

MARCH 1978

35p

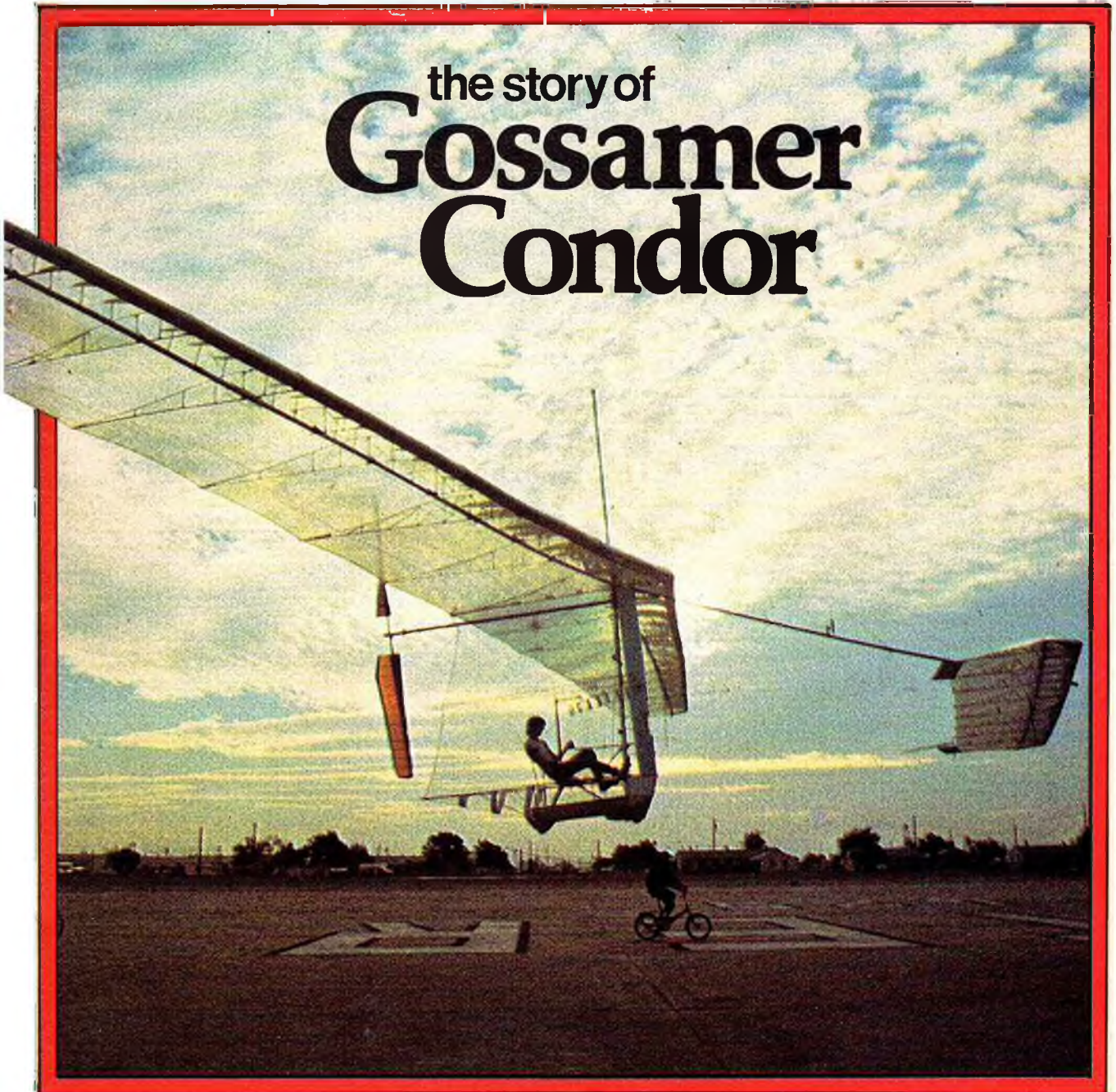
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HOBBY
MAGAZINE

Aero Modeller

the story of
**Gossamer
Condor**

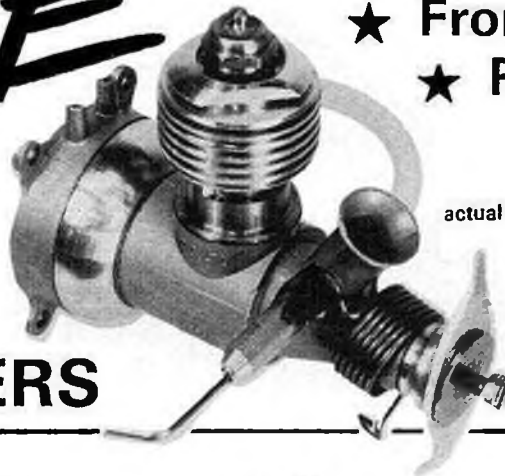




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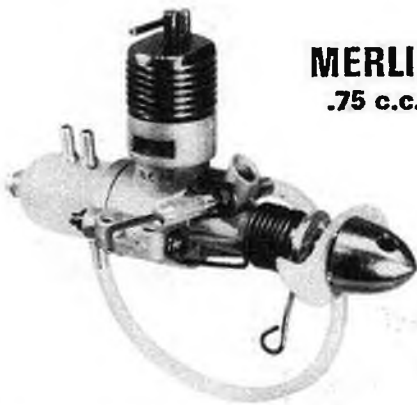


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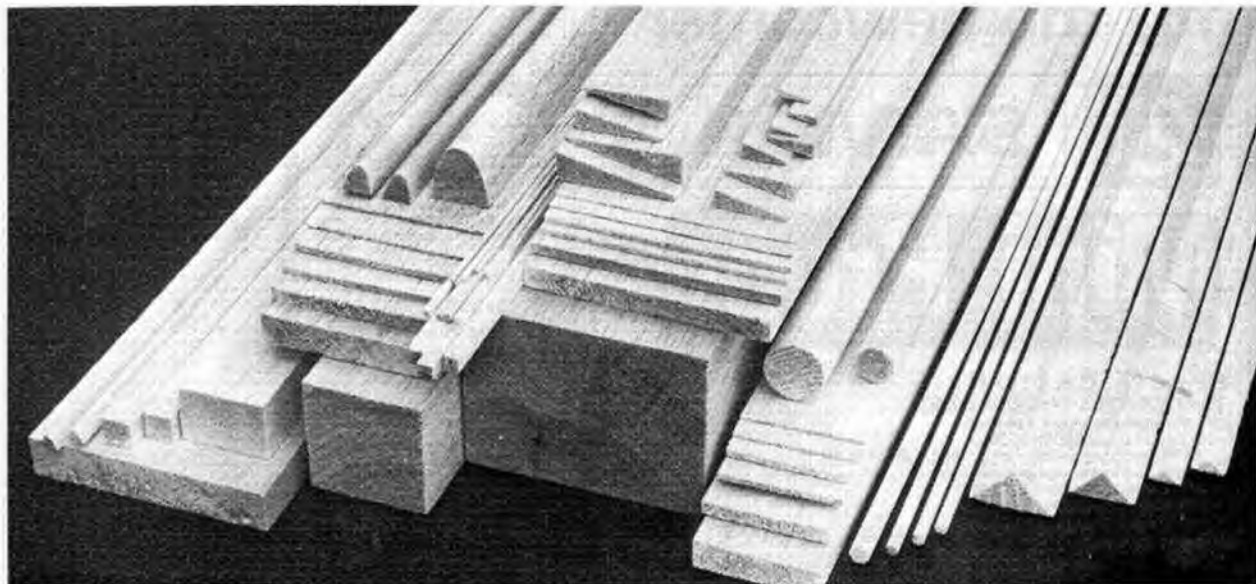
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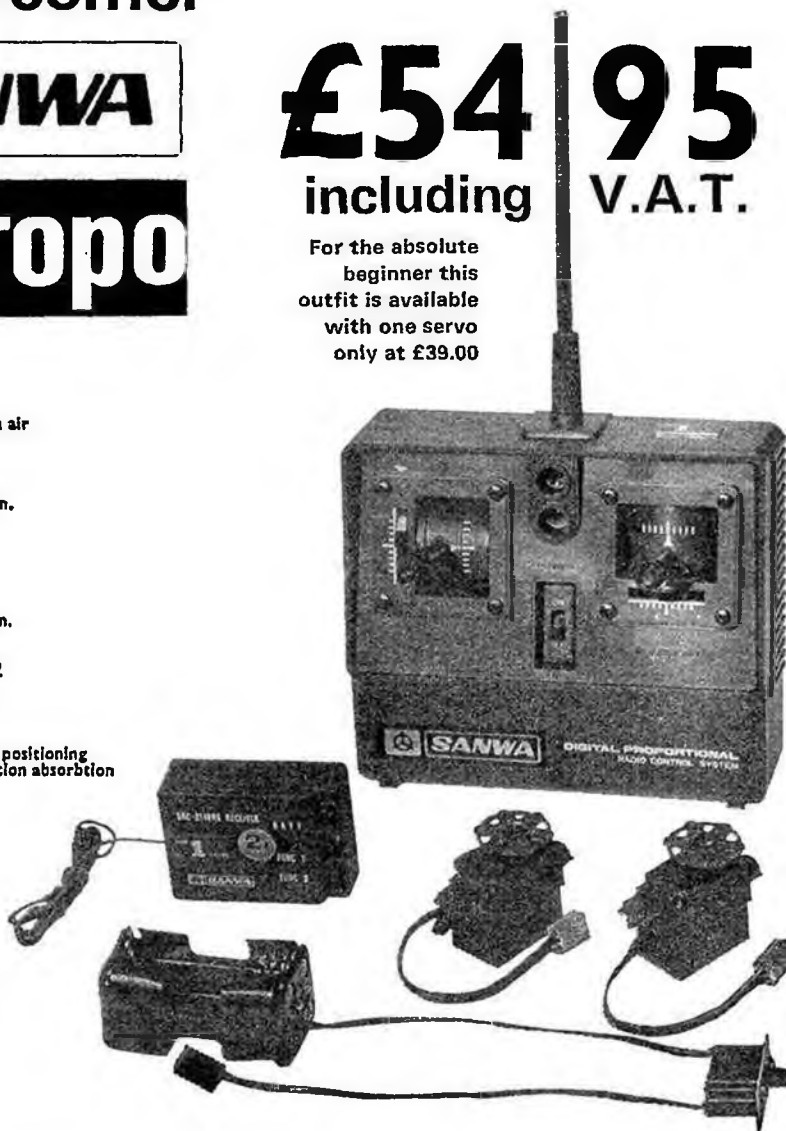
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Aero Modeller

INCORPORATING
MODEL AIRCRAFT

March 1978

Volume XLIII No. 506

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Comment

The New Year is always the time for planning the season ahead and from the look of things the coming year will be a bumper one for all types of flying activity.

The contest Calendar is already double booked for some dates, numerous weekends are taken up with full size or model flying displays, and modellers can now even combine their hobby with a special holiday. On top of all this Great Britain is the host for the coming Scale and Control Line World Championships at the biggest ever International event, next August at Woodvale. Team selection trials and preparations for individuals also has to be staged for Scale, Free Flight, Control Line and Radio Control. Certainly the year ahead will be a busy one but the time is now due for publicity on these events (can anyone tell us where the Nats will be?). Let's hope the British modeller comes forward to help shoulder the load, and share in the work and the rewards of organising what must surely be a bumper programme of Aeromodelling activities.

on the cover

Bryan Allen cruises Gossamer Condor II at Shafter California in wind-free morning conditions. This splendid portrait by Jack Lambie captures the essence of ultra low speed flight with the remarkable design described on page 138 of this issue.

next month

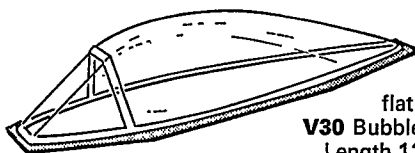
Plans for Semi Scale Chipmunk Control Line aerobatic model by Pete Tindal. A classic stuntler that won the Nationals Gold Trophy and placed 6th at the European Championships in 1977. The first in a series on E-Z-B indoor models, step-by-step how to build and fly them. More on spray painting, next month on Air Supply equipment. Plus all the regular features. The April issue of Aeromodeller is on sale on 17th March - look out for it.

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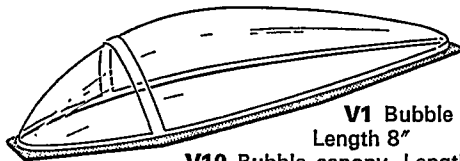


V2 Bubble canopy with
flat screen. Length 11"
61p

V29 Bubble canopy with
flat screen. Length 9"
55p

V30 Bubble canopy with flat screen.
Length 12 $\frac{3}{4}$ " **66p**

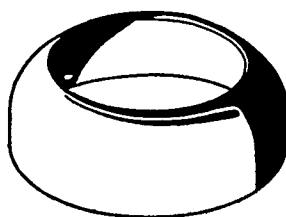
V33 Bubble canopy with flat screen. Length 8" **50p**



V1 Bubble canopy
Length 8" **44p**

V10 Bubble canopy. Length 6" **32p**

V3 Bubble canopy. Length 14" **73p**



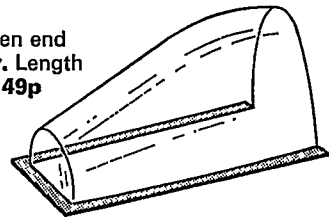
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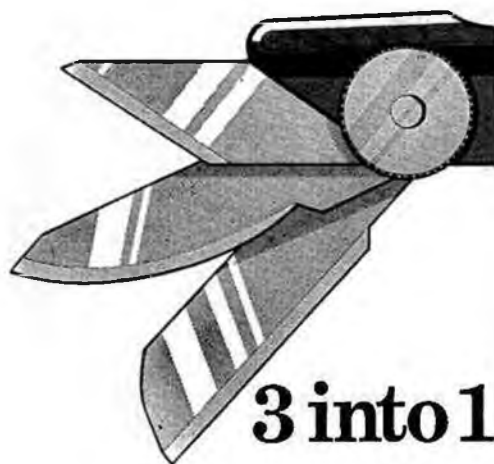


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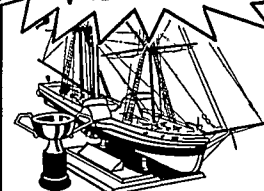
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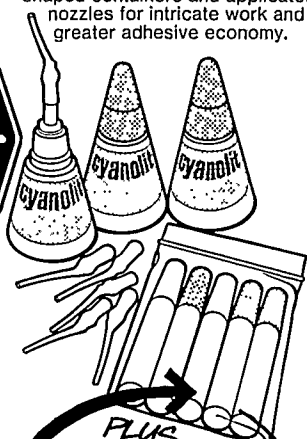
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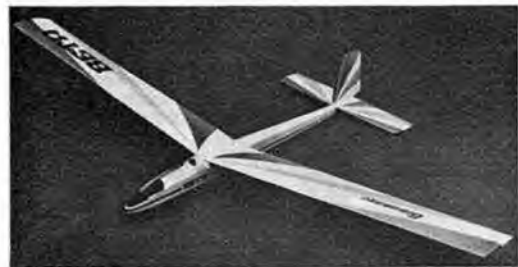


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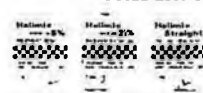
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Heard at the HANGAR DOORS

ACHIEVEMENTS of recent months which have strangely missed the headlines include the first crossing of the Alps over the St Gotthard Pass from Switzerland to Italy by R/C model. Using a relay of transmitters and chase cars, the *Modellfluggruppe Ensiedeln* flew the 'Big Lift' (Hoernlein 15cc engine) from Andermatt to Airolo in just under an hour; but those who have motored this pass will appreciate how it must have been the longest hour ever! In the USA, Nick Sher set a speed record of 121.57 mph for $\frac{1}{4}$ A C/L - yes! with a Cox TD .049! Hardly standard, a blank cylinder was machined for Schnuerle porting and tuned pipe.

EXHIBITION for Northern modelers organised by the Northern Association of Model Engineers, will be held in the Cross Heath Drill Hall at Newcastle-under-Lyne, Staffs., from March 23rd to 28th inclusive (Easter weekend). The venue is situated on the A34 trunk road about half a mile north from the town centre. There is direct access which avoids the town centre from the M6 junctions 15 from the south and 16 from the north.

CONCORDE enthusiast W Hodgson reckons his 'model is the greatest thing that's happened in Britain for a long time. . .'. He scaled up an



Giant model Concorde hangs silently over Macclesfield's main shopping street.



Lord Mountbatten of Burma who opened the Model Engineer Exhibition receives a crest from his old ship HMS Wishart at the SMAE stand. Martin Dilly presented the crest on behalf of David Parker who by chance had discovered it in the cellar amid family bric-a-brac.

Airfix plan, took six months, and spent £200 in materials - to make a 30ft long wood-and-nylon Concorde, with a 12ft 6ins wing span, and weighing 3 cwt.

The next problem is what to do with a redundant, 30ft supersonic Christmas decoration. The Chester-gate trader's association, who officially own the model, will be meeting shortly to consider its future . . .

ATC AWARDS. At the recent Toy & hobbies Fair held at the Exhibition Centre Birmingham, Airfix held a small luncheon to present awards to members of the Air Training Corps who had won a competition which attracted 98 participants from the Birmingham and Warwick, West Mercia and Staffordshire Wings. The common model chosen was the Airfix *Mosquito* which competitors were then free to detail and finish in any of its various forms and markings. The final winners were selected by a jury assisted by Air Commodore Sweeny & Peter Bullivant. Eventual winner proved to be Sergeant S. Cornes of 2352 Store Squadron, Staffs wing. His model was completed in under a month and details were taken from two books "*The Mosquito at War*" and "*The De Havilland Mosquito*" resulting in a considerably modified kit. Second Place went to Flight Sergeant Bentley 395 Squadron, Staffs Wing with CWO McKee 2030 Squadron Birmingham and Walsall in third place.

PONTINS MODELLERS HOLIDAYS. Following last October's highly successful Modeller's Holiday week organised by Pontin at Brean Sands, plans are already made to repeat the event twice in 1978. The first at Easter Bank Holiday, March 23 - 31st at Southport, and as last year, in October 7th - 14th again at Brean Sands.

All aspects of modelling will be included from trains, cars and boats to R/C, C/L and F/F model flying of all types. There will be special instruction sessions for children and beginners with all facilities for operating, displaying and demonstrating, with instruction on flying model aircraft. Accommodation for families up to 7 persons in self catering chalets is backed up with restaurants, licensed bars, amusements, and evening entertainments. Look out for their adverts or contact us for more details.

AEROMODELLER INDEX now available are the specially printed indices for Aeromodeller Magazine Vol. 42 1977 editions; already supplied to all subscribers/or price 50p including postage. Just the job to help in simple quick reference, they list all the articles and features, plans and details published during the past 12 months. No serious aeromodeller can afford to be without one. Supplies are limited so order soon from Aeromodeller, PO Box 35, Bridge Street, Hemel Hempstead HP1 1EE.



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winner of British Nationals
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A happy Hipperson after winning the 1976 coupe d'Hiver International at RAF Halton with earlier Artoo.

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IT IS REASONABLE to expect that a country that produces some of the best wine and cooking in the world, should also come up with something civilised when putting together a contest model specification. Coupe d'hiver has been flown for over 30 years on the continent, but only as recently as 1962 was it taken up seriously in the UK, after this magazine pioneered the idea by publishing the Garter Knight. My development of this design started around then. The first models – an identical pair – were built in a hurry for the French contest of 1964, and were trimmed on the field! It was quite obvious from the outset that one only had to take the class relatively seriously to put one in the high placings and this is still true today. So it was, that by not stopping for lunch, John O'Donnell and myself were both able to make the top ten!

These early aeroplanes were only 150sq.ins., with flat bottomed aerofoils and rather unsophisticated twin blade folding props, being some of the first I had ever carved. However the basis was set for the series and I continued with a flat bottomed section for some years, playing about with the propeller and fuselage configurations, until around the beginning of '67 I had standardised on the Benedek 7406f section. At the same time the current prop was designed and the combination of the two was a great step forward. Although still using the 40in. x 4in. wing the glide on the two designs built to this spec was far better and two minutes became possible in helpful calm evening air.

After the 100 gram rule had come and gone, they were brought out of retirement just before the first of the current Halton series – the end of '75. In the interim it had dawned on one and all that the glide portion of the flight was most important. Some, notably the French, had gone to extremes of size to achieve a good glide. I didn't think this was the efficient way of doing the job, I was convinced that a small increase in area was all that was necessary for all-weather performance.

That is exactly what the new model has – just under 200sq.in. The finished model was trimmed in two flights at the first Mini Meeting of the '77 season. Since then its record of flights is probably more impressive than its

record of contest wins as it has to be admitted that I am so fond of the model that I tend to fly the considerably inferior predecessors if there is any chance of losing it. Partly for this reason the model has never recorded below 1.30 and has only done half a dozen or so sub-max flights from its 35 or so attempts. I would put its potential well in excess of the 2-minute max, perhaps as much as 20 seconds over but a true figure can never be ascertained until I pluck up the courage to ask the indoor boys if I can try it at Cardington!

Construction - Wing

Give plenty of attention to making a template of the section. I originally copied the co-ordinates from the Jan '64 issue of *AeroModeller*. It may have got altered a little on the way so you will probably do best by copying the one shown here rather than re-plotting. Make a $\frac{1}{8}$ ply template or better still aluminium if you have it available and cut 50 ribs at least. Better to do a few more to save having to cut extra if you should break some accidentally later on. The nose and tail of the section can be chopped off and the spar notches marked by laying each rib over the outline of the section with extended lines drawn through the leading edge, trailing edge and spar positions.

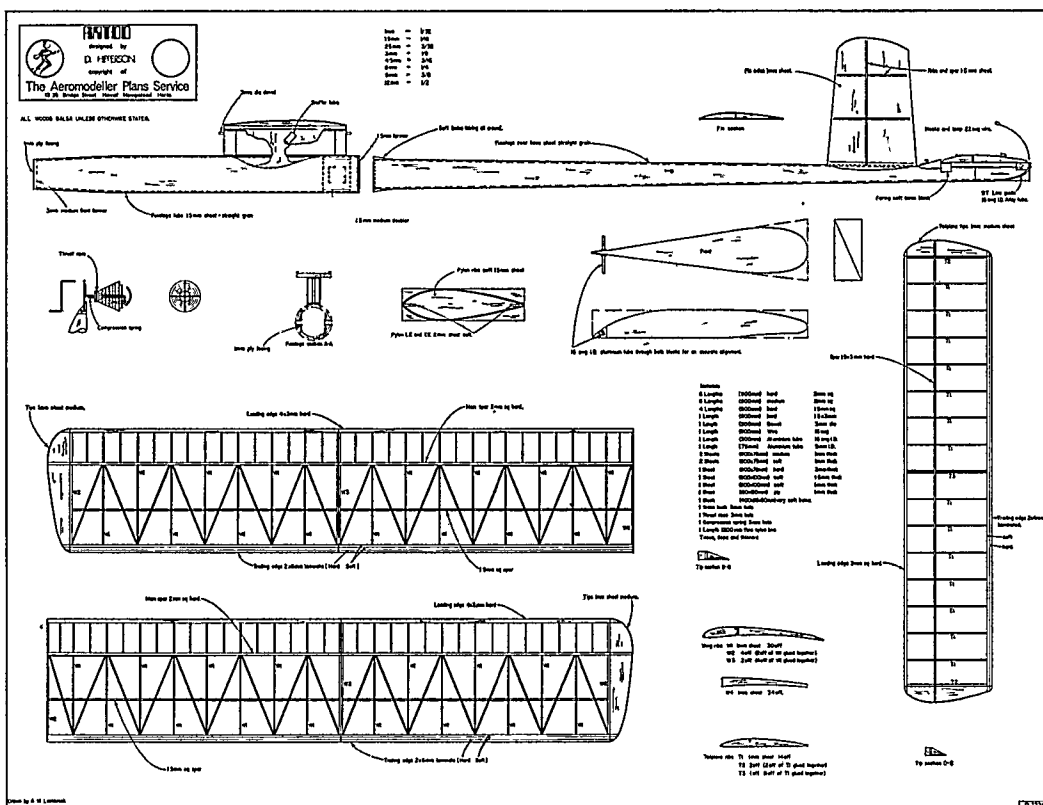
The main reason for the geodetic ribs is to beef up the section at the rear rather than warp resistance. Make a template for these two diagonal ribs but don't worry if you cut them less accurately than the ribs as they can be sanded down when installed.

The trailing edge is laminated from three strips of $\frac{3}{32}$ sq. This way it is very strong and warp resistant. Cut the pieces to length first and glue together with balsa cement.

When dry pin down the trailing edge strips suitably packed at the front to take the undercamber shape, and leading edge pieces (previously cut from medium hard sheet), spaced apart using ribs.

All the straight ribs can now be glued in with balsa cement remembering to lean the dihedral break ones over. When dry the top spar can be glued in using the white wood glue.

When dry remove from the plan and stick in the



bottom spar once again using white glue. The LE and TE sections can now be carved. Get as far as you can with a knife before resorting to garnet paper. It is less messy this way, and doesn't warp the wood upwards so much.

Cut the riblets using the front of the rib template and cement in place. At this stage cement in the web pieces, being careful not to let them protrude above or below the section. Now trim out any excess balsa cement from the corners where the rear geodetics fit and cement these in place. Notch the geodetic ribs and glue in the final spar. When dry sand down any protrusions above the section.

When you are happy that each panel is perfect in section and flat as possible trim out any balsa cement flush in the corners and fillet each joint with a tiny amount of white glue, lay flat and leave overnight.

Dihedral

Start by pinning down the inner panels so that when the tip panels are fixed to them at the correct dihedral angle their tips are nearly touching, enabling an exact comparison to be made. Chamfer the LE and TE where they will meet to ensure that all the spars butt up to one another neatly. When you are happy that you have a neat joint simply glue the dihedral ribs together with balsa cement, making sure the glue is on the ends of the spars as well as the LE and TE ends. Prop up the tips to the correct angle and weight them down so that any contraction in the glue joint doesn't destroy all the careful alignment to get them at the same angle. When dry all joints can be cleaned up and filleted with white glue.

The central dihedral can be treated in exactly the same way but remember the brace.

The Tail

This is treated in a similar way to the wing. This time only two pieces of $\frac{3}{8}$ " sq are used to laminate the trailing edge. Select light wood for the ribs but firm square stock for the leading edge and spar.

Fuselage

The motor section is from light straight grained $\frac{1}{8}$ " sheet. Its parallel section is 4in. wide and wrapped wet around

a convenient tube, pole or chair leg. It doesn't matter whether the former you use is exactly the correct diameter. If it's undersize then overlap the wood and then it will offer a little pressure to the glue joint when you spring it apart to cement the seam. If on the other hand the former is over large then when dry the tube can be held together for cementing with a couple of light bands.

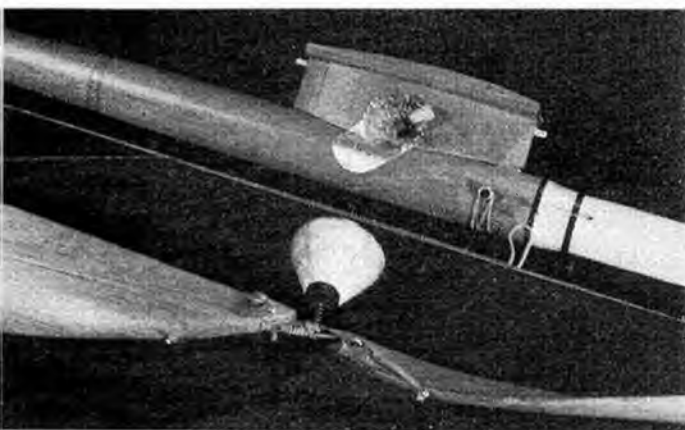
If you are in a hurry the parallel section can be extended to the nose. However, if you do this, remember to make the nose block correspondingly larger. If you want it to look a little prettier then taper the nose section off at the front. The blank is 4in. wide at the rear and 3 $\frac{1}{2}$ in. wide at the nose and it's so short you hardly need a former but a billiard cue or similar will make the job easier.

In both the above cases use some old $\frac{1}{2}$ in. flat rubber to bind the wet balsa to the formers and be careful not to wind it too tight otherwise you will have indentations that are difficult to sand out. The seams are glued with balsa cement and the nose section simply butt jointed to the parallel section. A solid circular former is inserted into the rear of the tube and the ply and balsa former to accept the nose block is cemented onto the front.

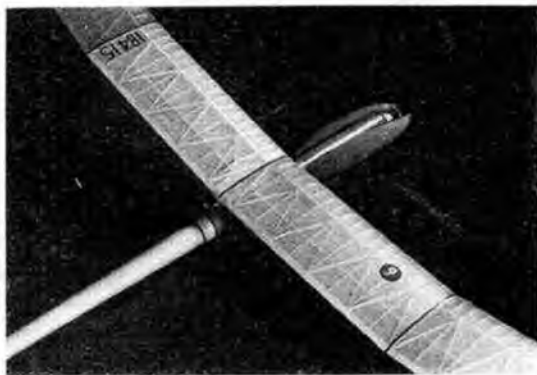
The tail boom is dealt with similarly. The blank is cut from soft, straight and even grained $\frac{1}{2}$ in. sheet. It should measure about 3 $\frac{1}{2}$ in. at one end and 1 $\frac{1}{2}$ in. at the other. You will need a billiard cue for forming this and it may be worth modifying the dimensions a little to suit the former you have available. I bind the wet wood with paper strips and very light elastic bands as it forms very easily but is prone to dent until dry. The seam is glued with balsa cement again once dry.

The pylon is simply two symmetrical ribs glued to a leading and trailing edge and covered with $\frac{1}{2}$ in. balsa. Don't be tempted to make the pylon any lower than it is as it is perilously close to the cross section limit of 3-1sq.in. already.

Fin construction is self explanatory and when assembled straight on the fuselage the semi symmetrical shape gives most of the turn required for the glide and climb.



Top, rolled balsa fuselage. Front portion tapers and silver foil on pylon avoids scorching from DT fuse. Below, very neat wire hub, noseblock and propeller assembly. Right, the latest Artoo 9 with diagonal bracing and riblet construction.



The Propeller and Noseblock

I use the full Bilgri type X blank as the tolerances are so small at these dimensions that to save wood with a calculated block is rather false economy in terms of accuracy. Glue on the ply plates at the hub and gouge a hole to accept the 16 swg alloy tube. The blocks can then be set up by laying them down so that their centre lines are parallel and epoxying in the alloy tubes in the overlarge holes, keeping them aligned with a straight piece of 16 swg wire through the two – very accurate and no messing about with jiggling up the finished blade.

The underside of each blade is then carved from corner to corner and has virtually no undercamber. Cut the blade shapes and then complete by carving the upper surfaces; remember, not too thin. Two coats of 50/50 sanding sealer/thinners and cover with wet lightweight *Modelspan*.

Noseblock

The noseblock is built up around the brass bush. The round ply back plate is bored out to accept the bush which is then located vertically by four triangles of $\frac{1}{8}$ balsa glued in against it. When perfectly dry the block is filled in with scraps of medium hard $\frac{1}{8}$ sheet cross graining with each other, before sanding to the finished round section and finishing. The prop stop is a good old fashioned wood screw with the head removed.

Covering

Cover the wing, tail and fin with the lightest jap you can lay your hands on. Dope/thinners of about 75/25 will be adequate for adhering it to the structure.

All warps are organised at the water shrink stage. Water shrink each panel separately and pin down till fully dry. Use no warps except for $\frac{1}{4}$ -in wash in on the inner right hand panel. When ready the surfaces can be doped – 25 per cent dope, 75 per cent thinners – three coats for the wing, two for tail and fin.

The finished fuselage with the pylon as yet unstuck can be doped liberally not so much for appearance or strength but a reasonable finish keeps the dirt off so much better. I don't cover or dope the inside.

Return to the wing and tail at this stage and check for warps – particularly in the tail. If warps have appeared then remove them in front of an electric fire.

Maximum finished weights should be: wing 26 grams, tail 5 grams, prop assembly 15 grams and fuselage with rear peg and pylon 29 grams. As you can see that is slightly overweight for the 80 gram rule – it would be 85 with rubber so perhaps you could improve on my weights and knock 5 grams off.

Assembly and Trimming

It is rather important that the CG comes out at the right point in relation to the wing so assemble the model complete with motor and hold the wing/pylon unit onto

the fuselage with long bands. Slide the pylon along a little, probably $\frac{1}{4}$ in, either way will be all you need unless you have built a very heavy tail boom or prop assembly. Cement the pylon in place and also stick on the four half dowel wing keys when you are sure you have the wing square, to ensure that the wing is always in the same position flight after flight.

In this condition Artoo should be close enough to try some hand glides into soft grass on a dead calm day. If the CG is correct then trim for a flat glide with tail incidence. Then a few turns can be applied. Wind up to what you expect to be half turns, release the prop and allow turns to run off, then launch. This way you will eliminate any bust that could stall the untrimmed model dangerously close to the ground.

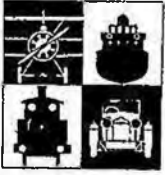
On a weak prop run of about 15 seconds the model should complete about one circuit to the right under power – too tight is dangerous. Double check that the glide is OK at this stage as it is annoying to have finished trimming the power to find the glide is wrong. You can't easily alter one without affecting the other later on. The model should not glide too near the stall and should take 35–40 seconds to complete a circuit. You will lose duration and thermal sniffing ability if you have it any tighter.

With the glide safe start increasing the power and adjusting the power trim with thrust direction only, i.e. packing the noseblock. On full turns it should climb away steeply from a 20 degree launch (never throw the model, it doesn't fly fast enough) and complete its first climbing turn in no less than 10 seconds. From then on the power turns should open out to complete between three and four circles in 40 seconds motor run.

My motors are six strands of Filati or Pirelli. My system of rubber consumption seems to be opposite from everyone else's, I use brand new motors in open models, cut them up and use them in Wakes, and when the same rubber breaks again they become 10 gram pieces for Coupe. For this reason motors of 10 grams made up into six strands give a length of 12–14 inches and can therefore take nearly 400 turns on occasions. The model has been flown on shorter motors but it reduces the run appreciably and this is a factor which does contribute to the consistency so it is not to be recommended.

I have seen people with cartridge loading systems but although I use this in Wakefield, on the Coupes I prefer motor loading sticks that allow easy inspection of the motors between flights as they do shed strands rather often. It is not unusual for me to take five attempts to get one fully wound motor for a comp flight but with motor sticks and S hooks already attached motors can be changed in seconds, even with cold fingers.

In case you were wondering about the name, it comes from an adaptation of R2 D2 who, everyone will know by the time this appears, is the name of the short fat robot from 'Star Wars'. He is affectionately known as Artoo. Finally, remember to light that fuse every flight to ensure an Artoo Dee Tee.



The premier hobby and craftsman's show . . .

47th Model Engineer Exhibition

Huge crowds of visitors see the biggest model and trade exhibition ever staged in the U.K., at Wembley 5th-14th Jan.

THE MODEL ENGINEER EXHIBITION always represents a broad spectrum of model interests. Virtually all of the creative hobbies are represented at this ten day long festival for the miniature modeller. The impetus of the 30 competition classes is augmented by trade and club stands, lectures, demonstrations and not least, the modelling public themselves. The 47th Exhibition brought together over 75,000 hobbyists, from school children to grandads, for the annual pilgrimage.

Royal Opener

This year the modelling world was honoured by Lord Mountbatten of Burma, ably assisted by his three grandsons, Ashley Hicks and twins Timothy and Nicholas Knatchbull, who opened the show and spent several hours taking great interest in the exhibits.

Upon hearing that one of the entries, a ten foot R/C Sailplane, had been constructed by 15 year old Simon Wheeler, he turned to one grandson and declared, "See that

Ashley, I shall expect one like that from you by next year." The sections on model ships and military models also held special interest for Lord Mountbatten who recalled many an amusing anecdote as he recognised ships he had commanded – including one of his favourites, the *HMS Kelly*. A welcome surprise for all was when Martin Dilly (on behalf of David Parker) presented Lord Mountbatten with the original crest from the *HMS Wishart*, the ship that had such a distinguished career under his command.

Aircraft Models

Of the aircraft models entered there was a predominance of Radio Control and plastics. One top award was a Bronze medal to G. Rae of Great Malvern for his Pylon Racing Glider that featured water ballast, to be released just prior to landing. A VHC Certificate was awarded to Ken Stokes of Oxford for his highly original *Seeker*. Latest in a series of models developed over the years by Ken, it is R/C with swept wing jet airliner appearance, power source being twin Rossi .15 impeller jet pods with the engines running at 28,000 rpm! J. Morley of Weybridge topped the Scale section with his original R/C Bell 47 G Helicopter to win a Bronze medal.

Fine free flight models were shown by Martin Dilly and J. P. Buskell who each produced exceptionally well built own-designs. We must mention also 12 year old A. MacGregor of St Andrew's, Scotland, who sent his *Lively Lady* which though not the best model present, was a good effort for a youngster. In F/F scale, D. W. Newby entered an APS *Westland Lysander* finished in night markings, and M. Okey's little *Curtiss Jenny* caught the eye for its very fine detail. It was worthy of the Bronze medal. Gordon Isles' *Kingfishers* saved the day for competition Control-line and received many comments from the visitors interested to see the alloy wings and general high standard of engineering of this most functional of models. In scale, it was the magnificent *Lancaster* by L. K. Wells and D. Newby's *Piaggio P166* which impressed but we could do with more next time!



Jim Morley makes Helicopter kits, his "2C" is well known: but this is his new larger version, very true to scale for 10cc (Merco) with the tube fuselage struts specially realistic in size for the Bell 47G.

Plastics

Amongst the plastics there were some excellent examples of scratch building, notably Harry Woodman's scratchbuilt ship's catapult with *Walrus* seaplane on top, which won the Championship Cup. Other awards went to Peter Cooke for his superlative *Tempest* and *Spitfire* models and, of course, Tony Woollett scored well as always, this time with the *DH86*. E. J. Vine's *Blenheim* I flew deserved the Bristol Cup and Ted Taylor's much modified *Phantom* kit was very

Arthur Britton of Derby modelled the *Comper Swift* to $\frac{1}{2}$ size for a *Merco 61* using original Indian registration and colour scheme. This *Swift* is currently flying as G-ACTF.

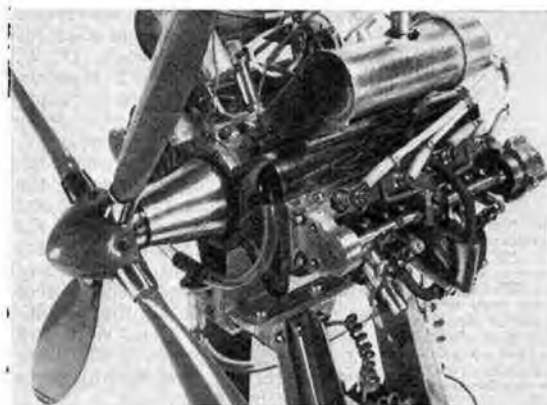


closely studied. Others which impressed were D. Collins' *Percival Mew Gull*, and the *B.E.2F* by R. Burgess which had a wealth of detail.

Electric RTP

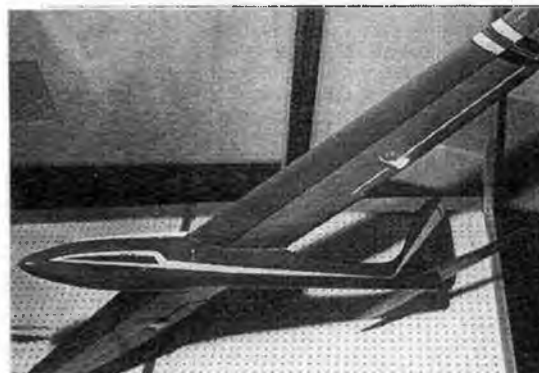
Once again Harry Butler, present throughout the week with his own trade stand, donated the services of a dual pole, transformer and equipment for the RTP circuit complete down to soldering iron and cyanoacrylate facilities for those necessary repairs that keep models airworthy. A great disappointment to all was the loss this year of a truly suitable flying circuit. Last year's luxury of limitless ceiling height coupled with a grandstand view for the public from the balcony above, succumbed under

Gordon Rae's aerobatic R/C glider which used water ballast to control wing loading and to soar once the racing is finished. Gordon also races cars - hence the interest in speed.



Harry Butler's newest kits for electric Round the Pole flight are plastic and balsa structure with very neat vac-form fuselage halves for the *FW 190* and *Hawker Hurricane*.

pressure for more space from the increase in exhibitors who, of course, make the show financially viable. The location in the Avon Suite under a restrictive 12 foot ceiling prevented a repeat of the aerobatics witnessed last year, and reduced flying to the round-and-round the pole variety. Although many flyers were disappointed, the pole was in almost continuous use through the exhibition (alternating with R/C cars) and continued to draw a large crowd of spectators.



Fabulous! The only possible description for Edouard Colpin's 8 cylinder aero engine which has two tanks, is overhead camshaft and was shown on a special mount which he brought from France.

Scale Contest

Once again the major attraction was the scale event, in which flyers could attend on any day with their model to be scrutinised and marked for authenticity, finish, detail, extras and flight performance. The nature of the flying site prevented most of the competitors from all but a nominal flying performance and many declined to fly at all. The steady increase in this type of scale flying was amply demonstrated by the high number of entries and the many ambitious projects that had been tackled. Every subject from pioneering flying machines through multi-engined aircraft to ducted fan jet types illustrated the versatility of using this type of power unit.

Juniors Do Well

15 year old Mark Newland from Yarmouth built a terrific *Rumpler Taube*, scratchbuilt from 3-view drawings and powered by a Mabuchi 26D fitted with gears; he topped the Junior Scale contest. Graham Harden from Sidcup and only 11 years old entered two models, a profile *Mosquito* twin and an Ansaldo *Albatross* both scratch built. Another 11 year old, Douglas Mawson from Kidlington, entered a very well built modified Sterling kit *PT17*. One of the most

David Newby's APS Plaggio P166 for two PAW 1.49 diesels was detailed to the curtains in the windows. Really nice model David not the easiest to make.



Incredible detail on 1/24th Hawker Tempest by Peter Cooke of Twyford had already won IPMS accolades. Scratch built to APS scale drawings, it has full engine cockpit and wing interior detail.



ingenious models present was Phil Evans' *Spitfire*, modified from a Guillow kit; it was fitted with two sets of lines to operate a retractable undercarriage. A small motor was fitted with a simple slipping clutch drive to override when fully retracted or extended, operation being controlled by a reversing switch. Other ambitious models were Dick Bryant's 48in. span *Hercules* powered by four geared motors; the model originally appeared at last year's show but was then in an unfinished white state, his return this year gave him a well deserved first place in the Senior Scale event.

Harry Butler again donated a transformer-controller unit as first prize. A good humoured and well detailed *Farman Biplane* was entered by Les Brock, to take second place. It had undercarriage and tail skid with operational suspension using wire and elastic bands for springiness, cotton braced rigging on wings and fuselage structure, a fine set of spoked wheels, rotary engine that rotated with propeller and an excellent pilot in true 'Magnificent Men' styling.

From Denmark

Regular visitors, Ib and Jette Lyngkilde were over once more from Denmark; this time they had an executive jet based on the *Hawker Siddeley 127* with ducted fan jet pod, using a miniature plastic fan from hairdryer running inside rolled balsa tube. They also brought an aerobatic

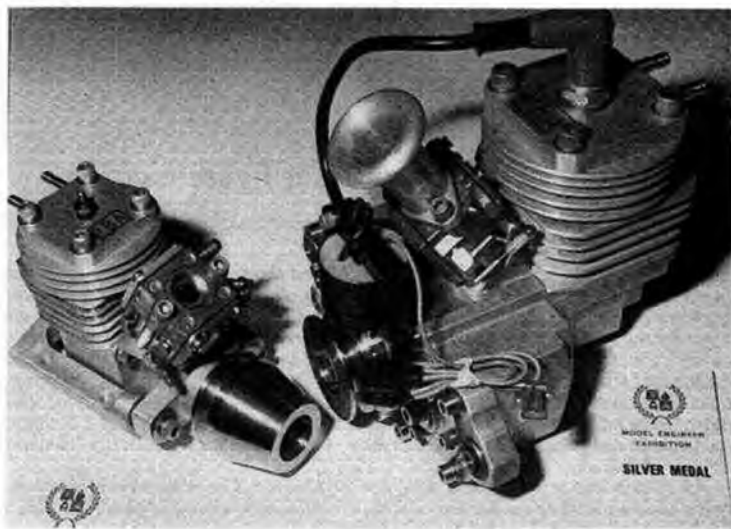
sheet profile biplane which had an elevator activated by a transistorised pulse decoder, all operating on just two lines; but unfortunately, ceiling height prevented it from being flown. Another junior, 14 years old Martin Tuck, produced a *Wright* type of biplane, the two propellers being driven by exposed rubber band 'fan belts' off a pulley fitted to a Mabuchi 26. Authenticity was completed with a catapult launch system as used on the original.

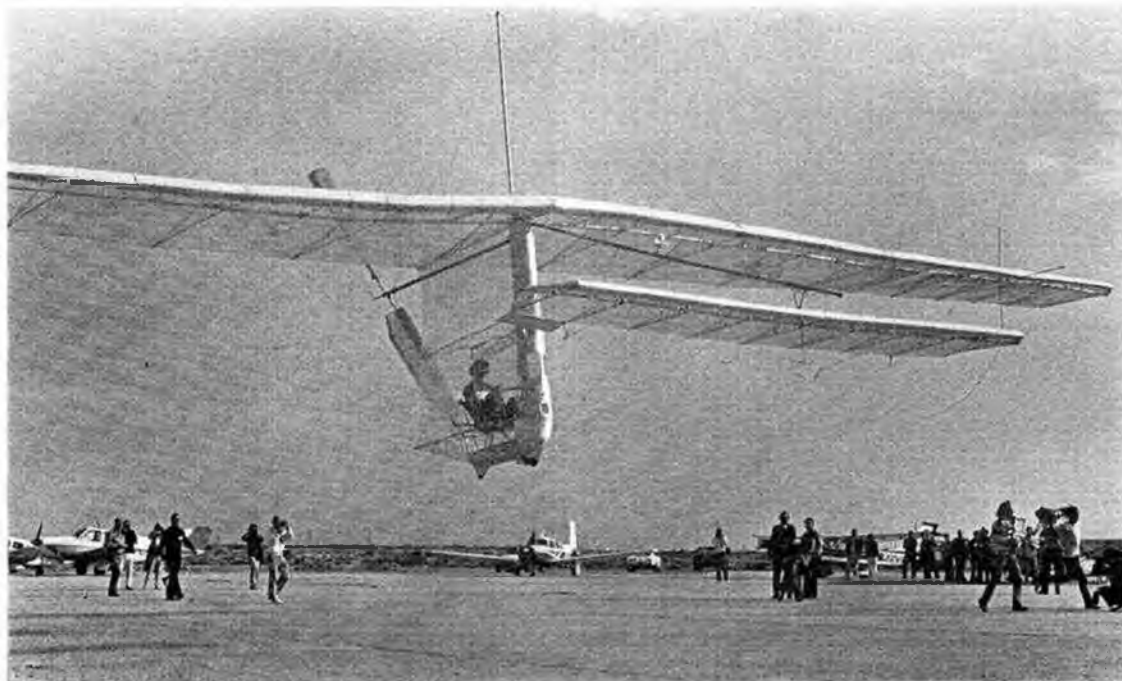
Following his success last year Martin Simkin, now classed a senior, returned with a *B25 Liberator* built at short notice before the show. Scratchbuilt to a 1/35 scale it had a novel bomb release consisting of a sliding trap door that released its cargo of bombs in a most convincing fashion.

* * *

RESULTS: Senior - 1st (34 points) Dick Bryant, *Hercules*; 2nd (32 points) Les Brock, *Farman Biplane*; 3rd (31 points) Martin Simkin, *B24 Liberator*. Junior - 1st (33 points) Mark Newland, *Rumpler Taube*; 2nd (32 points) Martin Tuck, *Wright A Biplane*; 3rd (31 points) Richard Batting, *Bleriot monoplane*. Prizes were donated by Harry Butler Models and Model & Allied Publications Ltd.

Many hurrahs for this year's crop of inspiring new engine designs. This pair of 15cc and 35cc Marine units by P. B. Allen of Wokingham have ultra short stroke features. Smaller one has rubber mounts in a special cradle, larger has integral gear box for twin shaft output either side of integral magneto.





Jack Lambie

tells his story of the

Gossamer Condor

Paul MacCready's

winner of the famous

Kremer prize for the first

Man Powered flight around a figure eight

Cruising at a mere 10 mph Bryan Allen maintains head-height during the 7½ minute figure of eight flight which won the £50,000 given by Henry Kremer. (Photo: Don Monroe.)

IN AUGUST OF 1976 my wife Karen and I had just completed the first tandem bicycle trip around the world—a journey of over 15,800 miles—when I received an invitation to lunch with Paul MacCready. I had heard rumours that he was all excited about trying for the Kremer Prize and I approached the lunch with some trepidation. I didn't really think it could be won. In fact, I had co-founded human-powered speed contests in 1975 to provide an inexpensive and practical alternative for engineering students and others interested in human power and aerodynamics. Our streamline bikes had yet to reach 50 mph, despite exotic, fully-faired, prone-position machines. Paul and I had known one another in soaring for many years and we had also collaborated on a truck air-drag reduction project for the National Science Foundation. I had great respect for his achievements as a soaring competition pilot (once a world and three times a national champion) and as a scientist/businessman. Nevertheless, I felt his pursuit of manpowered flight and the £50,000 Kremer Prize—the largest ever offered in aviation—was chimerical.

"I've calculated the power requirements for a standard hang glider," Paul said, "and it needs three horsepower to fly. But if it were enlarged to

This is the story of a team effort which achieved the seemingly impossible under the brilliant leadership of Paul B. MacCready, Jr. It is expressed here through the eyes of one who was with the concept from the very beginning and who put together the structure which has often been referred to as a 'man carrying indoor model'. Peter B. S. Lissaman produced all the aerodynamic refinements; ocean sailing and fellow sailplane experts worked on the rigging; wives and sons became totally involved in this great challenge. As the design changes and location moves were made, the team expanded to embrace another ex National Champion modeller in the person of Vern Oldershaw, who played a great part in 'cleaning up' the detail.

All of this was in progress a year ago at Shafter. The collective skills of the talented team were to realise the ambitions which had frustrated countless others for almost 18 years . . . but we intrude on Jack Lambie's story:

a 90ft span and kept the same weight, it could fly on only 0.3 horsepower."

"How can you make a plane that size that weighs only 50 pounds?"

Paul sketched a curious design on a napkin (how many great technological advances in aeronautics had begun as sketches on paper napkins?) The drawing appeared to be a toy 'jack', the kind kids play with and bounce a ball.

"See, Jack? Every part of the structure is used to brace another part. It will use a forward stabiliser so we can make use of this forward tube."

"But Paul," I persisted, "what about the weight? How could we make a plane that large weigh so little?"

"We don't need much strength," he answered. "The Kremer rules only require a 10ft maximum height at the start and finish of the flight. That's not far to fall if anything breaks."

He explained that the wing loading would be very light and that it would operate a lift coefficient of only .9 (compared to 1.4, or better, for previous MPAs). This meant a single-surface airfoil would have low drag.

My preconceptions crumbled. I could see for the first time that man-powered flight was an engineering feasibility.

Construction began in the huge Rose Parade float shed down in the Arroyo Seco not far from Paul's home in Pasadena. We laid out 2in. diameter, .035in. thick alloy tubes in 12ft sections that were joined to make an 88ft span wing. We put water bags at the corners of the seven ribs to simulate air loads and adjusted the wires to keep everything in line.

The approach was so radical compared to past MPA designs and yet so easily built that there was worry about someone picking up the idea and beating us to the prize. After all, £50,000 is a lot of money, and secrets of certain competition airplanes have always been rather well kept as long as it was important to do so. I fended off the questions of curious visitors, telling them we were making a special water bag holder, a contemporary metal sculpture for the Pasadena Museum of Modern Art, etc. We made some of our early tests at night on the lonely Rose Bowl parking lot. On 9th October 1976, ten days after my meeting with Paul, we carried the gigantic frame and its mylar covering across the street to the park. Though the lightly misting rain added a lot of weight, the craft acted more like a balloon than an airplane. We walked with it at 5 mph; it lifted easily and strained at the ropes we attached to all corners. Nothing broke. The structural idea was reasonable. Now for refinement.

An old friend of Peter Lissaman's who ran a test pilot school at Mojave Airport agreed to let us use half of his big hangar. I motorglided to the desert to check it out and, by coincidence, the 96ft span just fitted into the hangar. We soon moved our tubing there after we had chemically milled it down from 22 thousandths at the centre to 14 thousandths of an inch at the outer sections of the wing. Paul's brother-in-law, Kirk Leonard, is a skilled engineer and craftsman and he spent many hours on the new finer version while Peter worked with the computer on aerodynamics at AeroVironment Inc. The advantage of the computer is that 20 years of aerodynamic experience can be brought to bear in seconds instead of months of laborious computation. Span, area, speeds, angles of attack can be changed and efficiencies read out quickly. Propeller performance, too, could be checked out over a whole range of sizes, rpms, aspect ratios, and various angles of attack.

I finished the partially-completed first propeller in a couple of days, built a pilot seat frame, and got pedals, cranks, and chainwheels from my bicycle collection. One of the pleasant surprises was the ease with which the drive system went together. The plastic 'cable-chain' I ordered from New York was a little radical, but careful alignment and a judiciously located idle sprocket resulted in trouble-free performance.

First flights with Paul's son Tyler (a hang glider pilot) on board were promising. The machine seemed to float into the air at walking speed instead of 'taking off'. It hung as if suspended while Tyler pedalled rather easily making 45-second flights with a push start. Greg Miller, a new rider of racing cyclist championship quality, yet only 20 pounds heavier than Tyler, was added to the team. Greg could take off on his own and, after a good deal of flying practice, made a tremendously encouraging flight of two-and-a-half minutes while covering over a thousand foot distance. We went home that weekend sure that we were quickly going to capture the Kremer Prize.

The next time, MacCready measured and marked the one-mile figure-eight course, practised taking off and flying over the 10ft barrier, and called out the officials. After several trials, Paul realised we were still a long way from achieving our goal. It would take at least nine minutes to do the course at the first *Condor's* speed, and Greg's best flight was 2 minutes and 30 seconds. It had to stay up three times longer, and the matter of control was even more critical - a full turn had yet to be made. Paul had thought the machine could somehow be wrestled around the course using spoilers on each tip, but the plane slid to the ground shortly after one or the other flat plates was actuated. And then there was the problem of movement

Specially commissioned bronze sculpture from the Royal College of Art was presented to Paul MacCready by HRH The Prince of Wales on behalf of the Royal Aeronautical Society as a memento of the achievement - the cheque is less permanent!



within the air mass. Winds of 2 to 4 mph and the slightest gustiness would limit flights to only 30 or 40 seconds. Thin, single-surface airfoils have low drag at only one angle of attack. For the *Condor*, a low-drag spike occurred at about 8.2 mph. Above or below that speed, the drag rose impossibly high.

Finding the exact cause of the drag problem took weeks. Old gliding buddies Bill Bueby, John Lake, and I made a thicker leading edge to allow a wider speed range. It seemed to be the right move, but there were other problems: Twice the shaft-prop attachment broke. New wider blades seemed promising at first, but, like most everything so far, showed no particular gain over the old one. Peter Lissaman tried many propeller angles between 15 and 20 degrees. And the problem of turning was still with us. We tried a sail on top to provide dihedral effect, various spoilers, and tip rudders. It was frustrating. We had a plane that flew and flew, but no way would it make it around the Kremer course.

Peter spent many hours during winter working out the stability situation on the computer. The results were surprising and ominous: it appeared that it was impossible to control the *Condor* in bank by conventional means. It weighed about 220 pounds with the pilot on board, but the air mass deflected in its passage was around 600 lbs. This 'apparent' mass had to be rolled to bank the plane and, at the extremely low speeds we were flying, there was simply not enough force to move the huge wings and the 'fellow-travelling' air up and down with any wing-mounted aerodynamic device. The spoilers worked, but their coarse way of stopping a wing from flying could

not be tolerated in a machine that relies on pitifully weak human energy. What about other Kremer competitors? How did they attempt to make turns?

A new design went together at Shafter, a new base in Central Valley. I would call it number two because it represented a major change in some ways. Paul kept the basic wire-braced tube-structure concept, but aspect ratio was increased from 8.3 to 12.8 and the wing loading raised from 0.22 to 0.26 lbs/ft². A thick, double-surface airfoil was computer-designed by Lissaman and only a single tube along the centre of pressure was used for the spar. By eliminating the rear spar, enough weight was saved to permit use of more closely-spaced ribs and a cardboard leading edge. The pilot's seat and chainwheels were enclosed by a streamlined plastic envelope.

The result was that Greg and Tyler almost immediately doubled their duration times. One evening, in the quiet air just after sunset, Greg flew for over five minutes – but making a turn and control of the new machine in bank had yet to be accomplished.

In many years of model building and experimenting with a canard stabiliser, I had never been able to get one to fly as well as a conventional tail-in-the-back airplane. Paul had remained committed to the canard surface in front, but, with the better low drag and wider speed range of the new *Condor*, he yielded to suggestions and let us try a following tail. John Lake made a cardboard-and-foam, mylar-covered appendage and mounted it at the end of the ubiquitous aluminium tubing we used for just about everything on the ship. It seemed to work at first, but again, further testing showed the plane would still slide to the runway if held

beyond a quarter turn. The drag was too high. Paul pulled the following tail off and laid it in the corner with a half dozen other ailerons, stabilisers, tip rudders, old ribs, etc.

Paul was the mastermind of the *Gossamer Condor* project and was supporting the project on his money. He could not let emotions cloud what he thought should be done to improve the machine. We became accustomed to having a part we had worked on for days turn up in the corner in pieces because Paul thought it wasn't light enough or that it wouldn't work. Even such skilled and experienced craftsmen as Vern Oldershaw did and re-did parts at Paul's direction to save weight here or make a better airfoil there.

The trouble with working with a true genius like Paul MacCready is that you never know when he's wrong, because much of the time he's right when your instincts are telling you the opposite. Case in point: The *Condor* has a lift/drag ratio of about 10:1. All the previous analyses of manpowered airplanes state a minimum of 30:1 is necessary. A little thought, however, and it's obvious that as long as sink speed is low enough, it doesn't matter what the L/D is (as Peter pointed out in his 1962 paper, 'Le Minimum'). Again, other projects (such as the *Puffin II*) attempt to get a lift coefficient over 1:14 from their airfoils. This requires very smooth wings with many closely-spaced ribs as well as stiff covering – and up goes the weight.

Another departure in the *Condor* from other MPA designs was the ignoring of ground effect at the advice of Peter Lissaman. He had done his doctoral thesis on ground effect, and wrote that the phenomenon is not really understood and that sometimes the ground effect cushion just isn't there when you're counting on it.

MacCready's flying, banking, forward stabiliser was working exactly as he said it would, towing and yawing the plane in whatever direction we wanted – if only the *Condor* didn't slide to the runway once it got into a turn. Thinking about the problem one day, I mentioned some observations of my own.

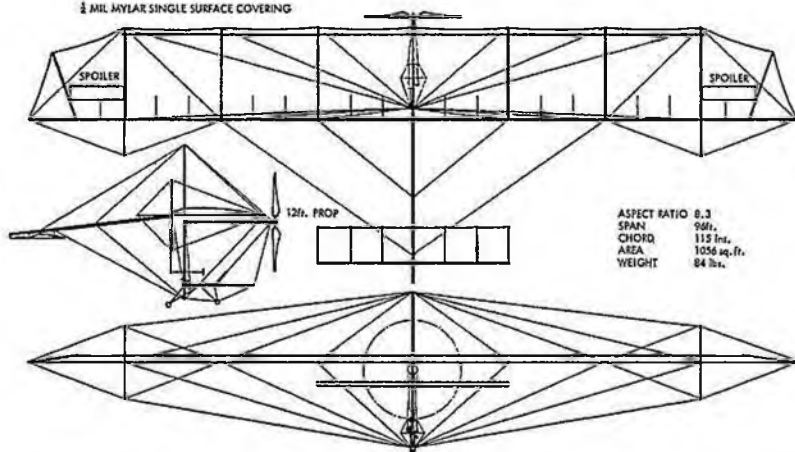
"You know, Paul, I've watched Volmer Jensen slope-soar his VJ-23 ultralight a lot, and I notice that as soon as a turn is started, he pushes opposite aileron and continues and completes the turn with full down aileron on the inside wing. And when my brother Mark and I put ailerons on *Hang Loose* we found control reversal at low speeds. Maybe this is even more true with the *Condor*?"

MacCready seldom accedes to a

Now for the next . . . Paul MacCready and his pilot, Bryan Allen, with Henry Kremer and Ron Moulton discussing the channel challenge. Paul has already announced he'll have a new design ready by April '78 and is first going to set a duration record of 3½ hours.



1 MIL MYLAR SINGLE SURFACE COVERING



GOSSAMER CONDOR I (Mojave version.) 332 FLIGHTS

suggestion when it is made. He picks everyone's brains, sifts through them, and it isn't until the change is made that you know he's decided to give a new idea a trial. Wonderful miracles and all that! – the opposite-action wing warp was one of the final keys to success! The drag of the inner wing (due to its increased angle of attack) swings that wing back, but also adds just enough lift to keep it from dropping. The result – a perfect turn. I made a little detent by Bryan's seat. He just clicks the lever into the notch and the wings are held in a twist for a turn with no other action necessary until the ship is straightened. Then he lifts the lever into neutral and goes his way. The *Condor* can turn about in only 180 feet.

One last trial of a thicker airfoil was made. Peter figured the ship would fly a little slower with the higher lift wing, thus reducing the drag of wires and fuselage enough to overcome the higher drag of more thickness. Unfortunately the new wing flew at about the same speed and the drag of the deep airfoil reduced performance slightly. Vern and Bill took the wing off and hung it on the back wall of the hangar. We took the old thin wing, completely rebuilt it, covered it, and put it on. All of this in two weeks! The prize was getting closer . . . I could feel it in my bones . . .

Typical Flight

It's 4.45 am. I open my eyes at the sound of a car. I sit up, pull on my clothes, and stuff the bag.

Jim Burke is rolling the doors open just as Vern Oldershaw arrives in his motorhome. Minutes later I lift the machine with one hand onto a little tow dolly. We roll it into the dawn-streaked sky. Bryan Allen, our 24-year-old rider, or pilot, arrives and helps us walk



Professor Hidemasa Kimura, Vern Oldershaw and Sam Durand tap out data on the Prof's sub-miniature calculator to compare Condor and Stork statistics. In London for the prizegiving, their meeting emphasised modelling technique influence. Special cake had full colour painting on icing, a craftsman's tribute greatly appreciated.



the ship a hundred feet to the end of the half-mile runway. Paul MacCready, the motivating force behind this incredible adventure, pulls in with his son Tyler, who is our backup pilot. Bryan slips into the gondola cockpit, straps his feet to the pedals, and begins spinning aluminium cranks that are bolted to a 62-tooth chainwheel which pulls a cable-chain to a 52-tooth wheel eight feet above him. The drive-shaft whirls the 12ft propeller as he warms up for the effort of flight. The translucent blades flash, flash, flash in the predawn glow. I restrain the machine. It wants to go.

"Ready, Bryan?"

"Okay, I'm ready now whenever you are."

We mount bicycles. Vern steadies the wing. I ride ahead with the 'starter pole' – a 10ft barrier over which the Condor must climb at the beginning and end of the Kremer circuit. The official observer, who is also Kern County's airport chief, holds his camera and stopwatch.

"Let's go!"

Bryan pumps a steady 110 rpm cadence. The Condor stirs on its tiny plastic wheels . . . five feet . . . ten feet . . . it behaves more like a dirigible than a heavier-than-aircraft (indeed, its mass/size ratio is similar) and it is difficult to pinpoint the moment of liftoff. But it's off the ground and climbing with unbelievable ease in response to the horizontal canard surface. Bryan floats effortlessly over my marker.

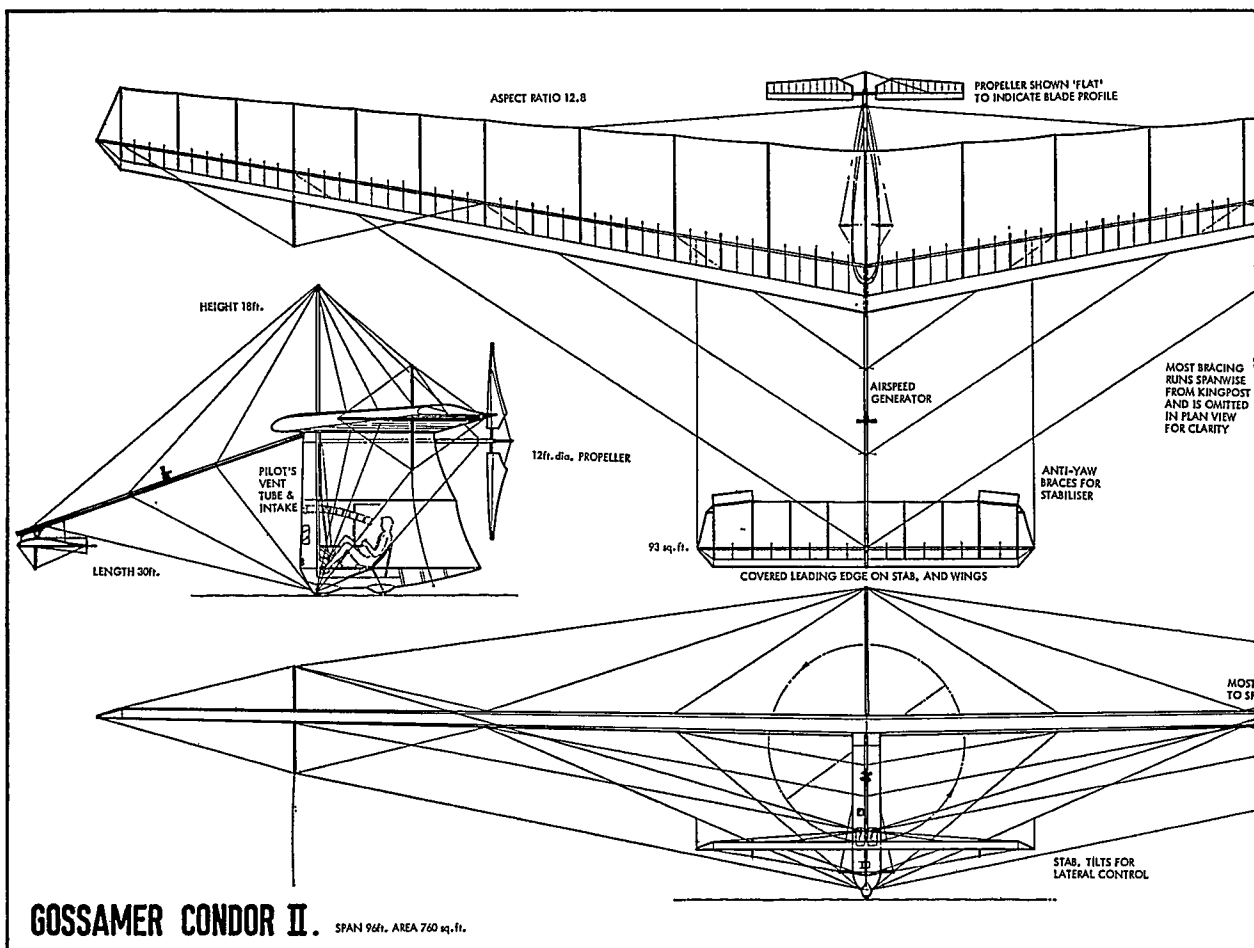
"Good start, Bryan . . . Beautiful, beautiful . . . keep it going . . ."

The first rays of the sun strike the airplane. Its mylar covering polarises the light, creating brilliant flashes of rainbow colours which ripple and play over its surface.

We pedal easily along and behind as it moves over the runway toward the

first turn a quarter mile away, our heartbeats synchronised with the faint 110 rpm whooshes of the prop. When he is almost alongside the turn marker, Bryan gently rotates the control wheel to the left. Now the canard surface's aileron tabs move it from the normal horizontal position to a bank that tows the machine around to the left. The pilot moves a lever under his seat into a notch detent which twists the left wing to a higher – but almost invisible – angle of attack than the right. This is exactly the opposite of regular airplane practice, of course. (Because of its 96ft span and 10 mph flying speed, the Condor needs only a three-degree bank to make a 150ft radius turn. The outer wing is going so much faster than the inside wing that the difference in lift is three times greater. Lift must be added to the inner tip – thus the reverse twist.)

Slowly, slowly the Condor wafts around the turn and starts back over the apron alongside the runway. I pedal beside, urging Bryan on,



"Keep it up. It looks great. Keep her going."

The rider's mouth is open. He breathes deeply. An airtube in the gondola blows a faint breeze on his face as he methodically pedals along five feet above the ground. I time his cadence by counting ten strokes of his foot. He's turning 98 rpm — the steady 0.35 hp needed to stay aloft in level flight and move the airplane. Clouds of birds rise from nearby fields, as oblivious to the drama taking place as is a crop-dusting pilot who mashes in over the far end of the course on his way to land and refill the Ag-Cat's insecticide tanks.

Four minutes go by. This is turning into a good flight. Will this be it? Will the Kremer Prize be won? Have the months of building, testing, discarding, trying again and again finally taken this long-unconquered frontier of flight? The official observer is watching more intently now. Our excitement

mounts as Bryan approaches the critical second turn. He's in good shape and not slowing . . .

* * *

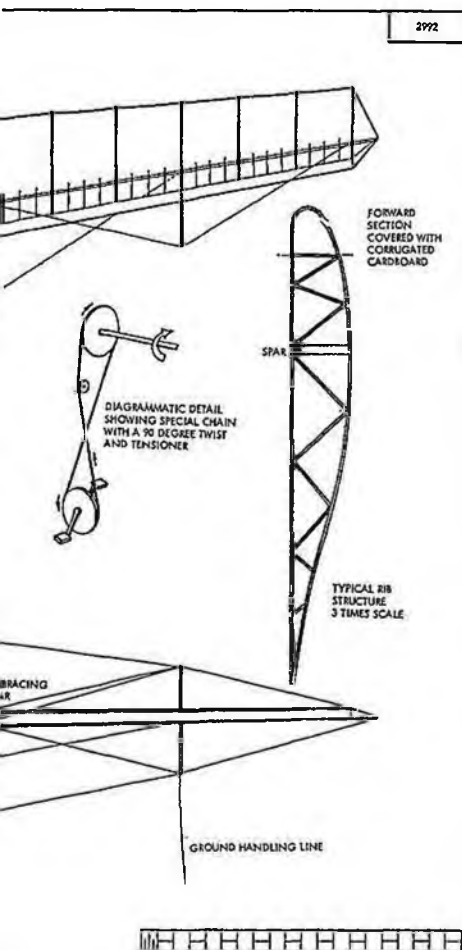
Bryan continues pumping away toward the second turn. After he makes that, all that's left will be to climb over the 10ft finish marker. The basic idea of the Condor has been correct. Working out the details took ten times longer than anticipated. But it's been done. We look at one another as we pedal or jog alongside. We're afraid to say it, but our half smiles make it clear we all feel our rider is about to complete the course.

Bryan is entering the final turn. Suddenly the wings tremble unexpectedly. Turbulence? The spar snaps and the wing folds back. Bryan noses down for a quick smooth landing as we rush under to support the slowly dropping wings. It's easy to assess the damage through the transparent covering. A crimped spar and some torn plastic.

They can be fixed in a few hours — but flying for the day is ended. But why the sudden break? After all, the wing is stressed for 1.5 g's.

Vortices! The coughing roar of another Ag-Cat charging off with its load of insecticide provided the answer. The earlier crop duster had come in for its landing above this part of the course shedding invisible whirling dervishes from its wingtips. These airy tentacles were still active four or five minutes later and reached near enough to the ground to ensnare our bird. (There is a touch of irony here. AeroVironment, MacCready and Lissaman's company, had done the definitive research on this phenomenon under contract to the US government. But attention focused on the massive wakes of large airliners and transport aircraft.)

As we trundle the Condor back to the hangar, I ask myself, "Why are we doing this?" I know it's not the prize money; most of us aren't benefitting much from that. Perhaps it's the ful-



On 31st December, Gossamer Condor was aired for the last time before moving across the USA to be hung in the Smithsonian Institute at Washington DC. Rough weather over Christmas almost prevented this 'last fling' but fate decreed a dead calm end to the momentous year. After the sandstorm coating of desert dust had been blown and shaken from the wings, Condor made 10 flights, among them one by Professor Geoffrey Lilley, Head of the Department of Aeronautics and Astronautics at Southampton University. Prof Lilley is a long standing member of the RAeS MPA Committee, and chaired the last Symposium in London but it was still a pleasant surprise for him to be (a) invited and (b) capable of actually flying the Condor. Apart from co-ordination of controlling, maintaining speed and pedalling, Geoffrey says he could have flown a long way but was quite happy with 200 yards of Human Powered Flight – and who wouldn't?

fulfilment of an ancient dream, the simple human goal that hasn't been realised even at this advanced stage of aviation. Perhaps now and in the next decade there will be a new Golden Age of Flying like 'regular' planes had in the twenties and thirties. But this time for ultralights. The technical and muscular effort for a human being to lift himself into the air, climb, turn, and truly fly has been a wonderful achievement.

Repairs are easy. Gossamer Condor wing folds have become acceptable as part of the operational hazards. This time, however, the rebuild was to be the last before the ultimate fulfilment of the team's great aim – the Kremer prize.

On 23rd August, in ideal conditions with a windspeed of less than 2 knots, Bryan Allen made one of his typical 30ft take-off runs toward the north pylon on Shafter Airport runway. After a 500ft cruise it was all systems

'go' as Bryan cleared the Tee bar on the start line and observer Bill Richardson, a long experienced aviator who was appointed to authorise any claim, clicked his stopwatch. Bryan was soon into the first, right turn after 250 more feet and he made a 425ft diameter 180 degree sweep around the marker to head for the south pylon, 2,640ft away. It was a smooth cruise of almost three minutes, then another sweeping left turn to re-trace his course back northwards. As he neared the original take-off point, eager followers yelled encouragement and with one last effort Bryan took the Condor over the Tee bar to finish at precisely 6:22.5. He had traced an almost perfect figure eight, the flightpaths were a mere 9ft 7in. apart on the start/finish line and met all the conditions of the famous contest.

The rest is now history – or is it? The Channel is the next challenge.

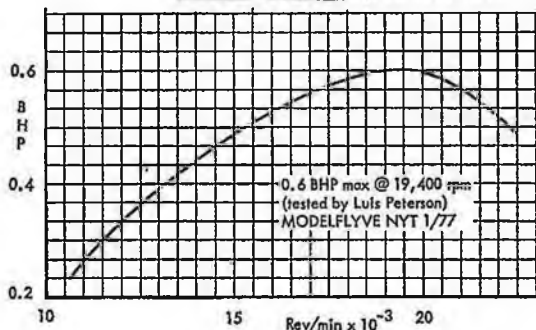
Kinky wings made little difference. Twist (wash-in) induced the turns and fore plane tilt controlled the rate as well as elevation – just like a power model! Piano wire bracing kept the ultra light structure in shape. (Photo: Don Monroe.)



RACING

by Dave Clarkson

BUGL Mk II (3.5 mm ID choke)



MOTOR TEST - BUGL 15D MKII

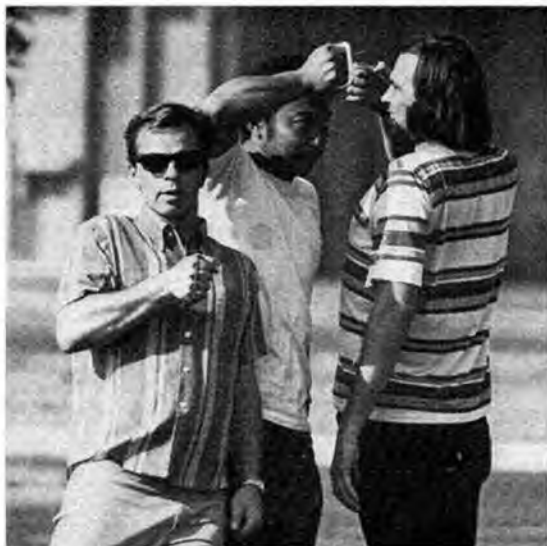
Thumbing through a copy of the Danish mag *Modellflyve Nyt* I came across — would you believe — a very complete and thorough motor test of the Bugl 15D MkII. Reproduced below is the BHP curve published plus some test prop figures.

Prop	Measure	RPM
Kavan 8x4 Blue Nylon..	..	16,500
Bartels 7½x3½ 'Rev-Up'	..	19,100
Bartels 7x3½ 'Cox'	..	22,400
Koster 7x2 'C2'	..	26,000

(According to a report, a Rossi 15 N FI glow gives 26,500 rpm on the Koster prop.)

So now we know what gee-gee's a really good FAI-TR motor like the Bugl puts out. Sort of puts the older designs in their place, doesn't it!

With motors, like most things, you take your choice and pays the money. Currently a Bugl 15D MkII comes at 300 Deutsch Mark excluding UK taxes and the necessary address is: Paul Bugl, 8501 Pruppach, Am Burgstall 17, West Germany.



THE 1977 HORTY CHARTS

Regular readers of this column will have been waiting for this one with bated breath. Once again I have great pleasure in summarising John Horton's League Tables for the past season and once again my summary can only be a small reflection of John's magnificent efforts. What a worker (spelt 'WORKER') — three cheers for John Horton! Much the same format as last year, so here goes with the summaries.

Just as a reminder on how the Horty system works. John awards points on the following basis:

	Open Final	Novice Final (if run)
1st	6 pts	3 pts
2nd	5 pts	2 pts
3rd	4 pts	1 pt

In certain 'special' contests like the Goodyear Marathon, Wharfedale 1000 B-TR, Team Trials etc, in which no Novice Final as such can be run, the 6-5-4-3-2-1 points go to the top six finishers in order. When a team splits, then each team member carries forward half of the team in question's total points to his new team — OK? Now you know where the half points come from.

1977 League List - FAI Team Race (44 teams, 14 contests)

		1st	2nd	3rd	Total Points
1. Heaton/Ross	(Norwest)	6	0	1	40
2. Smith/Fry	(Feltham)	4	2	1	38
3. Clarkson/Woodside	(Norwest)	1	1	1	22
4. Davies/Broadbent	(Wharfedale)	1	1	0	16
5. Hill/Oriss	(CM)	1	0	1	10

All Time Greats

	1975	1976	1977	Total
1. Heaton/Ross	45	32½	40	117½
2. Smith/Fry	30	34	38	102
3. Rudd/King	40	27	8	75
4. Horton/Hawarth	34	22	9	65
5. Clarkson/Woodside	23½	15	22	60½

No great surprise, I think. Congratulations are in order to Derek Heaton and Malcolm Ross for their double-header, a repeat of their 1975 performance.

1977 League List - B Team Race (34 teams, 7 contests)

		1st	2nd	3rd	Total Points
1. Wilson/Gardner	(Tynemouth)	2	4	0	32
2. Nixon/Campbell	(Hunters)	3	1	0	25
3. Smith/Hudson	(Tynemouth)	0	1	1	9
4. Hughie Lorimer	(Scotland)	1	0	3	9*
5. Bengtsar/Bohlin	(Sweden)	1	0	0	6

*Cos Hughie has no regular pilot, he only gets half marks; his various pilots having taken the rest.

All-Time Greats

	1972	1973	1974	1975	1976	1977	Total
1. Heaton/Ross							
2. Wilson/Gardner	10	17	4	8	14	5	58
3. Horton/Hawarth	0	0	5	6	10	32	53
4. Smith/Hudson	13½	10	19	—1	4	2	47½
5. Ridley/Burn	0	0	0	21	16	9	46
6. James/Cheesman	0	0	5	21	12	0	38

Still very much of a Northern speciality now that Dick Giles is living in Munich and John Gray seems to have retired.

1977 League List - Goodyear (66 teams, 16 contests)

		1st	2nd	3rd	Total Points
1. Jarvis/Needham	(Norwest)	3	0	4	41½
2. Horton/Hawarth	(Wharfedale)	5	0	2	38
3. Daly/Howard	(Norwest)	2	1	1	23
4. Cotterell/Perry	(Wolves)	1	2	1	20
5. James/Cheesman	(Elliott)	2	0	1	16

Starting the year as Novices, Jarvis/Needham and their OPS 3-5cc glow made entries count to win — the most devastating entrance into Goodyear since Ron and Mick Tribe arrived on the scene in 1972. My 'Novice of the Year' award (the highest placed team who started the season with no points at all) goes to the youngsters Hales/Sladden of Tynemouth who finished 6th overall — just half a point behind this year's Nats winner.

Dave Braun (left), Ken Mogi (centre) and Larry Jolly (right). Larry Jolly here shows just how useful it is to be tall and just how necessary is the 'shoulders back' Army inspired walk to achieve an easy — and now legal — desired 'high handle'. Dave Braun meanwhile shows just how much a dipped left shoulder gives the impression (if not the actuality) of 'whipping' — definitely something to avoid. (Photo: Charlie Johnson.)

All-Time Greats	1972	1973	1974	1975	1976	1977	Total
1. Horton/Haworth (Wharfedale)	20	15	23	44	42	38	210
2. Fry/Smith (Feltham)	9	28	34	46	9	4	141½
3. Heaton/Ross (Norwest)	39½	27	28½	5	4	0	117½
4. Rudd/King (Feltham)	11	33	37	12½	—1	5	114½
5. Daly/Howard (Norwest)	0	21	4	34	31	23	113

Almost, but not quite eh, John! Maybe this last season was the swan-song for John Horton and Donald Haworth for John intimates their retirement from Goodyear. The sight of John's bald head and the sound of Donald's big diesels will be missed.

Individual Racing Champions 1977

	FAI	Good-	year	B	Total
1. Wilson/Gardner (Tynemouth)	18	7	5½	32	62½
2. Horton/Haworth (Wharfedale)	10	9	38	2	59
3. Heaton/Ross (Norwest)	6	40	0	5	51
4. Smith/Fry (Feltham)	0	38	4	0	42
5. Jarvis/Needham (Norwest)	0	0	41½	0	41½

Fifty-five teams flew in more than one class in 1977 to produce the above results. Despite living in one of the more isolated parts of the country and therefore, having probably done more miles going to UK contests than most others, Dick Wilson and Jim Gardner ended up as 1977 Overall Racing Champions – to quote President Carter (Jimmy who?) 'Away the Lads!'

Overall Champion Racing Club 1977

Total Points	FAI and Goodyear Champions
1. Norwest 201½	½A Champions
2. Wharfedale 146	B Champions
3. Tynemouth 96	
4. Feltham 62½	
5. Hamilton 35½	

Clear cut this time, seems my comments last year about 'Feltham Fools' and the puny 'White Rose' had their effect as the results show.

I can't repeat it again can I? I can I OK – all say after me ('cos I am certain to get it out first)

NORWEST IS BEST

Great system isn't it (keeps on coming up with the correct results!) To keep it going, remember to send in the results of all open-entry contests to the tireless compiler, John Horton, 10 Lawn Avenue, Burley-in-Wharfedale, Ilkley, West Yorkshire LS29 7ET.

NEW YEAR'S DAY ALL-MANCHESTER ½A COMBAT FESTIVAL

To start the New Year in the right spirit of friendly competition, Stockport Club invited the local clubs in the Greater Manchester area to fly at our first ever ½A Combat contest. The rules were set to make everything simple and inexpensive and this is how it turned out. On the day entries from four local clubs commenced 'battle', the clubs concerned being: Stockport (seven entries), Bolton (four entries), Whitefield (two entries), Urmston (two entries).

Despite having the largest entry, the semi-finals saw Stockport almost eliminated for only one out of our seven made the semis; the other three semi finalists being all from Bolton. In the end, the lone Stockport semi-finalist won – not too surprising for he is John Berry, the reigning 'unofficial' World Combat Champion. Results were: 1. John Berry (Stockport); 2. Dave Carr (Bolton); 3. Dave Heaton (Bolton); 4. Bob Fitzsimmon (Bolton).

Everyone had so much enjoyment that we all promised to 'do it again'. Hopefully some sort of annual 'Greater Manchester Round-Robin' will result for ½A Combat.

Our experience has shown that ½A Combat is inexpensive, great fun and a great 'leveller' – just the sort of thing for club and inter-club contests. Some really excellent Combat can result too as John Berry and Dave Heaton showed in their semi final.



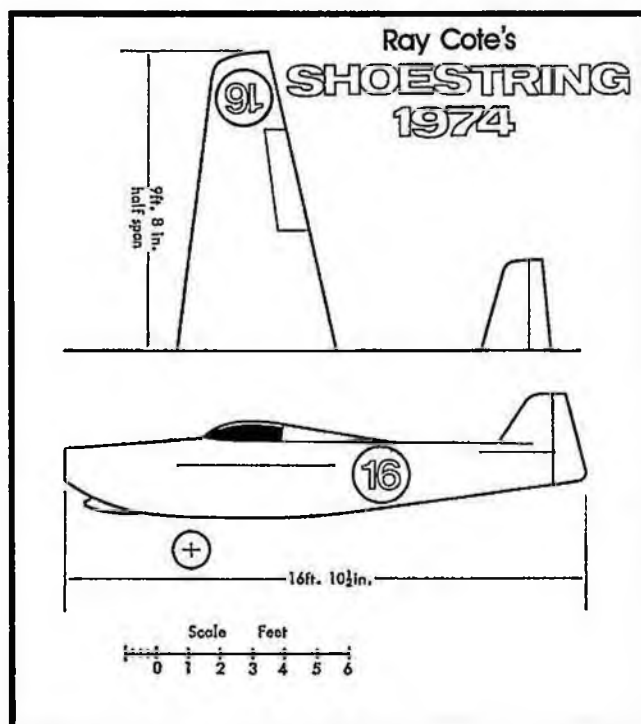
Yeh! Jed Kusik does it! A very well balanced stance shown by one of America's very best TR pitmen. (Just where were you standing to take this one, Charlie? - Ed.) Idiosyncratic model shows a lot of original but highly practical thought. Jed builds very light models and they work viz Jolly/Kusik's 4.00 heat time at the US Team Trials for their 1978 World Champs team. (Photo: Charlie Johnson.)

THE GOODYEAR RACER 'SHOESTRING' - REVISITED

If my memory serves me well, the very first Goodyear published by the *AeroModeller* was of 'Shoestring' by the late Jim Kloth. In the late '60s and early '70s, John Dixon of Feltham was using one of these to smash the opposition in Goodyear here and I always thought 'what a nice looking model – quick too!' Since that time, the only 'Shoestrings' have seen have been in the hands of Everitt/Cooke here and Tim Gillott in America – both highly competitive at their best. Maybe the time has come for a revival of interest in this design for in full-size racing today, 'Shoestring', 30 years after its first appearance, is still the one to beat. The profiles presented here show 'Shoestring' in its latest form – maybe less pretty but to my eyes more racey than originally. Notice the new straight taper wing, tail and fin all with anti-vortex tips making for a more 'modern' appearance (and somewhat easier modelling). If my slide rule has got it right 'Shoestring 1974', allowing the 5 per cent permitted under our Goodyear rules, would come out as a model with key dimensions of:

Fuselage length	24in.
Wing Span	30½in.
Fuselage Depth	4½in.

Very convenient dimensions showing great similarity to the currently successful Lil' Quickie model used by many here.



'WHARFEDALE 1,000' (CLASS B) Elvington 30th October 1977

Held this year on Elvington's large turning area, due to the recent loss of Rufforth, the event featured the ETA Trophy held over from the previous weekend due to lack of time.

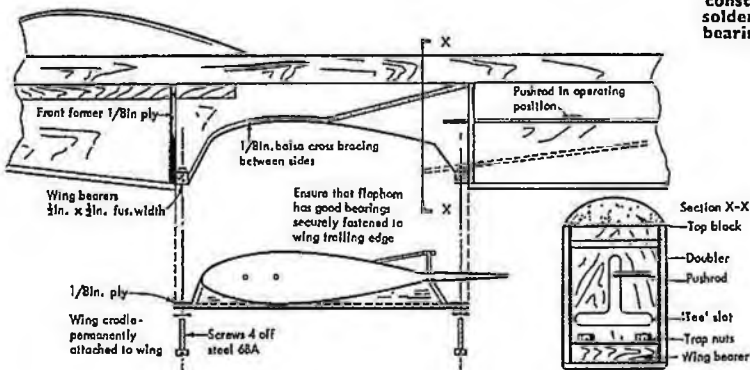
Dave Smith, Charlie Taylor and Gordon Yeldham had braved the long drive from London bringing with them a K & B 29 FIABC powered model, pushing a Tornado 8x8. They achieved 4:30 for the ETA Trophy and 9:55.7 for the 1,000. Charlie Taylor had also brought along 100 of his famous 'Taylor' glow plugs, which he generously offered as a prize to the winning teams - nice to see a manufacturer backing an event!

Thus, having sorted themselves out, the three 'ETA' finalists Nixon/Campbell, Gardner/Wilson and Langworth/Lorrimer set off on their 200 lap chase in worsening weather conditions at about 3.20 pm first to go were Langworth/Lorrimer at 78 laps, followed by Gardner/Wilson at 145 laps, leaving Nixon/Campbell to finish in an excellent 7:20, all three teams then had to prepare for the 1,000 lap event, the line up being: Circle 1: Fitzgerald/Berry, Salisbury/Rowe and Everitt/Cooke. Circle 2: Gardener/Wilson, Nixon/Campbell and Hughie Lorrimer, this time using John Horton as pilot, due to Bernie Langworth having to leave early. The final eventually got under way in high winds, threatening rain, and failing light at about 4.00 pm. All were away safely except Everitt/Cooke whose motor mysteriously refused to start, meanwhile Hughie Lorrimer and Nixon/Campbell, circulated well with the Nixon OPS showing a distinctly better pair of 'legs' whilst last year's winners Gardner/Wilson were plagued with a motor that refused to keep going for longer than 10 laps and promptly burst into flames during attempts to restart it! First to go were Salisbury/Rowe who fell foul of the high winds on their 148th lap, crashing badly, but not interfering with the slow, but steady progress of Fitzgerald/Berry, which no doubt helped to encourage Bill Cooke in his endeavours to start their engine by providing him with the evidence that there was still a race in progress! Back in circle 2 catastrophe struck the leaders and favourites Nixon/Campbell on their 262nd lap and 6th stop when a heavy landing removed their undercarriage forcing retirement. Wilson/Gardner's problems persisted and only Hughie Lorrimer continued untroubled doing a very regular 35 laps per tank.

Meanwhile Everitt/Cooke achieved their hard worked for 'airborne' state, and managed 264 laps in 18 minutes when trouble struck again. This time for good despite Bill Cooke completely changing the prop, plug, engine and gearbox. The threatening rain finally kept its promise and lashed depressingly across Elvington's vast grey concrete expanses. At this point in a fit of sanity Mike Fitzgerald, after first checking that 3rd place was his, sensibly decided to retire on his 377th lap having little chance of catching the leaders, Horton/Lorrimer and Gardner/Wilson.

By now the weather/light conditions were, to say the least, impossible and while Gardner/Wilson still had 140 laps to go the Lorrimer model arrived out of the gloom somewhat unceremoniously skidding along upside down to come to a halt at Lorrimer's segment, the lap counters read 986 laps, by torchlight the engine was re-started and the model released into the darkness. This was the last time Hughie would see his model in one piece. The last 14 laps ticked off the counters and the watches read 61 minutes 58 secs, not one of the quickest 1,000 lap winning times, but certainly one of the bravest. 'Horty' stood little chance of landing the model in the gloom and when the engine stopped there was a long moment of silence followed by a sickening crunch.

E. F. Davies

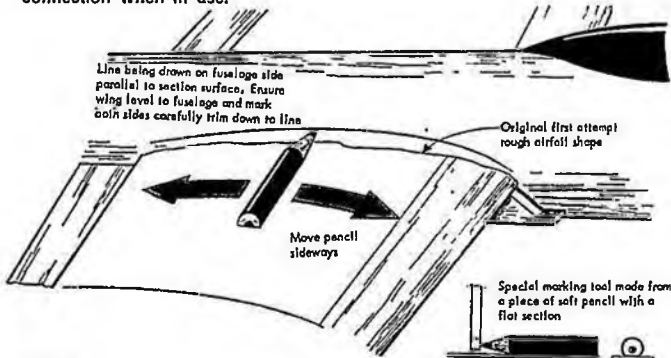


AEROBATICS

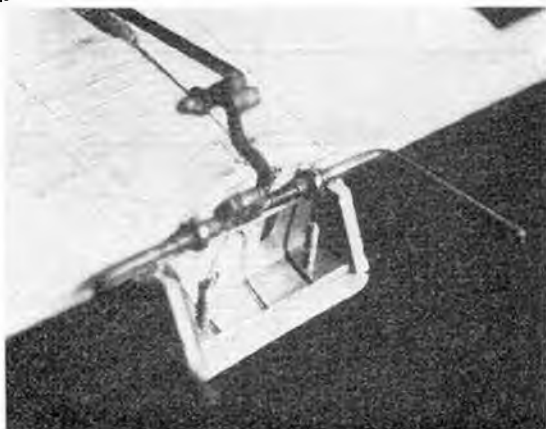
by Glen Alison

ONE OF THE developments in stunt design which can fairly be said to have been developed by the English more than any other country in the world is the use of detachable wings. There are three big advantages and a few disadvantages. Firstly, when at the building stage a whole stunter can be very unweildy in a confined space and one tends to cause minor dents and damage just through handling it, so it is therefore more convenient just to have either the wing or fuselage-tail assembly to deal with for most of the time. Secondly, once it is finished then having it in two pieces makes a wonderful difference to the ease of transport, getting it to your flying site. Many car boots just will not take a complete model or if they do then it is very inconvenient to get anything else in. Finally, after having flown your new creation it is much easier to make any trim changes required to the elevator/flap relationship or just the flap trim to get a flat flying attitude by taking the wing off and thus gaining access to the flap horn and pushrod for adjustments.

So much for the advantages, what then are the disadvantages? Firstly the model is more complicated to build, the wing mounting has to be built into the fuselage and also part of the fuselage is attached under the wing and therefore becomes part of the wing mounting process. This creates a weakness which must be counteracted by increased strength built into the design which means more weight. Although the increase is probably only about an ounce overall. The gap between the wing and fuselage is subject to the ingress of oil from the exhaust so efforts must be made to ensure as good a fit as possible and also to thoroughly fuelproof the inside of the fuselage in the joint area. Finally provision must be made to disconnect the elevator push rod from the flap horn when the wing and fuselage are separated but ensure a safe and positive connection when in use.



Below: Rear view of bolt-on wing fixing for Glen Alison's latest Cavalier MKIV when still at construction stage. Shows 1in x 1/4in alloy angle epoxied in place. (Sketch below left shows alternate ply construction). Note flap horn bearing consisting of brass tubes soldered to split pins set in back of trailing edge for anchor bearings.



On certain model designs, definitely a minority, the bellcrank is fuselage mounted and thus a different arrangement is necessary. The pushrod runs directly from bellcrank to elevator horn and provision must be made for the flap horn to engage into a fitting on the pushrod as the wing is offered up on assembly.

So how do you go about the design of a detachable wing system for your new model? Whether you are going to start from scratch or convert an existing design or even modify a kit, it is most important to draw full size a side view (elevation) of the arrangement of the joint lines and control movements. From experience I can say that it is very frustrating when one assembles a model for the first time and you find that the flap horn hits the rear fuselage former restricting up elevator movement for example. Another mistake can be the pushrod becoming disengaged from the flap at extremes of control movement, although you might not find out that one until it is too late!

Try to choose a design with the wing mounted fairly low in the fuselage in order to allow sufficient height above the wing to give adequate strength.

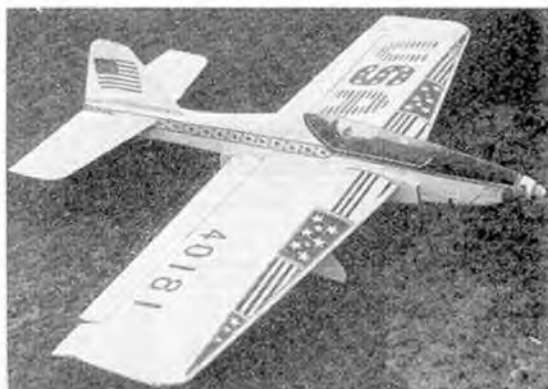
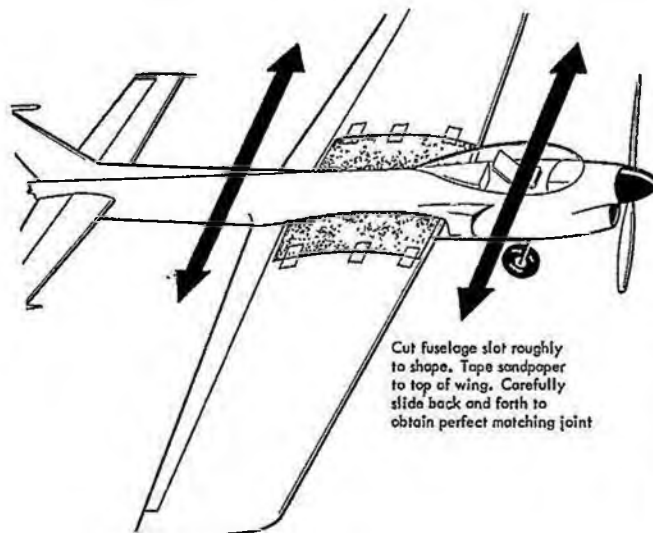
The fuselage sides need $\frac{3}{4}$ in. ply doublers on the inside and these extend to about 3 in. behind the wing trailing edge, tapered off diagonally to minimise stress concentrations. The formers immediately in front and behind the wing are made from $\frac{1}{2}$ in. ply with sections of $\frac{1}{2}$ in. sq. engine bearer epoxied to them and between the ply doublers and this is the foundation of the wing mounting. Trap nuts or a threaded steel plate are used above these short bearers to accept the wing screws, R/C accessories also provide useful wing fixing goodies. The rear former has an inverted 'Tee' slot in it to allow the pushrod to fall to the bottom and to one side allowing the engagement of the flap horn as the wing is offered up for assembly.

The part of the fuselage which is under the wing, the wing cradle, is permanently glued in place there, and has plywood extensions or tongues which mate with the wing bearers in the fuselage. The assembly is held together with four 6BA screws with large washers against the ply tongues. Good fuel proofing of the whole centre section is absolutely imperative for a model of this type if it is to last any length of time at all. I would recommend in fact coating the surfaces with polyester finishing resin or a two pack epoxy paint.

Now having described a typical system there are many variations that can be tried. I have used an arrangement using aluminium angle for the mating surfaces with success, but this is more of an engineering job than a carpentry one. Some people have used location dowels at the leading edge of the wing and two screws at the rear just like the majority of radio aerobatic models. I prefer a screwed up assembly because then the wing cradle can take direct load in compression and tension, making a much more rigid fuselage.

It is important to ensure that the centre wing ribs coincide with the fuselage sides and I would make them from $\frac{1}{2}$ in. balsa. The centre section sheeting needs to be $\frac{1}{2}$ in. minimum. Robustness in this area will be repaid with long life.

One of the problems encountered with this type of model is attaining a good fit between the fuselage and the top surface of the wing, bearing in mind that it must not be too tight as this would strain and bow the fuselage when the wing screws were tightened up. Gaps look ugly and admit oil from the engine exhaust. Here are two suggestions which may help. (see sketches, left and below).



Phil Bolderson of 3 Kings Club finished this APS Commodore designed by Claus Malkis, with excellent USA graphics. High winds unfortunately also finished the model during Open Day Aerobatic event at Croydon.

TEAM TRIALS for 1978 World Championships

Although not yet officially confirmed at the time of writing it appears that the team trial for this year's World Control-Line Championships will be held at RAF Duxford on 7th May. Normally, of course, team trials are held about nine months before the event in the Autumn of the previous year. This is mainly because of holiday arrangements having to be fitted around the Championships. Most British team members having to make the trip abroad their main family holiday because of the expense personally involved. This year, however, with the event being held in England at Woodvale, near Liverpool, the same problems are not so pressing. We will have the advantage of a trials much closer to the actual event, where flyers who are 'on form' at the time will get the team places. Another aspect is that there will be much less time for 'accidents' to happen to the models!

FOAM WINGS

There is good news for those stunt flyers who like foam wings. Pete Tindal, famous for his 'Chipmonk' design (soon to join the APS Plans range) and highest placed British flyer in both the last European and World Championships, has set up his own business producing specialist foam and glass-fibre model components. Trading under the title *Threshold Model Products, 67 Grosvenor Drive, Hornchurch, Essex*, he will supply both standard designs, eg Nobler, Chipmonk etc or one-off specials to your own design. There is a wide choice of features, the wings are hollowed out as standard and can be supplied with leading and trailing edges pre-fitted, and the undercarriage mounting blocks fitted as required. The covering material is either obechi veneer or balsa, he will even cover a wing with your own balsa if you have got some specially light stuff tucked away.

Prices are very reasonable, a typical wing for a '46' sized aeroplane will be in the region of £9-11 including post and packing and the dreaded VAT. Having the leading and trailing edges fitted costs an extra 50p as does the undercarriage mounting blocks, that must be worth it! There is also a 75p charge for making templates if it's a special that Pete has not made before - just send a drawing on paper and he will do the rest. Weight for a 56in. span x 600sq.in. wing as supplied is approximately 13oz. Got a query? Give Pete a ring on 040-24 59112.

Another entry at Croydon was this modified Mercury Crusade by Mike Sexton. Model features wing mounted undercarriage with Fox 35 power flown in the Novice event. It placed 1st.





Are you between 10 and 16 years of age? Then don't delay, join today

AMONGST the visitors to this year's *Model Engineer Exhibition* who took advantage of the facility to fly round-the-pole models were members of King's Cliffe Middle School. The school has an active model aircraft section for boys 8-13 years old under the guidance of Anthony Beckett. One of the designs developed by the club to help get newcomers started on electric RTP flying were the remarkable polystyrene flying wings shown here. Construction simply could not be easier, nor tougher, as proved by the endless fun the lads had flying them and entertaining the crowds. Many a mid-air collision took place whilst performing close formation flying, and many times the models hit the deck only to bounce back undamaged.

The wings themselves are simply cut from solid lumps of white expanded polystyrene. Two card templates to the aerofoil shape shown are cut out and pinned parallel to each other at each end of the polystyrene and cut using a hot wire bow. Any source of low voltage DC current can be used, ie train transformers or car batteries connected to a bow strung with nichrome or control line wire and tensioned either with elastic bands or by the spring of the bow itself. Any wing span from 6 to 24in. seems to work fine, and there must be lots to be learned from trying biplane or triplane versions. Readers will find it hard to build a cheaper model than King's Cliffe school flyers, as they get all their foam from scrap packaging material from TV and Refrigerator shops!

The motors used are the Mabuchi 26D (available from Harry Butler Models) and



Members of King's Cliffe Middle School, Richard Pike, Steven Bullimore with Roy Stevenson and Glyn Mould in front displaying their amazing flying wings.

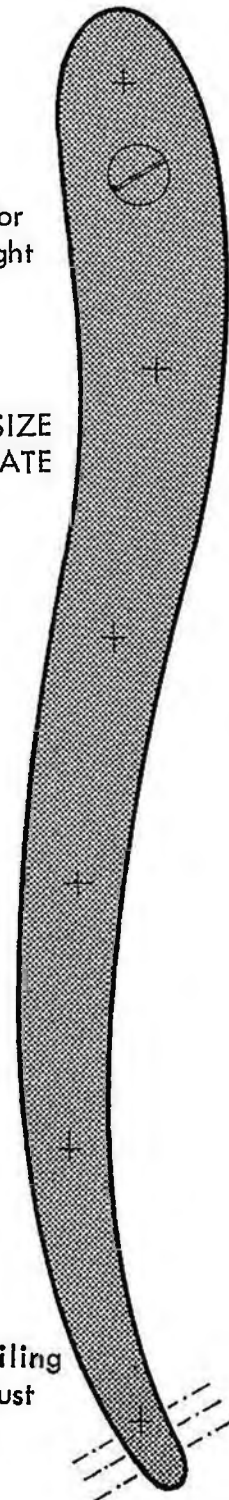
mounting is simply a push fit into a plastic or cardboard tube about 1in. diameter which is glued into a slot in the leading edge. A wire line guide, undercarriage legs and wheels complete the model ready for flying.

To adjust the model for optimum flying, strips can be trimmed off the trailing edge to remove some of the up elevator effect of the reflex wing section. Bending the line guide wire fore or aft also helps reduce or increase line tension and flight path diameter. There is also ample scope for trying variations of the wing section to see the effect on performance of more, or less reflex, undercamber, thickness of wing, area etc. Good luck and good flying!

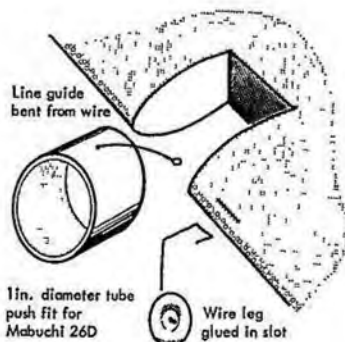
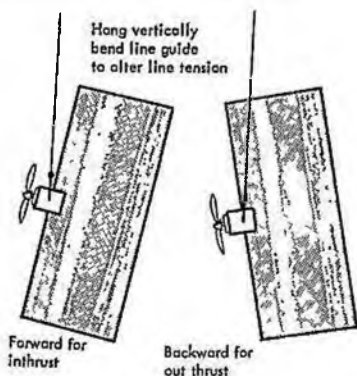
Cut from stiff card pin to foam

Screw for tip weight

FULL SIZE TEMPLATE



KINGSCLIFFE 'WING THINGS' ARE NO MORE THAN SECTIONED SLABS OF STYRENE: BUT DO THEY FLY!



Dear John Bridge,

I am between 10 and 16 years of age and would like to become a member of the 'Golden Wings Club'. With this application I enclose postal order (International Money Order) for 50p to cover cost of enamel club badge, two coloured transfers and membership card.

NAME IN FULL.....

ADDRESS

YEAR OF BIRTH.....

SCHOOL.....

NAME OF ANY OTHER CLUB OR CLUBS TO WHICH I BELONG (if any).....

Send to: GOLDEN WINGS CLUB, AEROMODELLER, P.O. BOX 35, BRIDGE STREET, HEMEL HEMPSTEAD, HERTS HP1 1EE.

Trim off trailing edge to adjust flight path

For those of you who may be contemplating
sending your cash abroad on a one-way ticket;

HOW'S THIS FOR REAL VALUE!

'A' Series Dual Axis Digimac III

Digimac III
dry cell:

£75.00

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servos

**New Digimac III 500
mA/H Ni-Cads:
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This is our latest proportional system
incorporating a completely new design
concept gained from fifteen years
development and production experience
featuring:

- ① Completely new transmitter circuit
reducing battery consumption.
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current receiver.
- ③ Integrated circuit servos.
- ④ Latest plastic film Transmitter and
Servo Potentiometers extending
operating life and improving
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- ⑤ Large clear expanded scale meter
giving a precise indication of the
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allowing independent charging
of the transmitter and receiver
batteries (rechargeable systems
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- ⑦ Rugged 500 mA/H vented Ni-
Cads used on all rechargeable
systems to increase reliability.
- ⑧ Easy and economic conversion
to Ni-Cads or to 4-6 channel
operation.



Digimac Models and prices (inc. VAT)

Digimac I, dry cell complete with servo	£39-95
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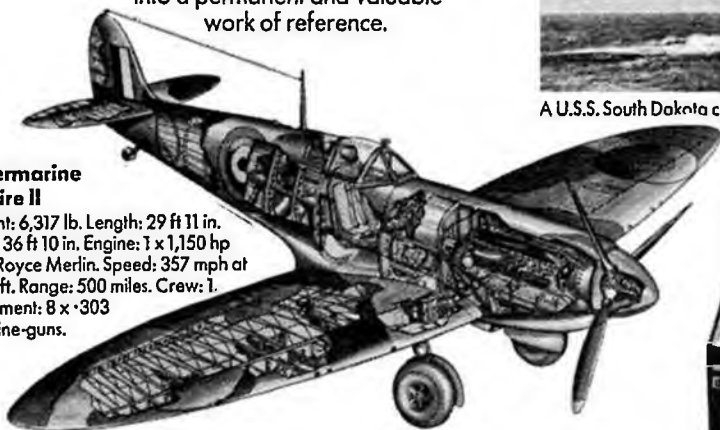
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At the Washington Scale event, right, Jeff Anderson and young helper with his winning OD Halton HAC 2 Minus. Finished in yellow tissue the model was an excellent flyer. Above Paul Street launches an Alan Moorhouse Luton Minor Peanut kit.



SCALE MATTERS

by Alan Callaghan

EARLY IN the New Year, an extended Christmas holiday with relatives in North East England gave an opportunity to attend the second of a series of winter indoor meetings held at the Sporting Club of Washington's Hall located in County Durham. Prevailing weather conditions in this part of the country are not usually very kind to outdoor flyers, and it is very encouraging to see indoor interest thriving with local flyers making the most of an excellent site. At 226 x 122 x 35 feet high, it is almost twice the size of any other sports hall available for indoor flying that I have heard of in this country. With the attendance of about 40 people being slightly below average, as I was told, there was little possibility of overcrowding. The Scale, EZB and HLG events were held in a very easy-going but well-organised and friendly atmosphere, despite the chilly weather keeping the air in the hall rather cool.

The Scale event attracted 11 models, some of which were multiple entries by the same people, and it was run to the North Eastern Area Class II rules. These rules at present cater for rubber power only, and include no weight or span limitation, thus resulting in Peanut models being in competition with larger types. No maximum or minimum flight durations are imposed. The flight section is interesting in that of the two quali-

fying official flights required, one *must* be ROG, and altogether five attempts are allowed at these two flights. One flight counts for duration points only, and the other for scale realism – hence the ROG rule. A placing system is used to balance these out giving an overall flight placing, which is then added to a static score placing, and the model with the lowest overall placing is the winner. Since there are with these rules three distinctly different categories to mark, i.e. static, flight realism, flight duration, there is a smaller chance of a tie occurring as happens with other placing systems, and a very versatile model is required. In consequence the judges arrived at a result quickly and with little difficulty and the event went very smoothly.

The winner, as at previous events, was Jeff Anderson of Durham, who, incidentally, is responsible for organising these meetings. His model was an own design *Halton HAC2 Minus* parasol monoplane, and whilst not exactly being overburdened with scale detail, the model represents a good compromise in complying with the rules in use. Quite light at 20 grams, the 1:16 scale, 21in. span subject was making flights of around 50 seconds on a 4 x .063in. rubber motor. The model has been fully detailed in a recent edition of *Model*

Aeroplane Gazette and is a very reliable and smooth performer.

In second place was another local flyer, Tommy Wilson, flying another parasol-wing subject very popular in indoor circles in 1977 – this being the fifth one I recall – in the shape of the *Supermarine Sparrow*. This 18in. span model was extremely light, and like the winning *Minus* was finished only in coloured tissues rather than paint. In third place came a familiar face from Cardington, Reg Boor, flying a nicely finished Peanut *Desoutter*, and who together with others had made the three-hour journey from Manchester especially for this meeting.

Another Peanut model to be seen well-trimmed and performing well was a modified Peck *Nesmith Cougar* built by Alan Pearson of Teesside. Foregoing the one supplied with the kit, Alan made his own steamed 1/16in. sheet balsa prop, and using a 4 x .050in. motor the model seemed a little slower in flight than other *Cougars* I have seen, but this is an improvement and the model was both consistent and very stable.

Paul Street had an interesting collection of models including a lightened version of Andrew Moorhouse's *Luton Minor* and which was regularly making a realistic S-turn right-hand landing approach after circling steadily to the left during its



More models from the Washington Hall, Paul Street flew his most remarkable Wright Flyer, rubber motor is just visible on this most ambitious project. Right, Reg Boor with a nicely detailed Peanut Desoutter finished in yellow, silver and black.



Left, Tommy Wilson at moment of launch, his Supermarine Sparrow is a very stable flyer. Seen also above this OD 18in model was finished in blue and white.

flight. Paul's 'piece de resistance' was something quite different by way of a *Wright Flyer* complete with a scale working launching rig! This model at 18in. span incorporated a lot of scale detail and was powered by two separate, if rather conspicuous, motors with their front attachments at each end of the foreplane. New motors had just recently been fitted and since Paul was spending most of his time flying his other models, an attempted quick demonstration did not quite come off, but I believe the model has flown reasonably well in the past. As a subject that must have represented the ultimate contrast to the simple models being flown in the competition.

I had with me two ultralight Peanut models, namely the *Rearwin Speedster* and the *Westland Widgeon I*, but having left my scale documentation at home I was content only to test fly with a new motor in each and was happy to achieve a 61 second flight ROG with the *Speedster* on only its second winding. There was not enough ceiling height to try for more in the slightly damp conditions.

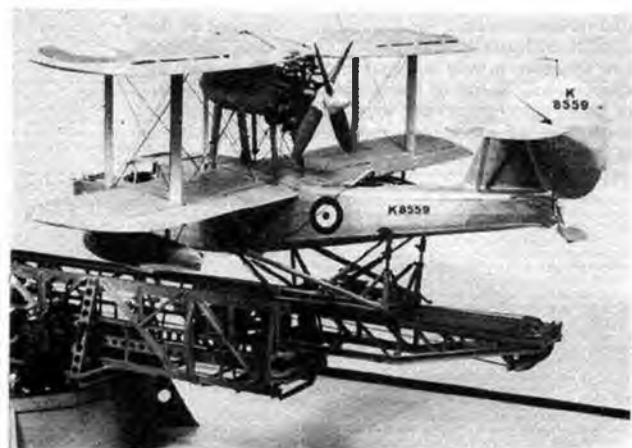
To anyone within reasonable driving distance of Washington, I can

recommend this venue as being second only to Cardington in terms of size as an indoor site. In contrast with Cardington, the hall is, of course, very well lit. A visit here may entail a longer than usual drive to do a spot of flying, but the sessions begin at 1.00 pm and are six hours long. Also do not forget the other overriding attraction from the point of view of that carefully built and well detailed INDOOR scale model — perfect weather every time at every venue — guaranteed!

Panel lines for lightweights

I spend a fair proportion of my working life at a drawing board, and the fact that one can easily take one's everyday tools too much for granted was brought home when I mentioned in this column a couple of months ago a thing called a Rotring pen, as used for detailing panel lines on a model. A fellow club member metaphorically said, 'Eh?', and so this month I am including details of these pens for the benefit of others who may have not yet heard of them. They are used by designers and draughtsmen in producing working

drawings and plans, and come in a range of nib sizes usually running from 0.1 to 1.2, although other sizes for more specialised purposes are available. The size refers to the thickness of the drawn line expressed as a metric fraction of a millimetre. A complete pen costs in the region of £3-4, nib units are interchangeable and available separately, and a special grade of drawing ink which is very dense is required. The pens are obtainable at all drawing office suppliers. Those shown are *Rotring Rapidograph*, but other makes include *Faber-Castell*, *Kern Pronto-graph*, and *Staedtler*. They are much easier to use than the old ruling pens, and are ideal for putting on panel and hinge lines as well as small lettering and stencilled markings. As a first purchase, a 0.3 size is generally useful and not too fragile, and is capable of doing most of the detailing on models down to Peanut size. The correct ink when dry will not smudge when handled afterwards, and most work with the pen is best done after the model has been fully painted. They are a very useful addition to the scale modeller's tool kit and reasonably priced.



Championship Cup winner at the Model Engineer Exhibition, Harry Woodman's superb Walrus on marine catapult. Built originally from a now unobtainable Merit kit it was so extensively modified as to almost qualify as a scratch built, the catapult being assembled from Plastruc. Above Dick Bryants Hercules a 48 inch span giant for electric RTP using four geared motors, placed 1st in the Aeromodeller Scale Contest.

Another useful item is a set of proportional dividers, also made by *Staedtler*. I bought these about three years ago and ever since have used no other method for scaling up drawings. They will scale up to ten times the original drawing, but unless you build radio scale models you are unlikely to ever use such a high enlargement factor.

Scaling up drawings can occasionally be fraught with problems, even assuming that the original drawing is accurate (which is not always the case). Some time ago, I tried to scale from a 1:72 drawing of a lightplane, and by using scale rulers and ordinary dividers the thing just would not come out correctly. I had scaled down and set out the figured length of the fuselage on the paper, and all the detail on the plan fitted in as reasonably as could be expected, but it still did not look right. I then discarded the plan in disgust and by working from an exact side view photo of the fuselage, which scaled at something like 1:81.45, was able to get everything right simply by relating the fuselage length in the photo to that on my paper. In one simple calculation, and by setting the dividers appropriately. I then checked back to the 1:72 drawing to discover that even at this size the nose moment was wrong by almost $\frac{1}{4}$ in., and my model plan was more accurate than any scale drawing available to substantiate it. The moral is *never* to trust any scale drawings implicitly, apart from any errors contained in the drawing itself, many types of paper shrink and expand in different ambient conditions, and obviously those somewhat expensive

photographic enlargements will only enlarge mistakes and not correct them. The dividers to which I refer are not exactly cheap, retailing now in the region of £13, but if you are firmly hooked on scale modelling, they make drawing enlargement extremely easy, and will last a lifetime without wearing out.

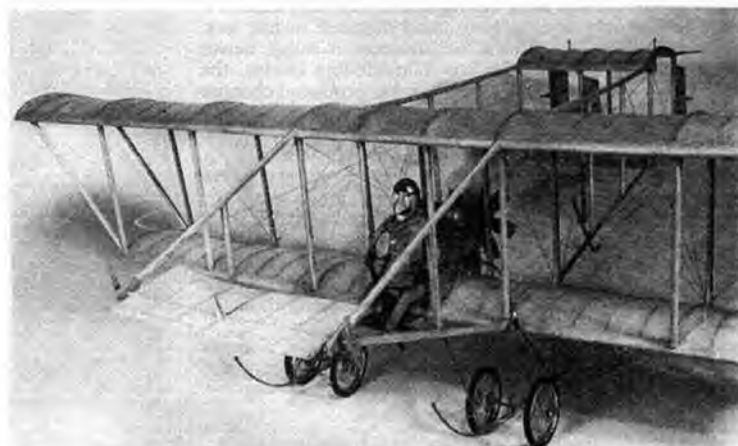
One of the first checks to make with a scale drawing is that the wingspan as drawn on the plan, and the fuselage length seen in side view *and* plan, are to the same exact scale. Frequently, and for reasons best known to the original draughtsman, they differ, albeit slightly, and this can result in such problems as wings refusing to align properly on a biplane. Assuming that each component is accurately drawn in itself (but perhaps not in exact scale with other parts), one can then adjust proportional dividers very slightly when dealing with each drawn view and the mistake can be corrected more easily than by any other method.

As a postscript this month, I am pleased to add that the intriguing *Vickers Vulcan* model featured in the December issue was built by Wing Commander Bob Vivian. The model

is 21in. wingspan and weighs 2oz, which is remarkable considering that the structure includes scale rib spacing, wing sections, and fuselage structure. Forty-six $\frac{1}{16}$ in. sq stringers were used on the fuselage, and the ribs have built-up construction using the same size of wood. The tailplane is to exact scale and the only problem has been with the rigid undercarriage. With this size of model a shock-absorbing unit is more or less essential and a new one is being designed.

By the time this appears in print the annual Crawley Indoor Meeting will have already taken place. Heavy booking by other interests prevented the usual contests being run on the date given in the January issue, and a fly for fun meeting was made possible only due to a late cancellation on 5th February. To anyone taking the date mentioned in the January issue as gospel, I apologise, but please do not arrive on the 28th! I am keen to publicise contest dates for Scale meetings, but any information is required a minimum of four weeks prior to the publication date of the issue in which it is intended to appear.

Runner up in the Aeromodeller RTP scale contest was Les Brock with his Farman biplane. 36 inch wing span the model was very nicely finished with plenty of working details.



IT SOON BECOMES apparent that a close study of the jobs envisaged, together with a similar study of available products, will enable the modeller to choose the product to suit his requirement. Quite obviously one does not use an artist's airbrush for a 6ft wingspan model; similarly one cannot detail a 1/72nd scale plastic kit with a production spray gun. Unfortunately, the all-round modeller may well have job requirements so diverse that it is not possible to identify a single universal unit. This may dictate the use of more than one airbrush or spray gun of varying size and style to cover all his needs. Those more

specialist in their interest, the plastic kit enthusiast or the large model enthusiast, may find a single unit (perhaps with two or more nozzle set-ups) capable of meeting all his requirements. Some of the coarser airbrushes, mini-guns or small spray guns may very well fit the bill for the middle-of-the-road modellers, but remember the choice of spray equipment is very much a 'horses-for-courses' approach.



Second instalment of a detailed series on the use, choice and techniques involved in spray finishing by IAN PEACOCK

AIRBRUSHES

As already mentioned the airbrush was originally conceived as an artist's tool; it is a precision instrument and should be treated as such. With proper care and attention the investment in terms of hard earned cash per man hour of use (or even 'satisfaction value'!) will amply repay the user with a lifetime of service; one gets what one pays for. Airbrushes may be grouped broadly into three categories: (1) *Twin action needle*, (2) *Single action needle* and (3) *Needleless*.

The twin action needle type of airbrush usually exhibits the greatest degree of finesse with minimum overspray (paint going where it is not required). Twin action airbrushes may be easily recognised by the fact that the control knob moves both 'up and down' and 'backward and forward', hence their name. Downward movement of the control knob regulates the air flow whilst rearward movement regulates the fluid flow. The further back it moves, the more paint flows. The dual action of this kind is apt to confuse newcomers to this type of airbrush, but perseverance will pay off when one considers the results attainable.

The *De Vilbiss* Company were the originators of the airbrush and are still regarded by many as the greatest; their *Super '63* probably amongst the very few, indeed it may be the only one, to have hand matched nozzle sets. Also from the *De Vilbiss* stable comes a much newer airbrush and one well known in modelling circles, the *De Vilbiss Sprite*, a more modern, mass produced cheaper sister of the *Super '63*. The spray pattern being only fractionally larger than the *Super '63*.

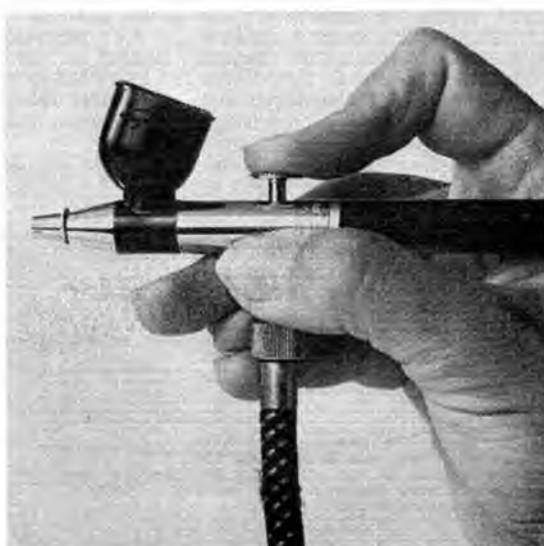
Other manufacturers are now in the field with equally good product ranges. Few however will be known to the modeller, who would be well advised to shop around the graphic arts dealers in his town, to seek out some of these alternative brands. All airbrushes vary in the degree of finesse that can be obtained and whilst not generally advertised, many can be fitted with differing nozzle set-ups. Reference to manufacturers' brochures will outline the very fine areas of cover that can be achieved.

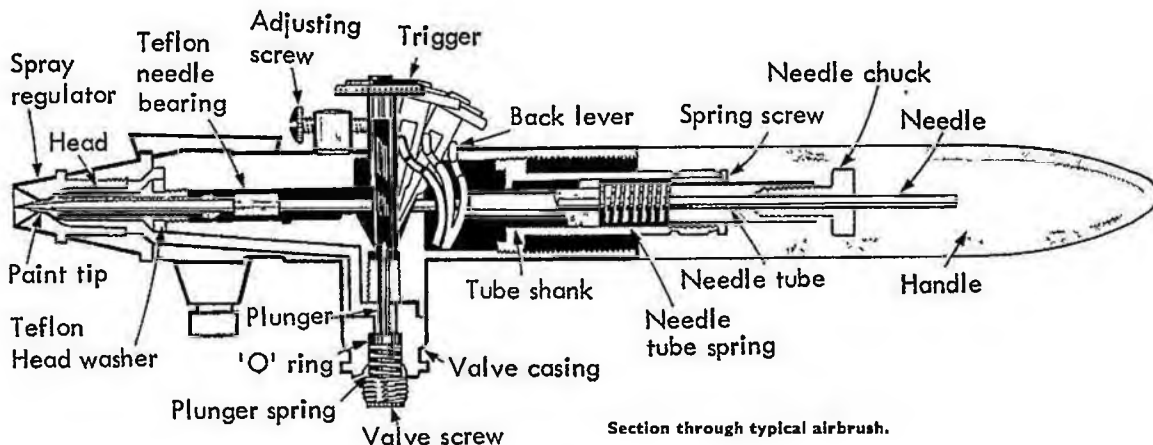
Of the many firms in the airbrush business, *Paasche* produce an extensive range of airbrushes and graphics

equipment together with an equally vast line in industrial spray painting equipment. *Microflame (UK) Ltd* are now acting as their agent and it should not be long before they are available in your favourite model shop, failing this look up your local graphics dealer in the yellow pages. Their most outstanding contribution, and without doubt the most expensive airbrush worldwide, is the *Model AB*, producing as it does lines from a mere hair's breadth up to around 1/4 in. wide; unfortunately its use is restricted to artists' inks. They also produce a comprehensive range under the title '*V*' series.

Probably by far the best known name to the modeller is that of *Badger*; in the UK they are handled by *Morris & Ingram*, whose driving force, Mr Ken Durran, drives a TR7 with one of the fanciest airbrush finishes you could

The *De Vilbiss Sprite* clearly illustrates an airbrush in use. Unit is held 'pen style' with index finger on the trigger which controls air and paint flow. This model has a small cup for paint.





wish to see. Badger are now very well established and include in their range twin action units in the form of the '100 series' and the '150'. These airbrushes are most suited to the 'super fine' work and feature internal mix nozzles.

Single action needle airbrushes, as their name implies, have a control knob that moves in only one direction. There, however, the system breaks down for this single action can control one or more functions and it is necessary to consider this in much greater depth. Unique in this respect is the *Badger 200* whose fluid control uses a pre-set needle position, regulated by the adjusting screw at the rear of the airbrush. The more ambidextrous may try to achieve this regulation during spraying but this was not how the unit was intended to function. Because the fluid flow is constant for any given needle setting, the versatility normally expected from an airbrush is missing. However this is compensated by simpler operation.

More familiar to our continental readers will be the names of *SATA* and *EFBE*. The action of the Satagraph and Efbe ranges is more akin to the larger production spray gun. There is no 'press-down' action, only the 'draw-back' action, the air valve being operated by the initial 10-20 per cent of movement. Continuing rearward movement of the control knob regulates fluid flow by needle control. At present I believe the Satagraph to be unobtainable in Great Britain, but the range from Efbe in Germany is distributed by *Frisk Products* of Croydon. There are six different units in the range available from the specialist graphic arts dealers. Workmanship is typical of the German preoccupation with quality.

Two of the Efbe units are much larger, being described in the brochure as 'light industrial'. These airbrushes are really of mini-spray gun size, whilst retaining the design, styling and operational features of the smaller airbrushes. They have a fluid cup of some 20cc (about 7oz) and provision for any of three set-ups featuring nozzle diameters of 0.4, 0.6 and 0.8mm respectively. The finest spray pattern obtainable is obviously wider than available from the smaller airbrushes, but a significant degree of finesse is still available.

The widest area of cover approaches that of a small production gun, and might well fit the 'middle-of-the-road' user's requirements. Indeed the flexibility of such a device may well prove my earlier statement about 'needing more than one airbrush' to be wrong in certain cases.

Needleless airbrushes are generally cheaper and less prone to damage and are capable of less finesse than either single or twin action needle devices. Their advantage lies in the simplicity of use (there being only one action – air supply on/off with a pre-settable fluid control. There is no needle to damage but the fluid tip is still a sensitive area and is reasonably fragile. No difficulty should be encountered using fast drying paints in this type of airbrush.

It would appear that *Thayer & Chandler* were first with this style of airbrush, closely followed by *Paasche*, *Binks*, and *Badger*. *Badger's Model 350*, the *Binks Wren* and the *Paasche Model F1* are all to similar performance speci-

cations as would be expected. In general, spray patterns vary from around 1/2 in. upward dependant on nozzle set-up, maximum being in the area of 2 in. wide. All of the four airbrushes mentioned have a choice of three different nozzle set-ups and all feature 'plug in' fluid cups and jars. Again for the middle-of-the-road guy, this area is worth investigating.

It would be remiss of us to omit the very popular style of spraying device, despite the fact that it is not really an airbrush. I refer to the *mini-gun* style of unit. For less than £10 one may acquire mini-guns such as the *Badger 250* and *250-4*, the *Brown hobby gun* and the *Miller shading brush*. Each gun has the same basic configuration employing an 'external mix' nozzle in the true sense of the phrase. Compressed air is expelled across the top of a specially tapered fluid tip which sticks up from the siphon fluid cup. The low pressure, so caused, produces a steady flow of paint at approximately right angles to the fluid tip. No provision is made to change the air jet but often a choice of fluid jets is offered. The fluid jet is screw-mounted and can, therefore, be raised and lowered in the path of the airstream to effectively alter the volume of the paint in use and thereby the paint spray cover. Mention should be made of the *Humbrol 'modeller's airbrush'* which, despite its limitations, is a good general purpose tool, at a budget price.

Badger 350 typifies an external mix airbrush; note the air supply inlet on the underside. Accessories include alternative size paint containers which are available in a packaged set with alrhone and can of propellant.



SPRAY GUNS

Most modellers are frightened away from spray guns, due, one supposes, to their apparent cost and complexity, and their need for a matching compressor. This is an odd situation really, the spray gun may lack some of the finer points but often costs no more than the highly acceptable airbrush. Varying set-ups, fluid cap sizes and positions, bleeder or non-bleeder etc, offer the user an almost unlimited freedom of choice. Many of the production guns are designed for specific uses; some would not suit our needs but there are many that do. The cheapest are around £15, with packages consisting of compressor, spray gun and nozzles, hobby gun, hoses and connectors, and even a viscosity gauge at around £75.

With the best will in the world, model shopkeepers have a difficult task to perform. Rarely are they able to stock all the available modelling 'goodies', let alone stay on top of the ever-changing technological scene. Use the yellow pages to seek out these specialist supplies under: (1) Spray equipment; (2) Compressed air equipment; (3) Pneumatics stockists; or (4) Motor car refinishing. Neither should one ignore the DIY industry, many a good product emanating from this source.

Unlike airbrushes, spray guns do not fall into such neat categories. *De Vilbiss* produce a good range of guns and three of them stand out as being particularly suited to us. Virtually all spray guns of the *De Vilbiss* type operate on a single trigger with an action similar to the *Efbe* airbrush; initial trigger movement opening the air valve, continuing movement (back to the adjustable stop) regulating the fluid. This single action makes the spray gun a simple to use device. Baby of the *De Vilbiss* range is their *MP gun*. It is a small, lightweight gun capable of a mansize job, and its big brother, the *MPS model* probably as large as most modellers need. Both feature interchangeable set-ups. Also from *De Vilbiss* factory comes the *EGA model*, a gun of great delicacy, operating in either the syphon or pressure feed mode.

Two other extremely good guns come from the *Binks Bullows* stable, their models 900 and 920 are but a drop in the ocean of their catalogue. The 920, a light-weight high performance gun, was designed for the rapid cover of small items on a production-line basis and as such makes a good modelling gun. The model 900 is a smaller gun, similar in size but not in style to the *MP*, having a forefinger operated lever.

Other areas worth investigating are in the DIY range of manufacturers. Two particular American brands are readily available, these being *Thomas Industries* of Wisconsin and *W. R. Brown Corporation* from Chicago. These DIY units are obviously aimed at the home handyman and as such are designed with cost very much in mind. Also the job specification tends to be more a case of 'painting a wall with emulsion paint' and therefore the coverage is inclined to be on the large side. *Thomas Industries* products are imported and distributed by *Burgess Power Tools* under the *SPRAY IT* label, three types being of interest.

The *SR527* is a low cost simple bleeder type gun designed to operate only in the pressure fed mode and at a lower than average pressure. The *546*, also a bleeder, can operate in either the pressure or syphon mode, and can accept internal or external mix jets. The third *Thomas No.571*, is referred to in the *Burgess* catalogue as 'Mr Versatile' and does in fact come part way to meeting the standards of the professionals' guns, with a choice of pressure or syphon feed in either bleeder or non bleeder mode, with both internal and external mix nozzles supplied as standard.

Two interestingly different spray guns made by *Burgess* under their own *Powerline* label are the *VS 640* and *969*, truly airless sprayers that require no compressed air at all. They are powered by a 250 volt 50/s electro magnet,

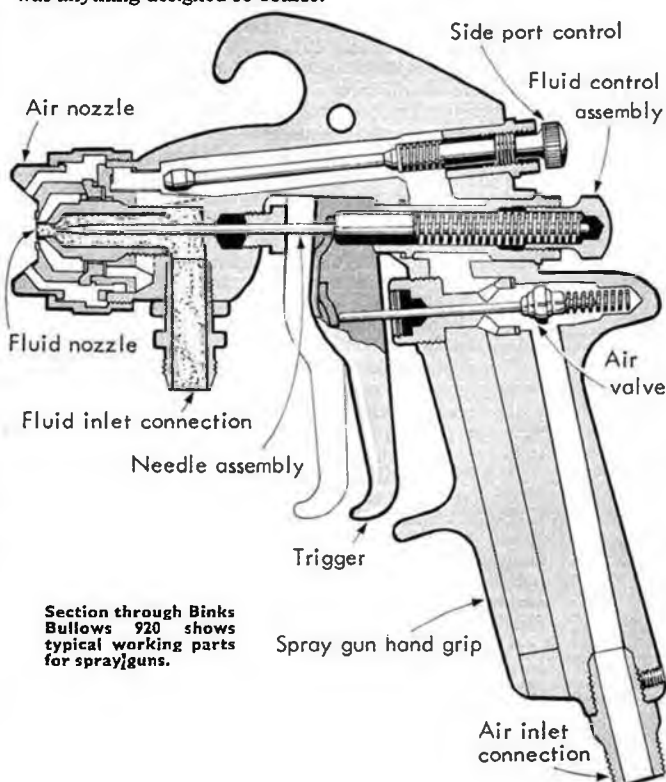


The Burgess Powerline VS646 airless electric spray gun.

which vibrates back and forth at mains frequency (100 vibrations per second), activating a piston and by means of a check-valve arrangement, pumps fluid from the fluid cup, up through the nozzle to produce the necessary atomisation. The end result is quite an acceptable unit for the larger area and is ideal for those of poor hearing, as it kicks up quite a racket when in use.

Whilst on the domestic scene, we should, I feel, just touch quickly on a few other sources of equipment. Both *Black & Decker* and *Bridges* produce spray equipment. The *Bridges* unit clips onto their electric drill and is a great gadget; we will deal with the compressor in a later issue.

Long before I had access to professional and semi professional spray equipment (in fact I hate to think how far back!) I made great use of a unit, bought for 7/6d from the model shop, and now, alas unobtainable. It was called the *Celspray* and was simply a 'scent spray' device operated by a rubber bulb. I still use mine today to water shrink tissue. The results in those days were fantastic and one could produce quite acceptable spray jobs and muscles in the hand to boot! Other scent sprays still available fit this bill today. Finally who amongst us has never tried the spray guns that come with the vacuum cleaner? Never was anything designed so coarse.



topical twists

by 'Pylonius'
Illustrated
by Sherry

No Angel, Charlie

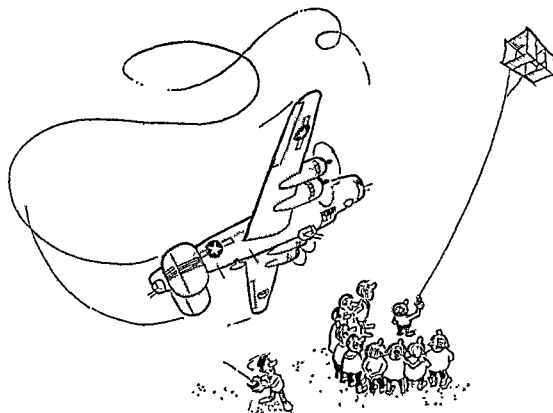
The idea of giving novice radio flyers the *L Test* treatment comes a step nearer with the suggestion that any flyer intending to perform at a public display should first pass a proficiency test. This does not mean that the buddy box operator will have to put up L plates, but it would seem only fair to warn an all too trusting public that the weighty object speeding about above its unprotected head is being propelled by someone who has not yet done a three point turn and whose emergency stop is likely to be in the downward direction.

When you think about it, there is no reason why the radio model should not be put on the same basis as the motor car. Certainly the idea of it being preceded by a man with a red flag has a certain appeal, but at least some sort of test should be applied before the newly fledged flyer is allowed to take to the open airfield. This would put things on a safer basis but do nothing to protect anyone from the biggest menace of all: *Old Charlie Showoff*. Now, old Charlie is no mean pilot, however mean he might be in other ways. He may have started off in all innocence, enjoying the early thrills of piloting, and savouring that conquest of the air feeling just like any other emergent radio flyer. For a time he would have revelled in the skills of controlled flight and the mastering of the various aerial manoeuvres. But, unlike any normal person, in just giving up when the novelty had worn off, or taking up Thermal or Slope Soaring as most people seem to do these days, he gets a touch of paranoia and seeks glory in showing off his skills to the multitude – or to as much of the multitude as he can muster. And the nearer the multitude to his daring repertoire of swoops and dives the greater the thrill. After all, what is the good of flying the model out over the country where the gawping crowd cannot see it – and anyway, giving the crowd a bit of a scare adds zest to the proceedings.

The trouble with Show Off Charlie is that he is not open to any sort of reason. His attitude to the public is a peculiar love/hate one. He looks to their applause and admiration for his hairy performances, but at the same time thinks they are out to stop all model flying just out of sheer maliciousness. And if the innocent do-gooder who tries to point out to him the error of his ways is a fellow modeller then he is given the full traitor treatment. In fact the danger and noise merchant relies on the good old esprit de corps of the movement to keep him in business, and he does all he can to foster the 'them and us' attitude among model flyers who, if they are in a beleaguered state, owe it very much to him and people like him.

When not meting out the dive and duck treatment to the public (or fellow modellers in its absence) he enjoys nothing better than to beat up the back gardens and local roof tops around the flying field. If he has a tile missing, so too have a few of the nearby houses. Ask him what a silencer is, that is if he can hear you above the din of his model, and he'll scornfully dismiss it as something that takes the drama and realism out of model flying – and they are only mischief making old fogies who complain about the noise – people who have to switch off their lawn mowers and hedge trimmers in order to hear the model planes, anyway.

If you haven't a Show Off Charlie in your club already, then be sure he is either in the development stage or just about to join.



Aerial Conkers

There is a strong rumour about that one of the new events at next year's Nationals will be a CO₂ Scramble. We can only hope and trust that this ugly rumour is unfounded; that we have not yet descended to such an egg and spoon race level in our major competitions. Yet, as model planes get more and more difficult to get under any reasonable sort of starter's orders, because of the way they have out-developed their abilities, there seems to be an unhealthy trend towards the novelty event. This is very noticeable in Radio, where at a major rally last year, the schedule was not concerned with the finer points of aerobatics or the pitting of speed against speed, but in the number of loops to be done in a minute and a Le Mans style take off and land event.

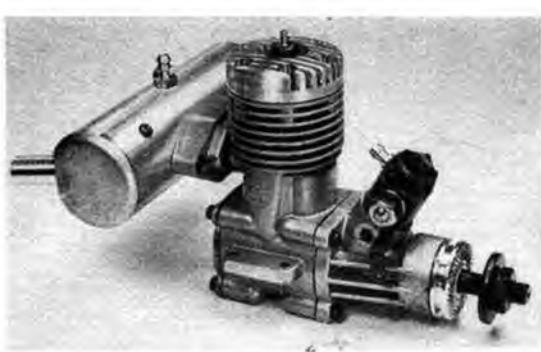
The novelty idea certainly has its appeal. Contests generally are a necessary evil. Everyone is convinced that the model movement would fall apart without them, but, at the same time, nobody can be bothered to run them. By good fortune free flight contests run themselves, or rather the flyers stage them on a do-it-yourself basis, and much the same goes for control line. But operating a radio model can be something of a full time job in itself, and without a bevy of officials you cannot do much beyond popping the odd balloon and landing on the spot.

Look Back in Anger

Vintage modellers appear to be rather sensitive about their image. They like people to take their peculiar form of archaeology seriously, rather than to be seen as elderly people, trying to re-create the lost joys of their toy-bound youths. But the last thing you want as a model flyer is an easily wounded soul. If the skin on your model is a delicate, blushing one, your own should be thick enough for the amused condescension of the public to bounce off. Yet, it is not so much the ironic glances of the public that are so hurtful, as the attitude of model flyers with more progressive ideas on the nature of model flying.

Of course, it is understandable that the harassed contest flyer with huge weekend journeys to undertake, the threat of lost models, last minute cancellations and rule changes, should look with envy on the carefree character who flies not for the imagined glory but just because he likes doing it. Yet, at the same time the vintage flyer feels just a shade guilty at taking what could be said to be the easy way out, and is perhaps too much on the defensive, imagining slights where none exist.

I often wonder how those old designers would feel about all these re-creations of their models. Flattering in one sense, no doubt, but in another a bit of a cheek. I mean, the vintage flyer romping around with his facsimile without any of the heartache and problems that went into the original model, and even slyly fitting modern devices like dethermalisers and radio control. Sometimes, though, you see evidence of an old designer getting in a dig over the years when someone unwittingly builds a model that was a noted stinker in its day – one that wouldn't fly then and won't fly now.



Engine Test

K&B 3.5 by Peter Chinn

DISTRIBUTED AND SERVICED in the UK by Irvine Engines, the K&B 3.5 is the most powerful 3½cc motor that we have ever tested and it is a safe bet that this is also the most powerful 3½cc engine manufactured to date. The 3½cc class has come into prominence of late, not as a result of the demands of contest modellers in the model aircraft field, but largely because of the surge of interest in 3.5cc class radio-controlled model power boat racing and in R/C model car racing for which a 3.5cc engine capacity limit is also in force.

The K&B 3.5 therefore started out as a high performance throttle-equipped engine, offered in both air-cooled and water-cooled types (the latter also in an out-board version) and by far the largest number of K&B 3.5s produced to date have been R/C engines. This report in fact deals with the throttle equipped aircraft motor although, since our tests were carried out, a non-throttle free-flight version of the engine has become available, in which the standard Perry carburettor is replaced by a plain venturi and needle-valve assembly. The venturi has a throat i.d. of ¼ in. or 8.73mm and, after allowing for the needle-valve, the effective choke area is approximately 47 sq. mm, compared with only 14.5 sq. mm for the standard Perry carburettor.

In most other respects, the free-flight engine is the same as the R/C motor. It does not have the transverse silencer and exhaust adaptor supplied with the R/C engine. Instead, it is equipped with a short, circular, slightly tapered exhaust stub, but the exhaust timing has *not* been extended to suit a tuned pipe system. Porting, compression-ratio, etc, remain the same but the free-flight motor should be capable of even higher outputs than the already highly impressive figures that we obtained with the standard R/C version. The substantial increase in choke area should add at least 5 per cent more bhp to its peak output.

The K&B 3.5 is not a cheap engine. In general design, it resembles, in many respects, the highly successful 6.5cc K&B rear-exhaust racing engines. It has, for instance, K&B's own particular development of the Schnuerle scavenging system employing four transfer ports, each fed from its own well-proportioned channel in the surrounding casting, so that, with the fairly large unbridged exhaust port, the porting covers almost the entire circumference

of the cylinder liner. The exhaust port is timed to open and close at 75° each side of BDC, while the four transfer ports all open and close simultaneously at approximately 62½° each side of BDC.

It is also an ABC type engine, i.e. a ringless aluminium piston is used in conjunction with a brass cylinder liner with chromed bore. As on the K&B 6.5 (and also the more recent 5.8 and 4.9), the piston has an almost uninterrupted skirt surface: the gudgeon-pin is inserted from the front and the rear gudgeon-pin hole is blind so that there is no risk of charge leakage through the exhaust port or of the pin being trapped in the port. Compression ratio is fairly high and checked out at approximately 13.5 on our test motor.

The crankshaft has the 12mm dia main journal now being adopted by other manufacturers of high performance shaft valve engines in this displacement group. It is bored ¾ in. (8.73mm) for the gas passage and has a large rectangular valve port that is timed to open for 200° of crank angle, closing at 60° after TDC.

The silencer, fitted transversely behind the cylinder, consists of an expansion chamber made from three light pressure castings (ground to a bright finish after assembly) comprising a cylindrical centre portion and a pair of end caps. The latter are fitted with ¼ in. i.d. outlet tubes. These tubes are sealed at their inner ends and admit the exhaust gases through perforations to reduce noise levels.

PERFORMANCE

The cylinder bore of the K&B 3.5 tapers approximately .002 in. on diameter and, as the ringless aluminium piston must (in order to maintain adequate piston seal when the engine is hot and the brass liner has expanded) be very closely fitted to the bore, it is quite tight at the top of the stroke when the engine is cold. This has given these engines a reputation, in some quarters, for being difficult to start from cold when new. However, this applies rather more to the marine versions than to the aircraft engine and we have to report that no such difficulties were encountered with the test unit. It was, in fact, very easy to hand start right from new (it had *not* been run-in prior to our receiving it) and was every bit as good, in this respect, as a good ringed engine or one having a lapped ferrous piston/cylinder assembly.

A characteristic of the ABC set-up is that the brass liner

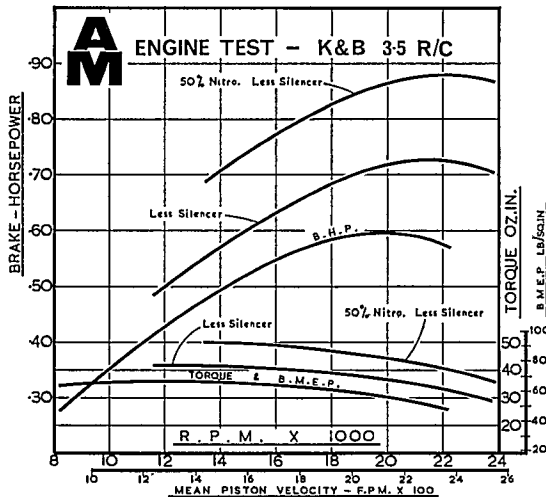


expands away from the low-expansion alloy piston very slightly, almost immediately that the engine starts – and, of course, it is important that it should do so in order to avoid undue stressing of the reciprocating parts – but this has given rise to the theory, with the bigger K&B ABC engines, that high nitro fuels are best for running-in in order to heat up the cylinder as quickly as possible. Be that as it may, we found no evidence to suggest that 'hot' fuels are essential for running-in the 3.5. We used our standard 5 per cent nitro fuel for running-in and also to determine the first two sets of performance figures to enable comparisons to be made with other engines previously tested on the same fuel.

That the K&B was going to be in a class of its own was evident at an early stage in the tests. For example, on 5 per cent nitro, less silencer, the engine showed a maximum torque of 42oz.in. at between 12,000 and 13,000 rpm, which is well above the best torque figure previously obtained for an engine of this displacement on similar fuel. Not surprisingly, the maximum power output, which was plotted as occurring at between 21,000 and 22,000 rpm was, likewise, exceptional at 0.73 bhp.

Where the K&B 3.5 really begins to show its capabilities, however, is when it is fed a high nitro fuel. These fuels are, of course, in much wider use in North America than elsewhere but, to check just how much extra power the K&B would deliver on such a blend, a further series of tests were run using K&B 'Speed Fuel', which is not at present available in the UK but which contains 50 per cent nitromethane.

The effect of substituting this fuel is shown on the performance graph. Maximum torque was up to 50oz.in. and peak power output to 0.88 bhp at 22,000 rpm.



All these 'less silencer' figures are quoted to emphasise the K&B's outstanding potential, since it is impossible to evaluate the true potential of different engines by comparing their performances when each is fitted with a different silencer. The K&B silencer actually absorbs

Continued on page 165

SPECIFICATION

Type: Single-cylinder, air-cooled, glowplug ignition
Schnuerle scavenged rear-exhaust two-stroke with
crankshaft rotary-valve and twin ball bearings.
Throttle type carburettor. Silencer included.

Bore: 0.650in. (16.51mm)

Stroke: 0.640in. (16.33mm)

Swept Volume: 0.2124cu.in. (3.480cc)

Stroke/Bore Ratio: 0.989:1

Measured Nominal Compression Ratio: 13.5:1

Checked Weights: 197g – 7.0oz (less silencer)
246g – 8.7oz (with silencer)

GENERAL STRUCTURAL DATA

Pressure diecast aluminium alloy *crankcase/cylinder casing* with detachable backplate. Pressure diecast aluminium alloy *front housing* incorporating 11mm i.d. intake boss and containing one 12x24mm 10-ball steel caged *ball journal bearing* at rear and one 1/4x1in. 8-ball brass caged *ball journal bearing* at front. Counterbalanced 12mm o.d. *crankshaft* with 11/32in. i.d. gas passage fed from large rectangular valve port. Pressed-in 3/8in. o.d. *crankpin*. Shaft end threaded 1/4-28 UNF. Drop-in brass *cylinder liner* with chromed bore and located by flange at top. Ringless aluminium *piston* with flat deflectorless crown and plain skirt. Tubular *gudgeon-pin* 1/4in. o.d. with PTFE pad at forward end. Forged aluminium alloy *connecting-rod*, bronze bushed at big-end and with oil slits at both ends. Machined aluminium alloy *cylinder-head* with bowl and squish-band combustion chamber and central short reach glowplug. Machined aluminium alloy *prop driver* fitted to shaft with steel split tapered collet. *Perry Micro carburettor* with .200in. i.d. choke, giving an effective choke area of 14.5 sq.mm.

TEST CONDITIONS

Running time prior to test: Approx 1 hour

Fuel used: Running-in and Tests 1 & 2: 5% nitromethane, 20% castor-oil, 75% methanol

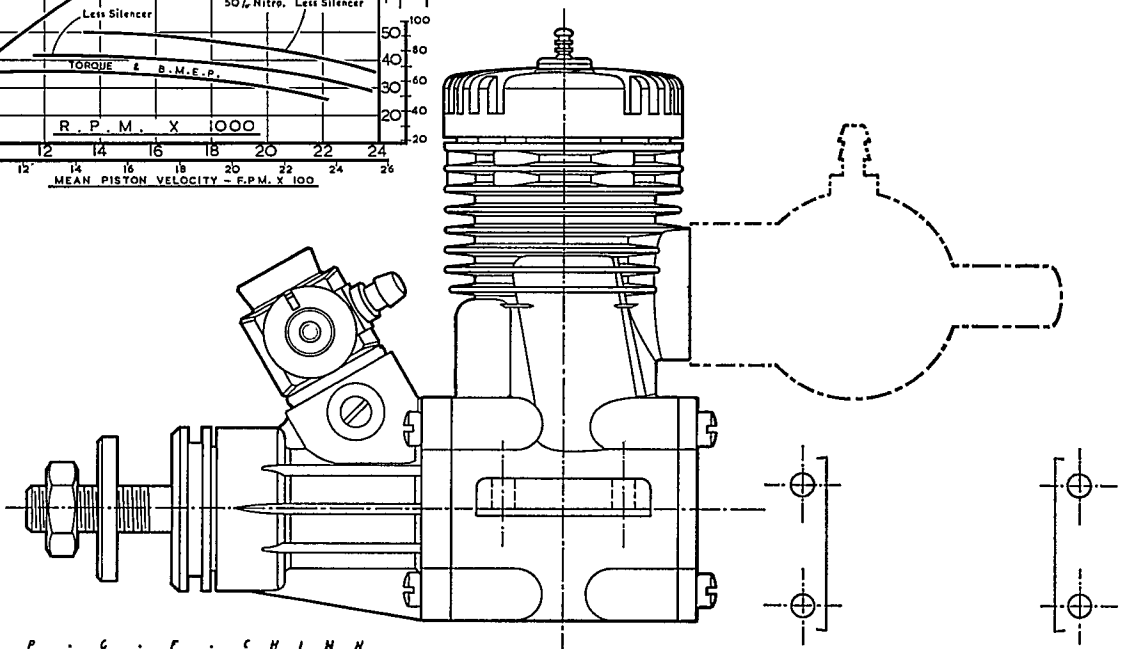
Test 3: K&B 'Speed Fuel' (50% nitromethane)

Glowplugs used: K&B KB-1S short reach as supplied

Air temperature: 22°C (72°F)

Barometric Pressure: 1022mb (30.18in.Hg)

Silencer: K&B transverse expansion chamber with twin baffled outlet tubes, as supplied. Volume approx 35cc



THE FREE FLIGHT SCENE

**This month:
Martin Dilly**



Family scenario, as Derek Cash of East Grinstead prepares his JA Train for flight, while patient wife wonders if its time to go home yet. Meanwhile kids ignore nice glider that dad wasted valuable building time making for them and get into mischief with the goodies in his tool box.

NE AREA SMAE INDOOR MEETING – 8th January 1978

The second meeting of the North Eastern Area Indoor Section for 1977/78 took place at the Sporting Club, Washington, on 8th January. It was a bitterly cold day outside and conditions inside the large hall were also very cold which accounted perhaps for some lower times in EZB and HLG. The turnout was a little disappointing as there were only 36 entries in the various competitions.

As always, however, there were several competitors from outside the Area who were perhaps attracted by the special HLG competition with a guaranteed first prize of £5 of modelling goods donated by Clayton Models Ltd of Newcastle-upon-Tyne. The competition, comprising three rounds of three flights each in separate circles. Steve Philpott, Alan Jack and Alan Callaghan were soon locked in very close competition and the competition ended with these three in the top places and separated by only two seconds. Steve Philpott's win was however rather more conclusive than the results show as any two of his top eight flights would have been sufficient to keep him in the prize money. He flew a distinctive model featuring a twin boom fuselage – one boom above the other.

Flying Scale to the North Eastern Area open rules was a very close contest and we were delighted to see R. Boor from the North West on his first visit to Washington. He flew a very well finished Desoutter Sports Coupe of Peanut size which was also well documented. The matt finish in handbrushed plastic paints was most realistic and the model fully deserved its first place in Static – it was not to fly as well. Eventual winner was J. Andersons Halton HAC2 which took first places in both duration and flight impression and was second in Static. Tom Wilson flew a Supermarine Sparrow of 18in. span to second place with the Desoutter taking third. (See also page 153).

John O'Donnell made a characteristic charge in EZB and won by a margin of over two minutes from Ron Pollard. John coped very well, as we would expect from such an experienced competitor, with the cold conditions and with a new model which still needed some final sorting on his arrival at Washington. The winning model is to John's well known tip dihedral layout but is most distinctive in being a one piece model – the wing is not mounted in sockets. The wing also features diagonal braces on the undersurface which are mounted on the underside of the leading and trailing edges. As these braces are straight they are well clear of the curved undersurface of the wing. The whole model is very stiff and must be ideal for steering and/or ceiling banging. Dennis Davitt from Leeds took third place also using a tip dihedral model.

Novice duration was won on this occasion by Bernard Hunt, a radio flyer from Huddersfield, who had never flown EZB before and managed one flight of 5min 5secs to win very clearly. Best Junior was Graham Davitt, still only 14 years old, but who can hold his own with almost all of the seniors.

Flying Scale (NE Area Class 2 Rules): 1. J. Anderson (Tynemouth) Halton HAC 2 Minus 3½pts; 2. T. Wilson (Tynemouth) Supermarine Sparrow 8½pts; 3. R. Boor (Assoc Member) Desoutter Sports Coupe 9½pts. **Junior:** 1. G. Davitt 16pts; 2. P. Anderson 6pts; 3. G. Hutchinson 3pts. **HLG (Best two flights from nine):** 1. S. Philpott (Whitefield) 69:9; 2. A. G. Jack (Tynemouth) 59:5; 3. A. Callaghan (2FSA) 57:7. **EZB (Best two flights):** 1. J. O'Donnell (Whitefield) 17:02; 2. R. C. Pollard (Tynemouth) 14:32; 3. D. Davitt (Leeds) 14:09. **Novice Duration (Best flight):** 1. B. J. Hunt (Huddersfield) EZB 5:05; 2. S. Philpott (Whitefield) EZB 4:06; 3. P. Anderson (Tynemouth) Pennyplane 1:57.



Limbering up for the HLG series at South Bristol Gala's outdoor event are victorious Kevin Brown 1st place, Pete Bayram 2nd, and Paul Davies 3rd to the right. All are members of the Richmond Club.

Having had your appetite whetted by mention of this hook, you may like details of this nicely engineered item: it is just about the neatest and smallest circle hook I have come across yet, and additionally, all the adjustments – straight tow, circle tow, zoom and glide – are made from the hook end of the system. The four drawings show the Hatschek hook in position for these four modes.

At the upper end of the hook, and fixed to it, is an alloy block **M** grooved along its front edge to slide up and down pivot arm **B**; this acts as a locator to prevent the hook from rotating, as an attachment for the rudder line **T** and to prevent the hook from dropping out of the whole assembly. The block is retained on the hook with an Allen screw locating on a notch on the hook; the upper arm of the spring also bears against this block.

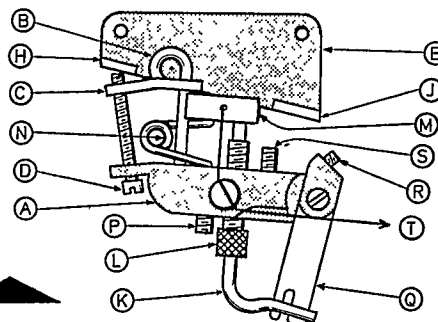
A wire stirrup is silver soldered to the hook's lower end to form a slot into which the latch **Q** locates during tow. This latch is machined from dural and carries the glide turn adjustment screw **R** tapped into its upper end; it pivots on a screw holding it to the hook body **A**, and a minute coil spring concentric with this screw ensures that the latch springs rearwards when the hook is extended to release it. The latch is slotted at its lower end to hold the normally-free end of a high aspect ratio towline pennant, which acts as a 'tell-tale' to show when the latch is open.

When on circle tow, the glide turn adjusting screw on the upper end of the closed latch is unable to contact lug **J**; the circle adjuster **S** which can be altered from below, can, however, meet the lug as the latched hook swings back when line tension is released to initiate circle towing.

A neat feature is the means of turning the rudder line through 90°. A blind hole about $\frac{3}{16}$ in diameter is drilled into the side of the hook body, and a recess milled into the lower rear side of the body; two small diameter holes are drilled into the side of the blind hole, one vertically from above it and the other horizontally from the recess. The rudder line runs through both holes.

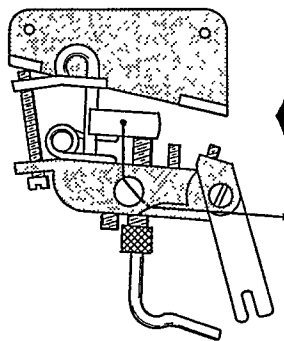
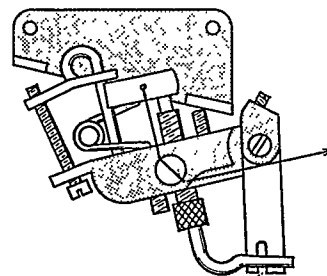
Bob Hatschek edits a magazine concerned with metal machining technology, and obviously practices what he preaches, since the workmanship is of a high standard; he can supply complete hooks, with instructions, for \$20. Bob's address is: 316 Grosvenor Street Douglaston, New York 11363, USA.

By BOB HATSCHEK



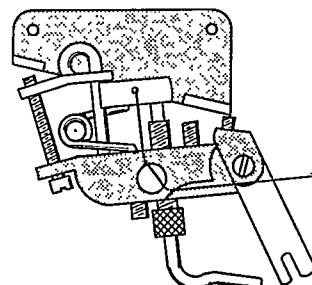
Straight tow while towline tension is maintained. Hook movement and thereby auto rudder line tension is limited by screw D stopping on lug H.

Circle Tow. As the tow line goes slack the tow hook swings back up until screw S stops against lug J. This releases the A/R line allowing the rudder to swing to circling position.



Zoom. At moment of maximum line tension, just prior to release of the model, spring N gets compressed releasing a small amount of A/R line allowing partial deflection of rudder resulting in model veering towards glide turn. The latch is also released.

Glide. When the tow line falls away tow hook again swings back up but this time the latch having been released is the stop with screw R bearing on lug J, thus releasing the A/R line allowing the rudder to swing to its glide position.



26th March EZB, MAN, HLG
27th March FID, CO₂ DUR
9th April FID, TEAM PRACTICE
14th May EZB, OPEN FILM
4th June FID, 35cm FILM
18th June EZB, PEANUT, HLG*
9th July FID, OPEN FILM
30th July EZB, MAN, HLG*
20th August FID, 35cm FILM
26th August CO₂ DUR, MAN, HLG*
27th August OPEN FILM, EZB
28th August FID, 35cm FILM
17th September EZB, CO₂ DUR, HLG*
1st October FID, MAN

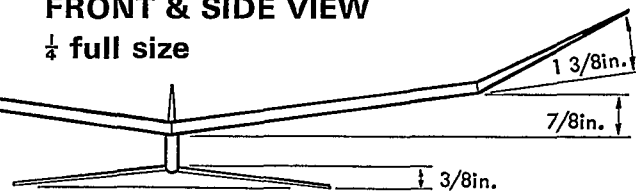
Five HLG dates; *denotes 'Sweepette Trophy' event (four)

As far as I know the dates are **firm** but final formal confirmation of Cardington shed *not* yet received. To be checked with Laurie Barr.

E.Z.B.: Easy Bee. M.A.N.: Manhattan. H.L.G.: Hand Launched Glider. F.I.D.: International Class Microfilm. OPEN FILM: Unlimited Microfilm.

FRONT & SIDE VIEW

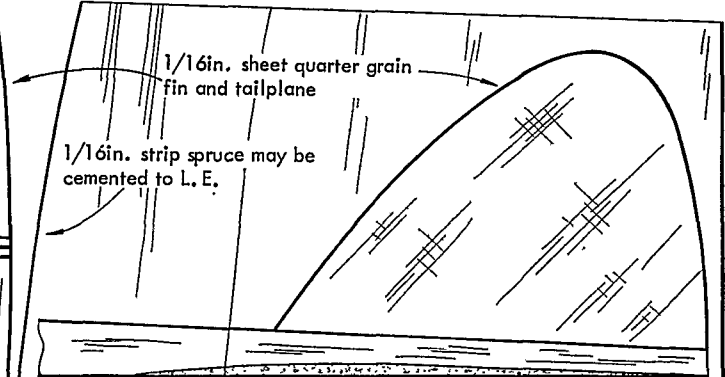
$\frac{1}{4}$ full size



Note:- Tailplane has 3/8 in. anhedral at each tip

2-4 grams lead weight
Sandpaper finger grips

55% - 57% C. of G.



Airfoil maximum camber point
 $\frac{1}{2}$ in. thick at $1 \frac{3}{16}$ in. from L.E.

Plane and sand wing
from $\frac{1}{2}$ in. sheet

WEIGHT
Calm air = 0.75 - 1.0 oz.
Rough air = 0.90 - 1.2 oz..

Sweepette

XX Mk IV

by Lee Hines

PARTS FULL SIZE

$\frac{1}{2}$ in. x $\frac{3}{4}$ in. hard balsa sheet fuselage
Skew wing as shown and
off-set $\frac{3}{64}$ in. to the left
when gluing to fuselage

Finger grip on underside of
wing. Carve from $\frac{1}{2}$ in. sheet

SWEEPETTE TROPHY FOR HAND LAUNCH GLIDERS

With the announcement of the forthcoming indoor glider events at Cardington I thought a few notes on hints and history might be of interest to any would-be participants.

Model gliders began with George Caley's 'Fixed Kite' of 1804 and he is responsible for our present layout of a main wing that is separate from the tail surfaces. One could argue that he indirectly helped to provide us with our indoor playgrounds: cavernous hangars built to house early lighter-than-air ships that he had encouraged a century before.

Just when and where gliders first came indoors I am not sure, the earliest reference I have is of Milt Hugelot from Chicago who in 1938 was amongst the first to have thrown a minute (M.A.N. 1968). In that same year San Franciscan Dick Birkett claims a record time of 1.17 secs. It then took a further 25 years to extend the world record to 1 min 22.5 secs, which reflects the excellent endeavours of the Californian pioneers. This was achieved by Mr Lee Hines who in 1964 unveiled a $\frac{1}{2}$ oz Sweepette 18in. that was built the same day the record was set!

It was his collaboration with others that led to a design partnership with fellow Californian Ron Wittman, who eventually developed Hines' original concept into his Supersweep over a period of 10 years. It was in 1974 that, despite popular disbelief, he was able to announce a new World Record time of 1 min 30 secs which stands to this day.

These facts refer to the unlimited ceiling category and illustrate world record progress, they do not reflect standard contest times of today: 75-80 secs (USA) and 65-70 secs (Europe).

HINTS

Build them light, a sound 18in. design below 25 gms is a safe size for Cardington; hungry gliders prefer a balsa leading edge, spruce strip can provide protection. A firm fuselage is essential to achieve maximum height and longer life (try and concentrate at least half the all-up weight here).

Variations on a geometric ellipse are popular amongst indoor glider designs, a 'perfect' example being Bob Dagand's 'Mr B' of 1954 (1.16min). His 16in. model weighed nearly an ounce and supports the argument that altitude increase by weight can increase time (Zaic 1955-56, p162).

The biggest problems facing you will be in wood selection, all surfaces need to be of light quarter grain, sheet wing stock should be around 40g for a standard $4\frac{1}{2} \times 36$. As this can involve much legwork the possibilities of foam wings are worth considering.

Concerning the launch, one is either of the flick or heave brigade, they are both equally as effective so settle for whichever feels consistent. Fitness harmed no one and can increase time in this dead air event. (Try jogging to the dole queue.)

Finally my thanks to Mr Zaic for his wonderful books and I leave you with a heartwarming note that despite constant references to Americans it was a Yorkshireman who made it all possible... Magic. See you in March.

K. Brown

HAND LAUNCH GLIDER - Cardington 1978

Hand Launch Glider contests will be run at five Cardington indoor meetings this year. The first meeting is a fly-in with informal contests for both open and 12in. span limit models. Further 12in. span limit events will be held if the first is a success. The main events are the four SWEEPETTE TROPHY contests. A flyer's three best results from the four events will count towards the final award. The trophy is being donated by LEE HINES, the well-known Californian flyer who held the Indoor Hand Launch Glider world record for ten years with his famous SWEEPETTE design. There will be awards for junior and novice classes as well and each event will be a contest in its own right with some of the prizes consisting of contest grade balsa kindly donated by SOLARBO LTD.

Kevin Brown has designed a Motif for the series and this will appear on transfers and tee-shirts.

As far as we can discover there is no official record for indoor hand launch glider in this country. The best flights we have heard of are around 65-70 seconds and we hope to establish a record during this series. Rules are still being detailed as I write this (in January) but will be available from the address below by the time this appears in print. Briefly, ten flights will be timed with the best two to count. As far as possible, complete freedom of design and materials will be allowed, as long as the model and its operation does not endanger people or property. The rules will aim to prevent freak successes like the ultra lightweight American device which did over two minutes in the thermal over a patch of hot sunlight on a hangar floor. The aim is to encourage advances in the fields of technique, aerodynamics and structures. Models must be launched from the floor without artificial aids (no stilts, catapults, strings or hidden mirrors!)

It is vital to remember, if you are thinking of taking part in this series, that in spite of the vast size of the shed at Cardington, it is still quite easy to hit the walls with an untrimmed model. I would strongly advise any flyer who is serious about this event to get models fully trimmed on a calm day before attempting to fly in the shed, as models can easily be lost and broken in the side girders.

The shed is about 150 feet wide so you should be able to fly within an area about the size of a football pitch without going over the boundary. When you can do that consistently by always launching from the same spot and in the same direction, you will be ready for the real thing. It will definitely not be possible to climb about in the shed to retrieve, so practice an accurate flight pattern and avoid the problem of lost models.

An information sheet with rules and details of the prizes is available on receipt of an SAE and an additional 9p stamp from: IHLG Series, 7 Richard Knight House, Favant Road, London SW6 4AY. Dates are: 26th March Open + 12in. span limit; 18th June, 30th July, 26th August, 17th September Open 'Sweepette Trophy' contests. Contact phone: Mike Fantham 01-736 7163. **Important Note:** ONLY SMAE Members may attend and a nominal charge of 50p per head will be made for entry to the shed to partly cover expenses.

Engine Test

K & B 3.5

Continued from page 161

more power (about 18 per cent at the peak) than those of some of its rivals and a re-check with the silencer, on 5 per cent nitro fuel, yielded a maximum torque of 36oz.in. and a peak output of 0.60 bhp at 20,000 rpm. Needless to say, this is still at least 50 per cent higher than one was used to expecting with a good 3.5cc engine (even without a silencer) in the past.

In order to liberate the K&B's full potential it must not, obviously, be overloaded with a big prop, but it is not necessary to always aim at 20,000 rpm in-flight speeds to appreciate the engine's much above average performance. The most useful prop sizes, depending on model size and wing loading, are likely to be 9×4 , 8×6 , 8×5 and 7×6 , although even on a 10×4 it was still well above its rivals. Typical static rpm recorded on 5 per cent nitro fuel with silencer, included 11,900 rpm on a 10×4 Taipan glass-fibre-nylon prop, 14,400 rpm on 9×4 and 8×6 Taipans, 15,200 on an 8×6 Power-Prop wood and 17,200 on a

7×6 Taipan. Removing the silencer added between 500 and 1,000 rpm to these speeds while, at the top end, switching to 50 per cent nitro fuel increased the static rpm on a 7×6 to 19,500 rpm.

The K&B's running and handling qualities were good. Vibration levels were moderate and response to the Perry throttle was good with a minimum idling speed on a 9×4 Taipan prop of only 2,600 rpm. The engine's easy starting qualities have already been remarked upon.

Over the past 30 years, K&B have produced many types of engines, among which the Torpedo 19 of 1951, the Series 61/64 models of the early '60s and the 40 and 6.5 pylon racing engines of the past dozen years have been outstanding. To this latter group must surely now be added the 3.5.

Power/Weight Ratio (as tested):

- 1.10 bhp/lb (5 per cent nitro fuel, with silencer)
- 1.67 bhp/lb (5 per cent nitro fuel, less silencer)
- 2.01 bhp/lb (50 per cent nitro fuel, less silencer)

Specific Output (as tested):

- 172 bhp/litre (5 per cent nitro fuel, with silencer)
- 210 bhp/litre (5 per cent nitro fuel, less silencer)
- 253 bhp/litre (50 per cent nitro fuel, less silencer)

CLUB NEWS

ALTHOUGH THE APPROACHES to model building/flying are too diverse to enumerate in any concise way, nevertheless aeromodellers can be roughly (and even tidily sometimes) grouped into three main categories, not determined so much by the type of models they fly as the nature of their involvement. The three categories work out something like this: high building interest/small flying interest; building/flying interests equally valued; and small building/high flying interest.

Into the first category come the scale modellers and those who specialise in the large and spectacular models. In the second category we have the contest flyers and people who build experimental models. And, in the last category, there are the people who buy the finished and semi-finished models. All, however, make their particular contribution to the model movement; and if we have a healthy balance it is because the standards of construction, finishing and flying are, perhaps, higher than they have ever been. Certainly, each year the targets set for us to emulate seem to be ever more formidable.

One thing common to all model flying, though, what-

ever grade or standard, is that you put your article to risk when you launch it skywards, and the twin hazards of loss or damage are never more apparent than in flying contest models in adverse weather conditions. Strong winds, then, have elicited equally strong comment from those reporting in the *Northern Area News* on the winding (?) up events of 1977. When, on one rare occasion, the constantly battering breeze took a sabbatical, no doubt through sheer exhaustion, the benefit of a zero wind situation came in the form of a thick fog. What you have to be thankful for is that the weather on the day is flyable at all; that strong wind could so easily be laced with an awful lot of model drenching moisture, or could whip up to gale force. Typical, though, was the way the season was ushered out with a few farewell gusts at the Northern Area FAI Rally. A fair entry in F/F nonetheless, with 21 in A/2 Glider and 11 in Wakefield, including Bob Wells and Paul Masterman who sportingly travelled up from the contest arid south for the occasion. Coming to statistics, for some inexplicable reason, possibly to do with the fact that model flyers can be just as perverse as the weather, the atrocious climatic outrages of 1977 did not have any dampening effect on the general upturn in free flight contesting; comparative figures showing that every type of event was better subscribed than in 1976 – something for which we can all be grateful. A good turnout at the Rally, too, for the FAI, team race, for which the weather was described as acceptable. Nine teams entered, making for four rounds and a final. Coming back to free flight, *John Pool*, 51 *Northfield*, *Barlby*, *Selby*, *North Yorkshire* *YO8 TJS*, is making available plans of his Lady Shelley winner 'Never Forget 14' in its 1977 *Mk 2 version*. Theoretically, the rubber powered tailless model is a dead

1978 Contest Calendar

SMAE 1978 FREE FLIGHT CONTEST PROGRAMME

(Phone check for cancellations 01-736 7163. This is incomplete. Numerous events have yet to be located. The Nats R Schedule for Cranwell (F/F) and Barkston Heath (C/L). We will announce details when released by SMAE on a month to month basis.)

March 12th	1ST AREA CENTRALISED FIA (KMAA + PLUGGE), O/P (Frog Senior), O/R	Area Venues
April 16th	2ND AREA CENTRALISED FIC (Halifax+Plugge), O/R (Gamage), O/G	Area Venues
May 7th	3RD AREA CENTRALISED FIB (Weston+Plugge), O/P (White), O/G	Area Venues
June 11th	4TH AREA CENTRALISED Team Glider (ME+Plugge), FIC (Astral), Cd'H	Area Venues
September 3rd	5TH AREA CENTRALISED Team Power (Keil+Plugge), FIB (Gutteridge), A/1	Area Venues
September 24th	LONDON AREA GALA O/R, O/G, O/P	Bassingbourn
October 8th	6TH AREA CENTRALISED Team Rubber (Farrow+Plugge), FIA (SMAE), 1/2A	Area Venues
November 19th	2ND CENTRALISED MINI A/1, Cd'H, 1/2A, HLG	Bassingbourn

March 18th **MIDLAND AREA INDOOR MEET (SMAE)**
Easy 'B', Novice & Expert, Penny Plane, HLG, Peanut Scale, CO₂ Scale. Hall size 110ft x 75ft x 25ft, clean ceiling. Venue: Rolls Royce Sports Hall, Derby. Details: (sae) M. Coomes, 22 Cox Drive, Bottesford, Notts. Tel: Bottesford 42034.

April 9th	1ST C/L CENTRALISED. FAI, 'B' Speed, Combat, Stunt. Venue: Barkston Heath.
April 9th	SOUTH COAST GALA. F1A, F1B, F1C, A/1, Cd'H, 1/2A, HLG plus R/C and Helicopter events. RAF Odiham, SMAE only. Contact: L. F. Couling, 7 The Green Walk, Willingdon, Eastbourne, East Sussex BN22 0RB (sae). Tel: 53116.
April 9th	NA VINTAGE & PANNETT MEETING. Elvington (SMAE only). Vintage Duration, Open Power plus Coupe, A/1 and HLG. Contact: Leeds 864026.
April 16th	NMAC 1/2A COMBAT. Venue: Brackmills Industrial Estate, Northampton. Prizes for Seniors and Juniors. Contact: M. Humphries, 21 Kingsthorpe Grove, Northampton.
May 7th	C/L TEAM TRIALS. Duxford. Contact: Bob Horwood, 21 Burghley Rd, St Andrews, Bristol 6. Tel: 0272 48869.
May 7th	BKFA KITE FLYING RALLY (no aircraft please) Old Warden, Beds.
June 11th	AEROMODELLER ALL-SCALE DAY. Old Warden, Beds.
June 25th	2ND C/L CENTRALISED. FAI, G/Y Speed, Combat, Stunt. Venue: Barkston Heath.
July 23rd	NA GOODYEAR/MARATHON. C/L.
August 3rd to 10th	SCALE & C/L WORLD CHAMPS. Venue: Woodvale.
August 20th	3RD C/L CENTRALISED CONTEST. FAI, 1/2A Goodyear, Speed, Combat, Stunt. Venue: Barkston Heath.
September 10th	NORTHERN AREA RALLY. F/F, C/L & R/C.
September 17th	MIDLAND AREA GALA. Venue: Barkston Heath.
September 24th	LONDON AREA GALA. Open Rubber Glider, Power. Venue: Basingbourne.
November 5th	NA FAI RALLY. F/F, R/C & C/L.

loss, thus making it quite a challenge. And it really is remarkable how John Pool, Henry Tubbs and other tailless enthusiasts have developed models of quite outstanding performance. Not so outstanding, according to opinion expressed in the newsletter, was the performance of the SMAE, in its budgeting for the Nationals. A somewhat excessive amount of money was paid out for camping facilities which, to say the least, were primitive. At the same time the hapless campers were charged fees far in excess of anything levied at camping sites providing first class amenities. This should not detract, of course, from the otherwise first rate effort put up at the Nationals, generally.

Setting an example that many in-name-only PROs would do well to follow, R. K. Gulliver, the new PRO of the Crawley & DMAC, sends us in a report of his club's activities which, he promises, will be the first of many. He introduces the club by telling us that top of the flying pops at the moment are Radio and indoor chuck glider, but there is quite an infilling of enthusiasm between these two extremes, with control line and free flight having substantial followings. It is well known that the pressurised South East of England area is not exactly overflowing with flying sites and the Crawley club must be grateful for the fact that their flying field situation is reasonable. There are two R/C sites, one and a half (?) control line fields and Ashdown Forest for the F/F boys, with negotiations under way for other sites. There is plenty of contest activity in thermal soaring, electric R/C, control line and free flight, with some notable club successes in the wider competition field. Among other contests held by the club throughout the year was one for Indoor Chuck Glider. This was won by veteran Pete Cameron. On the R/C side there have been a number of successful displays, and the imposition by the club of the 80 decibel rule has helped to restrict noise to an acceptable level. The club meets every Thursday evening, and the when and where of this and details of the club are obtainable from Mr Gulliver at Crawley 22755.

As the title suggests, the Crookham Contest Modellers are not clubroom bound but a group of people wholly dedicated to the art of contest flying – free flight, of course. R. C. Uden is the PRO and he informs us what the result sheets already show – that the 11 members who make up the group have had a most successful year, with seven firsts, seven seconds and six third places at the major SMAE events and rallies. On top of that they were the 4th placed club in the 1977 *Plugge Cup Championships*. Gary Madelin did particularly well to take first in FIA (Glider) at the Nationals and also at the Two Day Meeting. Fred Chilton also showed his mettle by taking the *Astral Trophy* for FAI, Power. And the up-and-coming youngsters have been on good form, too. Bill Simms got his first success with a top placing at the Club Champs, and there

was a good initiating win for Phil Uden in the *Wakefield Stag Trophy* at the Richmond Gala. The club gala, held last February at Bassingbourn, was well supported, and given the good weather hoped for, the success should be repeated this year. I hope to be there complete with Wakefields and woollies.

Yet another top free flight club congratulating itself on a most successful year is the Croydon & DMAC. Naturally, the first name the club PRO, M. L. Wood, presents in his honours list is the redoubtable Dave Hipperson who, when he appears on the contest field, you can only hope to get a second place. He had six outright wins in the Rubber classes, and these included both Coupe and Wakefield at the Nationals. He also had four good placings and shared in Croydon's *Farrow Shield* win with



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Ian Kaynes, Dave Digby and Paul Masterman. If he has to look to his laurels it is in the direction of clubmate Martin Dilly's large Coupe which has been whacking the opposition at most of the major events, with a win at the Southern Gala and three second places. Still very much a glider man, though, he kept up that side of his reputation by winning the Norwich Jubilee event. Other names to the fore were Tony Young's with a glider win at the Croydon Gala and Ian Kaynes for taking Coupe at the SE Jubilee event, coming third at the Southern Gala and 4th in the Nationals Open Rubber fly off. Then there was Ken Smith's second place in Glider at the Southampton Gala. On the social side Jack North recently organised a get-together of Croydon members past and present at the home of Club Chairman, Bryan Spooner. Along with the old members came some photographs and relics from the club's long historic past. There was even a Norman Marcus tailplane.

Control line flying also requires its special sites, preferably hard decked ones, but the new site on Mitcham Common, referred to in the *Three Kings Court Circular*, appears to be earmarked for Radio. Not to worry, though, for there appear to be ample sites in the Northern area — one for every day of the week, no less. Another item in the newsletter tells of a visit to the 'den' of well known Scale and C/L modeller, Alan Callaghan. Among other treasures delectably sampled were a few of the late P. E. Norman's ducted fan free flight models, part of a large collection given by P.E.'s widow to a free flight group. The models were the most remarkable flyers: fast, realistic and with an amazing survival capacity from the somewhat carefree landings. But whether the hard landings that eliminated two entrants from the Club Stunt event in November were carefree or otherwise we are not told, but it reduced

the field to a valiant five. There was a nip in the air, but the only weather hazard was the sun on the downwind (manoeuvring) side causing many a hard blink. Unscheduled power cuts and shearing engine bolts added the usual touches of drama, but a good contest, nevertheless, with Mike Sexton's *Crusader* putting up a sizzling display on his second flight to clinch the match. This puts him third on the *Doug Blake Trophy* table. Ken Gardner, who came a close second in the event, still enjoys an impressive lead, with Wal Cordwell second.

The initials SADMAL are not surmounted by a woe-begone scotsman but by an ornithopting mustang, emblem of the Sittingbourne Club's punning newsletter title, *The Bourne Flyer*. Still in (we hope) witty vein, I like the description given to the way the club departed to the *Townner Trophy* in a Saab with two large, white 'coffins' on top:

New to these columns is *Crosswinds*, the newsletter of the Cleveland Free Flight Society. The interest seems to be mainly Flying Scale. The theme of the particular newsletter to hand is the World War I Rumpler, a German bomber, for which there are two full size plans and three view drawings. A wonderful build, I have always been attracted to biplanes, but have always shied at the thought of the transporting and rigging complications.

Torque, the newsletter of the New Zealand's Christchurch MAC, carries a list of flying procedure rules operative on a North Island airfield. Memorising them is a feat in-itself, and altogether the trend is towards putting R/C flying on a par with full size practice. We may yet see the day when the control tower is manned for the day's flying.

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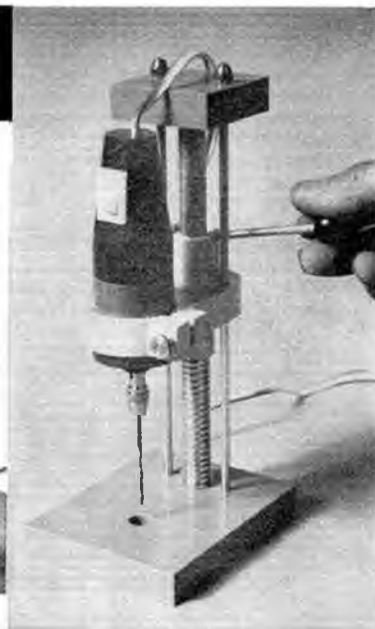
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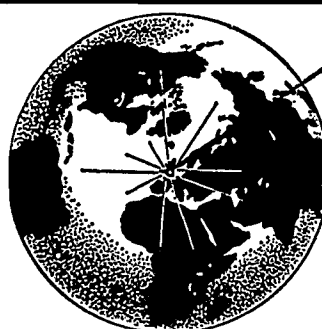
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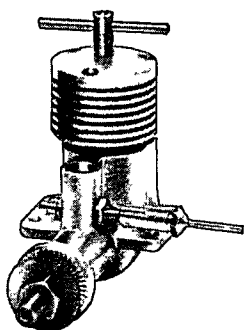
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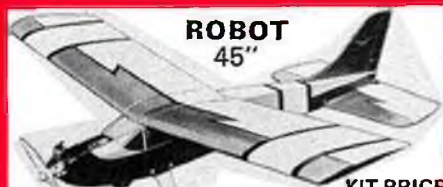
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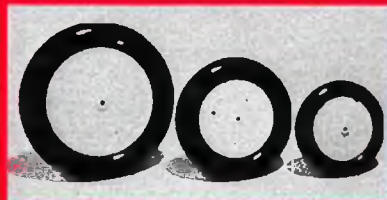
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