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Aeromodeller

JULY 1981

Editorial Director TONY DOWDESWELL
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Graphics LORNA CULLEN

MAP MODEL DIVISION MAGAZINE

Advertisement Director M. GRAY
Managing Director RON MOULTON

Comment

Unless our eyes and ears have deceived us, a state of lethargy seems to be overtaking the 'Aeromodelling' movement. No-one appears to be wishing to sound trumpets these days. Major events are programmed which could each be enticing, innovative stimulants for control-line, free-flight and dare we mention it, R/C. But, having set the date, the organisers seem to go into hiding.

Whatever happened to that good old status symbol, the PRO? Perhaps some of this is due to a change of manning in the committees. Significantly, a large proportion of old faithfuls, who were matured by WWII and emerged from demobilisation anxious to do something about life in general have now decided in their 50's and 60's that it is time to take a back seat and let the 'youngsters' have their head.

While this might be a generalisation, we know it to be true in several specific areas and sadly there has been a breakdown in continuity and a deterioration of promotional activity which demands drive and energy as well as some personal sacrifice.

We are left to wonder how much better supported the events held so far this year would have been if some of the old stagers had been available to encourage participation.

Wake up out there! AEROMODELLER is here to communicate but we can't write the lyrics before being given the music.

Contents

 ISSN 0001 9232

Volume 46 Issue No. 546

p.348 Ni-Cad charger

Vintage p.354

ON THE COVER

Martin Tuck with his round-the-pole twin electric powered model of the new BAe 146 airliner. Inset shows John Stroud's control line autogyro, full size plans and constructional article in this issue page 357.

NEXT MONTH

We will publish plans of the latest control line stunt model from the stable of Claus Maikis. Other features will include up to date news on the development of CO, R/C motors, getting to grips with glow plugs, plus all our usual features.

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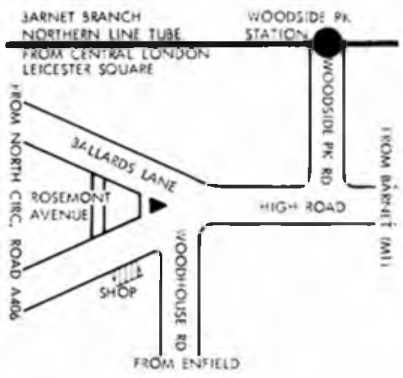

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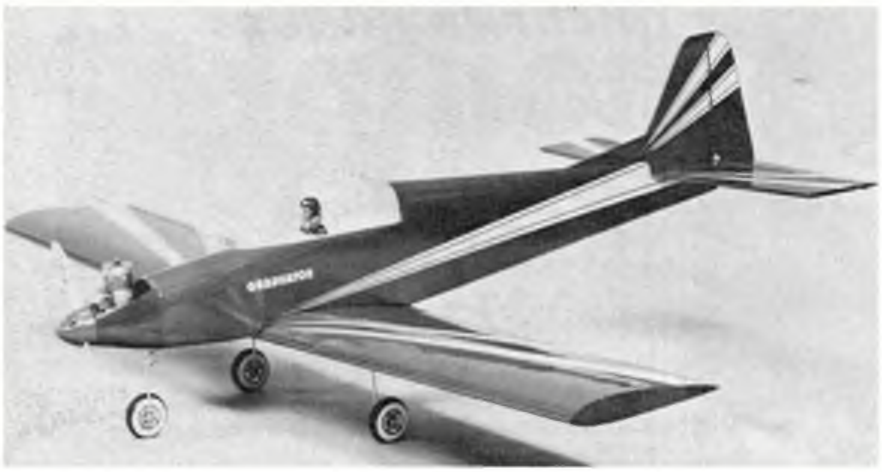

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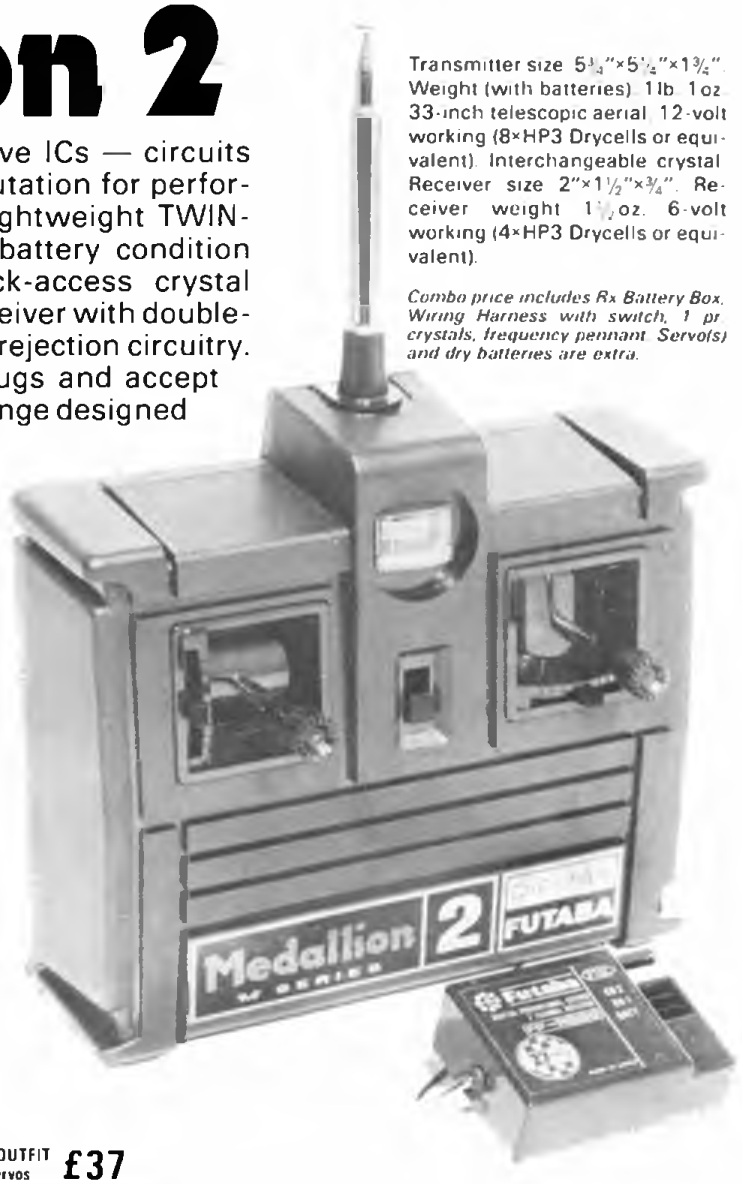
Combo price includes Rx Battery Box, Wiring Harness with switch, 1 pr crystals, frequency pennant. Servo(s) and dry batteries are extra.



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INTERNATIONAL AIR TATTOO 81

World-Wide support is being given to International Air Tattoo 81 at RAF Greenham Common, Newbury on June 27-28 to make it the biggest two-day full-size aviation event of the year. All of Europe's premier aerobatic teams will be coming together for the first time since 1976. The RAF's Red Arrows, now in its second season with Hawks, will be rivalled by the Patrouille de France newly equipped with Alphajets. The Italian Team, the Frecce Tricolori, Canadian Starfighters, and Karo As From Austria and the Patrouille Suisse are all expected to participate.

There will be an impressive array of NATO aircraft taking part in the flying programme. The Royal Hellenic Air Force will be sending A-7 and Phantom fighters for the first time and the new F-16 Fighting Falcon will be seen in the colours of the Royal Netherlands and Royal Norwegian Air Forces.

Some aircraft will be travelling very great distances to join the unique programme. The Royal Australian Air Force will be represented by a C-130 Hercules for the second time and hopefully the Royal Hong Kong Auxiliary Air Force will be making its first appearance with a Cessna Titan and possibly a Dauphin helicopter. From South America the Brazilian Air Force will be showing a locally built Bandeirante. Equally welcome at Greenham Common will be two teams from Jordan. The Royal Jordanian Air Force Falcons with their Pitts biplanes will be returning for a second visit this year and a trio of Northrop F-5E fighters will be making their debut in Europe.

In contrast to the modern jets there will be interludes in the daily seven-hour programme when the planes of yesterday will be flying. The nostalgic roar of the Merlin-engined Spitfire, Hurricane and Lancaster will mark 75 years of Rolls-Royce power. Going back to World War I a dog fight between Allied Camels and SPAD biplanes and German Albatross, Fokker DVII and Triplane will introduce the Leisure Sport display team. Also from Thorpe Park the magnificent Supermarine S5 replica seaplane will fly over Greenham Common each day to mark the 50th anniversary of the RAF winning the coveted Schneider Trophy in 1931.

Sea Search 81, the international SAR and maritime patrol aircraft meet at IAT 81, has attracted entries from 20 countries. The fixed-wing aircraft, will take part in a competition around the south-west peninsula, while the helicopter crews will test their skills at Bowood House, Calne, Wilts on Wednesday, June 24. There will be a special display of the Sea Search participants in the huge static aircraft at Greenham Common.

Put all together IAT 81 will be the biggest event so far organised by the volunteer team on behalf of the Royal Air Force Benevolent Fund. The team having been formed in 1971 to present its first display at North Weald, has raised over £250,000 to assist service charities.

BELGIAN INDOOR INTERNATIONAL

The Limburge Vleugels invite modellers to attend their first international indoor Contest organised at Genk.

1. Type of contest: Open International Indoor contest as defined in section IV, article 2.2.1. of the FAI sporting code.
2. Title of the contest will be: 'LV1 International Indoor Contest.'
3. Class of models: Free-flight Indoor — FID microfilm (EZB, Peanuts, Manhattan-cabin non-official).
4. Date of the contest: August 1 and 2, 1981.
5. Location: The contest will take place at Genk-Limburg. Genk is situated in the North-Eastern part of Belgium near the Dutch and German border.
6. Place of the contest: Sportcentrum van Genk, Emile vandorenlaan, 3600, Genk.
7. Contest hall dimensions. Category 2 as defined in the FAI sporting code. Free height: 9m60 (60 × 35m).
8. Entry fee: The official entry fee for each class will be 150 BF.

SCALEDOWN '81 EXHIBITION

Again this year, the Rotherham Scaledown Association is holding its annual exhibition in the town. It will be held at the Brian O'Malley Central Library and Arts Centre on Friday, Saturday and Sunday 9, 10 and 11 October and following its over-large entry last year, has been extended to take over the whole arts centre and galleries.

'Scaledown,' is one of the largest exhibition of its type in the North of England. The exhibition is being sponsored by the Rotherham Star newspaper.

Entries are invited from all ages, from all parts of the country, in any one of the 14 categories, including two in the field of aeromodelling. Gold, Silver and Bronze medallions will be awarded in each section, subject to there being sufficient entries.

DUXFORD MUSEUM

Duxford Airfield south of Cambridge, the preserved Battle of Britain airfield which is now part of the Imperial War Museum, re-opened to the public for the 1981 season on Saturday, March 14, 1981. Some 70 historic aircraft are on display or in the course of restoration, as well as tanks and other military vehicles, numerous artillery pieces and naval exhibits. The interiors of several of the aircraft are open to the public, including that of Concorde 01, the British pre-production Concorde.

A new hangar, constructed by the Imperial War Museum in 1980, will be open to the public for the first time, increasing the undercover display space at Duxford by some 25 per cent. Among the aircraft on display will be the only surviving RE8 in the country. It dates from the First World War and has recently been restored. It will be joined in the early summer by another First World War aircraft, a BE2c, which is now under restoration.

In 1980 some 380,000 visitors went to Duxford, many of them taking advantage of the improved access to the airfield provided by the M11 motorway. Duxford is within a stone's throw of Junction 10 on the M11. Additional improvements this year will make Duxford equally accessible from the North and the Museum expects a further year of record attendances in 1981.

Hours of opening: Saturday, March 14-Sunday, 1 November daily from 11am-5.30pm (or dusk if earlier). Last admissions 4.45pm. The airfield is closed on Good Friday and May Day Bank Holiday (May 4).

Admission Adults £1.00. Children (5-16 years) and OAPs 50p. Special rates for school parties. Admission charges for air days vary.

1981 NATIONAL FREE FLIGHT SOCIETY MODEL OF THE YEAR AWARDS

F1a	Simple Toy	Jim Wilson (USA)
F1b	Vitar	Ron Pollard (GB)
F1c	Modello No 2 bis	Mario Rocca (Italy)
Large Gas F F	Buck	Joe Foster (USA)
Small Gas F F	Witchawk	Jim Clem (USA)
Outdoor rubber	Beau Coupe	Bob White (USA)
Indoor rubber	Gram Prix	Irv Rodemsky (USA)
Special award	Article on F F trimming	Ralph Prey (USA)
Special award	Airfoil Development	George Benedek (Hungary)
Special award	Cartoons	Dr Will Nakashima (USA)

1982 nominations are now open until January 1, 1982, mail to Steve Geraghty, 194 Vista Del Monte, Los Gatos, California 95030, USA.

SOLAR CHALLENGER ARRIVES IN EUROPE

Paul Macready's solar powered aircraft featured last month arrived in France in the first week in June. Last flight trials in California exceeded all the required parameters of performance with a duration of eight hours, 19 minutes, distance of 230 miles and altitude of 14,300 feet. These achievements in separate flights piloted by Janice Brown and Steve Ptacek assured the Du Pont sponsored team of a firm chance to make the flight from Paris to London. Take off from Cormeilles-en-Vexin was planned for 8.30am and a landing of six hours, 15 minutes later, scheduled at the old Croydon aerodrome. Actual date of the attempt is weather dependent but hopefully will not be long after The Paris Air Show closure on June 14. Maximum altitude over the Channel was planned to

be 14,500 feet, where the solar power will peak for the flight. If it hasn't already happened — we wish the team all success in the historic flight.

1982 MODEL ENGINEER EXHIBITION

We are honoured to announce that Sir Harold Wilson, KG, OBE, FRS, MP, is to open the 51st Model Engineer Exhibition at the Wembley Conference Centre on Thursday, January 7, 1982.

£1.7M AIR AND SPACE MUSEUM AT MANCHESTER

Those interested in aviation, past and present will be interested to know that Manchester's 100-year-old City Hall as an air and space museum under a £1.7 million contract awarded by Manchester City Council.

Work has just begun on the project at Lower Byrom Street, and when completed in two years' time the 3000 m² Grade 2 listed building will house eleven full-size aircraft and a wealth of air and space exhibition material.

AVIATION ART IN PICCADILLY LONDON JUNE 17-JULY 10, 1981

Guild of Aviation Artists' 11th Annual Exhibition at the Qantas Gallery was opened by the Chief of the Air Staff Air Chief Marshal Sir Michael Beetham, GCB, CBE, DFC, AFC, ADC, on Monday, June 15.

Over 100 new paintings by the top professional and amateur aviation artists will be competing for the various cups and trophies to be won. Judges are expected to include the well known artists Frank Wootton, G Av.A., plus Ray Lee, Curator of the RAF Museum Art Gallery.

SOUTHPORT MAC EXHIBITION

This model exhibition has been organised in aid of the Year of the Disabled. It will be held at Southbank Road Wesley Church (corner of Ash Street and Southbank Road) Southport, on Saturday July 4. All aspects of modelling will be on display, including a display of slot car and radio controlled car racing. Start 10.30am, admission 20p.

What's Happening?

June 20/21
AEROMODELLER ALL SCALE DAYS — Old Warden Airfield, Biggleswade, Beds.

June 21
CHURCH FENTON NORTHERN AREA *VINTAGE & PANNETT MEETING* with Jack Kay Memorial Trophy *F/F VINTAGE O/P & O/G R/C Class 2 Scale STD & SR AEROBATICS* SMAE ONLY. Contact Tel 0532 864026

June 21
CROOKHAM F/F GALA *O/P O/R O/G H/G ALL IN FAI (5 FLIGHTS — NO ROUNDS)* SMAE members please. Venue Old Airfield, Beaulieu Heath, Hampshire. Start 10.00am. Contact P. M. Uden Tel 0734 51366

June 21
MORLEY & DIST. MAC *VINTAGE PANNET KAY COMPETITION O/P O/G Vintage Duration* Venue RAF Church Fenton. Contact Barry Judge Tel 0274 875976

June 21
SMAE SOUTHERN AREA - LEE BEES MAC — *F2B - NOVICE STUNT* VENUE HMS Daedelus, Lee-on-the-Solent, Hants. Contact Dick Craik Tel 048 95 5726

June 21
VMAS ANNUAL VINTAGE FLY IN 10.00am onwards. Insurance essential to fly at this venue. Venue Chobham Common. Contact Don Read, Tel Farnham 723400

June 28
NOTTINGHAM MAC OPEN COMPETITION *INCLUDES F2B, NOVICE, AND SCALE* Venue Basford Miners Welfare Club, Basford, Nottingham. 10.00am prompt start. Contact Steve France. Tel Nottingham 613089

June 28
RAFMAA DUCTED FAN FLY-IN *R/C, C/L and F/F, SCALE AND NON SCALE* No entry fee, spectators welcome. Venue RAF Abdingdon. Contact G. E. Whitehead, Officers Mess, RAF Upwood, Huntingdon, Cambs. Tel Ramsey 812092 Ext. 242. SMAE only.

June 28
WHARFEDALE MINI GOODYEAR MEETING 10.00am to 6.00pm. Entry £1 per team. SMAE but no age limit. Venue Dewsbury, Yorkshire. Contact Jeff Smith, Tel Leeds (0532) 663432

June 28
PETERBOROUGH MFC *A COMBAT* Venue The Embankment, Peterborough. Contact Neil Gill, 4 Beech Road, Glinton, Peterborough PE6 7LA. Tel Peterborough (0733) 252645

June 28
CENTRALISED MINI SMAE *A/1, CO/H & H/G* Start 10am. Venue Beaulieu Heath. Contact Barbara Tyson, 19 Wilverley Av., Strouden Park, Bournemouth BH8 0HT.

July 4/5
BRITISH TWO DAY FAI COMBAT INTERNATIONAL. Venue Dytchley's Manor country estate only 20 miles from London. Pre-entry is essential. For full information and entry forms, send large sae to Combat International, 89 Coldbow Crescent, Bexley, Kent. Phone enquiries Pete Jayes 01 226 1249 or Paul Vallens, Crayford (29) 53401.

July 5
TYNEMOUTH MAC *C/L TEAM RACE FAI - A GOOD YEAR* No spectators, entry to airfield by special pass only. Venue Albemarle Barracks, Newcastle. Contact R. Wilson Tel 0632 881127.

July 5
SOUTH MIDLAND AREA C/L AEROBATICS *F2B & NOVICE* 10.00am. Venue Stopsley Sports Centre, Luton, Beds. Contact P. G. Rabjohn, 47 Hilleyfields, Dunstable, Beds LU6 3NS.

July 5
WALSALL OLD TIMER R/C MEETING — details to follow.

July 11 and 12
TWO DAY C/L EVENT IN CONJUNCTION WITH THE ST JOHN AMBULANCE GALA *SAT & SUN F2B CLAPA CHAMPIONSHIP (MEMBERS ONLY) SUN OPEN NOVICE STUNT, OPEN CARRIER, OPEN SCALE* ALL PRE-ENTRY ONLY. Venue The Essex Showground, Nr. Braintree, Essex (on A130 between Chelmsford and Braintree). Contact Peter Burges Tel 516881 or day 519719.

July 19
DOUG BLAKE MEMORIAL TROPHY *OPEN AND NOVICE* Pre-entry. Venue Radlett. Contact Glen Alison, Rickmansworth 72675.

July 19
PETERBOROUGH MFC *3RD ROUND CLASS A DIESEL COMBAT* Venue 4 Beech Road, Glinton, Peterborough PE6 7LA. Tel Peterborough (0733) 252645.

July 19
SHUTTLEWORTH MODEL GROUP OPEN DAY C/L F/F Special contests for STAND OFF C/L SCALE and F/F RUBBER.

July 19
ELLIOTT SUMMER RALLY — *A TEAMRACE, GOODYEAR, FAI TEAMRACE, A COMBAT, CARRIER/PROFILE 40)* Venue Marconi Avionics, Rochester, Kent. Contact Peter O'Neill, Tel 0732 57899.

July 19
WHARFEDALE DIESEL COMBAT 10.00am start. Venue Dewsbury, Nr. Wakefield. Contact Jeff Smith. Tel 0532 663432.

July 19
BATH MAC *WESTERN AREA RALLY. F/F O/P O/R O/G, ALL IN MINOR, CO2 AND H/G, C/L FAI COMBAT, A COMBAT TEAM RACE FAI AND A.* Venue Merryfield, Ilminster, Somerset. Contact E. Burles, Tel 331126.

July 26
SMAE 3RD CENTRALISED C/L EVENT GOODYEAR, FAI T/T, FAI SPEED, *A AND FAI COMBAT AEROBATICS NOVICE AND F2B, CARRIER O&P Venue Fulbeck, Nr Barkston Heath*

July 29
CROYDON & DMAC *CONTEST FOR A1 A COMBAT, CO2, H/G* Venue Chobham Common, Surrey. Contact R. Elliott Tel 01 997 1563.

August 2
SMAE LONDON AREA MEETING — *C/L SPEED ONLY* Venue Old Army Parade Ground, Bicester. Contact Paul Eisner, Tel Lea Valley 760849.

August 16
AEROMODELLER VINTAGE DAY — Old Warden.

September 6
NORTHERN AREA RALLY *ALL CLASSES F/F C/L R/C* SMAE ONLY. Venue Church Fenton. Contact: 0532 864026.

Sept. 6th
PETERBOROUGH MFC 4TH (FINAL) ROUND CLASS A DIESEL COMBAT. Venue The Embankment, Peterborough. Contact Neil Gill, 4 Beech Road, Glinton, Peterborough PE6 7LA. Tel Pboro (0733) 252645.

Sept. 6th
NORTHERN AREA RALLY *ALL CLASSES F/F C/L R/C* RAF CHURCH FENTON. SMAE ONLY. Contact: 0532 864026.

Sept. 13th
BATH MAC *F/F, O/P, O/R, O/G ALL IN FAI, ALL IN MINI CO2 AND H/G.* Venue Colerne, Nr. Bath, Avon. Contact E. Burles Tel Bath 331126.

Sept. 20th
SMAE LONDON AREA MEETING – *C/L SPEED ONLY* Venue Old Army Parade Ground, Bicester. Contact Paul Eisner Tel Lea Valley 760849.

Sept. 20th
THE WHITCHFORD MEETING *FIA, FIB, FIC, A1 GLIDER COUPE D'HIVER — A POWER.* Profits will go to charities for the disabled. Whitchford is 2 miles S.W. of Ely, Cambs, and the site is a very large area of farmland with no crop problems, perimeter tracks and runways allow vehicle access to launch points for all winds. SAE to Martin Dilly, 20 Links Road, West Wickham, Kent.

Sept. 27th
ROMANWAY MFS — *VINTAGE & ELECTRIC FLY IN/R/C ASSISTED; ALSO CONTROL LINE.* Venue to be announced. SAE to G. Johnson, 37 Oxford Road, Kirthington, Oxon.

Sept. 27th
BATH MAC *F/F, O/P, O/R, O/G ALL IN FAI, ALL IN MINI CO2 AND H/G, C/L FAI COMBAT, A COMBAT TEAM RACE FAI & A POSSIBLY AEROBATICS.* Venue Merryfield, Nr. Ilminster, Somerset. Contact E. Burles Tel 331126.

October 4
AUTUMN KITE FESTIVAL — Old Warden Airfield, Beds.

October 11
SMAE NORTHERN GALA *A/F, F/F, O/R, R/P, G, C/L, A FAI CL/BR/C AEROBATICS* for SMAE Trophies. Plus other non SMAE events. SMAE only. Venue Church Fenton. Contact 0904 76794.

Oct. 11th
SMAE NORTHERN GALA *F/F, O/R, P/G, C/L, A FAI CL/BR/C AEROBATICS* for SMAE Trophies plus other non SMAE Events. RAF Church Fenton. SMAE ONLY. Contact 0904 76794.

October 18
NORTHERN AREA FAI MEETING *F/F/1A, B&C, C/L F2B AND C/R/C F3A AND B.* two flights before 1pm. SMAE ONLY. Venue Church Fenton. Contact 0653 2580.

Oct. 18th
PETERBOROUGH MFC *A COMBAT* Venue The Embankment, Peterborough. Contact Neil Gill, 4 Beech Road, Glinton, Peterborough PE6 7LA. Tel Pboro (0733) 252645.

Oct. 18th
NORTHERN AREA FAI MEETING *F/F/1A, B&C, F2B &C, R/C F3A & B, F/F 2* 2 flights before 1 p.m. SMAE ONLY. CONTACT 0653 2580. RAF Church Fenton.

Oct. 18th
ELLIOTT AUTUMN RALLY — *B TEAMRACE, GOODYEAR, FAI TEAMRACE, A COMBAT, SPEED, AEROBATICS.* Venue Marconi Avionics, Rochester, Kent. Contact Peter O'Neill Tel 732 57899.

EVENTS

June 28th
MAIDENHEAD MODEL MAKERS CLUB EXHIBITION *R/C FLYING, MODEL DISPLAY, SLOT CARS* 1.00 p.m. start. Entrance 50p. Venue Braywick Road, Rugby Ground, Maidenhead.

Sept. 3-5th
THE EIGHTH BUSINESS & LIGHT AVIATION SHOW AND CONVENTION SPONSORED BY FLIGHT INTERNATIONAL AND AVIATION MAGAZINE. Venue Cranfield.

October 9-11th
SCALEDOWN '81 EXHIBITION - 14 categories including two for aeromodelling. Flying and Static. Venue Brian O'Malley Central Library and Arts Centre, Rotherham. Contact R. Milnes, 528 Retford Road, Woodhouse Mill, Sheffield S13 9WE.

Mike Hetherington launches his paper Junkers D1 on an early test flight. Mike's very original building methods are outlined in the text.

DERBY INDOOR SCALE MEETING

Sunday April 26 will remain a most memorable day in more ways than one to those who attended the Indoor Scale meeting at Derby Municipal Sports Centre organised as the Indoor Scale Nationals by Nottingham Model Flying Club. From the point of view of the 48 official entrants in the three classes, CO_2, Open Rubber and Peanut Scale, as well as the sports flyers, the flying conditions were excellent — not too crowded, plenty of interesting models and the hall itself seemed to be noticeably better illuminated than it was last year. I doubt if anyone will forget their journey to Derby on this day, however, prevailing weather ensured that we had certainly the worst driving conditions I have ever encountered in travelling to a flying meeting. Our 300 mile round trip from the London area was made mostly in driving sleet, rain, and strong crosswinds in single file up the M1 in inches of slush, with even some spectacular arcing overhead power cables to help keep us alert at one point on the way. Other flyers had tales of being stuck in snowdrifts, etc. and whilst it would have been remarkable in mid December, in late April it seemed quite impossible!

Notwithstanding the travel difficulties, the response to the meeting was very good, and had the weather been really fine, the approximately 12 strong team of judges and helpers would probably have had more on their hands than they could cope with. The entries in the Peanut event alone must be some kind of record and the system of running this event seemed to work very well. After registering one's name and model, one could take it away and put in as many trimming flights as necessary during the six hour flying session. The model was recalled for static judging as and when the judges were ready. Timing was performed by a team of official timekeepers and the best two of three flight times were added together with a ten-second bonus allowable for ROG flights. This is quite a good system since it allows the non-duration type of model more scope for scoring well, but the rafter-dodgers can also make the most of it since they can occasionally still make it to the 'service ceiling' from floor level. Yes, the better they fly, the more chance there is of winning — everything else being equal, that is.

With 29 in Peanut, 6 in CO_2 and 13 in Open Rubber, it was quite impossible to keep a blow by blow account of each event, especially when one is trying to put in some flying oneself. Consequently I am sure that I may have missed some rather good models — one example being the Southern Martlet in Open Rubber by John Whatmore which by taking second place in static and fourth place overall in a closely fought event, is obviously a model to look out for in future, the Martlet being a delightful aircraft with good properties as a free flight subject.

Two other models gave a very good account of themselves in Open Rubber, these being Reg Boor's DH Puss Moth and Peter Frostick's Supermarine Sparrow in fifth and second place respectively. Reg's model was built from an original print of a Ray Booth design published in the June 1974 issue of the American 'Flying Models' magazine and is to 1:18 scale which works out at 620mm (24½in) span. Much of the structure was lightened during building and the finished weight (less rubber) is 38.2gm (1.35oz). Flying on a 460mm (18in) loop of 4mm Pirelli, the model was doing 25-second flights in lefthand circuits from a smooth take-off. One aspect of the flight pattern which was most attractive was the cruise attitude with the nose held well down on the 'horizon.' In an attempt to have the most duration wrung from their motors, many large Indoor Scale models tend to be trimmed to hang onto the prop in a strained attitude quite close to the stall which can be very unrealistic.

The Sparrow was unusual in that in flying in right hand circuits it was still able to bank properly into the turn. This can lead to a model spiralling in, and it is much more common to see a right-turning model flying with the wings dead level or even with a non-scale opposite banking attitude being held, when the torque reaction from the motor is at its highest just after take-off. Whilst taking top static honours the Sparrow did very well indeed to place second on its first day out against strong opposition.

Jeff Anderson only missed second place by one point with his large familiar Wittman

Left. Mike Hall's 1:24 scale version of the Hannover CLIIIA was powered by a Telco motor and flew well. A great deal of work is involved in that colour scheme together with the scale details.

Right. In the foreground Chris Chapman's Peanut Fokker DVIII had one of the most superb painted colour schemes to be seen at Derby. Behind is Mike Hetherington's paper Junkers D1 — see text for details of this interesting model.

Tailwind, and the event finally went to Butch Hadland flying his CO_2 convertible 1:12 scale Lacey. The old ones still fly well, too!

Despite some good flying in the CO_2 event, the same Lacey could not quite match Nick Peppiatt's large Sopwith Tabloid powered by a Brown Junior twin CO_2 motor which made its flying debut with a fourth place at the Crawley meeting earlier this year. The model could climb well into the air this time from a take-off but the underpropped motor had to be run at a very high power setting making a fearsome noise in the process. Another but smaller Tabloid by Geoff Spencer tied for third place with Ron Green's Swiss Bleriot XI and with fifth and sixth places going respectively to Dave Day's Howard DGA and Bill Spowage's Fokker Eindekker, the event was slightly undersubscribed compared with the others.

Two further CO_2 models observed flying well were the 50gm (1¾oz) Sopwith Triplane nicely converted from the Veron kit by CL stunt flyer Pete Iliffe, and a most original Hannover CL IIIA by Mike Hall from Walsall MAC. The latter sported one of several lozenge camouflage schemes to be seen around the hall and was an interesting choice of subject built to 1:24 scale and powered by a Telco motor. The colours were painted in very thin enamels after the lozenges had been set out on the tissue with a fine felt tip pen. Both Mike and his son Peter had also built two original Peanut versions of the remarkable WWI Sage Type 2 biplane with its totally enclosed cabin. The lighter of the two was condenser-paper covered and flew quite well although not entered in the contest. Also not entered but perhaps even more unusual was a partly-finished Delanne D-10 by John Blagg. Having had my sights on the prototype version of this aircraft for some time, I was pleased to see that John's model showed much promise in flying! Scale documentation on this tandem wing aircraft is rather scarce however. The prize for the most original Peanut model at the meeting would surely go to Mike Hetherington who continues his experiments in building lightweight scale models from paper.

Carefully choosing a subject to best suit the technique, his latest is a Junkers D1 built using airmail writing paper over a minimal balsa framework with the scale corrugations ruled into the surfaces from the reverse side of the paper. Weighing between seven and eight grams, the model was very fragile and was withdrawn from the contest following some flight damage. Although the model lacks some of the refinements of more normally-built subjects when examined at close quarters, as the photo shows the appearance is most effective when seen from 'eyeball' judging distance. The weights achieved tell us a great deal about the overall feasibility of the building methods. In the Peanut event itself, it was certainly a welcome sight to see some new models 'in the money.' Although it was eventually won by Nick Peppiatt's Lacey *M10*, this was after a first place tie-breaker had been flown between this and Peter Frostick's Lacey — each scoring 3s and 2s in the placing system. The fly-off judged on flight realism decided the final result but the unique thing was that Peter's model was built as a special challenge down to only 255m (10ins) wingspan and still managed second place in static judging. Peter also has an all-foam 200mm (8in) version capable of 85 second flights. In third place Butch Hadland flew his relatively new (contest-wise that is) Morane Saulnier Type G monoplane — it's nice to see a change from those red and white aeroplanes in the top three!

All thanks are due to everyone who worked hard to make the meeting a success, especially the judges who had a very busy day. Flying was possible right up to the six o'clock deadline with the results being announced over the PA as they were finalised, and the SMAE plaque prizes were to be sent on in due course. Then came the drive home!

OLD WARDEN RUBBER AND C/L SCALE EVENTS — JULY 19

The model section of the Shuttleworth Veteran Aircraft Society will be holding their annual Open Day on July 19 organised by Secretary Mick Staples. This year not one but two informal contests will be held for outdoor rubber scale models, one of which will be the SMAE Newsletter Contest originated by editor David Parker. A contest has been held on this occasion for a few years now, continuing the original idea of encouraging the larger type of outdoor model where quiet flight and the old traditional aeromodelling skills are called for. Since Old Warden is a fairly small airfield, these models are well suited to it, and a number of dedicated followers have enthusiastically kept the event going from the beginning. Mick Staples will also be running an informal C/L Scale contest to Class II rules so why not bring along a model even if you are just looking for a pleasant day's flying?

CO_2 SCALE (6 ENTRIES)

		Static	Flying	Total
1. Nick Peppiatt	Sopwith Tabloid	92	84	176
2. Butch Hadland	Lacey M10	75	96	171
3. Geoff Spencer	Sopwith Tabloid	75	75	150
3. Ron Green	Bleriot XI	96	60	150
5. Dave Day	Howard DGA	73	67	140
6. Bill Spowage	Fokker Eindekker	29	70	99

PEANUT SCALE (29 ENTRIES)

		Static	Flying	Positions
1. Nick Peppiatt	Lacey M10	41.5	130	3 + 2
2. Peter Frostick	Lacey M10	43.5	112	2 + 3
3. Butch Hadland	Morane Saulnier	40.5	87	5 + 6
4. John O'Donnell	Fike E	29	170	16 + 1
5. Doug Hunt	Piper Cub	31	97	14 + 4

OPEN RUBBER SCALE (13 ENTRIES)

		Static	Flying	Total
1. Butch Hadland	Lacey M10	75	101	176
2. Peter Frostick	Supermarine Sparrow	87	76	163
3. Jeff Anderson	Wittman Tailwind	65	97	162
4. John Whatmore	Southern Martlet	85	69	154
5. Reg Boor	DH Puss Moth	70	77	147

This CO_2 conversion of the Veron Sopwith Triplane flew very steadily for its builder Pete Iliffe. Simply finished in tissues, it was very neatly built.

BRITISH AEROSPACE 146

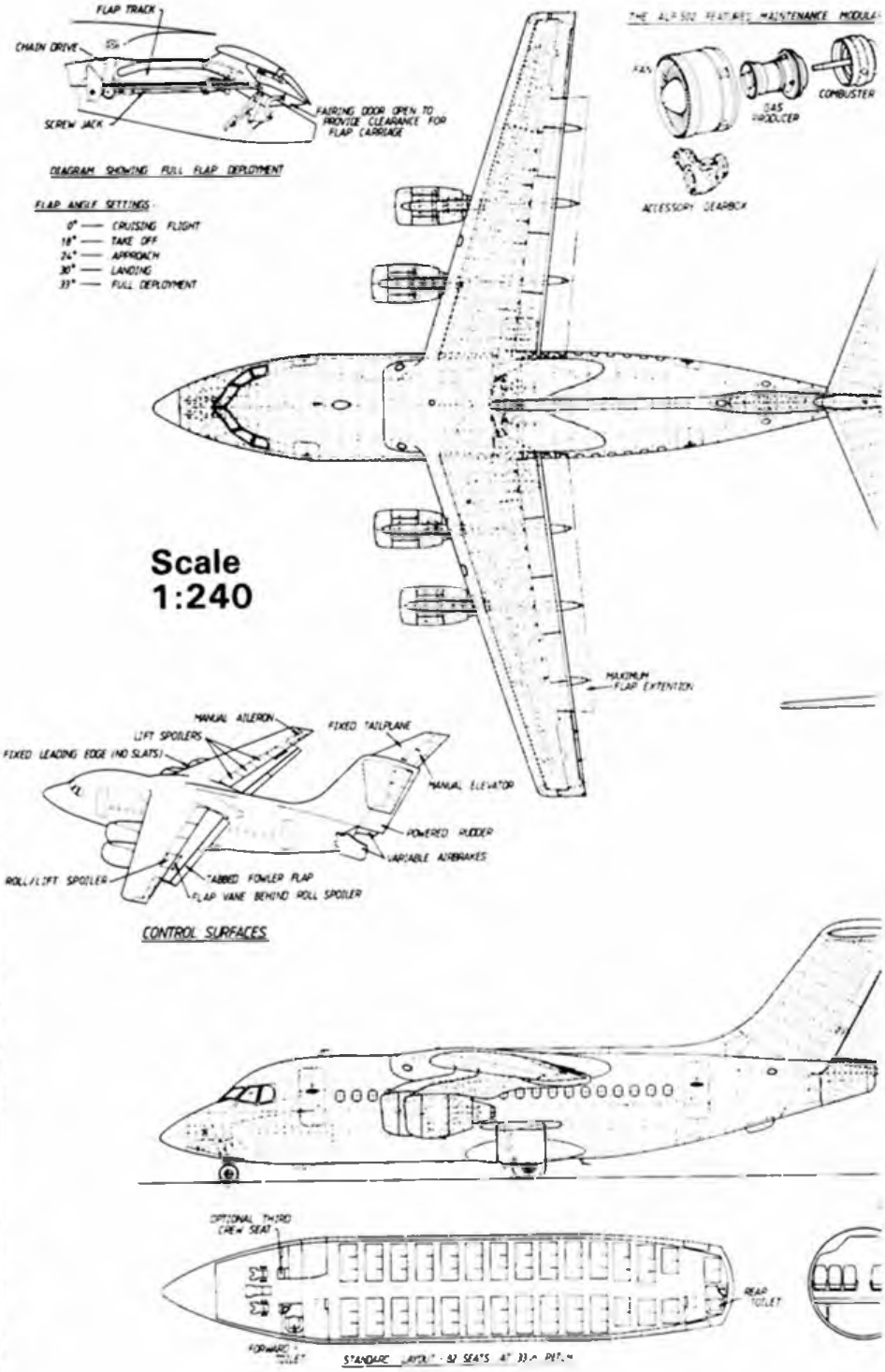
AIRCRAFT DESCRIBED

No. 249

Drawn and Described by Martin Tuck

THE OLD 'DE HAVILLAND' aircraft assembly hall at Hatfield, Hertfordshire once produced such famous aircraft as the D.H.82a Tiger Moth, the D.H.98 Mosquito, and the first ever jet airliner, the D.H.106 Comet. In later years the D.H.121 (later Hawker Siddeley) Trident, was designed and constructed at Hatfield, so it is fitting that Britain's latest airliner, the BAe 146 is being produced at this most famous and historic site.

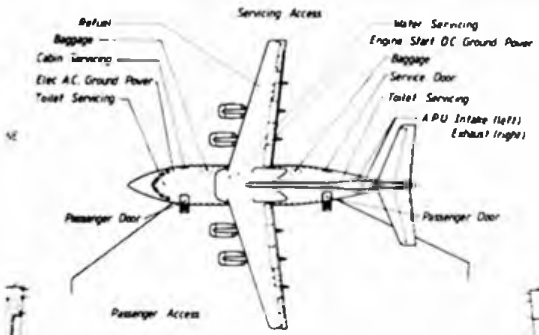
Prototype BAe 146 in final stages of assembly just a few months prior to roll-out. Below: for modellers a detail of the wing with Fowler-type flaps extended.



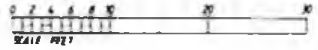
The origins of the design lie with a Hawker Siddeley proposal revealed in August 1973, for a short-range aircraft powered by four quiet turbofans. Most of the money for the project was to be provided by the British Government but because of the economic crisis which swept across British industry at that time, the project was suspended.

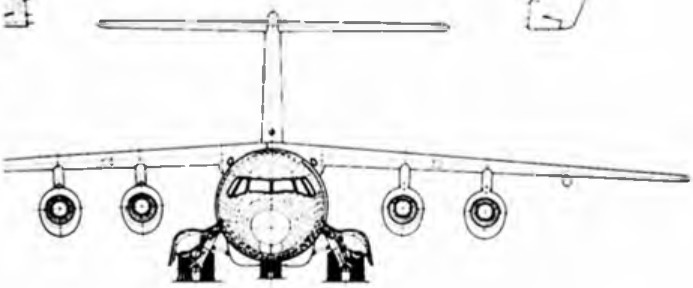
During April 1977, Hawker Siddeley was absorbed into Britain's newly nationalised aviation industry, British Aerospace. This provided finance for the completion of the design together with wind tunnel testing, the production of test rigs and assembly jigs. The 146 project was relaunched in July 1978.

The design requirement calls for a relatively small aircraft able to offer the same high degree of passenger comfort as larger wide-bodied airliners, combined with low aircraft and seat/mile costs, excellent STOL airfield performance, and low operating

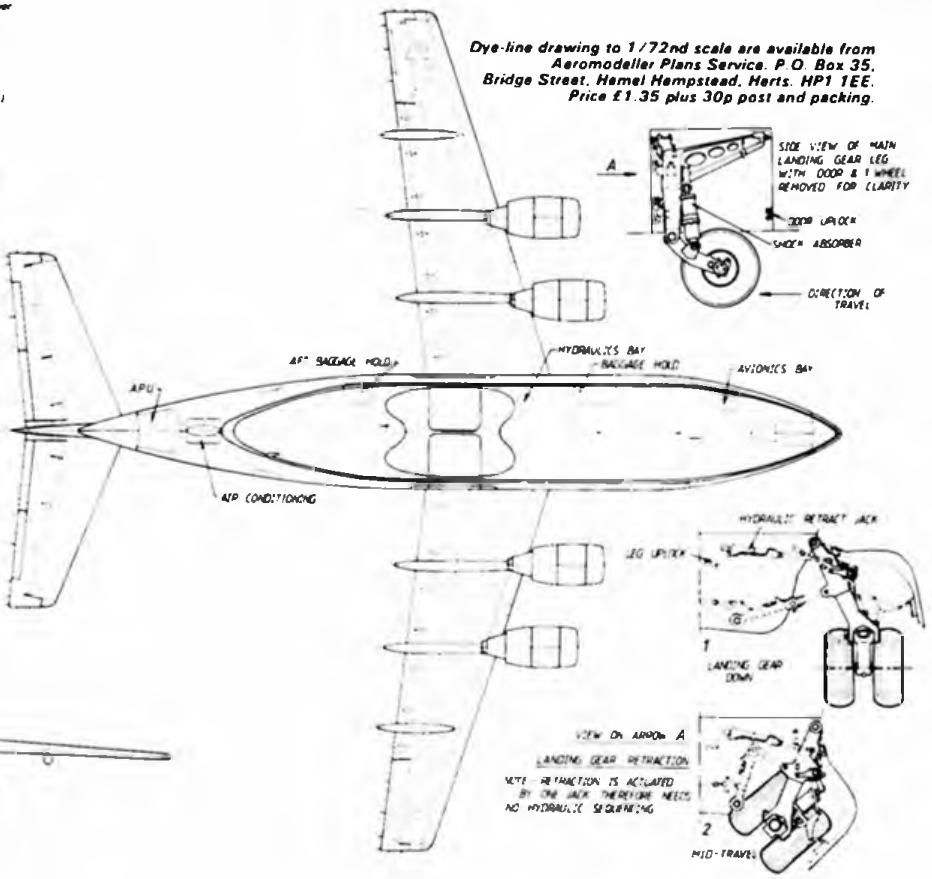


GROUND HANDLING and MAINTENANCE



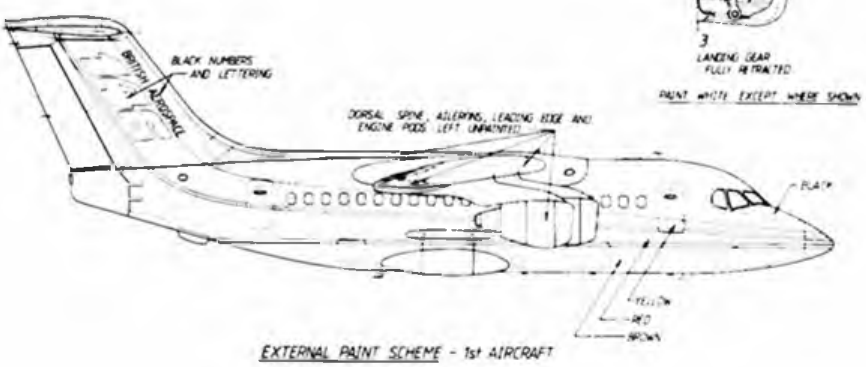


Dye-line drawing to 1/72nd scale are available from Aeromodeller Plans Service. P.O. Box 35, Bridge Street, Hemel Hempstead, Herts. HP1 1EE. Price £1.35 plus 30p post and packing.



BASIC SPECIFICATIONS BAe 146-100

OVERALL		
Span	86 ft 5 ins	26 34 m
Length	85 ft 10 ins	26 16 m
Height	28 ft 3 ins	8 61 m
WING		
Gross area	832 sq ft	77 3 sq m
Aspect ratio	8 97 : 1	
Quarter chord sweep	15°	
FUSELAGE		
External diameter	11 ft 8 ins	3 56 m
Ground clearance	2 ft 2 ins	0 66 m
CABIN		
Length	50 ft 7 ins	15 42 m
Internal diameter	11 ft 1 in	3 37 m
Headroom	6 ft 1 in	2 02 m
Floor width	10 ft 7 in	3 23 m
LANDING GEAR		
Wheelbase	33 ft 1 5 in	10 43 m
Track	15 ft 6 in	4 72 m
BAGGAGE HOLDS		
Volume	500 cu ft	14 15 cu m
FUEL CAPACITY		
Standard	2 540 Imp gal	3 050 US gal
Optional	2 840 Imp gal	3 412 US gal
ENGINES	4 Avco Lycoming ALF 502R-3	
TYPICAL OPERATING WEIGHT EMPTY	45570 lbs	20670 kg



EXTERNAL PAINT SCHEME - 1st AIRCRAFT

noise. This type of aircraft is better known as a feederliner.

The 146 is aimed at the low traffic density end of the market routes which need fewer than 3,000 seats a week. BAe market studies foresee the need for some 800 to 1,000 airliners in the 70-100 seat category over the next 15 years.

The primary 146 market is currently served by a variety of aircraft ranging from the twin turbo-props, the H.S.748, the F27 etc, to the tubo-props, the H.S.748, the F27 etc. to the noisey, fuel greedy D.C.9s and 737s. Despite its four jet engines, the 146 will be quieter than the twin turbo-props, and will be extremely fuel efficient, an important factor these days.

At first, the aircraft will be built in two versions. The 146-100, seating 70 to 90 passengers, is the 'hot and high' version, designed to operate from runways as short as 3,500 feet or from high-altitude airfields at high temperatures. The 146-200, with a longer fuselage, increased capacity and lower seat/mile cost, will seat 85 to 109 passengers and will operate from runways as short as 4,000 feet.

British Aerospace is responsible for the overall design of the aircraft and for the production of all fuselage components. The wing boxes (fuel tanks) and the engines are built by Avco Corporation in the United States, and the tailplane and moving surfaces of the wings and tail by Saab-Scania AB in Sweden. Both companies are full risk-sharing partners. Final assembly is carried out by British Aerospace, who are also responsible for marketing the aircraft.

The aim throughout design has been to reduce manufacturing cost and engineering complexity simultaneously by reducing the number of parts and generally simplifying the overall design, at the same time letting the materials used give their best with the minimum of stress concentrations. As we all

know — simple is efficient and this policy extends to the aircraft's sub-systems too — the electrical system for example, can back up the hydraulic system and vice-versa.

Power is provided by four Avco-Lycoming ALF 502-3s, two spool turbofan is developing 6,700lb thrust each. The 502R-3 is a derivative of the T-55 family of turbo-shaft engines which have amassed over 3.5 million hours of experience, powering helicopters. This type of operation — short flight cycle, rapid throttle response, is a valuable background for a feederline operation.

The engine is built up of four functional modules which not only gives flexibility of overhaul and maintenance programmes but also reduces spares and shipping costs. Spare engine modules can be stowed in the forward underfloor freight hold.

Thrust reversers are rendered unnecessary by designing the aircraft with large flaps, very efficient lift spoilers, powerful automatic wheelbrakes and a rear-fuselage mounted airbrake, saving weight and engine maintenance.

Structurally, disciplined design has minimised the number of parts, and hence the number of joints, which in turn leads to fewer stress concentrations and less opportunity for corrosion to develop. Maintenance procedures are also cut down.

Each wing has a single piece top and bottom skin, the thickness of which tapers from root to tip. The stringers are 'glued' to the skin using the Redux-bonding process, which de Havilland pioneered on such aircraft as the Comet, the D.H.125 Executive Jet and the Trident. Redux-bonding is a process in which the metals are joined by an epoxy resin under extreme heat and pressure. The Redux process eliminates hundreds of fasteners, saving weight, and benefiting fatigue life by evenly distributing the structural loads

Major load carrying fuselage frames and the front and rear main wing spars are machined from solid slabs of aluminium alloy, designed to meet the latest failsafe concepts, derived from extensive long life testing carried out on the Airbus project.

Being a British aircraft, corrosion protection is among the most comprehensive in the world, with each part being painted with an epoxy-based primer and all joints and interfaces wet-assembled using a Chromate rich sealant excluding moisture, thus enhancing fatigue life. The result is an airframe well suited to a long service life so necessary in intensive short haul operations.

Design simplicity, good accessibility and low maintenance costs extend to the flying controls also. Aileron control is supplemented by hydraulically powered roll spoilers, which also act as lift dumpers when the main lift spoilers extend. All can be preselected to extend on touchdown ensuring maximum weight on the landing gear for immediate braking on short runways. All can be cancelled at short notice should conditions necessitate a touch and go landing.

Below: Nose section of the prototype in the jigs prior to mating with the fuselage centre section and wing. Right: seating arrangement as seen in the full-size mock-up, prepared for sales and promotional purposes. Below right: flight deck.

The rear fuselage mounted airbrake is hydraulically powered and its position is infinitely variable during approach with no change in trim.

The elevator is automatically retrimmed as the single piece Fowler flaps are deployed, having no slats on the leading edge keeps the angle of attack within the authority of a fixed tailplane, ensuring immunity from locked-in stall problems.

The hydraulics are powered by two independant 3,000psi systems each driven by a self-regulating pump mounted on the inboard engines and using a fire resistant phosphate-ester fluid. A power transfer unit enables one system to back up the other in the event of a failure. A small D.C. electric pump provides a separate emergency system for the anti-skid brakes as well as emergency lock down for the landing gear.

Ease of access and maintainability are strong points on the 146, with refuelling, equipment, access hatches and luggage holds remote from the passenger doors. Great care has been taken to make all the equipment readily accessible and those components or modules most likely to need periodic removal are positioned close to the access doors

Most customers for the 146 are expected to be medium sized and small airlines, including commuter airlines which typically do not order aircraft as far ahead or in such quantities as the larger international airlines. Many airlines have expressed great interest in the 146 with negotiations taking place with a number of them. At the time of writing an un-named American airline has placed an order for two aircraft, and another, a South American airline holds options for three aircraft, but is experiencing difficulties in obtaining a licence to fly the routes it has planned.

Other airlines have signed letters of intent, which is extremely encouraging as normally with this type of aircraft, orders are not usually expected until after the first flight at the very least.

In the course of 70 years, British Aerospace and its constituent companies have produced more than 224,000 aircraft and over 700 different types — types that have borne such famous and respected names as de Havilland, Hawker, Avro, Bristol and Vickers.

Today, British Aerospace employs over 73,000 people around the world and has an annual turnover in excess of £1,000 million. Its current civil projects cover the whole spectrum of aviation.

Of direct relevance to the 146, the product line includes the HS 748 feeder turboprop, the 100-seat BAC1-11 and design and construction partnership in the Airbus.

Design and production of the 146 is controlled by the Hatfield-Chester Division of British Aerospace. Final assembly and production test flying will be at Hatfield.

TOPICAL TWISTS

by Pylonius
illustrated by Sherry

SAGGING INTEREST

Ever since I looked into a wind tunnel viewer at all that swirling motion around the captive aerofoil section I have had the gravest suspicions about airflow and wing sections in general. The perverse thought occurred to me that if you were to take that wing section out and float it free on the uncertain air you would get a different story than the one told by the wind tunnel. But looking at all those whorls, eddies and votices makes you realise that the invisible stuff in which we are permanently encapsulated, except when lying in the bath, is sticky, horrid, and as unpredictable as it is unmanageable. Appropriately it is known in content by the term 'slugs,' implying that it does the same sort of damage to your aeronautical self confidence that the other kind do to your cabbages.

I remember, too, looking through a book of aerofoils, each differing one from the other by the merest shade of an ordinate, but with supporting graphs showing widely diverse lift/drag ratios. But even were the slugs to be on their best and most predictable behaviour, what about the sag? I mean the state of the aerofoil section as the tissue dips between the ribs, giving that emaciated look so appropriate to the weightwatcher's approach to model making. On average the section looks more like something out of Crash of the Month than the prescribed piece of poetic geometry.

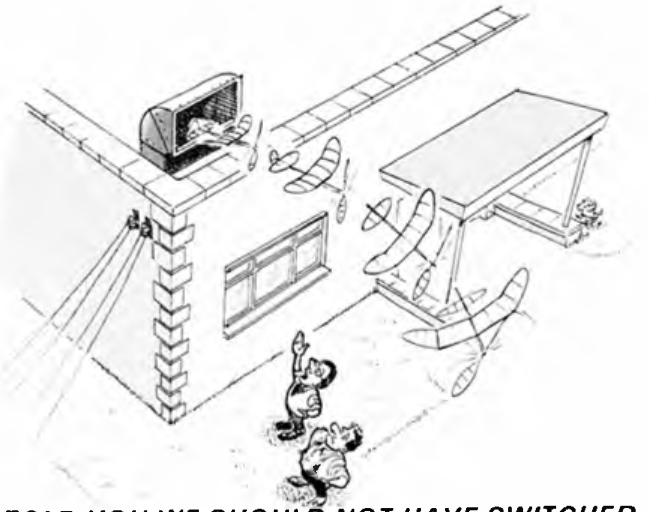
Ah, we said, if only we had perfectly formed, non sagging wings we'd not only lose our models much easier but we'd have beautiful, desirable laminar flow; an ideal pursued by aviating man down the ages. But what happened when they produced the all smooth, uncrinkled wing? No improvement in performance and all sorts of stability problems. Thus it was discovered that tissue sag, far from being detrimental was doing a thoroughly worthwhile job for the model aviator. From that time on laminar flow was out and newly discovered turbulent flow very much in. All very perplexing, especially since on full size gliders they polish up the wings like mad to get that perfect laminar flow, and there we are cutting up the airflow by every possible device. It is what I say: you just can't trust that stuff called air.

THE IN THING

It is all the fun of the contest fair these days, with the competition calendars simply bursting with every sort of novelty and sideshow. You can try your skill at the loops per minute stall, or flap down to a spot of spot the landing. Equally you can groundhog your way to limbo fame or play to the shooting gallery with a spate of balloon bursting. You can mouse race, rat race and generally cut your model to ribbons in combat of either the wire or wireless variety. But what has happened to the more serious type of competition that used to dominate the contest calendar, free flight? It gets hardly a mention on this year's agendas. The wide open spaces may not be so wide as they were but what is left is strictly off limits to free flight model flyers. Any options which have not yet been foreclosed have not been overlooked and are due for suitable treatment by busybody and bureaucrat. But what of the alternatives? Well, you can go radio and give yourself as hostage to the whacko gang of CB addicts, or enter the vertiginous world of circulatory flight. But there is still one outlet remaining for those averse to the captive model machine, and that is indoor flying.

What seems to be happening is that the great outdoors is going indoors to give free flighting in miniature in those conditions often dreamed of but rarely achieved: dead calm and no thermals. Good thing, too, for what a dirty big piece of d/t fuse would do to three grammes of fragility does not bear thinking about. Not that indoor sites are all that easy to come by. We no longer live in those pre-cost conscious, non-bureaucratic days when the Albert Hall was a favourite venue; for pocket size flying you now have to dig deep into your pocket. The present day cost of using the Cardington Hangar would have gone a long way to meet the budget outlay on its former occupant, the R100 Airship, whilst with local halls the sky would be the limit were it not for the low ceilings.

Indoor wise you can do most of the things you do on the flying field, except lose your model. There is glider, free flight rubber and power (CO2) and scale. What is more it is the last redoubt of the purely functional model, in which microfilmies and EZB's swoop unself-consciously around without any pretence of being a full size plane in miniature. Not such a bad thing since the Dummy Pilots Association is much over subscribed, objecting most strongly to being filled up with red ink for the Crash of the Month Trophy.



"I TOLD YOU WE SHOULD NOT HAVE SWITCHED ON THE AIR CONDITIONING"

But before you get too enthusiastic you must ask yourself if you really have the temperament and steadiness of hand to face up to 1/32nd square balsa and condensor paper.

FORWARD THINKING

Do you ever get tired of the same old nose up front, tail behind and wing in between layout, and yearn for something different? Well, there's a lot of re-thinking going on in this area of design ever since the back-to-front Gossamer was pedalled to fame and glory. Of course, it has been said that if Santos Dumont had been the first to fly instead of the Wright Brothers, aviation would have been advanced ten years — just because his aeroplane faced the right rather than the Wright way. Certainly it must be concerting for the pilot to be looking out on the tailplane waggling up and down, particularly since his main interest is in seeing that the propeller keeps going round. And on models it's generally more handy to have the working end up front, and not to feel that the CG is wandering loose up the fuselage. And, anyway, putting the tail first seems to be a timid way of going on, like putting a feeler into the oncoming air, but useful in a prang if you're worried about your engine.

Generally, we are prejudiced in favour of the orthodox layout because the top designer made birds that way, except for the Oozlam bird, and you know what happened to that.

MAIN MODEL TOPIC

By John Stroud

This simple Ni-Cad charger has been designed to convert radio control dry battery systems, and can be made by the complete novice.

I DO NOT KNOW what the sales figures of dry battery R/C outfits are but I bet many thousands have been sold. If the purchaser does not get hooked on R/C then perhaps buying a dozen batteries once in a while is acceptable. If on the other hand, he uses his outfit regularly, the shortcomings of dry cells are soon apparent and unacceptable. Their short life, cost and unreliability might be a nuisance in a car or boat but in a plane it is asking for disaster. Thumbing through the magazines brings a bit of a shock because full ni-cad conversions can be nearly as dear as the dry cell outfit was in the first place. With the cost problem in mind I have designed a scheme for converting to ni-cads in stages as the funds become available. Stage one is to build a charger and buy four ni-cads for the receiver. Stage two is to buy ni-cads for the transmitter and charge them sequentially with the original charger. Stage three is to build another charger board for simultaneous charging of a set of 12 cells.

The heart of my cost cutting idea is to build a charger which will run off 12V DC. It can be used off any 12V DC supply which will give at least 130mA. I use a car battery charger or the cigar lighter socket in the car. Alternatives could be a 'Scalextric' or model train power unit. Even if you need to build a small 12V DC power supply, it will only cost a couple of pounds extra.

The ni-cads used in most R/C outfits are of the AA size and 450 mAh to 500 mAh. (mAh = Milli amp hour) 1 mA = 1/1000 amp). When fully charged they give just over 1.2 volts per cell and should not be discharged below 1 volt. The mAh rating is calculated by multiplying the length of life a fully charged cell will give by the rate of discharge. For example — a 500 mAh cell will give 50mA for 10 hours. (50 × 10 = 500) or 25mA for 20 hours (25 × 20 = 500) or 100mA for 5 hours (100 × 50 = 500). In order to recharge an AA ni-cad cell it is necessary to push 65mA back through the cell for at least 12 hours. If the 65mA is kept constant it does not matter if the time is well over the 12 hours.

Fast charging is much more critical and needs to be carefully controlled and timed. This scheme does not include a fast charging facility.

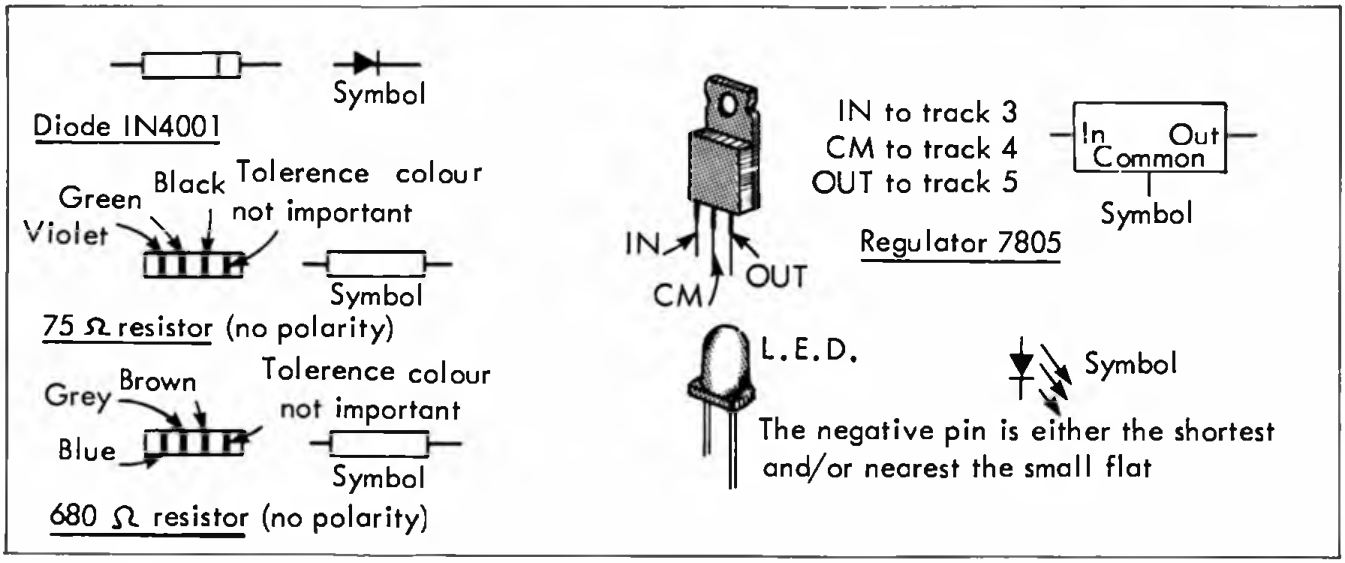
Modern electronics are a mystery to me so I will give the building instructions to the detail I needed — then almost anyone with a small soldering iron can complete the project. The full component list is shown below.

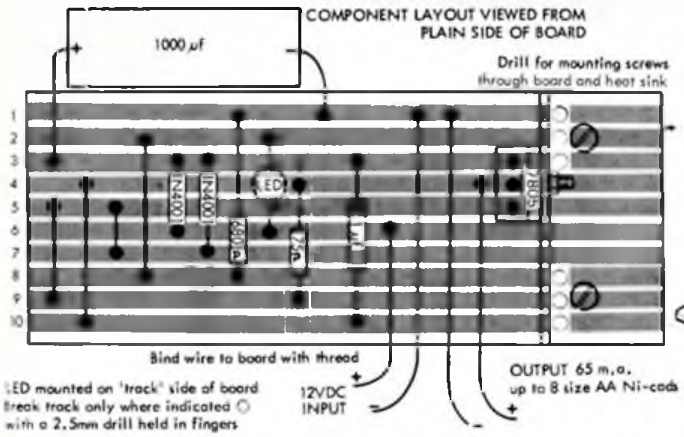
Charging Board

Condenser	1000 µf 24V	1 off
Condenser	1 µf 24V	1 off
Resistor	75Ω .5W	1 off
Resistor	680Ω	1 off
Diode	IN 4001	2 off
Regulator	7805	1 off
LED + Bezel		1 off
Circuit Board	10 track	5cm × 3cm

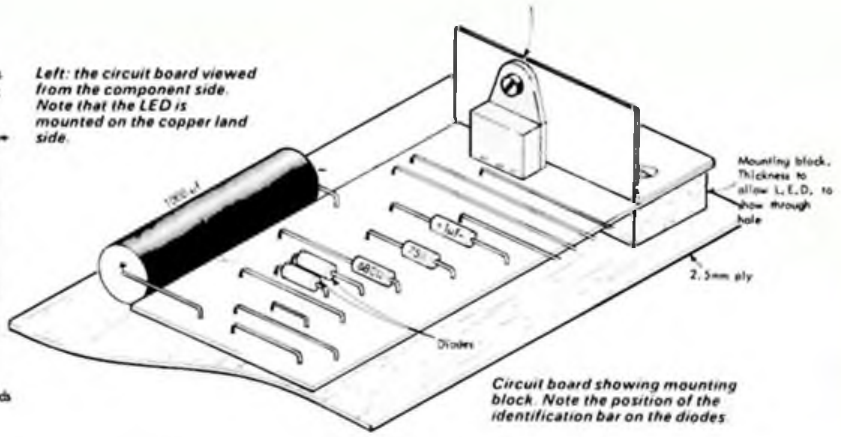
Accessories

Screw Terminals	2 off
Aluminium sheet (heat sink)	5 × 3cm
A.A. size battery holder for 4 cells	1 or 2 off
Connectors for above	1 or 2 off
Mes. bulb holders	1 or 2 off
6V .1A Mes. bulb	1 or 2 off





Left: the circuit board viewed from the component side. Note that the LED is mounted on the copper land side.



Circuit board showing mounting block. Note the position of the identification bar on the diodes

I have divided the parts into two lists. The charging board parts, the average modeller is unlikely to have in his scrap box and the accessories he might have. At the end of this article is the address of a shop from which the components can be obtained by mail order. Having obtained your bits, the first thing to do is recognise them and in some cases identify polarity. Seek out advice if you are not sure on these points — don't guess. The two capacitors will have their size and polarity + and - marked on them.

LED

Load the components except the LED onto the plain side of the board with the track on the opposite side. Put the wires through the holes and solder carefully. Cut off excess wire after soldering.

Numbering the tracks 1 to 10 make the following connections.

9 plain wire link to 5
10 plain wire link to 4
7 plain wire link to 5
8 plain wire link to 2
6 Diode IN4001 Neg to 3
7 Diode IN4001 Neg to 3
8 680 Ω Resistor to 1
2 plain wires from track 1 for input and output negative
1 plain wire from tracks 4- output position
9 75 Ω Resistor to 4
10 µf capacitor Pos. to 3
1 1000 µf capacitor Pos. to 3
Regulator 7805 In to 3
Common to 4
Output to 5
1 plain wire from track 6- input position.
Drill out tracks 1, 2, 3, 8, 9, 10 as shown.

LED on other side between 6 and Neg. to 2

The 75 Ω resistor can be substituted to give alternative charging rates. Calculate substitute resistance by

$$R = \frac{5}{\text{charging current}}$$

eg. for 22mA

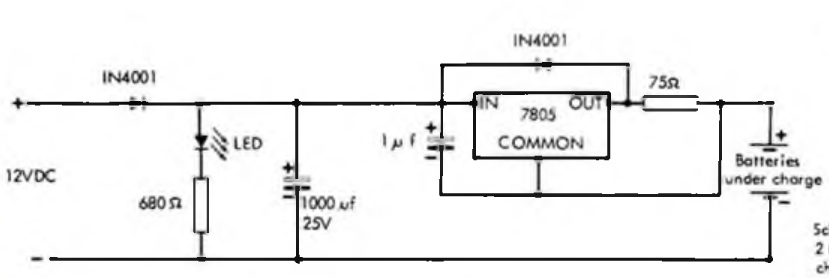
$$R = \frac{5}{.022} = 227\,\Omega.$$

To add to the usefulness of my charging box I have added 3 small torch bulbs which give me three useful pieces of information. With the box disconnected from the supply, I can check by putting the bulbs in that each set of batteries is making correct contact in its holder. With the batteries out and the box connected to the supply, a dull glow in the bulbs indicates the charger is working. Finally by using the bulbs to discharge a fully charged set of batteries, I can carry out a capacity test. I use 6V .1A bulbs which give a discharge on a set of 4 cells (4.8V) of 85-90mA. A good set will last five hours at this rate. (Two cells out of a set of 8 inexpensive ones I bought failed this test!) One of the characteristics of Ni-cads is that they perform very well right up to the point they are exhausted — then they almost switch off. The cell which exhausts first can then be harmed by getting a reversed polarity. There is no point, therefore, in capacity testing to exhaustion. I put the box somewhere where I will notice the bulbs go dim — such as on top of the telly. If you are looking for a dud cell with a volt meter, remember to do it with the cells on load as, when off load, the dud cell sometimes recovers its terminal voltage.

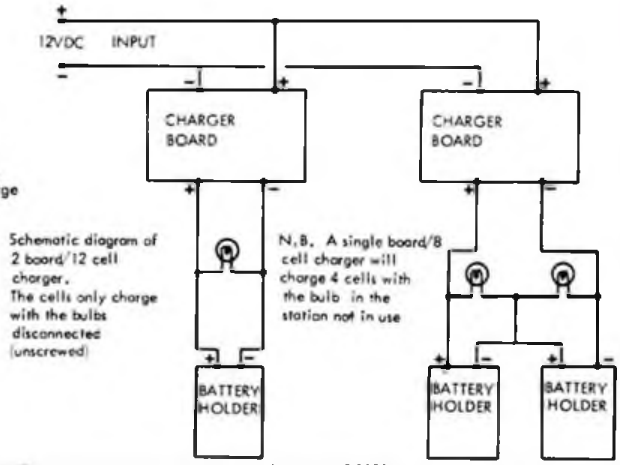
I mounted my battery holders onto the lid of a small ply box by drilling them and binding them on with thread. It works well. I then mounted the bulb holders and terminals. The LED only lights up when the 12VDC supply is connected up the right way round.

I hope this article is enough to encourage non-electronic types to have a go. Once one gets down to it, it is not so difficult as it might seem. All you need is a soldering iron of about 15W and a few hand tools. If you cannot find the courage to have a go, then get an 'electronics nut' friend to make the difficult bit — it will only take him a few minutes.

A kit of bits can be obtained from 'The Components Centre', 7 Langley Road, Watford, Herts. Their advert appears on page 386.



Theoretical circuit diagram



Something special for electric RTP flying . . .

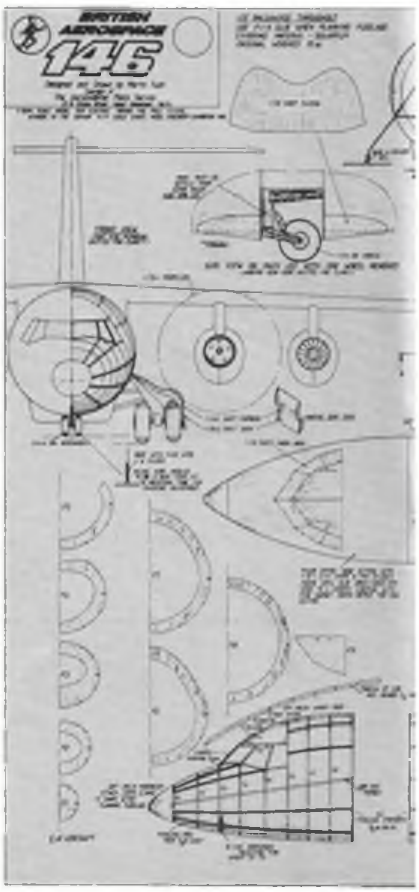
This beautifully built and finished model flies just as well as it looks. Note the large Fowler flaps are permanently in their extended position

BRITISH AEROSPACE 146

DRAWN, BUILT AND DESCRIBED BY MARTIN TUCK

THE ORIGINS OF the design lie back as far as 1978, when I joined British Aerospace Hatfield design department, to work on the full size 146. At this time it was in its later stages of design, and the construction of test specimens had just started. I knew then that I just had to build a flying model of it. Originally it was to be a six-foot span radio-controlled aircraft, but after drawing up plans, I decided that the vibration set up from Glow I.C. engines mounted in very long engine pylons, could have had a detrimental effect on the internal structure of the wing. I also believed that I would have had difficulties with the large Fowler flaps, as well as the small control surface sizes.

So after a break of a few months, the idea struck me of making a 'Round the Pole' model for the competition held at the Model Engineer Exhibition every year. It had all the qualities of a winner, no-one had done an airliner before, especially one with *anhedral*, (probably because all the books on the subject recommend plenty of *dihedral* for stability). Anhedral, however, is just as stable — and indeed more efficient than dihedral — as long as the aircraft has a low centre of gravity, the high wing and those large landing wheels make sure of that! The control surfaces are fixed, except for a trimmable



Full size copies of the plan reproduced here to 1/7th size are available as Plan No RTP/1419, price £3.25 plus 40p postage and packing from Aeromodeller Plan Service, P.O. Box 35, Bridge Street, Hemel Hempstead, Herts HP1 1EE. Overseas readers may obtain copies from local aeros or direct to the above address.

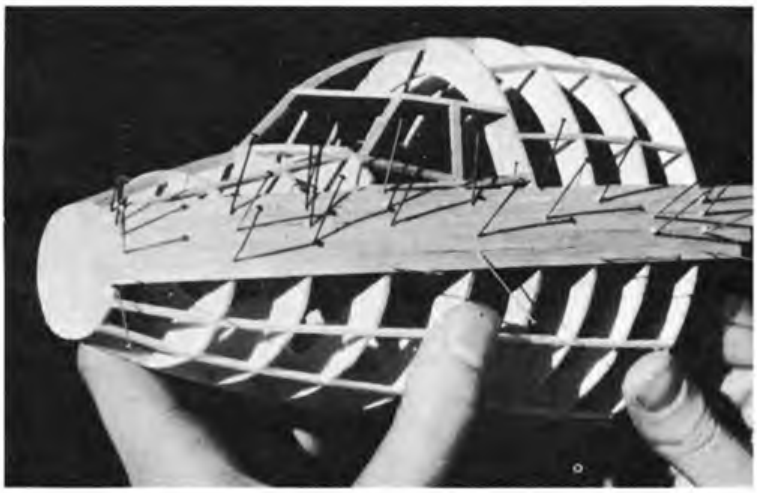
elevator, and no offset rudder was needed as the torque from the propellered engines keeps the line taught, (the reason the model flies clockwise). I decided to have the flaps fixed in their extended position for no other reason but to increase the wing area.

Fuselage Construction

Construction is not really unusual, but it relies for its strength — and contour — on the sheeting which covers the entire length of the fuselage. I should say at this point that it is important to keep the weight down to a minimum, and that it is not necessary to 'beef up' the structure. Use the lightest and strongest balsa available to you, and it is best to use either P.V.A. or Aliphatic resin glue throughout construction.

The fuselage frames for the nose and tail sections are accurately drawn, so provided that you transfer them accurately onto the sheet balsa, and set the frames 90° to the building board, a good reproduction of the fuselage is virtually guaranteed. I find that pricking round the outline of each frame with a pin through to the balsa, is the best method to transfer shapes from the plan. Start with the large ones first, as you will find that the waste balsa from the insides of each frame are large enough for the smaller ones.

The framework of the nose and tail sections are then sheeted with light $\frac{1}{32}$in sheet balsa. Because these are double curvature, thin strips, say $\frac{3}{16}$in wide have to be applied individually, pinning each strip to the frames. When dry these can then be sanded until a smooth fuselage contour is obtained. Remember though that the skin is only $\frac{1}{32}$in thick so don't go to town with the sanding block.



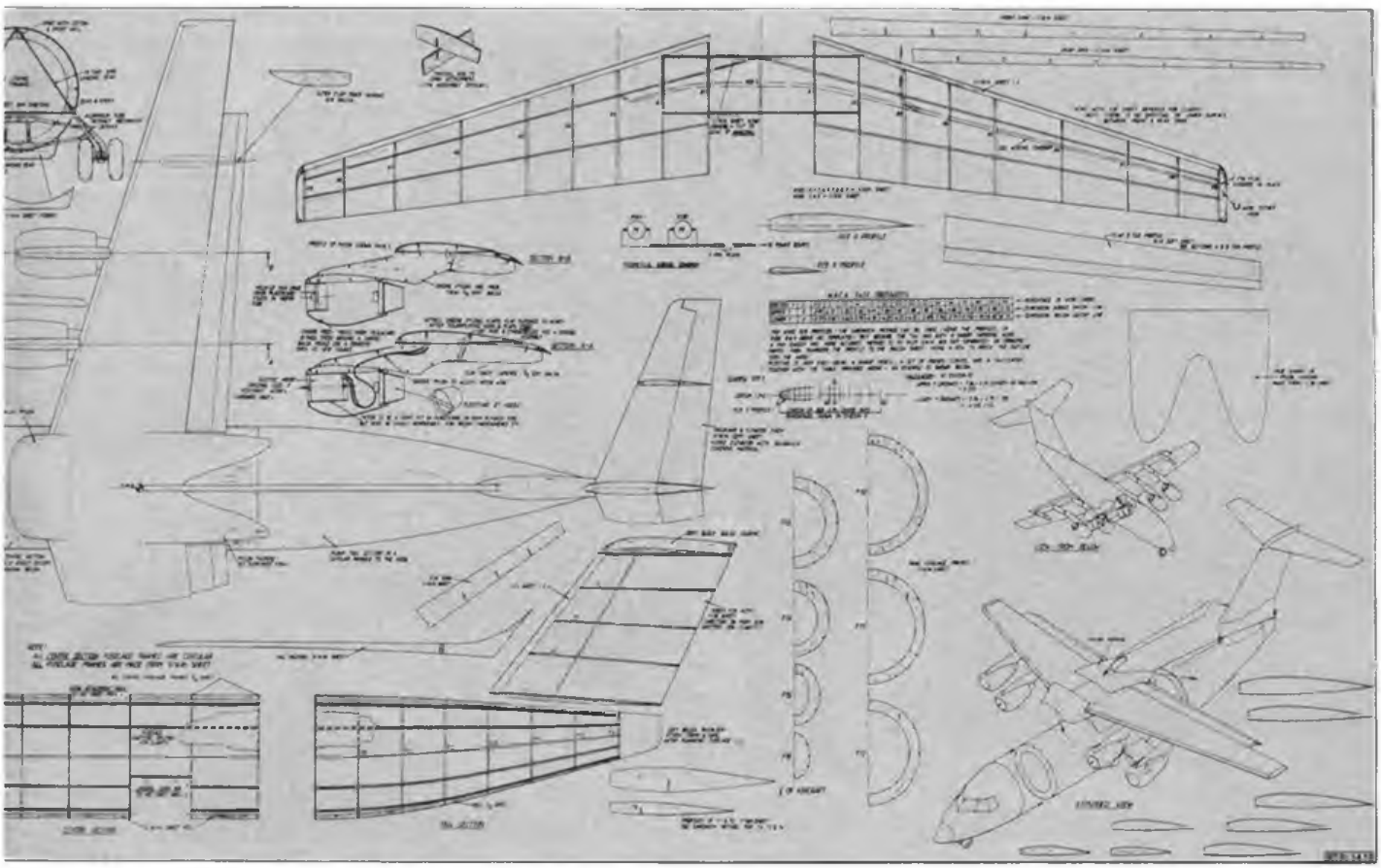
The front section of the fuselage, showing the 1/32nd strips of balsa pinned to the frame to form the outer skin. Any spaces between the planking can be filled with a commercial filler or PVA glue mixed with balsa dust.

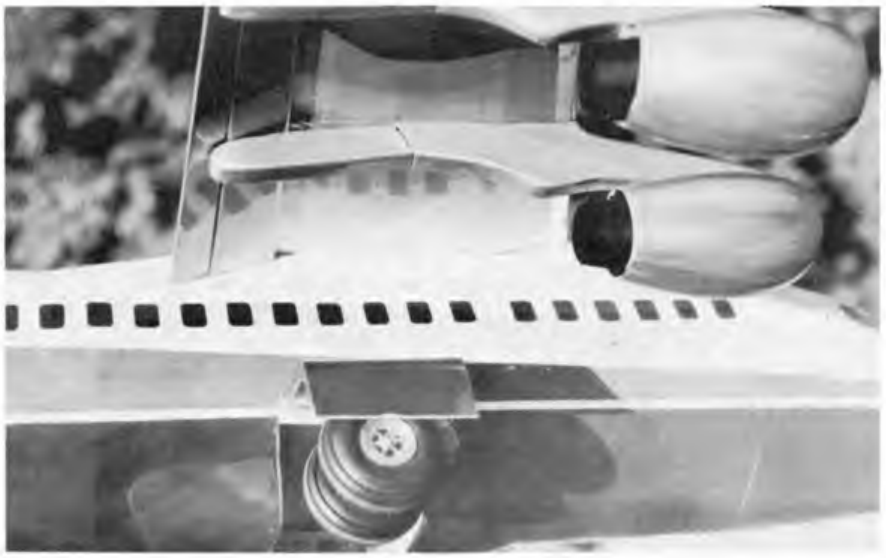
The soft balsa noseblock and canopy roofing can then be added, carved and sanded to shape, to blend with the curvature of the fuselage.

The centre section is a 'cylindrical tube' so the fuselage frames are circular, and consequently sheeting of the section can be done in one operation. The cutouts for the wing and landing gear bay can be found by simply holding the fuselage up to a light source, and the shadow of the frames can be seen through the thin balsa.

When the three sections of the fuselage are completed, the sections can be joined. Any gaps in the joins can be filled with balsa dust and P.V.A. glue mixed to a paste.

Now cover the entire fuselage in Solarfilm, the fewer joins the better. I managed to do it with two pieces and a bit of nifty work with a clothes iron and heat gun. Then cut away the areas for the landing gear and wing attachment.





The angle of the Fowler wing flaps can be clearly seen on this underside view

Wing Construction

The ribs for the wing can be made using the sandwich method, with the tip and root rib profiles shown on the plan, but because the 146 has such a sharply tapering wing, and very few ribs, it is far easier and more accurate to plot each rib profile on drawing paper and then transfer it to the balsa in the usual way. Plotting is very easy once you get the hang of it, using a sharp pencil, a ruler and a calculator. All is explained on the plan together with examples.

Construction is straightforward, but note that the sheeting on the lower surface of the wing ends at the front and rear spars. Cut the wing joiners to shape from $\frac{1}{16}$in sheet to give approximately 3° *anhedral* and glue them to the main wing panels, the same distance apart as the attachment frames in the centre fuselage. Install the wiring at this stage making sure that the plug is on the starboard side, and that there is enough wire poking through the wing to run down the engine pylon. The top surface of the wing can now be sheeted with $\frac{1}{32}$in sheet, this covers the entire wing. The wing can now be film covered.

The engine pods are moulded from 'Plasticard' using a carved balsa male and female mould, together with a hot oven — a technique that has been described many times in modelling books and magazines. To save time you can purchase the pre-moulded pods. (*See the classified ads. column.*)

The engine tube can either be of thin plywood or plasticard, but the engine must be a tight sliding fit into it, so that the motor brushes can be replaced easily. The motors used on the prototype were the cylindrical type — KeilKraft type 4552X.

When the pylon assemblies are complete they can be attached to the wings ensuring that the wires to the engines are buried in grooves in the pylon itself. When dry, the motor can be soldered on, and the motors fitted into their tubes. The outboard engines are made in the same way except that a mock up fan is glued into the tube.

The small details like flaps and 'flap track fairings' can be pinned and glued to the wings, ensuring that they have been film covered beforehand.

The whole wing assembly can now be attached to the fuselage by glueing the front and rear wing spars to the fuselage frames, between the cutout in the centre fuselage section. The operation is completed by attaching the wing fairings to the fuselage.

Fin and Tailplane construction.

The fin and tailplane is of conventional construction, but it is important to keep the weight to a minimum.

The elevator is hinged by the film covering material. The fin and tailplane assembly can now be glued to the fuselage with epoxy, ensuring that part of the fuselage covering material has been removed in that area to provide a strong bond. The tail fairings can now be added.

The Landing Gear.

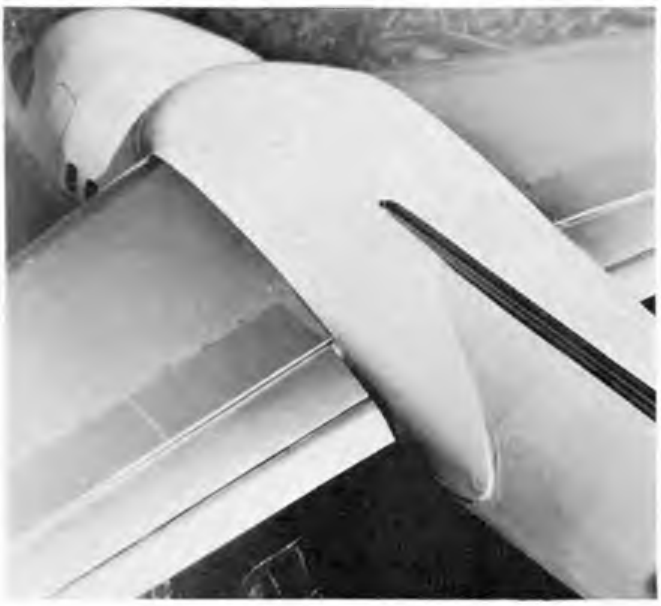
The nosewheel is straightforward to make but ensure that the wire used is a tight fit in the nosewheel receiving tube in the nose section.

Bend up the main landing gear wire and attach to the fuselage as shown on the plan. The landing gear bay can now be sheeted in with $\frac{1}{32}$in balsa, and the leg details added using soft balsa and dowelling.

Make up a pair of doors and fit to the fuselage together with the landing gear door fairings, the profiles of which are shown on the plan.

All the wheels must rotate freely when attached to the axles, and check that the aircraft tracks correctly, by rotating the nosewheel slightly in its tightly fitting tube.

Right, detail of the wing fairing. Left shows the KeilKraft 4552X motor installed in the inboard nacelle. Propellers used were 4" diameter as supplied by KeilKraft. Note the mock-up fan in the outboard engine nacelle.



Tail assembly showing the 146 logo and fine line markings to indicate rudder hinge point.

Above shows the well detailed undercarriage. The Graupner wheels look as if they have been designed for the job!

Finishing.

By now, most of the model will have been covered in Solarfilm, so its just a matter of covering the parts that need covering, and painting the model in the colours of the real aircraft.

The prototype was painted in the colours of the first three full size aircraft, (the test aircraft) the white, yellow, red and brown colour scheme of most of British Aerospace's company aircraft. I used Humbrol enamels, hand painted, but spraying it would probably have been lighter.

The landing gear details — screw jacks etc, are made from odd scraps of balsa and aluminium tubing.

The windows were cut from dark blue Solarfilm, carefully ironed on. The 'Aircraft Described' feature shows the colour scheme, but note that the wings are now white, unlike my model's silver wings, this was because the colour scheme was altered after my model had been finished.

Flying

Flying should prove straightforward, provided that the centre of gravity is in the correct position. The prototype needed full power at take off and a neutral elevator setting, but the motors can be slowed to about ⅔ power once up. As it is a scale model there is very little one can do with it while flying, but it certainly is a crowd puller. I once flew it in front of the real 146 for the TV cameras and all the aircraft fitters downed tools to watch — the foremen were not too pleased!

Vintage Corner

by ALEX IMRIE

The writer's Wasp using the Frog 1.75cc petrol engine. To improve running it was necessary to fit a small fuel tank on top of the crankcase to minimise differences in fuel levels. This was merely a different way of doing what the Elf float chamber did! 65mm diameter "MG" wheels are fitted. Below: the original Wasp fitted with the 2.3cc Elf petrol engine. The long undercarriage was necessary to provide clearance for the 12-inch propeller. Replicas (as a rule) use smaller propellers, but the length of the undercarriage should not be reduced since this will change the whole appearance of the model.

WASP

Various vintage modellers have offered help with material for this column and I am sure that many fine contributions will be received in due course. However, I am pleased to report that the most active response up to the present has come from original vintage modellers, who are still very much with the hobby today. This month L. S. Wigdor, who has been at the game for almost 50 years, provides the source. His first model was a Warneford stick tractor, he then built many Cleveland kits and made a Pelly-Fry design and Kinglet before progressing to power models in the mid-1930s.

In 1937 he received a small Elf petrol engine from his penfriend Elbert J. Weathers in California. This engine, although of limited power for its 2.3cc capacity was a smooth running sand-cast beauty and had an ignition coil that would work satisfactorily on only one and one half volts. A feature of this engine was its very great fuel economy and it could drive the 12 inch diameter by six inch pitch Chauviere type propeller supplied with the engine, at 3500rpm for 40 minutes on one ounce of fuel. Other features not usually found on so small an engine were a float chamber carburettor, adjustable and completely enclosed contact breaker at the rear of the engine, three piston rings, and a 'full-size' type of airscrew hub which in addition to the normal crankshaft nut, also used four bolts which passed through the propeller to screw into tapped holes in the drive washer.

However, although these features were most impressive, the engine's very light weight (4oz bare) coupled with its single cell flight battery were even more impressive and simply called out for a really small petrol model. L. S. Wigdor had already built petrol models powered by both the Brown Junior and the Baby Cyclone engines, and these were mainly large machines of around eight feet wingspan. An attempt to fit these engines into a 50 inch span model had not been overly successful, and wanting a small model he now enthusiastically started a design for the Elf.

Wasp by Dave Baker fitted with Frog 100 Mkl diesel. Note the wire and dowel cabane, wooden wheels and the old Frog plastic propeller. Model is nicely decorated with the name of this magazine (thanks Dave!) and is emblazoned with the old black and gold NGA (National Guild of Aeromodellists) transfer.

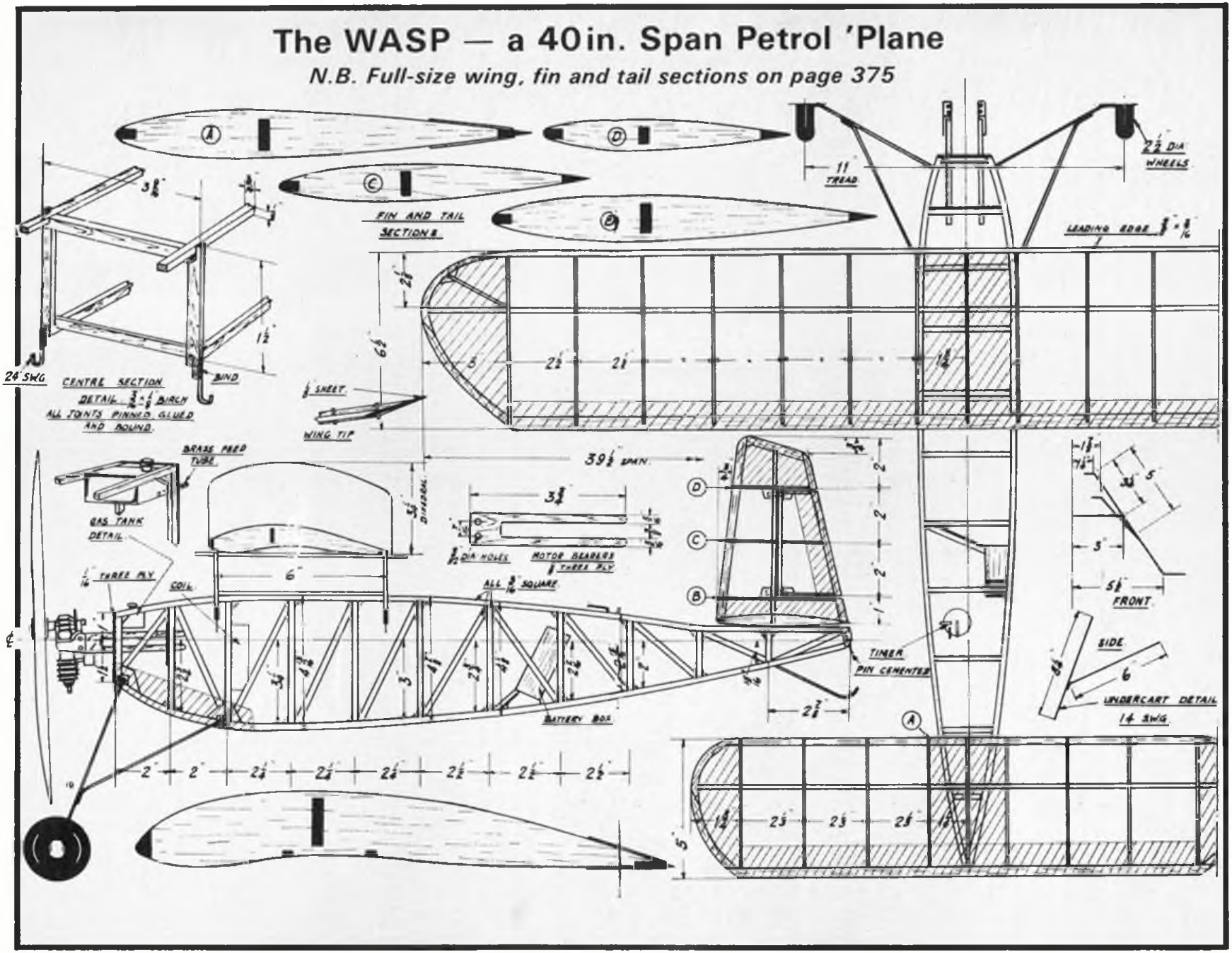
Below: close-up of the Elf engine showing the "full-size" propeller hub, and the pleasing shape of the Chauviere wooden propeller. The "main" fuel tank was made of sheet brass and was mounted in the front fuselage bay supplying the jet via a float chamber. Note the toothpaste tube filler cap!

The machine that emerged in the summer of 1937 was named Wasp and was a parasol of 39½ inches wingspan. It resembled the Kovel-Grant layout but had the spidery wire undercarriage of the rubber-driven type of model, and the tall fin with the reversed rake tip was a typical Wigdor trademark. The Elf was fitted inverted, and booster battery contacts, modified clock timer and access panel for the flight battery were located on the top of the rear fuselage. Covered with bamboo paper, treated with full strength Titanine tautening dope and finished in aluminium, the model weighed 17oz and this light weight resulted in slow flight speeds of between 15 and 20 miles per hour. The model was stable in the air, and performed best in fairly tight circling flight, being quite sensitive to adjustments of the large rudder tab.

The Elf engine had been responsible for quite a spate of small power model designs in the United States, the better known being Miss San Diego (48 inches span) by Joe Weathers, Cavu (44 inches span) by Ken Willard, and the S-4 (36 inches span) by Malcolm J. Abzug. In the UK the attrac-

The WASP — a 40in. Span Petrol 'Plane

N.B. Full-size wing, fin and tail sections on page 375



tion of such a small power model as the Wasp led to a description and plans appearing in Aeromodeller for April 1938. It is not known how many replicas were built at the time as a result of this, but in recent years at least two Wasps have been flying regularly.

One built by David Baker has given excellent service powered by an elderly Frog 100 Mkl diesel. This model possessed an unusually slow glide being covered in Modelspan and lacking the usual weighty ignition components like coil and battery. The writer's model, powered by a Frog 1 75cc petrol engine was built in 1974, and was originally covered with double weight tissue finished with aluminium dope. Several seasons of active flying eventually meant a recovering job and this was undertaken in lightweight nylon, which with the overall silver finish has put the weight up, fortunately without affecting the performance too much. Of course, this model has always been slightly faster than Dave's machine due to the weight of the ignition

Seven foot span Miss America powered by Brown Junior 10cc petrol engine, model is finished in the original colour scheme and has hand-painted fuselage decoration. Built by Noel Barker, who since he was a Halton apprentice in the 1930s has never lost his enthusiasm for the large petrol model.

equipment.

The Wasp drawing, which was originally a double page layout in the larger pre-war Aeromodeller, is reproduced here as a single page. The dimensions are easy to read, and aerofoil sections are given full-size, so it should be a simple matter for enthusiasts to produce a Wasp replica. On the original the centre-section cabane was made of birch, a commodity that seems to have gone from the shelves of our model shops. However, bamboo, cane or wire can be substituted without changing the appearance too much. The original wheels were turned balsa doughnuts that could be purchased commercially in 1937, but Trexlers, although of slightly different section should fill the bill nicely. Engine mountings will of course vary depending on engine used.

There is no reason why replicas of this design cannot be powered by any of the popular small diesels of 1cc capacity and under. A lightweight version could easily fly well on the DC Dart, but possibly the best power unit might be the Mills 75cc diesel (original or Indian replica).

Should any modeller wish to power his Wasp with the Frog 1 75cc or similar petrol engine, I suggest that he use a nickel cadmium battery to save weight and also that he use a modern propeller like the Top Flite ten inch diameter by 3½ inch pitch, or better still and more in keeping with vintage thinking . . carve his own! The original Frog propeller supplied with the 1 75cc petrol engine was so inefficient, as to make all the difference between success and failure in the flying performance of the Wasp, especially if the old 4½ volt flat battery was being carried. On the other hand David Baker's Wasp has flown well using the old Frog propeller which is probably better suited to the zip of the Frog 100 diesel, than it is to the lower power output of the Frog petrol engine.

So c'mon you Vintagents, get down to it, here is a simple model, easy to build that will use engines currently available. Send in photos of your Wasp for us to use in this column, and if you don't delay cutting wood, your Wasp could be one of the swarm that is expected to be at Old Warden on Vintage Day on August 16. See you there?

SAM 35 speaks

During April there were two meetings with vintage flavours that I have unfortunately not been able to attend due to the nature of my employment. Accounts of vintage happenings at these events are eagerly awaited and when to hand the reports for the Western Area Rally at RAF Colerne and the St. Albans Old Timer Fly-in will be given.

I would like to remind readers again to send black and white photographs and/or data of any vintage models building or flying, or an account of any vintage flying meeting that they may have attended. Receipt of material like this will ensure that this column will adhere to its original aim, which was to tell modellers what is currently happening in the vintage scene.

Meanwhile news of what vintage enthusiasts are building comes in via the grapevine. Derek Welch is progressing with his version of Miss America, and is doing a lot of research to get things right. When last heard of he was machining the small castings for joining the steel music wire vees on the undercarriage. The emergence of this model, which will be finished in the original colour scheme of red, white and blue is eagerly awaited. Steven Payne has just finished another seven foot wingspan pre-war 'gassie,' this one, British in origin, is a Cloud Airmaster. Finished in blue and yellow and powered by an Ohlsson 60 spark ignition engine this model will be of the radio control assist class using three channels.

Much cement squeezing is going on in Bedfordshire where three Club Conquests are under construction by Messrs Fisher, Kemp and Penhall, to be powered respectively by Drome Demon, Hurleman 48 and Stentor 6-spark ignition petrol engines. Knowing these builders' attitudes to vintage modelling, I doubt that any radio

Miss Lisa Conisbee poses with Peter Fisher's 1938 Club Conquest fitted with Drome Demon 6cc petrol engine. This model is currently flying with a 1941 May Rocket engine.

control assist will be used by this trio! The Conquest was a pleasing high wing cabin design of 66 inches wingspan produced by Model Aerodrome of Birmingham during the autumn of 1938.

Dave Baker really took the hint about corrugated cardboard ribs described by Peter Michel in the last issue of SAM 35 SPEAKS, and has used them in a double sized Scram. He is most enthusiastic about both the economical and practical aspects of these and is considering using them in a double sized Sal Taibi Powerhouse which will have a chord of over 27 inches! (Big is beautiful sez Dave!).

A party of four SAM members had the pleasure of visiting Colonel C. E. Bowden and Mrs Bowden recently and spent an enjoyable afternoon amidst historical aeromodelling surroundings that would provide sufficient material for a good sized book. The GOM of petrol modelling (as Dr. Forster used to call him) is still very active and flies radio control models these days. He was able to show his visitors the original Blue Dragon and a modernised Kanga fitted with the same Wall 28cc petrol engine that powered the original Kanga biplane in 1932 when it broke the petrol-driven model aeroplane record with a flight of 71 seconds.

AUTOGYRO RO49

A control line model for .8-1cc motors by John Stroud

THE FASCINATION of an autogyro must be that it seems to fly by some sort of magic. After studying many designs I can list most of the essential design features but I still do not really understand why they fly! It seems to me that the rotating wing is just a method of having a wing which is travelling faster than the aeroplane is flying. Within certain limits the scheme works very well but autogyros will not take-off vertically like a helicopter, nor do they have the lifting ability and speed of a conventional aircraft. One of the best designers of full-size autogyros was a Spaniard called Juan de la Cierva, who lived between 1886-1936 and was responsible for a considerable amount of research and development work on these machines. Many years ago I was involved in refurbishing one of his designs for the Science Museum. It had some very odd features about its tailplane, as I remember, with positive incidence on one side and negative on the other! Control was via a tilting head of the rotor. It also had an enormous shaft and clutch to 'pre spin' the rotor from the engine prior to the take-off run. If my memory serves me right, it needed at least 250 rpm on the rotor and could then get airborne in a few yards and climb at about 45°. RO49 has been designed to resemble an autogyro of the 1930s. Flying characteristics can be described as odd, peculiar or even weird. I have certainly found it interestingly different and an irresistable magnet for spectators.

Construction

At first sight one could be forgiven for thinking an autogyro would be more difficult to build than a conventional plane. In fact the reverse is true and the rotor can be put together much more quickly than a built-up wing. Mark and cut out the two 1.5mm ply hub discs. Make sure you mark the exact centre with a hole right through the ply. Cut out three strips of hard 3mm spruce or ply for the rotors. Using a piece of newspaper or similar, draw three lines 120° apart, large enough for rotor assembly on a flat surface. (see diagram if your geometry is rusty). Pin one ply disc in place and then shape the inboard ends of the blades to fit neatly together in the centre. Cut out the lower balsa wedge pieces and glue to the disc. When viewed from above, the rotor turns clockwise and the *leading edge* is *lower* than the trailing edge. Glue and pin the rotors in place over the 120° lines, remembering to pack up the tips 1.5mm. When this assembly is thoroughly dry, add the top wedges and ply disc. It is a good idea to mark this disc 'top' and also annotate the leading edge of each rotor. When the glue has dried, sand each rotor to a conventional wing section and epoxy in the brass tubing bush. Use a set square and a long piece of wire in the bush to set it vertically. When the epoxy is set, the rotor can be balanced by a little extra sanding or putting pins in the tips of the lighter blades. It is surprising how much difference careful balancing makes to the free spinning of the rotor.

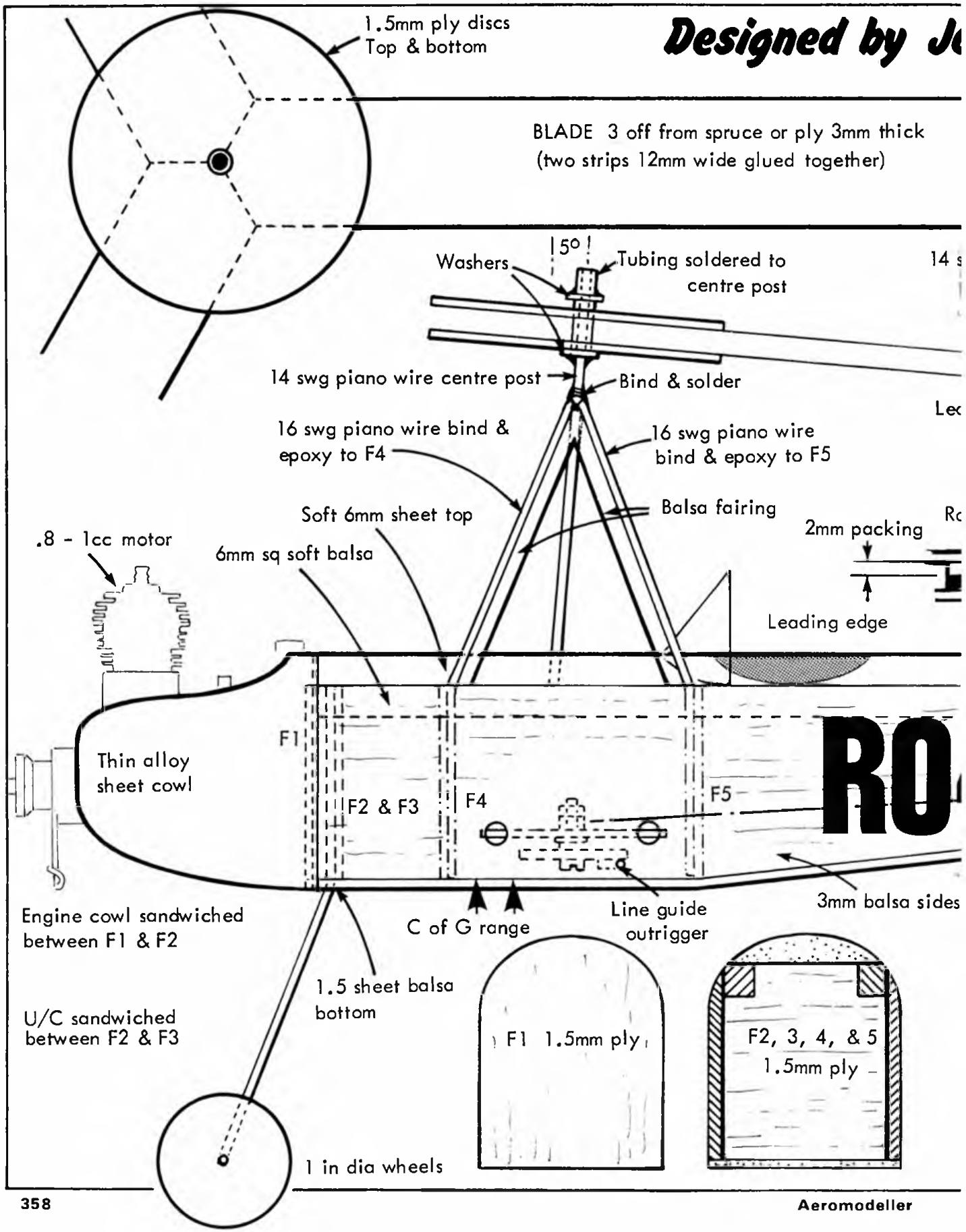
Left: motor pylon, lead out wires and line out-rigger.

Right: sew and epoxy the pylon wire to the appropriate former.

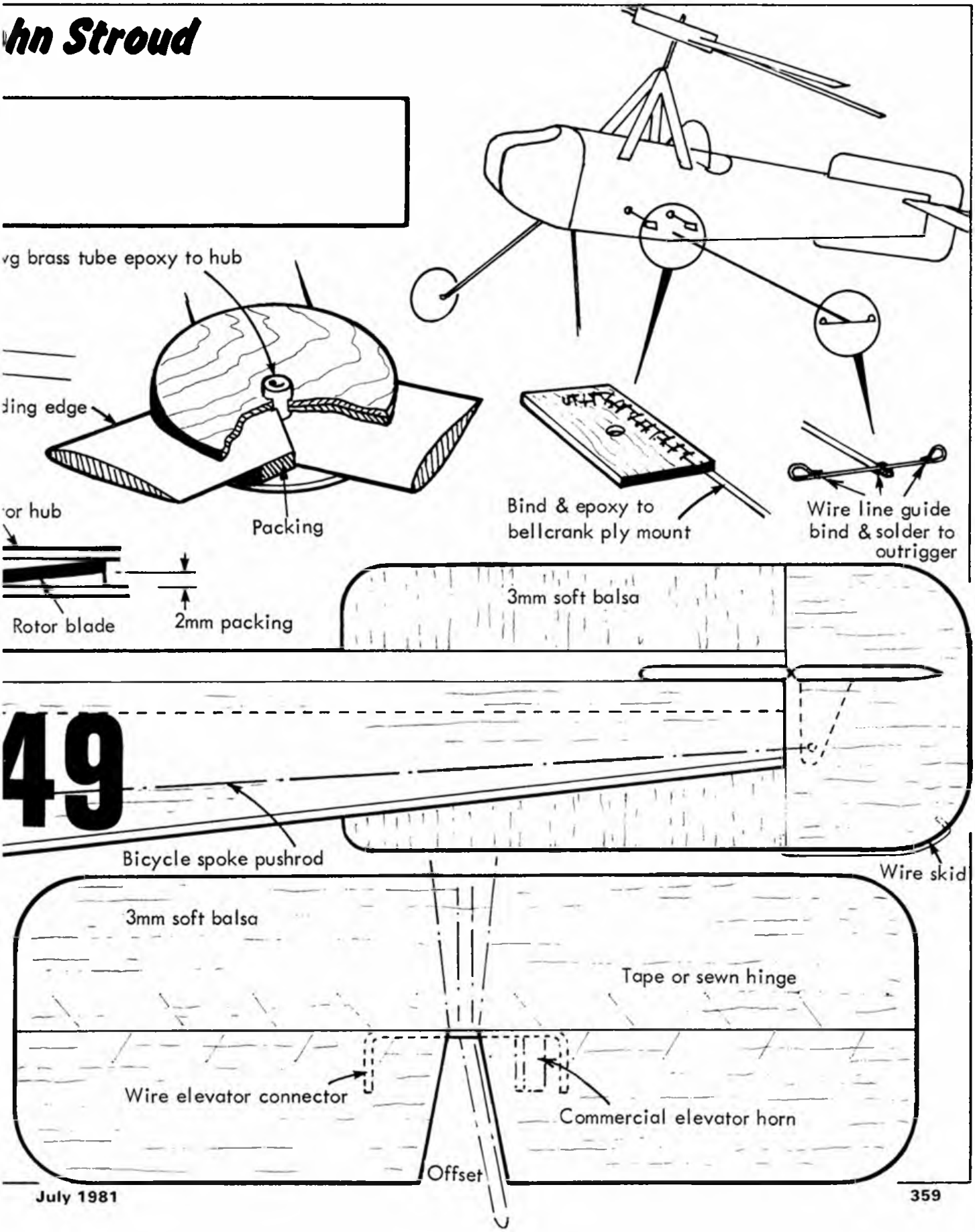
Below: balsa fairings are epoxy glued to the wire rotor pylon, and top surface of the surface

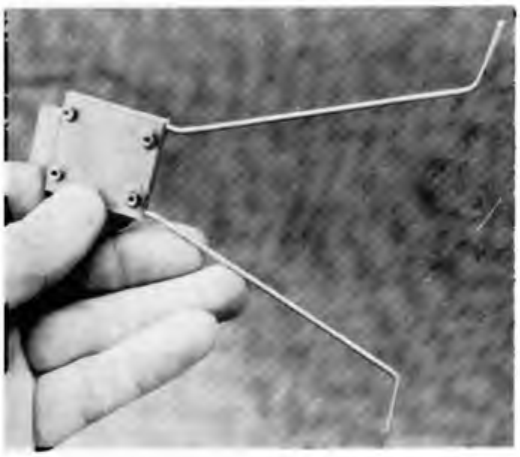
Fuselage and tailplane

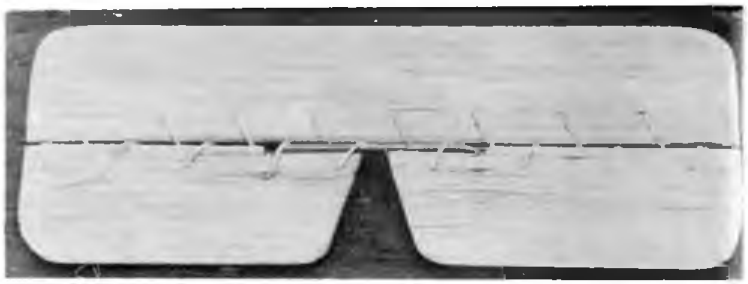
Cut out the tailplane and elevator from light 3mm balsa. Cut and bend the wire elevator joiner. Trim the elevators to inset the joiner and epoxy in place. When the epoxy is set, round off all the edges and join the tailplane and elevator together using tape or sewn hinges. Cut out all the fuselage and engine mounting formers. The centre must be removed from the rearward one to allow the push-pull rod to pass through. Bend up the undercarriage wire and epoxy it



hn Stroud







Right: sew or tape hinge the elevator. Below: the wire line guide should be bound with fuse wire, and soldered to the end of the outrigger.

The undercarriage is epoxied between F2 and F3. Use the engine bolts to hold both formers together while glue sets.

between two 1.5mm ply bulkheads as shown. It makes a better assembly if one fills in round the undercarriage wire with scraps of 1.5mm sheet balsa. The sandwich can be held together with engine bolts and nuts but be very careful not to epoxy the bolts in place. Bend the two wire rotor head supports together, as one, to ensure they are exactly the same, then bind and epoxy them to their formers. Cut out the two fuselage sides and glue on the 6mm square balsa longerons. Cut out the bellcrank mount from 3mm ply and bind and epoxy the 14 swg line guide outrigger. Glue this, and the formers, to the outboard (starboard) fuselage side only. When this has set completely, fit the bellcrank and control wires. (It is very difficult to fit the control system after the second fuselage side has been fitted). Add the second fuselage side and leave to dry. Pull the rear fuselage together after trimming the 6mm longerons to allow the parts to close. Glue the rear together and add the tailplane and connect up control system. Cover the bottom of the structure with 1.5mm balsa and carefully trim and fit the 6mm soft balsa top. Whilst this is drying, cut out an extra 1.5mm ply engine bulkhead and try out a few cardboard templates for the engine cowling as shown in the illustration. Finally cut and bend a cowl out of thin aluminium. I think my idea is original and it makes an easy way of covering up a Cox Babe Bee.

Carve the top of the fuselage to shape and sand the complete structure to a smooth finish. Cut out the fin parts taking careful note of the grain directions. Pin and glue the fin in place allowing for the offset shown. When this is dry, sand to shape and epoxy in the wire skid. Carefully make a hole in the top deck to achieve the the five per cent tilt as shown on the plan. Epoxy the base of the post through the fuselage top deck and bind and solder the top in place with the support struts. Epoxy fairings to the struts made from 6 × 1.5mm balsa. Cover the entire model with lightweight tissue followed by two or three coats of thinned dope and talcum powder. Lightly sandpaper between coats and paint and trim to taste. I normally finish C/L models with ordinary household polyurethane paint although I find some makes are not proof to high nitro glow fuels. I now add a coat of hot fuel proofer to make sure. Solder on the wheels, line guide and rotor head. As the rotor head is load bearing, it is essential to make a good job of the soldering of the retaining piece of tubing without getting the solder down into the bearing. Slipping a piece of tightly fitting cardboard between the tubing and washer helps a lot. Oil the bearing and made sure the rotor turns freely. Check the position of the C of G as it is very critical. Add ballast if necessary to achieve the correct position shown on the plan.

The motor head can be adjusted for trim, by bending the centre post forward or backward very slightly. It is most important that the C.G. position is not further back than shown on the plan.

The engine cowl is made from thin alloy sheet. The shape and size will depend on the engine used. If a Cox engine is used, as shown on the plan, trace the shape of F1, then from the side elevation, trace the sides of the cowl and place each side of F1. Cut out the shape, leaving excess material to bend over the top surface of the cowl. Bend sides forward and sandwich between F1 & 2 using the engine bolts. When satisfied with the shape, remove and transfer to alloy sheet and cut out. Finally fit the engine and cowl, making sure that all wood surfaces are fuel-proofed. The curved rear top part of the cowl can be epoxied together.

Flying

Pre spinning the rotor by hand brings it nowhere near the required speed so this model needs a good, long, smooth take-off run. Hand launch is impossible and a full circle of hard surface or very short grass is essential. The prototype first flew on rather too short 5 metre lines in a tennis court. The take-off run was about 5 metres, which was not quite as long as I had expected. In low level flight it reacts and performs just like a rather nippy little trainer. The rotor turns quite fast. 'Up' control demonstrates the peculiarity of autogyros. As soon as the nose goes up, the plane almost comes to a standstill in the air and the rotor speeds up. Neutralising the controls immediately regains normal flying speed. This manoeuvre is rather unnerving and made panic set in at first but it has not caused an accident — yet. The only way to get down safely is to touch down with the engine still running. This is easier said than done and I have already written off the original set of balsa rotors and replaced them with the spruce ones shown on the plan. Heavier rotors do store more energy and made landing a little easier. Fly only on light lines between 7 and 10 metres long. Calm weather is essential and watch out because autogyros are different.

Ron Pollard of Tynemouth gets his Wakefield away in the Barkston Heath gale.

Dave Hipperson reports....

RAFMAA free flight event . . . Barkston Heath . . . 3.5.81

Results

Open glider

1. J. Williams	5.47
2. J. Cooper, Biggles	4.39
3. M. Dilly, Croydon	3.39

Open Rubber

1. R. Peers, Falcons	7.30
2. J. O'Donnell, Whitefield	5.00

HLG

1. M. Page, Peterborough	4.22

F1A (A2)

1. P. Owens, Liverpool	5.31
2. B. Baines, RAFMAA	3.47
3. J. Williams	3.43

F1B (Wakefield)

1. J. O'Donnell, Whitefield	5.51
2. J. Foster, RAFMAA	4.06
3. I. Taylor	3.07

As can be deduced from the results the RAFMAA Meeting at Barkston Heath on May 3 was a blow out — more by way of turbulence than solely wind speed. It came at us at between 20 and 30mph from the south and over a deep valley and two ridges of trees just upwind of the launch point. This made flying *anything* a very hazardous affair until models were at least halfway across the drome.

Russell Peers having already suffered the ignominy of a breakdown on the way to the contest, had arrived late, and with only half his models, was determined to make up for it and did just that with a very creditable full score (2.30 maxes) in open Rubber. O'Donnell could have challenged this were it not for a lost model on the second flight. The remainder of the open rubber entry stopped after one flight — the conditions were so bad.

John was undeterred by a 51 second first flight in the Thurston Cup for Wakefield to continue with his famous rough weather feathering prop model and record two maxes to take this class with a commanding lead over co-organiser Foster.

Glider suffered even more in the turbulence and scores were even lower. Brian Baines managing second place in F1A with only two flights! Through all this Mike Page managed to put together a very creditable total in HLG which included three one minute maxes.

SMAE 2nd Area Centralised Free Flight — 5th April 1981

Results: Open Glider — no trophy (4 in flyoff). 1. R. Pollard (Tynemouth) 9.00 + 4.59; 2. B. Baines (RAFMAA) 9.00 + 4.30; 3. P. Moate (Tynemouth) 9.00 + 1.56; 4. J. Walker (J) (Birmingham) 9.00 + 1.35. Open Rubber — Gamage Cup (22 in flyoff) 1. R. Pollard (Tynemouth) 9.00 + 17.21; 2. A. Jack (Tynemouth) 9.00 + 15.01; 3. T. Chambers (Darlington) 9.00 + 8.50; 3. P. Ball (Grantham) 9.00 + 8.50; 5. D. Davitt (Leeds) 9.00 + 7.05; 6. M. Groome (C.M) 9.00 + 6.43; 7. J. O'Donnell (Whitefield) 9.00 + 5.43; 8. R. Peers (Falcons) 9.00 + 5.22; 9. D. Morley (Grantham) 9.00 + 5.17; 10. D. Martin (Tynemouth) 9.00 + 5.07. FAI Power — Halifax Trophy - Plugge Points (17 flew) 1. S. Screen (Birmingham) 15.00 + 5.17.100; 2. P. Harris (Birmingham) 14.56.93; 3. D. Reader (Birmingham) 14.45.87. Plugge Points after 2 events Birmingham 472, Biggles 376, Grantham 273, Liverpool 215, Crookham 213.

Martin Dilly reports....

First this month, a correction. The magazine in which the CO_2 latent energy motor article appeared, which we mentioned in the March Free-Flight Scene is not the Chartered Engineer, but the Chartered Mechanical Engineer. My apologies for the omission, and my thanks again for their permission to use the material.

European Championships winning A/2

Our three-view this month is of the glider that Jugoslavia's Branko Leskošek used to win the F1A fly-off at the European Championships at the superb site at Mostar last year. Three features, while not revolutionary, make the aircraft a little unusual to British eyes.

Instead of using a fibreglass fishing rod blank fuselage Branko favours a slab-sided balsa one. Paul Lagan, writing some years ago in South Island News, put forward an interesting argument against rod blanks, or, by extension, any other similar type of low cross section circular fuselage. Using one on an F1C model he found that the glide was a bit vague, tending to wander and then to tighten up the glide circle to an excessive degree. A ply 'keel' epoxied to the boom made a vast improvement, far more so than an increase of fin area that Paul had previously tried. He reasoned that an increase in 'flat-sided' keel area helped to prevent upsets in the yaw axis, but also warned of the need to increase the frontal side area to compensate and keep the centre of lateral area in a safely forward position. He suggested that this may be why a number of East European A/2s with box fuselages used those spine-like light alloy keels round their noses.

The wing construction, while using a D-box to resist twisting loads on tow has a rather narrower chord than usual, and, strangely, laps the upper balsa sheeting over the 2 × 10 spruce top spar. This, of course, moves the spar lower down the airfoil where it is less able to resist bending, but the wing certainly seemed to withstand energetic zoom launches at Mostar. At the front of the D-box the leading edge is a composite balsa one of fairly small cross section, the main member being 3 × 7, with a 2mm balsa triangle on top to fill the angle under the overlapped top balsa skinning. Presumably whacking into trees and fences is not one of the problems faced where Branko flies; I have a feeling that most British fliers would favour a spruce nick-resisting strip along the leading edge to prevent impact damage here. Full depth zig-zag diagonal riblets run between the front and rear spars, both of which are fully webbed front and rear to give a full box spar effect, rather than the I-beam most people use. Total wing weight is a light 160 grammes.

The tailplane construction uses a semi-geodetic rib layout aft of the mainspar, and rather widely-spaced riblets in front of it. Although the article describing the aircraft is in Slovak, rather than Czech, which I can only just decipher, the tailplane spar appears to consist of a full span vertical web with 1mm tapered top and bottom spars in front of it; the rear criss-cross ribs would then be glued to the rear of this, similarly to the structure that Larry Conover used on his Lucky Lindy F1C aircraft in the late 50s. Tailplane weight is rather high at 12 grammes.

The Russian-type hook unlatches at 3.5 to 3.7 kg load.

More special publications from Vol Libre

Vol Libre, or rather André Schandel, its dynamic editor, continues to produce a superb series of 'Specials' on various aspects of free-flight. The latest is a 100 page collection of plans, reports, reprints and original material on the World Championships of the 1960s; this was the decade when names like Køster (*please* get that 'ø' right, editors everywhere!), Oschatz, Loffler, Seelig, White, Verbitsky and Klima were coming to the forefront of the sport, and variable pitch propellers, variable incidence tailplanes, multi-function timers and the early circle-towing systems were being developed to improve model performances. To many model flyers this constant challenge to squeeze a few more seconds and a bit more consistency out of a purpose-built functional aeroplane is what makes competition free-flight so fascinating, and such fun to take part in. Vol Libre is one of the best periodicals today to give you the information on how to do it.

Later this year André will publish one or more Vol Libre special editions on Wakefields; these will be a collection of history, plans, constructional articles, photos and up-to-date theoretical material that anyone interested in model flying will want, whether or not their French is fluent. André still has a few copies of Volumes I and II of the World Champs Special Editions at 20 francs each. Write to him at 16 Chemin de Beulenwoerth, 67000 Strasbourg, France. He will also welcome contributions, especially on Wakefield matters for the Specials.

More on aluminium foil covering

After the item in the March F/F Scene, we had a

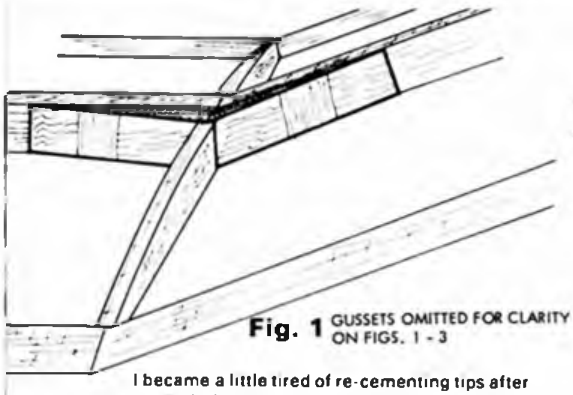


Fig. 1 GUSSETS OMITTED FOR CLARITY ON FIGS. 1 - 3

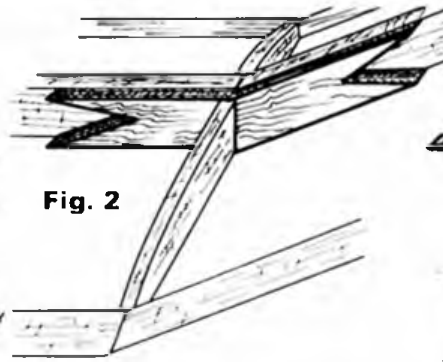


Fig. 2

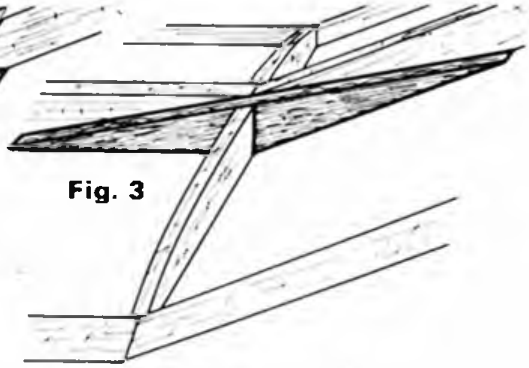


Fig. 3

I became a little tired of re-cementing tips after a particularly windy season's flying, and decided to keep the things on rather more permanently I use flat set top and bottom spars on A/2s and used piano wire braces to bridge the spar break. The centre and tip panels each have a soft 5mm rib at the dihedral break end; after each is finished except for covering it is propped up to the correct angle (i.e. half the angle the tip and centre panel will finally make with each other) and block sanded to give a sloping face to each rib. The panels are then butt joined together, when the glue is dry span-wise slots about 60mm long are cut across the dihedral joint in the exposed faces of the upper and lower spars, plus leading and trailing edges. I use a carborundum dental separating disc for this, about 25mm diameter and 0.5mm thick, mounted on an arbor in a 12 volt mini-drill. The wire braces are 20 swg for the top spar and 26 swg for the other three; check the fit of these in the slots and then thoroughly clean and roughen the wires before gluing them in place with epoxy or cyanoacrylate, using baking soda if necessary with the latter as a gap filler.

Sand off any surplus adhesive and you have tips that will survive much of the rough and tumble of British contest flying; if the really hard impact does crack the joint, the wires tend to pull out of the adhesive matrix, which acts as a guide for relocating them during field repairs.

Free-flight organisations

For many British flyers 1981 will be remembered as the year of ESP, extra-sensory perception was essential for anyone hoping to participate in free-flight contests here, with venues being lost, altered, not notified, and, worst of all, the SMAE's own contest calendar not being published until well into the contest season. In the so-called 'drivers' manual' to which Council operates, contest calendars are supposed to be submitted to the SMAE competition secretary by the first week of August of the previous year, with confirmed or provisional venues noted, the resulting Council-approved contest calendar is supposed to be published in the final issue of Model Flyer of the previous year to the contest season.

The problems are by no means peculiar to F/F, and we all know the difficulty of locating and acquiring sites suitable for our particular discipline, but some sort of advance planning is vital. Several of us remember the team trials at Sculthorpe a few years ago which was interrupted by the arrival of the high-speed section of a motor rally, necessitating the curtailment of our own event. It transpired that the motor rally organisers had booked the airfield over a year before we had; the side issue of the double-booking is one that presumably has been remembered and will be acted on in future.

It is quite possible for F/F to share a venue with either other sports or other model flying disciplines, although the latter cannot be of the 'tents, Tannoys and ropes' variety, because of the need for rapid shifts of F/F launch point in case of wind changes. It would seem logical for the SMAE competition secretary to act as a co-ordinating point at the early planning stage so that areas, technical committee and clubs hoping to run events can do so on the least possible number of sites consistent with contest practicality. It seems ludicrous to me that at present ten SMAE areas, about half a dozen technical committees and a couple of hundred clubs may all be writing to a very small number of military sites asking if they can hold model flying events there. Even as I write this, a copy of the SMAE newsletter blithely publishes two F/F contests on the same date and about 50 miles apart. At the very least we should revive the sanctioning procedure, or something like it, by which the SMAE, whose Articles of Association require it to promote contests, among many other things, acts as a clearing house for contest information and heads off potential clashes before they are published. With the 24 hour phone answering service at the Leicester office it shouldn't be difficult.

I suppose proof-reading does require some knowledge of the topic concerned, but even in this august journal the rather superficial What's Happening page contains some puzzling stuff. For instance we read that Bath MAC were to run All in Minor at a March contest; was that for under 18s, or a telescoping of Mini and Open Rubber (O/R) or for some category we didn't know about? Matters were hardly improved the following month when the entry was altered to read All in Miner, presumably for people with Davy lamps. If you are trying to publicise a contest, and good publicity is vital, do make sure that details are exactly what you want people to read; you may know what abbreviations mean, but others do not. Standard terms like OG for Open Glider and so on are acceptable and indeed there is a case for running a list of *all* future events every month, instead of just those in the next few weeks. A very small typeface would be quite legible, and this is the method used in the AMA's magazine Model Aviation.

Having finally seen the SMAE contest programme in the April Aeromodeller, though, what on earth is the good of an entry like 'March 15; F/F 1st Area Centralised'? Are we ashamed that the contest is for the K&MMA Cup, which is for F1A gliders and counts towards the Plugge Cup overall championship, for the Frog Senior Trophy for Open Power and also for an Open Rubber event with no trophy? Let us have real information please, not just a facade.

The German SPL design dating back to the late 1960s uses solid balsa wings, with the tips held on by short wire stub joiners in tubes and PVC insulating tape wrapped chordwise round the joint, allowing washout to be easily adjusted for trimming on the field.

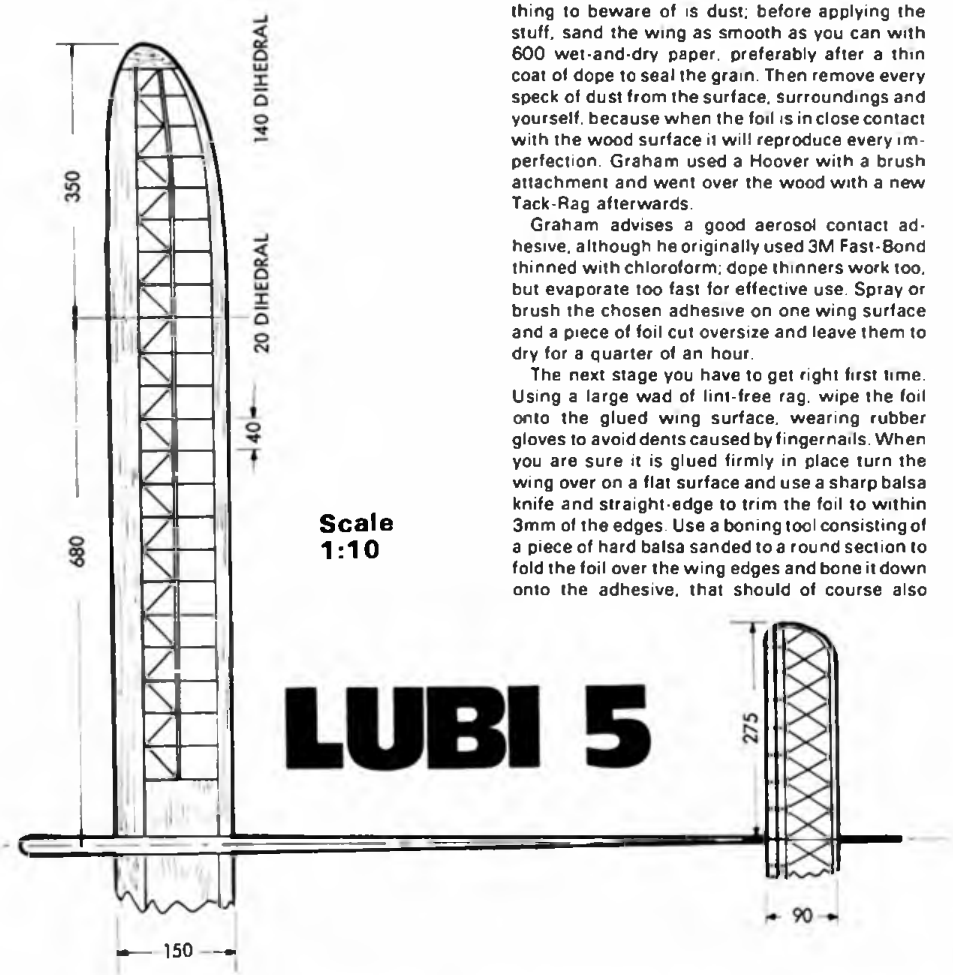
1981 British World Championship teams

The trials to select the British team for the forthcoming World F/F Championships at Burgos have been beset with high winds, and the SMAE's technical committee wisely postponed or cancelled flying on several days when the weather would have risked models or flying sites. At last, only three months before the date set for the Championships, we have a team picked to compete against the 36 nations so far entered.

For our glider flyers their final day was a trial in more ways than one; with good flying conditions, light winds and strong lift for most of the day, they flew 14 rounds, with lengths of rounds and intervals for recovery — of models and competitors — varying according to the drift. Organiser Alan Jack made flexibility the keynote, and as far as I know the glider flyers were well pleased with his efforts. Flying at the former RAF Thor missile site at Hemswell, which I last visited for the Nationals in the early 60s, we were lucky in that the drift was towards the high escarpment along one edge of the airfield, with a wind in the opposite direc-

Left: our 1981 Wakefield team and reserve. L to R: Ron Pollard (Tynemouth), Dave Hipperson, Roy Miller and Bryan Spooner, all of Croydon.

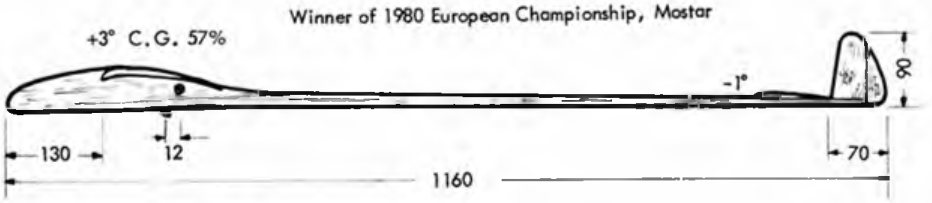
Right: top placing F1C flyer was Ken Faux, here offering the Rossi up to the starter box; has he checked the D/T groove?

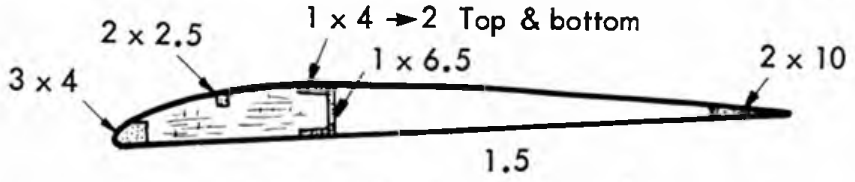


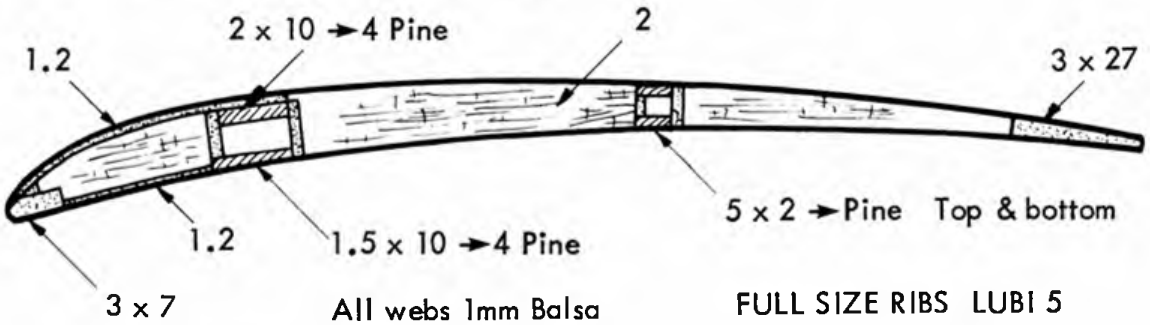
LUBI 5

F1A MODEL BY BRANKO LESKOSEK (YUGOSLAVIA)

Winner of 1980 European Championship, Mostar







couple of most helpful letters from Graham Bryant on techniques of foil application. The first thing to beware of is dust; before applying the stuff, sand the wing as smooth as you can with 600 wet-and-dry paper, preferably after a thin coat of dope to seal the grain. Then remove every speck of dust from the surface, surroundings and yourself, because when the foil is in close contact with the wood surface it will reproduce every imperfection. Graham used a Hoover with a brush attachment and went over the wood with a new Tack-Rag afterwards.

Graham advises a good aerosol contact adhesive, although he originally used 3M Fast-Bond thinned with chloroform; dope thinners work too, but evaporate too fast for effective use. Spray or brush the chosen adhesive on one wing surface and a piece of foil cut oversize and leave them to dry for a quarter of an hour.

The next stage you have to get right first time. Using a large wad of lint-free rag, wipe the foil onto the glued wing surface, wearing rubber gloves to avoid dents caused by fingernails. When you are sure it is glued firmly in place turn the wing over on a flat surface and use a sharp balsa knife and straight-edge to trim the foil to within 3mm of the edges. Use a boning tool consisting of a piece of hard balsa sanded to a round section to fold the foil over the wing edges and bone it down onto the adhesive, that should of course also slightly overlap onto the other surface. Repeat and cover the other surface; diligent boning will smooth the joint lines down satisfactorily.

This technique is primarily of use with straight edged surfaces, since the foil will not follow compound curves, although I seem to remember one of the early Verbitsky F1C models having foil-covered elliptical tips.

Wing top panel attachment

For many years the standard method of attaching the outer panels to the inner ones on free-flight aircraft was by means of ply dihedral braces, which were usually glued to the leading edge and spars. This was usually reinforced by applying gauze bandage strips to bridge the discontinuities at the leading and trailing edge joints. Done properly this is still an efficient method, particularly in the case of a structure using spars arranged in vertical pairs, when the ply brace is simply a rather stronger web than is used between the spars in the remainder of the wing. However, I have reservations about ply braces less than 2mm deep glued to the vertical faces of small section spars; after all, a third of the ply grain is running in the wrong direction, i.e. vertically, where it will resist neither loads from leading edge to trailing edge on impact, nor lift loads on tow in an upwards direction.

The sudden ending at either extremity of braces is also structurally bad; some sort of tapering, so the strength gradually decreases, is preferable.

One solution is to taper the brace in thickness, as in **Fig. 1**; another is to cut long Vs into each end, as in **Fig. 2**, in order to reduce the braces' stiffness towards their ends. If you use a full-depth spar, like in the Conover structure mentioned earlier, then a spruce doubler of the type shown in **Fig. 3** is sensible (see previous page).

Overlapping the spars is another way of overcoming the structural discontinuity at the dihedral break, but don't forget to stagger the spar slots when cutting the ribs for the tip panels. Whatever else you do, remember to reinforce the spar to rib junctions with gussets, keeping the grain parallel to the gusset's long side.

One of the decisions to make when planning a wing structure is whether to build in a deliberately weak link, so the tip breaks off cleanly and at an easily repairable place if the aircraft is blown over after landing or suffers a sudden shock load on the wing. Several of the top A/2 flyers in the USSR favour this approach, but I suspect they may not often fly in the blustery conditions we have in Britain, or they would be sticking tips on again after every flight. The method consists of building centre panels and tips as separate units and using a full-chord soft balsa rib about 10mm thick to join them. On impact the balsa rib splits and leaves a large glueing area to cement together again; I have even seen some West German gliders on which the panels are covered and doped separately and flat, before the soft rib is added. This doubtless helps to keep each panel intact. On Krejcirik's Vega the bays adjacent to the dihedral joint are fully sheeted, just to reduce the chances of a breakage taking place inboard or outboard of the joint itself.

tion the turbulence as it blew up onto the Wolds would have made the Odiham curl-over seem like a picnic. About the only terrain problem, apart from the one downwind farmer who somehow got missed in the pre-event round of visits by hard-working Mike Coomes, was the rather distinctive-smelling pig slurry that had been sprayed over some of the launch area at the start of flying.

For most of the rounds, lift was not hard to pick with a circle tow glider and several models were lost out of sight upwards on D/T in strong thermals; however, of the three with seven maxes after the first flyable day at Sculthorpe — Maurice Gilmore of Grantham and the Richmond pair of Mike Fantham and Pete Williams — only Williams survived to make the team. Fantham, in fourth place and only two seconds short of filling the third spot on the team, had an inexplicable hook unlatch right at the start of his tow on the final, fourteenth round; this prevented him from circling, and meant he was forced to tow upwind as well as being unable to check the strength of any thermal he located. His resulting 2:19 cost him a team place.

Tony Cordes of Whitefield and Biggles' Andy Crisp, both now in their second World Champs glider team, picked up in the final three rounds as the wind increased and the lift became less marked. Tony last flew for Britain at Wiener Neustadt in 1973 and has had a number of high placings since then in British contests. Andy who flew his APS Flashback design is, like Fantham, one of our fittest glider flyers. He used an offset towhook, rather than a variant of the Russian type, and employs an Israeli-type very large diameter wire 'cottage loaf' towing to give the necessary recoil to release the model when the line is twanged. Andy was in our 1977 team at Roskilde, Peter Williams, our top placer, has flown World Champs in Wakefield, but his glider places till now have been in our European Championships team. He is a civil engineer by profession and uses Chobham Common near his Surrey home, for trimming and practice flying.

My remarks in a recent Free Flight Scene concerning team selection produced comments from competitors both for and against the timetable separating the glider flying day from the Wakefield and F1C one. In my innocence I had assumed that competitors would attend the complete trials, rather than only the day they were themselves flying on; the fact that some did not made time-keeping a problem for some flyers. Perhaps the answer is to have the time of the first round of each day announced well in advance, but to decide the class on the day; I still think that the former system of 'laminated rounds,' i.e. F1A, F1B, F1C, F1A etc., throughout the day is not the best way, because people can be delayed downwind with recovery problems instead of being at the launch line timing their colleagues in the rounds immediately following their own. With this year's system a flyer is responsible only to himself when deciding whether to stay and look for a lost model, or to use another one for the following round. The alternating round system means instead that there is always the timekeeper upwind to consider, who is probably himself waiting to fly and relying on a flyer in the previous round to time him. The really fortunate few are those with their own 'private' helpers, of course.

A couple of weekends later the winds returned to coincide with the final date available to pick the Wakefield and F1C teams on the May Day Holiday Monday at Barkston Heath. The wind speed was just under the 18mph set as the upper limit and soon the top places started to shuffle in both classes. After 12 rounds the Wakefield leaders were the three Croydon flyers, Roy Miller, Bryan Spooner and Dave Hipperson, with Ron Pollard from Tynemouth lying fourth, while in F1C Anglia's Roy Collins led from the two Birmingham flyers Stafford Screen and Ray Monks, with Freebird Ken Faux trailing them after an early D/T which he was to repeat during the final day's flying.

Both Miller and Spooner had a couple of sub two minute flights in the cold wind, while Pollard put in three good maxes to move up and break the Croydon dominance. However, on his fourth flight while climbing well above four other models in good lift, the pylon motor-tube joint failed under the shock of the Montreal prop stop dropping in, and the wing separated from the model to count as a non-scoring attempt and make Ron do it all again. In the light of the weather conditions a number of flyers decided to give up and keep their aircraft safely in their boxes, but Joe Barnes, flying a twin-finned Wake finished the course and gave the final team placers some worries. Veteran British team member Ron Pollard finally came out on top and made it one of our strongest F1B teams for years, although at the time of writing it is not certain whether Dave Hipperson will be able to take up his team place, in which case clubmate Bryan Spooner will move up and go to Burgos.

F1C leader Roy Collins seemed rather off form and didn't manage to max for several rounds, but Ken Faux's cowled model seemed to be on rails and, in spite of his second early D/T of the trials, he went into top place to make our power team also a very strong one, with Roy slipping into fourth place as reserve while the two Birmingham flyers stayed in second and third places.

The F/F technical committee chairman had an unenviable task which he handled very well, only stopping flying when absolutely necessary, and ignoring some of the more hysterical estimates of windspeed in favour of the figures shown by a pole mounted wind-meter. I certainly cannot recall worse conditions for team selection trials in the 30 years that I have taken part, and one can only hope that 1981 will act as some kind of immunisation against anything as bad for a long time. Our team now has three months to prepare to take on the world's best, and the best wishes of all model flyers go with them to Burgos.

1981 F/F TEAM TRIALS

F1A

1.	P. Williams, *Richmond*	62 05
2.	A. Cordes, *Whitefield*	61 24
3.	A. Crisp, *Biggles*	61 20
4.	M. Fantham (Res.), *Richmond*	61 19

F1B

1.	R. Pollard, *Tynemouth*	56 29
2.	D. Hipperson, *Croydon*	55 50
3.	R. Miller, *Croydon*	54 31
4.	B. Spooner (Res.), *Croydon*	53 47

F1C

1.	K. Faux, *Freebirds*	58 59
2.	S. Screen, *Birmingham*	58 37
3.	R. Monks, *Birmingham*	57 57
4.	R. Collins (Res.), *Anglia*	57 07

Bob Bailey reports....

Rumanian F1D International Slanic, Prehova, March 25-29, 1981

Last year at the one and only competition to be held in No. 1 Shed at Cardington, a team of three

Bruce Rowe of St. Albans launches parasol-winged Wakefield at F/F Trials at Hemswell.

Rumanians came over; we looked after them and paid all their expenses. They offered us reciprocal hospitality on a return trip to Romania; first refusal went to those of us who helped look after them on their visit here. Thus Reg Parham, Bernard Aslett and I set off on the long train trip from Victoria (having missed by one day the chance of booking air travel for much less than the standard scheduled fare of — guess — £400!).

First problem was the boat across the Channel — two hours late in arriving meant that we missed our scheduled trains and had to play it by ear from then on! Bernard Aslett who had master-minded all the travel arrangements had to phone Andreas Ree in Budapest who was going to help us change stations and also to try to let the Romanians know by telephone when our revised arrival time would be.

The main problem en route was my model box which was too wide to go along the train corridor and meant some frantic dashing along the platform with the box when we had to change carriages! The box had to be left unattended for long periods of time with disastrous consequences because when we arrived in Slanic after two and a half days' travelling (day and night), I found that all three wings were badly damaged due I believe to someone giving the box a mighty kick!

At supper we discovered that our Rumanian friends had waited for more than five hours in Bucharest for us (where Bernard's telegram which cost us £4.50 went we never found out!).

Next day Bernard and Reg very generously sacrificed some valuable practice time in the salt mine to help me mend one wing so that I could at least do some flying. Eventually the time came to see this unique flying site so on with plenty of warm clothes and round to the pithead. The route down is via one of two standard miners' cages suspended by a single cable (not recommended for claustrophobia sufferers) in which the darkness is absolute. The cage bumps from side to side of the shaft which is cut from solid rock salt. I was a little apprehensive but there was no need to worry: the operators have it all sussed out!

In the mine the lighting is dim with a row of bulbs along one wall and five lights in the roof. A seven second exposure time on F-8 on ASA64 film is required. The roof, walls and floor of this enormous cavern are dark grey rock salt; this means that it is incredibly difficult to see the

models when high up from directly below. Occasionally there is a regular flash of light as reflections come off a propeller; this is often the only part of the model that can be seen!

The reason for the dim lighting is that the light bulbs heat the air and cause drift which is usually of very low magnitude. No steering is required; I think this is a big advantage of the site, and means that one can sort out rubber sizes etc much more quickly than at Cardington which by comparison is usually very treacherous in terms of safety.

We soon found out that because it is relatively cold (11°C) in the mine that it is difficult to make the models climb (7-8 mins maximum compared with 12-14 min at Cardington), this means that small propellers (18-19in dia.), long and heavy motors (1.5g or more) and lots of turns are needed to get good flight times. Many people asked what our prop diameters and pitch were. When told, the usual comment was "English propellers — too big!"

After too short a practice session, the first job was to cut down the optimistic 20in diameter props to 19ins, and reduce the pitch to about 28ins;the reason being that the models need much more power at Slanic to maintain level flight than at Cardington or Wiesbaden.

The opening ceremony took place that afternoon on the square outside the pithead with all the teams (seven in total) lined up for the speeches, national anthem and hoisting the Rumanian flag. On permanent display is a metal replica of a microfilm model, which illustrates the importance attached to model flying in Rumania. The cavern used for the contest is reserved exclusively for indoor flying but cannot be used very often because of the difficulty of organising the skilled personnel required to operate the cage.

Next day saw the final practice session (until 1pm) with Bernard working on one third size motors and I on half size. Reg was flying quite satisfactorily on full size motors (no steering problems except one flight which shot down the hall at an alarming rate). I reduced the pitch on one propeller a little to get more climb — a very stiff fuselage and braced tail helped the climb a great deal but braced tails are not necessary — nobody else used one. Bernard had continuous problems with weak tailplanes; these dogged him throughout the contest and made it very difficult to get altitude.

All too soon came the first of two rounds that day; everyone put their flight cards in the pile and waited for their turn to come. Three hours were allotted to each round; it was originally to be two hours which as events showed, would not have been enough. Jiri Kalina who has flown at Slanic on 14 previous occasions used a six year old model and immediately started off with the highest flight time of the contest — 36.47. Edward Ciapela was undeterred — he put in a 34.16 for starters with the same design of model he flew very well at Wiesbaden! There's flexibility of flying ability for you! Both models went very high, within 15 feet of the ceiling which is 226 feet (69m) above the ground and that's a long way up (nearly 50 per cent more than Cardington!).

I had a good start with 28.37 which got high but ran out of turns at a considerable height, flying on Ian Dowsett Pirelli. It made me realise that to get 30 minutes was somewhat more difficult than I thought! Reg had a reasonable flight with 26.18 but Bernard's model never got away due to massive stalls to record 13.58.

In the second round Edward Ciapala produced his best flight — 35.11 — to put him in the lead, several others also comfortably cleared 32 mins. to show that to get anywhere meant that really good flying was going to be essential. I drastically over corrected with a ten per cent thinner motor for 24.00 and Reg improved with 28.45. Bernard's flew straight with stalls into the wall for 1.56; the model was uncontrollable.

So back up to the surface after 12 hours for some dinner, the odd drink, sort out some motors and ready for the off tomorrow.

We were having trouble with winding up Dowsett Pirelli properly in the cold conditions; when the rubber is overstretched to start with, it bunches badly and this will ruin the flight.

Last day, four flights to go, three hour rounds meant another long session. Georgi Chinghi put in his second best flight, a very nice 33.09 to boost Rumania II's chances, having to 33.10 the previous round. Jiri Kalina went back into the lead with 33.27.

I improved a little with 26.26 with still too thin a motor. Bernard had no luck at all with trim. The next round saw me plagued with a bunch — one minute the model was climbing like a rocket and three minutes later fell out of the sky! — 14.55. Nobody else improved significantly that round.

The main highlight of that round was the liberal helpings of Chinese and Rumanian brandy, washed down with a bottle of beer.

Fifth round and Reg lent me a loop of his rubber given to him by Manny Radoff; my Dowsett Pirelli was playing up a bit but by this time we had learnt that we must keep all the motors we might need for that flight nice and warm in a trouser pocket! This really helped to get a good wind with plenty of turns. I launched and the model kept going and going — within 20 feet of the top and deadsticked at a ridiculous height for my best of 31.00. That rubber is powerful! Bernard started to improve with a 23.20 but still couldn't get high enough. This round saw Jiri Kalina increase his lead with more consistent flying — 33.59 — whereas Edward Ciapala couldn't get going at all.

It is worth mentioning that most of the top fliers used orange Pirelli which refuted the commonly held opinion in GB that orange is no good in cold weather. The main secret seems to be to keep the motor nice and warm until use. Ten minutes left out and it is cold again with the attendant winding problems.

Last flight and I tried Reg's motor again with more turns than before and it never occurred to me to back off. Pity, because the model hit the roof after five minutes, crashed around for a while and eventually hung up on a balcony at the side just under the roof. A dubious honour, shared by Reg on his previous visit, and not on many others, to my knowledge! I would have gone up for the model but the miner in charge said no, it wasn't safe so he relaunched it. It nearly hung up again but eventually landed for what would have been 34.35 min again deadsticked and possibly sixth or seventh instead of fourteenth! Such is life. Reg just failed to push up his best time and Bernard again had climb difficulty.

The next morning saw the award ceremony, attended as had been the previous day, by the General in charge of all Rumanian sport, to whom we were presented while down the mine. The ceremony was followed by introduction of all foreign competitors to the Mayor of Slanic and a sightseeing tour in which our coach drove down into a working salt mine, this time of beautiful white rock salt. The entrance tunnel was so low that the roof rack of the coach got badly bent with alarming noises.

The winding up banquet started at 4pm, we finished eating at about 7pm and drinking in the small hours (with the Poles and Rumanians inevitably!).

I must express our heartfelt thanks to our Rumanian friends who did so much to make us more than welcome. Their hospitality was overwhelming, nothing was too much trouble. We were very well fed and watered and the accommodation was very comfortable. I certainly look forward to when the World Championships can take place at Slanic.

Results (21 flew)	Rounds						
	1st	2nd	3rd	4th	5th	6th	Total
1. Jirir Kalina, Czechoslovakia	**36:47**	31.48	33:27	32.47	**33:59**	33.58	70.46
2. Edward Ciapala, Poland 1	**34:16**	**35:11**	9:40	22:14	15.23	30.08	69.27
3. Stefan Botos, Rumania 2	**33:25**	32.37	28.56	26.43	32:32	**33:05**	66.30
4. Georgh Chinghi, Rumania 2	26:22	**33:10**	**33:09**	28.30	6.15	30:03	66.19
14. R. Bailey, St. Albans	**28:37**	24.00	26.26	14.55	**31:00**	6.57	59.37
16. R. Parham, C/M	26.18	**28:45**	**30:00**	9.06	16.00	28.20	58.45
21. B. Aslett, Swindon	13.58	1.56	14.39	0	**23:20**	**15:43**	39.03

Team results: 1. Poland 1 198.45; 2. Rumania 2 192.36; 3. Hungary 186.47.

Left: Stafford Screen returns from the chase with F1C Rossi model.

Right: Roy Miller fits his prop as Ian Dowsett holds.

FROM THE HANDLE

RACING
Jim Woodside

The 1980 World Championships

The Final of F2C

Those of you who read the *Aeromodeller* report on the 1980 World Championships, will know that the final of F2C led to protests being lodged by the USA, and the UK against the F2C Jury decision to declare the Danes the winners. As I was team manager on this occasion, I have refrained from making any comment until the publication of the minutes of the December 1980 CIAM meeting; these are now available. The least any competitor can expect at international level is, that the rules will be fairly and sensibly applied. However the jury for F2C has been protested or censured on three occasions in the last five major closed internationals. On this occasion the F2C jury deliberated for so long on what to do about reflying the final, (a plea supported by the FAI jury) that the organisers dismantled the F2C equipment! The crux of the jury's deliberation was that a final is a unique race, and cannot be reflown or restarted. Dutch Team Manager, Rob Olive, explained that the Bochum 1979 F2C final had been reflown — thus setting a precedent. The general view was that a final is only another race, and is subject to *all* the rules governing F2C heats and semis. In the end we left Poland doubting yet again the quality of the jury, and debating how they can be improved.

Some good has come of the situation, as the FAI have clarified the rules regarding finals, and taken some action on jury composition.

The protest lodged by the USA and UK to the FAI

1. We protest the decision of the F2C jury regarding the final result of this event. The jury decided that the Danish team had won the final, and that the USA and UK were not allowed to participate in a re-flight of the final after a collision, involving USA and UK models, in which the F2C Jury determined that *neither* team was at fault.

2. Under rule 4.3.8.a, "any team in *any* race that has been interrupted through obstruction or collision for which it is not responsible" — shall be granted an attempt.

3. Rule 4.3.8.c states "a team which has been granted an attempt is allowed to participate in another race".

4. There can be only *one* interpretation of the rules in 2 and 3 above in relation to 1 above.

5. The correct decision is to allow both the USA and UK teams to refly. These times, together with the time already recorded by the Danish team should be used to determine the final result. Should the Danish team elect to refly they should be allowed to do so.

Signed by Don Jehlik *and* Jim Woodside.

The FAI decision (my précis)

1. "The Sub-committee feels strongly that the F2C Jury composition is critical to proper conduct at team race competitions. In an effort to improve this aspect of the sport, the Committee will publish a list of recommended jury members, and monitor and report on jury performance and problems in the coming year" (1981).

2. "The Committee has no option in the light of the facts, but to censure the F2C Jury in the strongest terms for its indecision, since it is the responsibility of such juries to make prompt and effective decisions during the competition".

3. "At this time the most practical solution to the protest would appear to be as follows:

   a. the Danish team should retain the individual championship and awards.
   b. the UK and USA teams should be placed equal second and each awarded silver medals.
   c. although there is *no* suggestion that the Danish team was in any way at fault during the final race of the F2C event at the World Championships, it is felt that it would be the correct decision, in view of the fact that the remaining two teams were unable to satisfactorily finish the race, that the Danish team should be requested to relinquish its right as individuals under paragraph 2.3.5 of the Sporting Code" (This is the right of a World Champion to compete at the next Championship as defending champion).

Rule Changes effective January 1982 and Rule Clarifications effective immediately.

F2C Rules amendments

1. Change 4.3.2.a. Delete "the limits of which define the starting and refuelling points" and replace with "at each sector, a starting and refuelling area one meter in length, shall be marked on the outside of the flight circle, known as the pitting area". Also, change from "starting point" to pitting area in 4.3.6.d; 4.3.7.a; 4.3.7.1, and change 4.3.7.k to read "... he must go to the pitting area at (or immediately behind) the point at which ..." Also for 4.3.14.g, delete and replace with "if a mechanic services the model outside a designated pitting area".

2. 4.3.8.a. Revise to read "For any team any heat or semi-final that has been ..."

3. 4.3.8.d, add: "In a final race, when one team is granted an attempt because of interruption of the race through obstruction or collision, for which it was not responsible, before any team has completed 100 laps, the final race shall be stopped and reflown. Any team which has already been disqualified shall be excluded from the refly".

4. *Clarification.* 4.3.7.k. "The pitting area is occupied when a mechanic is standing at such a point, even if his team's model is still in the air".

5. 4.3.7.1. Change to "Should the model stop between the two pitting areas, the mechanic must go towards the NEAREST free pitting area" i.e. movement anti-clockwise as well as clockwise is now allowed.

6. *Clarification.* 4.3.13 and 4.3.14. All places where the term 'heat' appears should have that term replaced with 'race', so that the rules apply to finals and semi-finals, as well as to the preliminary races.

So closes a regrettable episode. The frustrating thing is that all the hard work put in by the finalists in 1980 came to an unsatisfactory conclusion, and nothing can change or compensate that. The lesson to be learnt is that the F2C Jury standard must be high. The rules can be clarified but it is the jury who are the final sensible arbitrators. Without competent juries, international standard teamrace decays into argument, dispute and ill-feeling.

Club Class Goodyear Racing Three Sisters C/L Site

Tom Miller, who with his pilot Rob Fitzsimmons, won the Goodyear League 1980, has founded the Northern Area Scale Racing Association.

N.A.S.R.A.

N.A.S.R.A. will run a series of five race sessions to be held during the early evenings rather than the traditional Sunday afternoon. In keeping with the transatlantic sounding acronym, the winner of the series will be awarded an American style trophy.

Dates: 22nd May, 19th June, 17th July, 14th August, 18th September.

Time: Practice ends 5.15 p.m. Racing begins 5.30 p.m. SHARP.

Entry Fee: 50p.

Rules:

(1) Engines are restricted to 2.5cc suction fed, any make, but subject to the 'Claim Rule'. Glow motors are permissible. Allen key comp screws and 7 strand engine retaining cables are not required.

(2) Tanks to be commercially available items of 30cc maximum capacity. Vent alterations are permissible, but filling must be by squeeze bottle. Pressure filling is not allowed. Fairings fore and aft of the tank are permitted, providing their combined length does not exceed the length of the tank being used.

(3) Pit stops are not compulsory.

(4) Shut-offs may *not* be used during races. However, their use is encouraged for speedy termination of heats, pre-race engine setting and saving engines from 'cooking-up'. Their use during a race, inadvertent or otherwise, will incur a 2-lap penalty each time the shut-off is operated.

(5) Both members of a team can enter a model. If both models qualify for a final or semi-final, the team must scratch one model or use a separate pilot/pitman, as the case may be, should they elect to fly both models.

(6) **Claim rule**
A finalist's engine can be 'claimed' and purchased by an entrant. The price will be £17.50 incl. VAT (subject to adjustment) paid to the Contest Director who will reimburse the finalist concerned. Cross claiming is not allowed.
Note:
Pre-acceptance of this Rule is a condition of entry.

(7) Propellers shall be wood or thermoplastic, and commercially available.

Rule No. 6 on engine claiming should produce some interesting situations! Free bullworkers are issued to all Contest Directors. Pre-Race Contact: Tom Millar — Bolton 56890.

Northern Area Winter Rally RAF Church Fenton, 25th January 1981.

The weather just before this meet was very mild and calm for January. This must have helped in attracting a good entry for this time of year. On the day a chilling wind blew but did not hinder the contest.

FAI Teamrace: 10 entries

The winter break has done little to slow performance as the results show. Langworth-Broadhead's heat time was established using a Nelson Mk100 in a flying wing. The model was not used again after the first round. The final was *very* close with Lanworth-Broadhead having marginally faster airspeed and Wilson-Gardiner the better pit-stops. It was pleasing to see Horton-Haworth really improving their heat time using their reed-valve Nelson AAC.

	Fastest heat	Final
Lanworth Broadhead	3:35*	7.45.5
Wilson Gardiner	3:46	7.46
Horton Haworth	3.52.5	8.47

* Un-official fastest heat.

Goodyear Teamrace: 13 entries

Goodyear was run by John Ulrick of the Wakefield Club and I thank him for his report precised below. Don Haworth's splendid Wild Turkey powered by a much reworked STX15

produced the best heat and semi and eventually the final. Only goes to show that style and performance can be combined — but how do you catch that wing!

	Heat	Semi	Final
Horton Haworth	4:26	4:22	9:03
Broadhead Langworth	4:47	4:48	9:58
Fitzgerald Williamson	4:49	4:41	10:45

Best Novices on this day were:

Etherington Smith	5:32
McPeake Jenkins	5:48
Gibbons Chambers	6:19

The 1981 European Championship Selection Trials

The F2C trials along with all the others fell victim to the freak April weather on Sunday 26th. Discussion in the club hut at the 3 Sisters site amongst the eligible flyers and organisers finally led to a vote being taken as to who should compose the team. While we would agree that race performance is the most easily accepted guide to selecting a team, it was heartening to have a vote that chose a team as strong as would have been found by any other method.

Team Best Heat in 1981:

1.	Smith/Brown Best Heat	3:33
2.	Langworth/Broadhead	3:35
3.	Wilson/Gardiner	3:33
4.	Reserve: Gray/Haycock	3:38

Northern Area Spring Rally Church Fenton, 29th March

Goodyear T.R. 10 entrants

Thanks to John Ulrick for the report. There was some good racing especially in the semis. Novice team Hardwick/Leeman put in the third fastest semi but elected to fly in the novice final which they won.

	Heat	Semi	Final
Horton Haworth	4:31	4:23.8	8:52.6
Catlow Jephcott	4:30	4:32.5	9:53
Sykes Crabtree	?	4:41	10: 26.8

Novice Final

Hardwick Leeman	9:35.5
McPeake Jenkins	11.07.6
Henton Paxton	Rtd.

½A Teamrace

There was a small entry in this event, which was dominated by Horton Haworth's model powered by the Haworth Schnuerle Mkl with a 4:03 heat.

1.	Horton Haworth	Haworth Schneurle Mk I
2.	Heaton Woodside	Oliver Schneurle Cub
3.	Sladdin Archer	Oliver Mk II Cub

Stockport Mini Goodyear T.R. Event

Andy Snowdon sent me the following results of the contest, which was run to SMAE rules except that the age restriction was waived. There seems to be some enthusiasm at club level for these fly for fun events.

1.	Meager	Meager PAW Competition	Deerfly
2.	Millar	Millar MVVS 1.5	Scoville Stardust
3.	Morrel	Etherington PAW Competition	Deerfly

The winners were awarded with a trophy each with 2nd and 3rd teams receiving medals. 18 teams entered and after all expenses were paid a profit of £1.50 was left.

Detergent for racing fuels

Not the bubbly variety used to sparkle your crockery and whiten your whites but the additives used in lubrication oils and fuels to absorb carbon as it forms during combustion. Emulsified carbon is thus blown out of the engine along with the exhaust gases.

The slow build up of carbon does cause a gradual deterioration in engine performance. During the days when the Bugl was 'the' engine, a fairly common practice was a decarbonisation of the piston and cylinder head before a final, in order to regain a little extra edge. The Nelson seems to be far more tolerant of carbonisation but still needs the occasional cleaning.

The first mention I remember of detergents was in an *Aeromodeller* article of *circa* 1966 by Don Jehlik and Herb Stockton on the subject of E.T.A. modifications and fuels used in their World Champs winning Jefe II. Attempts to locate a source of the detergents mentioned, come to nought and for me, the subject lapsed until the 1977 European Champs. A small sample of carbon dispersant used by Boris Krasnorutski the F2C winner, was taken back to Holland for analysis. I might add here that the Russian teams were using fuels which contained nitro benzene, an additive which can improve range but which in itself produces a lot of carbon during combustion. After analysis the Lubrizol Corporation, who manufacture oil additives for use in industrial and commercial applications, were able to supply a sample of an equivalent product. Extensive testing in the last two years has shown that the additive does reduce carbon and that which does deposit in the engine is softer i.e. more easily removed than carbon from non-detergent fuels.

Problem.

How to obtain detergent. The companies who manufacture these specialist products do not deal with the general public. The samples we used were given out of interest and kindness. Some weeks ago I spoke with Lubrizol (U.K.) and explained the problem of availability. They generously offered to supply me with a few litres of detergent on the following conditions.

1. that NO direct approaches are made to the company asking for 'samples' (this is why I have not disclosed the specific code number);

2. that the detergent be diluted 1:1 with Kerosene before distribution;

3. that no guarantee is given or implied.

Distribution: this will be for the *U.K. only*. I cannot undertake to post any abroad. Contact me at home or at contests. Bona-fide users only please. Note: Shadow Racing in the USA can supply a similar product and this can be posted anywhere in the world. (They can also supply Diesel Ignition Improver).

Application

Only a very small percentage is needed in the fuel — ⅛% is adequate of undiluted additive (¼% of 1:1 mix). At the moment my own fuel brews are:

	Nelson	Oliver Cub
Castor oil	7	15
Ether	40	35
Kerosene	53	50
I.P.N.	1.8	2
Detergent	0.125*	0.125*

* 0.250 for 1:1 detergent: kerosene mix.

Decarbonising: we might as well deal with the processes of decarbonising and cleaning an engine. We must make a distinction between engines of **1.** ABC and AAC liner-piston set. **2.** steel/iron liner-piston sets.

Steel/iron liner: these are easiest. Normally, clean the liner and piston in hot soapy water using a worn scotchbrite pad. Clean out any 'bits' under running water and dry thoroughly using kitchen towel. Oil and re-assemble.

ABC/AAC liner: the chrome plated liners can be cleaned with worn scotchbrite but the pistons need especially gentle treatment. Alloy pistons form a 'hard skin' during running in and this must not be removed unless you want a quickly clapped engine. Hard carbon on the piston crown can be removed with a blunt blade but avoid the piston's edge. Clean the piston wall with a solvent such as cellulose thinners soaked into a clean cloth. Clean components in thinners, oil and re-assemble. Alloy cylinder heads, like the Nelson, should be cleaned with thinners and cloth.

How often you carry out decarbonising is a matter of experience. Usually the engine seems stuffy or more temperamental. Try to note any measureable improvements and build up a pattern to guide you.

Rossi 15 Mk III

Ewen B. Jones has told me that he has a batch of the long awaited Rossi 15 Mk III arriving in the near future (have I heard that somewhere before?). This is for sure. The engine features a beefier crankcase, a 12mm crankshaft but not the rumoured 5 transfer ports. Liner option in steel and ABC will be on offer. Ewen also has some diesel heads and so should be able to make up some conversions, which should be of cheer to Goodyear enthusiasts. The only rub is . . . a much higher price that the last advertised retail. Interested parties should ring Ewen on 0632-466549 (Washington, Co. Durham). Nelson 15G.

Not a printing error — Henry is producing a 2.5cc glow engine aimed at the FF, Speed, U.S. Goodyear and Combat markets. The engine will be front intake, with a 12mm shaft, ABC liner and rear exhaust. The first engines are scheduled to appear in June of 1981 and will be priced at US$160 or US$170 with an R.C. carb.

I understand that there is some co-operation over the engine with Joe Klause, who makes those excellent needle valves and other parts for tuning Cox T.D. engines. Modellers living in the North American continent should contact Kustom Kraftsmanship, P.O. Box 2699, Laguna Hills, CA 92653, U.S.A. Overseas customers should contact: Nelson Competition Engines, 729 Valemont Drive, Verona, PA 15147, U.S.A.

Nelson 15D

A new option available for this year will be a titanium shaft fitted to the aluminium case team race engine, which will offer some weight reduction. Prices for 1981 are: 15D ABC US$140, 15D AAC US$150. Magnesium backplate ADD US$10. Lightened steel shaft ADD US$10. Titanium shaft ADD US$61. 15D Mk 100 Lightweight US$260.

SPEED

Jo Halman

1st Control Line centralised meeting

This first meeting was held at RAF Cosford on 12th April. The morning weather was sunny with a cold blustery wind and the afternoon weather was overcast with the wind dying down and a light rain falling by mid-afternoon. By late afternoon this light rain developed into a full scale downpour — but there is nothing unusual in that!

There were eleven entries and all had attempts but only seven returned twelve official flights. Five people flew in the .40 class but there was no-one flying in the .40(N) (newcomers) class. Three people flew in the .29 class, two in FAI and only one in the .60 and .049 classes.

Taylor/Jones flying an OPS.40 put in two flights of 144.33mph — consistent but too slow. Dick Roberts, one of the few left handed fliers, had built a left handed model i.e. with the asymmetric wing on the opposite to usual side of the model to facilitate whipping the engine up to speed. Unfortunately he had a run in on take off ruining his lines. As he did not have a spare set he had to retire. Pete Grange, flying his usual Irvine .40 could not get the engine on pipe in the first round and hit the ground in the second round. Dick Miles could not get his engine, a K&B .40 to go either and returned a slow speed of 129.30mph. John Alcock, too, suffered slow speeds with his ST .40.

In the .29 class Ian Skinner managed to produce 159.79mph with his STX.29 but with

82% of the record was only placed 4th overall. Pat Rose had no luck at all with his OPS.29 and did not return a flight.

Of the two fliers in the FAI class — Peter Halman was running the event and did not fly — newcomer Les Farrar, an ex-teamrace man, set off for his first attempt at flying a speed model. The weather by this time was appalling, very hard rain, but he made three creditable attempts to get the model out of the dolly. However, the urge just was not there and each time the model did get out of the dolly it fell out of the sky for lack of power. We hope to see Les at the rest of the meetings and are sure he's going to make it. Paul Eisner, the other FAI flier, didn't really get going and his best speed was 135.57mph but it was enough to give him third place in handicap speed.

Second place went to Martin Radcliffe with his OPS.60. Martin put in two flights the fastest of which was 178.96mph. In the opinion of many speed fliers Martin is the best monoline flier in the country and really is a joy to watch. His control right from the start is perfection personified: the model comes out of the dolly, reaches flying height, levels off and stays there until the flight is over. His body is under control all the time, no jerking, no fussing, no panic — all is calm, controlled power. If you have not seen Martin fly you have not seen a master speed flyer at work.

The Lee/Morrissey team took first place with 96% of the .049 record with a speed of 96.42mph. Although Alan and Ken fly both the .29 and .60 classes they only entered the .049 class with a Cox.49. And none of this hand launched stuff for this experienced pair: the dainty little model — only 5¼ ounces in weight — sits in its custom built dolly and takes off like a bird.

This first meeting of '81 was in no way a fast meeting, but it very rarely is. It is more in the way of getting both engines and fliers back into the competitive mould and sorting out any problems that may be left over from the last season or, indeed, that have appeared during the winter months. Although the weather deteriorated the meeting was most enjoyable and we are all looking forward to the next one.

STUNT
Glen Alison

Stunt News

The first stunt competition of the season was held on April 5th at Braintree, Essex by the Witham Club. Under Contest Director, Peter Burgess the event attracted fifteen entries and the weather was reasonably kind with light variable wind under dull skies, although very cold. Several fliers showed signs of ill-preparation after the winter lay-off with erratic engine runs and high flying, not yet having got their 'eye in'.

The first round was led by John Lynch, of the Bretons Club flying his ST46 powered 'Eagle' with 1119 points, but this was short lived as the boys from 'up north' took over. Barry Robinson and Neville Dickenson from County Durham both made big increases in their scores for the second round to take 1st and 2nd spots. Barry flew his 'North Wind' design now fitted with an Irvine 40, a new motor on the stunt scene, not without a few problems however as they are a bit 'wild' as supplied and need some modification to tame them for stunt use. Neville had an 'O.S. 40 FSR Stunt' in his Genesis. You may remember that Bob Hunt the 1978 World Champion used one converted from the R.C. version but now it can be obtained in Stunt form and very well it performed too.

Bad luck story of the day must surely go to Pete Tindal, whose Merco 61 powered C.A.P.20 ran out of fuel coming out of the cloverleaf on the vertical climb and it just piled into the ground. In the second round he flew one of his trusty Chipmunks but the engine was set too lean and it died in the vertical eights. Pete was forced to land inverted and that was that. But with two incomplete flights he did very well coming sixth in the final placings.

A good competition to start the ball rolling this season, judged by Allan Church.

Pete Illiffe's 'Genesis' ST.46 powered design by 1978 World Champion Bob Hunt.

Terry Taylor's Sig 'Chipmunk' Fox 35.

Results: Open Stunt F2B (23 entries) April 12th, Cosford

1.	Pete Tindal	"CAP 20"	Merco 61	1027
2.	Bill Draper	"Super Hawk"	Enya 40	1013
3.	Neville Dickinson	"Genesis"	OS40 FSR	1010
4.	John Newnham	"Nobler"	Merco 35	997
5.	Barry Robinson	"North Wind"	Irvine 40	997
6.	Peter Illiffe	"Genesis"	ST 46	978
7.	Glen Alison	"Cavalier 3"	Irvine 40	971
8.	Arthur Tipper	"Olympus"	St 46	958
9.	Bob Wallace	"Olympus"	Fox 59?	954
10.	Keith King	"Cherokee"	ST 46	949

Nationals — Stunt

Good news this year is that as well as Open F2B and Novice events, there will be the welcome return of Junior Stunt. Flown over grass to the SMAE Novice Schedule, it is for fliers up to 17 years old, with a 10% points bonus for those under 14 years old.

Continental News

Interesting model from Swiss champion Toni Salathe has a two piece wing to aid transport. Each half is bolted to a strong beech stub spar protruding from the fuselage sides which plugs into a balsa box or socket in each wing. The long bolt which holds it all together is inserted in through the outboard wing tip and also doubles as wing tip weight! The flap horn is permanently mounted inside the fuselage but the tails stick out and engage in slots in the end of each flap. There are location pins which aid wing alignment and the wing roots are covered with foam tape to prevent the ingress of oil. The tail plan/elevator assembly is also detachable and slides in a slot from the rear of the fuselage. An interesting design which should pack into a suitcase to eliminate all transport worries.

'Polygon' was made by German Herbert Baumgartner to a Claus Maikis design of 20 years ago, however, it still looks fresh and up to date now.

Left: Toni Salattie's model which has detachable wings and tailplane powered by an ST46.

Right: 'Polygon' made by German modeller Herbert Baumgartner from a Claus Maikis design of 20 years ago.

SMAE 1st Centralised Contest April 12th, RAF Cosford.

Held on a rather rough football pitch in the lee of trees and hangars where the only patch of short grass obliged fliers to take off downwind, it proved to be a disappointing site for an 'official' SMAE contest. However, it attracted an excellent entry of 23 in Open F2B and 11 in Novice which bodes well for the forthcoming season. The weather was cold and blustery to begin with but improved throughout the day until the rain came in late afternoon. Because of the large entry and a late start, the second round did not finish until 7 pm! which was not popular with those having a long journey home.

Peter Tindal did very well to win after having just spent a week repairing his model from a very bad crash the previous contest at Witham. Bill Draper and Nevile Dickinson were very close behind; it is certainly going to make the Team Trials for the European Championships a wide open event with no 'automatic' selection. It will be more closely fought than for many a year.

Carrier Event

Possibly because this is the first Carrier event of the year and the venue is on the West side of the country, there were only 7 entries in Open Carrier and 1 in 40 Profile.

Of the competitors in the open event, 6 were from the Bilston Club and a sole representative from Feltham Club, V. Millar, who although using a Profile model, elected to fly in the open class.

The '40 Profile' class was not run due to lack of interest.

The first round was flown to the order of a draw, a system which helps in the smooth running of the event. The first few flights did not provide much interest until P. Baldwin did a complete flight terminating in a 95 point landing, resulting in a 496.4 point flight. D. Holmes, next to fly, managed to 'get it together' and scored 496.5 points. V. Millar had a successful complete flight at the end of this round, but was handicapped by using a Profile model.

The second round was somewhat shorter, due to several competitors being unable to fly after first round accidents. R. Clews, flying after a two year lay off, had a motor flame out on the slow run, as in the first round, hence scored no flying points. P. Baldwin knowing that he had a target to beat managed to perform a better slow run, coupled with a 95 point landing resulted in a score of 504 points. D. Holmes flying next knew that an all out effort was required again and managed to better his first round flying score and coupled with a 100 point landing resulted in a 508 point flight.

Other notable incidents included P. Owen's loop off the deck in the second round, and he got away with it, only to end the flight with a 'Kamikaze' attempt at the Carrier. K. Garbett's OS 40 VF Powered MO1 showed good potential, but fell apart. J. Gibbs ran out of airspace, clipped the prop' to around 2in diameter and continued flying for two more laps, to a round of applause from the resident full size glider pilots!

All of the competitors used Martin MO1's powered by OS 40 FSR, KB 40, HP 40 or HGK 40.

RESULTS

1. D. Holmes	Bilston	508 points
2. P. Baldwin	Bilston	504 points
3. V. Millar	Feltham	349 points

Dave Day

Film (RE) covering — conclusion

Recovering the now only slightly oily fuselage was quite straightforward. It is not easy to cut a curve in the film to suit the wing section as the wing itself gets in the way so the method I adopted is as follows:

The rudder was detached and covered in two pieces (one each side). A strip of film about ½in wide was ironed to the rear of the fin and fuselage, and the rudder re-hinged. Each side of the fin and rear fuselage was then covered with a piece of film, which extended to the centre lines of the top and bottom decking, back to the strip already in place at the rear, and forward along the sides as far as the windscreen frame. These pieces were cut roughly to shape beforehand and a cut was made to clear the tailplane, the edges being trimmed to suit in situ. On the bottom decking these pieces ended at the flap hinge line, and the next move was to cover from this point forward to the rear of the cowl with a section which was cut to suit the lower wing shape on each side. Finally, the top of the nose was covered with a piece which extended down to the cowl joint. This probably sounds very complicated, but what it amounts to is a fuselage covered with 4 pieces of film with all joints trailing and the tricky section on top of the wing was tackled in two sections. Before recovering the wing/fuselage, and tailplane/fuselage, joints were sealed with epoxy fillets. After covering, the inside of the cowl and forward fuselage were sealed by rubbing epoxy into the wood and over the edges of the film. Final weight of the model after all of the modifications described was 43 ozs — exactly the same as before. The modifications to the control system described previously have completely cured the problem of turning tighter on inside corners and I regard the whole exercise as being completely worthwhile.

European Championship Trials'

These were to have been held at the 3 Sisters Site on 26th April but as most of you are aware, much of the country was coated with 8-10in of snow and the radio was advising people not to travel. In fact 6 hardy individuals out of 10 invited managed to get there (though, their time of arrival is not recorded). Nonetheless, although conditions were flyable, contest director Arthur Eves decided to postpone the event (it had already been postponed from last year!) to the SMAE C/L centralised meeting at North Weald on May 10th. He also decreed that only those who *arrived* at 3 Sisters would be invited to the re-run.

Personally, I must say that having set out at 5.30 a.m. from Watford and arrived in the Birmingham area by 9 a.m., it seemed pointless to carry on when although the meeting *might* have been on I would have arrived too late to fly. It now seems a bitter blow to be told that I, along with 3 others, cannot be considered because the contest *could* have taken place but didn't. One more fall of snow and we may not need a trials.

Wolves Fly-in 3rd May

Last year, this meeting was spoilt by a dispute which resulted in the 2nd, 3rd and 4th placed competitors leaving before the contest ended. It is, therefore, pleasant to record that the only problem this year was the weather. The site is surrounded by trees and buildings, with the result that in a very high wind such as was present on the day, there was a great deal of turbulence close to the ground, although relatively calm, while higher up, gale force winds were blowing models all over the place!

One competitor who suffered badly in this respect was Pete Iliffe whose model was almost blown into the ground on the square eights and wisely decided to tour round from then on and keep the model in one piece. A few laps later the model was literally upended while in level flight and Pete only narrowly escaped disaster.

The conditions were very variable, however, and some competitors had relatively calm conditions, particularly towards the end of the second round.

John Newham, having elected not to fly in the first round when conditions were at their worst, found they were even more unattractive in the second round so didn't fly at all.

In case anyone is interested, I was using the film covered model which you have been reading about. Due to lack of testing (excuses!) I had an over-run in the second round having already lost the starting points. Mathematicians among you will deduce from this that it would have been a lower score than the first round anyway so for lack of testing substitute lack of practice!

Results

F2B	1st Round	2nd Round	Best Fligh
1. B. Draper	1951	1999	1999
2. A. Tipper	1918	1989	1989
3. N. Dickinson	1908	1987	1987
4. T. Taylor	1892	1933	1933
5. R. Quilter	1805	1923	1923
6. D. Day	1916	1834	1916
7. Mr. Wallace	1791	1877	1877
8. G. Sibley	1873	1858	1873
9. B. Robinson	1873	1840	1873
10. Mr. Shelley	1525	1846	1846

Last month's mystery photo was taken at the 1957 US Nats. Models visible include Don Still's 'Stuka Stunt' (top left) Roland McDonald's 'Strathmore' (top right) and a pair of 'Noblers' by George Aldridge.

Engine Test Review

by Peter Chinn

WEBRA RECORD R/C

Country of Origin: West Germany
Type: Compression-ignition, shaft rotary-valve, with plain, unbushed main bearing.
Bore: 12.0mm (0.4724in)
Stroke: 13.0mm (0.5118in)
Swept Volume: 1.470cc (0.0897cu.in)
Weight: 94 grammes (3.3oz) less silencer 111 grammes (3.9oz) with silencer.

This engine was the subject of the Engine Test report in the final issue of **Model Aircraft** magazine before that publication was incorporated into AERO MODELLER in January 1966. The Webra company (then known as **Fein und Modell Technik)** had begun model engine manufacture in 1950 with a 2.5cc diesel, later known as the 'Winner', and had followed this in 1952 with their first 1.5cc diesel, later called the 'Record'.

The Record was originally a radial mount engine with over-square cylinder dimensions of 13 × 11.5mm (1.526cc) and had a substantially better than average performance. It progressed through minor modifications before being succeeded by the entirely redesigned under-square Record in the early nineteen-sixties. This model later became available in an 'R/C' version with simple barrel throttle; the model that is the subject of this report.

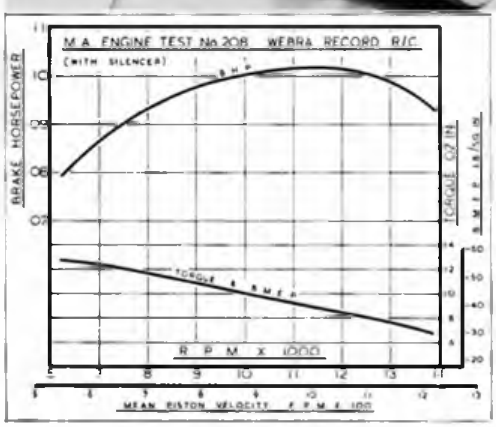
Of recent years, of course, the Webra company has become better known as the manufacturer of large glowplug engines for radio-control models and, for the present at least, no more diesels are being made. However, substantial stocks of the Record are still held in the U.K. by Ripmax, hence the reason for including the engine in this review series.

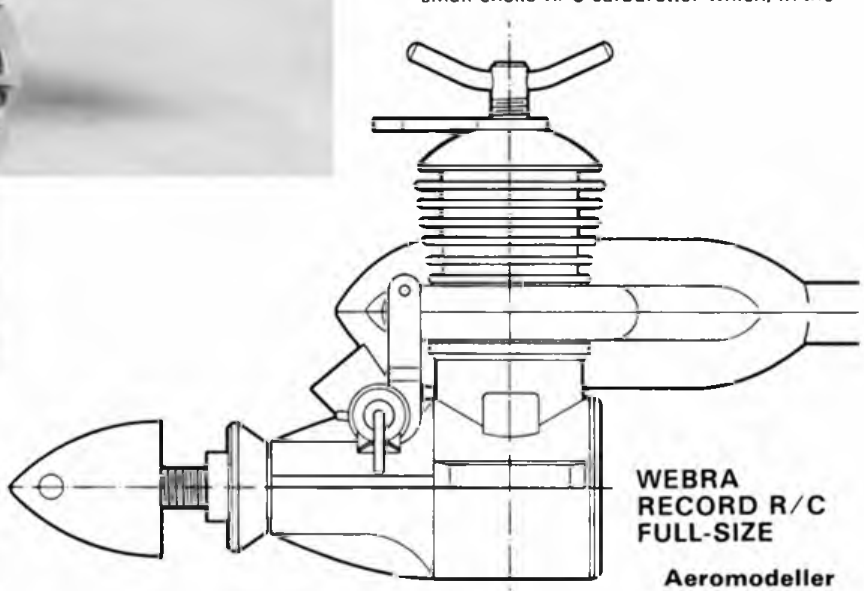
Structurally, the Record follows an orthodox pattern. The crankcase is an aluminium pressure casting with integral (unbushed) front bearing and detachable screw-in backplate. The cylinder screws into the crankcase and the cylinder fins, in the form of a turned alloy jacket and head, screw over the upper part of the cylinder. The latter has three radial exhaust ports and six internal flute type transfer ports. The crankshaft has an 8mm journal, a plain, non-counterbalanced web with 4mm crankpin and a 5mm propshaft stud. The lapped cast-iron piston has a conical crown and a pressed-in gudgeon-pin couples it to a dural conrod.

The air intake is an integral part of the main casting and incorporates a transverse boss which, on the R/C version, is bored out to take a 7mm o.d. throttle barrel. This has 3.8mm choke that is considerably restricted by the 2.4mm spraybar, giving an effective choke area of only 3 sq.mm.

The Webra silencer (catalogue No. 1100/R) for this engine consists of a collector ring completely surrounding the cylinder and leading straight into an expansion chamber that contains a vertical baffle having two small holes totalling about 12sq.mm. through which gas escapes to the 5mm dia. outlet. The complete unit is divided along its horizontal centre line and joined with two countersunk screws. To fit the silencer to the engine it is only necessary to unscrew the cylinder jacket, slip the silencer and two fibre gaskets over the cylinder and secure it in position with the screw-on jacket.

Tested at a time when strenuous efforts were being made to impress upon modellers the importance of using a silencer, the published report on the Record R/C showed only the results obtained with the silencer fitted. These, as will be seen from the performance curves, indicated a peak power output of 0.102 bhp at 11,500 rpm. Checks made at the time, however, revealed that the Record R/C engine's gross output (i.e. less silencer) under otherwise identical conditions, was approximately 0.120bhp. While these output figures are not as high as the performance of some other 1.5cc diesels, it must be remembered that they are achieved with a small choke R/C carburettor which, in the





WEBRA RECORD R/C FULL-SIZE

Aeromodeller

interests of good throttling and fuel draw for R/C work, restricts the engine's top end performance.

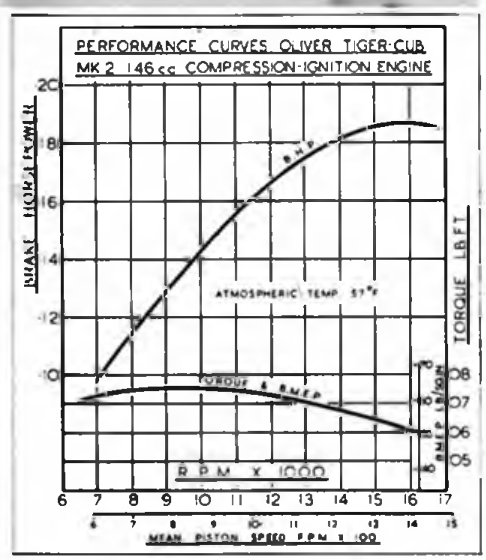
It will be noticed that torque at the lowest speeds tested was quite good and that, as a result, the power curve was unusually flat as it approached the peak, which means that the engine is not critical to prop size insofar as this affects utilisation of its full performance. A prop of around 8 × 4 is the size that one would normally employ with a small R/C model fitted with a 1.5 diesel and, in practice, this size suits the Record R/C very well. With the silencer fitted, between 10,000 and 10,500 rpm can be expected with a modern 8 × 4 prop, which will mean that the engine will be close to its peak output in the air. With a prop of this size (or slightly larger) and the silencer installed, the engine also throttles quite well. One does not expect a small diesel, with a relatively crude throttle, to 'idle' at much less than half speed, but we were able to get the Record R/C down to 3,800 rpm from 9,900 on an 8 × 4 beech prop.

General handling qualities were quite good. With the silencer added, the engine cannot be primed through the exhaust port, but intake priming proved to be quite satisfactory.

TIGER CUB MkII

Country of Origin: U.K.
Type: Compression-ignition, shaft rotary-valve with twin ball bearings.
Bore: 0.465in (11.81mm)
Stroke: 0.525in (13.33mm)
Swept Volume: 0.0892cu.in (1.461cc)
Weight: 116 grammes (4.1oz)

Unlike the majority of model i.c. motors manufactured today, Oliver engines are not mass-produced; they are not distributed through trade channels and they are seldom advertised. Oliver engines are, in effect, 'hand made' in small quantities and are sold direct by the manufacturer to the customer. These engines are relatively expensive: the Tiger-Cub Mk. 2 dealt with here costs £28, but continues to attract customers more than twenty years after it was first introduced.



The Tiger-Cub Mk. 2 is of typical Oliver design and quality construction. The crankcase is a gravity die casting in aluminium alloy, fully machined and with a shot-blasted external finish. The counter-balanced crankshaft is of EN.202 steel, hardened and ground, with a 3/8in (9.5mm) main journal, a 1/4in outer journal, 1/4in bore gas passage and a 13/64in dia. crankpin. It runs in one 3/8 × 7/8in and one 1/4 × 5/8in ball journal bearings. The cylinder is of EN.32 steel, located in the crankcase by a flange in which there are four radial exhaust ports with, below and between them, four upwardly angled elliptical transfer ports. The upper part of the cylinder is encased in a machined finned jacket and the complete assembly is tied to the crankcase with four long screws. The piston is of Meehanite with a conical crown and has a 5/32in dia. fully-floating gudgeon-pin coupling it to a conrod machined from RR.56 high duty alloy. The machined aluminium prop driver is mounted on the shaft with a split tapered collet and the brass needle-valve assembly is reversible for left or right handed operation.

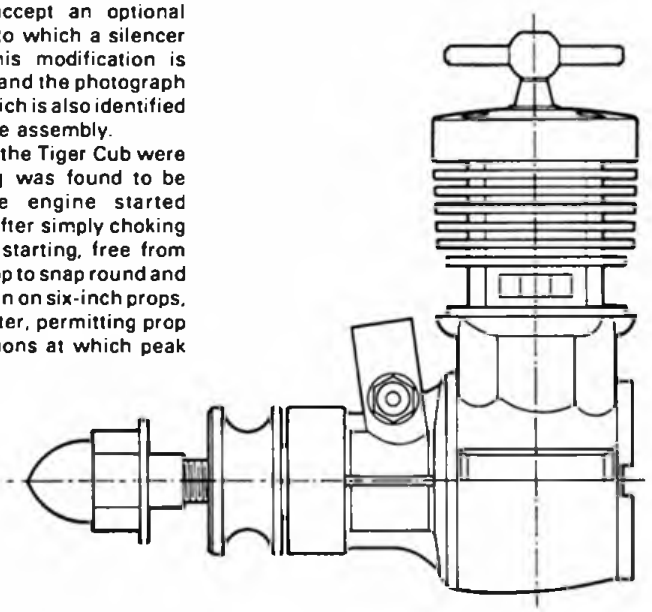
The test results quoted here are from a test on an early production Tiger Cub without a silencer. The Cub was later slightly modified to accept an optional exhaust collector ring to which a silencer could be attached. This modification is shown on the drawing and the photograph is of this later model which is also identified by a modified prop drive assembly.

Handling qualities of the Tiger Cub were excellent. Port priming was found to be unnecessary and the engine started promptly, hot or cold, after simply choking the intake. Easy hand starting, free from any tendency for the prop to snap round and 'bite', was obtained, even on six-inch props, although such a diameter, permitting prop revs above the revolutions at which peak power is developed, will not normally be used, of course.

No power loss on warming up was detected over the speed range tested, which extended from 6,500 to 17,000 rpm. As is usual with high speed diesels, fairly precise setting of the compression screw and needle-valve was required for speeds approaching the bhp peak, but both controls were positive in operation and held settings firmly.

The power output of the Cub is excellent (when tested, it was unquestionably the most powerful 1.5cc diesel at that time); torque reaching 14.4oz.in at between 9,000 and 10,000 rpm, while peak power was 0.186 bhp at just short of 16,000 rpm. The engine does not, however, have to be operated as fast as this to offer above average performance: as the performance curves show, 0.18 bhp was developed at 14,000 rpm and 0.16 bhp was still available at around 11,400 rpm. On the P.A.W. beech props used at the time of testing, a 7 × 4 was tuned at 14,500 rpm and an 8 × 4 at 12,300 rpm. The latter figure is about the same as one would expect on a Cox 8 × 4 prop. Other prop speeds obtained included 12,000 rpm on an 8 × 4 Keilkraft nylon and 10,200 rpm on a 9 × 4 Keilkraft nylon.

Information as to delivery dates, etc., for the Tiger Cub and other Oliver engines, may be obtained from the manufacturer: John Oliver (Engineering), 248 Ringwood Road, Ferndown, Dorset.



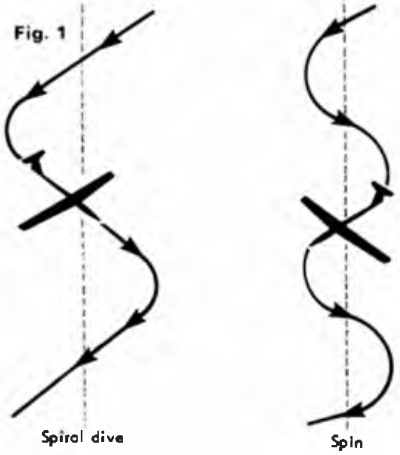
OLIVER TIGER CUB Mk.II. FULL-SIZE

FOLLOWING LAST MONTH'S article on aerobatics for the slope soaring enthusiast, I hope that you are now amazing your friends with loops, rolls, stall turns and bunts. I also trust that you have not tried to bore through the hillside with the nose of your model!

This month sees the completion of this section of the series, and remember that if at first you do not succeed, then try, try, try again. Aerobatics can only be perfected if you are prepared to spend some time in practice.

Our first manoeuvre is apparently quite straightforward, straight and level inverted flight. Build up a little excess speed in a shallow dive, then fly across the slope, and therefore cross wind. Initiate the manoeuvre with a 180° roll, then concentrate on maintaining a constant altitude without any undulation, finishing with a roll back to normal flight. Try and make the rolls as crisp and precise as possible with the intervening flight at a constant altitude and with no tendency to yaw during the final roll out when aileron response will probably be lessened because of lost speed. Once this has been mastered and you are as relaxed flying inverted as 'right way up', the next figure is an inverted circle. This may be carried out either crosswind or into wind. Once again a shallow dive followed by a roll to the inverted position. Let us presume a left hand circle, then since a degree of bank must be maintained for the full 360° with the inside wing lower, the shortest distance of roll will be to the right (think about it) as the model points downwind the turn must be tightened by increasing the bank slightly so that the additional downwind speed does not turn the figure into an oval. Exit at the same point as your entry, by taking the shortest roll back to level flight, in this case a left roll. For a right hand circuit the control moves will of course be reversed.

Fig. 1



One basic move we have not yet mentioned is the spin. This is a simple manoeuvre but one which is rarely completed properly, many so called spins being nothing other than a spiral dive. As can be seen from **Fig. 1,** the spin is when the model rotates about an imaginary vertical line which passes through it. If the rotation is around the aforesaid vertical line, then it should correctly be called a spiral dive. The main pre-requisite for this manoeuvre is plenty of height! Face the model into wind and gently ease in full up elevator. The model will then stall and probably drop one wing, immediately put in full rudder and ailerons the same way as the 'dropped' wing. Once the required number of spins are completed, neutralise all controls and after a slight delay, the model will recover. This delay varies from model to model and only practice will enable you to time recovery onto the initial heading. If the model is slow to recover, then a touch of opposite rudder should help. Having completed the spin, push the nose down slightly to build up speed again. For a model to spin well there must be plenty of rudder and elevator movement, perhaps rather more than is normally required. Do not fall into the trap of moving the C.G. to a more rearward position since although this will give nice flat spins, recovery can be non-existent in extreme cases! The next logical step is an inverted spin which is carried out in exactly the same way but to be true, entry and exit must both be inverted. The key to initiating good spins is to start from a completely stalled condition.

With the control movements set for spins, then flick rolls are that much easier to perform. In fact this type of roll is carried out by using the same control surface movements as for a spin but after building up a fair bit of excess speed in level flight. As with ordinary rolls, perform the manoeuvre cross wind. After an extended dive, to gain that excess speed, initiate the flick roll by a touch of elevator to raise the nose, then full right aileron and rudder and full up elevator. If the model barrel rolls, then the control surface movements are too small, especially rudder and elevator. To recover, release controls and as with the spin see how long the model takes to regain its composure. With practice and timing you should be able to start and finish in level flight. Inverted flick rolls, as the name implies, start and finish in the inverted position; this time however, a touch of down elevator is used to raise the nose followed by full right aileron, full left rudder and full down elevator. Note that for normal flick rolls, aileron and rudder are moved in the same direction whereas inverted flick rolls need aileron and rudder moved in opposite directions. For your first attempts do make sure that you have sufficient altitude. These manoeuvres can look very impressive but at the same time are a little disconcerting to the pilot.

Now let us look at some combination aerobatics, using a series of the basic manoeuvres already covered. First of all the cuban eight. This is shown in **Fig. 2** and consists of two loops connected by half rolls. Start with the shallow dive across wind and pull up into a loop. Just after the three quarter position, half roll and continue into the second loop, once again half roll at the three quarter position and continue to level out at the entry point. It is easier performed than explained provided that you have sufficient initial speed and do not pull in the first loop too tightly, thereby losing speed. Do not hold the loops too long before rolling or there is a danger of yawing too much and screwing out of the manoeuvre. Negative cuban eights are somewhat easier although take a good bit more courage first time. From level flight, bunt the model, then roll at the three quarter position followed by a further three quarter bunt, half roll and finish, turn **Fig. 2** upside down.

Our next combination is the vertical eight and this should be performed cross-wind to ensure that an even diameter is maintained through the move, but start well out from the slope so that downwind drift will

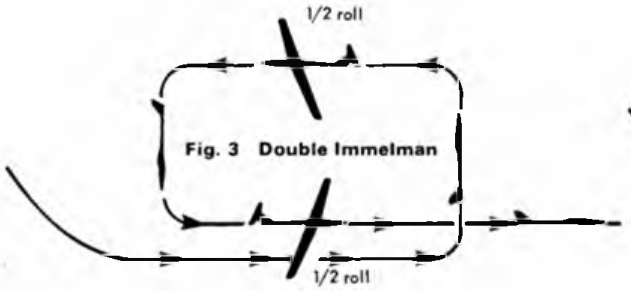


Fig. 3 Double Immelman

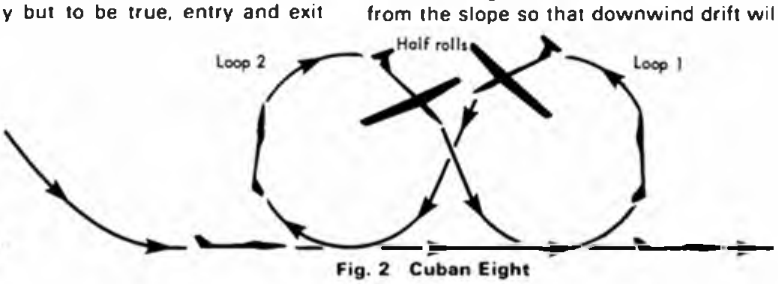


Fig. 2 Cuban Eight

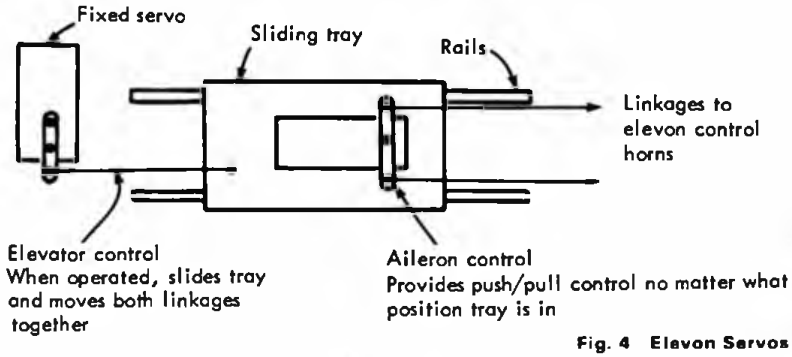


Fig. 4 Elevon Servos

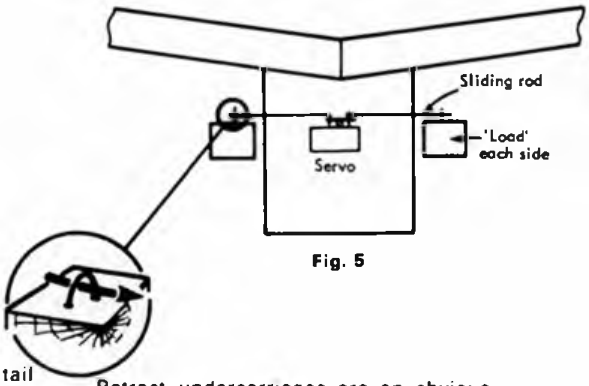


Fig. 5

not affect you too badly. Start with the usual gentle dive, then pull up into a loop. When you return to the entry point, push in down elevator and bunt round to the entry point. Practice until you can achieve equal sized loops and bunts with superimposed entry and exit points.

The double Immelman is an attractive figure and after the initial dive, a loop is pulled levelling out at the top before making a half roll to the upright position, then enter a bunt coming into level inverted flight at the bottom before half rolling to the upright again (**Fig. 3**).

Of course many combinations can be developed but I would finish off with a suggestion that you consider interspersing any of the previously mentioned manoeuvres with flick rolls, either positive or inverted. Remember that practice makes perfect and for your first attempts at glider aerobatics, make sure you have plenty of altitude for safe recoveries; it's cheaper than a new model.

Elevons and things

Certain wing and tail configurations demand the use of coupled servos so that one set of control surfaces can perform two functions. Elevons are a combination of elevator and ailerons used on some delta wing and flying wing models. The need is for the surfaces to move both jointly and independently so that elevator control moves both (of the split) surfaces whilst aileron control will only move one or perhaps both but in opposite directions. This is achieved by use of a 'mixer', either mechanical or electronic which these days can be via the transmitter. Since I understand little or nothing about the intricacies of electronic equipment, apart from the fact that when you switch on it should work, I will concentrate on the home built mechanical mixer. The simplest form is a fixed servo which moves a tray carrying the second servo which is then free to operate push rods in the normal way. **Fig. 4** explains how this works. The tray must be free to slide and should therefore be longer than it is wide and the rails must not bind on the tray runners. Piano wire can be used for the rails, with the outer sleeve of a control 'snake' as the runner bound and glued to the tray. There are some very good mechanical mixers on the market made from injection moulded nylon which do not take up so much room and operate very effectively.

This system can also be used for V tail gliders where it is necessary to mix the elevator and rudder functions.

Extra functions

If you have a spare channel and servo why not experiment with parachute or bomb dropping. Most high wing trainers have more than enough spare carrying capacity in terms of wing loading to cope with an additional eight or nine ounces of weight. Bombs can be made up from solid balsa or one inch plastic pipe, fitted with fins and a nose weight, and a simple release mechanism, as shown in **Fig. 5**. A loop is fitted to the 'load' and is engaged by a sliding wire which is actuated by the servo. Either a single load can be carried or one on each side of the fuselage released by full servo travel from one end to the other providing selective release. Parachutists can be made from toy dolls or 'Action Men'. When releasing a parachutist, do so well up wind or you may have some distance to travel to recover them from the dropping zone.

Glider towing and release is quite common these days but a large stable model is needed as the tug and an experienced glider pilot should be co-opted. Take offs must be made with care since the glider will become airborne before the tug and if not carefully controlled will tend to lift the tail of the tug leading to a nose over. Optimum two achorage points are shown in **Fig. 6**. The release mechanism is similar to that described above and is controlled by the glider pilot. Any turns must be made with a very wide radius and co-ordinated with the glider so that the 'tail does not wag the dog'.

Experimentation with flaps can be quite educational. They should be of about the same size as the ailerons but it is unwise to have more than 30° of movement unless you want them to act as air brakes. Linkages and hingeing are as per ailerons.

Retract undercarriages are an obvious extra and there are many variations on the market. If mechanical units are used then do ensure that they lock up and especially in the down position without stalling the servo. A stalled retract servo can very quickly drain a battery pack and if this also controls the other servos, then loss of control quickly leads to a 'polythene bag crash'. For this reason it is as well to use a separate battery for retract servos. The air or gas operated units do not suffer from this problem and have the added advantage that they only need a standard servo to operate them.

Keil Kraft SE5A

I had hoped to complete the report on building and finishing this model but attendance at a recent three week course followed soon after by a short holiday, has meant that there is still some work to do.

The aerofoil section chosen should therefore not incorporate any undercamber, before painting and detailing. I do not find handling heavyweight tissue as easy as nylon but have developed a technique which whilst not original, certainly makes the covering job much easier, for me at least. Preparation of the framework is conventional and having cut the piece, 1in. oversize all round, I put some water in the bottom of the bath and 'float' the tissue on this for about ten seconds. This ensures even wetting and takes out all the crease marks. The tissue is carefully lifted and held vertically to drain before being positioned on the framework. A final gentle tugging into shape disperses the odd wrinkle, then it is fixed with a 50:50 mixture of dope and thinners. Each panel is pinned to the building board, which is covered by a polyethylene sheet, and left to dry overnight. This avoids shrink induced warps.

Next month should see the completion of the SE5A and weather permitting, the first flights. Until then, happy landings.

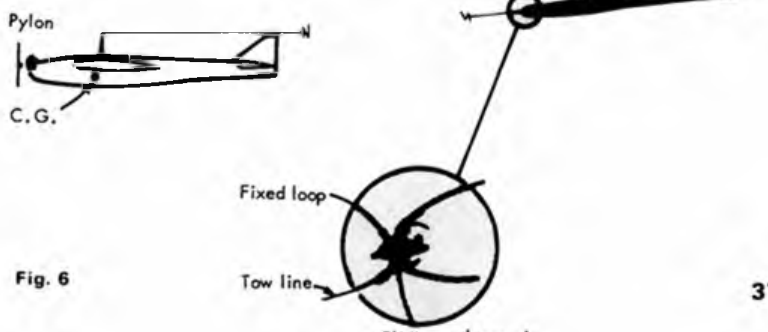
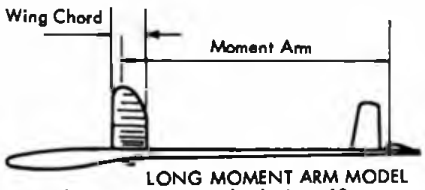


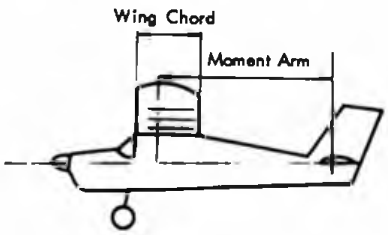
Fig. 6

OUR PREVIOUS ARTICLE described some of the points to be considered when designing a wing for a model aircraft. Having fixed the size and shape of the wing, the next item to be considered is the tailplane. A conventional wing, built without such aids as sweepback and fancy aerofoil sections, is not capable of stable flight, because the air loads acting on it are variable and move in directions that upset its flight path. This can be demonstrated most readily by trying to fly an old pair of wings by themselves; the wings will pitch nose up and rotate rapidly with little forward speed. Obviously some means of preventing this must be provided, and it is the tailplane that fulfils this function.

By supporting a small flat plate on a boom some distance behind the wing, with a small angle between the two, the wing can be prevented from rotating, and made to fly through the air at a known angle. The size of the plate required for this controlling effect depends upon the length of the boom — the longer the boom, the smaller the plate and vice versa. The flat plate, of course, has become the tailplane, and the boom is the rear fuselage. If a long rear fuselage is selected so that a small tail plane can be used, it must be built strong enough to prevent flexibility, yet light enough to require as little compensating



LONG MOMENT ARM MODEL
On gliders, position tow hook about 10mm in front of balance point



SHORT MOMENT ARM MODEL

ballast in the nose as possible. Alternatively, a short fuselage will require a larger, heavier tailplane. A compromise has to be struck, and a common set of relative sizes has evolved. The fuselage length from wing quarter chord to the tailplane quarter chord is called the moment arm (i.e. the leverage on which the tailplane acts) and it can be quoted as a multiple of the wing chord. Sports power models will commonly have a moment arm of about three times the wing chord, while gliders will have a moment arm of up to five times the wing chord, with rubber models in between. Exceptions will be seen, but these are likely to be specialised designs.

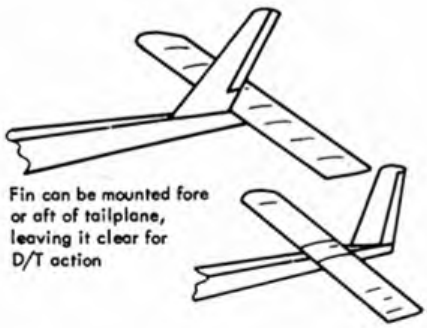
For aesthetic reasons, the outline of the tailplane is likely to be similar to the wing, but to a smaller scale. For example, a tailplane with curved leading and trailing edges would look out of place on a model with an angularly shaped wing. The important feature to be considered is the area of the tailplane, which should be between one third and one fifth that of the wing. As indicated earlier, the larger area tailplane will generally be found on a short moment arm fuselage.

Although the tailplane has been called a flat plate at the start of this article, in practice it will be found to commonly have a curved upper surface. The lower surface never has undercamber, and is nearly always flat, although convex surfaces can be seen. The effect is to streamline the flat plate, and even to introduce a little camber (curvature of the chord line) so that some lift is generated. It is dangerous to let the tailplane do too much work in supporting some of the weight of the model, as this implies moving the balance point of the complete model backwards. This reduces the stability of the model, and a common symptom can be seen when the model gains speed in a dive (say following a stall). The increased airspeed increases the lift of both wing and tailplane, and because the tail is acting on a long lever, it rises, forcing the nose down further. The model enters a steepening dive and does not recover. For a start, therefore, mount you tailplane parallel to the datum line of the fuselage, or even with a slight negative angle of attack (0° to —2°).

The aerofoil section chosen should therefore not incorporate any undercamber, and can be either symmetrical or be a thinned down flat-bottomed section like a Clark Y.

Structural design of the tailplane should follow that used for the wings, although lighter quality balsa may be used to advantage, as air loads are less. Some stiffening of the centre section with sheet might be required to support rubber securing bands and, if fitted, the tip-up dethermalising tail mechanism.

The size of the fin necessary to control the model in yaw is always difficult to determine accurately, as it is so dependent upon such factors as wing dihedral and the amount of side area of the fuselage, fore and aft of the wings. The area will be between half and a quarter of the tailplane area as a rough guide, but some apparently ridiculously small fins can be seen on some gliders, which still perform effectively. The fin should have attached to it an adjustable



Fin can be mounted fore or aft of tailplane, leaving it clear for D/T action

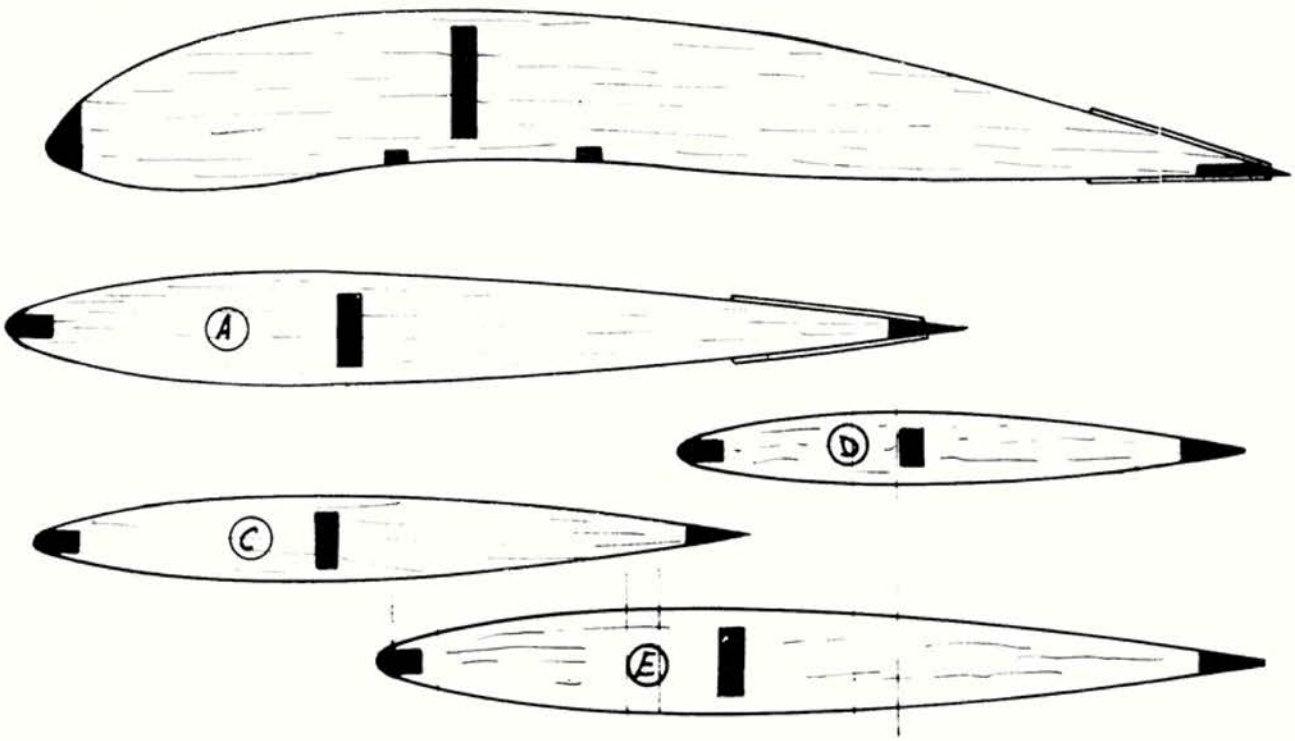
rudder for trimming purposes. A symmetrical section is used, and can be of the flat plate type if a sheet balsa fin is being used. Solid sheet fins are common, as the relatively small size may not warrant a built-up structure.

Fin position may be in front or behind the tailplane, because it can then be mounted directly on the fuselage without interfering with any dethermaliser action of the tailplane. If mounted directly on the tailplane, take care that accidental knocks will not set the assembly askew, thus upsetting the trim.

We have now considered the major requirements of the flying surfaces of your new design, so next time we will move on to examine the fuselage design.

The WASP

Full size wing, tail and fin sections



The latest in products for the modelling scene

plan, shaped undercarriage and control pushrod, wheels, bellcrank hardware and a good set of stick on decals. The model is designed for a .049 Cox Golden Bee, but could be modified to accept a beam mount engine. Price £5.30.

'Deweybird' is a trainer sport model with a span of 22½in capable of loops and simple manoeuvres. Although the box is half the size of the other kits, it in fact contains a similar amount of wood and components which include a shaped undercarriage and wheels, control hardware, decals and a good plan with clear instructions. Price £4.95.

'Skyray' is a very simple fully aerobatic model with a one piece 23¾in wing. The fuselage, tailplane, fin and ply engine bulkhead are die-cut. The wing is clearly printed on the wood and only requires a few simple cuts, using a straight edge and sharp knife. As with the other kits, glue, dope and control handle and lines are not included. Price £4.25.

The final kit in this range is based on the Beechcraft Staggerwing biplane and has been designed by Mike Scott, World Champion scale flier. Once again all sheet profile construction is employed, and the kit includes a moulded radial plastic engine cowl. The wings on this model are pre-shaped and only require a good sanding to finish. Good plans, decals and all hardware are included, plus die-cut fuselage and ply parts. Price £4.95.

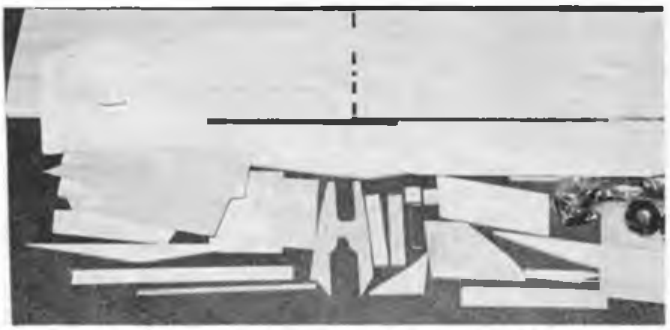
To sum up, a good selection of designs with good quality materials and well suited to the beginner.

K&C

Two interesting new economy kits from K&C - Crescent Model Aircraft kits, Parndon Mill, Parndon Mill Lane, Elizabeth Way, Harlow, Essex, are the Econ-o-Mizer and the Min-e-Mizer.

The Econ-o-Mizer has a span of 50in and is suitable for 30 to 45 power plants. The Min-e-Mizer has a span of 38in and is designed for 19 to 29 engines. Both of these kits are sold in two versions — control line and an R/C version for 2 — 3 or 4 function radio.

The models have a balsa profile fuselage with foam veneered wings. Good quality balsa is used throughout, and at the price are very good value for money. Price Econ-o-Mizer R/C £24.00 including accessory pack and post and packing. Control line version kit is £16 complete.



HENRY J. NICHOLLS

A new range of ½A Control Line models from SIG (USA) are now available from Henry J. Nicholls Ltd., 308 Holloway Road, London N.7. We received four kits for examination, a semi-scale Spitfire, a trainer and two stunt designs.

All the kits include very good quality sheet balsa, beautifully die-cut, requiring only cleaning up in places with a sharp knife and sanding smooth. The construction of the 'Spitfire' is slightly different to the others, in so far as it has plastic moulded fuselage sides. These in fact glue to a basic profile fuselage which takes all the stress loads. The kit includes a good

R/C Min-e-Mizer costs £20 including accessory pack and post and packing, while the control line version is £14.00 complete.

RIPMAX

Twister electric starters are now being produced in three different sizes. All three starters work from a 12V DC supply. The Twister L Two is the lowest powered model, suitable for motors up to .40cu.in. The LTW 1 has a higher rating capable of starting .60cu.in motors, with the LTW 2 giving that extra urge to turn the larger high compression motors. All of these starters are available from Ripmax Models, Green St., Enfield EN3 7SJ. Prices L Two £21.95, LTW 1 £25.95 and the LTW 2 £29.95.

MILNE

Starfire is a small, compact, self-contained micro blowpipe system incorporating a standard butane gas cylinder and a rechargeable oxygen cylinder. The unit is ideal for a large number of applications including brazing, silver soldering and heating, and is available from C. S. Milne Limited of Leicester.

When completely charged ready for use the unit weighs only 8.5 kg and the equipment supplied as standard includes a C. S. Milne micro blowpipe incorporating gas/oxygen control valves and interchangeable nozzles, a replaceable 320gms butane gas cartridge and rechargeable oxygen cylinder of 670 litres capacity. The unit comes complete with regulator, gas hose, and a carrying frame which houses the gas cylinders, making the set completely self-contained and portable. The nozzles are located using a knurled nut and there is no need to use spanners when changing them. Using the specially prepared adaptor hose, the cylinder can be recharged from a standard oxygen cylinder in a few minutes with a minimum of fuss. Price £130.00.

WOLFCRAFT

A boxed set of rotary rasps and countersinks is now available in the Wolfcraft range of power tool accessories.

The set, which is supplied in a protective styrofoam box, contains six accessories, as follows.

Three *rotary rasps*, suited for working on wood, rubber, plastic, fibre and soft metals. Each with ⅛in (6mm) shanks, the rasps are cylindrical, conical and ball-ended. Two *rotary files*, — one cylindrical and one conical — both suited to soft metal work. Again, these feature ⅛in (6mm) shanks.

The set is completed by the inclusion of a ½in diameter (12mm), ¼in (6mm) shank countersink, suited to both wood and soft metal work.

BOSTIK

Bostik Ltd., the Leicester based adhesive manufacturer, have entered the consumer super glue market with a combined glue releasing agent kit making the use of this versatile adhesive a safer operation.

Bostik have been selling 'Super Glue', or cyanoacrylate as it is known, to the industry for years but until they solved the skin bonding problem they refrained from placing it on the consumer market.

The 'safer' approach starts with the bottle which is designed to release only a drop of glue without squeezing. It will also dispense a line of glue making it very suitable for small jobs and applications involving the modeller or craft hobbyist.

Should the user find himself accidentally attached to his work or himself then the Bostik kit has a spillproof bottle of releasing agent which will free him in minutes.

The Bostik 12 Super-Gluing kit, price £1.49, is part of the Bostik House Holders Range of nine repair adhesives presented with point of sale selector chart designed to help the consumer overcome the confusion surrounding the selection of an adhesive.

Correction:

Please note, last month Transatlantic Plastics Ltd. — Transglaze sheet was described as an Acrylic material. It is in fact PVC.

Club News...

POPPING OVER TO THE LOCAL COMMON for a spot of trimming on a quite pleasant, eminently flyable day and finding the place deserted but for a few horse riders and dog walkers I could not help recollect, with not a touch of regret, how crowded with model flyers it would have been on a similar sort of Sunday in the old days. In those times, of course, the sports flyers would be doing free flight with the sort of lightweight models wholly acceptable on a public open space. The advent of radio for the masses, whilst a boom in many respects, added quite a bit to the models in the way of weight, power and speed, attributes that the authorities, other common users and nearby residents did not find all that pleasing. Generally, it has meant that the modern sports flyer cannot use the urban open spaces but must go out in search of the specialised flying field. What is more, he is now encumbered with equipment requiring a certain amount of preparation, so that his visit to the flying field is often a day out operation, far different from the casual dropping in on the local park or common. Technology may have its benefits, but there is a lot to be said for the simple life.

Our first report is from a club still in the process of establishing itself, only now in its second year: the **Sheffield C/L Aeromodelling Society.** Membership is slightly up on last year, 18 in all, in spite of problems with the flying site. Use of the field is now on a temporary basis, but it is hoped the situation will soon be resolved into something more permanent. And not a bad showing on the contest field for a first year club with Stuart Metcalfe and Alan Hill making third place in 1/2A Team Racing at the Nationals, and a third place in F.A.I., at the Northern Gala, where John James and Martin Kizzel also did well with a second and third in Combat. Mini Goodyear is the club's main interest, however, holding its first contest for this class in March. Weather, common to this turbulent year, was rough, but braving the gale force winds five teams had a go, all putting in recordable times. This sort of enthusiasm has pushed up the club heat record to 5 mins. 35 secs., accredited to Steve Etherington and Bob Meager. Look out for faster times in the future. Club details from John James on Mexborough 588476.

Not quite the Great Egg Race, but something similar reported in the **South Bristol M.A.C.'s** newsletter. Two rubber bands attached to the newsletter is all the power allowed for lifting a ping pong ball off the ground and keeping it airborne as long as possible. Scope for some interesting design projects. The event is scheduled for the July club meeting, just one item in the series of monthly events through the year, including quizzes, talks, auctions and film shows. A very full outdoor calendar, too, covering most aspects of model contesting with something on almost every weekend throughout the year. All, however, subject to the vagaries of the weather, and certainly off to a bad start in March for the first free flight competition at Whitchurch. Very wet and very windy, and poorly supported as a result. All mini field events, highly susceptible to wind, yielding only one good flight of 1 min., 43 secs., by J. Mayes in Kid Glider. Elsewhere in the newsletter Dave Hanks has come up with some startling figures on his liquid crystal read out. On the basis of the cost of a sheet of 15 thou indoor balsa a cube foot of the stuff would cost £2,800. Don't speak too loud, though, or they'll be storing it away in Fort Knox.

The March edition of the 'Bourne Flyer', the newsletter of the **Sittingbourne & D.M.A.C.,** is all about the competition season getting under way. The contest calendar is simply bulging with events, many of which will go to the clocking points in the Best All Rounder competition. Top of the 1980 table was Mervyn Tilbury, scoring high points in a whole range of across the board events, including Radio Power and Glider, Pylon Racing, Mini Goodyear C/L, and F/F duration, plus a few more. A remarkable exercise in all rounder talent. Not far behind him came Dave Monk, also scoring high in a wide range of events.

Still in the same area we next have to hand a copy of *'SEADOG'*, the newsletter of the **South Eastern Area.** Again it is a story of things to come on the contest field, although there is mention of that glorious repast, the Area Dinner and Dance — apparently a huge success. Ashdown Forest will be astir with the first of the Area F/F meetings, and highly popular Thermal Soaring also features prominently on the contest calendar. Not to be overlooked are the useful slopes to be found in that part of the country, such as the famous Long Man at Wilmington, where the Long Man trophy is competed for annually. Lots of R/C activity therefore but power flying is limited by an acute shortage of suitable flying sites, putting a premium on such excellent fields as the one at Graveney where mid year a Scale Class 2 and Fun Fly Rally is to be held. Coming back to the Dinner and Dance, the well known collector of historic models, Lt. Cdr. Alwyn Greenhalgh, offered a witty toast to the Society, and there was a caption competition on the subject of that fantastic creation of wire and canvas, Hiram Maxim's Steam Aeroplane. I liked the one which described it as a new aviary for Ashdown Zoo by Lord Snowdon.

Roger Brown, Editor of the **Northampton M.A.C.'s** newsletter 'Flying In-Formation', has sent along a copy of the March issue. First thing that caught my eye was a full size plan reprint of an Indoor Chuck Glider by Hugh O'Donnell (He came near to winning the Wakefield in 1953 when only fourteen years of age). This is very much a conventional chuckie whereas the things I have seen the top indoor exponents flying are quite different, using ultra light balsa, miniscule tailplanes and silicon fibre bracing. Anyway, no doubt the old and the new were featured in the Timperley Indoor Rally held on March 7th in which chuck glider was the most popular event. Four comps held, with the stars of the evening undoubtedly the cute little Peanut models, although the best flight of those recorded, 18.5 seconds, does seem rather on the modest side. Naturally, the first club outdoor contest for A/1 Glider got the usual wet and windy treatment from our unrelenting weather, resulting in a lower than expected entry. Even those who flew suffered model damage, not to mention what happened on test flights. Winner was Junior, Allan Warman. On the radio front one of the members has connections with the local Citizens Band mafia who seem genuinely willing to help in any case of club field interference. Seems a useful form of approach.

Talk of Indoor meetings may seem out of season but they do seem to hold some excellent events in the genre up North. From **Northern Area News** comes a report of the final meeting of the North Eastern Area. Sizeable entries and high standards of flying made up to an enjoyable and competent meeting. A nice range of Scale models, too, to catch the eye. But meantime all the outdoor life is astir, and given the continued availability of flying fields the North can look forward to another hectic season. A nice read, the N.A.N., spoilt for me by some hypercritical remarks about this journal. But do opinions culled

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from those standing around on the flying field amount to much? If the magazine has its failings there is at least every evidence of a striving to achieve a fair balance between the various interests in our now highly diversified hobby — the very thing it is accused of not doing! Even in my modest sphere I try to give everyone a fair crack of the whip, but sometimes it is a question of what comes to hand. Too often, though, this sort of criticism is nothing less than resentment at the mag not being filled exclusively with the critic's pet interest.

Oddly enough, one of the critics of the magazine is the sender of our next report, Jeff Smith, P.R.O., of the **Wharfedale M.A.C.** At least, though, he is specific in his complaint: lack of C/L coverage. It is not a question of no C/L inclusion at all but, in his view, just insufficient. Whether a substantial criticism or not, one thing is certain, and that is, in spite of seemingly all engulfing radio, control line flying still has a strong following: testifying to which is the buoyant Wharfedale Club celebrating its Silver Jubilee — 25 years of existence. Jeff goes on to tell us that special transfers are to be printed to mark the occasion. At the recent A.G.M., all officers were voted back into office, and Chairman John Horton was awarded a life membership for services to the club, which go right back to his days as a founder member. Looking into the club newsletter, 'The Circle', we see that Mini Goodyear started off the season in fine style. The venue was Dewsbury and the weather fair and dry for the second round of the Mini Goodyear League. A good turn out of 12 teams made for a tight schedule and an exciting day's flying. It was the Rothwell/Norfolk team that came out top, and they now top the league with 13 points. A warning in the newsletter of the dangers of a too happy go lucky attitude to team racing, at Dewsbury there were a few scary near misses — those safety helmets are not just for effect — they are essential.

Our next report comes from Peter Mason, an Art teacher, to give news of the **Broadwater School Aeromodelling Club.** The school is in Farncombe, Surrey, and sensibly the pupils are involved in those areas of model flying which call for the minimum of outlay and no travelling to distant fields; both R.T.P. and Combat can be safely accommodated within the school grounds. The majority of members are 2nd and 3rd year pupils, with higher form pupils attending when their studies allow. The R.T.P. flying is now advanced enough for competitive events to be held in one of the art rooms during lunchtime, whilst, presumably, Combat looks to more open surroundings. The standard Combat model is a Quasar, which is available in kit form from Peter Mason, the club organiser. Personally, I am all for the fostering of aeromodelling interest through the schools, and see no reason why is should not have a place on the curriculum.

Napolean's retreat from the Moscow weather has nothing on the retreat of aermodellers from our now Siberian climate. Much of the 'Court Circular', the newsletter of the **Three Kings Aeromodellers** — normally wholly C/L — is largely taken up with Indoor affairs. Take, for instance, the longish report on the February Indoor meeting. Here the local press was invited along to admire the neat rows of r.t.p. models and to see what wall to wall flying is all about.

This month's winner: Mr. Reece, Birmingham.
A varied collection of captions this month. The photograph was first published in September 1955 Aeromodeller and was taken at the all Britain Model Aircraft Rally held at Radlett aerodrome, sponsored by St. Albans MAC. The four engine aircraft is a Lincoln built by Mr. A. P. Briggs.
Runners up were: "SO THAT'S WHAT THE 6TH CHANNEL WAS FOR. MACHINE GUNS," from J. C. Tuffnell, Epsom, Surrey; "DID YOU SEE THAT, SID? THAT MAN HAS JUST CAUGHT THE BOUNCING BOMB," from Johnny Lyndon, London.

Typical of the expertize being put into these small, electric powered craft was Dave Chaplin's 'Hellcat'. The solid look is achieved by covering over with 1/32nd sheet what is basically an open structure kit. Flies as well as it looks. The 3 K's are lucky in having the use of a hall for such activities at their Phipps Bridge meeting place. There is a secondary benefit here, too, for subs are kept to the existing level of £5 by Indoor flyers paying individually for the use of the hall. But the famous Croydon patch still exercises some attraction, however under siege from the weather, and models can be seen flexing their wings for the contests to come, like the Doug Blake Trophy and the Club Open Days. The first of the Opens is scheduled for May 24th, featuring Scale flying (some profiles here, it is hoped), whilst Carrier, now on a popular up swing, is scheduled for August 9th, and that big Scale Day is on September 13th. Lots of valuable prizes and, it is hoped, good outside support.

Another club with a strong C/L following is the **Wolves M.A.C.** Chris Shelley, the Secretary, has sent in a report together with 'The Wolf Call' club newsletter. He informs us that the club had a successful year in 1980 and, at the time of writing, was looking forward to the coming season with every confidence. Several flying displays are already booked and there are a number of new competition flyers preparing to join the regular band. Two Fly-Ins have been planned: one a firm date on May 3rd and the other provisionally set for the 20th September. Again, here is a largely C/L club with a strong r.t.p. involvement — carrier type events currently popular. Membership is around the 35 mark with hope of improvement.

News from the **Hemel Hempstead M.F.C.,** newsletter is of works to the Puttenham Flying field to make it usable. It is low lying, wet and hoofed over by cattle but the landowner is allowing the club to erect an electric cattle fence around the take off area, and this plus a bit of groundsman toil, should make things take off again. What we modellers have to do to keep flying! Other news is the club held its A.G.M., in March, re-electing the same officers. Despite all the services provided by the club, sub fees were being kept at a reasonable level, £12 for adults and £6 for juniors. Plenty of club trophies going spare for future competitions. But aren't annually held trophies a bit of a bind? I am sure most people would prefer a permanent plaque.

If you have anthing of value which, paradoxically, you no longer value, then the club auction is the occasion to dispose of it for useful cash. Very much taken with the club auction is the **Enfield M.F.C.,** where at a recent flogging session over £200 passed hands for all manner of useful items. At least it is one way of getting over the building problem, for there always seem to be unwanted models on offer. The club auction also bestows a small benefit on club funds. A mention in the newsletter of that much coverted flying site off the M.11, known as North Weald. Model flyers have been after it for years and negotiations are proceeding so slowly that it could well finish up as the fifth London Airport before a model flyer sets foot upon it. New models taking the Spring air on the club field have been a Lark helicopter, very impressive; a pre-war monster design of over 3lbs., limply powered by a Mills 2.4cc diesel, swanning flight; and in direct contrast there is the threat of a Me163B Komet.

'Nitro', the newsletter of the **Belfast M.F.C.,** has gone all miniscule, making for a neat little booklet. This club, which used to be the free flight bastion of the province, has in recent years gone over to control line, and this month is very much taken up with Goodyear racing. The only evidence now of free flight is the news of a Combat model that went airborne. It is claimed that it actually went into orbit, and can be seen with the naked eye bunting away in the constellation of Orion — re-entry expected in 1992.

Another neat booklet also from N.I. This goes under the horrific name of 'Ohmnibus', and is the journal of the **Ulster M.A.C.** This covers the radio side of things in the province, and includes a number of good photographs.

Photographs, too, in 'Aeolus', the journal of the **Banbridge Aeromodelling Club.** Featured is a whole series of shots depicting the retrieval of a radio from a dense bit of high twiggery. The newsletter still boasts the world's worst cartoonist.

And that's about all for this month. **Clubman**

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BEDMINSTER
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HENGROVE
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Sun 10 00-1 00
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(MACCLESFIELD) LTD
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MIDDLESBROUGH Tel (0642)
HOBBYDROME 211212
283 LINTHORPE ROAD
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Late night Friday 8 pm
Closed Wed

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DERBY Tel (0332) 46579
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DE3 3ER
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16 DEVENPORT ROAD
STOKE, PLYMOUTH
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(Late night Friday 8 pm)

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PALACE AVENUE, PAIGNTON
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Mon-Sat inclusive
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R F AUSTIN MODEL SHOP 424038
SHOP, 156 SEABOURNE ROAD *
SOUTHBOURNE BH5 2JA
Open 9 am-5 30 pm Mon-Sat
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Half day Wed

BOURNEMOUTH Tel (0202)
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823 WIMBOURNE ROAD *
MOORDOWN, BH9 2BA
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Fri 9 am-6 30 pm Sat 9 am-6 pm

BOURNEMOUTH Tel (0202)
WESTBOURNE MODEL 763480
CENTRE *
59 SEAMOOR ROAD
WESTBOURNE
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CO LTD
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K & C MODELS & 418817
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RADIO ACTIVE 40016
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WICKFORD MODEL EXCHANGE *
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Closed all day Wed

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SOUTHSEA
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HONG KONG Tel 3-684184
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SUPPLIES
2a AUSTIN AVENUE
KOWLOON, HONG KONG
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WIGHT MODELS
84 HIGH STREET, PO33 2SU
Open daily 9 am. through lunch, till 5 30 pm except Sunday and Monday, closed all day

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Wednesday 9.30-12 30

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Wednesday 9 30-5 00

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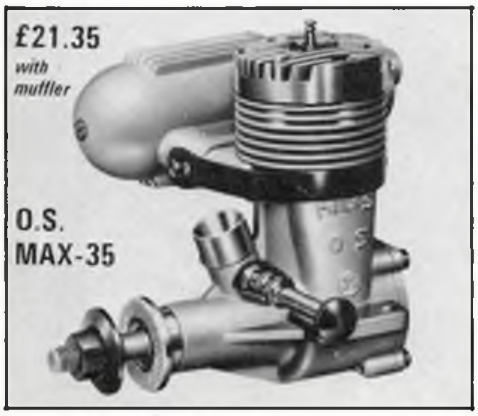

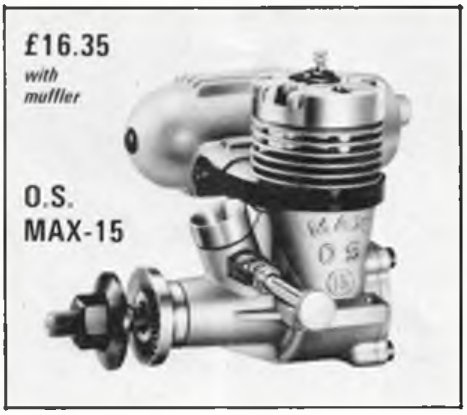

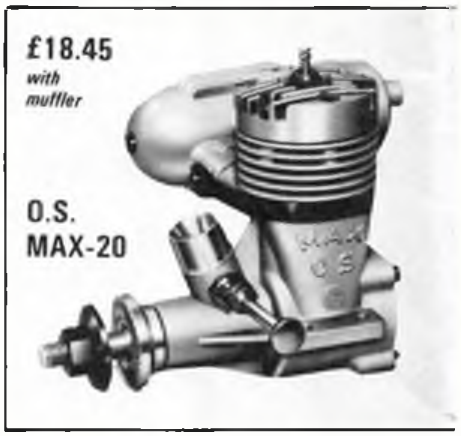

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RO49

1.5mm ply discs
Top & bottom

BLADE 3 off from spruce or ply 3mm thick
(two strips 12mm wide glued together)

5°

Washers

Tubing soldered to centre post

14 swg piano wire centre post

Bind & solder

16 swg piano wire bind & epoxy to F4

16 swg piano wire bind & epoxy to F5

Balsa fairing

Soft 6mm sheet top

6mm sq soft balsa

.8 - 1cc motor

Thin alloy sheet cowl

F1

F2 & F3

F4

F5

Engine cowl sandwiched between F1 & F2

U/C sandwiched between F2 & F3

C of G range

Line guide outrigger

3mm balsa sides

1.5 sheet balsa bottom

1 in dia wheels

F1 1.5mm ply

F2, 3, 4, & 5 1.5mm ply

14 swg brass tube epoxy to hub

Leading edge

Packing

2mm packing

Rotor hub

Leading edge

Rotor blade

2mm packing

Bind & epoxy to bellcrank ply mount

Wire line guide bind & solder to outrigger

3mm soft balsa

Bicycle spoke pushrod

Wire skid

3mm soft balsa

Tape or sewn hinge

Wire elevator connector

Commercial elevator horn

Offset

BRITISH AEROSPACE 146

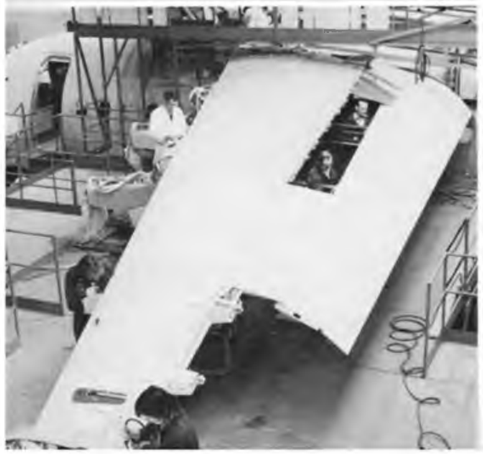
AIRCRAFT DESCRIBED

No. 249

Drawn and Described by Martin Tuck

THE OLD 'DE HAVILLAND' aircraft assembly hall at Hatfield, Hertfordshire once produced such famous aircraft as the D.H.82a Tiger Moth, the D.H.98 Mosquito, and the first ever jet airliner, the D.H.106 Comet. In later years the D.H.121 (later Hawker Siddeley) Trident, was designed and constructed at Hatfield, so it is fitting that Britain's latest airliner, the BAe 146 is being produced at this most famous and historic site.

Prototype BAe 146 in final stages of assembly just a few months prior to roll-out. Below: for modellers a detail of the wing with Fowler-type flaps extended.



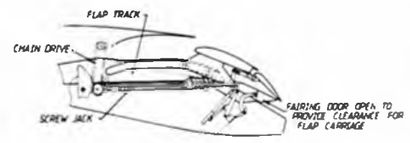
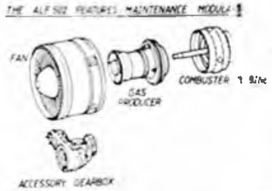
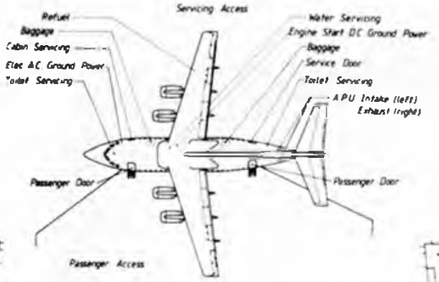


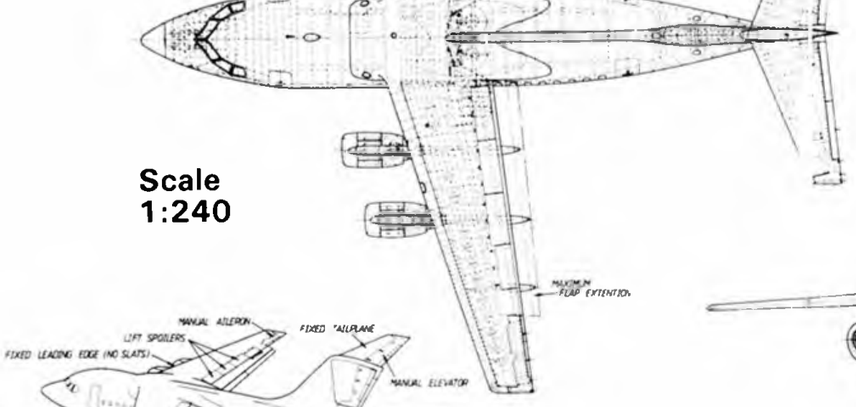
DIAGRAM SHOWING FULL FLAP DEPLOYMENT

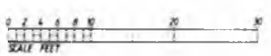
FLAP ANGLE SETTINGS
0° — CRUISING FLIGHT
18° — TAKE OFF
24° — APPROACH
30° — LANDING
33° — FULL DEPLOYMENT

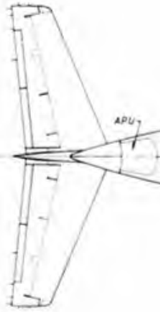


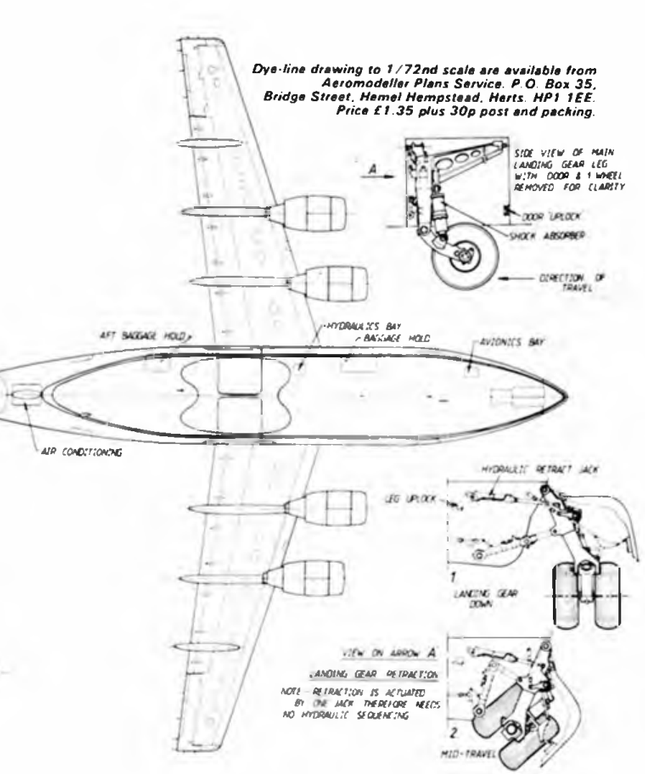


GROUND HANDLING and MAINTENANCE

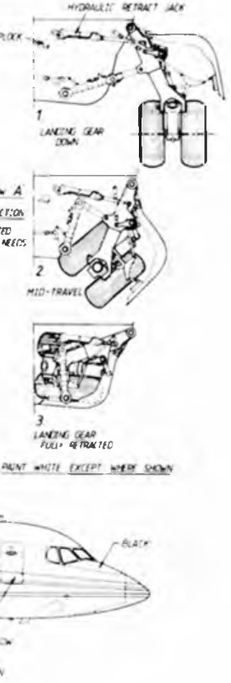




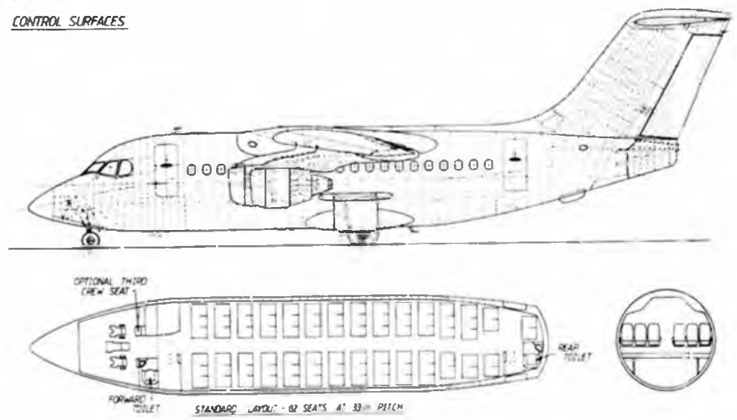




Dye-line drawing to 1/72nd scale are available from Aeromodeller Plans Service. P.O. Box 35, Bridge Street, Hemel Hempstead, Herts. HP1 1EE. Price £1.35 plus 30p post and packing.

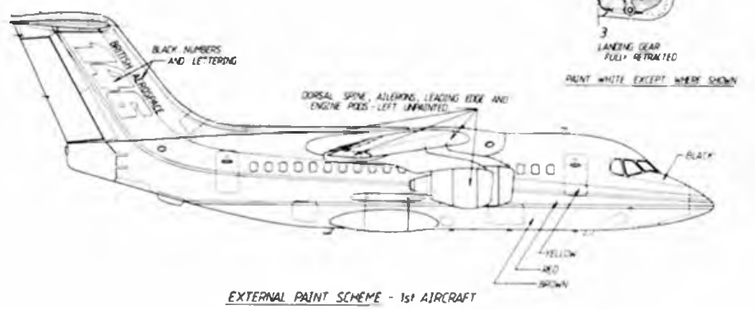


CONTROL SURFACES



BASIC SPECIFICATIONS BAe 146-100

OVERALL		
Span	86 ft 5 ins	26·34 m
Length	85 ft 10 ins	26·16 m
Height	28 ft 3 ins	8·61 m
WING		
Gross area	832 sq ft	77·3 sq m
Aspect ratio	8·97 : 1	
Quarter chord sweep	15°	
FUSELAGE		
External diameter	11 ft 8 ins	3·56 m
Ground clearance	2 ft 2 ins	0·66 m
CABIN		
Length	50 ft 7 ins	15·42 m
Internal diameter	11 ft 1 in	3·37 m
Headroom	6 ft 1 in	2·02 m
Floor width	10 ft 7 in	3·23 m
LANDING GEAR		
Wheelbase	33 ft 1·5 in	10·43 m
Track	15 ft 6 in	4·72 m
BAGGAGE HOLDS		
Volume	500 cu ft	14·15 cu m
FUEL CAPACITY		
Standard	2 540 Imp gal	3 050 US gal
Optional	2 840 Imp gal	3 412 US gal
ENGINES	4 Avco Lycoming ALF 502R-3	
TYPICAL OPERATING WEIGHT EMPTY	45 570 lbs	20670 kg



EXTERNAL PAINT SCHEME - 1st AIRCRAFT

Scale 1:240

The origins of the design lie with a Hawker Siddeley proposal revealed in August 1973, for a short-range aircraft powered by four quiet turbofans. Most of the money for the project was to be provided by the British Government but because of the economic crisis which swept across British industry at that time, the project was suspended.

During April 1977, Hawker Siddeley was absorbed into Britain's newly nationalised aviation industry, British Aerospace. This provided finance for the completion of the design together with wind tunnel testing, the production of test rigs and assembly jigs. The 146 project was relaunched in July 1978.

The design requirement calls for a relatively small aircraft able to offer the same high degree of passenger comfort as larger wide-bodied airliners, combined with low aircraft and seat / mile costs, excellent STOL airfield performance, and low operating noise. This type of aircraft is better known as a feederliner.

The 146 is aimed at the low traffic density end of the market routes which need fewer than 3,000 seats a week. BAe market studies foresee the need for some 800 to 1,000 airliners in the 70-100 seat category over the next 15 years.

The primary 146 market is currently served by a variety of aircraft ranging from the twin turbo-props, the H.S.748, the F27 etc, to the tubo-props, the H.S.748, the F27 etc, to the noisey, fuel greedy D.C.9s and 737s. Despite its four jet engines, the 146 will be quieter than the twin turbo-props, and will be extremely fuel efficient, an important factor these days.

At first, the aircraft will be built in two versions. The 146-100, seating 70 to 90 passengers, is the 'hot and high' version, designed to operate from runways as short as 3,500 feet or from high-altitude airfields at high temperatures. The 146-200, with a longer fuselage, increased capacity and lower seat / mile cost, will seat 85 to 109 passengers and will operate from runways as short as 4,000 feet.

British Aerospace is responsible for the overall design of the aircraft and for the production of all fuselage components. The wing boxes (fuel tanks) and the engines are built by Avco Corporation in the United States, and the tailplane and moving surfaces of the wings and tail by Saab-Scania AB in Sweden. Both companies are full risk-sharing partners. Final assembly is carried out by British Aerospace, who are also responsible for marketing the aircraft.

The aim throughout design has been to reduce manufacturing cost and engineering complexity simultaneously by reducing the number of parts and generally simplifying the overall design, at the same time letting the materials used give their best with the minimum of stress concentrations. As we all