Aero Modeller

March 1976

INCORPORATING
MODEL AIRCRAFT

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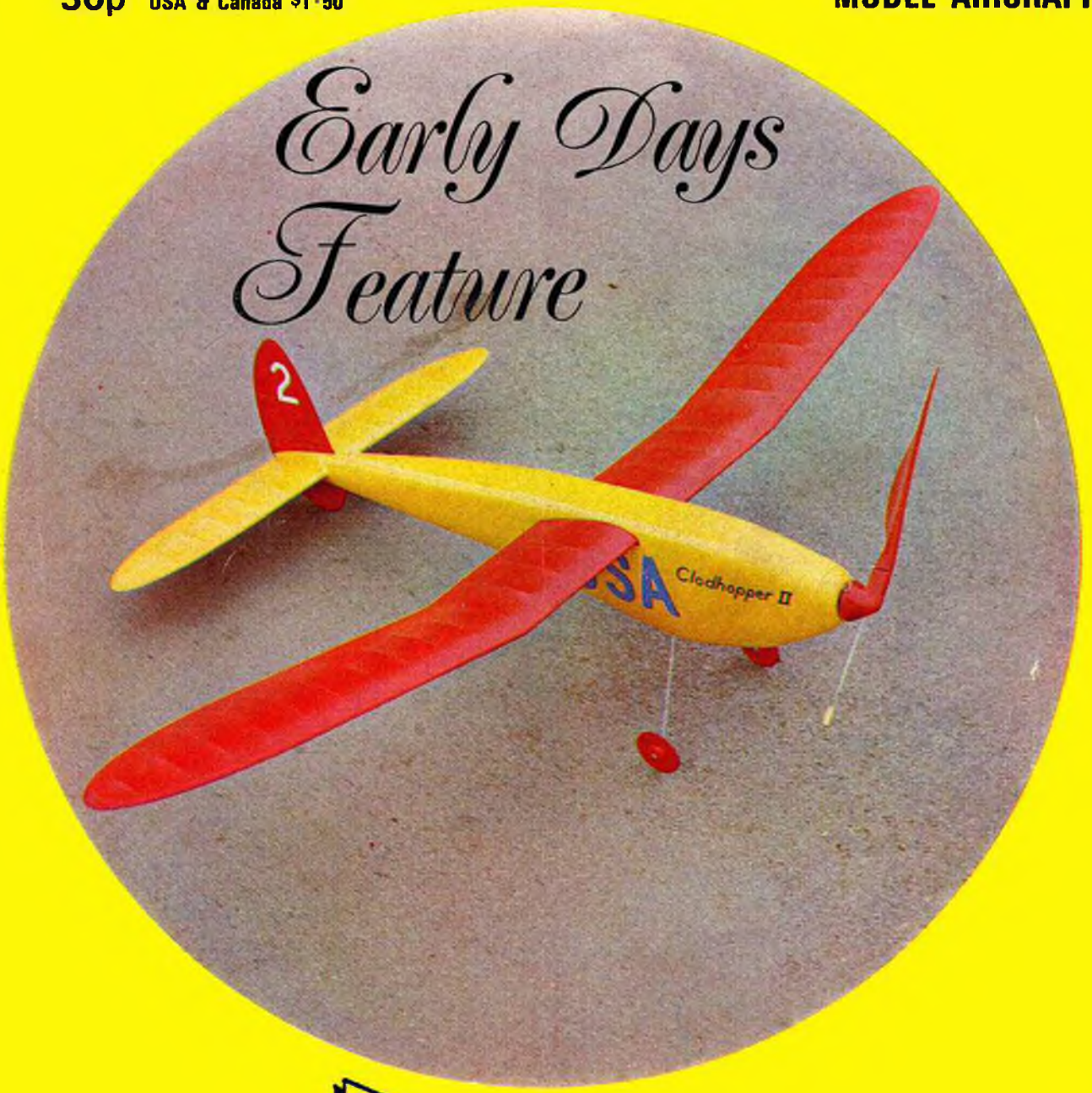

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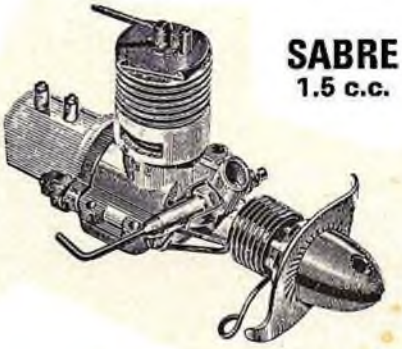

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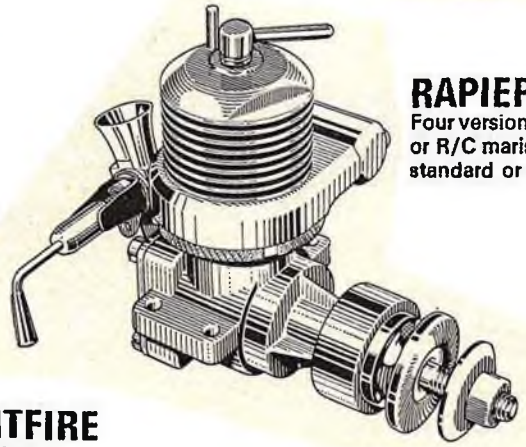

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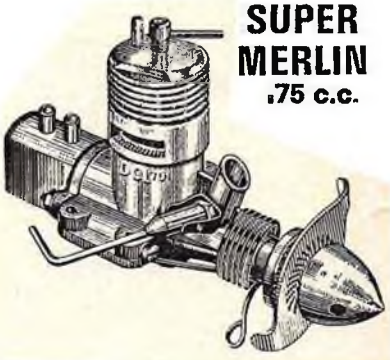

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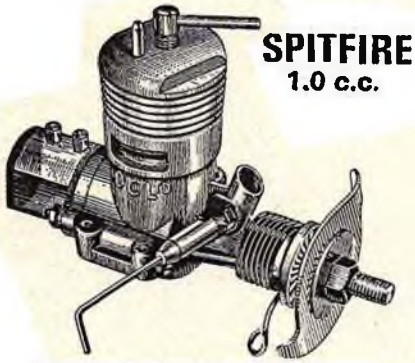

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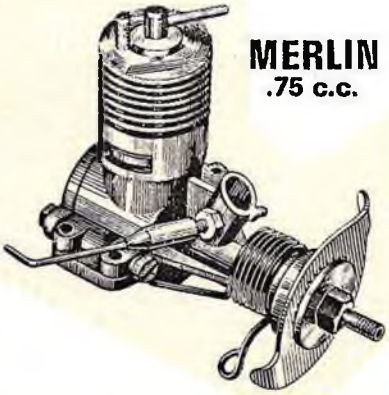
1.0 c.c.



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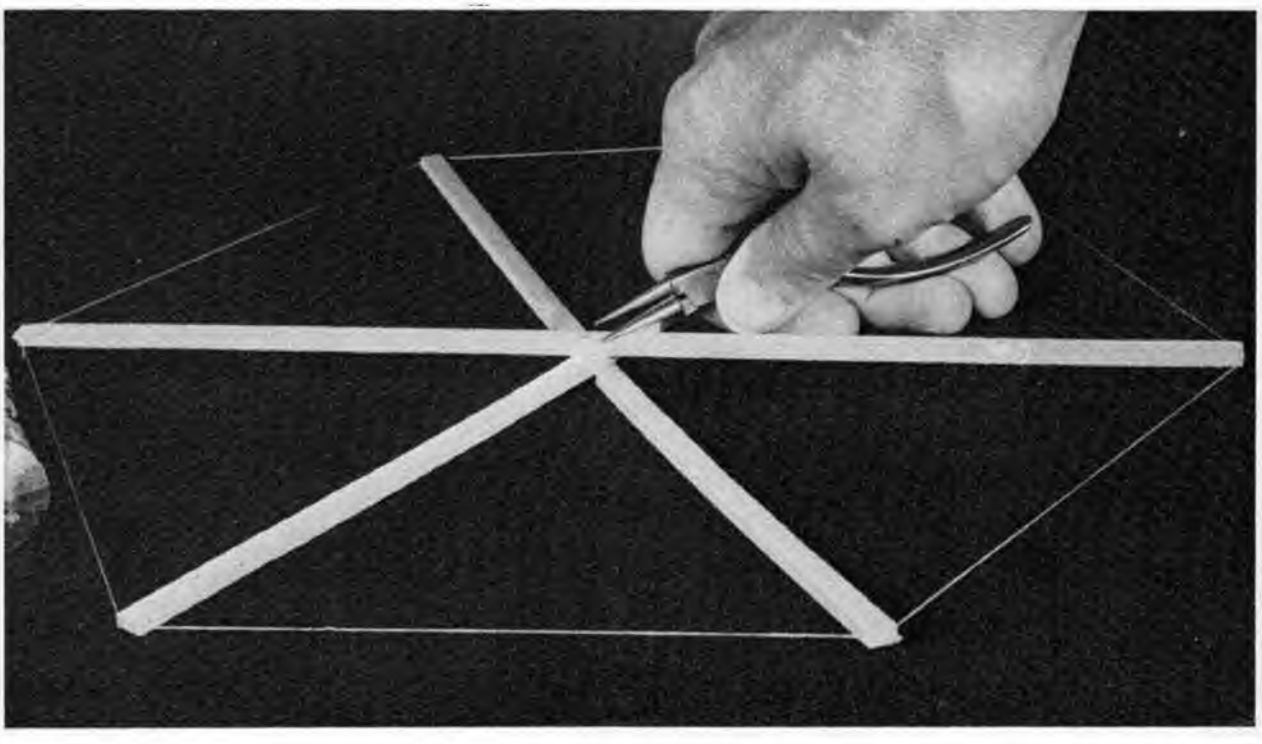
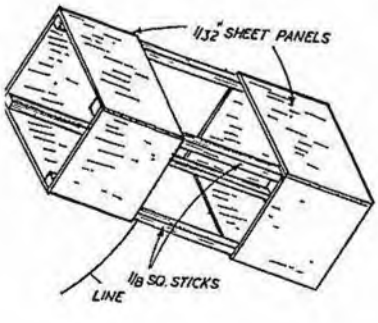


Yes—it's a simple hexagonal kite 'airframe' (one of the best shapes of all for small kites). Made from three equal lengths of balsa strip, pinned at the centre, spread out evenly and with a thread outline. Cover with tissue, fit a 3-line bridle and a crepe paper tail about six times as long as the kite. Try it in sizes from 6″ sticks to 18″ sticks. You can make one in about twenty minutes. Fun to fly while you are waiting for the wind to drop!



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Aero Modeller

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March 1976 Volume XLI No. 482

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Advertisement Offices: Model & Allied Publications Ltd., P.O. Box 35, Bridge Street, Hemel Hempstead, Hertfordshire HP1 1EE. Tel: Hemel Hempstead 56117.

Subscription Department: Remittances to Model & Allied Publications Ltd., P.O. Box 35, Bridge Street, Hemel Hempstead, Hertfordshire HP1 1EE (subscription queries Tel: Kings Langley 66846). Direct subscription rate £5.00 per annum, including index. $15.00 (U.S.) for overseas subscribers.

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MODEL & ALLIED PUBLICATIONS LTD.
P.O. BOX 35, BRIDGE STREET, HEMEL HEMPSTEAD, HERTS HP1 1EE
Tel.: Hemel Hempstead 2501-2-3 (Mon.-Fri.)

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Comment

1976 will surely be remembered as the year of the R/C Trade Shows—there are no less than three to be organised by the fifth month of the year! Each will follow the same basic formula of providing a continuous programme of R/C flying plus trade displays by manufacturers, importers, distributors and retailers enabling one to see (and purchase) all the latest equipment and accessories.

First to be held is the event organised by the Esher and District Model Flying Club at Kempton Park Racecourse on 27/28th March. Special attractions planned include live steam model railway locomotives, a boating pool and R/C car racing. Next will be Sywell R/C Model Expo '76, organised by the Barnstormers Ltd., at Sywell Airport, Northamptonshire, on Easter Sunday and Monday (18 & 19th April). This event differs from its counterparts in that both full size and model flying displays are interposed for greater spectator appeal. Third of the shows is the Elmbridge Model Club's Symposium and Display to be held on 8-9th May at Sandown Park Racecourse. In addition to their large trade show housed in a single large hall, there will be facilities for displays of R/C aircraft, boats and cars. Special features include control-line flying and electric RTP demos.

So much for what is definite. Less positive is the situation for the British Nats. As we go to press we cannot announce details, although rumour has it that we shall be descending on a Gloucestershire airfield over the Spring Bank Holiday.

on the cover

Currently residing in the Russ-Craft Model Museum in San Marcus, California is this reproduction of Jim Cahill's Clodhopper II, built by Jack McCracken —President of the North American Rockwell Flightmasters club. Museum owner Russ Barrera hopes to eventually have reproductions of all the Wakefield winners. Plans of this famous Wakefield are available from the AeroModeller Plans Service— as order No. D1188X, price £1.00.

next month

Plans for Mike Woodhouse's A/2 glider *Wichita*. Richard Wilkens describes the development and unusual features of his *FAI Blasta* combat model. Vintage fans will be pleased with the drawings of the *Kan-Doo* C/L stunter, while our regular columnists provide facts and information on scale, free-flight, control line and engine topics—all in the April issue, on sale 19th March.

AeroModeller is printed in Great Britain by Leicester Printers Ltd, The Church Gate Press, PO Box 20, 99 Church Gate, Leicester LE1 9FR for the Proprietors and Publishers, Model & Allied Publications Ltd, (a member of the Argus Press Group).
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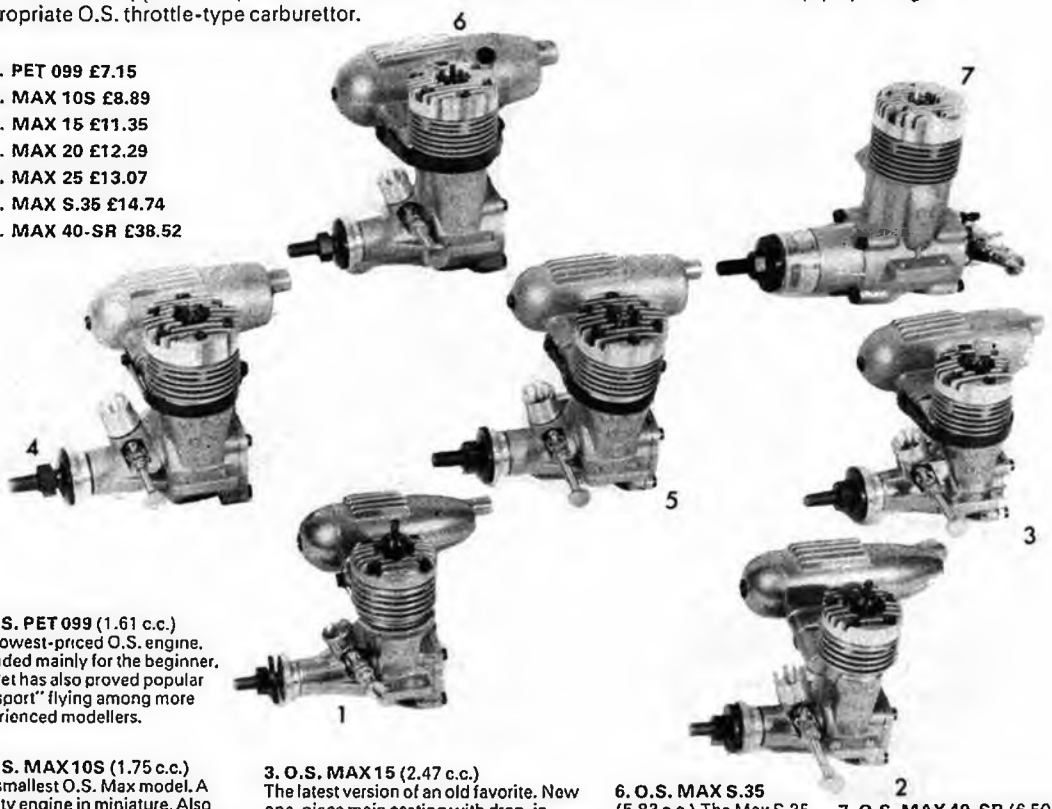

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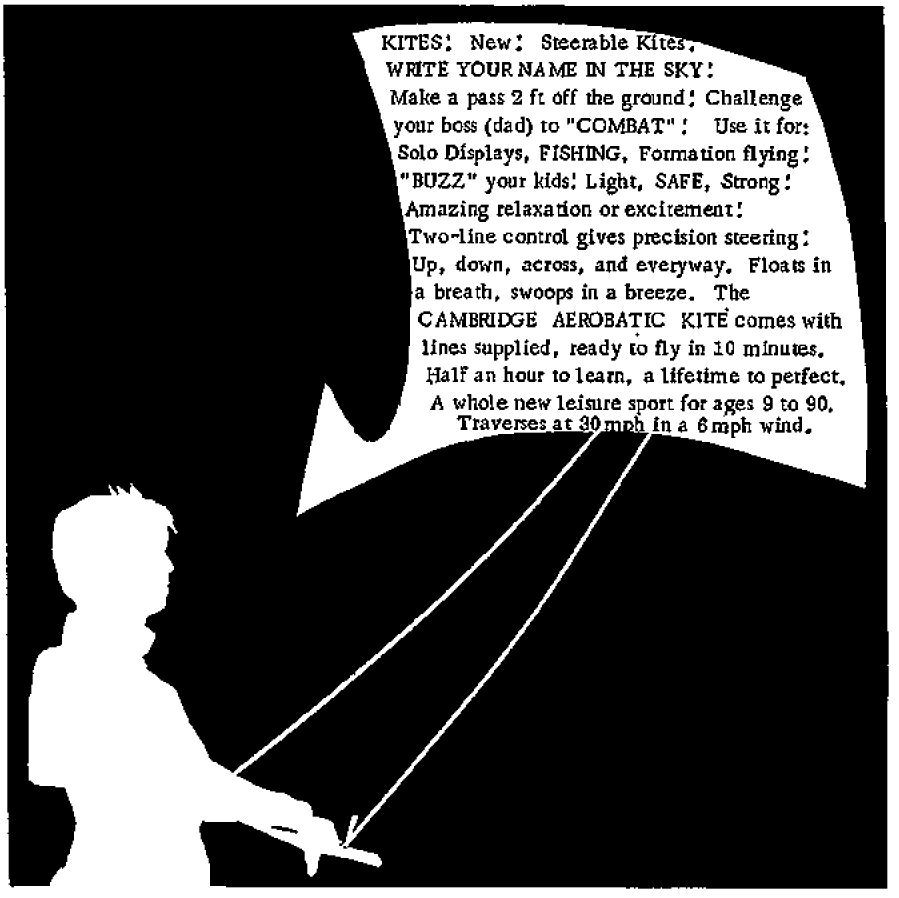

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AT YOUR MODEL SHOP

Heard at the HANGAR DOORS

Prince Andrew, a cadet corporal with 255 (Gordonstoun School) Squadron in the Highland Wing of Britain's ATC in Scotland, chats with his gliding instructor Flt. Lt. Peter Bullivant. The Prince has great enthusiasm for "pure Flight", but will have to wait until he is 16 before going solo. Peter Bullivant is of course well known as a pioneer (and author) of electric RTP, and a stalwart performer at the Model Engineer Exhibition "circuit".

BALSA supplies during 1975 were decidedly 'at risk'. There was a time when stocks were so low that the future of supplies for kits, as well as sheet and strip stocks, were likely to have serious effect on the model trade, not only in the UK but also in each of the other producing nations.

Fortunately, the experienced management of the Balsa lumber Companies in Ecuador, has survived the situation and one of the major hazards, that of transportation has been resolved so that supplies now appear to be more adequate for our needs in the coming year.

Inevitably, the competitive demand for industry and general inflation, will have their effect on the price, and other alternatives have been sought.

In India, a local wood known as 'Dhupi' is employed for components in kits where weight is less important (the weight averages 22lb/cu ft). India also has her own balsa, grown in the Southern States which is used for strip and sheet parts.

In the USA, a substitute material to be known as 'ALLSA", has been announced by the Envoy Corporation of Phoenix, Arizona. In a publicity memo, which admits that there is nothing *yet* that can replace Balsa, the Envoy Corporation states that they had made a recent discovery, which could lead to a material that has all of Balsa's merits and 'then some'. The indication is that the Envoy Corporation are exploring the market potential, before entering production as they go on to say 'the costs to produce this happy product are quite staggering'. Quite understandably, they would need considerable assurance before launching into competition with the fertile highlands of Ecuador.

Envoy have had an encouraging response – and many questions on their Allsa product. To anticipate some which readers may raise, they offer the following expectations: Availability? – mid '76. Sizes? – metric 1m x 15cm. Weight? – 4 grades, 3 to 16lb/cu ft. Grain Pattern? – equivalent to quarter-grain. How does it work? – like balsa but better for die cutting, sanding, flexibility. Takes all usual adhesives and finishes. Has it been tested? – NO! For the good reason that it has to be mass produced to come out of a production line that needed to be researched before investment. It cannot be Lab-built. It is definitely coming and will meet the promises. Who created it? – Davie W. Jones, model builder/designer since 1937. Will it conflict with Balsa? – like Butter and Margarine, there's room for both, say Envoy. Meanwhile, we re-affirm that there is nothing yet that satisfactorily replaces Balsa, which at present is in plentiful supply.

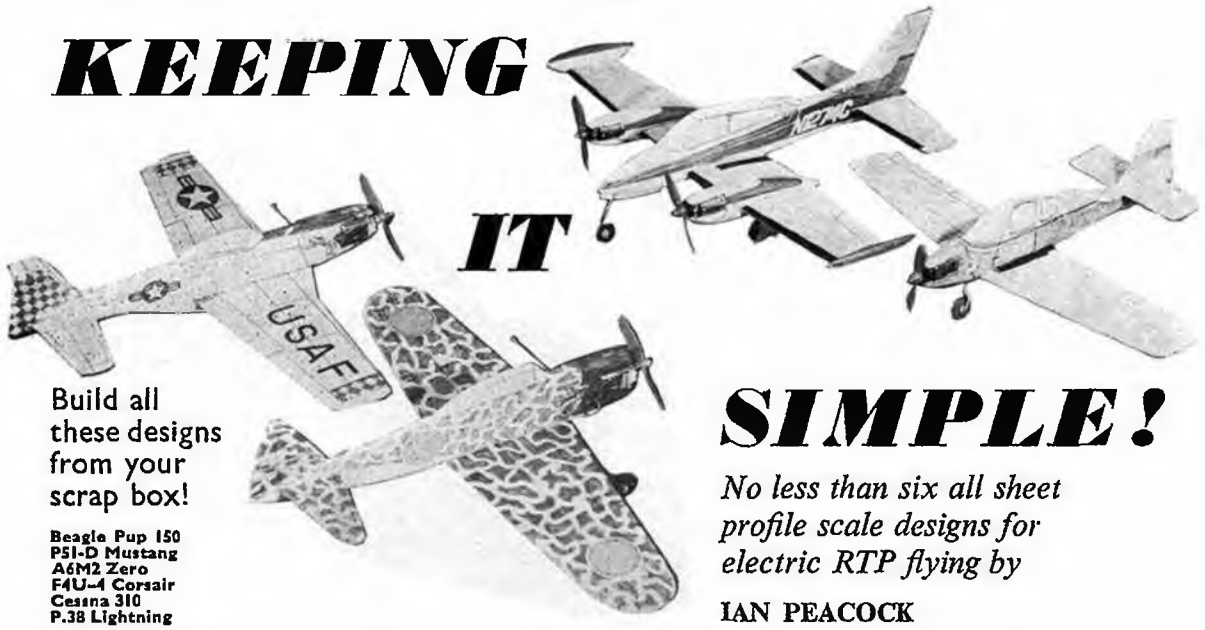
MAJOR COMBAT event of 1976 will surely be the Dutch International to be organised by the *Daedalus* and *de Vleermuizen* clubs. Deprived of the opportunity to host the first Combat World Championships event despite their experience of running four highly successful Internationals – these clubs aim to make this years event as much like a 'proper' Championships as possible but with one exception: namely, the event is an 'open' meeting, not restricted to National teams.

By holding the event on 3rd-4th July, a week before the Utrecht C/L World Championships, they hope that competitors and spectators alike will attend both meetings. However the problem with an 'Open' meeting is that there maybe more entries than can be handled in a weekend – 128. Thus it may well be that entries received after June 1st will not be accepted. The venue at Rotterdam will be the same as used in '75, with the same excellent field facilities, but with much better accommodation. Those planning on either entering or just spectating should write to Ron Kaptijn at Schoonboomstraat 391 Amsterdam 1018, Holland for information and entry forms. Quite a feast of top quality flying in a single week for C/L fans.

KITE & MODEL AEROPLANE DAY 1976 has been set for May 2nd at Old Warden. The success of our first K & MAA revival last October promises that this springtime date will produce festoons of kites and flotillas of real oldie models from the very early days. Make it a date. Swap shop for old engines, kits, accessories and prizes for the most original kites will be among the attractive features. No extra charge to come on the airfield – just the standard Museum admission of 50p adults, 25p children.

VINTAGE CONTROL-LINE enthusisasts will be very pleased to learn that the special – and rather unique trophy – created by Michael Beach has been christened the FIREBALL Trophy. First event for pre 1950 C/L designs will be an informal rally on May 2nd at Old Warden, in conjunction with the K & MAA day. Next month we'll provide more details, plus a dimensional drawing of the 1948 Gold Trophy winner, Peter Cock's famous *Kan-Doo*.

KEEPING IT SIMPLE!



Build all these designs from your scrap box!

Beagle Pup 150
P51-D Mustang
A6M2 Zero
F4U-4 Corsair
Cessna 310
P.38 Lightning

No less than six all sheet profile scale designs for electric RTP flying by

IAN PEACOCK

ROUND THE pole flying, whilst not new in concept, is a fairly recent innovation at least as far as our model club is concerned. Being mainly a radio control-orientated bunch of guys, it was more than a little surprising that electric round the pole demonstrations at the 1975 *Model Engineers Exhibition* created such interest. Many came away bubbling with ideas and enthusiasm and quite a few with a pocket full of suitable motors and props obtained from Harry Butler!

Within quite a short space of time electric RTP was really upon us. A few frantic phone calls acquired the necessary parts, and investigation of the clubs recreation room showed that 15 foot lines were in order. Needless to say the R/C modellers amongst us (self included) opted for the fairly sophisticated model, with more than mixed results. Several of us found that all was not quite so straight forward – it was not even circulatory!

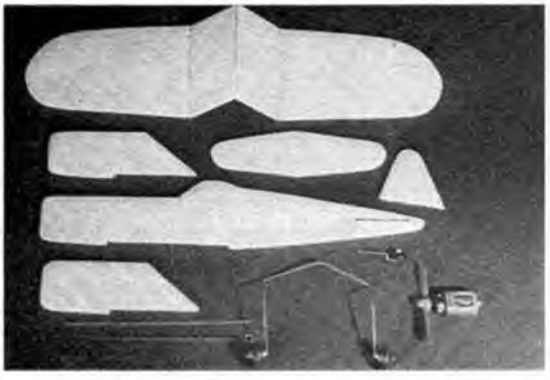
Concurrent with these activities, I was asked to take a helping hand in running a school model club with the members ages ranging from 13 to 16. Here also was an area for RTP. Peculiarly, here also initial models were too sophisticated, with similar marked lack of success.

Clearly something had to be done – and it was. Reading carefully all the published data and recalling the sum total of my now somewhat rusty C/L experience, I sat down with pencil, paper and scrap balsa box and produced the first of a series of highly successful profile scale models.

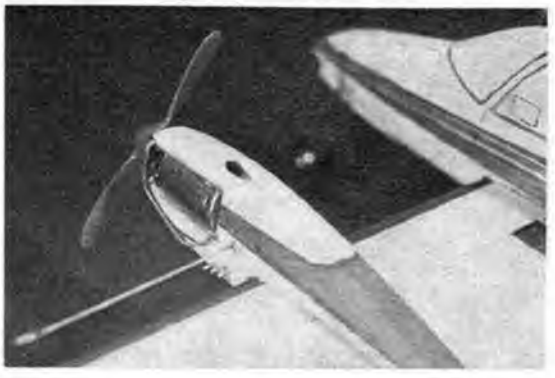
Over the succeeding months electric RTP activity developed along clearly defined paths, one of which rapidly became the most popular – RTP 'Combat' had arrived in Northampton! It was soon found that models of this simplicity and relatively low cost could dog-fight to destruction with little serious outlay, either in time or money.

In fact at a local club 'do' in the Autumn (featuring incidentally 'guest appearance' of both Harry Butler and Peter Bullivant) a combat bout of some 2½ hours was fought between two models (seen in the photographs), with dozen after dozen of mid-air and air-to-ground crashes. Luckily a tube of *Hot Stuff* adhesive was to hand allowing

'Kit' parts for the F4U-4 Corsair shows the simple construction—the average modeller's scrap box will probably contain sufficient wood to make these models, and a couple of hours should see a new creation arise from the building board.



Close up the Cessna 310's nacelle reveals the air dust exhaust for cooling the armature. These slots should be in both top and bottom portions of the necelle, to allow air to flow through the motor. A drill passed through at an angle will do the job nicely—but ensure holes align with slot in motor 'can'.



30-40 second repairs to be carried out much to the delight of the spectators who found the whole scene somewhat mind-boggling.

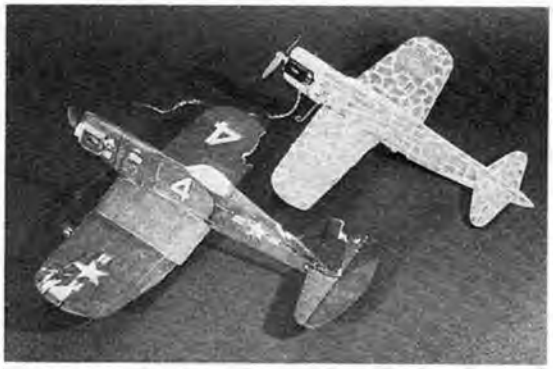
This degree of success was found also at the school club where youngsters achieved sufficient success to prompt the organising of a club visit to the 1976 ME Exhibition.

Just about any combination of airframe/motor can be produced around this basic formula. At least two *Flying Fleas*, a *Concorde*, and a *Boeing XB-47* can be seen around the local 'poles'.

What we have to offer here, however, are a couple of well tried twins, and four single engine models. As can be seen, these really are quite simple to make and easy to fly, but as they were first built to encourage youngsters, perhaps the more experienced will bear with me while I run through the basic steps.

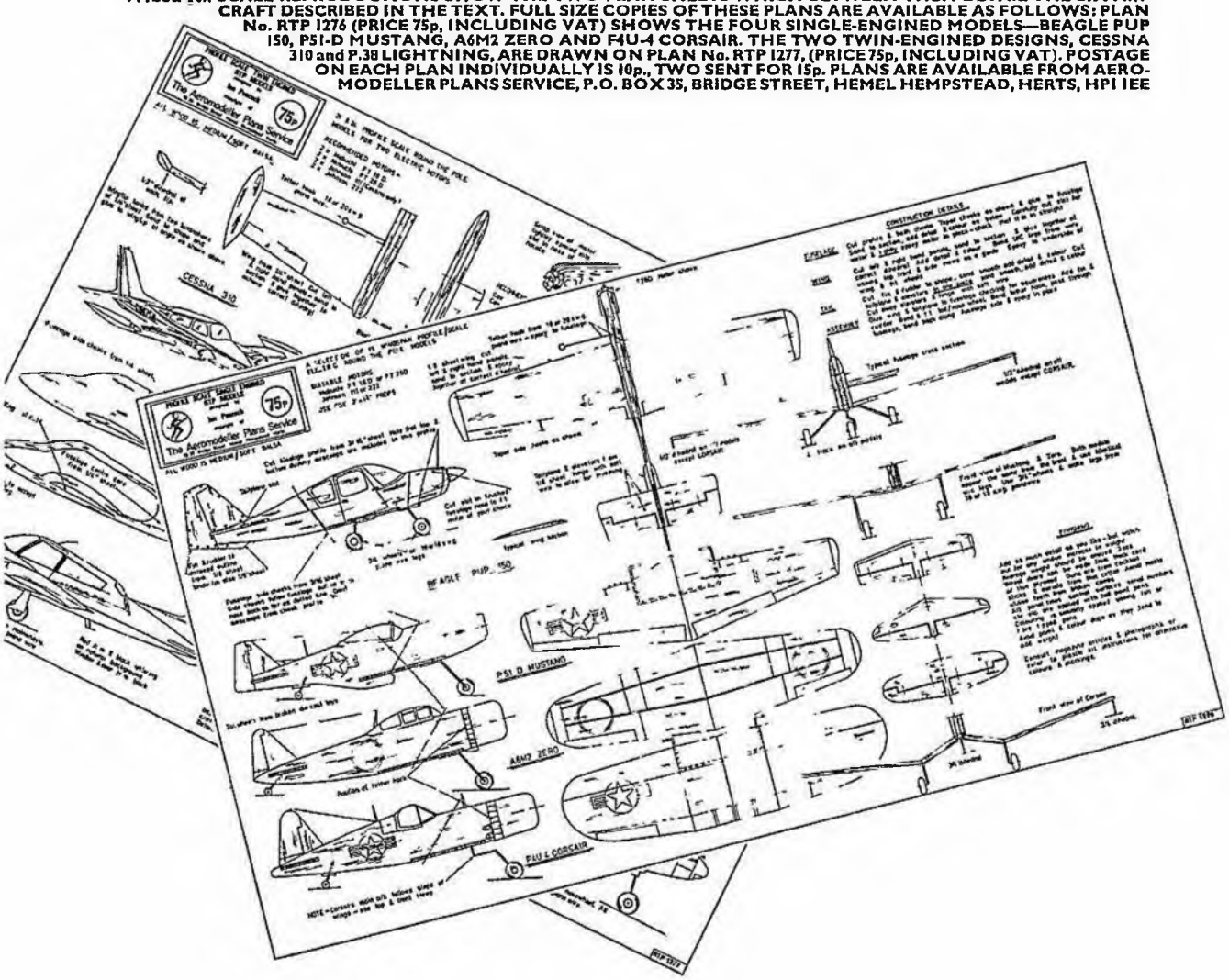
First trace out all the parts required onto medium/soft balsa sheet. Note that whilst $\frac{3}{16}$in and $\frac{1}{4}$in sheet is called for in the single engined versions, in the interests of economy $\frac{1}{4}$in sheet may be used throughout if desired.

Carefully sand each part to shape taking care to round off all the edges except for the bottom of the fuselage (where the wing fits!) Using PVA adhesive, (or 5 – minute epoxy if you are in a hurry) glue together the wing halves, propping up the tips to achieve the correct dihedral. Whilst drying, cut the elevators away from the tailplane and fit in place with soft wire hinges. This allows the elevators to be slightly adjusted should the finished model require a little trimming. Glue fin and rudder to fuselage and add outer cheek pieces to either side of the fuselage nose and allow to dry, note that these cheeks taper along their outside face.



The prototype Corsair and Zero—all from $\frac{1}{4}$in. sheet (see text) after an exhausting 2$\frac{1}{2}$ hour combat bout, during which nearly a whole bottle of 'Hot Stuff' was consumed! The models are still airworthy despite much damage. Only cowards use streamers we are told, it's much more interesting to make the combat real, and aim for the model itself!

THESE $\frac{1}{4}$th SCALE REPRODUCTIONS SHOW THE TWO PLAN SHEETS WHICH BETWEEN THEM DETAIL THE SIX AIRCRAFT DESCRIBED IN THE TEXT. FULL SIZE COPIES OF THESE PLANS ARE AVAILABLE AS FOLLOWS: PLAN No. RTP 1276 (PRICE 75p, INCLUDING VAT) SHOWS THE FOUR SINGLE-ENGINED MODELS—BEAGLE PUP 150, P51-D MUSTANG, A6M2 ZERO AND F4U-4 CORSAIR. THE TWO TWIN-ENGINED DESIGNS, CESSNA 310 and P.38 LIGHTNING, ARE DRAWN ON PLAN No. RTP 1277, (PRICE 75p, INCLUDING VAT). POSTAGE ON EACH PLAN INDIVIDUALLY IS 10p., TWO SENT FOR 15p. PLANS ARE AVAILABLE FROM AEROMODELLER PLANS SERVICE, P.O. BOX 35, BRIDGE STREET, HEMEL HEMPSTEAD, HERTS, HP1 1EE



Carefully cut a slot in the nose to take the motor, which should be a snug 'slide fit'.

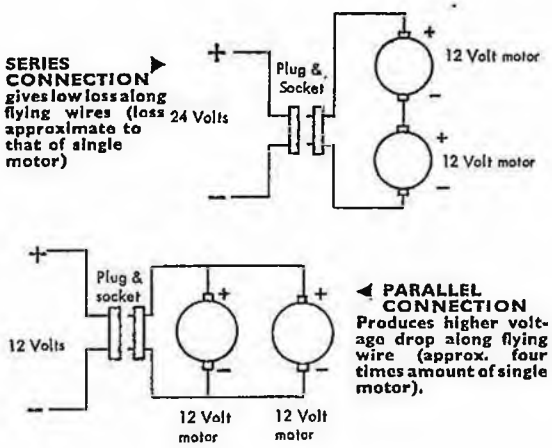
If motors are mounted upright (*ie* the slots in the motor 'can' for armature cooling lie on the sides) no additional cooling is required, but if mounted flat (slots in 'can' face up and down) then cooling holes in the top and bottom of the nose are required this is shown quite clearly on the photographs of the Cessna 310.

Lightly sand the finished wing, tail and fuselage, and then refering to the drawing or to photos, magazine plans etc., add what panel lines, control surfaces, insignia and other details you require using varying colour ballpoint pens. Final colours may now be added with felt or fibre tip pens. This technique naturally does not give such a good finish as tissue and dope, but is quicker, lighter and, it does look quite effective. Now epoxy wing and tail to fuselage taking care that all is square, both from above and from the rear. The tether hook is added from 18 or 20swg piano wire and undercarriage units bent from 16swg piano wire – these latter pieces are then epoxied direct to the underside of the wing. Add wheels and extra detail (*ie* wheel doors, aerial masts, guns etc.) to taste. Finally attach motor in its slot with a *small* dab of 5-minute epoxy at each side top and bottom. This will secure the motor adequately whilst allowing it to be removed with a knife if necessary.

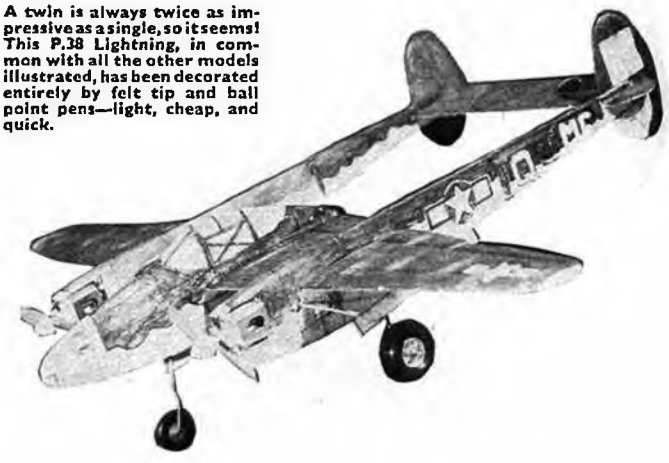
Adding a plug to the motor leads is obviously a matter of the requirements of your pole – ours uses a 4 pin plug and socket, to allow for auxiliary functions, and for neatness the plug is epoxied into the fuselage or nacelle. Various substitutes for the materials shown on the plans have been pressed into use where they have been easily to hand. 16swg welding rod makes good U/C legs and tether hooks, straightened paper clips also fit the tether hook requirements. Wheels taken from broken Dinky toys and discarded Scalextric cars are emminently suited. (We have one Spitfire proudly taking off and landing on the biggest pair of wide racing slicks that you have ever seen!).

Motors from Scalextric and Airfix racing cars have also been used but a resurgent interest in slot-car racing in our area has removed this source of supply. More recent models have propellers and motors supplied by mail order from Harry Butler, whose address appears elsewhere in this issue.

The twin engined models exhibit a widely varying weight due to poor wood selection. Several, including the P.38 Lightning came out at around 8ozs and required two Mabuchi FT 26D motors, although others, such as the Cessna 310 weigh only 4oz and fly quite happily on smaller motors.



Twin engine operation is fun if you have a twin headed pole. The model may be flown on *both* sets of wires with independant control of each motor's speed – be careful, however, that single engined performance on the *outboard* engine does not cause the model to turn into the circle. If the pole has only a single head, the motors may be connected either in Series or Parallel. If one's power supply is capable of producing reasonably high voltages, Series wiring is to be prefered due to the lower voltage-drop down the flying wire. All good electrical students will tell you that the voltage lost down the line is the multiple of the resistance of the wire and the square of the current passing along it. *ie* $V=R \times I^2$. As the resistance R remains to all intents and purposes constant, it is the current that determines this loss. Two motors in parallel, double the current and therefore *quadruple* the loss. Two motors in series however require the *same* current and therefore the voltage drop stays the same. Don't believe me–check it for yourself–it really works! However no-one gets anything for nothing and to work in series twice the input voltage is required.



A twin is always twice as impressive as a single, so it seems! This P.38 Lightning, in common with all the other models illustrated, has been decorated entirely by felt tip and ball point pens—light, cheap, and quick.

* * *

Previous articles in the *AeroModeller* by more knowledgeable people than myself have explained in depth the requirements and techniques of electric RTP flying, but for the novice let me reiterate one or two important points from our own experience:

1. Bend tether hook fore or aft to enable hook to be on the balance point of model.
2. Use elevator adjustment sparingly – it can have a surprisingly large effect.
3. Bend tether hook up or down to cure any tendency to fly 'one wing low' (the chinese aviator?)
4. Use rudder offset as in C/L practice if model repeatedly tracks into centre.
5. *Never* have more than 12 volts *at the motor*. If in doubt check the voltage with a meter when the motor is running.
6. Allow good cooling around engine.
7. Use Cox props 3 x 1½in (Cox. 010 props) for all small motors, or even better Harry Butler's new red nylon props. Cox 4 x 1½in props, as supplied for Pee-Wee engines, may be used on FT 26D size motors. If in difficulties *re* supply of these propellers – or indeed any equipment such as motors, pole heads, power unit etc. then write to Harry Butler (Models) who can meet the needs of all electric RTP fliers.

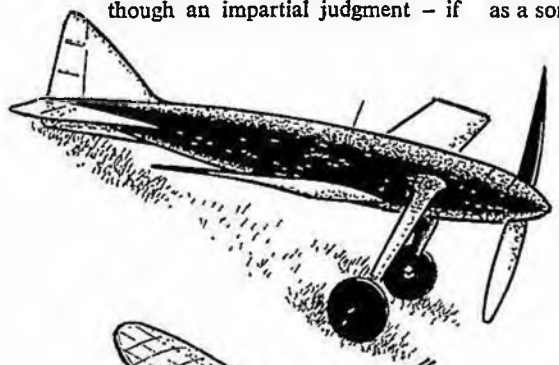
THOSE EARLY DAYS.....

Part 2 of "Magpie's" recollections

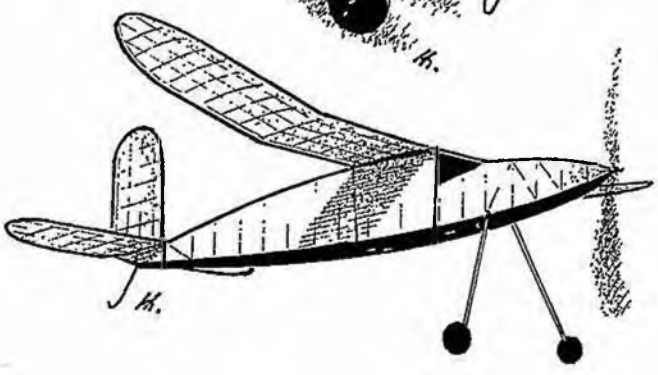
Above left: B. E. Pelly-Fry watches Gordon Light's typical American Wakefield with cabin-type, boxy fuselage, large tail and spatted wheels. Photograph was taken by the late Richard Langley, then comp. sec. of the SMAE, in 1933 at Fairey's Aerodrome. Above: Dick Korda receives the 1938 Wakefield Trophy from the late Bernard McFadden.

SOMEONE ONCE SAID that a large part of our life is spent in attempts to rectify the mistakes of the past, and building the foundations for the mistakes of the future. Although that may be too pessimistic a view, some of it is true and provides a nice hunting ground for political reformers and psychiatrists, not to mention writers of reminiscences. It is always easy to be wise after the event, and expressing astonishment that an older generation was blind to the opportunities open to them. The fact is that in any discipline the 'state of the art' is generally the result of a lengthy process of development with its attendant and unavoidable mistakes. The writer would prefer to stress the highlights in this development rather than the failures, although an impartial judgment – if such were possible – cannot always leave out the latter.

A highlight certainly appeared in 1926 in the form of Ralph Bullock's rubber-driven Racer, for its lines were so advanced and aerodynamically sound that it would be difficult to improve on them today. The all-up weight was 21½ozs and the weight of rubber, divided into eight 'motors' geared to the propeller, was surprisingly low: only 3¾ozs. The flying of rubber-driven racers is always a formidable task, for the course must be flown in a straight line and the initial burst of power with its inherent propeller torque makes this extremely difficult. It is not known how Bullock solved this problem, but he did and recorded an official speed of 16 mph. Now this may be regarded as a somewhat disappointing reward for such a stout effort, but according to the current report the model flew into a wind of an estimated 12 mph, so it would have been an airspeed of some 30 mph. It must have been impossible to make a model of this kind fly the course both ways – it would have to accelerate to a ground speed of about 38 mph and that would very likely have left little power to fly the course of 50 yards. Thus this magnificent racer's potentialities will never be really known.

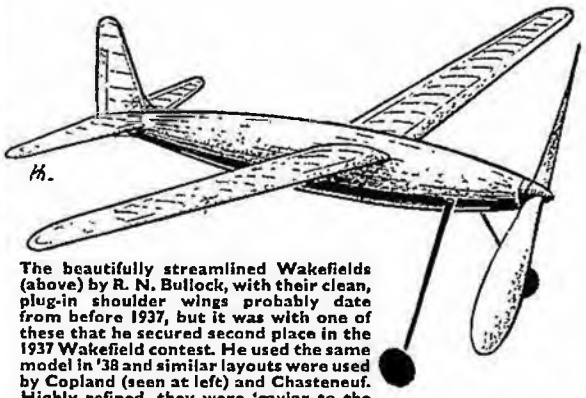


Ralph Bullock's 1926 rubber-driven Racer, capable of over 30 mph. Wings plugged into sockets on the fuselage, which had an elliptical cross-section at its maximum girth. Front and rear spars consisted of top and bottom flanges ¼ x ⅜ inch spruce; LE and TE were 24 swg steel wire. Problem with rubber racers is to handle the initial burst of power; any excess makes the model climb. The eight skeins only constituted about one-seventh of the total weight.



The 'cabin' rubber model by Chester Lanzo, has much in common with the designs of Gordon Light and Dick Korda. Polyhedral wings, box-car fuselages, large tail surfaces and about 20 inch diameter, almost paddle-blade props.

When looking through our notes for these articles there is one story that must be told here. In the late twenties, materials were not only simple and standardised, but there was – as always, even in these modern times – an inherent suspicion about any new material or method of construction that happened to come along. It will amuse readers to hear that in those days a friend of ours called in at the top aeromodeller's shop of the time (it was in New Oxford Street, London) to buy some spruce, piano wire, oiled silk, wood glue etc, for his new model. The owner of the shop said: "*Have a look at this stuff, just been sent to me from America,*" and he showed my young friend a piece of some strange, white and very light wood. "*It's some useless soft stuff, called Balsa Wood. And who in their right senses is going to use that in model aeroplanes?*" That small



The beautifully streamlined Wakefields (above) by R. N. Bullock, with their clean, plug-in shoulder wings probably date from before 1937, but it was with one of these that he secured second place in the 1937 Wakefield contest. He used the same model in '38 and similar layouts were used by Copland (seen at left) and Chasteneuf. Highly refined, they were 'caviar to the multitude'.

block of balsa wood – just for the record – was the very first of its kind ever to get to England and we are happy to report that the young man in question took the sample away and used it for fairings. We later learnt that there were different grades of balsa: light, medium and hard. Until then balsa was mostly used for rafts and packing expensive furniture, it being so soft that it did not scratch the French polish. With balsa came a special cement and Banana Oil, so a completely new technique of 'easy' building gained more and more followers.

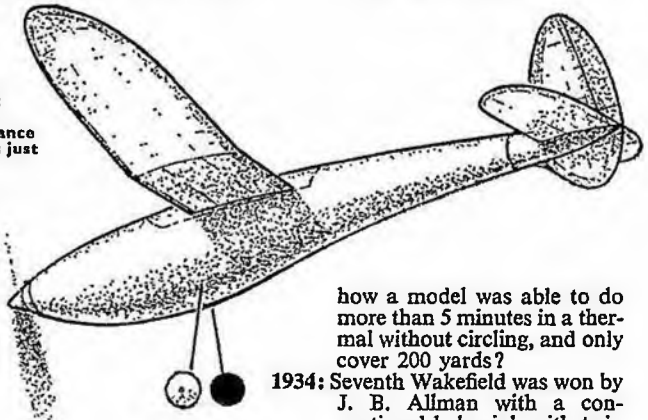
As balsa wood, that strange species from Ecuador, having first found a market in the United States, it was only natural that methods to work it originated in the New World, to use that old description. And when they started to compete in the Wakefield International Cup Competition they did make one sit up and take note. However, a short summary of past Wakefield contests should precede a discussion on the engineering aspects, and here we make grateful use of the researches of that very same friend who handled that magic bit of balsa wood. He, in his turn, consulted Co. C. E. Bowden's book *History of Model Aircraft*.

1927: Wakefield Cup presented by – then – Sir Charles Wakefield.

1928: First contest, won by T. H. Newell of Great Britain.

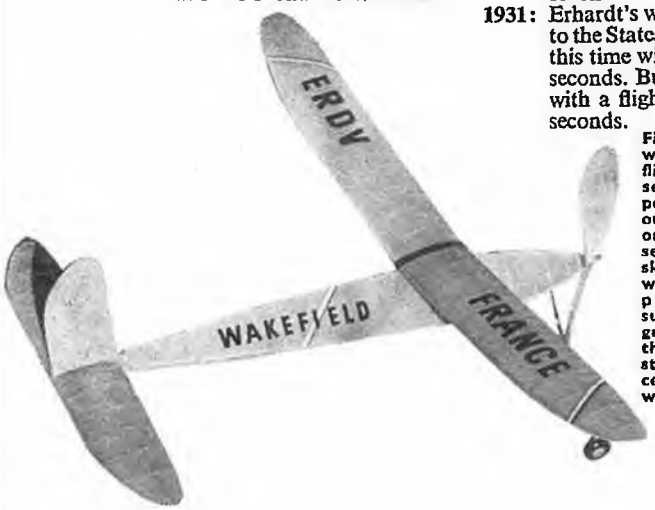
1929: Second contest, won by R. N. Bullock with an equal chord, low-wing design.

1930: Third contest, this time at Halton, won by the American Joe Earhart. Enter the balsa wood! Light, spindly, long-legged high-wing job with single thread 'lift-wires' from bottom of fuselage to wing tips. Concave lower surface of mainplane. Winning flight 155 seconds.



Cahill's fine 'ship' as it was on that still and hot day of 1938 at Guyancourt airfield in France when models just disappeared overhead. Streamlined, monocoque fuselage, very short landing gear and single bladed folding propeller. Motor weight was about 44 per cent of the all-up weight.

1931: Erhardt's win took the contest to the States and he won again, this time with a flight of 264·8 seconds. Bullock came fourth with a flight by proxy of 162 seconds.



Fillon's 1937 Wakefield, which won with a best flight of 11 mins. 23 sec., was inspired on a popular American lay-out with parasol wing on a diamond cross-section fuselage, single skein rubber motor with large 20 inch prop., large tail surfaces. With 80 grammes of rubber, the power unit constituted about 36 per cent of the all-up weight.

1932: Although 'won' by Joe Culver, the contest was declared null and void on unknown technical grounds, and the Cup returned to England.

1933: Won by J. W. Kenworthy (GB) with 321 seconds OOS, A. Willis (GB) second with 143·5 secs and Gordon Light (USA), proxy-flown by J. E. Pelly-Fry, third with 143·2 secs. The models were required to fly over a course of 200 yards 'without circling', a curious requirement, presumably intended to encourage designing for directional stability. Can anyone explain how a model was able to do more than 5 minutes in a thermal without circling, and only cover 200 yards?

1934: Seventh Wakefield was won by J. B. Allman with a conventional balsa job with twin skeins of rubber. For the first time the average of three flights was introduced and he recorded only 111·8 secs, nothing like as good as the previous year.
The Americans sent a six-man team of which that famous world traveller and author of the late, lamented Year Books, Frank Zaic, came third, but the report does not mention second place.

1935: Gordon Light won the 8th Wakefield with a model that looks very much like a copy of the one Pelly-Fry flew proxy in 1933. Both wing and tail airfoils had concave lower surfaces. It recorded an official

A Korda Wakefield takes to the air – the classic American slab-sided layout is immediately recognisable. Incidentally, plans for all models photographed on these pages are available through the AeroModeller Plans Service (advert!) namely: Coplands Wakefield, plan No. D121X price 85p; Fillon's 1937 Wakefield, plan No. D1218, price £1.30; Korda Wakefield, plan No. D1263, price 75p. Prices include VAT.

time of 7 mins 30 secs, but was actually airborne for well over two hours, landing by sheer chance at Hanworth aerodrome, having travelled from Fairey's factory airfield at Heath Row. That once more carried the Cup to the US.

1936: The six names in the British team which went to the USA have since shot to considerable heights in industry and significantly demonstrate how modelling is a great character building exercise. J. B. Allman, Alwyn Greenhalgh, Dennis Fairlie, H. A. Jones, Bert Judge and Bob Copland still retain their interest in the hobby. The contest was won by the young A. A. Judge whose design was then kitted by Frog. This led to his long connection with that company as a designer and with Joe Mansout in the creation of Jetex. Held at Wayne County Airport, Detroit, the event was thermal-free and other high places were taken by Copland (3rd) and Allman (5th).

1937: The duel between British and American modellers has ended and this time it is a win for France when E. Fillon collects the Cup for one year with an average of 253·23 secs, using a parasol layout, the wing being mounted on a central rail fixed to the 'diamond'-section fuselage and stayed by means of short wire struts. There is no need to add any more details here as a description of the contest, with the plan of the winning model was reprinted in the *AeroModeller* for March 1974. Bullock was second with an average of 194·53.

1938: France organised the contest and Jim Cahill won with the highest average yet: 654 secs, followed by Bougueret, France with 418 secs. Although full marks should be given to Cahill's design, the result was not entirely satisfactory and set one thinking whether an average based on unlimited flight times was a real criterion of model performance. It was a classic example of what was to happen time and again in national as well as international contests. The model had floated down after some two or three minutes when it struck a powerful riser over a cornfield only 10 to 20 feet up and shot up to record over 30 minutes. On his second flight Cahill was disqualified for 'pushing' the model and the third recorded only 37 seconds. The results were later analysed by 'Clubman' who wrote the prophetic words: *"Taking three minutes as the minimum flight that should have been accomplished under the conditions on July 31st what do we find?"*
And he lists the results as follows, noting the number of flights over 3 minutes with each nation had recorded: America 2; France 5; Sweden 3; Germany 5; Great Britain 10.

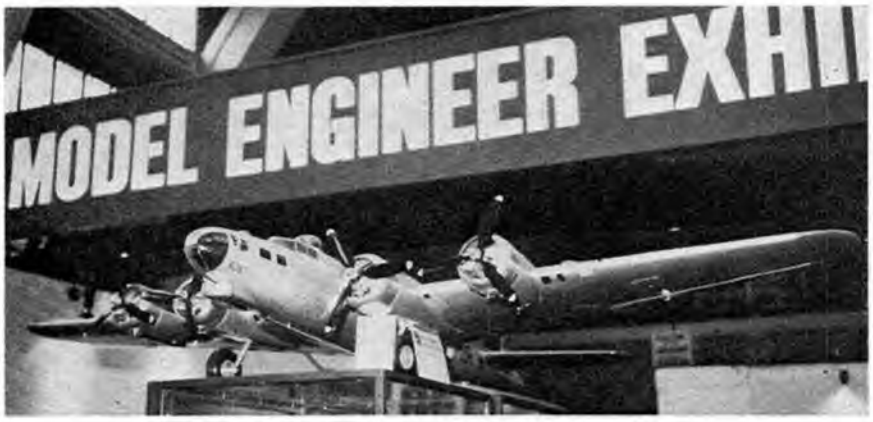
1939: The contest in the States was virtually decided by the very first flight when Dick Korda (US team) scored a world's record with a fantastic 43 mins 29 secs, his model landing only half a mile from the flying ground. Bowers, of Canada, came second with an average of 272·66 and Great Britain took fourth, fifth and sixth places (Copland, Lees and Stott). Korda averaged 950·2, so he clearly did not take any risks on his remaining two flights.

So much for vital statistics, which were needed as background to the winning models. The Wakefield Contest, like so many important things at that time, ran into a spot of bother caused by that man Hitler and it was nine years later that Great Britain won the Cup in the States when the late Roy Chesterton scored a victory with his *Jaguar*, but that event no more belongs to the vintage era.

So let us look at the models in the sketches, but we should first mention another item in the rules which had an important bearing on Wakefield design. Models had appeared – particularly in the States – which possessed horizontal tailplanes of vast area, in some cases 40 or more per cent of that of the wing. Acting as lifting surfaces they effectively decreased the wing-loading and made a mockery of 'the rules'. So the area of the tail was limited to one-third of that of the wing. In '39 the Korda model was found to have too large a tail, the cross-sectional area of the fuselage was too small and the model was underweight, so he had to make corrections overnight.

The 1938 model of Jim Cahill – see sketch and cover – was a beautiful job and possessed all the characteristics of a winner; it had in fact already won the Moffet Trophy in the States the year before. *Clodhopper* had, we were told at the time, been lost after a fly-away and those days and nights in the open had slightly marred its condition, for the fine monocoque fuselage showed slight sagging of the soft $\frac{1}{16}$in. skin between the closely spaced bulkheads. In the US team it was known as 'the hungry horse'. By adopting a deep fuselage belly, Cahill was both able to meet the cross-section rule and using a very short landing gear, so short in fact, that it could only take off with the tail well down, or the prop would hit the ground. High aspect ratio wing and tailplane made for good performance and close rib-spacing as well as 'buried' box spars helped to maintain the shape of the airfoil. The latter was the only item we would be inclined to change these days: it was probably RAF 32 or Eiffel 400, thick undercambered airfoils, which Cahill used both in the wing and the tail. There must have been two versions, for on *AeroModeller* plan D 1188 (price £1.00) the spars are solid and the rib-spacing has been increased from 1$\frac{1}{2}$in. to 2in., it also bears the name *Clodhopper II*. Where the European designers still used two bladed, free-wheeling propellers, the Americans were already adopting single bladed 'folders'. Another difference is seen in the manner rubber power was transmitted to the propeller: British builders often using two skeins and gears where the Americans

continued on page 167



MODEL ENGINEER EXHIBITION

Seymour Halls

30th Dec–10th Jan, 1976

Who else but Albert Briggs could produce such an impressive B-17 Superfortress for radio control, using four diesel engines? This 11 lb beauty earned him a Very Highly Commended certificate.

"AN OUTSTANDING SUCCESS" is the only way to accurately describe this year's Exhibition – and who could argue following an attendance figure of 64,000, some 28% higher than the previously recorded 'best'? Not only did more people see the Exhibition, but there were also more exhibits, trade and club stands than ever before, squashed into the confines of London's Seymour Halls. In addition, there were constant working demonstrations of radio controlled tanks (seen 'in action' over appropriate terrain and with most realistic – if not noisy – pyrotechnics), R/C boats in the adjoining swimming pool plus of course our own RTP display. More of which anon . . .

Sad to say, however, we must make our annual comment about the lack of support in respect of model aircraft entered as exhibits. A reader wrote to us complaining that there is *'never enough for the poor aeromodeller'* at the Exhibition and requesting fair shares for all. Truth is there is ample scope for the aeromodeller to compete – any type of model aircraft, whether scale or not, and using any kind of motive power (if any) is quite eligible – so the 'blame' as such must rest upon the shoulders of the reticent modellers. The great pity is, of course, that an excellent opportunity to show the fruits of our labours to the public, was missed. Can we aeromodellers *afford* to lose such good PR material?

Topping the non-scale category was none other than Martin Dilly with his circle-tow equipped A/2. At first glance this model is rather deceptive – it appears neat, but no more. Closer examination though reveals the thoroughness and detailed preparation that has gone into this machine – not to mention the accuracy with which it was built – and that infers a lot more than just a good covering job too. In all, a worthy winner of the Silver Medal.

Competition was very fierce in the scale section, but it became almost a 'Banks benefit' when David Banks of Kingsbury collected a Silver Medal plus 'Very Highly Commended' and 'Highly Commended' certificates with his trio of diminutive CO_2 and rubber powered 1/20th scale versions of a Sopwith Camel, Caudron Racer and Bristol Scout.

Built to an incredibly high standard and superbly finished with an airbrush, the Sopwith Camel in particular completed a 'David and Goliath' performance by topping Roy Scott's impressive R/C Junkers 88, complete with retracting undercarriage and realistically 'weathered' finish. This latter model with its hard-to-duplicate external glassware earned itself a Bronze Medal, and doubtless, when it is completely finished (more interior detail has yet to be added), it will be featuring at the top of Class II – if not Class I – scale contests in 1976.

By tradition, so it seems, although in truth a mere seven years, our own involvement with the 'ME' concerns electric round-the-pole flying. Once more, the circle was suspended between balconies over the main exhibition area, permitting the 'usual' 46 foot diameter flight circle to be employed. Harry Butler, in addition to taking a trade stand to display his wares, also brought a veritable air force with him – no less than thirty aircraft, ranging in size from his *Volt Master* kit to the huge – and immensely impressive *Boeing B17*, as kitted by Sterling. Flying on just two geared Johnson 36D motors, this latter attractive aircraft proved extremely popular with the crowds. Harry flew his entire fleet throughout the 11 day period, delighting the public with aerobatic displays from his *Pitts Special* (a subject to be kitted in the future), KeilKraft *Camel*, and Sterling *Ansaldo* as well as slow, realistic flight from the large scale Sterling *Peashooter* and Mercury *Tiger Moth*.

That great 'electric' enthusiast in the USA, Pat March, posted three models across the Atlantic, and these we discovered were his *Voltswagon* design – in three assorted sizes! The largest, spanning 34 inches, used two 36D motors geared to a common shaft, resulting in ample power and sounded most 'throaty'. We had hoped to fly all three at once, but unfortunately the smallest variety (just 14in. span) proved too light for our line length, thus we had to be content with 2-up formation flying. Plus a little (unintentional) combat . . .

For the first time, a competition was organised for visiting RTP enthusiasts, this being for both scale and aerobatic classes, with Junior and Senior categories in each. Run on very informal lines (contestants could fly on any day they wished, whenever they liked – and no entry fee) it proved most successful and was well supported, particularly by Junior flyers.

Rather surprisingly, few RTP enthusiasts seem to be enjoying aerobatic flying, although loops are really very easy to perform – perhaps lack of space in the average club room is the answer, but what is wrong with the garden or other open space? Winner proved to be Andrew Baldwin of Hemel Hempstead with his semi-scale *Pitts* biplane, built mainly from expanded polystyrene wall tiles and

At left, Andrew Baldwin with his three RTP models—and prize for aerobatics. Below is Mark Chesterton who won Junior Aerobatic award for his RTP Keil Kraft 'Hurricane'. At right is the RTP master himself—Harry Butler—oiling the gears on his Mercury 'Tiger Moth'

powered by a geared Mabuchi 26D motor and 6 x 4in. Top Flite propeller. This 13in. span model weighs 4½ozs and yet is capable of very good loops (though they widened somewhat on the last day as constant repairs increased the weight!), and as a novelty Andrew has fitted a hopper full of French chalk, to simulate crop spraying. The same competitor also flew in the scale event with his familiar scale, Rothmans-liveried *Pitts Special*, and a most attractive semi-scale monoplane which flew in a very sprightly manner, despite its large size. In all, a worthy winner of the superb transformer/rectifier unit – donated by the manufacturers, Harry Butler (Models).

Main challenges to Andrew were Ib and Jette Lyngkilde, who once again paid a visit from Denmark, this time bringing their own models a *Spitfire*, plus a *Tiger Moth*, and *Gloster Gladiator* from old Frog all-sheet balsa kits – still on the shelves in some Danish model shops, vintage fans please note. During their many hours spent at the flight circle, they delighted the crowds with the performances of these little craft – we particularly enjoyed the near-vertical climb followed by an *immediate* flattening-off into level flight, as well as very good loops. In the Junior aerobatic class, 15 year old Mark Chester of Berkhamsted flew his Keil Kraft *Hurricane* to such good effect that he could hardly fail to win – the performance even surprised him, as he had not flown on such long lines before.

Undisputed winner of the Senior Scale event was the Coventry Club's Peter Lindridge flying his *Spitfire Vc*, complete with retracting undercarriage operated via a Johnson 1.5v motor, working through a 200:1 gearbox. Despite the all up weight of 16oz the straight-drive Mabuchi 64 engine coped with the 27in. span model – although take-off was only achieved by retracting the wheels at an opportune moment after hitting a bump on the track! Very sensibly, Peter had detachable scale details – such as plug-in cannon and aerial – which enabled test flights to be completed without damage to vulnerable parts.

Bernard Sexton came with the Three Kings 'troupe' and produced a very fine Comper Swift *Black Magic*, scaled up from *AeroModeller* drawings to 24in. span. The engine is faithfully duplicated being all-scratch built with the exception of the Williams Brothers cylinders. Powered by a geared Johnson 36D (fitted with an extension shaft) the model flew very well and was a strong challenge for the top position.

Many Juniors flew in the scale event, the majority using Keil Kraft kits, although one or two converted commercial Peanut plans. However, the judges decided that 13 year old Daryl Burton provided the most praiseworthy effort. Although his Westland Whirlwind was only profile-scale, for his originality in choice of subject, drawing his own plans and providing a model which flew so well with a pair of Mabuchi 26Ds, he was awarded the power unit donated by Harry Butler.

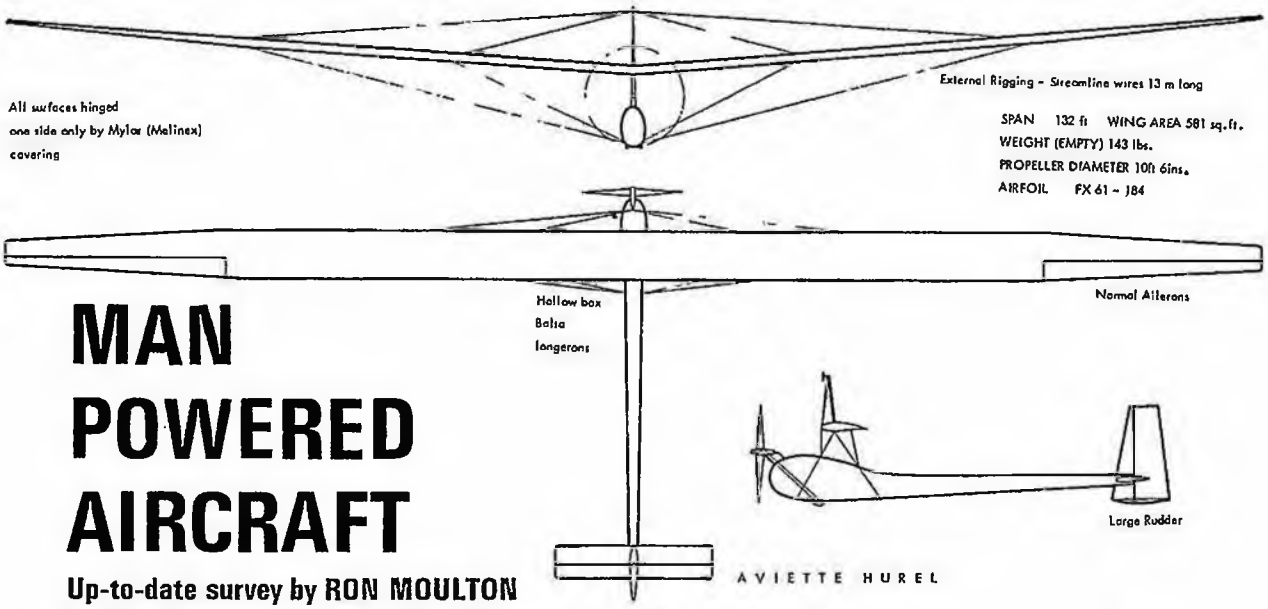
In addition to these persons, there were many varied entries from all over the country, mainly consisting of models constructed from kits by Keil Kraft, Guillows and Sterling, as well as many clubs and schools who flew just for fun with no contest flying in mind – indeed we were extremely pleased to see so many younger modellers present.

Danish visitors Ib and Jette Lyngkilde flew these all sheet kits to good effect. Despite their all sheet construction and small size, these models handled the long lines perfectly, and produced some very nice loops.

David Banks' 1/20th scale Sopwith Camel, powered by a CO_2 engine, topped the 'Flying Aircraft Models' section to win a Silver medal. This 17in. span model weighs just 1¼ ozs, and is a perfect example of how an airbrush should be handled.

Caught with its wheels just about to be fully retracted, this Spitfire Vc must be that built by Pete Lindridge of the Coventry Club, which won the RTP scale contest.

For sheer spectacle on the RTP flight circle, nothing could compare with Harry Butler's 39in. span Boeing B-17 Flying Fortress which was built from the Sterling kit. Just two motors — geared 36Ds — were used, in the inboard nacelles.



MAN POWERED AIRCRAFT

Up-to-date survey by RON MOULTON

THE £50,000 PRIZE awarded by Henry Kremer for the first flight by a man powered aircraft around a prescribed figure of eight course still remains unclaimed. So too does the lesser (!) prize of £5,000 for a much simpler 'Slalom' flight. But progress with numerous projects spread around the world may well change the situation in 1976.

Largest of all MPA's, the two-man *Toucan* by Herts Pedal Aeronauts made several successful test hops before a wing failure in November sent it back to the workshop. Best flight with the earlier, short span wing was 700 yards in July '73 and hopes are in this well organised group for better performances when repairs are completed. Other British two-seater is Ron Phillips' machine at Watton, Yorkshire. Made extensively of dural tubing, this is Ron's second aircraft, and it has already been air-tested on tow with only the outer panels of its 80ft, wing fitted.

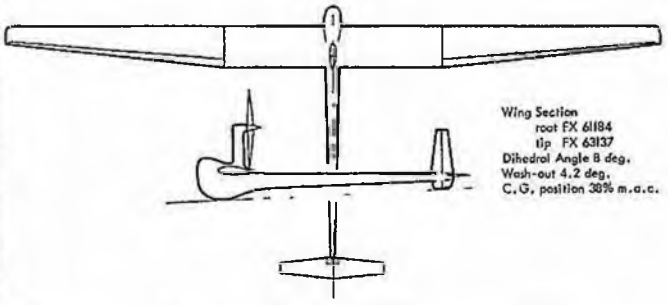
Further north at Prestwick, R. J. Hardy's *Dragonfly* is only limited by the local weather. Trials caused changes of detail design ranging from strengthening the rear fuselage to resist ground handling to moving the prop from pusher to tractor plus extension of the stabilator area to compensate the pitch-down couple of the high thrust line. But now the light (about 95lbs.) *Dragonfly* is ready and waiting.

So too is the elegant *Micron* by Peter Wright which is an all-plastic structure except for the drive-frame and mechanism. A remarkably narrow wing, vee tail and tear drop fuselage shape make this carbon fibre reinforced machine an outstandingly different approach. It is now on trials at RAF Cranwell where it shares hangarage with the famous *Jupiter* and *Mercury* machines flown by S/Ldr John Potter. John is currently experimenting with plastic structures for a new Cranwell project.

In France, many flights have been made by Eric Verstraete, a Belgian cyclist who has completed five man-powered machines and flown them at Calais airport. Eric

Top, the largest single seater, made by aero-modeller Jacques Martinache for Maurice Hurel of Paris. Left, two of Eric Verstraete's remarkable MPA's at Calais. Tee tails and tip flaps (air brake 'ailerons') are features. His 1976 machine is smaller unlikely to have ailerons.

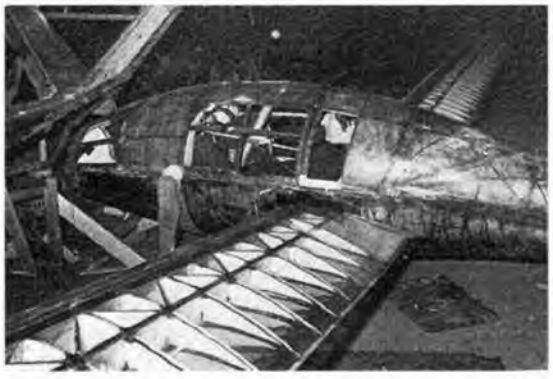
Herts Pedal Aeronauts Team and the Toucan before November '75 flights which resulted in a broken wing. Drawing of extended span Mk. II at foot of page.



Japanese students came to Farnborough '74, saw some British MPA's and now have this Jupiter-like NH75 ready for tests.

has a tremendously dynamic personality and aims to fly the Channel following Bleriot's route. He has some interesting ideas and is now completing a relatively small, highly loaded aircraft to fly in average weather conditions.

At Le Bourget, Cdte Maurice Hurel has his huge *Aviette* in the Aeronavale Hangars, ready for a professional cyclist to make flights when weather permits. His outrigger aileron balance surfaces have now been removed as not necessary and the result is a saving in weight and drag. Several long flights have been made with the *Aviette* and it is the most advanced of overseas contenders.



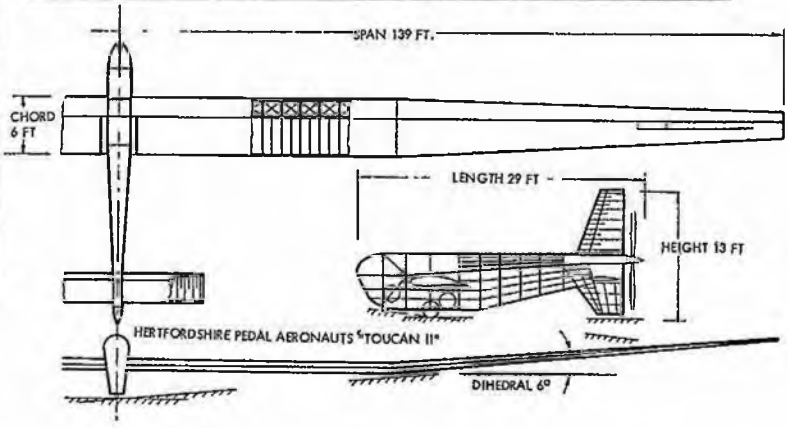
Polish modeller, Leon Poiniak has made a very light (60lb.) machine of unusual gull wing shape, and a Japanese team of Dr Hidemasa Kimura's students have completed NH-75 which shows some influence of the *Jupiter*.

In the USA, the two-man canard biplane concept is still being pursued by MIT while many other American experiments range from pneumatic, air-inflated wings to ornithopters. Dozens of constructors all over the world have registered with the Man Powered Aircraft Committee of the Royal Aeronautical Society (4 Hamilton Place, London, W1) and they collectively prove that the spirit of adventure is far from dead.

A new edition of Keith Sherwin's book *Man Powered Flight* is now available from Argus Books Ltd (£2.95) with updated information on design concepts and progress.

It has an extended Bibliography, Index and an extra chapter to make it 192 pages, with 100 drawings and 144 photographs.

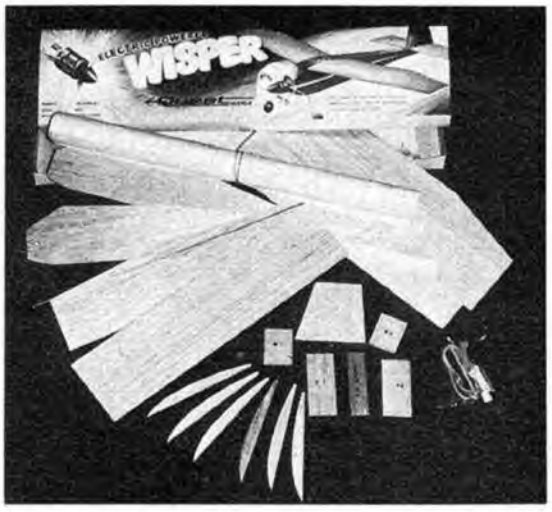
Left: Peter Wright of Melton Mowbray in his slender Micron with 40:1 aspect ratio wings and all-plastic structure. Carbon Fibre reinforced polystyrene and glass epoxy moulded shapes (tail mould in background) make this an adventurous project. Pylon mount for prop, with cable/roller drive (below left), fits above cockpit canopy. Below: M. J. Hardy's Dragonfly at Prestwick before prop pylon change, also high aspect ratio.



KIT REVIEW by Joe Goodchild

QUEST 'WISPER'

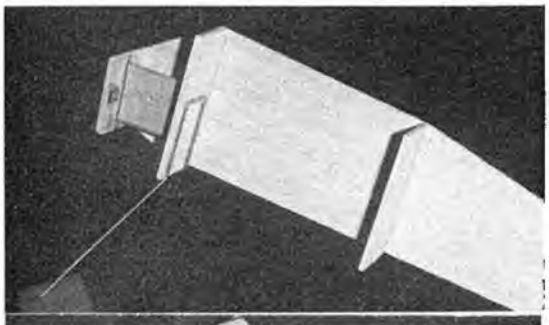
a model especially welcome, being the first available in the UK designed specifically for electric power—using the Mabuchi A-1 unit.



Attractively packaged, we found the Wisper kit to be most comprehensive, containing everything necessary to complete the model apart from the motor, glue and finishing materials. All pre-cut parts were accurately cut, and the balsa selection remarkably good.

THIS REVIEWER must confess to being a 'sucker' for small models and motors, and having once seen the Mabuchi A-1 motor and its attendant charger, he had to have one. The package duly arrived and the motor was installed in a hastily constructed Mercury *Gnome* glider which had its maiden flight at the local club's free flight evening. The opportunity to review one of the first kits designed for the Mabuchi was therefore most welcome.

Wisper is a typical high-wing sport design of 24in. span and of all sheet construction. The kit box has a very good illustration of the completed model, which tempts one to open the box and investigate further. Anyone who does so will not be disappointed; a clearly drawn, well laid out plan together with a most comprehensive and simple instruction sheet showing an exploded view of the model should make construction and flying easy, even for the beginner. All parts are accurately cut to shape, the wing panels and fuselage sides being well matched, in fact, this particular kit had graded wing ribs, a pair in hard balsa for wing root and soft for the others (and subsequent examination of three other kits confirmed this high standard of thoroughness). A packet of 'goodies' containing wheels, spare motor mounts, wing dowels and even rubber bands completes the kit. Cement and dope will have to be purchased separately.



Converting Wisper to suit one of the small Cox motors is extremely easy – here the motor mount M1 has been converted to a firewall (with mounting nuts epoxied in place) and M2 is used as a brace between this and the former F1.

In order to save weight coloured tissue was used for finishing in lieu of colour dope. Transfers are not included in the kit.

Construction

The instructions are of the 'Stick A-B' variety and suffice to say, if followed no trouble should be encountered in completing the model and little elaboration is needed. I must agree with the advice that the motor be purchased before, or at the same time, as the kit as this makes the setting up of the motor mounts so much simpler. The two fuselage sides were pinned together before construction and pilot holes for the wing dowels drilled thus ensuring accuracy when they are parted and ready to accept the wing dowels at a later stage. Following the instructions, building progressed apace and the fuselage was soon ready for covering. The wing ribs were doped and sanded before construction as sanding when assembled can be awkward. The underside of the wing panels also received a coat of dope to allow the wings to take up a natural curve. The sheet tail surfaces presented no problems, sandpaper being all that was required. Such was the accuracy of the ready cut parts that the only use for the razor blade was for cutting the fuselage top and bottom sheeting, and the ends of the wing ribs.

White tissue is supplied in the kit for covering, but in the interests of quickness and lightness I used yellow tissue on wings and tailplane, orange

on fuselage and fin with black for trim. No doubt well thinned colour dope, preferably sprayed on, would not increase the weight unduly.

A small amount of ballast was required in the tail to bring the C of G into the design position, the total weight in flying trim coming out at exactly 4ozs. The construction consumed a week of evenings, taking a lot of time out so as not to miss favourite TV programmes! Unfortunately the weekend brought gale force winds and rain, so flying tests had to be put off but eventually the weather turned favourable and the model taken out to the flying field. A pause for final photographs and test glides began – to use that well known phrase "it flew straight off the building board" is not out of place as the first launch resulted in a long flat glide with a trace of left turn. A two minute charge was deemed sufficient for the first flight under power, batteries in place – switch on and a gentle heave resulted in a smooth climb in a wide left hand circle, a gentle transition to level flight as the power ran out and finally a glide back to earth still turning left. A longer charge resulted in the same flight pattern with more height gained and two circuits of about 50 yards diameter. Several more flights were made using various charging times, and all resulted in stable circling flights. The uncanny sight of the model climbing away in almost absolute silence will surely attract favourable attention wherever one of these little models is flown, and that means virtually anywhere there is open space of about football pitch size.

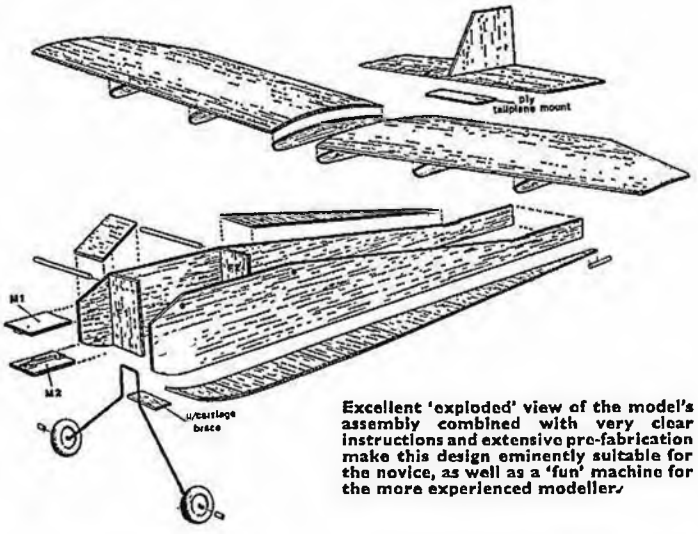
To summarise, *Wisper* makes a perfect introduction to electric power flying, being quick and easy to build and viceless in its flying characteristics. It is also a model that can be flown anywhere and makes a pleasant change from those noisy, oily 'normal' power models.

Postscript

Whilst waiting for the weather to clear, the idea occurred that here was a model that would make an ideal sport model for the ultra small engines such as the Cox TD 010 or Pee Wee. Of course the silence of electric power would have to be sacrificed, but not unduly so. To explore the idea the waiting time was used to construct a second model. For those who have flying areas where power models are tolerated the modifications required are simplicity itself. The motor mount becomes the firewall, drilled for the motor and blind nuts epoxied to the rear. Mount M2 had one edge sanded to allow for 2°–3° downthrust and was used as a vertical brace between M1 and former F1. All other construction and finish was as on the original, except for a final coat of Ripmax *Tufkote* to fuelproof. The TD010 was 'detuned' by fitting an exhaust restrictor, consisting of a thin strip of aluminium with a $\frac{1}{16}$in. dia. hole drilled in it wrapped around the cylinder. A larger prop ($4\frac{1}{2}$ x 2in.) was also used. The C of G and rigging angles were left unchanged.

Test flying proved the idea completely, the same flat glide as the electric version and with the engine running rich the model climbed away in lazy left hand circles but getting a lot more height due to a longer engine run and also to the fact that the model was almost 1oz. lighter. If anyone tries this conversion, a name and address panel is essential, and keep the motor run short unless you need the exercise in tramping over the countryside following a small speck in the sky.

The Quest Models Wisper *retails at a cost of £2.60 and is distributed in the UK by Ripmax Ltd. Kits may be obtained from any Ripmax dealer. In case of difficulty write to Ripmax Ltd, Ripmax Corner, Green Street, Enfield, Middlesex for details of your nearest stockist.*



Excellent 'exploded' view of the model's assembly combined with very clear instructions and extensive pre-fabrication make this design eminently suitable for the novice, as well as a 'fun' machine for the more experienced modeller.

Despite the all sheet construction and 'box' fuselage, the Wisper still looks an attractive little craft. Above is the model built as intended for the excellent Mabuchi A-1 electric power unit, while below is our reviewer's power conversion, complete with Cox Tee Dee .010 cu in motor. Trust Joe, he never can leave anything standard!

topical twists

by 'Pylonius'

illustrated by Sherry

"He just can't get the hang of it"

PROs and Cons

THERE is much ado these days in the model press and elsewhere about public relations. It is not sufficient just to build and fly models; the public must know what we are doing, and love us for doing it. Not that I have subscribed to these sentiments. I have always looked upon model flying as a private idiosyncrasy, keeping it secret from the neighbours for the sake of the family, and practicing it only in the most private surroundings. Generally my policy has been to put as great a distance between myself and the public as possible. Apart from avoiding all those fool questions it has given me much more room to fly. From observation over the years I have always felt the starry-eyed efforts at public enlightenment of the riches of the hobby to have met with little success; the public continuing to regard the chap with the 6ft span, ready made soarer as a more advanced form of aeromodeller than the true enthusiast with his wind up, rubber powered Wakefield. If what you were doing was fairly harmless, and you kept out of the way, no one was likely to trouble you – or so you hoped.

But what has put a different complexion on public relations over the past few years is that the public has more or less taken over the hobby, or rather sport. Go to your favourite model flying patch and you find the public armed with more than just a wide grin – they have those fearsome mis-guided toys to persecute you with. Going across the local common is like traversing a radio activated minefield. How much safer I would feel if I had a herd of PROs to drive before me.

Just to what extent the public has taken over I found when I toured the model shops in search of a usable stick of balsa. Only a few wretched bits of pitiful pap were on offer, but the shelves were filled with glossy kits at affluent-age prices, and the counters crammed with electronic goodies.

The extent of the public takeover was even more forcibly impressed upon me when the small boy, instead of asking the traditional, '*Did you build it yourself, mister?*', coolly informed me that his father had bought him a four channel radio etc. On this evidence it seems to me that we should not worry about public relations, apart from advising local authorities and other powers that true model flying has no connection with the public variety going under the same name.

Historic Hours

Once a nation of shopkeepers, we are now fast becoming a nation of curators, with museums springing up faster than supermarkets. That obsolescent airfield is not just a semi-derelict patch of land with a few old aircraft on it, but a shrine to the great god Nostalgia encrusted with the holy relics of a more picturesque age. Even those fading bits of old model which, at one time, we would have stuffed unceremoniously into the dustbin or incinerator, are now lovingly resurrected and paraded before the envious eyes of other equally vintage struck members.

It was not all that long ago that the definition of an antique was an artefact over 100 years old, and then it had to have the merit of being beautiful and rare, but now anything, however crude and mass produced, is given the historic presentation treatment almost as it rolls off the assembly line. The way things are going we will be shortly running out of historic time, with any model meeting postponed for a week re-dubbed a vintage event. And that fly-away model will not be a goner but a bygone, coming down to earth in another age like a TV space rocket. Just think, that model you are hoping to fly on Sunday may be hailed as the last of the gallant old balsa machines, and in no time at all we will be dressing up in flairs and parkas for a parade of mid-seventies models in *National Vintage Week*.

Downhill Struggle

After looking at the shocking state of some of the 'first models' we see about I can only assume that those adverts urging you to go on to build a full size aircraft after building a model are designed with a view to reducing our overlarge population. Happily, kitchens and garden sheds do not have the internal dimensions of Dr Who's spaceship, so apart from the obvious difficulties of getting airborne along the garden path, few planes with square leading edges and helical fuselages are likely to darken our skies.

Given all these possibilities of humour you would think our TT cartoonist would find the full size transition business a subject for his drawing board rather than his building board, but it seems he has taken the first tottering, downhill steps towards full size flight by building himself a hang glider – a sport in which the landings are usually hoppy rather than happy.

Hang gliding is no new sport, though. People have been suspending themselves from anything thought to be flotatious since the year dot, and have mostly come down the hill more in the style of Jack and Jill than the birds of the air. Perhaps a safer outlet for anyone looking for a new thrill is the latest in controlled kites. It can do every manouevre in the book, and in the brook come to that, since it can engage in a spot of fishing. It can also fly Combat, and, like an amorous dwarf, make passes at a few feet off the ground. What's more you don't have to carry it back uphill.

MILES M-5 SPARROWHAWK

another 'Peanut' from Walt Mooney's bag for an aircraft that flies for miles and miles...

Full size plans overleaf

ALL OF THE MILES HAWK series of light aircraft are beautiful low wing machines, so a Peanut scale Hawk was obviously in order. Looking through the three views in Don L. Brown's book, *Miles Aircraft since 1925* we came to page 91 and a drawing of the *Sparrowhawk*, the short wingspan of this special racer seeming ideal for a Peanut Scale attempt.

The model shown is covered with Japanese tissue, has a plastic propeller, and with a 14in loop of ⅛in rubber weighs 0.6 ounce. On its first official contest flight in the Santa Ana Blimp Hangar, it did 53 seconds from an ROG launch and this proved to be the best indoor flight it has made! All my efforts to trim it out for longer duration since then have resulted in shorter flights. The model will do 48 to 50 seconds consistantly indoors, while outdoors the best official time is 1 minute 51 seconds, but of course that is with thermal help.

In the interest of consistant flying characteristics, two deviations from exact scale were made intentionally. First, the dihedral was increased and secondly the horizontal tail area was enlarged.

The centre of gravity shown on the plans is the actual flight CG of the model in the photo – with the CG further aft due to a longer motor the model flight becomes less stable and more erratic. Ballast is required if your model turns out tail heavy, although no ballast was required on the original model. The plastic propeller used is not the most efficient one available, so experimentation may result in even better flight duration.

The model climbs in wide right hand circles and glides in tighter right circles. Under the first power "burst" the *Sparrowhawk* banks to the left and flies almost straight – allowing the model to turn left under power usually results in a spiral dive.

Aerodynamics include a right rudder setting that is just perceptable, and one-eighth inch of washout at each wing tip – the twist in the wing is consistant from tip to root. Elevator trim required will be dependant on motor installed, and the resulting CG position. No thrust line adjustments have been found to be necessary on the original model.

The structure of the ship follows standard model practice – the only item that requires any special care are the wing fillets. These are carved from block balsa to fit the wing and fuselage contours, then the external fillet curves are carved and sanded to shape. After they fit right, and look right, they are made as light as you dare by carving away the excess wood that would be left inside the fillet.

The wing and tail structure is completely conventional. The fuselage is also very conventional: sides built over the plans, box structure, with top formers and upper sheet covering added. Because the thrust line is high, the formers must be cut out for rubber motor clearance. I found it easy to build the box structure complete with cross pieces top and bottom, then add the formers. When the former attachment is dry, knock out the upper cross pieces and then add the sheet balsa upper decking.

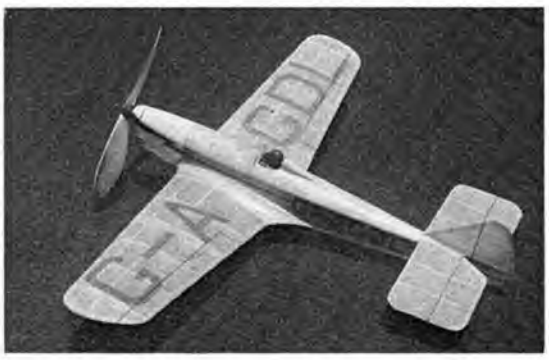
The engine cowl is composed of two thin side panels, a bottom panel $\frac{1}{16}$in thick, and a top panel carved, and hollowed for motor clearance, from a solid block. The nose' block is also carved from a solid block.

The landing gear fairings were made from bond paper – a pattern is provided. Note that the pattern is not quite symmetrical and the bond paper fairings are folded one direction for a 'left' and the other for a 'right' fairing.

I understand the original airplane was coloured cream with red trim and numbers. The model is covered with pale yellow (cream?) tissue and the trim and numbers are cut from red tissue. The propeller was painted aluminium, the types and engine cowl inlets were painted with flat black plastic model paint

Details, such as the headrest, carburettor inlet, exhaust stacks, and tail skid were made from hardwood scraps. The 'pilot' is a plastic head from a slot racing car. Only a head is really necessary, cement it to the head rest. The wind shield is thin plastic with a painted silver frame on its edge.

A really attractive little airplane with a good flight performance. Model finished in darker tissue is handiwork of Fudo Takagi, remainder of pictures show the author's model.



1/16 BY 1/8 LEADING EDGE
1/16TH SQUARE SPARS

1/16 TH SHEET WING TIPS
(5) CENTER RIBS 1/16TH SHEET, OTHERS 1/32ND SHEET

1/16TH SQUARE PARTS

SCALE TAIL

H TAIL

1/16TH SHEET CORNERS AND GUSSETS

WING DIHEDRAL

1/16 BY 1/8 TRAILING EDGE

USE BLOCK BALSA FOR NOSE BLOCK, COWL TOP AND HEADREST

CARVED BALSA WING FILLET

"ALL PARTS ARE BALSA UNLESS OTHERWISE NOTED "

USE 1/32ND DIA. PIANO WIRE FOR LANDING GEAR AND PROPELLER HOOK

FRONT VIEW

1/32ND SHEET SIDES AND BOTTOM

FUSELAGE TOP VIEW

1 2 3 4 5 6 7 8

1 2 3 4 5 6 7 8

PECK POLYMERS PROPELLER AND THRUST BUTTON

7/8TH DIA. WHEELS

PAPER FAIRING SEE PATTERN

1/16TH SQUARE LONGERONS AND UPRIGHTS

SIDE VIEW

WHEEL FAIRING PATTERN

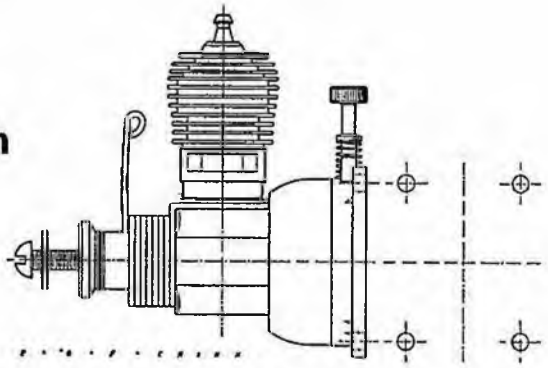
PLASTIC WINDSCREEN PATTERN

WING RIBS

PEANUT SCALE
"MILES M-5 SPARROWHAWK"
BY WALT MOONEY

ENGINE TEST

by Peter Chinn



COX PEE-WEE ·020

FOR MANY YEARS the L. M. Cox Manufacturing Company Inc. of California have enjoyed the distinction of producing the world's smallest production model internal-combustion engine, namely the tiny 'Tee-Dee .010' which has a swept volume of less than one-hundredth of a cubic inch or 0.163cc.

The Cox 'Pee-Wee' model that is the subject of this month's report, has twice the displacement of the Tee-Dee .010, but is still a very small engine indeed. Complete with its integral fuel tank and starter spring, it weighs only 24½ grammes or less than seven-eighths of an ounce. The combined piston displacements of *thirty* Pee-Wees would still not quite equal the volume of one Merco 61. No other engine manufacturer is making engines as small as the Pee-Wee at the present time.

The Pee-Wee is not a new engine: it has been with us for a great deal longer than most, having first come on the market in 1957. It has not changed very much in the intervening 18 years: in fact we found it necessary to make a side by side comparison of the current model with a 1957 model to discover just what had been changed.

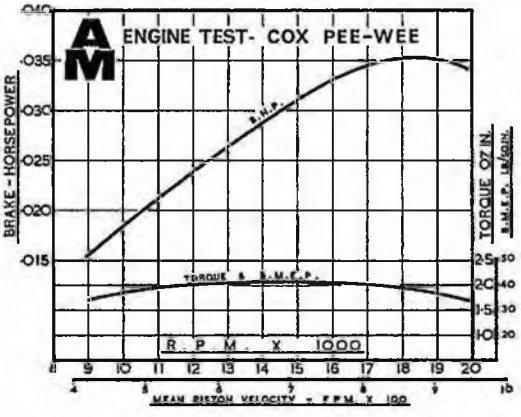
In common with other Cox engines, the Pee-Wee uses a machined, rather than cast, aluminium alloy crankcase. The shape of this has been slightly modified from that of the earlier Pee-Wee motors: the external shape of the crankcase nose, forming the plain unbushed crankshaft bearing, is now parallel instead of curved. The cylinder, too, has been slightly modified. It has thicker walls, larger diameter lower fins and slightly narrower exhaust ports.

Another alteration is the provision of a wire gauze filter screen over the air intake which is located in the centre of the fuel tank backplate. The engine is of the reed valve type and the tank and induction unit is similar to, but on a smaller scale than, that of the 0.8cc Cox 'Black Widow' engine featured in the August 1974 AM Engine Test article.

The rear induction unit is an exclusively Cox design that combines the crankcase back cover with reed-valve housing, fuel tank, and induction tube, and the radial mount backplate with needle-valve, in a self-contained assembly that attaches to the crankcase with four screws. The needle-valve is actually installed in the top of the tank backplate and the fuel/air mixture is conveyed through the centre of the tank via the induction tube that is an integral part of the bell-shaped aluminium fuel tank. Mixture then enters the crankcase through the reed-valve housing which projects into the rear of the crankcase. The thin beryllium-copper reed valve is X-shaped and is retained by a wire circlip.

The engine's top-end design is basically the same as that which has distinguished all Cox engines for the past twenty-five years and uses a one-piece machined steel cylinder that screws into the crankcase and is surmounted by a screw-in combined glowplug/cylinder-head unit. The piston has a hardened skirt and is permanently attached to a hardened steel connecting-rod through a ball-and-socket joint. The cylinder has two diametrically-opposed internal flute type transfer passages and two rectangular exhaust ports. The bottom edges of the latter are below the bottom of the piston skirt at the top of the stroke and thereby allow a short period of sub-piston supplementary air induction into the crankcase.

Those who wish to use a side-mounted or inverted installation, can do so very simply by withdrawing the four backplate screws and rotating the engine on its tank unit through 90 or 180 degrees. This leaves the tank filler and vent tubes (also needle-valve) conveniently located at the top.



Performance

Cox engines have always been among the better made products of the model industry and particular attention is given to precision finishing of the vital working parts, such as the piston, cylinder and bearing surfaces. Because of this, the Pee-Wee does not suffer the problems that have beset some other very small displacement motors, where poor fitting and consequent mechanical deficiencies and inadequate gas sealing have resulted in starting troubles and indifferent performance. It also means that the required running-in time is negligible.

The Pee-Wee, despite its small size, is quite easy to start and requires no special knack or technique, other than to ensure that one does not flood its tiny combustion chamber with too liberal a prime. No prime is necessary for re-starting the engine when it is warm.

Like other Cox reed-valve engines, the Pee-Wee is equipped with a spring starting device. This consists simply of a coil spring mounted on the crankcase nose. The free end of the spring is shaped so that it can be drawn forward and hooked around one prop blade but will spring back out of the way when the engine starts.

The Pee-Wee can be started by merely flicking the prop but the spring, instead of merely bumping the engine over compression, really does spin it rapidly and this has two advantages. First, the engine is more likely to start promptly and, second, it is unlikely to reverse its rotation and run in the opposite direction. Kicking back on starting and running the wrong way is not entirely unknown with some rotary-valve engines, but it is a very common complaint with reed-valve motors since the induction timing is not fixed and a reedvalve motor is quite happy to run in either direction. Using the starter will almost invariably prevent this from happening. Even if you are an 'expert', therefore, there's no need to feel a 'loss of face' in resorting to the starter spring.

The range of available commercial props suitable for the Pee-Wee is very small indeed but, happily, Cox's own 4½in dia. 2in pitch prop, supplied for use with the Pee-Wee, is well matched to the engine's power curve. On test, our Pee-Wee, running on 25 per cent nitromethane fuel, delivered its peak power output at approximately 18,500 rpm. The Cox 4½ x 2 was turned at 17,400 rpm, which suggests that the Pee-Wee will quickly accelerate up to its peak or slightly higher in flight. We also tried the engine on an old 4½ x 2½ Cox prop (which it turned at 13,700 rpm), on a 4½ x 3 Top Flite wood (14,800), a 4½ x 4 Cox (11,100) and a 5 x 3 Tornado nylon (10,900 rpm).

Very small displacement glowplug engines do not usually take happily to being loaded with too large a prop and although the Pee-Wee pulled remarkably well on some of the bigger sizes, there would certainly be no point in attempting to prop the engine for less than 11,000 rpm. If the user wishes to exploit the engine's full power output, it is probably best to aim for a static rpm of not less than 15,000 to 16,000 rpm – the lower figure for coarse pitches and the upper figure for fine pitches.

When one gets down to an engine of such tiny dimensions as the Pee-Wee (where a couple of fingers, side by side, will hide it from view) things are apt to become rather a fiddle, so we are happy to report that adjusting the needle-valve was not at all critical. The engine slowed either side of the optimum setting, instead of cutting out abruptly if adjusted too 'lean', so it was quite easy to arrive at the required adjustment.

The Pee-Wee came through our test procedures completely unscathed and the glowhead element also survived.

Power/Weight ratio (as tested): 0.65 bhp/lb.

Specific Output (as tested): 107 bhp/litre.

SPECIFICATION

Type: Single cylinder, air-cooled, glowplug-ignition two-stroke with reed-valve induction. Plain bearings. Spring starting device. Integral fuel tank.
Bore: 0·300in.
Stroke: 0·282in.
Swept Volume: 0·01993 cu. in.=0·3266cc.
Stroke/Bore Ratio: 0·94:1.
Checked Weights: 24·5 grammes – 0·86oz. (with starter spring)
23·0 grammes – 0·81oz. (less starter spring).

GENERAL STRUCTURAL DATA

Crankcase and main bearing unit machined from extruded aluminium alloy bar. Hardened and ground steel *crankshaft* with machined-in crescent counterbalance, 0·161in. o.d. divided main journal and 0·080in. dia. crankpin. Shaft end knurled for pressed-on machined aluminium alloy *prop driver* and tapped for prop retaining screw. One-piece machined steel *cylinder* with integral fins and blued external finish. Steel *piston*, case-hardened on skirt surface only and fitted to ball-ended hardened steel *connecting-rod*. Screw-in aluminium alloy *glowhead* with platinum alloy ignition coil and seating on ·002in. soft copper gasket. *Crankcase backplate, reed-valve housing, induction pipe and fuel tank* machined in one piece from aluminium alloy. *Reed valve* of ·001in. copper-beryllium shim. Pressure diecast zinc alloy *fuel tank backplate*. Complete tank and induction assembly secured to crankcase with four screws. *Starter spring* of ·034in. dia. spring steel wire.

TEST CONDITIONS

Running time prior to test: Approx. 10 minutes.
Fuel used: 25 per cent nitromethane, 25 per cent Newton R castor oil, 50 per cent methanol.
Air Temperature: 23°C (74 F).
Barometer: 1016mb (30·00in. Hg.).
Silencer used: None.

FLYING SCALE COLUMN

by Eric Coates

A Mk II Brown CO_2 engine installed in the Tern Curtiss Robin. Only the top of the cylinder head will protrude through the cowl, while the tank is housed within the cabin area where there is plenty of room. A very simple conversion job.

THESE WORDS are being penned in the early days of 1976 when ones thoughts naturally turn to what may be in store for the Scale Modeller in the forthcoming season. The SMAE Scale Calendar shows quite a few new innovations this year – the midsummer Scale Meeting has been replaced by a 'Fly-In'. Details have yet to be finalised but there will be no formal competitions as such, just a registration fee for the three classes (R/C, F/F and C/L) with possible prizes for outstanding models. This will be more on the lines of the *AeroModeller* Old Warden Scale Days but open to SMAE members only and on the much greater expanse of Little Rissington. The Autumn All Scale Meeting, with formalised contests to Class 1 rules in all three main classes, will be retained aspreviously.

Three Indoor Scale Meetings at Cardington are scheduled with the main meeting, the Indoor Scale Nationals, being brought forward by popular request, from August to May. At this meeting the SMAE is holding for the first time a competition for the new CO_2 electric powered class. Provisional rules were drawn up for this class by the Scale Technical Committee last year and are included in this column for the benefit of prospective entrants. A further competition for this class is also scheduled for the November meeting.

At the time of writing neither the location, duration nor the date of the Nationals has been fixed.

Prime event in the European Scale Calendar this year will be the Scale World Championships to be held at Dalarna, Sweden, during the period 18th-25th June. As well as the FAI events for R/C and C/L, I am informed that there is a strong possibility of a Class 2 R/C type of event; to the newly formulated FAI provisional rules for this class of model. The SMAE will be holding Trials in order to pick its R/C and C/L (FAI Class F4C & F4B rules respectively) teams, at Little Rissington on April 11th.

Mick Staples chose the Fokker DVII as his latest C/L scale model, and it has already earned him a 'Highly Commended' at the Model Engineer Exhibition. Built to ¼th scale, this 6lb model is powered by a Merco 49. As is typical of Mick's handiwork, the model is built and finished to a very high standard.

CO_2 Models

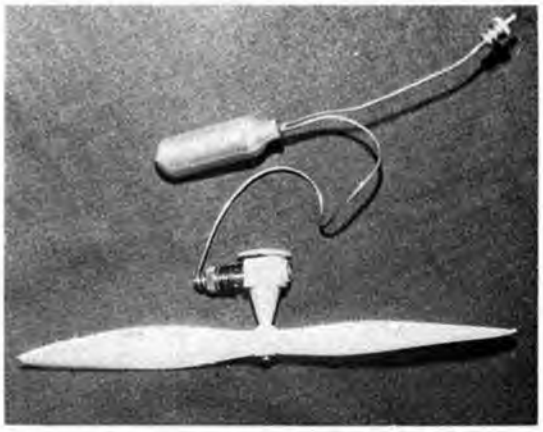
This class of model is now becoming quite popular in the UK with several of the Brown engined powered models to be seen at most Cardington Scale meetings. It was hoped that the long awaited British manufactured CO_2 unit would by now be in production and readily available in shops. Unfortunately this is still not so, and although pre-production motors have been seen in action I cannot give a date when production versions will be available.

It is several years ago now that the first of the miniature Brown units appeared. Regular readers of this column may remember I enthused about the performance of that motor which I fitted to a 17in span *Ryan PT*20, built from a Tern kit. This was back in the summer of 1973, and the model flew superbly well for many months. I remember several flights at the Southern Gala in which altitudes of around 300ft and flights in excess of two minutes were recorded. As winter drew on and the weather grew colder I noticed the first drawback to this form of propulsion – the efficiency is dependant upon the gradient between the fuel temperature and the surrounding air. As the ambient temperature dropped, so did the power from the motor. This really came home with a crunch, literally, when early in 1974 on a beautiful, clear, calm but freezing, day I attempted to fly the *Ryan* in a field on the Yorkshire Wolds. There was insufficient power to climb from a hand launch and she flew straight into a frozen molehill. Although I repaired the model the combination was never the same again. The crash also exposed the weakest point of the Mk 1 Brown motor – the feedpipe to cylinder head attachment. CO_2 gas is fed from the tank to the cylinder head via a piece of copper capilliary pipe and is admitted to the cylinder by means of a ball valve in the head. The piston has a spike in the centre of its crown and at TDC it strikes the ball, dislodging it off its seat so that a gas charge is admitted to the cylinder. This expands, forcing the piston down and exhausts, around BDC, in a manner similar to an i.c. engine. The amount of gas admitted per rev., and hence the speed of the motor, is controlled by the amount which the ball valve is lifted. This is controlled by turning the whole cylinder; which is screwed into the

crankcase. Unfortunately this twists the feed pipe, which on this engine is soldered straight into the centre of the head. When new, the copper pipe is well annealed and quite ductile and seems to stand up to the twisting, but as the pipe grows older it age hardens, the process being accelerated by the low temperatures of the CO_2 gas and at times liquid, to which it is subjected. A fracture is inevitable in time and this occured during the collision with the mole-hill. Re-plumbing is then called for but I must admit that even when the weather warmed up in the Summer of '74 the old performance never returned. The *Ryan* ended its days at Cardington Scale Nats. that year, when my wife slipped and sat on it!

Last year I retired my *Puss Moth* (AeroModeller Plans Service No FSR 1211, price 40p) from rubber power and fitted the old Brown engine to it. Conversion is a simple job as the accompanying photos show. The sheeted nose portion of the fuselage was sliced through just behind Former 1 and a $\frac{1}{16}$in ply firewall epoxied inside the $\frac{1}{32}$in sheet covering. Prior to fitting the firewall the engine is temporarily mounted and the nuts for the three mounting bolts epoxied to the rear. The tank is fitted in the cabin, at the CG, so that no trim change takes place as fuel is consumed. The pipe is run externally beneath the nose. A new nose cowling, slightly longer than the original rubber version, has to be carved and hollowed out to fit over the engine–I recommend that the model is trimmed before this is fitted. The *Puss* was lighter than the *Ryan* and also possessing more wing area, so that the lower power of the now asthmatic Brown Mk. 1 was quite sufficient for it. No side thrust was called for and only 1° of downthrust, achieved as all thrust changes are attained by means of a packing washer inserted between the engine backplate and the firewall. The old familiar 'figure 8' type of rubber trim, possessed by this model, was retained; *ie* initial left hand power turn widening out to straight flight followed by a right turn as the power ran out – fine for outdoor flying but I am afraid disastrous for indoor flying. When performing in such a manner at Cardington last August the old *Puss* met her end in a collision with a girder. One final point on this model. It was necessary to add tail ballast to it to get the CG in the right place after conversion. A little more aft positioning of the tank could obviate this problem if the trim change could be tolerated

Bill Brown realised the shortcoming of his first design because in 1974 a new version appeared, in both single and twin cylinder forms, in which the attachment of the feed-pipe to the cylinder head is much improved. Instead of the pipe going into the centre, it enters the cylinder head from the side and is coiled round a few times before running aft to the tank. I obtained one of these Mk. II engines last year and have found it a great improvement in this respect. Not

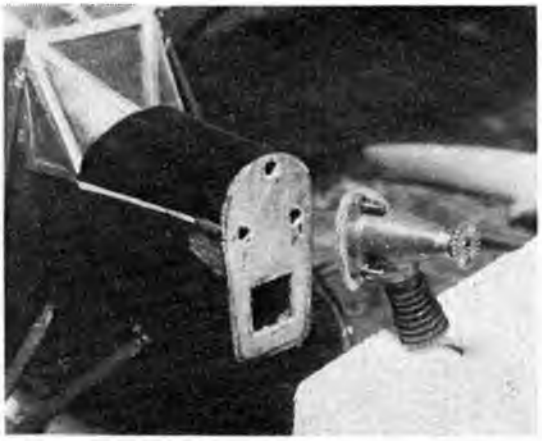


only is the risk of fracture minimised considerably, due to lower vulnerability and the fact that the tube is working within its elastic limit when speed adjustments are made, but a far neater installation can be made with the feed pipe much less obtrusive.

As when I obtained my first Brown engine, I received a new Tern kit for review about the same time. This time for an 18in span *Curtiss Robin*. I reviewed the kit in the July 1975 edition of this magazine. The model is a natural for the Mk. II Brown; mounted upright in this case. Only the top of the cylinder head protrudes, but the pipe can be led away almost invisibly to the tank mounted in the capacious cabin. The engine was mounted in almost the same manner as on the *Puss*, however, with the Mk. II comes a dural mounting ring in which are three equidistant tapped holes, to receive the mounting bolts. One can, therefore, dispense with epoxying the nuts behind the firewall and sandwich this latter item between the engine and mounting plate. The model is built as per the rubber job with the exception of the nose block which is hollowed out. The firewall is fitted at about half the length of the cowling. I found that one degree of downthrust and a similar amount of right side-thrust was necessary for this machine. In fact this was built into the firewall as an inspired guess whilst the model was being constructed, and proved to be the correct trim for the model flew straight off the board. It is equally at home, unlike the *Puss*, indoors or out. For indoor flying I tighten the left turn a bit and keep the power down to prevent it climbing too high. The undercarriage of the Robin is a little short so that the standard Williams prop has to be cropped to 4in dia. With the reduced power required, for this model, this causes no problems.

Picture at top of page shows the new Mk II Brown Junior CO_2 engine complete with tank and uncropped 6in diameter Williams propeller.

Who will be the first to fly an electric indoor scale model in competition? These Peanuts – a Currie Wot, Luton Minor and Comper Swift – would be more suited to CO_2 conversion as the power/weight ratio is more favourable.



Our Columnist's original rubber-powered Puss Moth receives the conversion treatment – here a Mk I Brown CO_2 engine is mounted inverted after a quick 'saw-job' and addition of a ¼in ply former.

I think this size of model – 18in – is ideal for the Brown motor. One can power larger models, up to around 24in or even 30in span, if they are ultra light but then the full power of the motor will be required – the duration of the run is directly proportional to the power being developed. With 18in span models, weighing about 1 oz all up, with a fresh bulb one can obtain engine runs up to 90 secs. duration with the engine throttled back. This falls off as the charging bulb becomes exhausted. With a large model, requiring full power, one only obtains about 2 or 3 fills from a sparklet bulb before the duration one obtains is hardly worthwhile. With the smaller model one can still obtain a run of 25 or 30 secs. even after six tank fulls.

The new SMAE rules have been drawn up to allow either CO_2 or Electric power. At the moment I do not think electric power is developed sufficiently to allow models so powered to compete on even terms with the CO_2 motor for indoor models. I have recently tested one of the new Mabuchi A1 units and although the power developed is comparable, perhaps even a little more, the power to weight ratio isn't in the same parish. With a power unit flying weight, including batteries, of 2½oz one must consider a scale model in the 30in span bracket. This is too large, despite the size of Cardington, even if sufficient power could be developed. However, I expect that electric power will make great strides in the next decade so that the CO_2 engine will not always reign supreme. After all they will work in cold weather even if you have to charge the blessed thing for 5 minutes to get a worthwhile run.

Finally please do not write and ask me, or the Editor, where one can obtain Brown CO_2 motors. To my knowledge, no UK dealer stocks them – you will have to make your own arrangements to obtain one from an American dealer. They are not cheap items either; by the time one has set oneself up with the motor, tank, charger, props etc. you will have very little change from $40. The manufacturer is Brown Junior Motors Inc., PO Box 77, Pine Grove Mills, PA 16868, USA.

SMAE Provisional Rules for F/F Scale models powered by CO_2 & Electric Motors

27.1 *General Characteristics*

Maximum Surface Area — 50 dm²
Maximum Weight —120 grms (4.24oz)
(No fuel but including cells or tanks)
Maximum wing loading — 50 gr per sq dm

Motive Power

(a) CO_2 Motors.
(b) Electric Motors (battery to be carried in model).

27.2 *Definition of an attempt*

There is an attempt when:
(a) The model fails to take-off within the three minutes allowed the competitor.
(b) The model takes off but fails to achieve an official flight.
(c) When the model strikes an obstruction before landing.

27.3 *Definition of an Official Flight*

An official flight shall be recorded when the model has been airborne 20 secs. unless it strikes an obstruction before landing.

27.4 *Number of Flights*

Each contestant shall have 2 attempts to complete each of 3 flights. If an obstruction is hit during the second attempt then the flight will be scored up to that time.

27.5 *Flight*

27.5.1.	Take off. (Optional)	K=20
27.5.2.	Realism in Flight	K=20
27.5.3.	Glide and Landing Approach	K=15
27.5.4.	Landing	K=10
	Total:	K=65

27.6 *Multi Engines*

100 point bonus will be scored for each engine in excess of one provided that each engine contributes thrust simultaneously for a period of at least 15 secs. after take off.

27.7. *Marking. (Flight Points)*

Each section in 27.5. may be awarded marks between 0 & 10 by each judge during the flight. These marks are multiplied by the relevant K factor.

27.8. *Flight Score*

The flight score shall be the aggregate sum of points awarded in 27.5., plus the multi-engined bonus (27.6.) where applicable, by all the judges.

Static Judging

The model is statically judged in accordance with part 20.10. in the SMAE Rule Book. This is the standard static scoring system used for outdoor F/F, C/L and R/C Class 1 models. It is felt that CO_2 models can be built to similar high standards to this class of model and, unlike rubber powered models, still perform well. No compromises for scale fidelity are, therefore, tolerated without incurring loss of static marks.

The best flight score in 27.4. will be added to the static score for the overall score.

A 2/3 th scale Fokker DRI built by David Banks, and also powered by a Brown CO_2 motor. Total weight is around 1½ ounces for this beautifully airbrushed replica.

BETWEEN THE LINES

with Dave Clarkson

An aerial view of the Utrecht flying site – venue for the 1976 World C/L Championships, to be hosted by the Netherlands. Although Combat will not be held as a W.C. event, an open International will be held at Rotterdam a week earlier – see 'Hangar Doors' for details.

MODEL FLYING CHARACTERISTICS AND LEADOUT POSITION

The lacks of news in these winter months gives me the opportunity of including my 'educational' pieces in the column. Recently I have done this virtually every month and such features seem to have been appreciated (squeal if they are not!). This months 'lecture' concerns the lead-out position on the model, and the effect this has on the way it flies. I am indebted to Enrico Flores (pitman half of the Utrecht '75 team-race winners) for supplying the theory and mathematics which have formed many of the conclusions made here. Enrico's mathematics are not reproduced here because this is a complex problem and the mathematics are similarly complex – frankly, most of you would not understand the maths, I certainly had great difficulty in doing so.

First I examine the case of a model flying tangentially to its flight circle, *Figure 1* illustrates the situation.

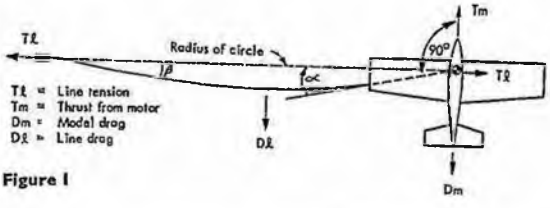
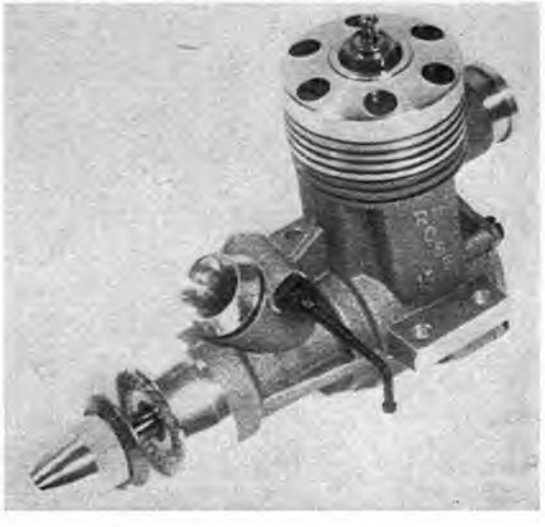


Figure 1

Combat fans who want a really fast motor are already taking to the Rossi 15 diesel, but not so many have experimented with the glow version. Maple Models of Luton however have anticipated the trend with their own 'custom' Rossi for combat or Goodyear racing. Differences from the 'norm' are the standard-plug head (Taylor 1.5v competition plug fitted), conventional prop driver and safety prop nut. Price is £39.95 – and at no extra cost the exhaust stub will be machined shorter if desired. Should different sized venturi inserts be required, then ask for quotes.



Angle ∝ ,the angle between the flight radius and the line joining the mean leadout position and the model centre of gravity, is given by a remarkably simple formula, considering the complex matters used to derive it, namely:

$$\propto = \text{arctg} \frac{(3\ Dl)}{(4\ Tl)}$$

For the typical racing model this works out to be around 2½° rake back. In Combat and Speed models where the line drag is proportionately greater, the angle of rake becomes larger. For Stunt models the converse applies and so the rake should be somewhat lower. A further conclusion is that light models should have more rake than heavy ones and vice-versa.

This is an over-simplified picture because it assumes two things. First that, if left to its own devices *ie* launched with no lines attached, the model naturally flies in a straight line. Second that it is actually desired to have the model fly tangentially to its flight circle. I will dispose of the first fairly quickly and deal in greater depth with the second below.

We fly our models on perfectly flexible lines in the transverse direction. This means no tension, no control. Therefore most models have built into the design a natural tendency to turn away from the centre of the flight circle. Wing assymmetry, tip weight, engine and rudder off-set all do this and just about every control-line model has one or more of these. To restore a tangential flight characteristic under normal flight, the line-rake should be decreased as *Figure 2* illustrates.

Good windy weather models have more natural turning tendency than bad ones, and models do vary widely in their windy weather

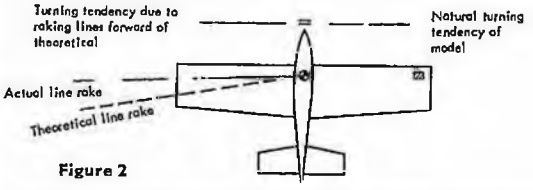
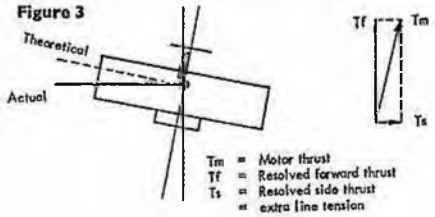


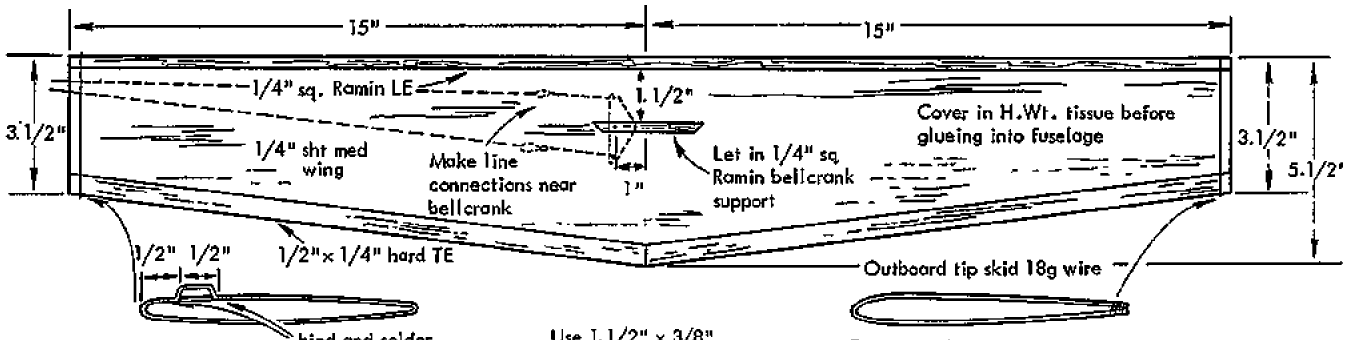
Figure 2

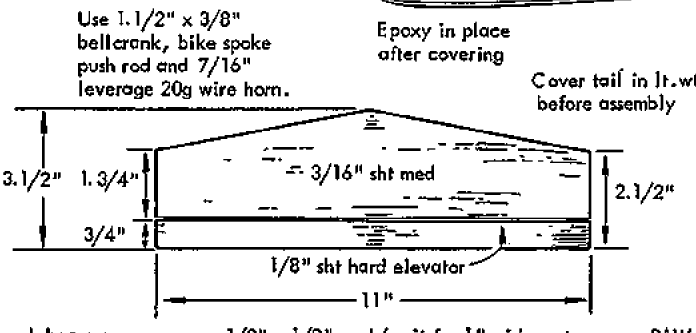
characteristics so it is virtually impossible to estimate the amount of line rake reduction that exactly compensates for the natural turn. For the typical modern team racer, I have approximately calculated from observations that the rake reduction should be in the range ½-0°. Most speed models have less natural turn so less reduction is indicated, the reverse applying to most Stunt and Combat models.

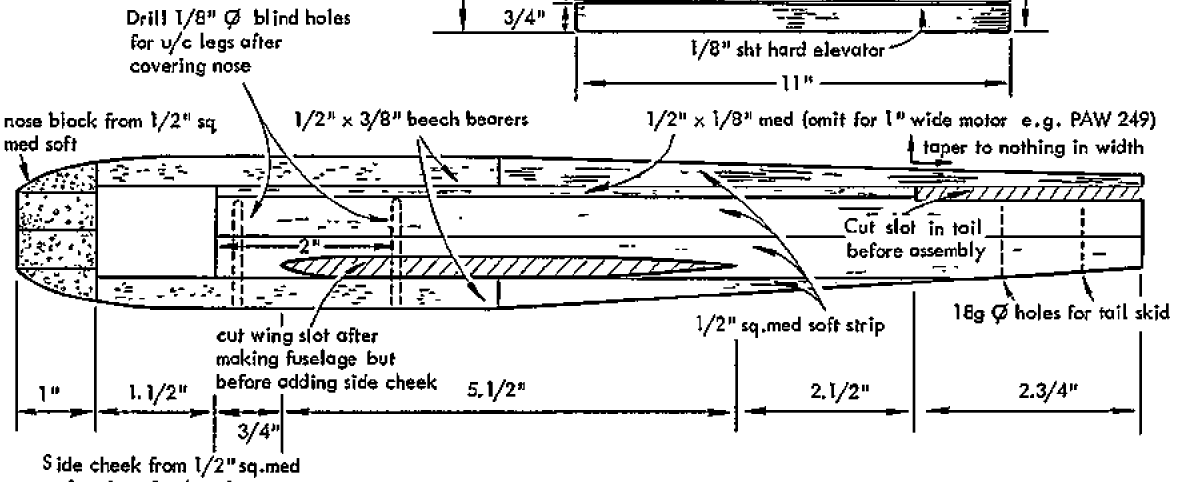
Finally, do we want our models to fly tangentially? For Stunt and Combat models, the answer is usually *no* for the obvious reason that their operators want all the line tension they can get – temporary loss of control due to slack lines is disasterous in terms of the contest result. Most Stunt fliers seem to get over this by building in a lot of natural turn into the model but for Combat fliers this is constructional-

Figure 3



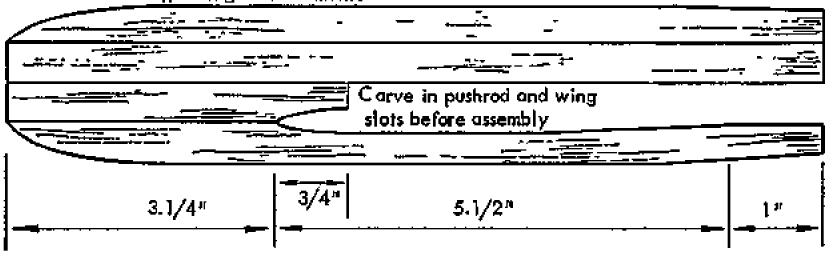






Side cheek from 1/2"sq.med soft strip. Sand to shape before glueing to fuselage and wing. Then sand model nose to final shape, then cover side cheek and nose with gauze bandage using balsa cement.

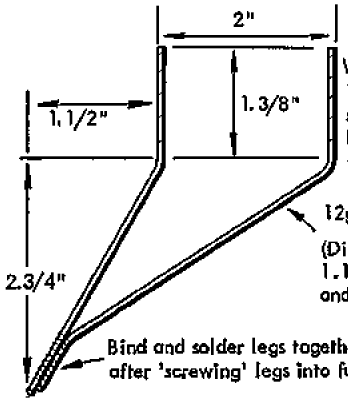
Cover fuselage sides, top and bottom before epoxying in motor mounting bolts, wing and tail and before adding side cheek



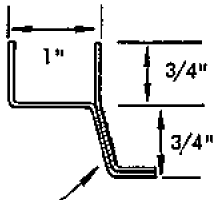
A-RAT 135

2·5cc club field rat racer

ALL WOODS BALSA UNLESS OTHERWISE STATED



Mount legs in fuselage by putting epoxy into fuselage holes and onto u/c legs. Then screw legs individually into holes in fuselage and remove excess epoxy. Wire spiral on legs give essential keying for epoxy



Optional tailskid from 18g wire bound and soldered together. Epoxy into rear fuselage reinforced with cloth patch.

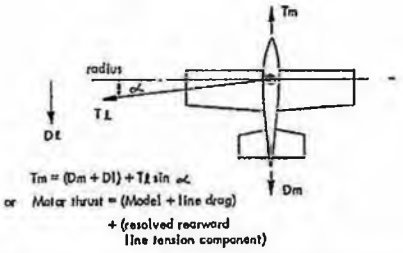


Figure 4

ly inconvenient, so they use extra line rake to fly the model nose-out thus persuading the motor thrust to provide some of the tension. *Figure 3* illustrates.

Increasing line-rake in this way is a very good method of increasing control retention because, whilst the extra tension at high speed is very small, at low speed (say in a very tight manoeuvre=very high model drag) the extra tension becomes significant.

However for Racing and Speed, line tension can be a bad thing. Most Speed fliers, especially those flying the larger classes, will agree here but I suspect most racing fliers will not. Nevertheless it remains a fact that most Speed and Racing models work best when set-up to fly nose-in. For the Speed flier this is done to keep line tension down to acceptable levels, for the Racing model a nose-in attitude reduces susceptability to obstruction and increases response to whipping (of course none of us whip, do we?). But the reduced susceptability of a nose-in model to obstruction may come as a surprise. However the fact is that blocking effects vary directly with line tension – *Figure 4* shows why.

The second term disappears if, by building an awful lot of natural turn into the model, the model flies tangentially with 0° line rake. This is virtually impossible to achieve without accepting a big increase in the model drag *le* the effort is not worth it. However by using the motor to reduce line tension, either by using inthrust and/or a nose-in flight attitude, then the line tension contribution to the power absorbing factors diminishes. Since blocking effects can only be transmitted via the lines, a reduced line tension significance means less susceptability to blocking.

You may think that a nose-in attitude gives just as much drag as a lot of natural turn, but this is not so – as I hope *Figure 5* shows, because the effective angle of yaw is reduced due to prop wash effects.

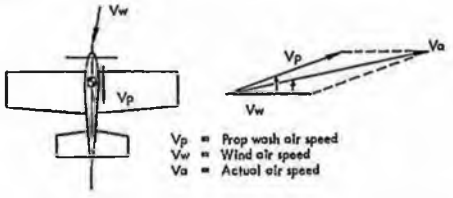


Figure 5

You will see that, typically, the actual angle of yaw is halved effectively by the prop wash as far as the air flow local to the fuselage is concerned. Wing and tail drag is hardly effected by yaw, but fuselage drag most definitely is if the affective yaw moves above 1°-2° *le* a maximum nose-in actual yaw of 2°-4°. Below this limit, yaw hardly effects drag for streamlined bodies. This last qualification is important, for in Goodyear we have slad-sided bodies, not streamlined bodies, so the nose-in trick on Goodyears does not work!

To summarise for a typical team racer:

	Theoretical rake	=2½° back from CG radius
minus	Correction for natural turn	=2° "
minus	Reduction to give nose-in	=0° "

The result is for a team racer that the leadout mean should be in-line with the model CG. Now go back to your World and European Champs reports and look at the photos of the top team race models printed. See how many appear to have leadouts set up in this manner (like all of the Russians!). Theory and practice agree once again.

AMERICAN ROSSI-GOODYEAR MOTOR SYSTEM FEATURES

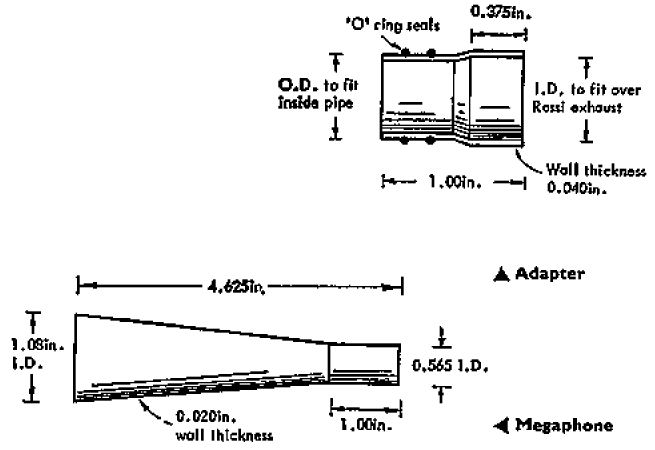
Over the last year I have collected information from various sources in the USA on this subject. Now that it seems to be pretty comprehensive in the areas covered, I will reveal all – hopefully just a bit too late for my major competitors in Goodyear here to gain full benefits! The important information concerns tuned pipe systems for Goodyear Rossi's. Quoting Phil Bussell (noted US speed flier) from his excellent report on racing at the US Nats in the November 1975 *Model Aviation.*

'Most of the outstanding Goodyears this year sported megaphone tuned exhaust systems and all of the top entries were front-inductiond Rossi 15's. RPM increases in the 1000 to 1500 range can be obtained with the use of a megaphone-tuned exhaust system and, obviously, if you intend to compete in Goodyear in the future (at least on a National level) you will need to incorporate some sort of tuning in your system ie quarter wavelength straight section tuned length, half wavelength (megaphone system) or full wavelength, full-tuned pipe'.

Apparently the top 3 all used tuned megaphone systems. For the 140 lap final their times were: 1. John Ballard 6: 30; 3. John Kilsdonk 6: 31; 3. Turner/Wheeler 6: 36.

All were clocked by Phil doing 110-115 mph in practice reducing to 105-110 mph in their finals. Information quoted for Turner/Wheeler goes *'The Turner/Wheeler team used a 7 x 6 Bartels prop blank cut to 6¾in long and left at 6in pitch. The blade area was thinned considerably as they like to have their engine running about 23,000 to 23,500 rpm on the ground on their flying prop and fuel. They were running 60% nitro, 20% synthetic oil and 20% alcohol for fuel. Their megaphone length was 6in measured from the centre of the glow-plug to the end of the megaphone. They run a normal (standard*

German stunt flier Claus Maikis has always had a flair for original design, and his models are distinctive without being outlandish. Above right is his stylish 'Coronado' which uses Super Tigre 49 power (note variable line rake too) and at right is his 'Shooting Star', now ten years old!



open-faced timing) sleeve with the exhaust port raised approximately 0.030". Most of the megaphone-equipped engines sport tuned-pipe sleeves with a much longer exhaust port duration.'

So far so good – a nitro-eating, fire-breathing pipe fitted, pipe-timed Rossi R15 FI is the clear message. A few more details follow in Figure 1 from a private source concerning what both Kilsdonk and Ballard use in the way of megaphones.

They run Kelly Tornado-Presswood type 7 x 6 props, re-worked to give 22-24,000 rpm on the ground on 50% nitro fuel. (I rather suspect that the Rossi listed spare parts – megaphone and adapter – are pretty similar to those sketched above.) From the same source comes a recommendation concerning 'the easy way' ie the straight pipe tuned exhaust suitable for use on a Rossi R15 N (*ie* 145° exhaust opening). This is a length of ⅜in OD 18 swg aluminium tube reamed to 0.58in ID – to fit over the Rossi exhaust stack with the standard Rossi rubber sealing ring in place. Start with the motor propped to give 21-22,000 rpm static and trim the pipe length in small stages to give maximum airspeed. The optimum length suggested is around 4.30in so a start length of 4.50in is recommended. Apparently it is better to err on the short side in this pipe trimming procedure since in-race speeds are generally lower than practice speeds due to unintentional (or intentional!) blocking, so the motor runs hotter in traffic. RPM gains of around 1000 are reported for straight-pipe tuned-exhaust systems.

As far as props and fuels go, the essential data is included above *ie* props re-worked to give a little less than 24,000 static rpm and fuel nitro contents above 50%. At these nitro levels, synthetic oils become essential. My informant suggests 5% Castor and 17% UCON MA 2270 synthetic for a chromed liner motor and 12½% Castor 12½% MA 2270 for a standard steel liner. Ken Morrissey (UK open 2.5cc and 10cc speed record holder) tells me that G-MAX ML-70 oil is at least as good as any UCON he has tried, so we British may not be starved of suitable oil. G-MAX also sell nitro at a reasonable price – buy a gallon, you are going to need it!

What heads are these mighty men on? Frankly I do not know but we can all be certain they are not standard Rossi heads. I have heard rumours that double-cone type trumpets with uncorrected compression ratios in the range 9-10:1 are the thing, but quite obviously a bit of experimentation (or a neat bit of spying) needs to be done.

Almost finished now except for a mysterious gadget called a GO-JET. The GO-JET is a type of needle valve (how do you make it pressure tight?) that goes onto the pressure inlet to the tank. By varying the GO-JET setting, the motor prime for starting can be varied to give the fastest start. How this works I do not know; but, logically, restricting the pressure line reduces the pressure in the tank thus requiring a more open fuel needle setting than normal. Maybe this more open fuel needle setting is the key. Again this seems another case for some experimentation – lengths of crimped metal tubing in the pressure line? The Southern Californians like the GO-JET and the best time reported for a 140 lap final there is 6:09 so maybe they have something.

After last year's UK Nats and in subsequent contests we all thought that a Rossi 16N with a modified head on medium nitro fuel was the way ahead. WRONG AGAIN! Life is never simple, is it?

A-RAT REVISITED

Many clubs hold 2.5cc Rat-Race contests as part of their club contest calendar. Usually such club contests are held over short grass and Goodyear models (usually Goodyears are not well known for good glides) frequently prove unsatisfactory under such conditions. My original *A-RAT* only had 90 sq in of wing area and thus required hard ground or very short grass to get easy landings, so over the years bigger wing versions have been built to overcome this shortcoming culminating in my latest 135 sq in wing version which can be landed very gently indeed – an important feature especially for non-expert pilots and mechanics. The large wing also makes for easy hand-launching essential when using a really rough field. This *A-RAT* recently won the Whitefield-Stockport 2.5cc Rat Challenge held using the Australian 2.5cc Rat rules *ie* 10 minute, 1 compulsory stop heat and 20 minute, 2 compulsory stop final. The winning heat and final lappages of 227 and 448 laps compare rather favourably with the 1974 Australian Nats best performances of 221 and 400 laps so obviously *A-RAT 135's* big wing does not hurt the speed.

Besides a larger wing than the original, the latest version also features simplified construction *ie* external controls, ¼ sq in strip balsa fuselage. As can be seen from the drawing (page 158) some typical 'Clarkson' features are included, so reading back editions of this may help full understanding. My version was entirely covered (wing, fuselage and tail) with 1oz glass cloth applied using Humbrol *Epoxycote* epoxy paint purely as an experiment. I laid the glass cloth over the bare balsa and painted on two coats of paint, the first coat to stick down the cloth and the second to fill the pores etc., no further finishing being necessary to get a strong, light, fuel-proof coloured finish. One word of caution using this technique concerns the sanding down of the model prior to covering. Every surface blemish (dent, ridge, etc.) shows through. The epoxy paint obviously sticks every bit of the cloth right down to every bit of balsa, so do a super job of fine sanding to the structure before covering. Once covered with a hard finish such as glass-cloth/epoxy paint combination, there is no way of sanding any unsightly blemishes out. This technique may be more than adequate for more exacting duties like Team Race and Goodyear service at top contest levels, but is far from necessary for club 2.5cc Rat. Therefore on the sketch I have called for simple dope and tissue covering using heavyweight tissue on the wing and lightweight on the fuselage and tail. The 'Combat' trick of cement plus bandage on the side cheek should do the trick here.

It took me just three evenings to build up my *A-RAT 135* structure, and another two evenings to cover, paint and install tank, controls etc., hardly a lot of effort for a highly competitive machine that proved to handle so well on a wet and soggy sportsfield, and should be an ideal racing trainer for beginners.

THE AEROBATICS SCENE *by Glen Allson*

A new group has been formed for the promotion and control of Stunt flying in Great Britain. It is called *CLAPA* (the Control Line Aerobatic Pilots Association) which will be run along the lines of the American PAMPA organisation. Benefits of membership will include bi-monthly newsletter giving articles by experts, dates and results service of competitions, league table positions, and helpful advice on stunt generally. Why not send an S.A.E. for full details to Ted Fowler 38 Groveside, Henlow, Beds, and that includes all you 16 year olds thinking of taking up stunt, now you're too old for combat.

* * *

News from the States is that defending world champion Bob Gieseke has withdrawn from the U.S.A. team, for the World championships this year in Utrecht. He will be replaced by Les McDonald of Miami, who will join the other members of the team, Bill Werwage and Gene Schaffer. However Gieseke has opted to enter as an individual, as per F.A.I. rules, which means that he cannot score for the U.S.A. team. This action allows another American flier to gain international experience, but still gives the U.S. team a chance to defend its title with McDonald who placed 2nd at the U.S. Nationals.

* * *

At the C.I.A.M. (model section of F.A.I.) meeting on December 4th-5th in Paris there were several proposals made by various countries for the alteration of the F.A.I. stunt rules. Mostly they were from the U.S.A. and these were:

1. To increase flight time from 7-7½ minutes, to help competitors who fly large slow models on maximum length lines – *proposal rejected.*
2. Definition of an official flight to be that the pilot raises his hand for a whole lap after take off. This was on the grounds that one could tell whether one had a good engine run or not – *proposal rejected.*
3. Deletion of hand signals on the grounds that pilots are of a high enough standard these days for the start of a manoeuvre to be obvious – *proposal rejected.*
4. Clarification of the rule regarding the scoring of manoeuvres made out of sequence – this matter was referred back to the sub-committee for consideration.

Proposals from the Dutch for flight time to be increased from 7 to 8 minutes, and a German proposal for safety thongs to be introduced were also rejected.

The Free Flight Scene

this month: Michael Warren

THERE IS A FEELING in some quarters that this Column is concentrating too much on the three FAI classes. I do not necessarily accept the criticism. We *do* tend to concentrate on FAI, partly because it is these events that Martin, Bob and I mainly fly, but also because it is FAI that has seen the majority of model and flying technique developments. And surely it is improvement and advancement that this Column should mainly be examining? Anyway here, by way of a change, are three plans and some contest reports . . . and not another mention of FAI!

'ILLUSIVE BUTTERFLY' – by Julian Hopper

The first of this month's plans is of Julian Hopper's very successful open rubber model. Among its 1975 performances were victories at the Devon, Southern, East Anglian Open and SMAE Galas, and second places at the Nationals and at Woodford. My thanks are due to Julian, who lives at Saffron Walden in Essex and flies with the Stanstead club, for the plan and the additional information.

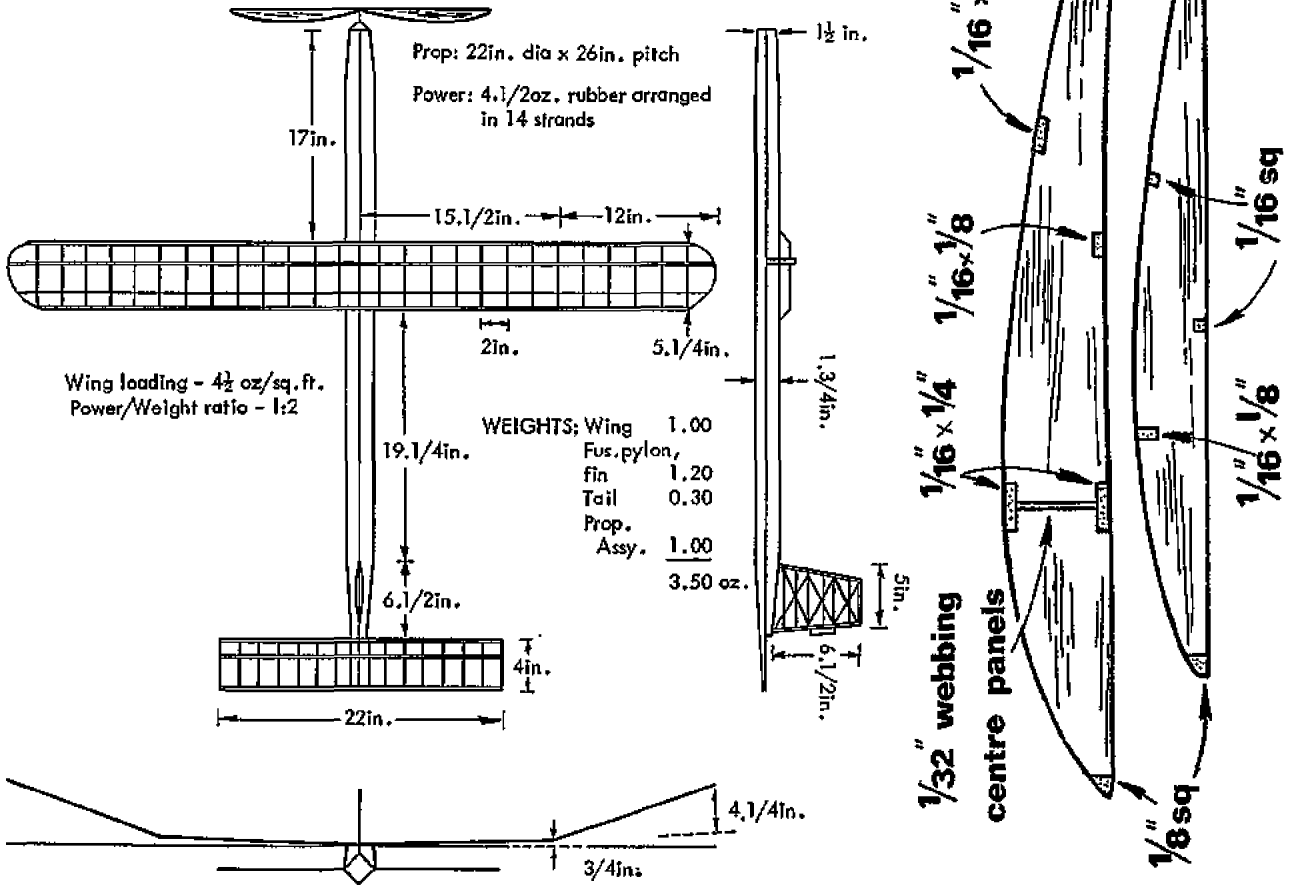
The Illusive Butterfly series was started in 1963/64. The mark number has only changed when a radical alteration was made to the design – of total wing area, for example, or of area distribution between the wing and tail. Thus, as many as five models have been built of the same mark number and with perhaps just minor modifications – to structure, prop dimensions, wing section etc. Most of the earlier numbers were much more rugged than the Mark 12 which I'm flying currently. They probably showed considerable 'northern' influence but the change to a more modern and conventional appearance was for performance as the prime object, rather than durability in gales.

So far, five of this Mark 12 series have been built and all have performed with a degree of success. Some changes have included wing tip shape, thicker airfoil section, use of an underfin etc., but they have all flown much the same, with the thicker airfoil (as shown on the plan) probably having the edge on the glide.

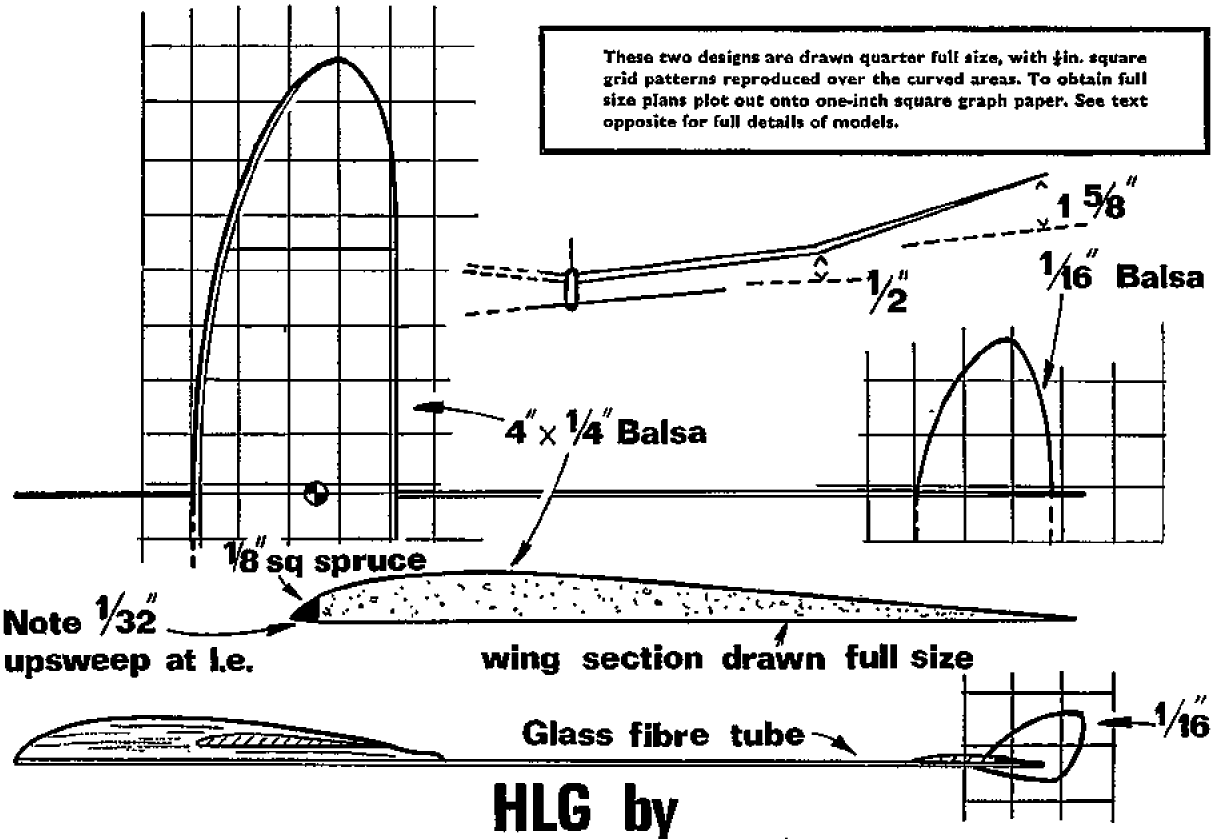
With a relatively large model such as this, weight seems less critical than with smaller models and they can therefore tolerate more 'beefing up' where it counts – in the centre wing panels, and the fuselage for example. The diamond fuselage of this design has $\frac{1}{8}$in square longerons and $\frac{1}{16}$in x $\frac{1}{16}$in Warren girder spacers. I'm pretty sure that this model flys with a heavier wing loading than most current rubber ships.

ILLUSIVE BUTTERFLY Mk.12 by Julian Hopper

Scale 1 : 15
(ribs drawn full size)

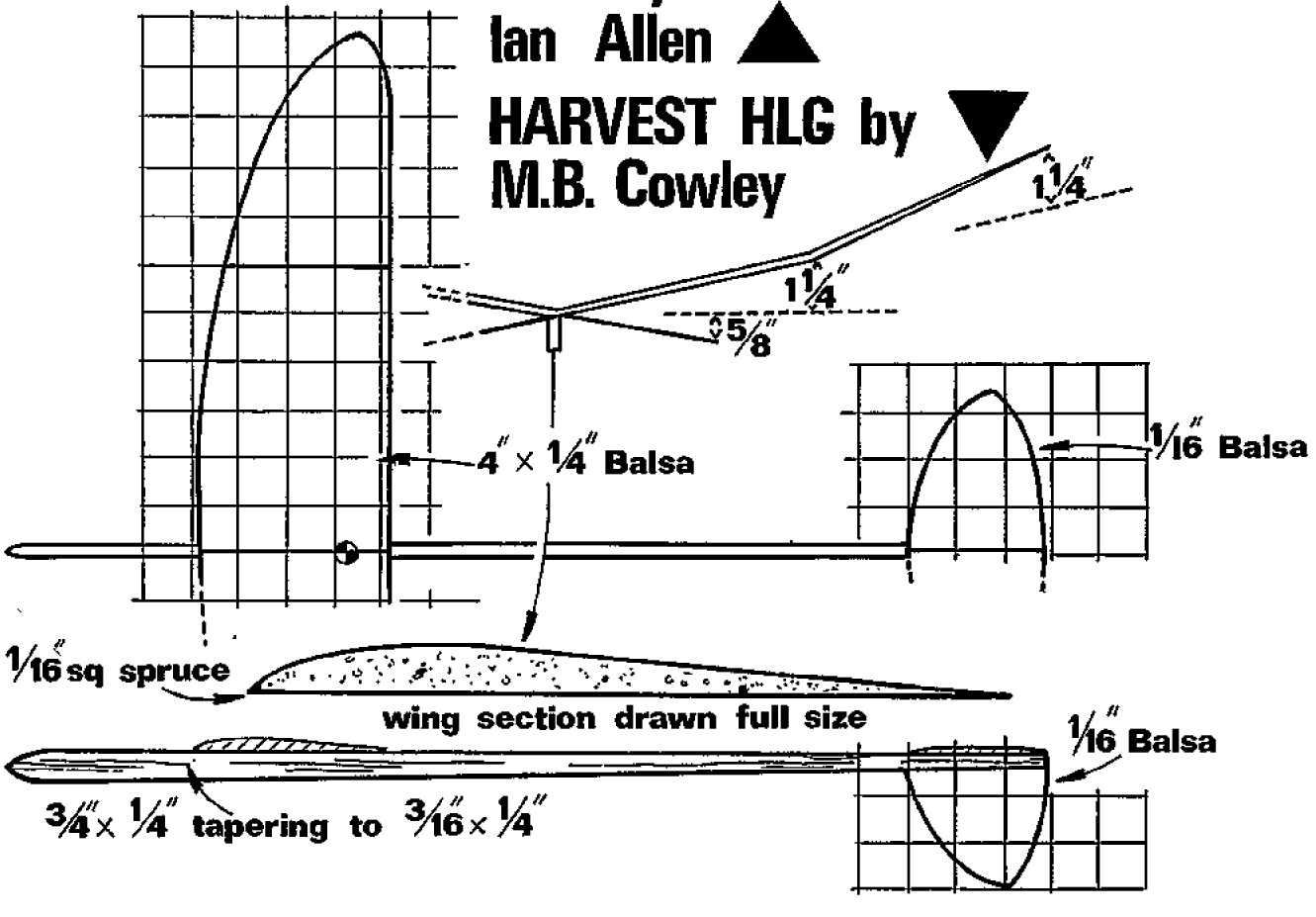


These two designs are drawn quarter full size, with ¼in. square grid patterns reproduced over the curved areas. To obtain full size plans plot out onto one-inch square graph paper. See text opposite for full details of models.



HLG by Ian Allen ▲

HARVEST HLG by M.B. Cowley ▼



CHUCK GLIDERS '76

There can hardly be a free flight modeller in the world who has not built a chuck glider at one time or another. No ribs to cut out, no thrust lines to worry about – they can be a real relief after the complications of some models. When I started thinking about a features on chuck gliders – or hand launched gliders (HLGs) as they are sometimes called – I wrote to several people up and down the country who I knew were working on them. All the modellers were kind enough to help me, and this month we have two particularly successful designs – those by Ian Allen (winner of the '75 Nationals amongst other things) and Martyn Cowley (2nd at the same Nationals and with many 'top three' placings to his credit in '75).

Details of Ian's model are as follows:

Wing: Cut from a piece of $\frac{1}{4}$in x 4in x 18in contest grade quarter grain balsa of 4lb/cu ft density, with an $\frac{1}{8}$in square spruce leading edge. The wing tapers uniformly from being $\frac{1}{4}$in deep at the centre to $\frac{1}{16}$in at the tips. The wing section is as shown on the plan, with a sharp high point and – very important – a $\frac{1}{32}$in upsweep on the undersurface of the leading edge.

Tailplane: Cut from $\frac{1}{16}$in balsa, again of 4lb density quarter grain.

Fin: From $\frac{1}{16}$in, 4lb density balsa and sanded to a symmetrical section.

Pylon: From three laminations of $\frac{1}{8}$in square spruce, capped by a piece of $\frac{1}{32}$in hard balsa, which keys the wing and increases the side area of the nose. The wing and tail incidences are of course both zero degrees – as Ian says: '... *vital, and hard to achieve*'.

Fuselage: From a Ronytube 30 inch glass fibre rod – but from the middle of it, so that there is no tailplane whip on the launch. Throwing tab (not shown on the plan) is streamlined into the starboard wing root under-surface – Ian is right-handed – with a deep notch at the trailing edge for the flier's index finger.

Ian's models – at between $\frac{3}{4}$oz and $\frac{7}{8}$oz – are somewhat lighter than those he used to fly, a saving of $\frac{1}{4}$oz having been made by changing from British balsa to SIG contest grade balsa obtained via a penfriend in America. It is not vital to use this type of top-quality wood, but it is obviously an advantage if you can get it. (Both these models incidentally are fitted with D/Ts of the dropweight variety. With this system, part of the model's noseweight is detachable – it is *fixed* to the model via a thin line attached to the tail and is *held* firmly in the nose (for the flight) by an elastic band. A piece of D/T fuse goes through the band. When the fuse burns through it, the band breaks, the weight swings down – still attached at the tail – and the model returns safely to earth).

Below: The Falcons club believes in "guaranteed prizes" — worthwhile and distinctive ones at that. In 1975 awards were specially made tankards, a marked contrast to the SMAE's mass produced plaques. At bottom in John Scholfield (left) receiving Whitfield Club's "Bob Williams Memorial Trophy" from Bob's son David, while club Chairman Mike Reeves watches. The newly presented award is given for outstanding achievement by a member— John's progress and enthusiasm made him the first recipient.

Ian Allen with the chuckie — sorry "hand launched glider" — with which he won the '75 Nationals event. Has 50-52 second "dead air" potential.

Martyn Cowley's HLG – *Harvest* – is something of a contrast to Ian's and is about Mark 12 in a series:

'I started the series aiming for high still air times and was disappointed to find my 60 sec. still air models performed badly on the usual turbulent contest days. Hence I designed to obtain stability in rough air, using more dihedral, shorter nose length and an anhedral tail, yet – by using larger wing areas – I've retained fairly high still air times. I do not think that wing section is critical – I use a fairly standard Clark Y type of section. A D/T is essential with such a large and stable model, because it doesn't slip out of lift. Having lost models in the past I daren't even trim now without using D/Ts.'

The two models that Martyn is now using were built in October 1974, have done 55 seconds indoor at Cardington and weigh 50 grammes. This figure is so high, by the way, that I thought Martyn must have sent me faulty information, so I checked it. He was right – the models weigh 50 grammes (that's 1$\frac{3}{4}$oz) each! Such relatively large wings need to be strong to cope with the strain of the launch, so wood of 6lb/cu ft or thereabouts is used for the wings rather than the far lighter (4lb/cu ft) wood used by Ian Allen. A balsa fuselage – of very tough wood – is used by Martyn in preference to the more common glass fibre or spruce.

Everybody develops their own flying and trimming techniques for HLGs. Ian Allen says his main aim is consistency and a good glide: the model does about 50-52 secs. in 'dawn/dusk' air. Martyn Cowley details his trimming technique as follows:

'I trim with a fairly forward CG, using elevators to give half a loop under a full power throw. If the model stops nose-up at the end of the launch throw, then the loop is too large and you need more up elevator. If the model goes onto its back at the top then the loop is too small and you need down elevator. I use rudder with a banked throw to give half a roll during the loop to get upright flight, and finally nose-weight is used to give a good glide for whatever turn circle results. I trim this way because I consider the throw is the most important stage, to gain maximum height at the start gives the best chance of making the max.'

Bob Wells, of the Anglia club, writing in *Free Flight News* in 1974 had some useful advice on launching HLGs:

'The model must be gripped firmly but not too tightly on launch other wise it is almost certain to slip in the hand and take off in the wrong direction. The launch should start with the model somewhere near the right foot; the arm is then accelerated so that the model reaches maximum speed when at its highest point above the head. At this moment it should be released with a good flick of the index finger behind the right wing. Points to watch are that the arm should 'follow through' and not stop as the model is released: stopping the arm abruptly will result in an aching shoulder and a numb hand after a few throws. You should not try to look at the model as it is released, as

this will result in loss of balance, an erratic launch and possibly cricked neck. If you have not acquired 'the knack' it is worthwhile practicing the launch, fairly gently at first, getting somebody to advise you on which way the model was pointing when released. After you are launching the model consistently, you can gradually work up the strength of the throw until the model is being launched correctly at the maximum speed you can attain. Having achieved a consistent throw you can trim the climb on the model knowing that the model will react to the change of trim and not to a variation in the throw.'

As far as future developments are concerned, Ian Allen is one of several in this country and abroad experimenting with 'flapper' HLGs, *ie* models where the wing section changes from a smooth, low drag section for the climb to a high lift, undercambered section for the glide. We will be bringing you details of some of these, as well as other conventional models at some time in the future.

NORWIND INDOOR CONTEST *Wigan 22nd/23rd November*
By Bob Bailey

The first Norwind contest of the season produced fairly cold conditions, these being noticeably so for the Sunday. For the first time there was a fair invasion from the South in the form of Laurie Barr and family with Ron Green and myself. Saturday was given over nominally to flying microfilm; although there was no contest the intention was to see how practicable this would be for the next contest in February. In the event, most flew EZB in readiness for the Sunday. The existing hall record soon went; in addition Derl Morley did two flights of about 12 minutes with his 35mm microfilm model before the conditions deteriorated in the afternoon.

Although it was even colder on the Sunday, the EZB times improved still further during the four hour session in the morning (9am-1pm) and one in the afternoon. Laurie Barr eventually came out on top after Andrew Barr was leading him by one second with his standard Cardington model – evidently the lighter models Ron and I had built for low ceiling work were too flexible for the cold conditions; Cardington models proved to be more suitable.

Much steering with the recovery pole was in evidence (with the odd suspicious shove from behind) as the drift during the afternoon put many promising flights into the wall at the other end of the hall.

HLG, run with one person at a time flying was very closely fought between Pete Branigan (who won and was 4th in EZB) and Mick Duce. The technique appears to be to make the models light enough so that it is just possible to throw them to the ceiling; sinking speed is all important.

Laurie also won scale (eyeball) with his *Piper Cub;* although fourth on static points, the duration was well above all the others except for Andrew's *Piper Cub.* Second and third place scale were taken by Mick Reeves and Roy Roberts flying models which were a compromise between the very light Micro-X kits, not built for maximum scale points, and the more highly finished (and somewhat heavier) painted models which were down on duration.

Results

EZB: 1. L. Barr 11:14+10·25=21·39; 2. A. Barr 9:53+10:46=20:39; 3. R. Green 19:35+10:21=19:56. **Scale:** 1. L. Barr 132.5+8pts; 2. M. Reeves 59.5+9pts; 3. R. Roberts 109.4+11pts; **HLG:** 1. P. Branigan 25·7+26·7; 2. M. Duce 25·1+25·2; 3. B. Picken 23·5+24·1.

FALCONS GALA *7th December 1975*

Ian Allen (who has the intriguing title of Falcons Club Team Manager) has kindly sent me a report and results of this meeting, which was held at RAF Chetwynd, near Newport, Salop.

The weather once again was kind to us. It was totally overcast all day, but the wind varied from light up to only moderate as the day progressed. The lift generally was weak and became less frequent as time went on. The sun broke through just in time for the fly-offs, though it was colder by then. Open glider proved to be a close-run thing due to the absence of strong lift, with John O'Donnell winning with his A/2 by just one second from Jimmy Gough's large lightweight *Caprice.*

The Junior event proved to be a clean sweep for the Falcons, being won by the very on-form Philip Dilks (he also won the '75 *Frog Junior* and was North-Western area junior champion) with his 4th place in Open glider. Second was Andrew Gough, matching his father's performance in Open glider. Incidentally, both juniors used the *Caprice,* showing yet again what a fine model this is.

Fly-offs were required in Open rubber, Open power and HLG, and three examples of over-anxiousness proving disastrous occured in them. The first was in Open rubber, when G. Ferer returned from his last max with only five minutes to go in the flyoff period, only to break a longeron in his haste – the fuselage collapsed in mid-air! In Open power Roger Baggot's model had arrived at the launch point without him, after his last max and he finally returned just in time to over-run by one fifth of a second!

The third incident, in HLG, illustrated just how 'sudden death' these particular fly-offs are. Roy Roberts mis-launched, lost the best part of half his height and recorded only 22 seconds. Very frustrating after a hard days graft to make nine good flights.

For the second year running, the Falcons Club provided unique trophies for the winners – last year it was specially-prepared china plates, suitably inscribed, and this time it was pint pots! Excellent prizes – and the club was particularly pleased since they won five of them themselves!

Results

Open Glider (*41 entries*) 1. J. O'Donnell (Whitefield) 8:01; 2. J. Gough (Falcons) 8:00; 3. A. Cordes (Leeds) 7:41. **Open Power** (*17 entries*) 1. R. Monks (Birmingham) M+4:06 2. P. Harris (Birmingham) M+3:56; 3. R. Peers (Falcons) M+3.27. **Open Rubber** (*11 entries*) 1. P. Ball (Grantham) M+4:42; 2. J. Barnes (Liverpool) M+4:34; 3. J. Cooper (Biggles) M+4.26. **HLG** (*12 entries*) 1. I. Allen (Falcons) 4:33+0:38; 2. R. Roberts (Wigan) 4:33+0:22; 3. S. Philpott (Walsall) 4:08. **Junior** (*5 entries*) 1. P. Dilks (Falcons) 7:37; 2. A. Gough (Falcons) 6:00.

SMAE CENTRALISED MINI CONTEST *14th December 1975*

The SMAE's end-of-season event for the 'mini' classes – A/1, CDH, ½A power and chuck glider – was held at the London Area's flying site at Bassingbourn. It was not a particularly successful meeting, being (or at least appearing to be) something of an afterthought to the year, and having received only limited advance publicity. The weather must have been a bit off-putting, with fog in some areas and a heavy frost over most of the south of England. But for those who ventured out it was a pleasant, if cold, day – with little or no wind.

Entries were on the low side – 18 in A/1, only 5 in HLG and 13 in each of the two other classes. It was a strange day in some ways, the nearest thing to dead air I've seen. There was some buoyancy from time to time – hence the maxes in A/1 – but nothing that you could reasonably describe as a thermal, and many models were performing with unusual consistency. (Four of my five A/1 flights for example were within 2 or 3 seconds of 1 min 35 – so I know what *that* model's good for without a thermal!).

Two fliers put five maxes together in A/1. Ken Smith, on one of his infrequent contest visits, was flying a relatively new model, still with his familiar pod and glass fibre boom fuselage, but now with a Burrows wing section. His opponent in the fly-off was Martyn Cowley with a fine A/1 – a new wing on a much repaired fuselage, and with offset circle tow-hook and a spring release system. His fly-off launch, with the model soaring away to well above tow-line height, was most impressive and made much of the day's other A/1 flying seem, frankly, a bit out of date.

There was a four-way fly-off in ½A power, Russell Peers coming out on top. John O'Donnell was clear winner of Coupe d'Hiver, more than 90 seconds clear of Ian Kaynes in second place, and chuck glider was won by Julian Hopper, with Martyn Cowley second.

Results

A/1: 1. M. Cowley (Biggles) M+2:16; 2. K. Smith (Croydon) M+1:34; 3. R. Pavely (Anglia) 9:36. **½A power:** 1. R. Peers (Falcons) M+3:40; 2. J. Fletcher (Royston) M+3:26; 3. P. Bayram (Richmond) M+3:24; 4. J. Hopper (Stanstead) M+3:19. **Coupe d'Hivor:** 1. J. O'Donnell (Whitefield) 9:45; 2. I. Kaynes (Croydon) 8:13; 3. A. Wells (Anglia) 8:01. **HLG:** 1. J. Hopper (Stanstead) 4:55; 2. M. Cowley (Biggles) 4:35; 3. J. Billam (Grantham) 4:34.

Ron Green tried the Technical College Sports Hall "for size" with one of his FAI 65 cm models on the occasion of the N.W. Area Indoor Meet. Microfilm covering fails to hide admirer Julie Rose.

CLUB NEWS

I THINK IT IS safe to say that model clubs today are much less parochial than they were – by which I mean they draw their memberships from far wider areas than was the case when almost every locality had it's own model club. This diffusion, however, poses certain problems of communication and, to use an old fashioned term, of 'togetherness'. I remember the time when the Club Sec. could get round the whole club on his bike in one evening, and with the flying field on the doorstep, as it were, most members would turn up during the week, either at the field or the equally local clubroom. Nowadays such a frequency of contact is not possible, and members are likely to just drift away unless given some central interest. But one means of keeping members in touch with events is of course the club newsletter.

And our first report from Ian Nichols, PRO, of the **Worcester MAC,** leaves no doubt of the value of the club's *Flysheet* in sustaining the interest of members in the internal affairs of the club. Ideas, as well as the flying of models, are needed in order to keep a club going, and Mr Nichols tells us that one suggestion, a model of the month contest, has already been adopted. What he hopes to glean from the members, through their pens, is something of the wealth of knowledge and knowhow that is modestly tucked away. The Club Treasurer has already taken the hint, and is soon to burst into print with a series on indoor flying. Mr Nichols also believes that much literary talent remains untapped, although one particular literary offering came as something of a backlash to all those exhortations to the apathetic to get activated. The correspondent, a confessed 'apathetic' pointed out, quite devastatingly, that if all the apathetics descended upon the flying field the few people who now enjoy their week end flying in quietitude and comfort would be hideously overwhelmed! Apathetics, he avers, are not without merit. They keep down noise levels, leave no litter and create no pollution.

Usually if there is a large gap in mid Wales they fill it with water, but the large gap filled by the newly formed **Aberystwyth & District Radio Models Club** is one of giving unity to the growing interest in radio flying in this part of the world. Mr F. Ian Sant, who sends us this report, informs us that although the founder members are primarily radio enthusiasts they would welcome free flighters and control line flyers into their midst, and they are even looking into the possibilities of boating facilities. There are thirty members on the books so far, but since Aberystwyth stretches, in effect, for fifty miles around, there is obviously lots more talent lurking in them thar hills. Contact Mr F. Ian Sant at Ravensclough, Goginan, Aberystwyth, Dyfed SY23 3PF, or phone 097084331.

Modern control line models are sophisticated little beasties which demand only the best promenading substance under their little booties, which is why the **Stockport & DMAC,** is saying, like the town's football club, 'Only the Best is good enough'. Plans are afoot to build the first genuinely private (modeller owned) pair of tarmac C/L circuits in the country, and already the formidable twin tasks of getting planning permission and raising the funds are underway. So far there is over £500 in the kitty, of which the club auction yeilded £100, whilst another £100 came from an anonymous donor. Given luck and a lot of hard work it is hoped to have the first circuit laid this year. Ultimately the aim is to provide an international standard C/L field for the North West of England. Just what is likely to be seen on the circuits, and why, is given an exciting exposition by Mike Daly using two slide projectors synchronised together and linked to a stereo sound set up. The treat was given to club members and to visitors from as far away as Ilkley. It captured all the spectacle and thrills of team racing and gave, at the same time, an illuminating insight into the skills of piloting. The show has already been booked by five clubs, and it is hoped other clubs will add this colourful feature to their Winter programmes.

The **North Western Area** newsletter carries the full results of the Area F/F events throughout the '75 season. Open Glider proved the most popular, as might be expected, with the events for the highly specialised Power models attracting but few entries, and Open Rubber, once the mainstay of any free flight meeting, down on one occasion to a single entry. These weightings are, perhaps, a measure of the economics involved. Gliders carry no expensive ancilliaries such as engines and rubber motors, and are not subject to catastrophic crashes. Many Power modellers fly their highly valued models in special events only, and quite a number of top Rubber flyers have virtually given up Open flying, giving their attention to Wakefield and Coupe D'Hiver. Even the policy of guaranteed prize money for the Area events have failed to pull in the Rubber and Power flyers in reasonable numbers. It may be that cash inducements must be really substantial weighed against other factors like the cost in petrol of attending an Area Meeting – up to £5 in many cases. Why not put Coupe D'Hiver on the menu? Our French friends demonstrated at Halton that Coupe flying was every bit as demanding and satisfying as Open Rubber, but without that near dusk fly off situation.

The **Elmbridge Model Club,** based in Surrey, was formed only a year ago, but already has a booming membership in the region of 70. Excellent club meeting facilities are provided for the members at Moseley Football and Social Club where, if talk of model aircraft palls, there is Bingo, table tennis and other diversions, plus reduced bar prices. Outside, perhaps, the world is a little grimmer, with the flying field situation not all it could be. Attempts to get a foot in the old Brooklands Aerodrome failed as a result of earlier occupants airing unsilenced engines. But there are still hopes in other directions, with a new control line site at Fairmile Common due to open in the New Year. Meanwhile some C/L members – those with dual membership – make use of the Three Kings site on the old Croydon drome. This site would seem to be much pressurised as, in addition to the C/L flying, there is a certain amount of Radio flying and Radio Car activity of dubious legality.

A report on free flight for 1975 appears in the newsletter of the **Scottish Aeromodelling Association.** What 1974 lacked in those vital ingredients of free flight activity: good weather and the space to fly, 1975 made up for in good measure. Brighter skies and lighter winds lured many a reluctant flyer from his lair, and the provision of the Newbigging site gave a much needed contest incentive. In 1974 the total number of recorded contest flights was a mere 58, but in 1975 this had risen to 219.

Peter Hollis, PRO, of the **Bristol & West MAC,** sends us a not too glowing report of what for the club has been a quiet and not particularly good year. Various factors have contributed to this recession, but the main one has been a dearth of power flyers. They are, of course, rara avis in the free flight world nowadays, but the anticipated return from Ghana of John Bailey should help to alleviate the situation.

Some successes on the contest field, though. Garry Pink won the SMAE Cup, and also Vintage Precision at the South Bristol Rally with an 0.29 per cent error. In the Area Inter Club Hamish Gunn took Rubber and Elton Drew the Glider, and in the Area overall Hamish came top in both classes of Rubber and Elton in All-In FAI. Not too bad in Rubber and Glider, then, it's just the motorised stuff that needs pepping up in 1976.

The Swindon MAC, concluded a successful 1975 with a slap up do, or rather Annual Dinner at the Wiltshire Hotel, according to a report sent in by PRO, Tony Rogers. Championship awards went once again to Brian Osborne in Radio by a large margin, and to Comp Sec. Rex Woodruffe in free flight after a close tussle. An AGM, followed the Dinner, and the digestive juices were enriched with the news that the club had plenty of that inflationary substance in the bank, and, financially, all is set fair for 1976. Membership, too, has built up during 1975 and, generally, the club is going from strength to strength. By the time we go to press the first comp of the season will have been held: a slope soaring meeting.

If down in the Forest (Ashdown) something stirs it is unlikely to be a model aircraft, unless the arboreal disturbance occurs on the six only days per year when the South Eastern Area holds its free flight meetings. According to *Seadog*, the Area newsletter, the Forest Conservators keep the model flying concession to this minimal degree in the interests of public safety and the protection of the fauna and flora. The Area feels the restrictions to be too severe, and negotiations are still proceeding in their inconclusive way. Meantime the sighting of an eagle sized bird over the Forest, which has got all the local bird watchers in a flap, gives a hint that a little feathery disguise might be one way of keeping the models flying. Seriously, though, if the Conservators objections are mainly against power flying why not try to widen the scope of non-power models? Area freeflighters, though, appear to be in good fettle, with active participation in SMAE, events showing in the results lists.

It's nice to see the Northern Area News in circulation once more, and to note that it has plenty of flying activity to draw upon. This issue covers the Area AGM, giving some insight into the work put in by the officials who make the whole scene possible. Chairman's report singled out Comp Sec., John Godden, for special mention. Not only had he put the whole competition set upon a more streamlined and attractive basis but had participated in the F/F events at a level which had gained him the Area championships. It was a good year for F/F up north, with fine weather at most events bringing out the climate conscious freeflighters in useful numbers. An expansion in the Area, too; the addition of the Hull Area R/C Society bringing the total number of clubs up to 21.

The Leicester MAC's December Bulletin describes itself as a 'Bumper Christmas Issue', full of info, articles and a plan. But it all begins with a bit of a moan at the lack of cohesion among flyers these days. And not all those many flyers, either, but the same old doughty faces to be seen on the flying sites around Leicester. It was ever thus, up there or down here. I might say I have been manning my local site almost single handed for over thirty years. Weather, though, continues to be encouraging to flying even after that wonderful summer and autumn. Two drawbacks to winter flying, though, the 'gof', which is the way the newsletter describes the white stuff that all but blanked out the *AeroModeller* Coupe D'Hiver International at RAF Halton, and the finger numbing cold that caused Gerry Ferer to spasm crunch his rubber job fuselage at the Falcons Gala at Chetwynd. Gerry was also groping around in the 'gof' at Halton, and, like me, was impressed by the Wakefield sized French Coupe's.

That's all for this month. **Clubman**

CONTEST CALENDER

February 22nd	**CROOKHAM CONTEST MODELLERS** F/F RALLY. Open R/G/P plus all in FAI. SMAE members only. Venue Bassingbourn Old Airfield, Royston, Herts. 10 a.m. start.
February 29th	**BUNGEE-PEERS F/F GALA.** Open R/G/P. (3 x 3 mins). HLG. (best 5 from 9, 1¼ min. max.) Entry fee 30p/event, re-entry 40p/event. Juniors free. Guranteed cash. prizes 8.00 a.m. start at Chetwynd Airfield, Salop.
March 7th	**N.W. AREA INDOOR MEET.** Eaves Silver Trophy events: EZB, HLG, Keyhole Scale. Juniors up to age 15 over 12 must be builder of model. Soft footwear essential Venue/details from P. Branigan, 7 Tintern Drive, Formby, Liverpool. Tel: Formby 74133.
March 14th	**SMAE INDOOR SCALE.** Open rubber and Peanut. Venue: Cardington, Beds.
March 21st	**SMAE 1st AREA CENT. F/F MEET.** FAI Glider, Open R/P Area venues.
March 28th	**OUTLAWS FAI COMBAT RALLY.** Pre-entry 50p to R. Wilkens, "The Laurels", 3 Rack End, Standlake, Oxon. Trophies 1-3. Venue: next to A415, 5m S.E. Whitney, Oxon.
April 4th	**S.E. AREA INDOOR MEETING.** Peanut, EZB, HLG, CO_2 Pre-entry 60p/event Juniors 30p. Hall size 120 x 105 x 30 feet. Venue: Crawley Sports Centre, Haslett Ave., Crawley, Sussex. Details/entry forms on receipt of SAE from A. C. Grantham, "Woodlands", Redehall Road, Smallfields, Horley, Surrey or 'phone A. C. Boyle — Horley 3664.

THOSE EARLY DAYS.....

Continued from page 141

had already taken to short powerful motors on a single hook. The former were able to obtain longer motor-runs, but the latter were able to climb more quickly above the turbulent layer which reaches to about a hundred feet.

When we compare Cahill's model with that of Korda, we have textbook examples of the streamline and slab-sider schools. Now that fuselage cross-section plays no part in design, the arguments for either have become somewhat academic, but they were hotly discussed at the time. The box type fuselage is easier to build and repair and shows better stability characteristics. Korda also used high aspect-ratio on wing and tail-plane, close rib spacing, but employed a very thick concave airfoil. The relatively short landing gear again necessitates a tail-down take-off. Korda's model belonged to the *Cleveland Balsa Butchers* school; characterized by somewhat functional lines and multiple spar wings, the six spars being only $\frac{1}{16} \times \frac{1}{8}$ in. in the centre panel of the wings and $\frac{1}{16}$ in. sq. in the outer. The effect of the three spars in the forward half of the upper contour may well have led to artificial turbulent flow. One will note a certain similarity in design layout of the models by Gordon Light, Dick Korda and Chester Lanzo, also of the Cleveland Club.

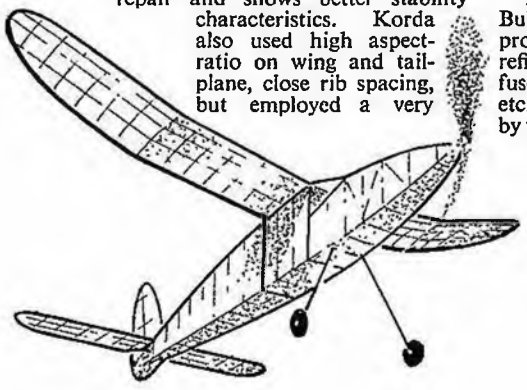
The British School, represented by Bullock, Chasteneuf and Copland, produced the most aerodynamically refined models with circular section fuselages, plug-in shoulder wings, etc. The load on the wings was taken by very stout leading and trailing edge 'spars', connected by closely spaced ribs. In 1938 Chasteneuf scored 612–183–164 and Bullock 287–634, losing his model on the second flight. With the same or similar model Bullock came second in '37 with an average of 194.53 secs.

So much for Wakefield development before the war. What would have happened if the War had not prevented aeromodellers to hold their annual or bi-annual contests during those idle nine years? All materials and rubber became scarce and the little hoards were spent on smaller and lighter models. On the continent of Europe the glider gained field; it was less dependent on balsa, but the use of hardwood and ply favoured large models. Horst Winkler's towline technique made it possible to fly from flat country. For the author, a convinced rubber addict, it was not a happy time, apart from other inconveniences.

The next instalment will be devoted to pre-war trends in power and glider design with due attention to he opening sentence to this article . . .

A survey like this is bound to contain at least one major boob. The author would only be too glad to hear from those who have a better memory or better historical documentation.

Magpie



Korda's model was not only typically American, but also representative of the Cleveland Balsa Butcher trend of design. Much more functional than Cahill's model, it also featured a large, high aspect-ratio tail-plane, short landing gear and single bladed folding prop. Motor weight was 36 per cent of the all-up weight.

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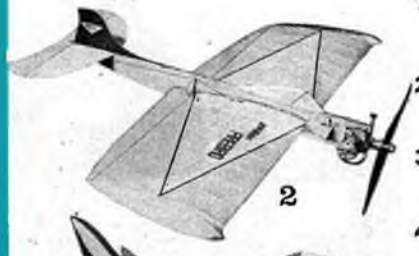

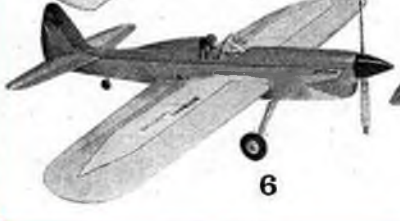

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