spacing and pendulum rudder/aileron controls. For 0.3-0.5 cc motors.
FSP/1408 **Price £1.65**

COLONIAL SKIMMER *by E. Fearnley.* For flying scale enthusiasts who want something different. Span 47 in. (1194mm); for 0.75-1 cc engines.
MA/250 **Price £2.75**

B.E.2e *by K. McDonough.* Lightweight and with large wing area, this 1/12th scale 40¾ in. (1035mm) model flies slowly. Detailed plan includes gun and camera! Power with 0.8-1cc motor.
FSP/721 **Price £3.96**

SOPWITH SWALLOW *by John Darnell.* A 1/8th scale version of a little-known 1918 fighter. Span 41 in. (1041mm), it is fine for the beginner scale enthusiast.
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D.H. 80A PUSS MOTH *by J. M. Greenland*
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CESSNA 172 *By W. P. Holland*
This 72in (1829mm) 1/6th scale model of the popular American light-plane is the answer to those who want an easy-to-build large model for radio conversion Knock-off wings and shock absorbing trike u/c. For 2.5-3.5cc engines
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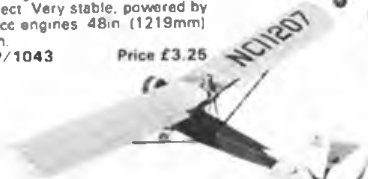
FAIRCHILD ARGUS *by E. J. Riding*
Authentic appearance makes this a winner. Span 37 in (940mm).
FSR/272 **Price £2.75**

CURTISS-WRIGHT JUNIOR
By J. Headley
Free-flight scale model of an unusual subject. Very stable, powered by .5-1cc engines. 48in. (1219mm) span.
FSP/1043 **Price £3.25**

D.H. MOTH MINOR *by G. W. Day.*
A handy size, low-wing model, well suited for the beginner. Span 35 in. (889mm).
FSR/168 **Price £2.10**

P-51D MUSTANG
by C. Chapman.
The famous WW2 American fighter at 26 in. (660mm) span is a faultless performer.
FSR/1441 **Price £2.10**



AUSTER A.O.P.9 *By R. G. Moulton*
36in. (914mm) span version with all sheet fuselage and tail assembly simple wings. Flies like the real thing, aerobatics or sport flying with 0.5-0.8cc engines.
FSP/580 **Price £2.75**

CESSNA BIRD DOG *By E. Fearnley*
High-wing cabin model of 36in. (914mm) span. Pleasing lines are developed from a simple sheet balsa fuselage construction.
FSP/568 **Price £2.75**

DORNIER 27 *by D. Garrett*
A 27 in. (686mm) span model of modern German light plane. Plans include modifications to take .3-.75 cc engines.
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APPENDIX: LINKS to THE PLANS

The original issue comes with two free plans(Waterman Gosling, Comet II) printed front/back on a pull out banner of four sheets. The banner is not included in the document.

Waterman Gosling by A.J. Taylor
FF Scale Rubber
https://outerzone.co.uk/plan_details.asp?ID=8952 ...
Document Page: 22

Comet II by Noel Crane
FF CO2
https://outerzone.co.uk/plan_details.asp?ID=9465 ...
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Boeing 767 by Bill Burkinshaw
FF Chuck Glider
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