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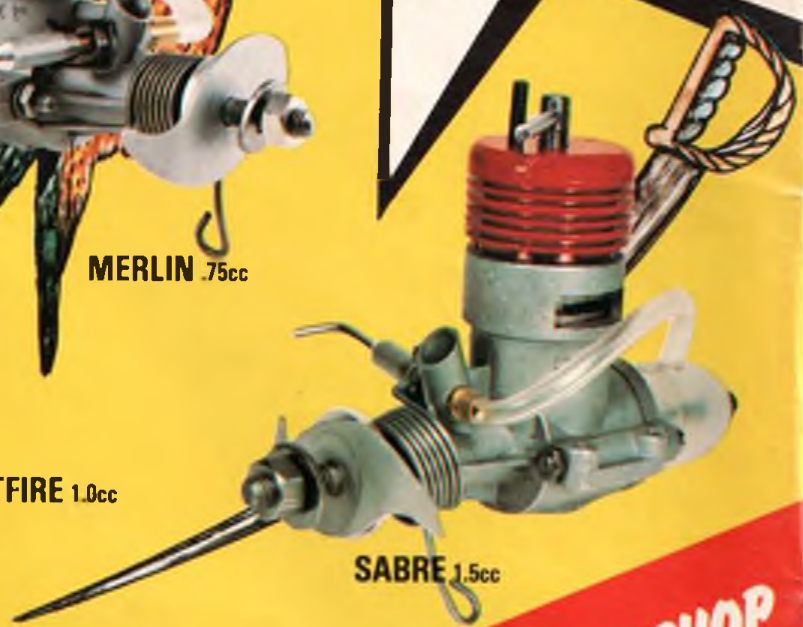

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# Aeromodeller

MAY 1981

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*EDITOR* COLIN RATTRAY
*Graphics* LORNA CULLEN

MAP MODEL DIVISION MAGAZINE

*Advertisement Director* M. GRAY
*Managing Director* RON MOULTON


## Comment

THIS year the Free Flight Nationals will again be held at RAF Barkston Heath on May 23, 24 and 25.

Last year the event was held at the same venue, and was well supported. The SMAE anticipate the same large turnout for this year's three days of flying, and are including a few additional items. There will be a free flight seminar, a Wakefield event to pre-1954 rules, a demonstration of indoor flying, plus many junior competitions. With this mixed bag of serious competition, fun and social events, there should be plenty of interest of all tastes.

One event will be a 'Chuck for Britain,' this is for hand launched gliders. People will be asked to sponsor the British competitors of this year's Free Flight World Championships team, to help with their travel costs to Spain.

Camping for the weekend costs £6 per person or £5 per person if a pre-booking is made. Pre-bookings should be sent to the SMAE office at Kimberley House, Vaughan Way, Leicester. Daily entry will be £1 per person or £2 per car. A coach will be charged £1 per person.

There is a lot to be seen at the Free Flight Nationals, and if the weather is good, you will have a most relaxing weekend. Don't forget if you write to the SMAE for permits to make sure that you mention 'Free Flight Nationals' on this occasion, as C/L & R/C Nationals follow in August on the same site.

If you have any queries, write to the SMAE, or contact the Free Flight Nationals co-ordinator, Bill Blake at the Leicester address.

Incidentally, Bill is looking for a campsite director or small team willing to do this simple job. He tells me that there are inducements! Full details of events will appear in the next issue.

## Contents





*ISSN 0001-9232*

**Volume 46 Issue No. 543**


### ON THE COVER

Clive Smalley's radio controlled slope soarer 'Bluebottle' this month's free plan. Inset is of 'Humdinger,' a control-line stunter designed by John Stroud. See page 336.

### NEXT MONTH

We have a major scoop! A report from Martyn Cowley (recently departed editor of Aeromodeller) on the 'Solar Challenger,' the world's first truly solar powered man, or as in this case, woman carrying aircraft.

A full size plan for a semi-scale type model, powered by the new 'Arden' rubber powered unit.

Latest news from the vintage scene, includes a three view drawing and photographs of some of the great models of the past that are still popular today.

There will also be plenty for free flight and control line enthusiasts, plus a review of a radio controlled SE5 and trade topics.

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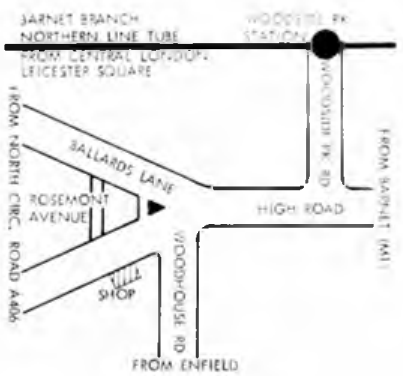


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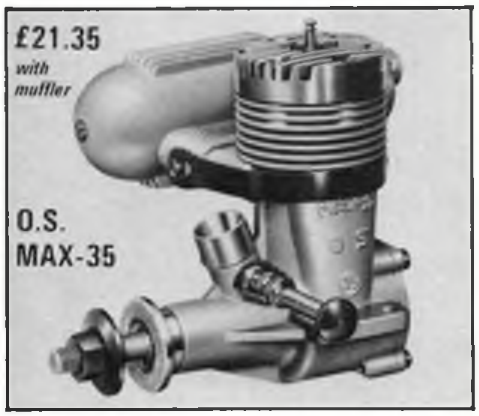


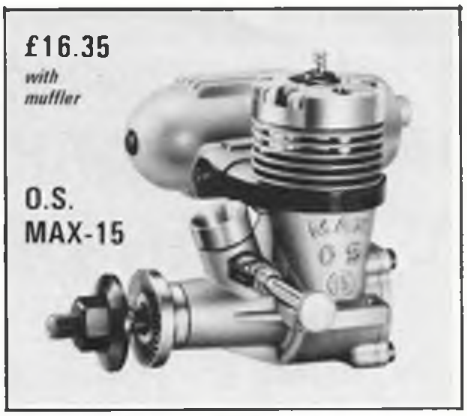






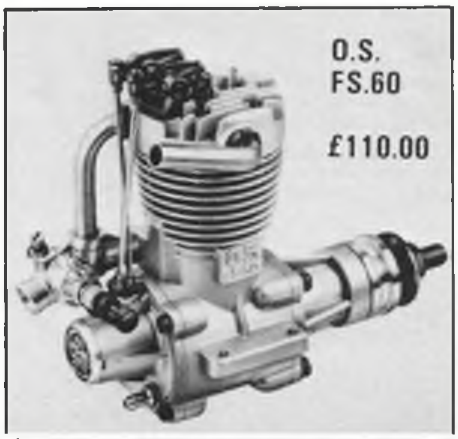


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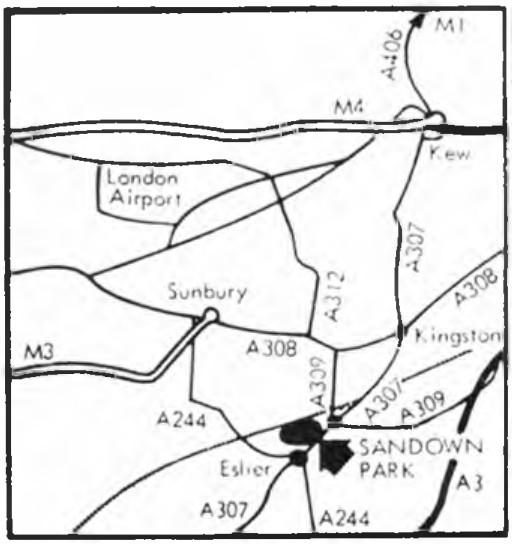


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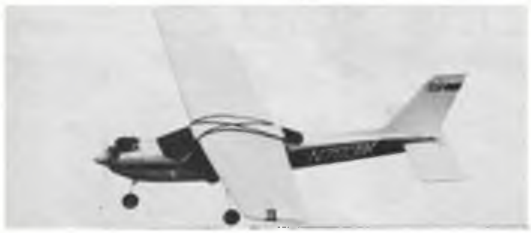

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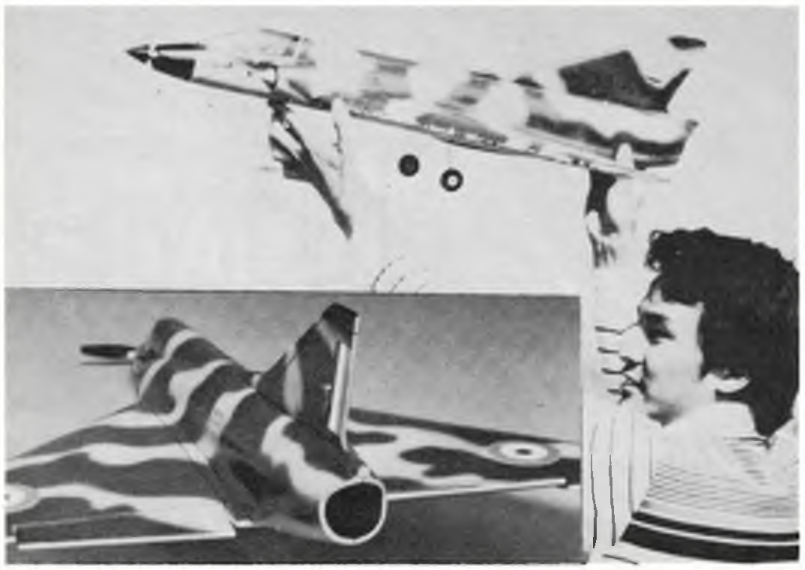

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A pair of Mini Goodyear class, profile fuselage team racers of all sheet simple construction. Designed for 0.8-1.5cc engines, they provide a perfect means of introducing Juniors to C.L. racing. Both span around 19in (483mm).
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**BLACKBURN 1912 MONOPLANE**
*by A. M. Finucane*
Perfect ¼th scale, free flight 48in (1219mm) span model of a pioneer monoplane, this "old timer" will fly as well as any of its modern counterparts with 0.8-1cc motor.
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**Plan FSP/682. Price £2.00.**

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**Plan RTP/1277. Price £2.00.**


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# Hangar Doors

*Seen at Elstree, Spencer Flack's full size Bucker Bu131 Jungmann*

## SWITCH ON — HOLKER HALL

This stately home, only 12 miles from exit 36 on the M6 and four miles west of Grange-over-Sands will run a second annual open model flying rally on May 30/31. John Bridge tells us about 200 entries are expected at this event which proved to be very popular in the north-west when launched last year, achieving an Old Warden type atmosphere with the close mown grass in delightful surroundings. There will be a helipad, a 200ft take-off square and possibly a portable hard runway. Free camping is available for competitors and a special welcome is open to all disabled people.

A one day event is scheduled for September 13 at the same location. Being only ten minutes' drive from Lake Windermere, a trip to Holker Hall can make a very attractive weekend for southerners too.

## AMA PRESIDENT

After a series of traumatic situations over the November to January period, the largest modelling organisation in the world, finally appointed its new President in February. Close voting, anti-establishment campaigning, and vindictive attacks on key personnel, made the Academy of Model Aeronautics elections more like those other political hustings we fail to comprehend, whenever US Presidential campaigns are exposed to British eyes.

Out of the melee, it is now John C. Grigg of Lockport, NY, who leads AMA. John has represented the important district II area, embracing New York and New Jersey, in the AMA Council for many years. His appointment brings confidence in a democratic system, which had been sorely stretched in its tolerance of opposition views, and which will surely now go ahead all the stronger for its recent experiences.

## SCALE MODELS

The May issue of SCALE MODELS carries a wide variety of feature articles and topical model reviews. Further reports on the 1981 ME Exhibition, Trade Fair News, and the new Airfix Focke Wulf Fw190, are supported by continuation of popular series such as USN Colours, Aircraft of 100 Group and Colour Spot.

Feature articles this month include: a vacform WWI Halberstadt CL-II, with new updated scale drawings and photo reference, a recent visit to one of the last RAF Units to fly the Vulcan V Bomber, colour data and drawings for Zakspeed Ford Capri and Escort, and a description of how award-winning modeller Vic Cook, converted a vacform Hawker Horsley into a Dantorp. All this and colour pages too in the May issue of SCALE MODELS — on sale April 3, 1981

## NEWS FROM SHUTTLEWORTH

The famous de Havilland DH 88 Comet G-

ACSS, winner of the MacRobertson Air Race from England to Australia in 1934, has been moved to a position of prominence in the Shuttleworth Collection at Old Warden and will be on view to visitors during the remainder of its restoration programme. This forms part of a plan to intensify and publicise the work, which has become possible through further offers of practical help from organisations within the aviation and allied industries.

To ensure that there will be the closest possible liaison between all the companies and individuals involved in this ambitious task, Ron Paine has been appointed Technical Coordinator.Mr. Paine is one of the most experienced engineers in this field, starting as an aircraft apprentice at Brooklands in 1928 and later became Chairman and Managing Director of British Midland Airways. As Technical Director of Wolverhampton Aviation (one of the companies that eventually became BMA) he was responsible for some very involved work on a wide range of light aircraft, including completion of the last batch of Gemini light twins (the Gipsy Gemini) after Miles Aircraft Ltd. had ceased trading.

Although the main work on the Comet is being undertaken by the engineering staff of the Shuttleworth Collection, the project would have been impossible without the extensive help provided by the Hatfield base of British Aerospace, acting as today's successor to the de Haviland Aircraft Company which built the aircraft. Other help has come from British Airways (engine bearers and undercarriage components) and Hants and Sussex Aviation (who have completely overhauled the DH Gipsy Queen engines), while Dowty-Rotol repaired and overhauled the undercarriage legs and Ciba-Geigy have provided all the glue for the wooden airframe. Many other firms and individuals have participated in the project. There are far too many to name here.

With the renewed pace of the programme, several other companies are providing strong support. Specialised Mouldings of Redwongs Way, Huntingdon, Cambridge, have made a plastic mould that has enabled Old Warden craftsman, Bert Etheridge to form the complicated shape of the Comet's wooden fuselage top and bottom decking. The Aviation Division of Dunlop, of Holbrook Lane, Foleshill, Coventry will be providing tyres, tubes and all fireproof hoses. Marconi Avionics of Christopher Martin Road, Basildon, Essex, have offered help with the avionics (radio) package, especially in the form of Airborne Direction Finding equipment. Lucas Aerospace, who have helped already on magneto and other related items, have offered to provide the aircraft's main electrical gear: Plessey Aerospace of Abbey Works, Titchfield, Fareham, Hants, will be supplying the special landing lamp that fits in the fuselage nose cone. CSE Aviation of Oxford have supplied the anti-collision light.

All this specialised support has become possible due to the historical significance of this aircraft, marking the important part that it played in boosting the British aircraft industry in the thirties. However, if the background to the Comet and its achievements escape you, read on.

**The background:** Late in 1933, Sir MacPherson Robertson announced that he would be awarding substantial prize money for winners of an air race to be held in the following year from England to Australia. This was to mark the 100th anniversary of the founding of the state of Victoria and to help to place that isolated area 'on the map.'

Although very little time was available and all other aircraft manufacturers opted out, the de Havilland organisation offered to design and build a suitable aeroplane, at a highly subsidised price of £5,000, in a total time of only nine months. This was conditional upon firm orders being placed by the end of February 1934.

Three orders were received and all three Comets were built in time. All three were at Mildenhall for the start and all three took off in the race. This was an outstanding achievement,for the Comet featured unusual structural methods to meet the streamlining requirement, together with a retractable undercarriage, a long-range fuel installation and variable pitch pro-

pellers. Other participants ranged from a Miles Hawk of the Manawutu Aero Club in New Zealand to Douglas DC-2 and Boeing 247 airliners, but the Comet was the only machine designed and built specially for the race.

The Comet G-ACSS, known as Grosvenor House (because the owner Mr. A. O. Edwards owned the Grosvenor House Hotel in London) won the race in a total elapsed time of 70 hours, 38 minutes and 18 seconds. Later it served with the Royal Air Force for evaluation purposes (the Mosquito of World War II owes much to the Comet design) and on its return to civilian ownership 'CSS carried out several other notable achievements. Its final flight was in 1938 and it spent nearly the whole of the war period standing outdoors, under a camouflage net, at the now-defunct Gravesend Airport.

G-ACSS is the Comet that has survived. In 1951 the (then) de Havilland Aircraft Company refurbished it externally, but removed the engines and all the equipment, to hang it on display in the Festival of Britain. Then it returned to DH for storage, before being passed to the Shuttleworth Collection at Old Warden Aerodrome in October 1965 for public exhibition.

## W. J. 'Bill' Forster†

The 'Grandad' of the model trade peacefully on March 10, 1981 aged 89 after a lifetime of modelling activity. Though perhaps better known for his establishment of 'Veron' the vintage enthusiasts will remember him as the co-founder of Aeromodels, Liverpool and the original Model Aircraft Stores, Bournemouth, which made MAS Kits including the 'Comet Scorpion.' Also for marketing among many other pioneering supplies, the 2.5cc Super Spitfire petrol engine of 1938 and the post-war 7cc Stentor. Bill was amongst the first to market Balsa in Britain, and belonged to the great era of Joe Kenworthy and Eddie Keil, with whom he had many alliances. During the war years he turned out tens of thousands 'solid' kits, turning to control line, free flight and radio control after 1946 as his company developed one of the best known trademarks in the world. 'Veron' carries on under the management of his son 'Bert' Forster to whom we extend out sympathies.

## NEW RTP CLUB

Les Brock has negotiated with St. Augustine's Church in Thorpe Bay, to use their hall once a month for RTP flying, hopefully every second Tuesday from 20.00hrs. to 22.30hrs. There will be room for two flying circles, with approximately 12 to 13 feet flying lines and a ceiling clearance of about 11 feet or so. Until he knows what the response will be, it is not possible to decide on the number of members or age limits. All models will be welcome — Scale, Aerobatic, Combat, Speed, Hovercraft, Cars, etc.

All details can be obtained from Les Brock at 202 Thorpe Hall Avenue, Thorpe Bay, Essex SS1 3SE. Tel: Southend on Sea 585592, or from John Tuff, 79 Tyrone Road, Thorpe Bay, Essex. Tel: Southend on Sea 587050.

The first meeting will be on Tuesday, March 10, 1981.

# What's Happening?

**April 18/20**
SMAE F/F 3RD TEAM TRIALS FOR WORLD CHAMPS — SATURDAY F1A 1st round 9.00am-10.00am
SUNDAY F1B & F1C 1st round 9.00am-10.00am
MONDAY F1A, F1B & F1C Timetable to be published on day. Contact Mike Coomes Tel 0949 42034. Venue to be announced

**April 19**
ST. ALBANS MFC OLD TIMER MEETING — Contact David Baker Tel 01 883 9013

**April 26**
NOTTINGHAM MAC INDOOR SCALE FLYING incorporating SMAE INDOOR SCALE NATIONALS — *RUBBER SCALE, PEANUT CO₂* Venue Derby Municipal Sports Centre, Moor Lane, Derby 12.00-6.00pm Flying fee £2 Seniors, £1 Juniors plus entry to centre plus SMAE competition fees. hall size 120ft × 120ft × 30ft approx. soft footwear essential. Contact Barrie Hotham, Tel Mansfield 34127

**May 2**
AEROSPACE AND VEHICLE CLUB — ANNUAL EXHIBITION — aircraft, military models, civilian vehicles etc. Venue The Clubhouse, Wombourne, just off the A449, four miles south of Wolverhampton. Doors open at 10.30am until 5.30pm. Contact N. D. Robinson, 50 Balfour Road, Blanford Mere, Kingswinford, Brierley Hill, West Midlands DY6 7DJ

**May 3**
ELLIOTT SPRING RALLY — *¼A TEAMRACE, GOODYEAR, FAI TEAMRACE, ½A COMBAT, CARRIER (PROFILE 40)* Venue Marconi Avionics, Rochester, Kent. Contact Peter O'Neill, Tel 0732 57899
WOLVES FLY-IN (CONTROL LINE) *F2B · NOVICE & JUNIOR STUNT CLASS II SCALE, CARRIER, SMAE OPEN & 40 PROFILE MINI GOODYEAR SMAE RULES BUT NO AGE LIMITS, ½A COMBAT* Entry fee £1. Venue Lucas Aerospace Sports Field, Stafford Road (A449), Wolverhampton, West Midlands (Signposted on A449 north of Wolverhampton) Contact C. S. Elliott, Tel Wolverhampton 76383
SMAE LONDON AREA MEETING — *C/L SPEED ONLY* Venue Old Army Parade ground, Bicester. Contact Paul Eisner, Tel Lea Valley 760849
KITE SPRING FESTIVAL Venue Old Warden Airfield, Biggleswade, Beds
RAFMAA FREE FLIGHT MEETING *O/G, O/P, O/P, F1A, F1B (Thurston Trophy), F1C, HLG* All SMAE members welcome. Venue Barkston Heath, Lincs. Contact F/Sgt Brian Baines, MSF, RAF Leuchars, Fife Tel 033 483471 Ext. 426

**May 3**
RAFMAA 100s Meeting. Venue RAF Barkston Heath, open to all SMAE members. Pre-entry £2 (£1 returnable on the day) to Flt/Sgt Norman Mitchell, MTSS, RAF Wattisham, Ipswich

**May 4**
RAFMAA SUNRISE CONTEST *F1A, F1B, F1C. About 5.9am weather permitting. Venue Barkston Heath. Go/no go decision based on weather forecast, will be made at Barkston Heath on May 3. Contact F/Sgt Brian Baines MSF, RAF Leuchars, Fife Tel 033 483 471 Ext. 420*

**May 9-10**
SCUNTHORPE SOCIETY OF MODEL ENGINEERS — MODEL & MINIATURE STEAM SHOW. Venue Sunshine Hall, Ashby High Street, Scunthorpe. Sat 12.00am-7.00pm Sun 10.00am-5.00pm. Admission adults 40p, children 20p (advance tickets 35p and 15p respectively). Contact R. D. Needler, Tel 0724 844890

**May 10**
BATH MAC *F/F, O/P, O/R, O/G ALL IN FAI, ALL IN MINOR CO, AND HLG, C/L FAI COMBAT, ½A COMBAT TEAM RACE FAI & ½A, POSSIBLY AEROBATICS* Venue Merryfield, Nr. Ilminster, Somerset. Contact E. Burles, Tel 331126
ELVINGTON NORTHERN AREA R/C *CLASS 2 SCALE* SMAE ONLY. Contact Tel 0635 2580
PETERBOROUGH MFC *2nd ROUND CLASS 'A' DIESEL COMBAT* Venue The Embankment, Peterborough. Contact Neil Gill, 4 Beech Road, Glinton, Peterborough PE6 7LA Tel P'Boro (0733) 252645

**May 10th**
SMAE 2nd CENTRALISED C/L EVENT *½A T/R, FAI T/R, ½ COMBAT, CARRIER* (O&P), AEROBATIC NOVICE & F2B, FAI SPEED (SMAE members only — cards to be shown — 50p levy for airfield) Venue North Weald, Essex

**May 17**
TYNEMOUTH MAC F/F RALLY F1A (5 rounds) O/R, O/P, COMBINED MINI, HLG Venue Albermarle Barracks (ex RAF Ouston) 15 miles west of Newcastle upon Tyne. 10.00am start. Contact Ron Pollard, 23 Ivy Road, Newcastle upon Tyne NE6 4PU Tel 0632 623737
SAM 35 MEETING Venue Biggleswade Common, Beds

**May 18**
EAST ANGLIAN AREA SMAE *OPEN ½A COMBAT CONTEST* Start 10.00am. Venue Changtry Park, Hadleigh Road, Ipswich, Suffolk. Limited pre-entry £1 (sae for map and rules) Contact A. Malcolm, Tel Ipswich 40896

**May 24**
THREE KINGS C/L SCALE FLY-IN. *PROFILE AND CLASS 2* Trophies for all types. 5p entry per flyer. Venue Old Croydon Aerodrome, Purley Way, Croydon, Surrey. Contact W. Cordwell, Tel 01 764 1661

## EVENTS

**April 17/19**
SOUTH MANCHESTER MODELS GROUP MODEL EXHIBITION — aircraft, boats, engineering, railways, ships, radio control, trams. Venue Embassy Rooms. Sale. 10.00am-9.00pm. Admission Adults 60p, OAP and children 40p, family tickets at the door £1.50p. Trade stands, refreshments.

# BLUEBOTTLE

An aerobatic slope soarer
by Clive Smalley

## Introduction

LET ME COMMENCE this article by first stating that this design was not originally intended to be a full aerobatic "kipper." The main design aim, was to produce a two function first aileron model as a follow-up to my previously published Orange Box design. One design parameter continued from the Orange Box, was the need for good manoeuvrability, to stay within the narrow areas of lift on my local slopes. In practice this has been achieved with the prototype, with an added bonus, for experienced pilots; there being sufficient room within the fuselage for a third servo operating the rudder. However, the model performs well on just aileron and elevator. To further increase the versatility of the model, provision for a ballast box near the centre of gravity has been included on the plan, although this was not fitted to the prototype. This enables the model to be flown in a greater variety of wind conditions. Without ballast the wing loading is relatively light for a slope soarer at around 11ozs/sq ft, giving a good performance in lightish wind conditions, providing the airspeed is kept high.

## YOUR FULL SIZE PLAN

The somewhat unconventional cross-section of the fuselage, was adopted to allow the aileron servo to be mounted on the underside of the wing, without the need to cut away the wing bottom skin, apart from a small slot for the servo connection. It has been designed to accommodate the older larger servos such as the original Futaba type. As the aileron servo lay flat within the fuselage, it was logical to similarly lay the elevator servo flat, giving rise to the phrase, "first of the wide bodied slope soarers!"

## Construction

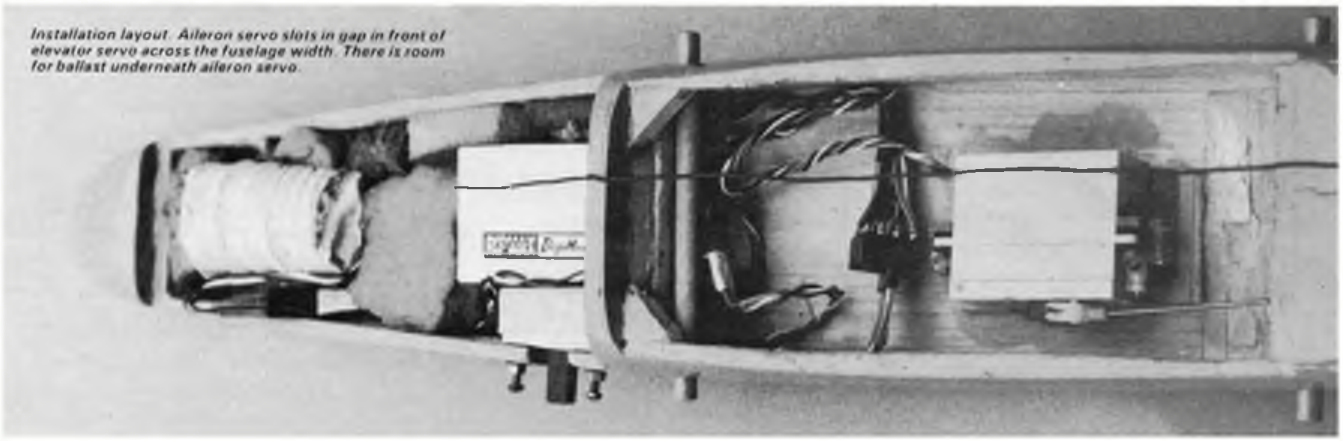
The construction of the model has been kept as simple as possible for fast building, combined with strength and lightness. Although not as economical to build as an open structure, the all sheet wing gives greater torsional stiffness which is useful when ailerons are used.

To speed assembly, the box wing is built over the bottom skin. Mark out and join $^1/_{16}$in sheet for both bottom skins to dead outline size. Mark on all the rib and spar positions. Cut out two sets of ribs by the sandwich method. Pin down a bottom skin and glue on the lower spar.

*How NOT to do it! Do not cut through lower skin as this weakens the structure. Model is designed to have servo mounted onto bottom skin.*

followed by the ribs and top spar. Angle the root rib to the dihedral template. Add the aileron spar and leading edge. Next fit the webbing between the spars making sure the grain is vertical. Finally add in the scrap blocks to take the aileron hinges. When dry, remove from the building board and sand the leading

*Installation layout. Aileron servo slots in gap in front of elevator servo across the fuselage width. There is room for ballast underneath aileron servo.*



edge to match the rib curvature. Do not 'round-off' at this stage. Now fit the tubes for the aileron cables, cutting slots in the skin for the exits at the horn positions and in the centre for the servo connector. Re-pin the assembly to the building board along the trailing edge and tip rib. Pack-up the leading edge at the centre by ¼in and support this along its length with shims of various heights to keep it dead straight. Make up the top skins oversize to allow for the rib curvature. Now glue in position with PVA and pin thoroughly to the existing structure. Leave for at least 24 hours. The packing at the centre will automatically build in the 'washout'. Build the other wing panel to this stage, checking that the washout is identical to the first panel. Make up the aileron cable by soldering a wire servo connector at the centre. Apply epoxy to the centre ribs, slide the cable into each wing panel from the centre and join the panels. Take care not to get epoxy on the cable or in the tubes! When cured, add the wing tip blocks, the centre section trailing edge pieces and the ⅛in × ⅛in spruce reinforcing strips. Sand the wing to a smooth finish. Carve the tip blocks and 'round off' the leading edge. The wing centre reinforcement can now be added using a nylon bandage and PVA glue in a similar manner to fibre-glass and resin. Cut the ailerons from trailing edge stock and hinge in position. Cut the cable to the correct length and solder the servo connector in position. This completes the wing assembly.

The fuselage construction is straightforward. No plan view is shown on the plan as the author feels it is better to mark the centre lines on each of the formers. Draw a straight line down the building board to represent the plan view centre line, and build the fuselage directly onto the board. Plans, especially after they have been folded, do not necessarily become straight even with the most careful sellotaping down and this can obviously lead to a 'banana' fuselage.

Make up a left and right hand side panel, gluing the ply doublers in position with contact glue. Glue F2 to one side panel at right angles, and F3 to the other side panel at right angles. When dry, these can then be joined to form the basic fuselage. Pin in position over the line on the board and pull the tail together exactly over the centre line. Glue and pin. Similarly add in former F1 and support the glue with rubber bands. It doesn't matter if the fuselage is built inverted on the board; use the longest straight, or flat edges. Next add the underside sheet, block and corner reinforcements. Fit the elevator cable if this is to be used. Whilst this is drying, make up the tail-plane/elevator assembly and cut out the fin. Use light but firm grade material. Epoxy the tailplane to the fuselage assembly and fit the rear top decking. Fit the hatch retaining plates, spot glue the hatch in position and epoxy on the nose block. Carve and sand the fuselage to shape and smooth off. Cut the hatch free and fibreglass inside the nose compartment. Glue in the wing dowels and finally epoxy the fin in position. This completes the basic airframe woodwork.

## Covering and Finishing

The model is suitable for any type of covering material. The author prefers coloured tissue wings with a painted fuselage in a bright solid enamel finish. This helps with visibility problems during flight. I do not advocate using nylon on all sheet wings as it is very difficult to repair the odd nick and split which is bound to occur.

Whichever method of finishing you adopt, do keep it as light as possible. Heavy models don't soar so well!

## Flying

Choose a moderately windy day for test flights. The model is responsive to ailerons and can be turned very tightly once mastered. With this type of model, it is always better to fly fast. Do not let the model slow down when heading into wind but squeeze slight down elevator to keep the speed high. Speed produces lift so don't be afraid of using down elevator. Better control response is obtained with speed and there is obviously less danger of stalling out. Remember the elevator is basically a speed control device. This also holds true for power models and full size aircraft.

When entering a turn, always begin to roll the model before applying the elevator to actually carry out the turn. With practice there is a little time lag between rolling and turning but if you apply elevator first, the model will rise and slow down. Application of aileron could then easily create a situation where the model stalls out.

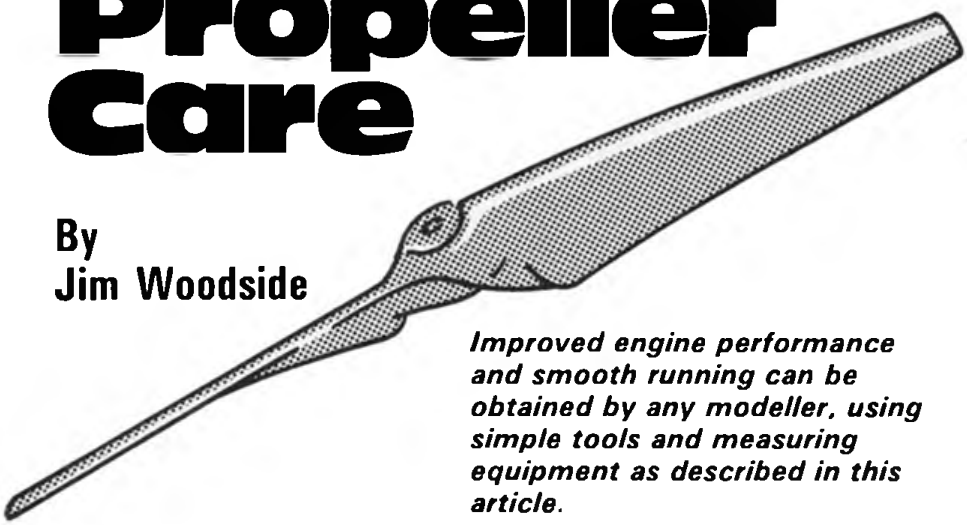
Finally, I do hope you have as much enjoyment from building and flying the *'Bluebottle'* as the author.

*Author's flying companion Alvin Grimley holds the prototype, displaying handy size for transportation.*

*Left: the tailplane assembly, showing the elevator pushrod outlet on the prototype model. This could be cleaned up by using a Micro-Mold ABS plastic fairlead cowl.*

*Right: a good firm launch into wind, off the slope and you are in business!*

# Propeller Care



By
Jim Woodside

***Improved engine performance and smooth running can be obtained by any modeller, using simple tools and measuring equipment as described in this article.***

WHATEVER THE BRANCH of aeromodelling the individual modeller is interested in, it is the normal experience that over the years his aircraft perform better. There are many reasons for this, for example:

— improving construction skill,

— increasing knowledge of engines and their operation.

In other words acquired skills and experience pay off in terms of performance.

The purpose of this article is to show that the benefits in performance resulting from increased skills and experience come not only from improved construction, motor operation and other basics but also from apparently secondary things like propellers. By paying attention to the prop, very useful benefits in smoother running, higher speeds and the like can be had. Here I give my own experience in this area, but let me emphasise that one does not have to be competition minded to utilise at least the basics, for simply by choosing a prop in a rigid material and balancing it, vibration can be reduced, model life improved, component failure rate reduced, and engine runs improved. All good things — so read on. If you are competition minded, whether in R/C, F/F or C/L, you can be sure that the ones who do the winning are following most, if not all, of what I describe here — even more motivation to read on!

In order of simplicity, the steps to better prop performance are:

1 choice of prop in stiff material
2 balancing
3 pitching the prop blades
4 forming an accurate airfoil on blades.

You can expect

1 smoother and better performance
2 to achieve consistent results
3 to be able to reproduce good props
4 to experiment logically
5 to reduce noise levels in some cases.

## THE CHOICE OF PROPELLER

The first choice of most modellers is the plastic propeller, they are cheap, readily available and forgiving of minor crashes. However, with the exception of the glass filled variety, they are flexible. This means they distort easily, (watch the blades of a plastic prop as an R/C engine is alternately revved up and closed down) — and are consequently losing efficiency. All flexible nylon props should be boiled in water for about 15 minutes to reduce any brittleness in the material. One should never put one's face in the same plane as the spinning prop disc in case a blade should be shed.

For better performance stiffness is then an important requirement. If the prop is to be balanced or further modified it should

1 be made of a material which can be carved by appropriate tools
2 have sufficient blade thickness to allow process (1) and still have sufficient rigidity left in the structure.

Thus the choice is limited to

1 wooden props
2 epoxy-glass mouldings
3 epoxy-carbon fibre mouldings.

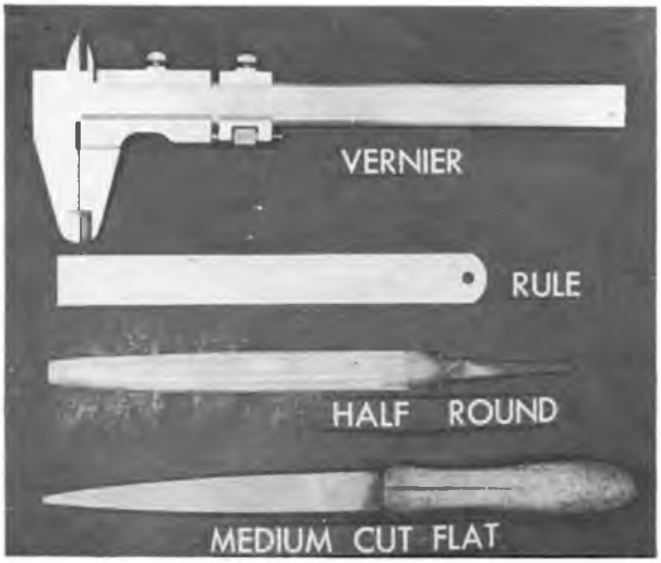
Wooden props are about the same price, size for size, as nylon. Epoxy mouldings are much more expensive but, damage apart, stable and very durable.

## THE EQUIPMENT NEEDED

Most of the equipment needed is illustrated in photographs 1, 2 and 3. Obviously you can get by with far less if you start by simply balancing the props before use. A full set consists of:

1 pitch gauge — see list at end for suppliers
2 prop balancer
3 vernier caliper gauge — a very simple, cheap one is good enough
4 steel rule — 6in or 12in
5 6in second cut (medium) warding file — the tapering blade width is useful
6 6in half round file for radiused corners
7 280 grade wet and dry
8 soft pencil or fibre tip pen
9 lots of patience

1




2


***Right: propeller mounted in a balance cradle to establish static balance.***

***Left: measuring equipment and a selection of files required for trueing pitch.***

**Note:**

The dust from glass or carbon props can cause skin irritation. Barrier cream is a help. Wash your hands under running water. If your hands are sensitive wear thin cotton or disposable polythene gloves.

On the assumption that you have assembled all the above equipment (rather than a new car!) I would like to describe all the processes involved in turning a moulded blank into a finished prop. The stages are related to an FAI team race prop but apply equally to any size and type of prop. However wooden propellers and many R/C size glass fibre props are finished for immediate use.

## USING A PITCH GAUGE

**Study photographs 3, 4 and 5.** Most gauges follow the same basic pattern as the JF pitch gauge used in the illustrations.

**Photograph 3:** shows the scale face — graduated in both inches and millimetres of pitch per rev. Notice that there are ten separate vertical scales.

**Photograph 4:** shows the base with its grooves milled parallel to the scale and cursor. Notice that these grooves are numbered according to the radial distance from the hub. Each groove has a corresponding scale on the face eg 30 on base must be used with scale 30.

**Photograph 5:** shows the main components of the gauge disassembled, which is useful for storage or travel.

The carrier enables the prop to be moved from slot to slot and lifts the prop sufficiently to clear the cursor.

Quite simple so far. With the prop firmly attached to the carrier at right angles to the face, the carrier is put into the first groove, the cursor brought against the rear face of the prop blade and a reading taken on the appropriate scale.

## PREPARING A PROP FOR PITCHING

Most glass fibre props are made in simple two part moulds, although Jurgen Bartels' fine products are made in steel moulds, which have heated electrodes built into the casing. As sold they usually have an amount of moulding flash around the hub and blade edges. All the props shown in **Photograph 6** have been found to be good regarding construction, strength and basic truth of the relationship between each blade. The wooden 'Punctilio' used for aerobatic flying is also made to a high standard.

**Step 1:**

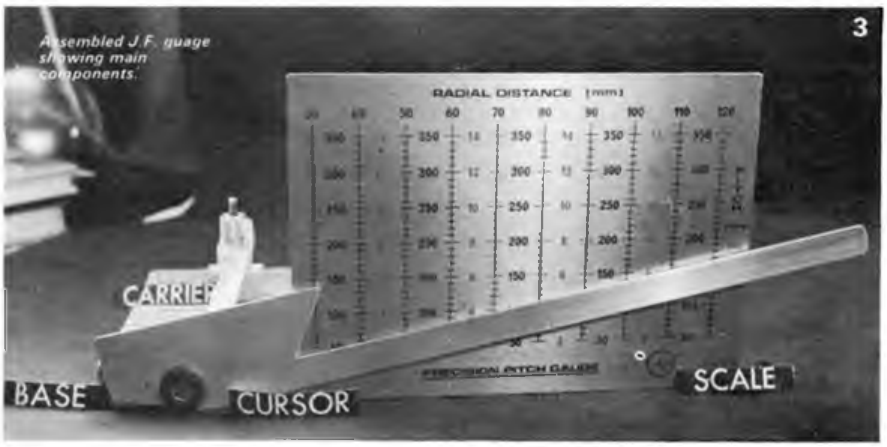
Using the flat file, remove all moulding flashings being careful not to cut into the blade area. Usually the blade outline can be seen. If doubtful, emphasise the outline with a felt tip pen. Clean flashings from hub. Pass a file over the rear of the hub face to clear obvious unevenness. Make sure that there is sufficient clearance for the carrier to seat cleanly, without fouling the blade root, especially with the cuffed root variety.

**Step 2:**

Mount the propeller on the carrier at 90° to the base. The cone nut will centre the prop automatically — **study Fig. 1.** The aim is to check that the prop is parallel along its length with the base. Take about three readings on each blade with the prop placed in the central slot on the base. Gently file the hub along the axis to adjust until any discrepancy is removed.

**Step 3:**

Check that the back of each blade is reasonably flat — file gently if not, but do not



3

*Assembled J.F. guage showing main components.*

at this stage alter the pitch. Label blades A and B. Take three selected readings on blade A. Make a note of these readings. Turn prop around and take readings on blade B at the same stations as blade A. Make a note of these readings. I suggest you take a reading near the hub, one halfway and one near but not at, the tip.

**Step 4:**

Compare the readings of blade A with those of blade B. If they are not very close (i.e. ¼in or 6mm) you will have to bring them to an average position by filing *across* the hub.

**Study Fig. 2.** Blade A is found to have more pitch than blade B. Looking down blade A from tip to hub, remove material to the right hand side of hub. N.B. Keep rear face flat by filing across full width. Work slowly until satisfied blades are equalised in basic pitch.

File front face of hub parallel to the rear face. Taking measurements with the vernier will tell you when this is achieved but note the remarks, later, on prop washers.

This completes the basic work.

## PITCHING AND EQUALISING THE BLADES

The stages in achieving pitch and equal blades are.

**1** using gauge to set equal pitch at opposite stations
**2** making blades equal width at opposite stations
**3** equal airfoil section at opposite stations
**4** equalise blade length
**5** achieve static balance on balance cradle.

### A) PITCHING

Mount prop on carrier. Check it is at right angles to base slots. Tighten securely.

*Do not remove from carrier until pitching is completed.*

This ensures consistent readings.

**Study Photograph 7**

Place carrier on base at first station. Measure pitch. Draw a line across rear of blade. Note pitch reading. Repeat to tip of blade A.

File back of blade face, adjusting the pitch at each station to desired reading. Lessen pitch by filing towards trailing edge. Increase pitch by filing towards leading edge. Recheck readings as needed.

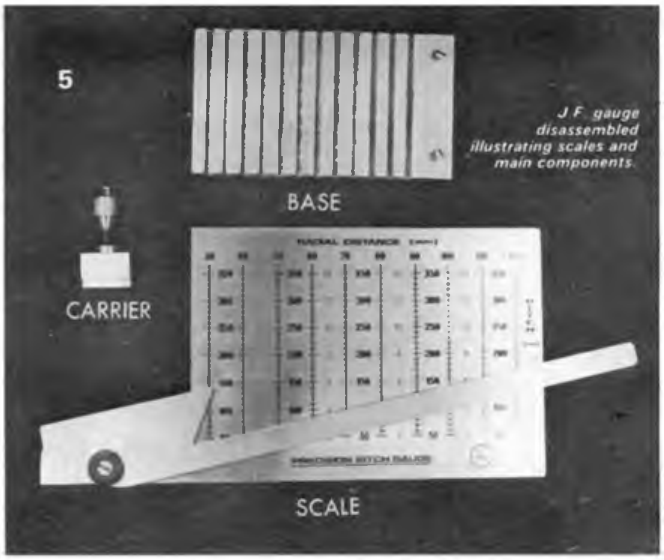
Photograph 8 shows correct hold, supporting blade.

Repeat process for blade B.

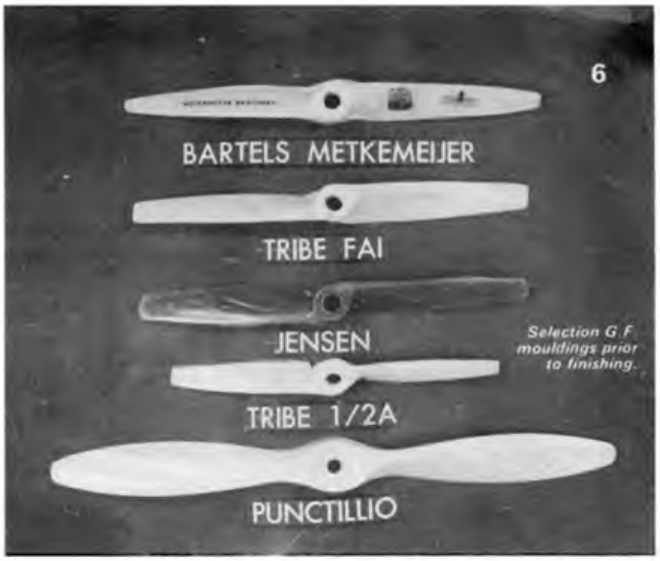
Note: more on 'desired pitch' later in article.

4

*Gauge base with propeller carrier, note radial distances.*




J.F. gauge disassembled illustrating scales and main components.




Selection G.F. mouldings prior to finishing.

## B) EQUALISING BLADE WIDTH

Redraw station lines on back of blades. Measure widths using vernier. Make blades of equal width at each station or trim to desired width.

## C) EQUALISING AIRFOIL SECTION

**Study Fig. 3.** Rub gel coat from front of blade with light strokes of 280 'wet and dry'. Draw a curving line following leading edge at about 30% of chord width back from leading edge. Using vernier measure the blade thickness at the intersection of airfoil high point and station line. Again equalise these at each station or adjust to preference.

Redraw the airfoil high point guide line. Carefully file blades to a flat bottom basic Clark Y section.

## D) EQUALISING BLADE LENGTH

Set vernier to half desired diameter *Less half the diameter of the hole through the hub.* Hook one jaw into hub and draw other jaw across tip to scribe a mark. Adjust blades to length set.

Lightly rub prop with 'wet and dry' to remove file marks but be careful not to undo your work. Seal the blade tips with a drop of cyno glue.

## E) BALANCING PROP

Mount prop on spindle in balance cradle. There should be little imbalance by now. Using a wet and dry, scrape material from the heavy blade until balance is achieved. Note: remove material from the whole area of the blade.

Time taken for your first attempt at these processes could be as long as four hours! But with practice you can reduce this to about one hour while watching television. Do not forget to have some newspaper on your knee. Who said anything about a winter rest?

It may have occurred to you that, with all of this careful work, particularly on the rear face of the prop hub, to get the aerodynamic balance right, the front face of the prop should be parallel with the rear face so as to ensure that when you tighten the prop down, everything stays as intended. Furthermore, with rigid props, if the front face is lumpy and/or not parallel, then when the prop is tightened down hard, you may even crack the hub. Obviously, fitting the front face flat and parallel is a must but with hand tools only it is virtually impossible to get it totally parallel. The solution is to use a fairly thick (say 2-3mm) plastic washer between the front face and the prop washer — DELRIN or NYLON does very well here. The result is no more cracked or wobbly props.

Mention has been made of 'desired' pitch, chord length and thickness. How are these found? Systematic record keeping is the key. I keep a book with headings as follows:

**TYPE OF PROP** i.e. make and model
**DIAMETER and NOMINAL PITCH** i.e. 6¾ × 7½
**REMARKS** i.e. speed, range, carb size

| STATION | PITCH | BLADE CHORD | BLADE THICKNESS |
|---|---|---|---|
| 1 | 5½ | 21mm | 2.3mm |
| 2 | 6¼ | 20mm | 2.1mm |

**Having set up the records department**

**1** Take a basic prop such as Tribe, Bartels, Jensen and clean up carefully using pitches as found but equalised. Equalise all other dimensions. Fly and note results, especially engine run, if you are racing or speed flying. Adjust pitch or diameter as your experience or 'hunches' dictate.

**2** Borrow a successful prop and measure it but remember that it is from a different (better?) engine — model — team combination.

Still it is a good guide.

Any experimentation ought to be undertaken in a logical manner. Remember that you have the following variables:

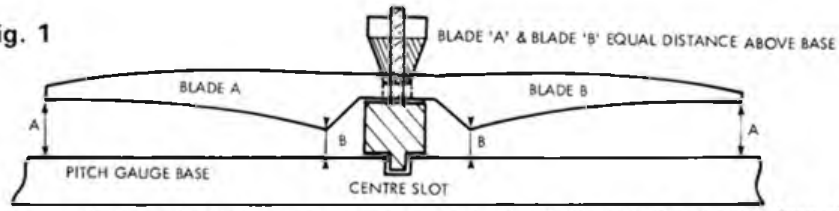
**1** diameter — generally thought to be very important in terms of efficiency as the root of the prop is not very effective because of the interference of the fuselage. Larger diameters may well give improvements in range and speed.

**2** pitch — the degree of 'slip' i.e. the difference between the ideal pitch and the actual distance moved forward, can play an important role. However simply increasing pitch to compensate will not suffice. Besides the efficiency of a prop with 30% slip, may be as high as 85%! (Slip is a ratio of distances but efficiency a measure of work in from the engine and work done by the prop).

**3** airfoil — the thickness of the blade can affect revs i.e. thinner should be faster but if the blades distort, any theoretical gain can be lost.

Bearing costs in mind it is probably better to start with larger diameters which can be

**Fig. 1**




*Truing up the hub along the long axis of the prop. Prop mounted on carrier. Base of gauge used as datum.*

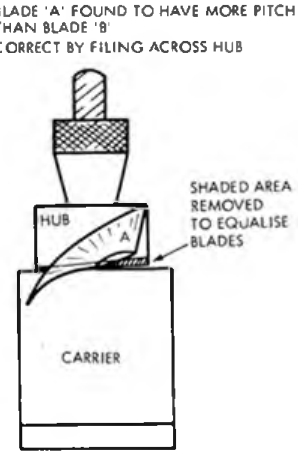



**Fig. 2** *Truing the blades to each other across the axis.*

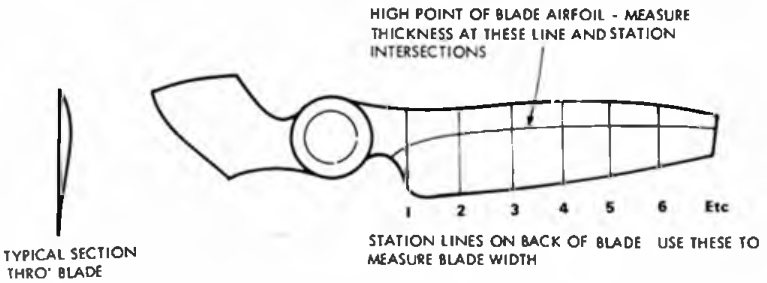
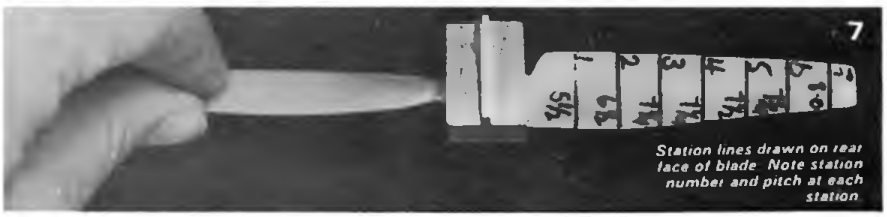




**Fig. 3** *Guide lines for fixing pitch blade width. Blade thickness & blade airfoil.*

'clipped' and thicker blades which can be thinned. Also in the absence of really effective measuring equipment other than the stopwatch, the 'suck and see' method is often the best.

The prop is then only one element in the make-up of a good model. It is, however, an important one and moreover one that can be changed to give optimum performance for competition flyers and smooth low vibration levels for all modellers. I would like to close this section by thanking Hutton Oddy of Australia for really opening my eyes to these possibilities during his stay in England during 1977.




## Directory of equipment and goods mentioned

**The JF Precision Pitch Gauge:**
Available through Irvine Engines via local shops Michael's Models Ref No D-ET3 Price £29.75
Price £29.75.

**Prop balancer:**
Irvine Engines.

**Vernier:**
Engineers Supplies — simplest are OK and cost about £4
Worth checking second hand shops in cities

**Props:**
*Bartels* wide range for all applications
Jurgen Bartels
Postfach 3001
D 2900 OLDENBURG (OLDB)
W Germany

*Tribe Brothers* good quality and value for racing and RC
From DES Model Supplies, Michaels Models or direct from manufacturers

*Jensen* by post from
Jensen Props
26 Centerparken
DK 2500 Valby
Denmark

**Punctilio wood:**
large range of speed, sport and RC props From local shops

All domestic suppliers advertise in Aero Modeller classified section.

# Vintage Corner

*Corsaire built from plans appearing in Zaic 1938 Year Book by the late John Haggart, shown holding model.*

*Alex Imrie gives an introduction to the Vintage Modelling Scene.*

IT HAS OFTEN BEEN SAID that the popularity of the Aeromodeller Vintage Day at Old Warden has to be experienced to be believed, however, despite the constant success and high gates enjoyed by this function, it is still thought by some to mark the only day in the year when the old time models get an airing. This is a misconception and be it known by this writing that vintage models fly all the year round, in all weathers. Night flying sessions on frosty moonlit winter's nights are not unknown, when the pencell illumination navigation light bulb (forced under the wing holding rubbers of a pre-trimmed model) mingles with the stars and traces its path across the sky to the accompanying note of its vintage engine.

The purpose of this coloumn is to show the reader the amount of current activity in the field of vintage modelling. It can only survive and continue to be of interest if you contribute to it, so in keeping with other columnists I invite readers to send in details and black and white photographs of models currently being built and flown. The emphasis must be on the present, since it is mainly news that is required. However, periodically historical matter will be included to serve as an educational aid for new readers.

An increasing number of modellers are concentrating their efforts in building and flying old time models of all types. When one looks at many models of bygone days it is obvious that they are fine designs in their own right, and the passage of time, not even 40 years can detract from their appeal. It is not hard to understand then, why modellers delight in being associated with vintage models. Not many enthusiasts make the spruce, wire and silk models from the twenties and earlier, but, many build models from the thirties since it was in this decade that balsa wood came into general use and model petrol engines were developed as suitable power units. The degree of authenticity obtained by these constructors, however, varies greatly, some of the diehards build models of rare design using original materials and the results of their labours are true replicas in every sense of the word, power driven models being fitted with spark ignition or compressed air engines.

These structures, many of them of plywood and spruce construction, lurch into hesitating flight usually of short duration, but the true vintage enthusiasts savour every moment of their involvement and gladly accept the frustrations associated with dirty ignition timer points, oiled-up sparking plugs and flat batteries, they also absolutely refuse to even consider fitting radio control to their creations.

Other modellers do not strain after 100% realism, they are just as enthusiastic but are happy to reproduce the shape of a well known model from the past using modern materials, and see it fly using an 'out of period' engine.

The most popular models would appear to be those from the period shortly after the end of the war when power model flying was once again being allowed following a four year prohibition from August 1940. At this time not only was there a plentiful supply of petrol engines once again, but the model diesel engine emerged. This new power unit meant for many modellers the end of infuriating problems with spark ignition, and of course, made the feasibility of really small power models a practical

*Above: two young vintage enthusiasts at Old Warden in June 1978 prepare their Ajax for flight. This model, introduced by Keil Kraft in 1940 is still available in kit form and provides a good introductory rubber driven model with which to enter the vintage scene.*

*Below: JC 'Jenny' (span 72in.), a design available from 'Power Models' of Southsea in the late forties, seen at Biggleswade resting between flights. This version powered by a Cameron 23 spark ignition engine was built by John Kemp, and is a regular performer at vintage meetings.*

*The columnist with his Phantom Model 'G' (4.5cc) petrol-engined Bowden Contest, in 1948. Plans for this fine performing design are still available from the Aeromodeller Plan Service 'X' list.*


*Six foot span Turner Special here powered by a PAW 19 diesel engine originally described in Model Airplane News in May 1936, seen in a guise that is fast becoming popular - radio-controlled assist. It is posed here [illegible] builder, Peter Michel, the treasurer of SAM 35.*


*Susan Penhall, representing the younger element, that is attending vintage meetings in growing numbers, holding her father's Kang Kub. A stable slow flying pre-war design by Colonel C. E. Bowden.*

possibility. Dyed-in-the-wool R/C modellers looking for 'something different' are also joining the ranks. They remember particular models from their past and build these old timers fitted with modern engines and radio to produce the 'radio assist' class of vintage model.

Many others at the hobby today now find that they have the opportunity to build the models that were out of reach to them as youngsters. Others have taken up vintage modelling for the relaxation and pure enjoyment that comes from delving into old books and magazines to discover what went on in the game almost 50 years ago. Some modellers, of course, liked the type of model that they built and flew in the old days, and although that might have been many years ago, they have just kept right on doing their own thing, refusing to be influenced in any way by changing trends and advancement techniques that have filled the model press in the intervening years, they are almost the Rip Van Winkles of the movement. All types of modeller, motivated for all sorts of reasons are turning to aeromodelling as it used to be and finding out how really enjoyable it all is.

Of course, it is not only power-driven types of model that are being resurrected, many a fine rubber-driven model or glider is emerging from the pages of old issues of Model Engineer, Aeromodeller, Flying Aces, Air Trials and Model Airplane News.

## SAM

Initially known as the Antique Model Association, the Society of Antique Modellers (SAM) was formed some seventeen years ago in the USA when the growing interest in vintage models indicated that some organisation would be necessary if the aim of 'dedication to the reproduction and flying of antique and vintage model aircraft' was to be fulfilled and for the membership to expand beyond the relatively small number of founder enthusiasts.

**SAM said,**

"The competition flying of free flight model aircraft of vintage design is intended to be casual, enjoyable and interesting for both competitor and spectator alike. It is neither desired to advance the state-of-the-art of aeromodelling, *per se* other than to increase participation in the sport generally, nor to remove again that which is already recorded in aeromodelling history books. The intention of the SAM rules is to categorise the basic types of vintage models and establish an equitable and simple framework of regulations for competition purposes. Therefore, model designs that revolutionised free flight competition necessitated two basic classifications, Antique and Old Timer."

The definitions decided upon at the formation of this body defined an OLD TIMER as a model aircraft which had been designed, kitted or plans published prior to December 31, 1942, and an ANTIQUE as a model aircraft which had been designed, kitted or plans published prior to December 31, 1938. For serious SAM competition work these definitions still stand, but there has been a general relaxation and in keeping with SMAE thinking the VINTAGE model (especially in the fly for fun context) is defined as a model aircraft which had been designed, kitted or plans published prior to December 31, 1950.

Over the last 4 years mainly due to the sterling efforts of Dave Baker modellers in UK with similiar interests were assembled into a loose knit SAM Chapter. Eventually here too it became necessary to introduce organisation and Chapter 35 is now affiliated to the parent Society of Antique Modellers. The first AGM was held in October 1980 when officers were elected and subscriptions decided upon. Members receive 6 copies annually of the news sheet SAM 35 SPEAKS, this journal is an absolute MUST for anyone interested in the vintage scene in UK and contains information on meetings, competitions, articles on vintage models and plans etc. Recent plans have included 'Victory' Wakefield by Larsen, Denmark 1940, 'S-4' a 1939 Abzug 36 inch span high wing power model suitable for the DC Dart, 'Wedgy' by Shulman, a 42 inch span power model for small engines (Class A) the 1940 American Nationals winner, while the Christmas 1980 free give-away was a full-size plan for the 'Baby Buccaneer,' a re-design in small size of the famous Berkeley Super Buccaneer of pre-war days.

Annual subscription is £5 for seniors and £3 for juniors under the age of 15 years. Any reader interested in joining should apply for membership to Peter Michel, Treasurer SAM 35, 56 Lynwood Grove, Orpington, Kent with the appropriate fee.

Membership is now rapidly approaching the 200 mark which makes SAM 35 stronger than some other better known minority groups within the model aeroplane movement as a whole, and warrants that vintage flying should be given more recognition than has hitherto been the case. A number of trophies are to hand for annual competition and a busy year of flying meetings and other functions is envisaged. At the time of writing (February) SAM 35 has already enjoyed its first 1981 flying meeting (kindly arranged by Peter Fisher of Performance Kits) when over 50 members spent a busy Sunday flying on Biggleswade Common on 25 January. The weather was kind and on more than one occasion as many as twenty models were to be seen in the air together, these varied from rubber-driven flying scale and vintage Wakefield and glider models through Sadler's 1940 Pacemaker, Slicker, Junior 60, Bowden Contest and Black Magic to a 1934 ten foot span KG 2 (Kovel-Grant). A good time was certainly had by all, this columnist flew his Super Atom powered Garami Molecule until it was too dark to see to re-fill the fuel tank, and when he vacated the field Geoff Clarke was still hard at it flying his ED Baby powered replica of Arthur Schiffermueller's 29 inch span low-wing model made from plans in the 1948 Aeromodeller Annual.

An added incentive for a vintage enthusiast to join SAM 35 is that he will be able to participate in the frequent friendly

exchanges of plans engines and other accessories amongst members at prices far below that currently charged by commercial undertakings. Finally, in case any modeller feels that before he can become involved in vintage and join in the fun, that he must possess a vintage engine, the following lines taken at random from recent issues of SAM 35 SPEAKS should dispel such thoughts . . .

"An Indian Mills at 200 feet looks no different from an original".

"Reproduction engines such as the Indian Mills are eligible under the rules, and work quite well enough for the sort of flying that we do."

"You don't have to have a vintage engine to compete or even win with, let alone just fly for fun."

C'mon in . . . the waters lovely!

Alex Imrie

## THE JOHN HAGGART MEMORIAL TROPHY

The original aim of the 'Bowden Trophy' of the 1930s when powered model flight was in its infancy of development, was to encourage a type of power driven model aircraft with inbuilt automatic stability and reliability. Realistic slow speed flight of the period was to be encouraged. The 'John Haggart Memorial Trophy' as intended to revive and perpetuate interest in this early tradition.

*1. Models must be authentic replicas of power designs, published in any National model magazine, or kitted, or manufactured prior to December 1948.*

*2. The entrant must be the builder of the model he uses in this contest, and all official flights must be made with the same model.*

*3. Models must conform to the original drawings. Additional nose sheeting and ply reinforced wing joints are allowed. Thrust lines, rigging angles, wing sections or structure may not be changed.*

*4. Power may be by ignition engine, or diesel or glow engines of the appropriate era.*

*5. Wing loading is not to exceed 16 ozs sq ft.*

*6. Models must ROG.*

*7. A total flight time of 60 secs is to be aimed at.*

*8. Each competitor will have 3 flights and the best one will count for the contest.*

*9. Flights will be in 3 rounds, and order of flying will be one at a time - by draw.*

*10. Each competitor will be allowed 3 minutes to get his model airborne. Failure will mean going to the end of the queue.*

*11. Models must land in a normal manner and in sight of the time keepers.*

*12. The flight time may be reduced if the weather conditions are other than reasonable, and this will be decided on the day.*

*13. Each competitor, must have valid third party insurance cover, proof of this will be required before flying takes place.*

*14. The Committee's decisions are final.*


*The late John Haggart originally designed this trophy as a replacement for the lost or stolen Bowden Trophy and it was re-named in his honour after the untimely death of this vintage enthusiast in 1975. The trophy, beautifully executed in aluminium and mahogany has been crafted by professional model maker Pat Tranfield, and is for annual competition. (See text for contest rules).*

# PRACTICAL AERODYNAMICS

## PART 2 OF MARTIN SIMONS' APPROACH TO MODEL AERODYNAMICS

TO GENERATE LIFT, a wing or blade is shaped carefully and held at an angle to the airflow as it moves. The angle of the wing in relation to the direction of the flow is called the *angle of attack*. When a wing, or part of one, is tested in a wind tunnel, every effort is made in these artificial conditions, to hold the angle steady and to keep the airflow smooth for the sake of precise measurements. The information so found being of great value to aircraft designers and engineers. In real flight the angle of attack tends to vary a good deal from moment to moment because the air is not often smooth and the aircraft is not held rigidly. This is particularly important for models because the various disturbances in the air are large in relation to the size and speed of the models so the angle of attack variations tend to be greater than, say, with a jumbo jet. In addition the operator of a model may change the angle of attack. Radio and line-controlled models have hinged surfaces, flaps and elevators etc., whose function is mainly to do this. Some free-flight models have been fitted with automatic trimming devices for reasons like those outlined in Part 1 of this series, and at one time 'pendulum' controls were quite popular for certain types of scale models, the idea being to correct large changes of the wing's angle of attack by use of a swinging weight pulling the elevators in the direction required. Most free-flight models have the trim set before flight and unless something goes wrong, such as a wing shifting on its mount or something breaking, the trim does not change until some adjustment is made by the modeller after a flight. Still, gusts and currents cause the actual angle of attack to vary to and fro on either side of the desired position.

Angles of attack are usually measured geometrically from the chord line of wings and tails, or fins. The chord line is in most cases taken as the straight line through the extreme leading edge or nose of the wing profile, to the trailing edge. Sometimes however, especially on profiles with flat undersides, a line touching the lowest part of the section may be used, largely as a matter of convenience. The angle of this chord line to the datum line of the model drawn on the plans, is not the angle of attack. So long as the wings remain firmly mounted, this rigging angle does not change but as mentioned above, the angle of attack does vary. It is probably best to reserve the term 'angle of incidence' for this drawing board angle but in some writings the angle of attack may be called the angle of incidence, which can cause confusion. What counts in practical model operations is the aerodynamic angle at which the flow meets the surface.

The tail unit of an orthodox model is, for the moment, best regarded as like the fletching of an arrow, designed only to keep the rest of the aircraft pointing into the airflow at whatever angle is required. The special job of the tailplane is to hold the main wing as closely as possible to the desired angle of attack and elevators on controlled models are there to change the mainplane's angle of attack for trim and manoeuvring. It is true that modellers sometimes rig tailplanes in such a way that they generate a little lift as well as trimming the mainplanes. More will be said in a later article about this but for the moment ignore any small lift contribution from the tail and regard it simply as a device for trimming the wing.

If a flat plate, which, in profile, is just a very thin, symmetrical wing, is held at zero angle of attack to the airflow, it will develop no lift. The air will simply be pushed slightly apart at the leading edge and will close in again behind. The only forces on the plate will be slight resistance or drag. Drag is an evocative term descriptive of the way anything passing through a fluid like the air, will pull a little of the fluid along behind it, forming a wake similar to that of a sailing ship passing through water. The fluid resists the movement. The drag of a flat plate at zero angle of attack is quite small but it is measurable and can be analysed into two parts. One part is the *skin drag* caused by the air actually rubbing the surfaces of the plate, causing friction. The other part is *form* or *pressure drag*. The plate has to push its way through and experiences a pressure resistance. A thick plate will generate more form or pressure drag than a thin one. These two types of drag combine together to form what is known as *profile drag*. Profile drag is always with us even with a simple flat plate section.

Small model aircraft can fly quite well with wings made from flat plates. The very smallest hand-launched gliders sold in toy shops are sometimes of this type. The plate-like wings are trimmed, by setting the tailplane appropriately, at a small positive angle of attack and some lift is generated. Providing the angle is not too great the air manages to flow smoothly round the wing and the total of all the pressures on the wing then yield a nett upward force. However, the profile drag also tends to increase; part of the price paid for forcing the air to provide lift.

Since the air behaves like a fluid, changes in one place can have effects elsewhere and in the case of all lifting wings, the approach of the leading edge is felt some way in front and the flow begins to respond before the wing arrives. There is an upwash effect so that the angle at which the flow actually arrives at the leading edge is quite different from the geometric angle of attack. As it passes over and under the wing, the air is deflected down by it and again, this downwash carries on for some way after the wing has gone by. So long as the air does remain flowing smoothly, the final result of this upwash and downwash is to return the air more or less to the same place as it was before the wing passed through. Only the wake, dragged along behind the moving wing, upsets this to some degree.

Note that the flow which is associated with a lifting wing has a generally upward curved pattern; upwash in front, downwash behind (**Figure 1b**).

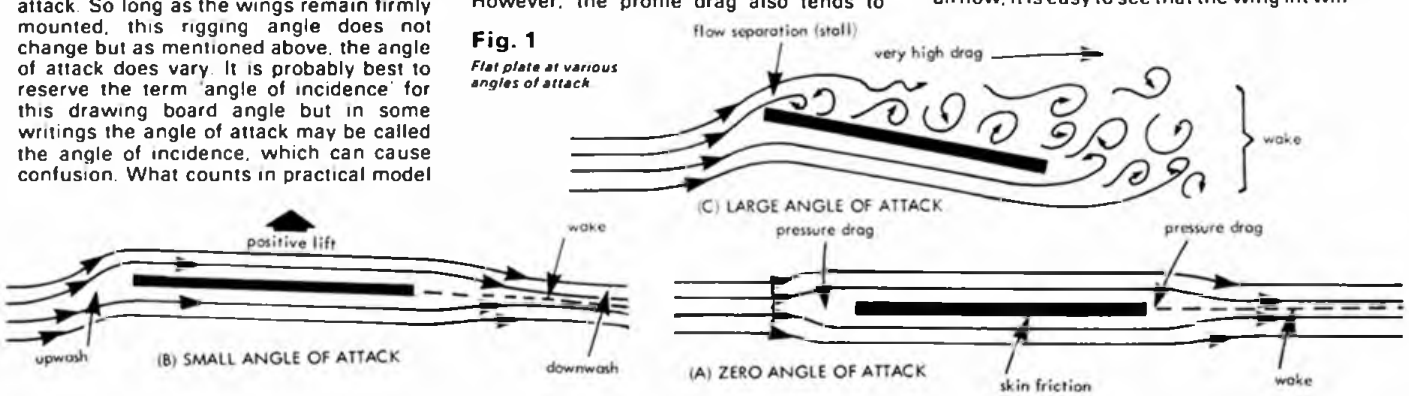
Such thin flat plates are useless for large wings because they cannot be made strong or stiff enough to carry large loads, but in any case they suffer from serious aerodynamic disadvantages. If the angle of attack of the flat plate is increased substantially, the airflow over the upper surface cannot change direction quickly enough and it tends to break away or separate from the upper surface. This does not produce an empty space or vaccum, for the air rushes into prevent this, but the flow thus becomes thoroughly churned up. It forms a series of vortices very like the small eddies and whirlpools visible behind your hand if you move it rapidly through water. The result is a very rapid rise in profile drag and because the smooth, upward curve of the flow is disrupted, the lift is very much reduced. This is a *stall* and flat plates have the disadvantage that they stall at a low angle of attack (**Figure 1c**).

Since tailplanes and fins on some medium-sized models should not have to carry much load they may be designed as flat plates and work well enough but their usefulness in other applications is very limited.

To ease the airflow round the sharp corner at the leading edge and to produce a shape that will conform better to the curved pattern produced by a lifting wing, it seems natural to use a plate that is curved or cambered. Such curved plates are also somewhat stiffer than flat ones so may be useful for somewhat bigger wings.

The angle of attack for a curved plate is also measured geometrically from the chord line through leading and trailing edges but if this line is at zero angle to the airflow, it is easy to see that the wing lift will

**Fig. 1**
*Flat plate at various angles of attack*



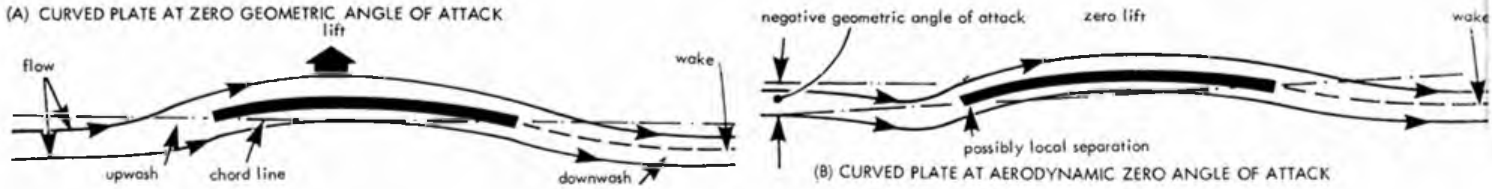



**Fig. 2**

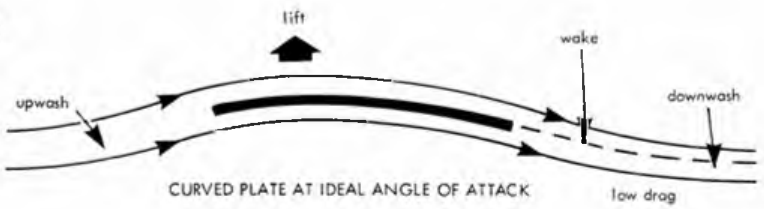

not be zero as it was with the symmetrical profile. Since the plate is curved upwards the airflow is bound to respond and some lift will be produced. So long as the flow remains smooth, conforming closely to the camber, the total drag will be quite low. The air is not badly churned up (**Figure 2a**).

If the curved plate is gradually turned down to a negative angle of attack, the lift force will be reduced and, at some position, the tendency of the camber to curve the flow upward will be exactly equalled by the negative angle of attack tending to curve it down. The actual pattern of flow under these conditions will be quite untidy, but the nett effect will be an average flow without any total upward curvature. The result is, zero lift. (**Figure 2b**) Since the flow is untidy, and since the leading edge meets it at an awkward angle, there may well be some flow separation on the underside, and the profile drag may be quite high. Aerodynamically, then, the cambered profile reaches zero lift at a negative geometric angle. For many purposes this zero lift position is far more important than the geometric zero angle which really has little significance in a flow pattern which is generally curved. The zero lift angle of attack for a curved profile is known as its *aerodynamic zero* and it is often better to measure angles of attack from this rather than from the chord line. A great deal depends on the amount of curvature. If the plate is only very slightly cambered it will behave more like a flat plate, that is, it will yield only a little lift at the zero geometric angle and its aerodynamic zero will not be very much negative. On the other hand, to produce more lift a more curved flow is required and a greater camber will tend in this direction. The aerodynamic zero will then be more negative. If too highly curved the air will not be able to follow the contours of the plate so some separation is likely, so there is a very definite upper limit to the usable camber. Except for very unusual purposes, a 'ten per cent' camber is about the upper limit for model wings. A ten per cent camber is one where the maximum height of the centre line of the plate, is one tenth as high as the chord length, i.e., ten parts in a hundred. If a curved plate is raised to a high angle of attack it will, at some angle, stall just as the flat plate did (**Figure 2c**).

So far what has been found is that a cambered profile will have more drag at its aerodynamic zero, when it develops no lift, than at some higher *aerodynamic* angle of attack where it does yield lift. But as the angle of attack goes higher and higher the drag will again increase and eventually the stall will result. Somewhere between the aerodynamic zero and the stall, there is an angle at which such a section will give lift with very low profile drag. For a slightly curved plate this angle will be near zero, for a more curved plate it will be more, measured from the aerodynamic zero. Thus for each cambered plate there is one, and only one, angle of attack at which profile drag will be at its minimum. This is the *ideal angle of attack* for that profile (**Figure 3**).

It has been supposed up to now that all these different plates are operating in flow of the same speed. Models fly at various speeds, some very fast, others, like indoor duration types and contest sailplanes, slowly. The total upward lifting force obtained from a wing depends not only on its shape, size and angle of attack but on the speed of flight. High speed tends to increase the lift, low speed reduces it. Suppose, then, we have a control line speed model or any other kind of very fast model which we want to make fly as fast as possible. In level flight, the total lift required will exactly equal the weight and the wing provides practically all this lift. This lift can be obtained in various ways. One way would be to use a thin symmetrical profile, close to the flat plate. No model can fly without any lift at all, but if the flat plate is trimmed at a very small angle of attack, it will give enough lift. Unfortunately, the drag will be more than the minimum so the actual speed obtained will not be as high as we'd like. If we go too far the other way, fitting a well-cambered plate, the camber will be too much so that the wing will have to be trimmed to a negative angle of attack, geometrically, and will operate only just above the aerodynamic zero. There will be too much drag again. What we have to do is choose a value of the camber such that, when the lift and weight are equal and the engine at maximum power, the wing is operating at its ideal angle of attack. With a very fast model this means we shall need only a very slight camber, but there will be some; the thin symmetrical profile is not the best.

**Fig. 3**




For the slow model everything is the other way round. A thin symmetrical or plate section is quite unsuitable because to get the essential lift at low speed, the plate would have to operate at a high angle of attack and in this trim it would generate too much drag, indeed it might even be beyond the flat plate stalling angle and then the model would not fly at all. The requirement is again for a wing that will generate the right lift, to balance the weight, when operating at minimum drag at the ideal angle of attack. Thus camber, lift and speed have to be carefully matched.

It is important to note that flight with the wrong camber will be possible, so unless the modeller is very conscious of these principles he may not realise why his aircraft does not go quite as fast, or stay up as long or glide as far, as the best models. For instance, a speed model with just a little too much camber, will fly round the circle well enough, but the wing will be at an angle of attack, aerodynamically, which keeps the lift down to that required for flight, and because of the excessive camber this will create more profile drag. Such a fault might show up as a 'nose down' attitude in flight, but probably not because the rigging angle on the drawings has really nothing to do with the aerodynamic angle of attack in real flight. The angle of the fuselage to the flight line does not give any clear idea of the operating conditions of the wing. In exactly the same fashion, on, say, a model sailplane, flight with too small a camber will be possible but the wing will be trimmed at an angle of attack higher than the ideal. This might or might not give a 'nose up' appearance in flight depending on how the wing happens to be mounted relative to the fuselage. The only evidence of the error will be a higher sinking speed, and the inexperienced modeller may blame this on other factors such as bad luck with sinking air or too much drag from the fuselage.

Thin curved plate sections are quite useful for certain types of model, especially indoor types, for reasons that will be explained subsequently. For models that operate in the rougher air outside, they suffer from structural disadvantages and there are also, as with the flat plate, aerodynamic snags. Trimmed at any angle but the ideal, profile drag begins to rise quite rapidly so adjustments have to be very carefully made and then the turbulence of the natural atmosphere is certain to cause the angle to fluctuate on either side of the desired position. With indoor models such factors are less important and fine adjustments certainly are made to get high durations. But for all other types of model, wings which are less affected by small variations are required in practice. Thicker profiles also allow wing structures to be made stiffer and stronger for the rough and tumble of outdoor flight.

Still, the idea of the *ideal angle of attack* applies to all cambered wings; for every model, then, there will be a best camber value and a best angle of attack, to bring the profile drag of the wing to its minimum.

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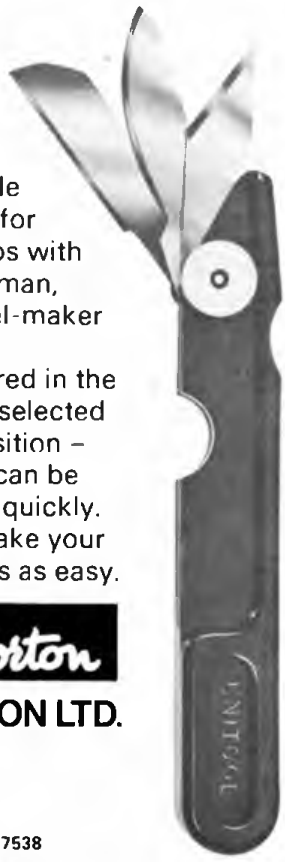

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# HUMDINGER

By John Stroud

## FULL SIZE PLAN TO BUILD A SPORT CONTROL LINE STUNTER

HUMDINGER WAS DESIGNED with three criteria in mind. Inexpensive, simple, manoeuvrable. The idea was to build a plane which provides a worthwhile improvement in performance over a 'straight and level only' basic trainer with as little increase in building difficulty as possible. Many beginners are not happy about built-up and covered wings on their second or third model, so the notion was born to try solid sheet wings and a flat plate section. When talking over the design with the editor last year, he reminded me that one of his free plans had been for a TD 049, profile stunter with flaps on 3mm sheet wings. Thinking that a modest increase in manoeuvrability would be enough, I decided to put pencil to drawing board. A built-up fuselage was chosen because they look a lot better, are stronger and are only slightly more difficult to build. On top of that, it allowed the model to be constructed from just two sheets of balsa plus a few odds and ends. Even if you buy the tank, you should be able to get all the dry materials for less than £3 at the moment.

With only an average amount of enthusiasm, the prototype was taken out for testing on a bitterly cold day in December. The engine was rather difficult to start due to the coldness, and my helpers began to show a strong reluctance to take their hands out of warm pockets. When the G-Mark 06 finally started I set off, slightly rich, on 35ft lines. The model flew well, with good control response but a lack of line tension when flying high.

The next flight was made with a slightly leaner engine, and I decided to explore the stunt capability of the aeroplane. To my amazement, it performed consecutive loops, bunts, horizontal eights, inverted flights and wingovers with plenty to spare. Line section tension was still not good enough so the rest of my young testers stuck to climbs and dives. I went home to thaw-out very satisfied (and slightly puzzled).

That night I increased the size of the fin to improve line tension, but could not get over how well it performed aerobatics. Perhaps I am just unlucky that I have not seen a good sheet wing stunter before. However, I must say the G-Mark 06 certainly seems to do it's bit by churning out lots of power, especially if it is given a brew with plenty of nitro. If you have got a hot little engine and fancy some fast action, then Humdinger is just the plane for you.

Start the construction by marking out the balsa parts on the 10cm wide sheets of 3mm and 4.5mm thick balsa. The trick to getting all the pieces out of one sheet of each, is to mark the fuselage sides out facing in opposite directions, nose outwards and against one edge of the wood. The tailplane then comes neatly out of what is left. Mark everything out faintly at first. I turned mine over and had another go before I got it right. Cut out the wing parts and glue on the tapered leading edge and tips. Note: the grain of the tips must go across the width of the wing to stop warping. The tip radii can be marked round baked bean tins or any similar object. Remember the flaps will come out of the 3mm sheet. If your engine is not a G-Mark, check that it will fit between the bearers as drawn. Adjustment to the width of the body might be necessary for some engines. Cut out the two front bulkheads from 3mm ply. Glue two engine bearers to the rear bulkhead only. The front one can be used as a distance piece but must not be glued into position yet. Leave this assembly to dry whilst you cut out the remaining parts. Shape the 3mm fuselage sides with them pinned together to make sure they are the same. Sand and shape the wing and check it fits properly to the fuselage sides. Sand the tailplane and elevator edges round and fit with sewn or tape hinges. When the first assembly is thoroughly dry, glue on the fuselage sides. Once again use the front bulkhead as a spacer but be careful not to glue it in place. When dry, glue the wing in place — making sure it is true and square. When this has dried, pull the rear fuselage together and glue on the tailplane. View by eye to ensure the two sides of the fuselage curve in equally.

Sand the wings very slightly to give a rounded leading edge and taper the back edge to 2.5mm for the hinge line of the flaps. Round the trailing edges of the flaps. Tapering to a fine trailing edge has a negligible effect on performance and makes it very prone to damage — so do not bother. It is possible to make this model without soldering at all and I made the control system this way. The eagle eyed will notice I soldered the laystrate leadouts but this was because I did not have any 18 swg wire handy.

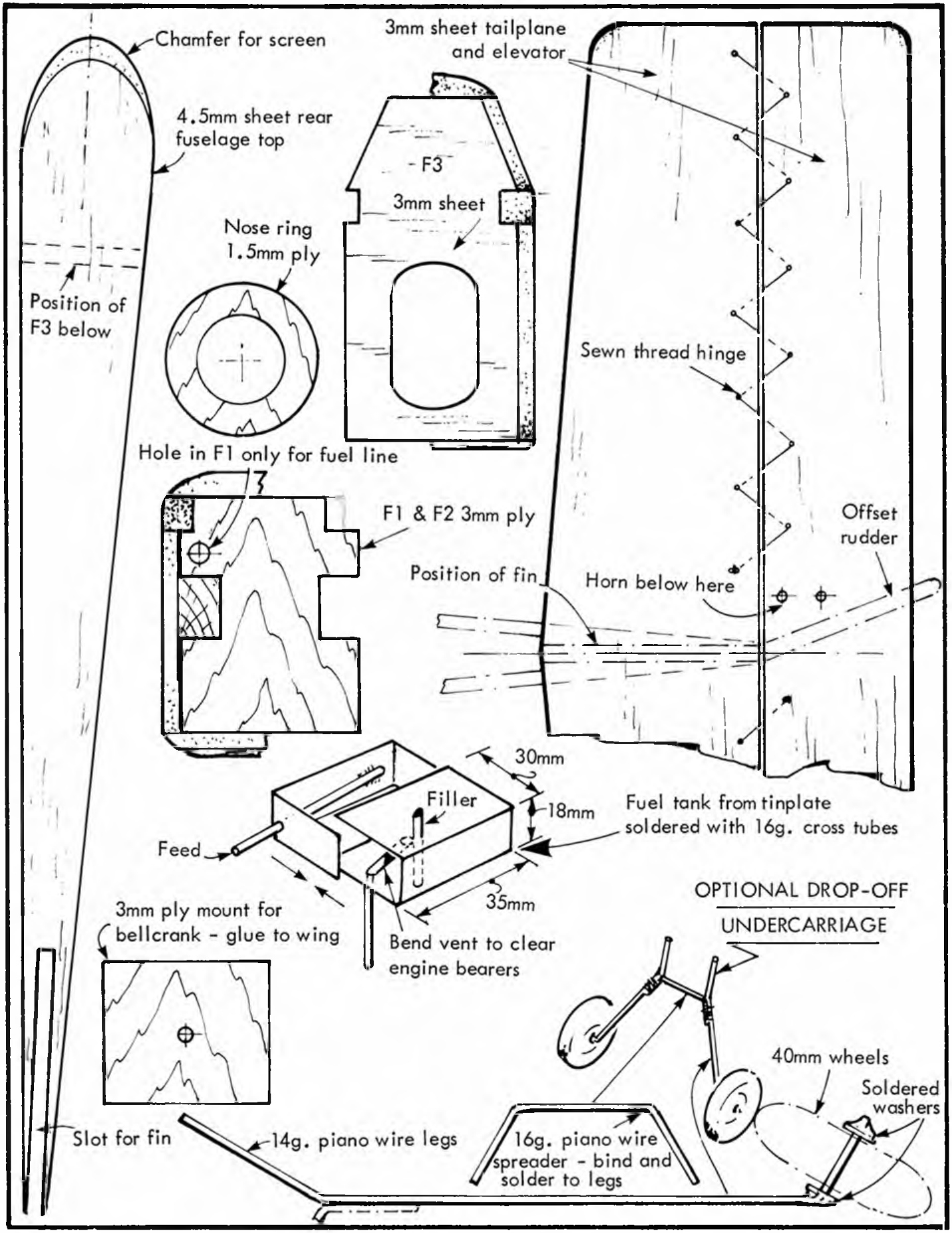
Bend up a horn for whichever system you are going to use. Make sure it is good and true. Wire is cheap and it may take two or three goes to get a good one. Temporarily pin the flaps in place and offer the horn up to them. Mark carefully where the insert will go. Trim the fuselage sides away to clear the flap joiner if necessary. Remove the flaps and make the hole in each flap where the joiner will be inserted with a small drill. Trim some wood from the hinge line to let in the joiner. If using soldered connections, slide the tin plate parts onto the joiner *now*. Araldite the joiner to both flaps and leave on a flat surface to dry.

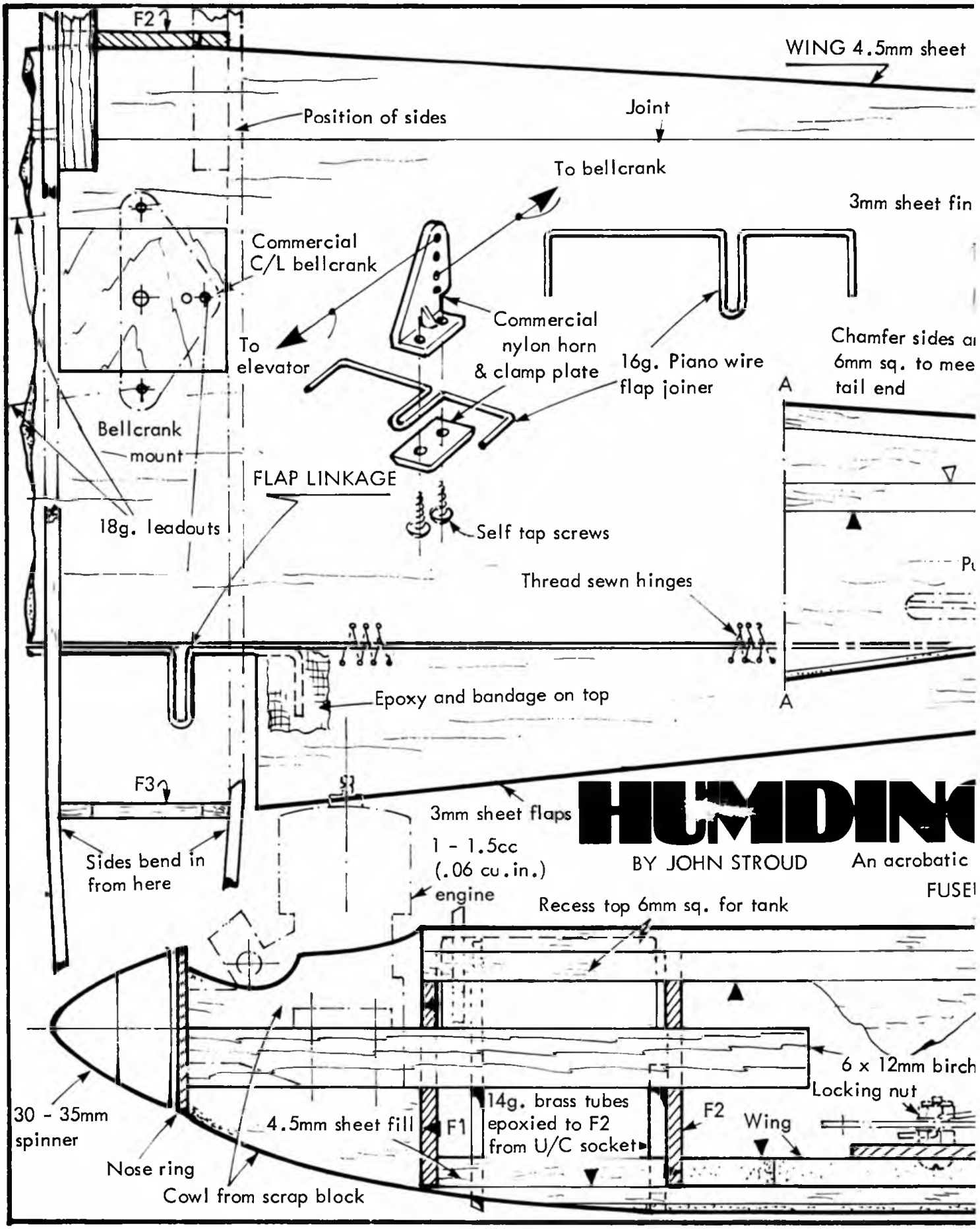
Remember to lay the assembly on thin plastic sheet or it may finish up stuck to your work surface. Glue and bolt the bellcrank mounting plate in position and leave to set. When set, fit the flaps to the wings with a few pieces of sticky tape, then replace them with a sewn or tape hinge. Make up the leadouts and flap push rod and assemble them into the plane along with the bellcrank. Ensure the flaps have at least 30° free movement up and down. Adjust the pushrod length to give level flaps when the bellcrank is central. Now fit the elevator horn and bend up the elevator push rod. Mark out where it needs to come through the fuselage side and make a small hole. Fit all the control system into the plane and adjust as necessary to give exactly neutral elevator and flap at the same time. Now carefully enlarge the elevator pushrod exit opening to obtain free movement of about 45° up and down of the elevator. Yes — the

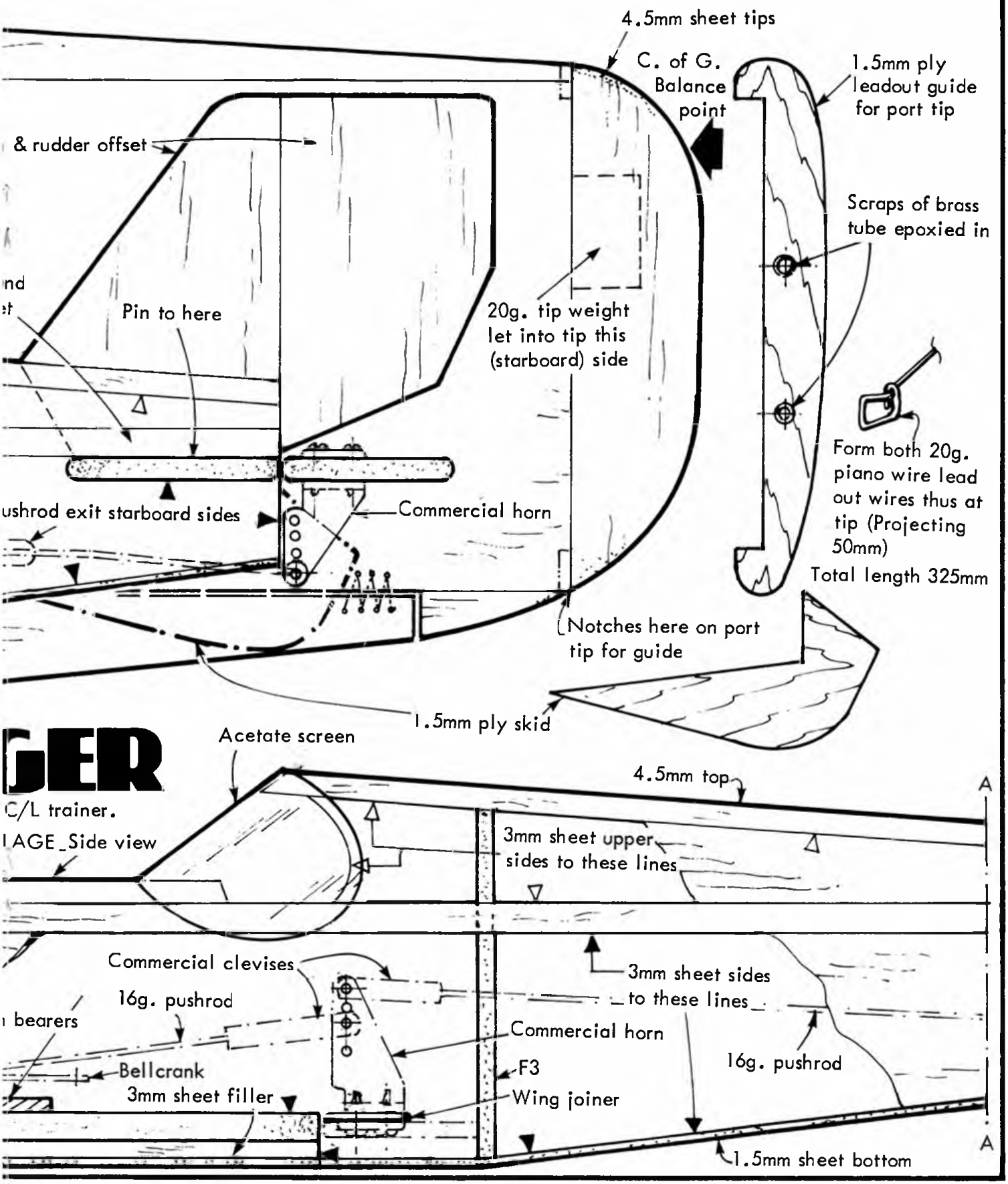
Continued on page 240

*Bellcrank assembly. Make sure the leadout wires do not bind at throw of the bellcrank.*

*Flaps and elevator linkage. Neutral elevator and flaps can be obtained by adjusting the clevis connectors.*







flaps should go down when the elevator goes up. The angular movement of the flaps should be less than the elevator. If this is not so, reduce the effective length of the elevator horn to obtain more movement. Time is well spent at this stage making sure the control system is free moving and secure. Once it has been boxed in, it is too late.

Glue on the 6mm sq fuselage longeron, add the cockpit and fin, and cover in the bottom of the fuselage. Note the rudder offset. Put two pins in each wing tip 2 or 3mm *in front* of the position shown for the final centre of gravity on the plan. Temporarily fit the tank, front bulkhead, fuselage top and engine complete with propeller and spinner. Balance the model (using the pins in the wing tips as a pivot) by repositioning the engine. Weight added by the finish etc., will move the C of G back nearer to the correct point. Mark and drill the engine bearers remembering to allow for the 2 or 3° engine offset to the right. Glue the front bulkhead firmly in place with the tank directly behind it and wedged in place with scrap balsa. If the drop-out undercarriage is to be fitted, epoxy the tubes to the front bulkhead as shown, and also epoxy the engine bolts in place.

Finish all the construction by adding the fuselage top and filling in where necessary with scrap balsa. Saw two slots in the inboard wing to fit the 1.5mm ply line guide.

*The complete model ready for covering. Inset, detail of elevator horn and sawn hinges.*

Make up an engine cowling to suit your engine. Mine is such a tight fit round the engine I needed to strengthen it inside with pieces of wire. It is held on by a thin strap and two small screws into the bearers. The outboard tip weight should weigh at least 20grms.

Fill in any parts necessary and give the whole structure a final sanding to shape. A couple of coats of clear dope mixed with talcum power will help seal and fill in the grain. I then like to cover my models with lightweight Modelspan using wallpaper paste, and when dry I give it three coats of clear dope.

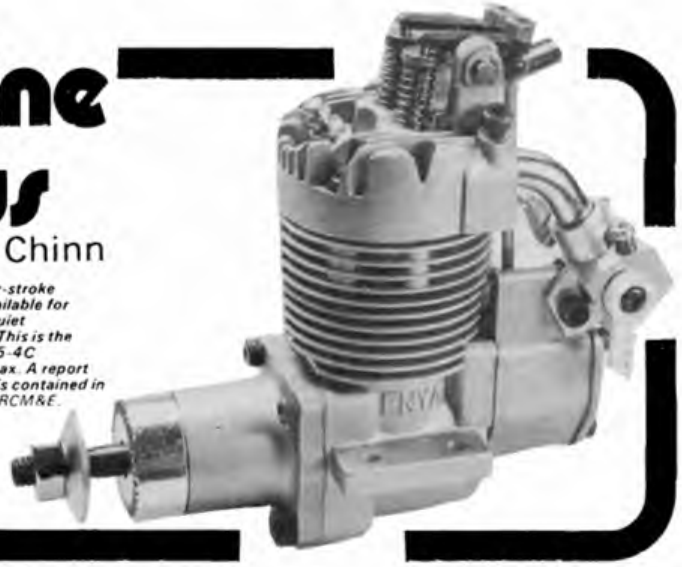
The model can now be painted using enamel or dope, and then fuel proofed. Simple schemes well done look much better than tricky ones you have made a hash of. If the paint has got into the hinges and made them stiff, try 'oiling' them with fuel — it works wonders. Make a final check of the C of G and add balance weights if necessary. The original weighs 350gms complete.

Make your first flights on 30 to 40ft lines, depending on the power of your engine. Most 1cc engines would be right on 30ft lines, a hot 1cc or an ordinary 1.5cc, try 35ft lines, and good 1.5cc engines such as a PAW will no doubt fly well on 40ft lines. Choose a calm day, get the motor really on song with a good prop and you'll be as surprised as me with this fast aerobatic 'Humdinger.'

**Aeromodeller**

# Engine News

by Peter Chinn



*Smaller, lighter four-stroke engines are now available for those who want a quiet economical motor. This is the new 5·86cc Enya 35-4C distributed by Ripmax. A report on its performance is contained in the current issue of RCM&E.*

## Collectors' corner

We have a letter from R. J. Cooper of Farnborough which raises the question of fuel for fixed compression diesels. First, however, an apology is due to Mr. Cooper who was one of only four engine enthusiasts to correctly identify the Atwood Champion featured a while back in the 'Silhouette' series. Unfortunately his solution, contained in a letter, rather than a postcard, was accidentally overlooked when the cards of the other entries were gathered together and sent on to us and so his name was omitted when the solution was published in AEROMODELLER last year.

In his latest letter, Mr. Cooper mentions that he has an old Owat 5cc fixed compression diesel and would like to be able to run it successfully. He writes: *"The manufacturers have quoted, on the starting instructions, as an alternative to the 'original fuel formula', a mixture of 60 per cent ether and 40 per cent Redex. This was used in conjunction with a 14 × 9 propeller which, unfortunately, I haven't got and, short of carving one, cannot obtain. I would like to know what their 'original' formula was and, if possible, what alternative prop sizes and modern fuel mixes I can use."*

According to our records, the original fuel mixture suggested by Modella Engines (Bradford) Ltd., the makers of the Owat, back in 1946 when these engines were first announced, consisted of 70 per cent ether, 20 per cent petrol and 10 per cent motor oil. However, not much was known about the finer points of fuel formulation in those days, and the thing to bear in mind, with a fixed compression diesel, is that the self-ignition temperature of the fuel has to balance against the revolutions at which the engine is to be operated — i.e. the load imposed by the actual prop used.

This can be done quite easily by using an additive in the fuel that will either raise or lower its cetane number. In other words, we can start with a basic home brew fuel, consisting of, say, 40 per cent ether, 30 per cent paraffin and 10 per cent oil, and then add a small percentage of a substance that will either advance or retard the ignition timing so that firing of the charge occurs at the correct point relative to the engine's operating speed. This also means that there is now greater flexibility in the choice of prop size.

Most early diesels, and particularly ones of relatively large swept volume, like the Owat, were designed to operate at fairly modest speeds. The operating rpm of the Owat, for example, was given as 5,000 rpm, hence the recommendation of a 14 × 9 prop. We would suggest that, in the absence of this non-standard size, Mr. Cooper might start off with a 14 × 6.

If, using the basic fuel mix, the engine shows symptoms of late ignition (i.e. the same as an 'under-compressed' condition with a conventional variable compression diesel) and particularly if it starts but continues to misfire when warmed up, this can be corrected by adding a small amount (usually between 1 and 4 per cent) of a cetane number improver to the fuel. The best compounds for this purpose are isopropyl-nitrate and amyl nitrate. Isopropyl-nitrate, which is manufactured commercially by Imperial Chemical Industries as a (full-size) diesel fuel additive, is readily available, through retail model shops, from the makers of Model Technics fuels.

Too small a prop will also produce 'under compressed' symptoms so an alternative (or additional) solution is to use a larger diameter and or pitch. If, on the other hand, the engine shows signs of early ignition (the same as an 'over compressed' condition) and slows down as it warms up, one should substitute a finer pitch and or smaller diameter prop. In the early days of model diesels, before commercial blends became available, nitrobenzene and rectified spirits of turpentine were included in some of the weird and wonderful mixtures recommended by engine manufacturers.

*This very neat Japanese flat-twin is the new 5cc G-Mark 30 imported by Irvine Engines. Should interest scale enthusiasts. Note the unobtrusive silencer below the crankcase.*

*New improved model Fox 25 and 19 models, which are available in standard or R/C versions. The 25 is scheduled for a future AM test report.*

## SALUTE TO BILL BROWN

Many years ago, by way of celebrating its 25th anniversary, we wrote a test report on one of our pre war Brown Junior petrol engines. The article was actually written for *Model Aircraft* magazine (later incorporated into *AERO MODELLER*) but, even before it appeared, a passing reference to the results of the tests on this venerable engine to the then editor of *Model Airplane News*, brought a quick-return request for permission to print the report also in the United States. This was a suggestion that, with the agreement of *Model Aircraft*, one was happy to fall in

*The engine that started it all, Bill Brown's 10cc Brown Junior. This is a 1936 'Model B' from the author's collection.*

with; the advent of the Brown engine having been, of course, an essential part of American modelling history and one that had marked the most significant point in the development of model aircraft, world-wide, since the turn of the century.

Bill Brown first started 'monkeying around' (to use his own words) with miniature i.c. engines in his father's workshop while still in high school. He has been experimenting with motors ever since and, last year, we received from him a package containing a lot of biographical material which makes fascinating reading.

It is particularly appropriate to mention all this just now because this month — on May 30th to be precise — Bill celebrates his 70th birthday. It also happens to be just 50 years since the first Brown engine flew a model. This engine, incidentally, was not the same as the 10cc Brown Junior that first appeared in 1932: it was a smaller motor — only 4.56cc — and had the unusual feature of induction through an atmospheric poppet-valve in the back of the crankcase.

Having pioneered the production of the first practical model aircraft engine in the early Thirties, Bill Brown turned his attention, in the Forties, to small carbon-dioxide gas motors. His first commercially successful design was the 0.29cc 'OK' $CO_2$ motor that was introduced by the Herkimer model engine company in 1947 and remained on their product list for the next fifteen years or so.

The OK engine was followed by a very much smaller motor in the shape of the Campus A-100. The OK unit (and sundry foreign copies of it that followed) worked directly from a 'Sparklets' bulb which, by reason of its weight, placed a limit on the degree of miniaturisation that could be achieved but, by devising a separate ultra-lightweight tank for the Campus engine, Bill Brown was able to drastically reduce dimensions and the piston displacement of the A-100 was a mere 0.025cc or only a little over one-twelfth of the capacity of the OK engine. Complete, ready to fly, it weighed only a quarter of an ounce.

It is now about thirty years since the Campus A-100 was manufactured but the popularity of 'Peanut' Scale class models has lately led to its reintroduction. Now called the Campus A-23, it is being manufactured by Bill's own small company, Brown Junior Motors Inc., which was set up in 1970 to produce a new intermediate size (0.08cc) $CO_2$ motor. This new Brown Junior, the MJ-70, has since become widely regarded by enthusiasts as the best of the $CO_2$ engines offered to date, although it has not always been easy to obtain, the demand for it having generally exceeded the production rate. In 1973, a fascinating little horizontally-opposed twin cylinder motor, the MJ-140 was developed.

All three Brown $CO_2$ motors are now on offer. The MJ-70 costs $29.95, the MJ-140 Twin $39.95 and the Campus A-23 'Peanut' motor also costs $39.95. Prices are inclusive of tank and an appropriate propeller but not a charger, which costs an extra $9.95. $CO_2$ addicts can obtain further details, together with a list of accessories, from Bill Brown at his small rurally situated factory: Brown Junior Motors Inc., P.O. Box 77, Pine Grove Mills, Pennsylvania 16868, U.S.A.

## SILHOUETTE SOLUTIONS

The two engines shown in silhouette in the March issue were correctly identified by four readers: Bob Brown of Newbury, Berks, R. Firman of Morden, Surrey, John Hemmings of Stourbridge, West Midlands and C. White of Lymington, Hants. The engines were the Herkimer OK 'Cub' .075 Diesel and the McCoy 'Duroglo' .049 Diesel. Almost right were Alan Price of Solihull, J. Shaw of Oldham, J. F. Taylor of Ormskirk and John Birnie of Gloucester, who can be forgiven for believing the Cub to be the Herkimer's .049 model.

These two engines, the former made in New York and the second in California, both appeared in 1953 and seemed to suggest, at the time, that the U.S. was taking a second look at compression-ignition engines after having tried and discarded them in the immediate post-war period. As things turned out, although both manufacturers continued diesel motor production on a small scale, alongside their regular glowplug models, for several years (Herkimer for more than a decade), diesels never succeeded in capturing a worthwhile portion of the market in the U.S. and were eventually dropped.

Both these American diesels used a then new idea, namely an O-ring seal on an otherwise loose-fitting contra piston. This was a feature not looked upon with much favour by some diesel diehards at the time, but we had no trouble with it and it has been successfully revived in the more recent Bob Davis diesel conversions of certain glowplug engines.

The McCoy Duroglo had a bore and stroke of 0.405 × 0.386in. giving a swept volume of .0497cu.in. or 0.815cc. The engine was very compact and weighed only 1.5oz. On test, ours produced 0.076 bhp at 13,800 rpm. As Bob Brown reminded us, a later model (dating from 1955) had the unusual feature of a clapper-valve between the intake and rotary-valve.

The Cub .075 (Herkimer also made a .049) was a larger engine, having a bore and stroke of 0.478 × 0.415in. for a capacity of .0745cu.in. or 1.220cc. In addition to an O-ringed contra-piston, it had a flat spring steel spider forming a 'shock-absorber' between the contra-piston and compression-screw. This was alleged to reduce the shock of the diesel's detonation-ignition process and our impression was that the Cub did, in fact, run more smoothly than most of its contemporaries. It also had an ability to fire evenly at uncommonly high rpm (for a diesel), at the time. Our motor peaked at just over 14,000 rpm with an output of 0.115 bhp and continued to run with undiminished steadiness when unloaded to more than 17,000 rpm.

Most remarkable of all, perhaps, was the fact that the Cub .075 weighed a mere 2.1oz — remarkably light for a diesel of 1.2cc displacement.

## CIPOLLA AND COX ENGINES

Ripmax advises that they are now sole distributors for the Italian Fratelli Cipolla company. The Cipolla brothers began model engine manufacture in the early '70s with the Cipolla Junior 1.5cc glow engine and later added the Cipolla 'Master' 3.5cc and 4cc models. The latest developments include ABC and AAC versions of these latter models.

Ripmax are also now co-distributors of the long-established Cox range of small glow engines.

*Solution to our March issue 'Silhouette Quiz.' The engines featured were the American McCoy .049 and Herkimer Cub .075 diesels, both of which first saw the light of day in 1953.*

# Free Flight Scene

*Martin Dilly reports....*

*Some of the Davis Airfoil Wakefield wings tested by Jack North in the late 1950s.*

## SIMPLIFIED RUDDER HINGEING

For several years I have been using a double-sided adhesive-coated Mylar to hinge A/2 rudders. The technique I use is this. Using light quarter grained 1.5mm sheet cut out a pair of fins and a pair of rudders, hold the rudders together and lightly chamfer the leading edge, i.e. the hinge line, so that when the finished component is in the glide turn position, a minimal break occurs in the concave surface, and a slightly lower drag results. My own preference is for twin torsion bar rudder bias springs, and these are bent from 30 or 33 swg single strand steel wire in a 'square Z' shape seen from the side, and with considerably more deflection on them in the plan view that the rudder will actually need.

Use a fin and a rudder piece together as a template, to cut out a piece of the film of their combined shape. With this as the sandwich filling add the two bias springs and all four pieces of balsa, making sure the hinge gap is closed up, and using a couple of bulldog clips to hold the whole assembly together against the springs inside.

Remove one of the bulldog clips, and place a pad of newspaper underneath the sandwich to provide a little 'give'. With a domestic iron on a fairly hot setting, press the sandwich firmly. You may need to use a finger on the balsa, to hold things under pressure as you slide the iron away after removing the final bulldog clip. Apply the heat until the exposed line of film changes from milky to clear, at which stage the thermo-setting adhesive has bonded to the wood. The balsa may go a little darker than normal during the ironing, but this does not matter. When cool, sand the assembly to an airfoil section and add suitable horns and adjusters.

The adhesive-coated film can be had from Mike Woodhouse at £1.00 per sq ft, plus 20p postage. His address is: 12 Marston Lane, Eaton, Norwich, Norfolk NR4 6LZ. The price of the Japanese tissue that Mike also carries has had to rise, and is now 13p a sheet for Lite Flite, 28p for Medium Flite and 30p for Super Flite.

## FREE-FLIGHT NEWS BULK PURCHASING

This is a non-profit-making service for subscribers to Free Flight News. The newsletter itself is published by Ian Kaynes, Paul Masterman, Mike Warren and Malcolm Wood and appears monthly. For a sample copy and subscription details write to Ian Kaynes, 8 Blenheim Court, Farnborough, Hants GU14 7DS.

Among the items that FFN Bulk Purchasing now has is, Pirelli and FAI Supplies of rubber, the former in 6mm widths at £10.00 and the latter at £7.00 for either ⅛ or ¼ inch width. Seelig four-function power timers cost £13.60 and single-function glider timers are £8.40. PTFE tubing for D/T lines is in stock again at 25p/metre. Dave Stapleton, who handles the FFN Bulk Purchasing has many other free-flight special items. Details can be had from him at 21 Ravensbourne Drive, Chelmsford, Essex CM1 2SJ.

## A WAKEFIELD KIT

It is a long time since one could buy a kit for a Wakefield that is remotely competitive, but it looks as if Champion Model Products in California will soon fill the gap with their Wake-Up. The prototype has been flying at Taft recently and has scored 4:25 in one of the evening air Champagne Fly-Offs there. We do not have a price yet, but an International Reply Coupon to CMP, 880 Carmen Court, La Verne, CA 91750, USA, will get you details as soon as kits are ready.

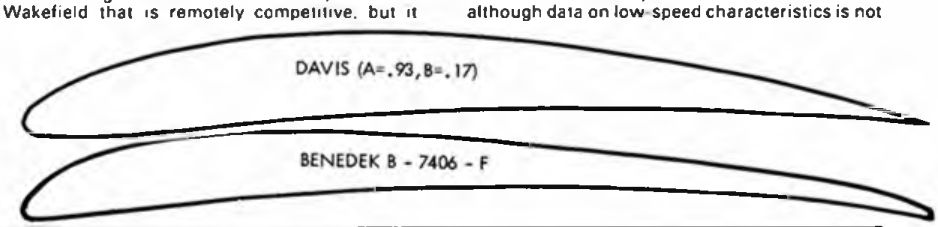
Another Champion Model Product, the Champion Coupe, has a well-established contest record, costs $18.95 plus shipping, and now includes a list of performance-boosting modifications. George Schwedt, who runs CMP, also has 20ft Mylar thermal streamers at 50 cents each, Japanese tissue and other F/F items.

## LIGHTWEIGHT GLASS CLOTH

SMAE Hon. Secretary Julian Cooper flies team racers rather than free-flight aircraft, and has available the ultra-light glass cloth that used to be sold by Northwest Model Supplies. It weighs approximately 18 grammes per square yard and costs £2.00 per yard, with a minimum 4 square yard order. You can reach Julian at 158 Conway Drive, Shepshed, Leicestershire.

## AIRFOILS

Coupe d'Hiver models tend to have rather narrower chord wings than most 'full-size' World Championship-class aircraft, so it is reasonable to assume that some airfoils that are successful with larger chords will be flying at well below their most efficient Reynolds number, if used on the smaller type. One airfoil that certainly works well on Coupes is the USA 5, the ordinates of which we published in the March 1977 F/F Scene on an un-numbered page which turns out to be 147. It is a fairly low-cambered section and, although data on low-speed characteristics is not available (plenty of university paper possibilities here) it probably has a lower drag and thus absorbs less of the power of the 10 grammes of rubber than several other traditional rubber model sections would.




| Chord % | 0 | 1.25 | 2.5 | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 95 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper | 0.9 | 2.95 | 3.95 | 5.6 | 6.6 | 7.4 | 8.55 | 9.2 | 9.55 | 9.65 | 9.3 | 8.6 | 7.7 | 6.65 | 5.4 | 3.95 | 2.9 | 0.95 |
| Lower | 0.9 | 0.1 | 0.1 | 0.45 | 0.8 | 1.0 | 1.5 | 1.95 | 2.4 | 2.8 | 3.4 | 3.8 | 3.75 | 3.4 | 2.65 | 1.6 | 0.9 | 0 |

| Chord % | 0 | 1.25 | 2.5 | 5 | 7.5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper | 0 | 2.1 | 3.0 | 4.5 | 5.5 | 6.3 | 8.7 | 10.0 | 10.3 | 9.9 | 8.8 | 7.4 | 5.5 | 2.9 | 0 |
| Lower | 0 | -0.7 | -0.8 | -0.9 | -0.9 | -0.8 | 0 | 0.8 | 1.4 | 1.8 | 2.0 | 1.9 | 1.5 | 0.9 | 0 |

*Above: Davis plotting figures. Left: Benede K plotting figures.*

The actual airfoil used by many of the best French Coupe models has a rather more 'flapped' trailing edge than the true ordinates give, and certainly this 'flapped' profile is very apparent in another good narrow-chord section, the Benedek B 7406-f. Dave Hipperson uses it, or something very similar, on his Artoo, available in the AEROMODELLER Plans Service, and an early Coupe of mine that has a very fair glide, in spite of a wing area of only 11dm², low by current standards, has the same section. On Artoo the spar position was at about 28% chord and on mine at 32%, so it may be that this coupled with the step at the rear of our 3mm wide leading edges, provides useful turbulation that helps to keep the air sticking to the upper surface.

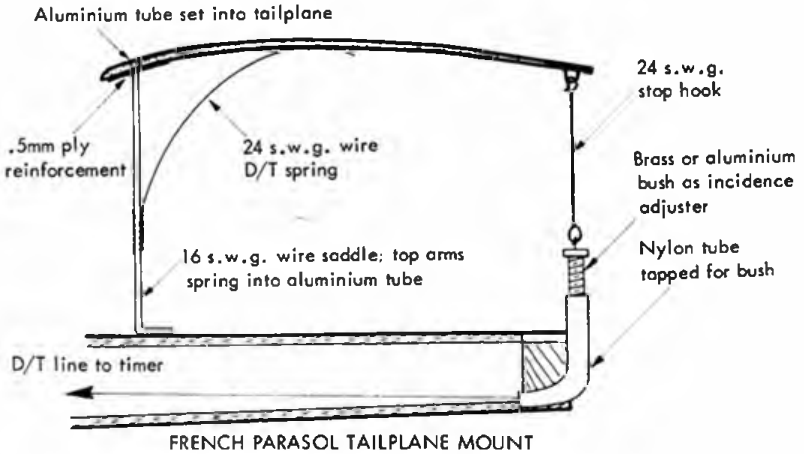
No doubt if we all used wings with an

absolutely uniform surface, without spar ridges and slightly sagging tissue and varying amounts of dope giving a matt or a glossy surface finish, it would be possible to make more valid comparisons. However, the resulting weights would make a Coupe landing a fairly earth-shaking event. If you are thinking of using an airfoil that has been notably successful on another aircraft, remember that it may not be simply the rib shape that you cut out that gives the high-performance. Try to use the same structure, at least externally. I remember, in the early days of ½A flying in Britain, Jack North building a series of wings with the Davis (A = .93, B = .17) airfoil that had given excellent Wakefield results. A superbly-built fully-sheeted version, of identical dimensions to the perfectly satisfactory tissue-covered ones, proved un-trimmable and inconsistent, so much so that it ended its days screwed up in a ball in a Chobham litter bin. That particular section seems at its best with a multi-sparred surface, and might be worth trying on a Coupe if the rather thin trailing edge of the B-7406-1 deters you.

Jack's Wakefield and ½A wings were mostly of 115mm chord, which is close to the Hipperson Coupe wing, so the Davis ordinates are given here also, together with the spar positions for that chord.

Upper surface irregularities on 115mm Davis (A = .93, B = .17) airfoil: leading edge rear 2%; front spar 22%, centre spar 48%, rear spar 74%; lower surface spars are at 34% and 60%. Covering was lightweight Japanese tissue.

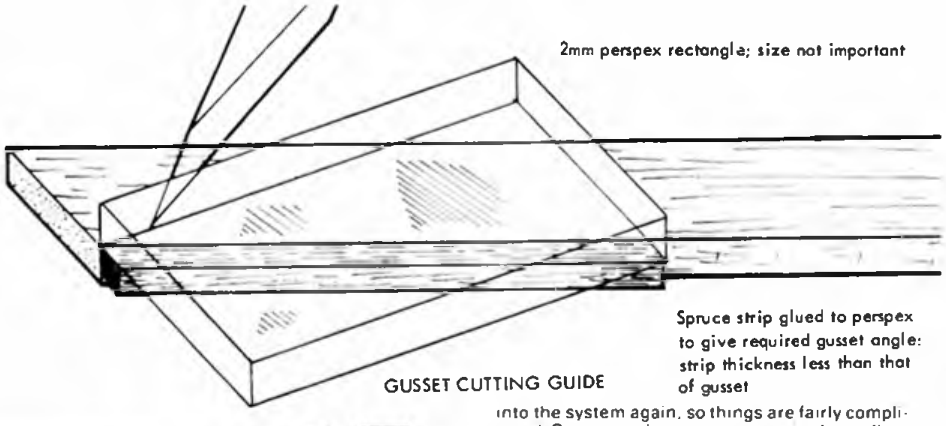
Finally on the subject of airfoils, John Malkin in New Zealand has just finished a revised and updated version of his 1971 book Airfoil Sections, which has been out of print for some time, and which contained ordinates for 315 sections; the book is currently printing and should be available later this year. John, who is president of the NZMAA, will be coming to Europe for the World Championships at Burgos in August, as a member of the six man F1 A and F1 B team. The New Zealanders feel that their standard of F1 C flying is not sufficiently competitive to warrant the high travel costs, but are no doubt hoping that the Australian offer to host the 1983 Champs is accepted by CIAM.




FRENCH PARASOL TAILPLANE MOUNT

## GUSSETS

An airfoil like the B-7406-1 has shallow depth of rib at the trailing edge point and this can prove a source of weakness. Slotting the rib into the trailing edge helps a little, but the resultant stress-raising notch in the balsa weakens the structure, and actually may reduce the strength to less than would be the case if the trailing edge width was simply that remaining aft of the rib. However, the tissue covering over the rib notch probably puts some resistance to bending back into the system again, so things are fairly complicated. Some people try to compromise by scalloping the wood between the ribs, which gives a slight gusset effect, but with the wood grain wrong for best transference of loads from ribs to trailing edge.




GUSSET CUTTING GUIDE

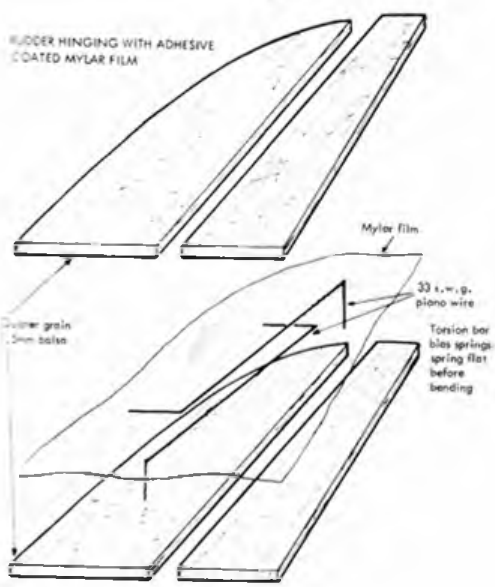
All this really brings us to the subject of gussets. They look simple enough — a lot of little balsa triangles in the corners of joints, but in a high-performance aircraft like we are building, hopefully, every bit must pull its weight, or rather lift it, more weight means less duration. The main factor to remember in cutting gussets is that the wood grain must run parallel to the hypotenuse. They do not have to be isosceles triangles, with two sides equal, nor do they have to be right-angled ones, although you will have to make a special jig to cut ones to fit, for example, between a rib and a non-perpendicular trailing edge.

Stage one is to cut a strip of straight-grained light balsa with a width equal to the height of the gusset from its hypotenuse (**Fig. 1**). Because most of the gussets I need are for rib to t.e. joints, I use a cutting guide that produces a triangle with approximately 30°, 60° and 90° corners, and use the result with the long side glued to the rib and the short one to the trailing edge. This gives some extra strength to the rear of the ribs. For thicker gussets you may prefer to use a razor saw, and this way you can also cut several gussets at once, using two or three strips of balsa held together. The perspex guide I use enables you to line the work up quickly before cutting. Ensure the blade is held square to the wood when cutting, otherwise it will be necessary to lightly sand the edges before gluing.

To give the maximum support to the joint, Elton Drew came up with an idea on his Lively Lady World Championship winning A/2 that saves 50% of the weight of gussets, yet gives full-depth rib support. He used a gusset each side of the rib, but half the depth of the trailing edge and staggered so one is flush with the top surface and one with the bottom. This does a lot to prevent that annoying slight distortion that wrinkles the covering over the joints as the tissue tightens.

As an added weight-saving refinement, you may care to make the hypotenuse concave on the gussets. Another idea is to use short diagonal full-depth riblets replacing the gusset's hypotenuse. Since the aim is to increase the warp resistance of the wing or tailplane, a simple precaution like ensuring that the covering adheres to every rib and spar will help a lot. Some Japanese tissue, being less porous than Modelspan, needs this attention, and if you use Polycell wallpaper adhesive the weight penalty must be minute. Literally ten or twenty grains each about half the size of a pin's head, swell when water is added to give enough adhesive to cover the undercamber of an A/2 wing. Make sure the Polycell is quite dry before water shrinking, although I have never had any problems with tissue pulling off.

To avoid excess glue getting outside the gussets, which makes final sanding difficult, I prefer to add gussets that will be on the lower surface after the wing is removed from the building board. This way you can make sure each one is snugly in position and that any spare glue is wiped off before it dries.

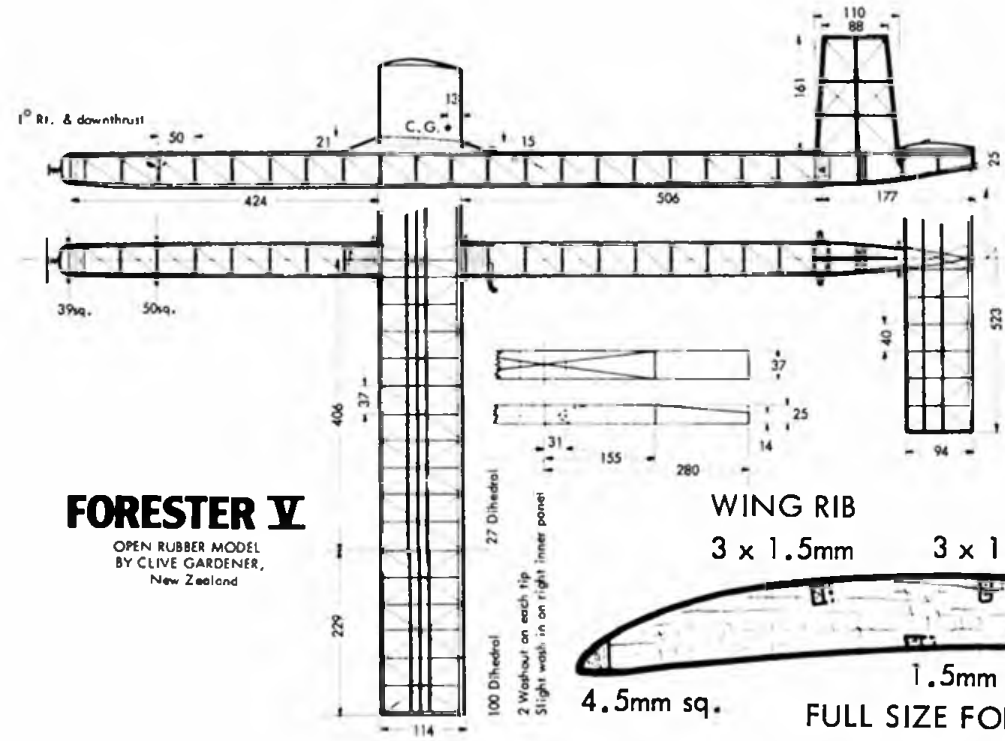



## A D/T FOR PARASOL-MOUNTED TAILPLANES

Presumably in order to keep it out of the wing wake, several French flyers mount their Wakefield tailplane on a wire parasol. The incidence adjustment and D/T system they use is interesting, and the diagram explains it. My thanks to Vol Libre, in which the original idea appeared.

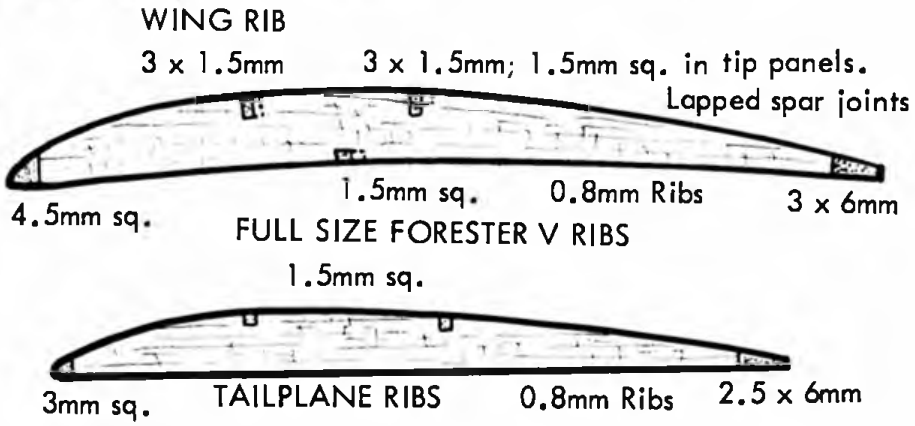
## FORESTER V — A NEW ZEALAND OPEN RUBBER MODEL

Clive Gardner is one of this year's New Zealand Wakefield team members, although a proxy will be flying for him at Burgos, the last Champs at which this will be allowed. Clive also flies Open Rubber to good effect, and Forester V has had three major first places, including a 1977/78 N.Z. Nats win with three maxes plus a 12.46 fly-off time. The aircraft structure is interesting in that it uses no structural diagonal bracing, twisting being resisted by strands drawn from 1oz glass




**FORESTER V**

OPEN RUBBER MODEL
BY CLIVE GARDENER,
New Zealand




cloth and doped onto the tissue after covering. This withstands the torque of 1200 turns would onto 70ft of 6mm Pirelli rubber, the 14 strand motor weighing about 110 grammes and giving a 2 minute run to the 490×580 prop. Airframe weight is 95 grams and rubber brings the total to 215, wing area is 14.5dm² and tail area 4.8dm². Clive, who used to be a member of the Godalming club before emigrating to New Zealand, stresses the importance of using a winding tube every time.

## NORTH EASTERN AREA S.M.A.E. INDOOR CHAMPIONSHIP MEETING — 1/2/1981

The final meeting of our 1980-81 session was held on the 1st February and in accordance with our usual practice the Area Indoor Championship was decided at that meeting on the basis of the best two results from three events.

The H.L.G. competition sponsored by Ronytube took place first and there were thirteen entries. Some very close times were recorded by the top half dozen competitors but eventually after six rounds there were three contestants who had times in excess of 30 seconds and these went through to the last three rounds. They demonstrated a marked contrast in styles. Dave Goodwin flew a Coot and this very small aircraft produced excellent times from a relatively modest height. Graham Davitt flew a larger American style model but was unable to match the excellent times he had produced last month in setting a new Hall and Area record. The outstanding man of the competition was undoubtedly Bernard Hunt who set a new record of 37.9 secs with an aggregate for two flights of 72.4 secs. His model is relatively heavy at 8.5 grammes and proved difficult to fly but five of his nine flights were in excess of 30 seconds.

The E.Z.B. contest sponsored by Free Flight News produced some exciting competition and like the glider contest the top competitors demonstrated very different techniques. Denis Davitt's model is almost conventional whereas that flown by John O'Donnell flies to the left, against the torque, in very tight circles and looks most inelegant in flight. It has however, an excellent performance and is a very rigid aircraft most suited to low ceiling work. The eventual winner was Bernard Hunt with an aircraft which he claims to be conventional. It weighs 1.25 grammes, is covered with Mylar and like the O'Donnell airplane is very rigid. His top time of 11 minutes 22 seconds almost matches the high time set at Spennymoor under the old unlimited rules when models of half the weight were common. The Scale competitors sponsored by Hobbydrome was well supported with fourteen entries. Few new models were in evidence but Jeff Anderson resurrected his ancient Halton specifically to provide back-up, no doubt with the Area Championship in mind. This was a fortunate decision as his large Wittman again proved troublesome. An outstanding flier but looking a little strange to British eyes was the very detailed Upton Baby Ace entered by Walt Mooney (proxy Mike Colling). The tendency in the UK is for painted aircraft whereas the Ace has a plain tissue finish. It would be true to say that in the final assessment there was no truly outstanding aircraft and the eventual winner was Paul Street with the Peanut Kania closely followed by John O'Donnell with the Fike and Paul's back-up aircraft the Super Marine Sparrow.

The winner of the Area Championship was for the fourth consecutive year Jeff Anderson with relatively modest performance in Scale and H.L.G. Junior Champion was Neil Turnbull from Darlington.

## Northern Area Winter Rally, Church Fenton, 25.1.81.

**Report by J. N. Walton**

A bright, dry morning, and a good forecast ensured a reasonable level of support for the first Northern free flight event of the year. There was however, a moderate breeze in a rather difficult direction, which kept down entries in open rubber and open power, and may have boosted numbers in the combined mini contest, which was flown to Northern area K factor rules. Lift remained patchy and hard to detect through the day, with the result that open glider scores were low, with no competitor returning a perfect score. As usual this class attracted the highest entry, but a time of 6.46 from Mike Reeves was sufficient to win by 13 seconds from Brian Picken, with Nantwich club member D. Allman in third place. (The wind direction had necessitated the max being reduced to 2½ minutes at the start of the day).

The combined mini contest attracted the next highest entry, and was keenly contested, the issue being in doubt until the last few minutes. With literally seconds to go, country member Gordon Beal made his only sub max flight of the day, dropping 21 seconds with his A1, but this was enough to force John O'Donnell and his now well known 'Soft Centre' A1 design into second place. Ian Davitt of Leeds was third, flying a Cd'h model.

Open Power was the only event to require a fly off, this resulting in a good win for Russell Peers with a 5.36 flight, with Ray Monks hard on his heels with 5.09, both models appearing to find helpful air quite early in the flight.

A disappointingly low entry in open rubber, but a good win for Loughborough member Steve Ellwood, with a full house, from Phil Ball. All in all, a good curtain raiser for the 1981 season, with an encouraging attendance of out of area fliers.

***SCALE Sponsored by HOBBYDROME***

| | | | |
|---|---|---|---|
| 1 P. Street | Sunderland | Kania 3 | 11 pts |
| 2 J. O'Donnell | Whitefield | Fike E | 11¾ pts |
| 3 P. Street | Sunderland | Supermarine Sparrow | 12¼ pts |
| 4. Walt Mooney | U.S.A. | Upton Baby Ace | 13 pts * |

* Proxy — Mike Colling. (Place by highest ROG time).

**NE AREA INDOOR MEETING 1.2.1981**

***HLG Sponsored by RONYTUBE***

| | | |
|---|---|---|
| 1. B. Hunt | Huddersfield | *73.4 |
| 2. G. Davitt (J) | Leeds | 65.7 |
| 3. D. Goodman | Sheffield | 61.3 |
| 4. B. Kenny | Sheffield | 58.5 |

* Hall Record HLG 37.9.

***EZB Sponsored by FREE FLIGHT NEWS***

| | | |
|---|---|---|
| 1 B. Hunt | Huddersfield | **22.12 |
| 2 J. O'Donnell | Whitefield | 19.33 |
| 3 D. Davitt | Leeds | 17.28 |
| 4 H. Tubbs | Leeds | 16.09 |

** Hall Record EZB 11.22

***Area Indoor Championship 1980/81***

| | |
|---|---|
| 1 J. Anderson | 21.3 pts |
| 2 P. Street | 26.3 pts |
| 3 A. G. Jack | 31.6 pts |
| 4 N. Turnbull (J) | 38 pts |

## Ron Green reports....

### UPSTART HLG for low ceilings by Ron Green

Although I have had a modest amount of success in low ceiling HLG over the years, one event, the S. E. Area Indoor meet at Crawley, has often seemed to be a bogey event for me. My arch enemy at this event being Butch Hadland. Butch's models have been very consistent and although my models have potentially been capable of winning, something always seems to have gone wrong on the day. Practice flights have usually been good but could not be matched in the contest.

I decided that this state of affairs had to change or I would give up in disgust! Armed with a copy of Mark Drela's Upstart IV drawings, kindly lent to me by Bernard Hunt, I set out to build a lighter version as Crawley is around 30ft high. I reckoned that a weight of 4½ — 5 grams should be O.K. To get down to this weight I built a wing with the forward 50% cut from 1/16 in C grain and formed on a curved block like an EZB prop blade. Carbon fibre was added almost tip to tip and the resulting stiffness was amazing. The model finally came out at just over 4 grams which seemed awfully light! However, a short basic trimming session in a workshop at the college where I teach showed a superb glide. The model was taken to the Slaithwaite meet where more trimming could be done under the 24ft ceiling. I used it in the contest as it looked better than anything else I had at the time and placed 2nd. One flight after the contest of around 35 seconds showed that it had terrific potential. The biggest problem I found was the psychological one of forcing oneself to throw such a light and relatively large model, flat out. Having hit the ceiling once though I had proved to myself that it would go to at least 25 feet.

At the Crawley meet I decided to fly the same model as it was still very much on trim. Having overcome the throwing problem, it looked really good. However some rather poor launches at the beginning of the contest made me think it would be a repeat performance. It was all or nothing from then on and it worked. The last four flights were 37, 38, 37 and 37 seconds giving me 1st place and the hall record. Butch told me afterwards he was horrified at the shape the wings went on climb out. Apparently they they assumed about ½ in of washout before reaching the top of the climb.

*Ron Green's "Upstart IV" designed by Mark Drela, USA. The flying shot was taken at Crawley where the model achieved a best flight of 39 seconds.*

The Loughton meet was the following week and with only a 22ft ceiling available, an even lighter version was built at 3.8 grams! The glide is incredible with a sink rate of under 6ft/sec. Unfortunately lack of trimming before the contest meant that I was unable to sort the transition properly. I was beaten by a jubiliant Bob Bailey. He was flying a similar but heavier (5 gram +) and faster sinking model but with a magnificent pattern, no height loss in the transition. After the contest with more trimming, I managed to set the unofficial hall record of 36.02 seconds.

Credit must go to Mark Drela USA for the design, Model Aviation January 1981 and also to Bernard Hunt for his encouragement prior to the Crawley battle!

## Bob Bailey reports....

### CRAWLEY 8th FEBRUARY

It was most welcome to have an indoor 'do' in the deep South — the first since Milton Keynes on October 26th (why haven't I received the report for the column yet?) The main events of the day were EZB and HLG (Hand launch glider) which were first and second on the agenda. The other scale events which followed are reported elsewhere.

EZB took place in the *very* brief interval between 12.30 and 2.00 p.m. and attracted 23 entries. Maybe the article in the Model Flyer by yours truly helped in some way — I hope so. It was a rush to get flights in — guess at a motor size and hope for the best.

As always, there was the jetstream on the top 3 feet from one corner to the other, so that put paid to ceiling scrubbing as a means of getting more flight time. To get anywhere near 9 minutes required the altitude to be restricted to 3 foot below the ceiling at the most.

One well known competitor (who shall remain nameless) used the 1½ hours for trimming; it was only later on that he discovered there wasn't any more time available so never got any flights in!

Ron Green and I were using long moment arms (tailbooms 275-300mm long) with large tailplanes. Centre of gravity was well behind the rear wing post! Ron got the best flight of 9.27 but I had a bit of luck with a fortunate bounce off the netting at the far end to give me a back up 9.01 and 1st place with Ron second. Time did not permit any further flying. Mr. B. A. Wade placed 3rd with a very nice 7.41 and an average back up.

### HLG

This saw the first appearance down South of the Upstart IV design by Mark Drela from Eastern USA. This design has out-Cooted the Coot with a large flapped wing and carbon fibre reinforcement on wing, tail and fuselage. They are very critical to fly as I found when both my models bunted on the climb, stopped and dived straight in! Exit fuselages and a rebuild job for Debden next week. 15 minutes practice was not sufficient to sort them out.

Meanwhile, Butch Hadland had the best of the 'conventional' models and has pipped Ron Green to the post several times here in the past. Ron was determined to change all that! With his Upstart IV in fine trim and not using more than 25ft. he put in magnificent flights of 38 and 37 seconds to be way out in front. His best unofficial flight was 39 seconds with more to come with suitable practice. The glide performance of these models has to be be seen to be believed. Meanwhile, on to the Loughton do at Debden ...

### LOUGHTON 15th FEBRUARY

The hall at Loughton is much smaller than Crawley with 20ft usable height and 60ft width. HLG was first, with plenty of time to trim. I had rebuilt my Upstarts with some helpful criticism from Ron Crawley with more success. 'Looking a bit dangerous' said Ron. 'An accidental tread on job' said Butch. The HLG fliers organised themselves into sequential flying to keep the air smooth. In the first set of 5 flights, Ron who was sorting out a new Upstart weighing 4 grams or less, with a fantastic glide put in a 28 and 29 to set the pace. I managed a 29 and 30 to take a narrow lead — coming literally from nowhere with a performance way above what I had achieved before — a mere 24 seconds — just goes to show what can be done sometimes.

Ron not to be outdone, put in flights of almost 32 seconds — I though I couldn't beat that but tried anyway. 'Come on, throw it' said Ron, so I did — the result being a 32 and 33 to take 1st place with a new official hall record. Later on, Ron got his model going even better and managed an unofficial 36.2 seconds — a fantastic flight for a mere 20ft ceiling. He must be the man to beat at the next do at Slaithwaite on St. David's day.

EZB followed shortly afterwards and proved to be just the opposite to HLG. Because of the cold weather, the conditions deteriorated steadily throughout the contest because of the hot pipe heating which caused a vicious downdraught in the middle.

It appeared to be a matter of luck with the drift by keeping to one side and not hitting the wall. Ron Green managed to get 3 flights of about 8½ minutes which proved to be impossible for anyone else to approach, let alone beat. No matter what I tried I couldn't even beat 7 minutes, so I had to settle for 2nd place. Ron said afterwards he would rather have won HLG! Mr. Wade who was 3rd at Crawley, also came 3rd with some very steady flying, which shows he is getting the hang of EZB — most encouraging to see — well done!

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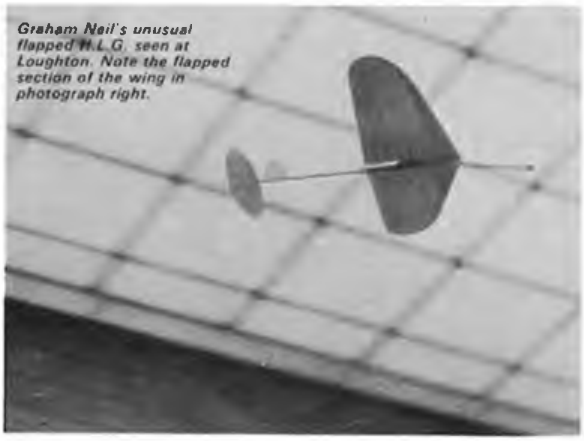
Results: Crawley 8th February — EZB (23 entries) 1. R. Bailey 9:10 + 9:01 = 18:11, 2. R. Green 9:27 + 7:45 = 17:12, 3. B. A. Wade 3:57 + 7:41 = 11:38. HLG (21 entries) 1. R. Green 38 + 37 = 75, 2. C. Hadland 31 + 30 =, 3. B. Dines 30 + 28 = 58. Loughton 15th February — EZB 1. R. Green 8:37 + 8:42 = 17:15, 2. R. Bailey 6:19 + 6:59 = 13:18, 3. B. Wade 5:18 + 5:17 = 10:35. HLG 1. R. Bailey 32.3 + 33.7 = 65.9, 2. R. Green 31.5 + 31.9 = 63.4, 3. C. Hadland 25.6 + 26.9 = 52.5.



*Graham Nail's unusual flapped H.L.G. seen at Loughton. Note the flapped section of the wing in photograph right.*

→ 258

# R/C Sport Flyer

*2 ELECTRIC MODELS REVIEWED BY CHRIS PINCHBECK*

OVER THE PAST year we have discussed a number of topics aimed specifically at the newcomer to radio controlled flying. The series has concentrated on both power and glider training models. Passing mention has been made of powered gliders using either a small glow plug or diesel engine fitted to an over-wing pod. An alternative method to enable you to get your model amongst the birds is an electric motor.

Many people in the past have experimented with electric power for models, but the power to weight ratio was too heavily in favour of weight! With the advent of more efficient motors, but more especially efficient batteries, this form of power has became a practical possibility. The prospect was even more attractive when fast charge (vented) nickel cadmium batteries came on the market. At best, this source of power will only give about five minutes output and it should therefore be considered as a means of gaining altitude prior to a glide back to terra firma. The situation can be improved somewhat by using a geared motor.

This month, we will review two electric powered models. Model Flight Accessories kindly provided one of the Hummingbird kits and our Managing Editor persuaded me what a good idea it would be if I built a Graupner Mosquito kit that he had had for some time.

## THE GRAUPNER MOSQUITO

Designed as a thermal soarer with the facility for power assist from either a pod mounted glow engine or an electric motor. It is in this latter configuration that the kit was built.

As ever with Graupner kits, the Mosquito is very complete and the die cutting superb, even the ply parts press cleanly out of their mother sheet. The general quality of the wood is excellent and there are several moulded balsa sections. A comprehensive hardware pack is included together with a blue tinted canopy. The plan is well printed and clear with some very useful sectional drawings. The instruction booklet included 'exploded' view sketches of both fuselage and wing construction which proved to be very useful.

### Fuselage

The fuselage sides are presented with ply doublers already bonded on, so after trimming to shape the positions of various formers, strengtheners and longerons, are marked prior to joining the sides with the two main ply formers. Once this assembly is dry, the tail is pulled in and glued, the rod in tube snakes installed, and the top and bottom planking fitted. The nose is then formed by pulling the fuselage sides into shape and the final planking fitted to the cockpit floor. After glueing various blocks into position, the completed fuselage is planed, carved and sanded to shape.

The cockpit canopy support frame should be assembled in situ to ensure a close fit. I elected to paint this matt black before glueing it into the canopy moulding which was then trimmed to its final shape. The canopy is held in position with a rear peg and a sliding pin in the front. Drilling of these holes must be carried out with care, and when fitting the front latch the canopy should be held in position with masking tape or tack glued.

### Tailplane

This is of conventional built up construction, rudder and control surfaces are solid sheet with lightening holes. Although the tailplane is shown as being held in position by rubber bands I elected to permanently glue it to the fuselage to avoid constant trim changes after each assembly.

### Wings

They are also of built up construction with hardwood mainspars, 1/16 in L.E. sheeting on the top of the wing only and full span inter spar webbing. Construction starts with assembly of the plywood root ribs which are drilled to accept the wing joiner tubes. Drilling of these ribs is critical since if the holes are off centre, the joining wires will not fit properly.

### Power pack

The motor recommended for the Mosquito is a Jumbo 540FG6 and the power pack incluces a well designed but simple folding propeller and drive shaft with a flexible coupling made up from 4BA bolts and substantial rubber O-rings. The final touch is a plastic spinner which clips firmly onto the central metal part of the folding propeller mechanism. The motor is retained in a shaped hardwood block by a wire clip. Plastic moulded air scoops are fitted to each side in front of the motor and the cooling air is exhausted through slots at the rear of the cockpit area. The power is provided by a 9.6 volt battery pack made up from eight fast charge (30 minute) nickel cadmium cells. This pack is housed on the floor of the fuselage under the wing seat and access is through a hole cut in the side.

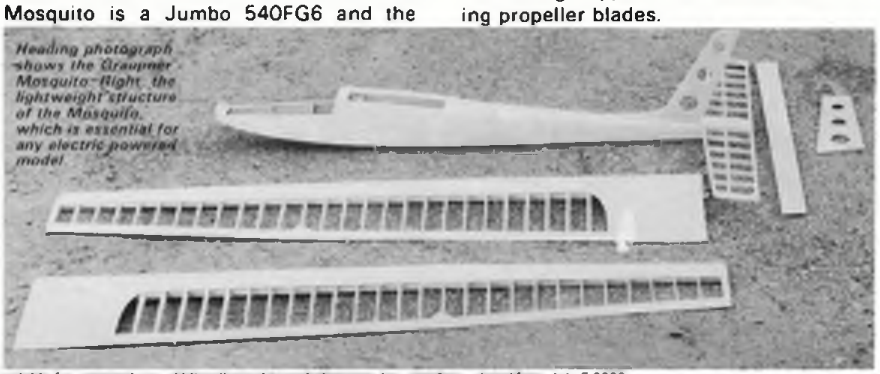
### Radio installation and flying

Radio equipment selected for use in the *Mosquito* was a seven year old but still very usable, *Skyleader SLX6*, using three functions to operate rudder, elevator and on/off power switch.

The small servos and receiver were easily accommodated in the radio bay, with the receiver positioned at the rear, to put as much distance between the receiver/aerial and the electric motor to minimise the risk of electrical 'noise' interference. The on/off main power control is operated from a simple slide switch, which mounts in a purpose made installation carrier and connects to the servo by piano wire link.

Once the model is assembled at the flying field, operations begin with a main battery charge to the seven cell 1.2Ah pack direct off a car battery, using the Graupner charge leads. The leads have good strong crocodile clips and are wired with connectors to the battery. A nice touch here is the instruction tag on the lead which quotes charging data and charging time (max. 30 mins). Careful attention should be paid to charging time. On no account should an overcharge be permitted — 30 minutes max means just that!

Test gliding on a downhill slope was useful, giving some indication of control surface effectiveness and then we were ready for the off! The on/off power switch was controlled from the throttle function and pre-flight drill includes retarding the throttle lever completely prior to switching on the radio system, otherwise the operator risks being trapped in a confusion of whirling propeller blades.



*Heading photograph shows the Graupner Mosquito—flight the lightweight structure of the Mosquito, which is essential for any electric powered model.*

Once ready for flight, the throttle control was advanced to start the motor and a normal level hand launch applied, the model climbing away at a perfectly adequate if unspectacular rate for a pilot more used to full flown aerobatic R/C models. No great amount of trim lever adjustment was required to establish stable flight. Maximum up trim did not coincide with maximum climb rate — in fact in this condition there seems to be little climb performance at all, but upon re-introduction of a little down trim setting, speed picked up and the climb performance noticeably improved, as did the effectiveness of the rudder.

The Mosquito is generally simple to fly except in a condition where a wing tip is allowed to drop below about 45° position in a turn in which case the model will rapidly wind up into the turn and quick corrective action is necessary — but that's all part of the fun!

Effective continuous power run is about six-seven minutes, after which there is insufficient energy left to sustain altitude and it is time to plan ahead for the landing approach, although the excellent glide characteristics of the Mosquito may delay this necessity for a fair time, depending on altitude available. The whole concept of the Mosquito is one of a power assisted glider and it is intended that air time should be augmented by thermal assistance, although on the day we test flew, there were probably more thermals at the South Pole than at our flying site.

Landing characteristics are quite gentle, and in any case an abrupt arrival is to be avoided. To compensate for the weighty power pack, the airframe is correspondingly light and a gentle touchdown will avoid the lumpy battery punching its way through the airframe.

## MFA HUMMINGBIRD

This model has been available for at least five years, and is designed as an introduction to electric flight for the beginner and experienced radio flyer alike. It has a very simple box fuselage construction, and can be built, covered and have its radio and motor installed within a week of evening building. The kit comprises a plan and instruction booklet, all the necessary wood, a pair of foam wings, pre-formed dural undercarriage, wheels, and a pack of hardware.

## Construction

Starts with tack glueing the two fuselage sides, then trimming and sanding to a matching pair, checking every now and then over the plan. The sides are now separated and marked (on the side) with the four bulkhead positions, and deeply scored by cutting a slot forward of F2 and to the rear of F4. This facilitates bending to shape when the fuselage is joined at nose and tail. The latest Mk II Hummingbird motor has a power pack which is slightly bigger than the one shown on the plan and the power pack instruction leaflet highlights this by suggesting that the size should be checked and F3 moved accordingly.

PVA glue is used throughout and once the two formers F2 and F4 have been fitted to one side, the other fuselage side may be glued on. When dry, the rear section is pulled together and glued to the stern post. As mentioned above, the 'scoring' helps this but to ensure against cracking of the fuselage side, it is as well to dampen down the outside of the sheet fuselage. This causes the wood to soften and the outside fibres to swell, making the side 'bend' naturally into the tail. I elected to use rod in tube 'snakes' instead of the balsa push rods and wire ends supplied, and these were fitted before proceeding to planking the top and bottom of the fuselage rear. When dry, the assembly is surprisingly light and strong.

The most difficult stage comes next, and this is forming the motor tube (engine mount). Two pieces of 1/16 in balsa are dampened with water and bound around the motor itself, they butt join and are glued with PVA. A useful tip is to wrap a single layer of polyetheylene sheet round the motor to prevent the glue from sticking the lot together. Everything his held together with masking tape until thoroughly dry when the motor can be pressed or pulled out. I left this sub-assembly in the airing cupboard for three days until it was absolutely bone dry. If you have difficulty removing the engine, screw two 6BA bolts into the front face of the motor housing and pull on these. Do not pull the motor shaft too hard or you may damage the 'works'.

Once the motor tube is made, it is fitted into F1 and installed as the nose is pulled in and glued. Once again dampen the outside of the fuselage. Triangular strengthening pieces are fitted before completing the planking top and bottom of the fuselage. When dry, the nose is carved and sanded to blend in with a 1½ in spinner (not provided) and all corners rounded.

## Fin and tailplane

These are from sheet as are the rudder and one piece elevator. In the review kit, the tailplane was slightly warped, and rather than use a new piece of wood, cross braces were let into the piece which was then pinned down and weighted until completely dry. I would recommend this course of action anyway since it reduces the possibility of warping at a later date. The tail assembly is glued to the fuselage as is the small under fin/tail skid, which is supported with pieces of triangular balsa stock. Rudder and elevator are hinged with the mylar strip provided.

## Wings

The foam wings are joined with epoxy adhesive and reinforced with the glass cloth bandage, (supplied) using polyester or epoxy resin. Once the tip blocks are fitted, they can be sanded to blend with the wing section.

With all construction completed, the undercarriage is fitted and holes cut to allow air circulation from the scoop on the fuselage side into the battery compartment and out through the floor. Holes are also cut for the charging socket and radio switch.

At this stage the airframe weighed 13½ ozs. The model was covered with metallic green Solarfilm with white trim. Motor and battery pack were installed but the on/off motor switch was replaced with a micro switch since I elected to instal a third servo for in flight switching. The instructions emphasise that for reasons of weight a 225 mAH receiver battery is used and not the normal 500 mAH size. Futaba radio was installed using FD 30M miniature servos supplied by Ripmax.

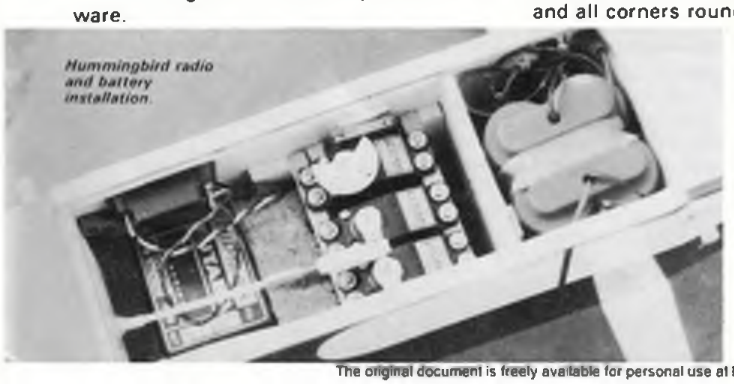
Finished weight, ready to fly came out at 94½ ozs giving a wing loading of 17½ ozs per square foot. The control throws were set up to give rudder ± 1 in and elevator ± ⅜ in.

## Flying

Two steps, switch on motor, hand launch, and away she 'hummed.' The climb out was gradual but steady and once a reasonable altitude was attained, the first turn was made. The model proved very responsive to rudder and only a touch of elevator was needed to keep the nose up. I flew circuits until the motor slowed and the nose dipped, then glided in for a smooth landing. Duration was about five minutes.

## Conclusion

An easy model to build, with steady flying characteristics, could very well be used as a first model/trainer.



*Hummingbird radio and battery installation.*

*Hummingbird ready for flight. Note the air intake on the side of the fuselage for cooling the batteries.*

# SHOP TALK

**The latest in products for the modelling scene**

## WYCOMBE

The Wycombe Kite Co, 2 Mole Run, Downley, High Wycombe, Berks HP13 5JJ, has been established by four devotees to make high performance kites more widely available. We were invited by Mr. De Leon to a demonstration of the two delta kites they produce. The conditions were by no means ideal at the locak park, many trees and a slope, with what wind there was blowing over the top; this always tends to cause turbulence. We started with the smaller 'Fringed Delta' which has a span of 46ins.

This was put aloft single handed by Mr. De Leon and was very soon some 200ft high. The larger Delta has a span of 5ft 6ins; this did require two of us to launch, and was most impressive also, gaining height quickly in the very light breeze, and was soon almost overhead. Both kites are made from rip-stock nylon with fibre glass rods fitted into the leading edge and a dowel spine and cross support, which can be replaced in the event of a breakage.

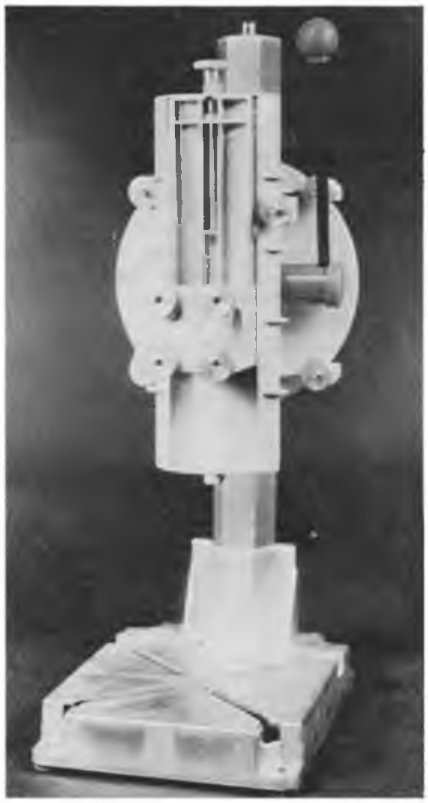
Altogether a most enjoyable experience, much closer to flying a tethered glider than a conventional kite. Price 'Fringed Delta' £5.99 inc. VAT, 'Wycombe Delta' £8.28 inc. VAT.

Wycombe Kite Company also sell a winder at £3.45 and line with a swivel for 52p. All these items are available from the above address.

## RIPMAX

Two latest imports available from Ripmax Models, Green Street, Enfield, Middx EN3 7SJ, are the 'Baby-Drill Stand' model R-EM1007 and the 'Baby-Drill' model R-EM1004.

The 'Baby Drill' has a 12v 18w motor, which consumes between .2 and 2 amps depending on the load. The motor also has a three speed gear box at the front end, with a low speed indicated at 2000 rpm and a high speed of 8000 rpm. The speeds are switched by a slide knob on the side of the body, and an off switch is situated at the rear. A very nice chuck is fitted capable of holding the finest drill available. Price £25.20p.



The complimentary drill stand has a die-cast aluminium base and an alloy hexagonal vertical post, fitted with a plastic slide and motor mount. The plastic mount incorporates a mechanism for sliding the motor up and down, this is operated by a lever on the side. The mount can also be rotated enabling holes to be drilled at any angle. Price £21.75.

## SWANN

The 'Craft Tool' designed and produced by Swann-Morton Ltd., Penn Works, Owlerton Green, Sheffield S6 2BJ is ideal for light cutting purposes.

The craft tool is supplied with 3 blades, each shaped for a specific purpose. These blades are produced in the same way and from the same steel as surgical scalpel blades and each of the craft tool blades has a fine surgical style cutting edge. The blades are held in place by pressure exerted by a knurled screw — it is not necessary to remove the screw to insert or withdraw a blade. All that is required is for the screw to be loosened and the blade can be moved in and out quite easily.

The Swann-Morton Craft Tools are supplied carded in fives. Each tool is vacuum sealed onto the card complete with its 3 blades.

Swann-Morton also produce two other cutting tools for use by the modeller, and craft worker — the Unitool comprises 3 heavy duty scalpel sharp blades fitted into a mansize handle. Whilst the blade of your choice is in operation, the remaining two blades are safely contained inside the handle with cutting edges completely protected.

The third tool in the Swann-Morton range is the Supatool. This has a strong handle into which can be fitted a choice from five special heavy duty steel blades. This tool is recommended for the heavier cutting jobs.

Swann-Morton Craft Tools are available at most craft shops and stationers.

## MARSHALL'S

A range of Pre Sensitised Printed Circuit Boards designated as Fotoboards, are being produced by A. Marshall (London) Ltd., Kingsgate House, Kingsgate Place, London NW6 4TA. They are protected by a peel off plastic sheet and are ideal for the product of prototypes and small runs of printed circuit boards. These boards may be developed by exposing in an ultra violet exposure unit for 10 minutes, or alternatively by being left in the sunshine for a whole day. In addition to the actual board, a kit for an ultra violet exposure unit is available. This is only available through Marshall's shops as it is not suitable for postal despatch. For further details contact the above address.

## MICRO-MOLD

Two new items from Micro-Mold, Station Road, East Preston, Littlehampton, W Sussex BN16 3AG. The clothes peg style glow clip retails at 79p. The adjustable throw horn retails at 48p per pair, including fixing plate and screws. It is recommended that this clevis connection on the horn is screwed on and off the stud, in order to cut a thread inside the connector. This makes adjustment easier when the horn is fitted to the model.


## GLOY

Henkel Chemicals Ltd., Merit House, The Hyde, Edgeware Road, London NW9 5Ab, produce a range of gums, glues and pastes suitable for aeromodelling.

Papier mache paste is a powdered cellulose adhesive formulated to thicken up easily with water. Papier mache is still a useful material for making cowls and other compound forms in these days of fibre glass. Cost per six pint sachet 39p.

Gloy paste is a traditional clean fluid paste suitable for covering small models with tissue, sold in bottles. 2ozs at 32p, 5ozs at 50p, and 10ozs at 78p.

Gloy gum is ideal as a base for making transfers as it is soluble in water. Sold in bottles, 2oz size 33p, and 5oz size 52p.

## FINE

H. Fine & Sons Ltd., Victoria House, 93 Manor Farm Road, Wembley Middx HA0 1XB, Phone: 01-997-5505 produce a very useful zip-round case, designed to hold a range of small tools. The case is made in a choice of sizes and tool layouts. For further details, contact the above address.

## MELODY

The excitement and adventure of the pioneering flying days are captured on two colourful wallpapers from Melody Mills Limited, Cossington Road, Sileby, Loughborough, Leicestershire LE12 7RU. Eight of these early aircraft are illustrated on 'Wings', pattern No. 10340, printed on tough, ready pasted vinyl, which is easy to hang, easy to strip, lightfast and scrubbable.

'The Red Baron', pattern No. 39001, depicts an episode from the days of aerial combat, when the skill and courage of the pilots in their open cockpits became legendary. This wallpaper is washable and will look equally great in the study/bedroom of your own family's aspiring Biggles!

Coming right up to date, and its into orbit with 'Outer Space', pattern No. 38301, a washable wallpaper featuring a selection of galactic scenes to stir the imagination. "Melody to Buck Rogers, come in please, we've got just the thing to redecorate your den . . ."

All wallpapers measure 11 yards by 20.5 ins (10.10m × 52cm) and are available from all good wallpaper shops, nationwide.

## BERNFIELD

Designed with model engineers in mind, this new high performance miniature bench drill has now been introduced into the U.K. by Toyo of Japan. Known as the Minidrill, with 6.5mm chuck capacity, it measures 435mm high by 315mm deep and is supported on a sturdy cast iron base table 170mm × 170mm.

Power is generated by a 220/240 volt motor and transmitted through an easy-change belt and reduction pulley system to provide six drill speeds from 850 to 3100 rpm. A high speed model (7000 — 10,000 rpm) is also available to order.

The main spindle is precision ground and hardened for both accuracy and strength with bearings mounted at both ends, to give a smooth-action rack and pinion feed. This is controlled by a calibrated depth gauge adjustable according to the depth required. A lightweight die-cast aluminium head-casing lowers the unit's centre of gravity, giving exceptional stability to the Minidrill. This also acts as a heat sink to the motor which prevents seizure of the machine during prolonged heavy use.

As well as the normal on-off modes, the power supply switch can be set for automatic operation of the drill with the movement of the lever arm.

The Toyo Minidrill sells for £96 and is available along with literature through the U.K. distributors, Eric H. Bernfeld Ltd., P.O. Box 111, 17a the Broadway, Potters Bar, Herts EN6 2HG. (Tel: Potters Bar (0707) 43619).

## LOCTITE

The Gluematic spring loaded applicator ensures precision flow of cyanoacrylate, and is simple, safe and easy to use. It dispenses a measured drop each time the applicator is depressed. The twist lock safety cap prevents misuse in young hands. Gluematic is ideal for mending metals, rubber, leather, ceramics, porcelain and most plastics. Available at most D.I.Y. shops, price £1.49.

# SCALE MATTERS

by Alan Callaghan

## CRAWLEY INDOOR MEETING

The 1981 Indoor Meeting run by the SMAE South Eastern Area at the Crawley Leisure Centre demonstrated once again the strength of interest that exists in indoor flying amongst scale modellers. Whether this is due to the usual winter frustration through the lack of opportunity to fly outdoors, or simply that the attractive challenge of making the smaller indoor scale model fly really well, is appealing to more and more builders is a debatable point, but the latest response of this annual meeting seems to continue a regular pattern in strength of numbers and the high quality of models.

The Open Rubber event drew seven entries, $CO_2$ Scale drew six, and Peanut no less than nineteen. Several others, myself included, flew just for the fun of it but with thirty-two official entries recorded, indoor scale flying yet again proves itself the most popular form of free flight scale modelling.

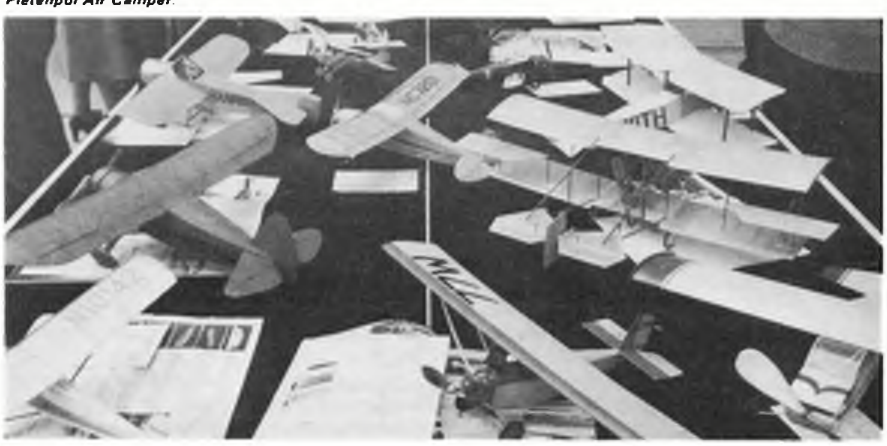
In $CO_2$ scale, Robin James achieved another Crawley victory this time with a new model, an American *Davis D-1K* monoplane. This subject has ideal properties as a free flight model — a high parasol wing with attractive planform, streamlined box fuselage, twin cockpits and an exposed five cylinder Kinner (hence the 'K') engine. A few of these aircraft are still preserved and flying in the USA. Robin's model featured a black/gold colour scheme in coloured tissue. At a scale of 1:16 it is approximately 550mm wingspan and weighs 35 grams complete with Telco motor. Placing only third in static scale due perhaps to the tissue finish, the *Davis* had almost a 20% lead in its flying score over its nearest rival, Butch Hadland's *Pietenpol Air Camper*. Robin's technique was to fly the model on low throttle so that it did not climb too high from a take-off, and it would cruise down to a gentle landing finishing with a short taxi run without the violent ground looping that seems to plague many a $CO_2$ scale model after touchdown.

In contrast with the *Davis* was the third place *Howard DGA* by well-known C/L Stunt flyer Dave Day. A much larger model, Dave's *Howard* required a fair degree of throttle to keep it in the air, and it was one of the fastest models to be seen flying at this meeting. Such models do not need much in the way of penetration qualities when flown indoors and this model's extra sparkle in performance would make it a very docile flyer out doors. The maroon/black colour scheme was neatly applied and made up for the model's slight lack of exact scale structure although it did rate a reasonable static score. Rib for rib and stringer for stringer construction is usually only a basic requirement in achieving top static scores in these $CO_2$ contests, and indeed the top marks were given to Nick Peppiatt's new *Sopwith Tabloid* mentioned in this column two months ago. This large and superbly light model was being tested for the first time and this accounts for the rather low flying score. Nick's attempted ROGs resulted in much of the aforementioned ground-looping, but the model eventually took to the air as the throttle was gently opened up between flights. One model from the same period that did not make it into the air was the *1909 Curtiss Model A* pusher by John Meaney. Built to 660mm span, this model at 34 grams weight was covered in tissue tinted with coffee, woodstain, and boot polish! With a trike undercarriage, all-flying ailerons and complex bracing system, the model was well-detailed, but the drag from all these various components combined, seemed too much for the $CO_2$ motor to overcome. Perhaps one of the new Turbotank $CO_2$ will provide enough power to get the model into the air. Pete Cameron's converted KeilKraft *Piper Family Cruiser* only achieved a very low flying score, and this I found most surprising since I managed to film it putting up some of the smoothest and most drama-free flights of the day, to finish in 5th place overall. As the total score was a simple sum of the flight and static scores, the end result remains unaffected but it seemed to me that Pete's two separate scores had been accidentally juxtaposed on the results board.

*Heading picture: Robin James' $CO_2$ powered Davis D-1K won first place at Crawley. Model is 1:16 scale with a black/gold colour scheme. Right: John Coker's Peanut Stampe SV4B is an excellent example of the realism that can be achieved in a 13in. span flying model. Its static score at Crawley was surprisingly low. Judge for yourself!*

No outstanding new models were to be seen in the Open Rubber event — the first two places in this closely fought competition going to Butch Hadland's familiar large *Lacey M-10* and Nick Peppiatt's super *P51B Mustang* with only two points separating them in the end. Nick's model made the highest flight score and top static marks went to R. Ashby's relatively enormous *Sea Tabloid* which, not surprisingly, did not put in a qualifying flight. Flying this kind of model indoors at approximately 600mm span with its pro-

*This shot of the judging table includes a Howard DGA, 1912 Henriot, 1909 Curtiss Model A, Sopwith Tabloid and a Pietenpol Air Camper.*




*Left R Ashby's large rubber-powered Sopwith Sea Tabloid did not fly at Crawley, but is nevertheless an impressive model. Size may be judged by the pair of spectacles! Right This mixed trio of Peanuts includes Peter Frostick's Eastbourne Monoplane, Rex Oldridge's Folkerts Special, and T Knight's Davis DA2A. All are good fliers.*

portionally huge floats is not only tempting fate but providing it with a dead certainty, and although the model was neatly built and most impressive, it really should be regarded as an outdoor type assuming that a rubber motor of sufficient power could be accommodated. Mr Ashby's second model was a *1912 Hanriot* monoplane — a much more practical proposition — and it eventually made third place, gaining second highest static score in the process, although the vivid green colour scheme seemed rather uncharacteristic of the period. Underpowered, the model only managed a low flight score.

In fourth place, Nick Peppiatt's second entry, his immaculately built *Bristol 138A* flew like a miniature control line model in very wide lefthand circuits with very little bank. Skimming the walls of the hall as it went, it too could only return a fairly low flight score. Flying these larger models can be fraught with danger at times in a crowded hall and twice I saw Butch's *Lacey* come to grief on official contest flights due to hitting people standing around despite shouted warnings, and with the consequent loss of the model's landing points, nerves were beginning to show signs of strain.

The peanut event, as expected, drew most support, and once again we had the usual situation whereby a handful of people with well-tried and trimmed familiar models were guaranteed to place well with quite a gap coming between these and the rest of the entries. A study of the results sheet shows that the top flying models regularly and easily put in flights of 50 seconds plus, whereas the majority of fliers found it a struggle to average 30 seconds or so. As the final scores again were a straightforward sum of flight times, plus static scores, it goes without saying that one needs to have an especially fine-flying model rather than a super-detailed static winner in order to make the top three. Cedric dela Nougerede's clear 21 point lead over his nearest rival in static was only sufficient to hold fourth place overall with his delightful *DH Tiger Moth* pictured in this column two months ago. His lady wing-walker had to be left behind for the *Moth* to manage its best time of 32 seconds.

Of the nineteen entries, the subject range was quite varied with duplications being restricted to two *Laceys* and two *Pietenpol Air Campers* together with no less than three *Ganagobies* from Bob Peck kits — the best being Richard Bould's in eleventh place. One of the most original new models was Peter Frostick's *Eastbourne Monoplane*, first tried out at Milton Keynes last year and now sporting a full set of rigging wires which has greatly reduced the model's flying performance due to drag. With their limited capacity for carrying weight, and therefore rubber, Peanuts really do benefit from being as aerodynamically clean as possible.

The only low wing subject at the meeting was the *Davis DA2A* by T Knight which also features a tricycle undercarriage and a much enlarged butterfly tail. Although the model's best flight times were only 29 seconds or so, it seemed to have good flying potential and the flight trim showed very good stall recovery properties. A very successful version of this aircraft has been flow in the USA by well known expert Clarence Mather.

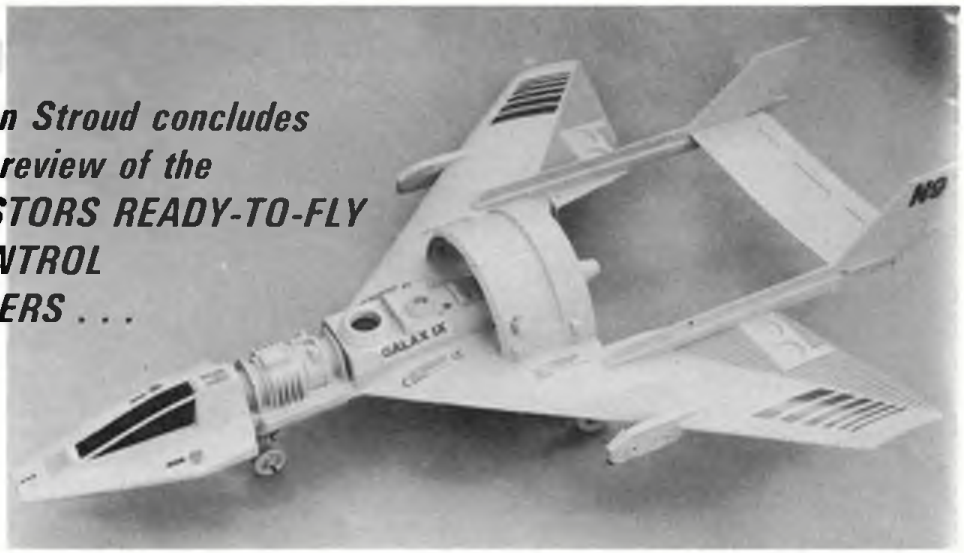
Biplanes were restricted to Howard Furness's *Stearman* and John Coker's beautiful *Stampe SV4B*, together with Cedric's *Tiger*. John's *Stampe*, although extremely accurate and neatly built, inexplicably was given only a very average static score which held his final placing down to seventh with a best flight time of 32 seconds. Top official flight times (no maximum enforced) were Butch's 68 seconds with his *Lacey*, closely followed by a 65 second effort by Rex Oldridge's *Folkerts Special* built from a Model Builder plan, together with a 63 second score by Nick Peppiatt's *Lacey*. Those seconds really count, fellows!

*The simple ones fly the best! Pete Cameron's CO² conversion of a KK Piper Family Cruiser with a Peck Baby Ace for rubber power.*

| Results | | Static | Flight | Total |
|---|---|---|---|---|
| CO² Scale | | | | |
| 1 Robin James | Davis D-1K | 22 | 37 5 | 59 5 |
| 2 Butch Hadland | Pietenpol Air Camper | 34 | 30 | 54 |
| 3 Dave Day | Howard DGA | 30 | 22 | 52 |
| 4 Nick Peppiatt | Sopwith Tabloid | 36 | 13 | 49 |
| **Rubber Scale** | | **Static** | **Flight** | **Total** |
| 1 Butch Hadland | Lacey M-10 | 40 | 28 | 68 |
| 2 Nick Peppiatt | P51B Mustang | 34 | 32 | 66 |
| 3 R Ashby | Hanriot | 48 | 15 | 63 |
| **Peanut** | | | | |
| 1 Butch Hadland | Lacey M-10 | 103 5 | 56 + 68 | 247 5 |
| 2 Nick Peppiatt | Lacey M 10 | 94 5 | 50 + 51 | 195 5 |
| 3 Rex Oldridge | Folkerts Special | 69 | 57 + 65 | 191 |
| 4 Cedric dela Nougerede | D H Tiger Moth | 124 5 | 32 + 24 | 180 5 |
| 5 J Whitmore | Pietenpol Air Camper | 102 | 31 + 26 | 159 |

# FLYING START

## *John Stroud concludes his review of the TESTORS READY-TO-FLY CONTROL LINERS . . .*



LAST MONTH I covered the five most conventional control line aircraft in the Testor Range. They were a Spitfire, Warhawk, Mustang, Cosmic Wind and Silver Wind. Each is fitted with the unique Zip starter and we have had a lot of fun flying them. This month I will cover the last three machines of the range and describe some ways of increasing the performance of this type of model.

If conventional aircraft are not your cup of tea, then these three machines should be right up your street. First the one that only just flies. The basic principle of the hovercraft is very simple and the mechanism of the 'Galax IV' has kept to that simplicity. The standard Testor motor is mounted horizontally and driving a fairly large propeller in a ring or duct. It is fitted with Rotamatic starting and has no flying

BD5 tailplane assembly; note all moving surface of tailplane.

BD5 wing clips into the slot of the wing root.

BD5 nose cone removed revealing balance weight.

controls i.e. it flies 'free'. The instructions are up to the normal Testor standard and mention that although it will fly on water, it sinks when the engine stops! The superstructure, if that's the right word, is nicely detailed, well made and looks just right. Starting the motor is fairly awkward. The clever clip provided for a Duracell U2 size battery means the craft must be held off the ground during starting. It is necessary to remove the propeller guard to start the engine and chopped up fingers are an easy result for the unwary. The lift pressure 'spills' out the back of the solid skirt and the machine goes surprisingly quickly over smooth tarmac or concrete. If the surface slopes, towards a drain for instance, gravity takes over and the thing just goes down hill. The Galax IV was, for me, the least interesting of the range. However, in fairness I must admit that all the younger people found it extremely enjoyable and interesting and so did many spectators. So, although you will not learn much about flying from a Galax IV, you can get some fun and learn to handle a glow engine.

The next plane we took a look at was the Galax IV Spacefighter. Described on the pamphlet as a 'Control Line spacecraft' this is probably the best way to describe it. The basic configuration is a swept wing, twin boom pusher but the styling has transformed it into a most attractive futuristic plane. The construction has been kept quite simple. The record and written instructions, leave no doubt as to how to start the model. The same 'Starter Kit' as the Galax IV is needed to provide the battery clip which enables connection to be made to the hidden engine. Everything was found to be tight and assembled correctly. After following the instructions exactly, the engine ran after taking five primes and bursts to draw fuel into the 'dry' engine.

First flights were made over grass and it was necessary to hand launch. Lack of power due to a rich engine setting caused the first two launches to sink to the ground. No damage resulted and a ¼ turn 'leaner' (screwed in) on the fuel gave us a few more revs and off it went. At first it seemed very short of power and flew with a marked nose-up attitude. However, a very gentle application of down elevator bought the nose down and the speed up. Eventually it was flying at a fair old lick. Gradual up elevator causes only a small increase in height when the plane slows down and flies very nose up. Too much up slows the aircraft right down and it then starts to lose height. Careful judgement is needed to level off and pick up speed before hitting the ground. My young helpers found they could handle the machine and were greatly amused when I found it could be whipped with a dead engine and flown indefinitely!

The last plane of the eight is the BD5.

BD5 engine and extension shaft. Note the flexible coupling to the engine.

This is a scale model of an interesting lightweight aircraft designed by Jim Bede in the USA. It is most unusual yet boasts fantastic aerodynamic efficiency. It would be intriguing to find out how his ideas work out in a model. Stripping the BD5 is far more difficult than any others in the range and I would strongly advise the inexperienced to leave it alone if possible. Models with pusher engines are fairly common although using an extension shaft is, as far as I know, unique. This one is quite long and has a four pronged coupling to allow slight movement. The engine is fitted with the 'Rotamatic' starter and turns in the normal direction. Starting and flying instructions are to the usual excellent Testor standard. First attempts to start the engine were, for once, futile. Convinced there must be something wrong with the engine, I decided to tackle the rather tricky job of dismantling the plane for inspection. It was then I found out why it weighs far more than the others at about 450 gms — to get the balance right it has a 100 gm weight in the nose! As luck would have it I solved my starting problem without stripping the actual motor. When fitted in the plane, the fuel control felt as if it was closed when in fact it was still 4 turns open. Opening it another 4 turns gave me a total of 8 turns open and a continuously flooding engine. With that sorted out, the engine fired up on the third operation of the Rotamatic starter. The extension shaft and coupling seem to absorb very little power and the engine sounded very lively and willing. First we tried flying the BD5 over grass on 30ft metal lines. Hand launches proved rather too difficult so we left it alone and enjoyed ourselves with the other aircraft. Next time we decided to go back to the instructions and do what they say. (Remember that old saying? When *all* else fails, read the instructions). What we needed was the lighter and slightly shorter nylon lines but above all, tarmac to take off from.

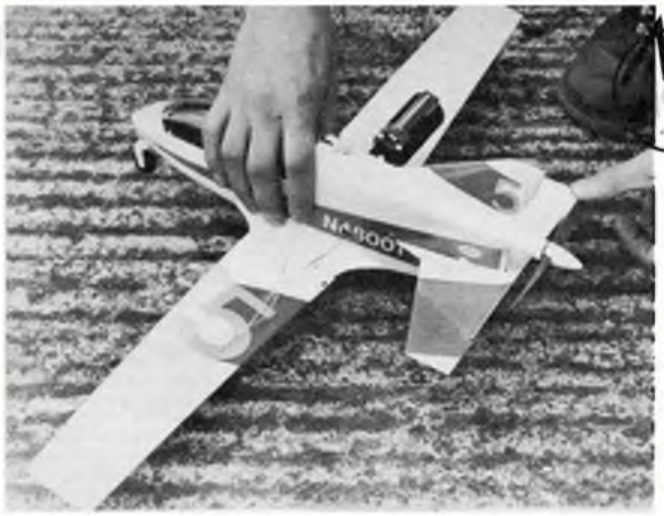
Our first trip to a local disused airfield ended in disaster because the aircraft caught fire and burnt out before we could get a flight. A minute's carelessness on my part was enough to cause my first ever burn out. Looking back I am fairly certain I primed the engine with the battery still connected. I know we all do it sometimes but it really is not worth it with this or any other glow engine. With only a few days to spare, a second BD5 was obtained and flown one evening as it was getting dark. The model proved to be very fast indeed, but unfortunately control response is not one of its strong points. The evening was bitterly cold and low temperatures will cause all plastics to become hard and brittle. Flying stopped when some cracks developed after a number of rather nasty crashes.

Now we come round to increasing performance. If, like us, you normally fly over grass, then taking the wheels and undercarriage off one of these models is no problem. All accept the BD5 are easy to handlaunch with a little practice. The gain seems to be about 3-5 mph but if you only fly over concrete, leave the wheels on or you will cause considerable damage.

Next we changed the props on all but the two pushers. As supplied they are either fitted with 5in × 2in or a 3 or a 4 bladed equivalent. In the 'Speed and Stunt' kit is a 5in × 4in prop with smaller blade area. This gave a very noticeable increase in speed on all planes. Unfortunately the 5in × 4in catches the ground on take off if fitted to the WW2 planes and can only be handlaunched. With the Spitfire, it was also necessary to trim quite a bit off the front ring cowling area to get it to clear the 5in × 4in prop. The weakened ring will not stand up to the use of the Zip starter and it is then necessary to employ hand starting.

All the models can be made to fit together a bit better by trimming some of the mouldings a little. Some parts which clip together have a tendency to ease apart and this must cause drag and slown the model. We found an easy solution was to use Sellotape to hold the bits together much more neatly. Finally we tried longer metal lines. Although they are slightly heavier lightweight 'Laystrate' lines, they offer much less drag than nylon. The 'Cosmic' models flew very well and much more quickly on 30ft Laystrate. The WW2 models found these lines too heavy and rolled in on launch. Even adding about 25 gm tip weight did not cure the problem. We have gone back to nylon lines but shorter and lighter metal lines would no doubt be worth trying.

In conclusion. A grand set of planes all slightly different and great fun to fly. They have good crash resistance and the engines are some of the easiest to handle I have ever used. My one regret is that only the hovercraft is fitted with an engine mount so that the engine can be taken over and used in an ordinary kit later on. In all the other planes, the engine is clamped into the plastic moulding and has no mounting lugs. It seems a shame to limit the use of such a useful engine. Perhaps if we put the suppliers under enough pressure they will sell a separate backplate similar to the one from the Hovercraft or the Testor 8000 engine.



*Right, starting procedure, with the needle valve set at the correct opening, prime the engine through the exhaust ports. Make sure the piston is covering the ports. Clip the battery to the plug, and rotate the propeller in a clockwise direction to wind up the Rotamatic starter. With luck the engine should start within two or three attempts.*

*Below right detail of battery pack fixed to the Galax IV Spacefighter.*


*Starting the Galax IV Spacefighter.*

# FROM THE HANDLE

# RACING
## Jim Woodside

### OPENERS

Somehow in the changeover period from Dave Clarkson to myself, the formal introductions were lost.

By now a couple of columns will have appeared. My initial concept is to try to include some constructional advice, equipment reviews and contest reports as a basic mix. However I would like some feedback as to what you would like to see covered — especially if you are just beginning or contemplating taking up racing. If you expect a reply to a letter, please enclose a stamped addressed envelope or reply coupon. I could also recommend putting your questions on a sheet of paper with a space left for the answer. Send to Jim Woodside, 15 Heathfield Road, Liverpool L15 9EU.

### RACING REVIEW OF 1980

John Horton's summary of the British racing year always makes fascinating reading and I know that they are a popular feature with the racing fraternity. Points are awarded as follows:

| Place | Open Final | Novice Final | Trials / Marathon |
|---|---|---|---|
| 1 | 6 | 3 | 6 |
| 2 | 5 | 2 | 5 |
| 3 | 4 | 1 | 4 |
| 4 | — | — | 3 |
| 5 | — | — | 2 |
| 6 | — | — | 1 |

**'A' Team Race**

Nine contests in 1980 (eight in '79) reflects the increase in interest with times faster than ever. Seventeen teams. Fastest heat Horton Haworth 3.56. Fastest Final Langworth Broadhead 7.51.

New models and engines are an encouraging sign. With the FAI C.I.A.M. muttering about 1.5cc engines, we could have a ready made advantage in this event should the international capacity ever be reduced to 1.5cc.

Wharfedale then still dominate as in '79 but Nixon Campbell and O'Neill/Bollen's Webra model are strongly in contention.

**Class 'B' Team Race**

Interest continues to decline with only four meetings and seven teams recording times in 1980. It is difficult to pin-point why this should be. 'B' addicts cite the new silencer rules. I hold that the event is simply unattractive to most racers — it probably is the most expensive sort of racing when engines, fuel and plugs are compared to possible contests.

Wilson Gardiner seem to have had this one stitched-up in 1980 with a clean sweep of all four contests.

**Goodyear Teamrace**

Goodyear was run to the 'diesel only' rule in 1980. Twelve contests were run, forty teams turned out and twenty eight teams scored points. Numerically, Goodyear and FAI are very much on a par but the spread of points in Goodyear (28) teams scored compared with FAI (16) shows that it is at least, more open. Most competitors seem happy with the diesel rule and certainly most races are being successfully completed.

The rather odd maths is accounted for by points received in Marathon events.

It is pleasing to see Tom Miller and Rob Fitzsimmons on top with their highly painted and scale-like models. At least performance and appearance can be reconciled in this class.

Highest placed novice team were Hardwick-Leeman of Loughborough with a total of 10 points. My wife Janice would like me to mention that she got 2 points but I don't think I will mention this fact! I have to stay home cooking while she goes out practising.

**FAI Teamrace**

Thirteen contests and thirty teams competing show that FAI is arguably the most popular class of racing. Certainly competition is fierce at the top with any of half a dozen teams capable of winning. Domestic standards must be amongst the highest in the World — the Nationals semis qualifiers were almost on par with the times at Czestochowa.

Langworth Broadhead have now consolidated their position as one of the best U.K. Teams. I hope that international honours will come their way. Nixon Campbell have also 'come through' with some very fine performances which have long eluded them. Ditto for Wilson Gardiner. The numbers of course, do not tell all the story and we must not forget Steve Smith and Colin Brown's fine performance at the 1980 World Championships. Smith Brown also only flew in five events and placed in them all.

**Overall season summary**

| | Team | Club | Total points |
|---|---|---|---|
| 1 | Langworth Broadhead | Wharfedale | 70½ |
| 2 | Wilson Gardiner | Tyneside | 59 |
| 3 | Nixon Campbell | Hunters | 58 |
| 4 | Horton Haworth | Wharfedale | 47½ |
| 5 | Jarvis Needham | Stockport | 36 |
| 6 | Green Cunningham | Ipswich | 31 |
| 6 | Fitzsimmons Miller | Norwest | 31 |
| 8 | Stubbs Schofield | Stockport | 30 |
| 9 | Smith Brown | Feltham | 27 |
| 9 | Allcock Chambers | Wolves | 27 |

Despite scoring no points during 1980, it is interesting to note that Heaton Ross still have command of the FAI Greats — a tribute to the lead built up in the middle 70s.

Langworth/Broadhead's achievement is best underlined by pointing out that their points came only from two categories — ½A and FAI. Congratulations to all the others — I know how much hard work it takes.

**Clubs**

| | | |
|---|---|---|
| 1 | Wharfedale | 153 |
| 2 | Stockport | 102 |
| 3 | Tynemouth | 89 |
| 4 | Hunters | 58 |
| 5 | Norwest | 50 |

Congratulations to Wharfedale, and particularly to Hunters whose 4th place has been solely the effort of Nixon Campbell.

Finally our thanks to John for all his hard work. Please keep the results rolling in to John Horton, 10 Lawn Avenue, Burley in Wharfedale, Ilkley, W. Yorks LS29 7ET.

### BOCHUM INTERNATIONAL, WEST GERMANY — SEPTEMBER 20/21st 1980

Sorry to say that I cannot give any details, other than results, on this important contest. British participation was limited this year to one in Speed and two in Aerobatics, which has rather restricted the feedback.

**F2A Speed 16 entrants**

1. Bilat (Switzerland) 261.4 kph; 2. Brechet (Switzerland) 260.8 kph; 3. Brands (Holland) 252.6 kph.

**F2B Aerobatics 17 entrants**

1. Ceck (CSSR) 5597; 2. Eskildsen (Denmark) 5536; 3. Fernandes (France) 5474.

**All Time Greats Class by Class**

**Team Race Points 1975-80**

| | | | |
|---|---|---|---|
| 1 | Langworth Broadhead | Wharfedale | 95 |
| 2 | Horton Haworth | Wharfedale | 70½ |
| 3 | Wilson Gardiner | Tyneside | 48 |

**'B' Team Race**

| | | | |
|---|---|---|---|
| 1 | Wilson Gardiner | Tyneside | 118 |
| 2 | Nixon Campbell | Hunters | 82 |
| 3 | Heaton Ross | Sharston | 74 |

**Goodyear Team Race**

| | | | |
|---|---|---|---|
| 1 | Horton Haworth | Wharfedale | 230 |
| 2 | Jarvis Needham | Stockport | 160½ |
| 3 | Rudd King | Feltham | 123½ |

**FAI Team Race**

| | | | |
|---|---|---|---|
| 1 | Heaton Ross | Sharston | 165½ |
| 2 | Smith Brown | Feltham | 137 |
| 3 | Langworth/Broadhead | Wharfedale | 133½ |

**Team ('A')**

| | Team | Club | 1sts | 2nds | 3rds | Total points |
|---|---|---|---|---|---|---|
| 1 | Horton Haworth | Wharfedale | 4 | 1 | 1 | 32½ |
| 2 | Langworth Broadhead | Wharfedale | 3 | 2 | 0 | 27½ |
| 3 | Nixon Campbell | Hunters | 0 | 3 | 2 | 23 |
| 4 | O'Neill Bollen | Elliotts | 2 | 1 | 0 | 17 |
| 5 | Green Cunningham | Ipswich | 0 | 1 | 1 | 9 |

**Team (Class B)**

| | Team | Club | 1sts | 2nds | 3rds | Total points |
|---|---|---|---|---|---|---|
| 1 | Wilson Gardiner | Tynemouth | 4 | 0 | 0 | 24 |
| 2 | Sladdin Laurie Wallace | Tynemouth | 0 | 3 | 0 | 15 |
| 3 | Fitzgerald Williamson | Wharfedale | 0 | 0 | 2 | 8 |
| 4 | Jarvis Needham | Stockport | 0 | 1 | 0 | 5 (marathon) |
| 5 | Nixon Campbell | Hunters | 0 | 0 | 1 | 4 |

**Team (Goodyear)**

| | Team | Club | 1sts | 2nds | 3rds | Points |
|---|---|---|---|---|---|---|
| 1 | Fitzsimmons Miller | Norwest | 1 | 3 | 2 | 31 |
| 2 | Stubbs Schofield | Stockport | 2 | 2 | 2 | 30 |
| 3 | Allcock Chambers | Wolves | 3 | 1 | 1 | 27 |
| 4 | Jarvis Needham | Stockport | 2 | 1 | 1 | 26 |
| 5 | Catlow Jepcott | L'borough | 0 | 2 | 2 | 26 |

**Team (FAI)**

| | Team | Club | 1sts | 2nds | 3rds | Points |
|---|---|---|---|---|---|---|
| 1 | Langworth Broadhead | Wharfedale | 4 | 3 | 1 | 43 * |
| 2 | Wilson Gardiner | Tynemouth | 3 | 2 | 2 | 36 |
| 3 | Nixon Campbell | Hunters | 1 | 3 | 2 | 31 |
| 4 | Smith Brown | Feltham | 3 | 1 | 1 | 27 |
| 5 | Clarkson Woodside | Norwest | 0 | 0 | 1 | 9● |

● points from Jarvis Woodside teaming
* final record holders in 7.31.5 ● heat record holders in 3.38.5

**F2C Team Race 17 teams**

| | | Best Heat | Best Semi | Final |
|---|---|---|---|---|
| 1 Visser -Buys | Holland | 3:34.9 | 3:42.2 | 7:26.9 FMV? |
| 2. Wakkerman-vd. Veerd | Holland | 3:41.7 | 3:48.2 | 7:47.1 Nelson? |
| 3 Hansen-Pederson | Denmark | 3:57.6 | 3:46.4 | 9:34.2 ?? |

*Langworth/ Broadhead winners of the FAI and best all-rounders.*

One interesting item gleaned from the results sheet is that Rob and Bert Metkemeijer finished 4th and 5th — in Aerobatics!

## CONTROL LINE RACING RECORDS

With the new season upon us, I thought that a list of current record times might give you some incentive to get out and 'bag' a certificate for yourself. Remember that new records can only be established in SMAE/FAI recognised (organised) events and that three teams must *start* the race or final in which the record is set.

If you think that you are in with a chance, it is well worth having several stop watches running to verify the time. Claim forms are available from the SMAE Records Officer — address in 'Model Flying'.

**A Team Race**

| | | Time |
|---|---|---|
| Heat | Horton-Haworth | 3:56.4 |
| Final: | Langworth-Broadhead | 7:51 |

**B Team Race**

| | | |
|---|---|---|
| Heat | Nixon-Campbell | 3:17.3 |
| Final: | Nixon-Campbell | 6:53.5 |

**Goodyear (2.5 diesel) TR**

| | | |
|---|---|---|
| Heat | Stubbs-Schofield | 4:13.2 |
| Final: | None claimed. | |

**FAI Team Race**
**SMAE records**

| | | |
|---|---|---|
| Heat | Smith-Brown | 3:38.6 |
| Final | Langworth-Broadhead | 7:33.5 |

**FAI (World) record**

| | | |
|---|---|---|
| Heat | B & R. Metkemeijer | 3:29.2 |
| Final | Axtilius-Samuelsson | 7:18 |

## PROVISIONAL 1981 RACING CALENDAR SMAE EVENTS

**Check dates and venues with Bob Horwood — Bristol 48769**

| Date | Name | Venue | Events |
|---|---|---|---|
| 12th April | 1st Centralised | Cosford | F2C, ½A |
| 26th April | European Trials | 3 Sisters | F2A, F2B, F2C |
| 10th May | 2nd Centralised | Barkston | F2C, G/Y |
| 24th May | FAI International | 3 Sisters | F2A, F2B, F2C |
| 14th June | 3rd Centralised | 3 Sisters | F2C, G/Y |
| 26th July | 4th Centralised | Fairford | F2C, ½A |
| 29-31st Aug. | Nationals | Barkston | F2C, ½A, G/Y |
| 13th Sept. | 1982 W. C. Trials | 3 Sisters | F2A, F2B, F2C |
| 27th Sept. | 1982 W. C. Trials | 3 Sisters | F2C only |

**Events to be held at Elliots, Rochester**

| | |
|---|---|
| 3rd May | F2C, ½A, G/Y, F2B. |
| 19th July | ditto |
| 18th October | ditto |

## BELLCRANK WITH INTEGRAL CONNECTOR

It is generally agreed that smooth operating controls in any type of model contributes greatly to good flying characteristics. In racing and speed models, the circular bellcrank has been the standard answer in providing this smoothness. The control cables always form a tangent to the bellcrank's edge, and control remains proportional.

**The drawbacks with circular bellcranks are:**

**a.** Problems of easy line connection — often continuous lengths of over 30 metres must be passed through the model or 'unclean' external connectors must be used.

**b.** Providing effective stops to limit elevator travel or locking the push rod if it goes over centre.

**c.** Access to machining facilities to make the item.

At the cost of a very slight loss of smoothness, a much simpler method of line connection can be used, which employs a variation on the standard form of triangular bellcrank. An added advantage is that the system can be made without any machine tools. The essence of the system is that two large headed buttons are provided on the arms of the bellcrank. Loops which are formed directly on the ends of the control lines can be slipped over the buttons. Of course, the holes formed through the wing need to be rather wider than normal but they need only be very shallow.

**The advantages can be thus summarized:**

**a.** Lines may be quickly changed from single strands to laystrates if the weather turns wet.

**b.** A single line can be changed if one is damaged.

**c.** If the bellcrank centre line is placed on the model centre line, any set of control lines will suit any model built for a particular class i.e. ½A, FAI, etc.

**d.** If the bellcrank is made in a cruciform style, the additional lobe can be used to operate other functions like the fuel stop.

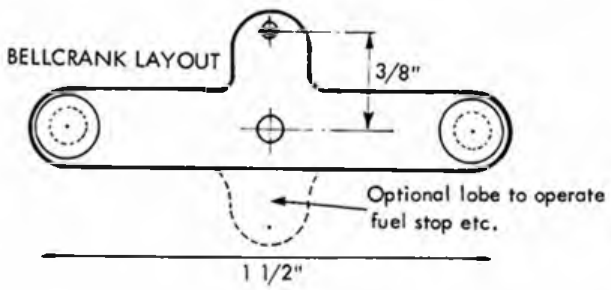
**Construction**

**a.** Mark out the bellcrank onto 1/16in mild steel and cut out using a junior hacksaw and files. Remember to radius all corners. Drill all holes and tap where necessary.

**b.** Bend the bellcrank as per side view.

**c.** Turn or file down the heads on two 4BA or similar sized brass bolts. Screw into the bellcrank, cut off the surplus and silver solder into place.

**d.** For a stronger and lighter unit, substitute titanium for mild steel and fabricate the buttons from dural — just make sure that your riveting technique is secure!




Material : 1/16" mild steel for bellcrank, 4 BA brass bolts for buttons


**Installation in the model**

**a.** Cut out a rectangle in the centre of the wing large enough to accommodate the bellcrank.

**b.** Form the leadout grooves in the inboard wing, noting that near to the bellcrank the grooves should be flared wider to allow for the sideways movement of the bellcrank.

**c.** Recess a piece of ½in wide 1/16in ply into the under side of the bellcrank bay. Cover the whole bay with 1/64in ply. You will now have a floor with a raised platform.

**d.** Install the bellcrank and check that the cranking is sufficient to allow the control lines to meet the buttons without any binding. Adjust if necessary.

**e.** Fuel-proof the bay and then the lead-out grooves by pouring fuelproofer through the holes. When dry, check that the cables can be passed easily down the wing — clear if necessary using thin stiff wire.

**Making-up the control lines**

**a.** Run out sufficient cable to make up the regulation length and add about one foot (300mm) extra.

**b.** Take one end and with about 4in overhanging, carefully bend the control wire around a bar of 1/8in — 3/16in diameter. Using a fuse wire binding of about ½in length, form a loop whose major axis is about twice the diameter of the bellcrank button.

**c.** Wrap the loose end over the main strand and secure the end with a second binding.

**d.** Run a very light coating of solder over the bindings, making sure that no loose ends stand proud.

**e.** Measure to accurate length and make up the handle end using brass eyelets.

## JENSEN RACING PROPS

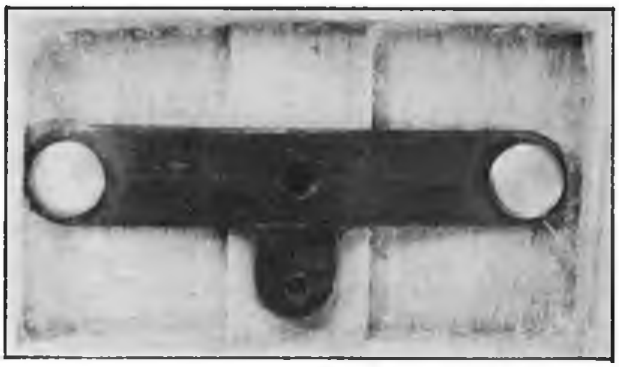
Flemming Jenson recently sent me an example of his latest product — a copy of the 1980 style Metkemeijer Team Racing prop as used by the brothers to record 3:29.2 at the World Champs last year. Those who have used this style

| Style | Description | Size | Price Glass/Carbon | Price Carbon only |
|---|---|---|---|---|
| IVO 2 | Metkemeijer 78 | 7 × 7.5 | 45 | — |
| IVO-3 | Mau-Geschwedtner | 7 × 7.5 | 45 | 50 |
| IVO-4 | Krasnorutski Single Blade | 3.75 × 8.1 | 40 | — |
| IVO 5 | Metkemeijer 1980 | 6.5 × 7.5 | 45 | 50 |

of prop, praise it's ability to hold a setting under difficult race circumstances. This probably is the best attribute we could wish in a team race prop.

Jensen mouldings are of very high quality and can be used with the minimum of preparation. Particularly pleasing is the high standard of truth in the blade pitches relative to each other.

Standard construction is a mixture of glass and carbon but two team race styles are available in carbon only.



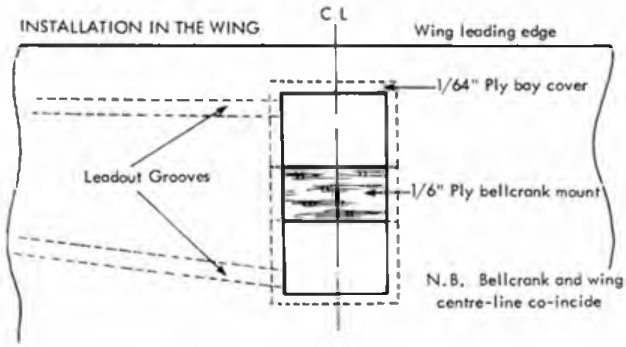
*Bellcrank bay in wing centre section. Note the recessed platform*

**Details**

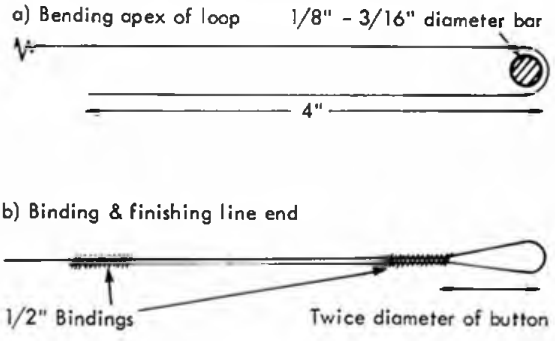
Note: (I) all prices are quoted in Danish Kroner (Dkr)

(II) postage is 100kr extra per order

(III) £1 — 14.50kr at the time of writing.




MAKING UP THE CONTROL LINES




Also available are two single blade FAI Speed props and two props for stunt — a 10 × 5 and a 12 × 6. Address: Flemming Jensen, Center Parken 26, 3.th 2500 Valby, Denmark.

## GOODYEAR RULE CHANGES — Correction

Rule 4.7.4.2 (p) — T-bar compression screws.

In the January edition a word was omitted from the above rule. It should read:

"That the use of 'T'-bar compression adjustment screws or compression adjustment screws which COULD have a forward facing projection of less than 8mm² be banned."

## EUROPEAN CHAMPIONSHIPS STUNT TRIALS

***(invited competitors)***

Barry Robinson, Peter Tindall, John Newnham, Bill Draper, Dave Day, Neville Dickinson, Rob Everton, Terry Taylor, Arthur Tipper, Peter Illiffe.

*Continued from page 247*

## INDOOR MEETING AT SLAITHWAITE

**Organiser and reporter Dennis Davitt**

This annual event was held once again at the Slaithwaite Leisure Centre near Huddersfield, a venue with good facilities, a reasonable geographical location and very helpful staff.

The usual fears for the organisers of an indoor event include the possibility of double booking (in the sense of the hall, or a clash with an outdoor event), the heating being left on; a snow-in; or a financial loss. Fortunately none of these problems arose and it was not necessary to call on the Northern Area backing for financial aid.

The first event was HLG, which had a good entry of 15 and produced times to a high standard. All competitors made 6 flights, with their best 2 flights scoring. A selection was then made of the top 5 competitors to make a further 3 flights. The result was a win for Graham Davitt, with Ron Green a close second and Bernard Hunt third.

Scale also had a large entry of 15, with several competitors entering two models. The event (not restricted to Peanut) was judged by Huddersfield Club members, Jack Hardcastle and Dennis Clarkson, ably assisted by Michelle Hardcastle. The rules used put emphasis on high flight times, and by putting in consistent flights of just over the minute with his Fike, John O'Donnell established a clear lead. Mike Sanderson was second and fourth with his Wittman Tailwind and Piper Cub, with the Uptom Baby Ace from Walt Mooney flown proxy by Mike Colling placing third.

Last event of the day was EZB, run to the '1.2 gm rules' adopted for the 1980/81 winter. All models were checked for weight on a sensitive go/go balance supplied by Graham Davitt, with the weight standard adjusted on a high accuracy electronic balance. A few models were found to be marginally under weight, and one was spot-on, but several models caused the delicate beam to hit the end stop with the indoor equivalent of a thunderous crash. These models were probably well over 1.5 gms.

To limit the number of models in the air at one time, seven official timekeepers were used. They were kept continuously 'clockwatching' by Mrs. Hunt who did a first class job of recording scores and queuing the flight cards. The arrangement of timekeepers seemed to work well, with very few collisions between models whilst ensuring all competitors had adequate time to make their official flights.

The vexed question of steering arose again. The organiser, on the basis of trying to meet the wishes of most competitors, asked for a show of hands of those in favour and those against steering. The result was 5 to 4 against steering, with 5 abstentions!

It was decided to allow steering within 6ft of the walls, primarily because of the drift. Whilst it is never possible to please all the people all the time, the decision seemed to be accepted. The result in EZB was a win for Bernard Hunt with Derl Morley second and Ron Green third.

With the 1.2 gm minimum weight limit in use, it was surprising that so few people were in real contention. The main problem seemed to be with propellers which were too small in diameter and pitch. For many people it would have been worthwhile trying 14 inch diameter by 24 to 30 inches pitch, so as to get the prop speed down to nearer 100 rpm.

Added interest at the meeting was provided by 'George' of Sams Models, who travelled up with Ron Green and somehow managed to pack what appeared to be his entire range of indoor goods into a car together with 3 passengers, put the goods out on display in the hall, and then conjured the whole lot back into the car again.

The meeting managed to avoid a financial loss, thanks entirely to trade support from Davies-Charlton, Humbrol, Modellers Den, Ripmax, Sams Models, Solarbo, Swan-Morton and Telco.

### Results

**Scale**

| | |
|---|---|
| 1. J. O'Donnell (Fike) | 254 pts |
| 2. M. Sanderson (Wittman Tailwind) | 111 pts |
| Top Junior — G. Brown (Piper Vagabound) | 60 pts |

**HLG**

| | |
|---|---|
| 1. G. Davitt | 61.5 secs |
| 2. R. Green | 59.25 secs. |
| 3. B. Hunt | 53.7 secs |
| Top Junior — T. Auckland | 39.5 secs |

**EZB**

| | |
|---|---|
| 1. B. Hunt | 19m. 47 secs |
| 2. D. Morley | 19.05 |
| 3. R. Green | 17.01 |
| Top Junior — G. Davitt | 16.08 |

# TOPICAL TWISTS

*by Pylonius*

*illustrated by Sherry*


***"I'm afraid madam, that model is not quite suitable."***

## RADIO WAVERINGS

The other week I nearly met the most ignominious end the old style model flyer could possibly suffer: I almost had my chips cashed in by a plastic, ready made model.

Here lies one whose end most drastic
Came by a wayward model plastic.
Had he been but one inch thinner
He might have missed the plunging spinner.

On balance I would say that the plastic, ready made model is a bigger threat to our flying fields than big, bad CB Radio itself. Instant modelling of this over the counter kind is now becoming the accepted thing. Anyone bringing an old fashioned built up affair on to the flying field is looked upon as something of a curiosity at best and a show off at worst. The plastic afficiendos are staggered. Why should anyone want to go through all that building drudgery when for an extra few pounds over the kit price you can buy the finished article — with radio installed as well, if you can shake out another few shekels.

As a Management Consultant model flyer pointed out: "Self build projects may be labour intensive but are far from economical — the man hours could be utilised to better purpose, either recreationally or professionally. The number of said man hours that go into any given project far exceed in value the basic worth of the produced article. What is more the home built model will possibly realise far less at a club auction than its sleeker, purpose made, plastic counterpart."

We might also be over selling the supposed catastrophic effects of CB Radio on our hobby. It is alright for the Americans to make radio whoopee along the highway, gleefully spiking all the police speed traps and generally giving with the gibberish, but will British womanhood stand for all that boyish bonhomie on the way out to the country park or Margate-on-Sea?" You can turn that thing off for a start. I don't see why I should be deprived of my Radio 2 just so you can have a chat up with a gang of mindless hooligans. In any case, you're not safe with both hands on the wheel, let alone with one holding that horrible microphone. Why you had to waste our hard earned money on the thing in the first place, I don't know . . ."

Knowing what English people are, you'll likely to get one loud mouthed extrovert hogging the air waves, with the rest of the would be chatty citizens either too bored, too timid or too polite to say a word. It might well be a five day wonder like that other imported craze, skateboards, which fell flat on its face, or at least most of the people who tried it did. In no time at all Citizen Band Radio will be reduced to the odd yobo or two swapping four letter verbiage and nothing much more.

## FLIMSY PROMISE

One area of aeromodelling activity that has shown a fair resistance to the usual commercial take over is Indoor flying. Very much the same sort of microfilm and tissue models as wafted featherlike in the rafters fifty years ago can be seen gently nosing the lofty reaches today. No one has yet produced an all plastic, ready made model that can fly indoors without shredding the walls.

Given, though, that by some miraculous means such a thing was possible, it would take something more than a miracle to equip the model with radio. But who knows what science may not be capable of in a few years? Just imagine a full blown radio comp in your local church hall! Or, more exciting still, in your very living room. Space Invaders and other telly games wouldn't get a look in.

## BALSA-URETHANE

Where does balso wood come from? Well, like money, which it so readily devours, it doesn't grow on trees — it is a tree, so we are told. Well, a sort of tree, if the botanical text books are anything to go by, but more a big lump of vegetable matter lurking in a murky swamp — something like celery soup gone cold. But here is the mystery. All the swamps in the world have long been filled in for urban and agricultural development. Where once the tubby balsa tree grew there is either a petrochemical plant or a field of pomegranates. No longer does the intrepid model supplier brave the crafty crocodiles and a dose of yellow fever in order to wrest the odd pappy log from the bog so that we modellers will have something to blunt our razor blade on, so where does the balsa wood come from?

My own theory is that balsa wood no longer exists — it has gone the way of the Dodo and the Greater Bugaboo — urbanised out of existance. What we now get is a clever plastic substitute with a cunningly simulated grain. Just as you cannot tell the difference between the rubber that they milk from the trees and the petrochemical sythetic, so plastic balsa wood is indistinguishable from the real stuff. It is a horrible thought, particularly as I suffer from a modern condition known as plastic aversion. Anything plastic gives me the heeby jeebies, and since we live in a largely plastic world I am in a constant state of heeby jeebies.

This brings us to the question: where have all the radio flyers gone? The answer is not that they've all died of boredom but are now suffering from a curious malady now sweeping the Western world and known as Plastic poisoning. The disease is a very insidious one, manifesting itself in various forms of whacky behaviour. A common form of the trouble is Agrophobia, which is not a fear of skinheads as you might suppose, but a dread of open spaces, and though modern flying fields could not be exactly termed open spaces, it is enough to keep the plastic flyers at home. But even there they may suffer from Claustrophobia. No, not a fear of Father Christmas, but an aversion to enclosed places, particularly workrooms. There is also another related condition known as Kitsophrenia. This is a form of split personality in which neither half fancies finishing the half finished kit. There is also Sub-Conscious Amnesia, a condition well known to Club Treasurers.

Radio Therapy, originally introduced as a treatment for people too fat or lazy to run after model planes, is no cure at all in the current epidemic — most of the sufferers find it too much of an effort to even operate a lever or switch.

# Club News...

ANY OUTDOOR group activity, however mild in form, will inevitably infringe on other people's interests in this very crowded island of ours. Model flying, given to a certain degree of noise and a fair spread of open space, is an easy target for anyone sensitive to what they think is an infringement on either their rights or their comfort. In order to safeguard our flying fields and to keep open the possibility of new ones there are two things we should strive to do. One is to fly as unobtrusively as possible so that there is minimum cause for complaint. And two, that we endeavour to get all complaints fairly investigated so that they can be seen in a proper perspective. To further these ends we can do no better to give our support, by way of membership, to our governing body, the S.M.A.E.

Our first report is from a club which has not appeared in these columns for some time, the **Lee Bees M.A.C.,** the Southampton based club. Dave Skertchly, the club secretary, informs us that the club has re-affiliated to the Society, and is looking out for more active flyers in order to keep up the C/L and F/F sections. The club boasts a large membership but, as Dave admits, the activity on the flying field does not reflect the numerical affluence. Too many fair weather flyers and not enough fair weather. All the craze in the club at the moment is Mouse Racing. We are reminded that Mouse is for 1.5cc engine, any size airframe, and a Le Mans style start. Dave would like to know if there are any other clubs interested in this mini rodent type of racing. By way of trying to liven up a somewhat soporific interest in free flight, the next club venture is to be simple-for-all P30 Rubber. Response so far is promising with the entire stock of kits sold out for the first event. Fittingly, the neat little club mag is called the 'Buzz'. It reveals in text and photographs the wide scope and the quality of the club's interests. Sent along to us, too, a copy of the Southern Area's 'Sandpaper' mag. Small in content but hopeful in attitude. *Lee Bees MAC, Sec. Eric Thomas, 9 Cheltenham Crescent, Lee on Solent, Hants PO13 9HH.*

We go northwards quite a way for our next report, which comes from Andy Snowdowne, P.R.O., of the **Stockport & D.M.A.C.** The club is mainly C/L and this is reflected indoor-wise in the r.t.p. display given by club members to the staff and pupils of Davenport Upper School. Quite a sophisticated demo, too, of the rapidly improving r.t.p. science, with carrier deck, combat and the bursting of powder filled balloons. The active display was backed up by a static array of C/L models, ranging from a Stunt Trainer to a piped Speed model complete with take off dolly. The local press was on hand for the occasion, and a photograph of John Doly, together with a Nobler Stunter and a group of pupils, was duly published in the 'Stockport Express'. Further displays at the school have been arranged, and, it is hoped, a C/L demonstration in the school grounds. Another successful club project was a Novice Stunt event at the Manchester Road, Cheadle, flying site. Well attended, with entries ranging from profiles to full blooded 'Gold' contenders. Tom Jolly was the judge and the eventual winner was Tony Eifflander flying a remarkable P.A.W. 1.49 model. But how on earth, or rather above it, did one competitor land up a tree. New club policy is to invite other local clubs along to its competitions. *Stockport & DMAC., Sec. Brian Whittaker, 18 Abbey Road, Cheadle, Cheshire SK8 2JW.*

Rupert Harris, the leading light of the **Debdenairs M.A.C.,** of Loughton, Essex, reports on the second Indoor Fly-In to be held in the Loughton Hall Community Centre gymnasium. Sponsored by Ripmax it had the misfortune to be rather unpublicised due to a regrettable oversight. Notwithstanding the limited attendance, though, the standard of flying was quite high (ceiling permitting) and all who attended thoroughly enjoyed the day's flying. Some really neat and well trimmed models were to be seen in the Peanut Scale event, with Butch Hadland's Morane 1913 Monoplane of particular interest, making its own special contribution to the art of model making. Meanwhile the club continues to thrive in its 'Festina Lente' way, gaining a couple of useful free flight members in the process. One regrettable loss, though: Australian member, Allen James, having moved to Bassingbourn (of all places!). *Debdenairs Model Flyers, R. G. Harris, 30 Mornington Road, Loughton, Essex.*

Gerry Parker, Secretary of the **Raynes Park & D.M.A.C.,** unabashedly proclaims his club as a purely Sports flying group, making no concessions to the unhealthy lures of competition flying. He tells us that the club has recently been reformed after a lapse some 13 years with the intention of bringing together fly-for-fun modellers whatever their interests may be: Free Flight, Control Line, Radio and Vintage. The general catchment area for membership is South West London to North Surrey. Flying is mostly at that erstwhile top venue, Chobham Common, but which still gives scope for much active model flying. A place to mind your p's and q's though, for model flying there is currently under attack from horse riders and conservationists. New members welcome. *Secretary, Garry Parker, 96, Orchard Way, Addlestone, Surrey. Phone Weybridge 53900, or in S. West London, Kevin Hallaway on 01 542 0125.*

More news of newish clubs. This time a report from the **North Yorkshire Free Flight Group.** After a disappointing first year, 1980 was much of an improvement is spite of the discouraging weather. The club is a split off from a large club which had been more or less taken over by Radio. Consistant flying, rather than virtuoso performances, during the year gave the club third place in the Plugge Cup. One member, though, had a spectacular year. After qualifying for the British team in F.A.I. Glider, Gerry Le Vey won in the same class at the R.A.F.M.A.A., event in June. Spreading their wings, as it were, four members travelled to the Pierre Trebod contest in France. Keith Proctor placed 16th in F.A.I., in a high class field of 100. Mostly out and about at contests, club members do meet informally for trimming sessions during the season at two sites in the York area. Interested free flighters should contact *Nick Walton 18, St. Nicholas Road, Copmanthorpe, York, YO2 3UX. Phone York 706794.*

A long, informative letter from Mr. A. E. Sweetland, P.R.O., of the **Crawley & D.M.A.C.,** bespeaks an active club of wide ranging interests. The club has attracted notice of late by dint of the excellent Indoor events staged at the Crawley Sports Centre. A lively and well attended meeting again this year we are told. But the main 'Area' of challenge for the club is Ashdown Forest, where they do battle with East Grinstead and other free flight clubs. The small but keen free flight group has already produced a nice tally of contest models for the coming Area meetings, where a confident eye is set on the R.A.F.A. trophy. The club flying field situation is reasonably good, although the R/C field has a few noise sensitive residents on its fringes. They were suitably disarmed, though, by a club goodwill foray at Christmas, bringing bottles of good cheer, and a showing of the club's rules and procedures to demonstrate a responsible attitude to noise and flying standards generally. One way of reducing the causes of nuisance is by 'spreading the load' to other sites, and new fields are being sought for this purpose. Main club event of the year will be a repeat of last year's 20th anniversary family fly for fun, including a barbeque and other homely attractions. Radio membership has now shot to the 100 mark, but Mr. Sweetland says that it will not be allowed to go above this nice round not over burdensome number. But no limits placed on small but valued free flight and control line sections. Mr. Sweetland is also happy to inform us that


*Why not try winning yourself a year's subscription to Aeromodeller by entering this month's Caption Challenge - just send your entries to Aeromodeller, P.O. Box 35, Bridge Street, Hemel Hempstead, Herts HP1 1EE - Results July issue.*

the club newsletter, 'Turbulator', has made a brilliant revival after a time in the doldrums. The club meets at Ifield School, Crawley, at 7.30 p.m. on a Thursday night. *Crawley & DMAC, P.R.O., A. E. Sweetland, April Cottage, Talbot Road, Lingfield, Surrey RH7 6AD.*

That well known free flighter, John Cooper, has sent along a copy of the newsletter of his club, the equally well known **Biggles.** Northampton based, but often to be seen in their Peanuts T shirts disporting over the wild grasses of Bassingbourn (of fond memory). The problem now is where this free flight group can fly at Area meetings. The choice would seem to be between Eversleigh — simply miles away — and Barkston Heath, but as the club catchment area is such an extensive one, reaching out of Oxford, some members will find both venues just a bit too remote. Never say die, though, for Trevor Payne is currently looking over a couple of possible sites. A few of the club luminaries are now expatriates, namely, Martyn Cowley, our ex-Editor, currently solar pedalling the famous Gossamer, and that model designer of flair, Steve Marriott. *Biggles F/F Team. Sec. John Cooper, 15 Brambleside, Kettering, Northants.*

Yet another club new to our columns. This time a report and newsletter from Nick Peppiott of the **Maidenhead Model Makers Club.** We are told that the membership is around 65, and that all model making interests are included, although model flying accounts for two thirds of the membership. Mainly Radio, of course, but there is also a small Indoor flying contingent. As with so many radio clubs there have been flying field problems, but some easement has come with an arrangement with the National Trust to fly on Widbrook Common (models suitably disguised as ducks) during the Winter, and a local farm is available in the summer. There is also Pinkney's Green for thermal soaring and quiet free flight. *Maidenhead Model Makers Club. Sec. Stuart Walters, 21 Malvern Road, Maidenhead, Berks.*

Down again to the South East corner of England where you just cannot escape the dreaded Ashdown Forest. Caught up in the gorse after losing their own flying field the **East Grinstead Model Club,** winners of the R.A.F.A. Shield for the eighth successive year, are nevertheless looking forward to a successful season. Ted Young, the P.R.O., informs us that the club had many other successes on the free flight field last year. Ken's club had many other successes on the free flight field last year. Ken Taylor won the Area Championship and Mick Howick the Thurston Wakefield Trophy. Members did well in the Individual R.A.F.A. placings, too. Derek cash winning Power and Tony Grantham Rubber. And all that in spite of the weather and Ashdown Forest! Club membership remains steady at around 18, with the accent very much on free flight plus a little Radio interest. The club meets every Monday night throughout the Winter at the Jubilee Hall, Smallfield, Surrey. Newcomers welcome. *East Grinstead MFC., P.R.O. Ted Young, 7 Stephenson Drive, East Grinstead, Sussex.*


**This month's winner did not give us his name, but lives in Surrey.** *Magic and conducting have quite a bit in common, as shown by our winner and runners-up this month. "I'LL TRY WITCH CONTROL!" from S. Wright, Grantham. 1st onlooker "I BELIEVE HE IS AN OPERA CONDUCTOR." 2nd onlooker "OH YES, WHAT'S HIS SCORE?" from Tony Brookes, Nottingham. "HE'S GOT NO RADIO SO HE'S TRYING MAGIC!" and "WHAT A WAY TO CONDUCT A MODEL!" both from R. Wilson, Stockport, and finally "JUST LIKE THAT!!" from Mrs. Dorothy Royle, Altringham, Cheshire.*

*The photograph first appeared in the August 1958 Aeromodeller, Free Flight Column. It is Captain Carroll's 'Livewire' multi channel R/C model, which he demonstrated at the Nationals of that year.*

Our next report comes from Stoke-on-Trent; sent in by Stephen Bould, Secretary of the aptly named Five Towns MAC. This yet another new club, being in existence for just five months, yet already comfortably established. At Wilfield High School they have generous meeting and flying facilities indoors and out. Membership is on a steady increase due to a spot of judicious publicity, numbering an enthusiastic 15. During the chill winter months members find relief in Indoor flying with EZB's very much in the ascendant, whilst the major interest on club nights is the r.t.p. pole whereon a diversity of craft are to be seen in gallant flight. With super optimism members are looking forward to those so elusive hot summer evenings, meanwhile anyone is invited to come along to a club evening at the School on Thursdays at 7.00 p.m. *Five Towns MAC., Sec. Stephen Bould, 38 Dartmouth Street, Burslem, Stoke on Trent.*

Steve Fielding, Secretary of the **Morley & D.M.A.C.,** writes to inform us that the club has donated a plaque to the Northern Area of the S.M.A.E. The plaque is to be known as the Jack Kay Memorial Trophy for Open Glider, in memory of Jack who met an untimely death last year. The trophy is to be competed for this year on 21st June at Church Fenton together with the established Vintage comp and Pannett Memorial Trophy. Steve reminds us that The Morley Club is now a force to be reckoned with in the free flight world, which should give unattached flyers the incentive to contact the *Secretary, 10, North View, Allerton, Bradford, West Yorks. Tel 0274 493080.*

We have a short note from the **South Wales Radio Control Society** giving some basic information on the club. It meets at 8 p.m., on the first Friday of each month at the Cross Inn, Gabalfa, Cardiff. A programme of guest speakers, discussions and film shows has been arranged for 1981. On the more active side of things a number of fly-for-fun competitions will be held on the club field which, luxury of luxuries, has a tarmac surface. In more serious vein there will be various aerobatic comps, culminating in the club organised Welsh Open. New members, including novices, are welcome. Contact the *Secretary, Gareth Davies, 36, Millfield Drive, Cowbridge, South Glamorgan.*

The newsletter of the **Timperley & D.M.F.C.,** (Nr. Manchester) suggests a lively club, full of flying and recreational ideas. Understandable enough though, since it is under the aegis of that energetic and inventive aeromodeller of long standing, Brian Faulkner, who is the Club Secretary. I notice he has even designed a model for the club Indoor meeting in March. Another plan in the newsletter is of an Open free flight model, and with the approach of what we all hope will be some flyable weather, eyes are turned to the great outdoors where a number of free flight comps are scheduled throughout the season, plus some small field, P30 and glider flying on Friday evenings. Other news is that the club is exhibiting at an Exhibition to be held at the Embassy Rooms by the Locarno Bingo Hall on the 17th, 18th & 19th April. A cup for the best models. *Timperley D.M.A.C., Sec. B. Faulkner, 29A Rectory Lane, Lymm, Cheshire.*

Not a great lot to report from the **Hemel Hempstead M.F.C.,** newsletter, but it would seem that they were lucky enough to get along that gen man on $CO_2$ motors and model finishes, Ian Peacock. The club hopes to stage a static display at Northchurch, St. Mary's School on the 4th April. *Hemel Hempstead MFC., Sec. Russell Attwood, 63 Crouchfield, Boxmoor, Hemel Hempstead.*

All the bigger Indoor meetings appear to be held North, according to **Northern Area News.** Events staged at Spennymoor and Slaithwaite brought out all the acknowledged experts at EZB and HLG. Much in the ascendancy was Junior Graham who broke the HLG record at Spennymoor and is quite a whizz at EZB. Mostly the talk in the newsletter is of plans for the coming season, complicated by a shortage of contest officials and the meagre supply of flying sites. Let's hope that all will come right on the day.

From the **Enfield M.F.C.,** comes a story of the members thinking of providing a trainer model to enable would be pilots to learn the easy way rather than the hard. It would also provide an example of the kind of model the radio tyro should build. As it says, Spitfires may look exciting in the hands of an expert, but... *Enfield MFC., Sec. R. Flaxman, c/o 33 Uvedale Road, Enfield, Middx.*

News from the **Banbridge Aeromodelling Club** is of member Trevor Hutchinson's inclusion in the Irish team for the World Aerobatic Champs in Mexico. There is also an amusing piece about a local Rector using radio model as the text for a sermon to children, operating the controls to make his figurative points. *Banbridge Aeromodelling MFC., Sec. B. McCartan, 220 Newry Road, Banbridge, County Down, NI.*

That's about all we can squeeze in for this month.

**Clubman**

# CLASSIFIED advertisements

All classified Advertisements must be pre-paid.
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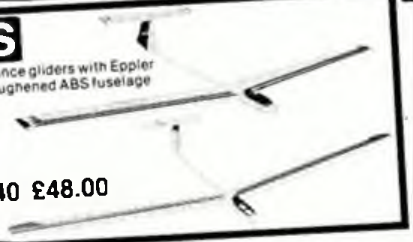

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