Aero modeller

MAY 1979 45p
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FREE PLANS
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FMV Diesel Feature

Scale Drawings: Fournier RF4D

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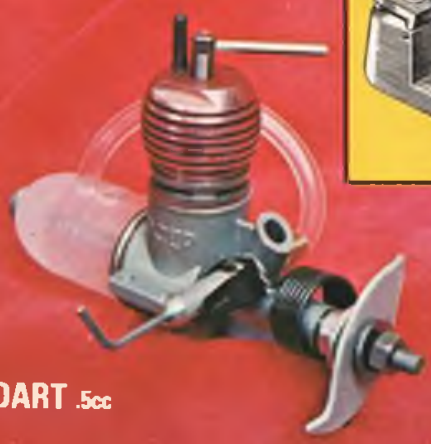

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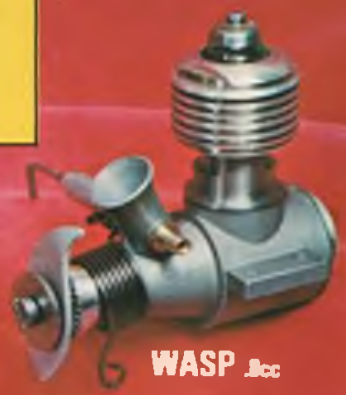

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Aeromodeller

MAY 1979

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MAP HOBBY MAGAZINE

Comment

DU PONT has announced its backing for Dr Paul MacCready and the Gossamer Albatross channel crossing project. The Albatross(s) weigh 55lb, span 96ft and are covered with Mylar polyester film, and braced with Kevlar aramid fibres (products of Du Pont) and aim to cross from Dover to Cap Gris Nez later this year to collect the £100,000 Kremer Challenge. Currently testing at Long Beach, we learn that the team has a boat fitted with a trampoline landing/take-off pad. Speaking at the Royal Aeronautical Society Symposium on Man Powered Flight, Paul MacCready acknowledged the inspiration which models have given to the ultra lightweight design. He will bring 3 machines over for attempts which may be made in June, one of the most suitable months for channel weather. Bryan Allen will once more pilot the Albatross, and though the rules permit climbs to above 50m for up to 3 minute periods, his technique will be to fly straight, level and low. Meteorological conditions remain the dominant factor. There are other machines under construction, and several alternate Kremer prizes to be won. Interested aeromodellers would profit by purchasing a copy of the Symposium papers from the RAeS, 4 Hamilton Place, London W1V 0BQ, Price £6.

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On the Cover

Competing in the June decentralised Free Flight event, flown nationally on local airfields, this four man team from the Richmond Club won the Model Engineer Cup for Team Glider last season. The four flyers, Pete Bayram, Pete Williams, Mike Fantham and Mike Warren dropped under two minutes from a possible total score of 36 minutes. All the models used were F1A class gliders, similar to this month's free plan, so no excuses for not getting your own team together this year. No doubt the glorious weather last June at Bassingbourn played its part, so let's hope this year's weather will offer similar conditions.

Next Month

It's a Gas, first part of a major new series on all aspects of CO_2 motors, operation and refuelling, kit conversions and model installations. John Cooper follows up this months Pink Elephant plan by explaining some of the techniques and secrets of glider towing. Rob Melkemeijer concludes his fascinating account of the development of the FMV diesel. A delightful 30in span F/F Scale model of the P51-B Mustang for .5cc diesels is the APS plans feature, and Walt Mooney's Peanut Baby Ace is the full size plan. Plus lots more in store on Control Line, Free Flight & Radio Control, on sale 18th May.

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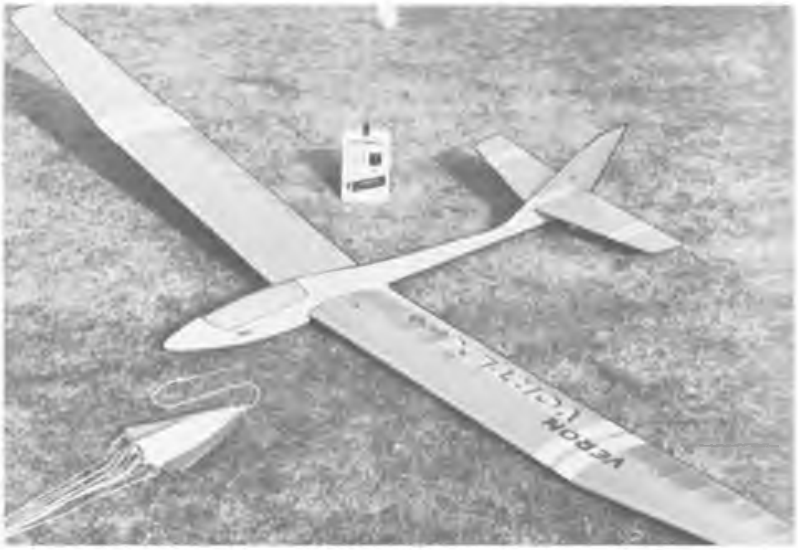

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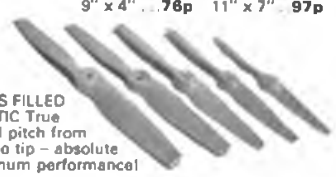

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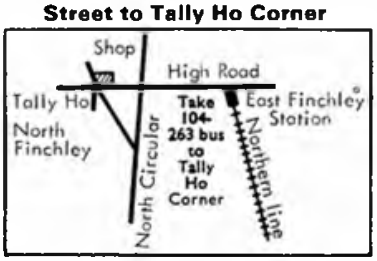

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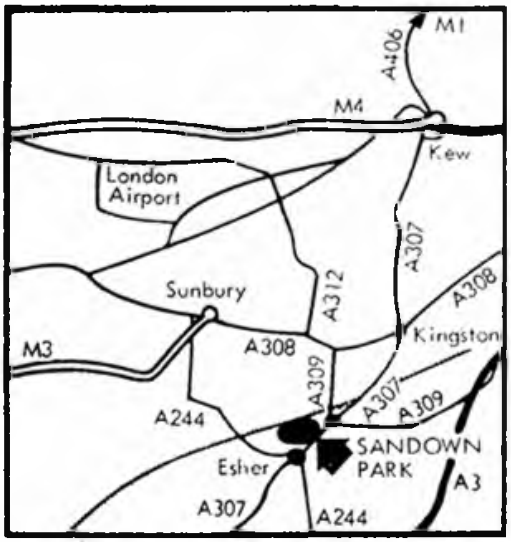

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LOCKHEED P2V-7 NEPTUNE *by J. M. Bodey*
An exciting and unusual 37¾in (953mm) span twin engined scale control line model for two .8-1.5cc engines. Tricycle undercarriage and all sheet covering.
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FOCKE-WULF 190 *by C. Maikis*
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Hangar Doors

NEW INDOOR DURATION WORLD RECORDS

The latest challenge in the USA is Indoor Radio Control flying, and the recent Pasadena Trade Show provided the venue for a duration trials event. $1,000 of prize money attracted entries in four classes, Electric, CO_2, Rubber and Lighter-than-Air. The main problems facing these innovative modellers were how to build large lightweight models capable of carrying an R/C payload; slow airspeed yet with manoeuvrable flight characteristics to turn within the confined building; and how to obtain maximum efficiency and duration from the chosen power source. The designs owed more to Free Flight models than truly indoor technology, and one entrant Bill Watson, used his experience working on Paul McCready's Gossamer Condor MPA to good effect, with a similar thick reflex section airfoil specifically computer designed for his model project. The radio equipment was naturally of the miniaturised variety as typified by that produced by Cannon Electronics. Winning times were 23:02 by Hal Cover with a 7ft span, 8sq ft, 6oz weight model, powered by an electric VL101 Hytork 48 with a 24:1 gear ratio and 18 x 24in prop turning at 600rpm, all up flying weight being 21ozs with airspeed approx 10mph. Bill Watson followed with a 12:50 flight with Tony Naccarato 3rd with 11:43, both using Astro 020 electric motors. Bill Watson used the same model with a 93in span 12in chord wing fitted with a power pod of four CO_2 motors to win that category with a flight of 1:07.7. Bill also took the L-T-A Class with a helium-filled Golden Kapton covered "football" (US variety) with a distance record flight that covered more than 7½ miles over the heads of the trade show as it cruised around the 400ft laps. The "Golden Football" even used radio controlled water ballast to counteract helium leakage. The longest rubber powered flight came from Tony Naccarato with a mere 47 seconds but this was preceded by a dramatic CA repair to a propeller blade broken during the winding. Response from the show will almost certainly ensure a similar event next year and just as assuredly even higher times are in store.

Congratulations to Mike Cross and his father for an excellent PR job for model flying, and for the £300 they helped raise for the Life Saver Appeal for Cancer research.

MINI GOODYEAR LIFESAVER

We've had sponsored walks, sponsored swims, sponsored ping pong and now why not, sponsored Mini Goodyear. This novel idea for raising funds for the LifeSaver Appeal was the brainchild of the Wharfedale & District Model Aeroplane Club in conjunction with the Northern Area of SMAE. Sponsors donated so much per lap for a racing event lasting one hour, spares being permitted for everything but the flying crew! A total of 15 teams took part and winner was 15 year old Mike Cross assisted by his father. £300 was collected to help the fight against cancer and handed over in a highly original manner, written as a cheque on the winning model itself! It has now been resolved to hold this worthy event annually and we wish them all success for the benefit of the charities and the good name of Aeromodelling.

EUROPEAN CHAMPS

Now here's the Good News; following the disappointing cancellation of the official FAI European Control Line Championships, the Utrecht Aviation Society 'De Kemphanen' has stepped in to compensate by running a replacement event. It is hoped that this "Criterium Midden Nederland voor de Europacup" championships will be seen by the top C/L enthusiasts as the alternative and that it will attract a large entry from all nations. The proposed classes will be F2A, F2B and F2C but no mention yet of F2D; will the Amerongen International be the replacement event for Combat fans? Full details of programme and entry fees will be announced later and details are available from Henry Borra, Floridadreef 17, Utrecht, Holland. The important dates to remember is the weekend of June 9th-10th, with some practice on the Friday.

RISING COSTS

Despite having contained the costs involved in the increased size of the New Look *Aeromodeller* since our relaunch with January issue, rising raw material and production costs have now forced MAP to reluctantly raise the price of all of our model hobby magazines. Living in these inflationary times, we trust our readers won't begrudge this slight increase in their monthly modelling budget.

Letters

MORE GALAS AND RALLIES PLEASE

Dear Sir,

First may I say, having purchased a first *Aeromodeller* costing 6 old pence, with a 'photo' on the front in blue of the De Havilland Rapide way back, I will say the current issues with the new look is now very interesting and 'readable'.

Reference 'Comment', regarding entries to contests and competitions – most events are run by SMAE with the usual ending of the notice "SMAE Members only". I feel the SMAE should organise "General Flying events" of a variety to allow anyone (insured and licensed of course) to enter and NOT to allow top contest fliers to enter, to give the general model fliers a chance, such as a "Woodford" Rally type or like the old Daily Despatch do at Sherbourne A fun flying event with R/C high wing models, F/F gliders and F/F Power with a C/L event. The SMAE *could* then put up the notices seeking membership at the rallies. I have visited one of the events, where it stated "SMAE Members only" – the turnout is always VERY POOR!

Stockport, Cheshire. *R. Wilson*

COLLABORATIVE BLACKMAIL?

Dear Sir,

Whilst agreeing 100% with the idea of all aeromodellers being SMAE members I would like to stress that in a "free" society freedom of choice is of paramount importance in enabling that society to remain "free". I would therefore like to register a protest at the SMAE in "cahoots" with the MOD trying to blackmail all would-be spectators at contests (on MOD property) into joining SMAE before they have even seen a model plane, let alone built one. Surely friendly persuasion is much better and more productive than open blackmail i.e. join the closed shop or you don't get a lookin.

If this is the thin end of the wedge then I would like to warn ALL aeromodellers that sometime in the not too distant future, that to travel by road to any flying meeting you will have to be a fully paid up member of the Automobile Association as well. Also should the said meeting be on M.O.D. property, you will be required to join the RAF to get in and wait for at least three years before trying to get out.

Kirkby in Ashfield, Notts. *J. H. Green*

I truly wish I could claim that the SMAE and the MOD were in 'cahoots' together over the use of MOD land and I'm flattered that Mr Green feels that the SMAE has such influence. The fact is however, that the MOD, like any

other landowner makes up its own mind what conditions it wishes to put on those using its land.

Apart from model flying, many other sports use MOD land and the MOD has a set of Defence Council Instructions which tell local Station Commanders what they must insist on before giving permission for an airfield to be used. It appears to be MOD policy that they insist on affiliation to the appropriate national body where one exists – and the SMAE is listed in the DCI along with national bodies for motor sports etc.

One probable reason for this is that among other things, the MOD insists on users having a hefty insurance policy specifically to protect the MOD. The SMAE had the good sense and initiative to go to the MOD to determine precisely what insurance cover was needed and then went ahead and obtained it (at a four figure annual premium, Mr Green) and lodged it with the MOD. This cuts MOD administration costs significantly whenever an MOD Airfield Licence is applied for. (Yes, a licence is needed for each usage.)

From the SMAE's viewpoint we naturally only provide this service for model flying by our own members – and only full members at that. (Associate Members can come along as spectators.) I am puzzled by Mr Green's feeling that this is somehow wrong – to use his AA example, does he expect them to help him when he breaks down if he's not a member? Surely one of the main reasons for any organisation is to offer services for its members?

There is also a real security problem nowadays, and the MOD often insist that we restrict entry to the field to SMAE members only – in a few cases we even have to supply names in advance.

Finally, there is rarely a problem in practice for anyone who has a genuine interest and wishes to spectate. Unless security is especially tight we can normally arrange for spectators on a limited scale.

However, as Mr Green states that he agrees that everyone should belong to SMAE then the simplest way is to pay £2.75 and become an Associate Member. This provides almost unlimited spectator entry to any MOD land when an "SMAE only" event is on, plus six issues of a Newsletter posted directly to you – can't be bad at today's prices.

SMAE Chairman — *Ray Favre*

Two views of the model Paulhan-Tatin Aero Torpedo designed and built by Mr Sizer in 1949.

MOTORISED ORANGE BOX

Dear Sir,

I have done quite a bit of small modelling and I really like the Orange Box but I was wondering if it would be possible to put a small engine in it to get it aloft as there is nowhere locally I could just glide it. I would welcome details if possible.

Dartford, Kent. — *D. Letchford*

R/C gliders such as the Orange Box can be flown off quite small flat sites using towline or elastic bungee, and typical launch heights of 500ft achieved in this way should provide ample scope for thermal soaring if you do not live near good slope sites.

However should you still prefer to try engine power, a small .75 — 1cc motor fitted to a simple power pod strapped over the centre section of the wing should give sufficient height over a 1—2 minute engine run to produce some good gliding, don't forget a silencer though.

REMEMBER THE PAULHAN TATIN

Dear Sir,

In your issue of February 1979, page 115, you show a picture of the Paulhan-Tatin Aero-Torpedo model. I was particularly interested in this because I built such a model in 1949 (30 years ago!) I enclose two photographs and two sheets of drawings.

My model flew quite well and I was very pleased with it. I believe this model held the World's airspeed record in 1911 and was exhibited at the 1911 Paris Airshow. Every good wish.

Lowestoft, E. Suffolk. — *J. A. Sizer*

SEEN ANY GOOD FILMS LATELY?

Dear Sir,

I am interested in obtaining model aircraft films 8mm sound for showing to a group of boys in a school club and wonder if you can advise me where these could be obtained. Preferably these should be of an instructional type of basic design models.

Canterbury, Kent. — *M. Steel*

Do we have any film makers amongst our readership who can help Mr Steel? We understand several model clubs have undertaken such projects, are they yet ready for the box office?

What's Happening?

EVENTS

April 19th/21st
MODELAIR: F/F, C/L, R/C, RTP & PLASTIC models on exhibition with flying demonstrations on Saturday. Open 2–9pm 19th & 20th, 10am–9pm on 21st. Venue: Heartsease Youth and Community Centre, Norwich.

May 5-11th
MAP MODELLERS' WEEK. Primrose Valley leisure holiday centre, Filey Bay, Yorkshire.

May 12/13th
ELMBRIDGE R/C SYMPOSIUM. Trade show plus continuous model flying, cars, boats, train demonstrations. Sandown Park.

June 10th
AEROMODELLER ALL-SCALE model flying day at Old Warden aerodrome, home of the famous Shuttleworth Collection, Bedford. R/C, C/L, F/F.

CONTESTS

April 22nd
MIDLAND AREA GALA: *O/G, O/R, O/P, A1, CDH, ½A, HLG, CO₂, P-30, VINTAGE (PRE 51)*
Venue A: Barkston Heath.
Contact: G. Ferrer. Tel: 0533–886519.

April 22nd
TYNEMOUTH F/F RALLY: *O/G, O/R, O/P, COMBINED FAI (No Rounds), COMBINED MINI, HLG,* 10am start
Venue B: Albermarle Barracks.
Contact: Alan Jack. Tel: Cramlington 714773.

April 22nd
ELMBRIDGE C/L COMP: *F2B, NOVICE STUNT*
Venue C: Fairmile Common, Esher.
Contact: Martin Redcliffe. Tel: 01 397 4407.

April 22nd
INDOOR DURATION: *EZB, MAN, IHLG*
Venue D: Cardington.
Contact: Bob Bailey. Tel: Stevenage 723642.

April 29th
INDOOR SCALE NATS: *PEANUTS OPEN CO₂/ELEC*
Venue D: Cardington (P).
Contact: Denis Thumpston. Tel: 021 354 2523.

April 29th
ST. ALBANS GALA: *O/G, O/R, O/P, F1A, F1B, F1C. (No Rounds), A1, CdH, ½A, HLG*
Venue E: Bassingbourn
Contact: J. Fletcher. Tel: 0438 68731.

May 6th
2FSA SCALE MEETING: *INFORMAL FLYING. Plus Rubbers Scale Kit Comp (Keil or Veron)*
Venue F: Chobham Common.
Contact: Bill Dennis, 27 Wheble Drive, Woodley, Reading.

May 6th
ELLIOTT SPRING RALLY: *OPEN SPEED, F2B, F2C, GOODYEAR, ½ATR, ½A COMBAT:* Trophies, Diplomas and refreshments.
Venue G: Marconi Avionics, Rochester.
Contact: Pete O'Neil. Tel: Sevenoaks 57899.

May 6th
3rd F/F AREA CENTRALISED: *F1B (WESTON + PLUGGE) O/P (WHITE) O/G*
Venue: Local Area.
Contact: Mike Fantham. Tel: 01 736 7163.

May 6th
BRECKLANDS ½A COMBAT RALLY.
CANCELLED.

May 6th
WOLVES FLY IN: *STUNT, STAND-OFF-SCALE, 35 SLOW RAT, SMAE CARRIER, 3.5cc PROFILE CARRIER,* SILENCERS ESSENTIAL
Venue H: Lucas Aerospace, Wolverhampton.
Contact: P. McMahon, 46 Underhill Lane, Underhill Estate, Wolverhampton. Tel: 722826.

May 7th
3 KINGS MAY DAY: *F2B, Trophies to 3rd*
Venue I: Old Croydon Aerodrome.
Contact: A. Fritz. Tel: 01 767 4128.

May 13th
BROADLANDS STUNT & CARRIER CIRCUS. *OPEN, NOVICE & JUNIOR STUNT CARRIER (INCLUDING .40 PROFILE)* Silencers essential, 10am start
Venue J: Earlham Park, Norwich.
Contact: J. Bailey. Tel: 0603–868135.

May 13th
INDOOR DURATION: *EZB, CO₂*
Venue D: Cardington.
Contact: Bob Bailey. Tel: Stevenage 723642.

May 20th
2ND C/L AREA CENTRALISED: *F2B, F2C, F2D, BTIR OPEN SPEED*
Venue A: Barkston Heath (P).
Contact: Bob Horwood. Tel: 0272 48869.

May 20th
CROYDON QUIET CONTEST: *O/G, O/R, F1A, F1B (No Rounds) A1, CdH, VINTAGE RUBBER, HLG*
Venue E: Bassingbourn.
Contact: Ray Elliott. Tel: 01 997 1563.

May 26th /28th
INDOOR NATIONALS: Sat: *IHLG, MAN, CO₂;* Sun: *F1D, O/FILM:* Mon: *EZB, 35cm.*
Venue D: Cardington.
Contact: Bob Bailey. Tel: Stevenage 723642.

A full calendar of model flying events for 1979 appeared on page 145 March Aeromodeller. ***In order to comply with requirements for any event held on an MoD airfield, ONLY SMAE MEMBERS will be admitted. Contact Membership Secretary Mary Horwood. Tel: 0272-48869.***

FREE PLAN FEATURE

PINK ELEPHANT

JOHN COOPER'S 80 INCH SPAN F1A GLIDER

WOULD YOU LIKE a simple to build and easy to fly F1A class glider that will give you a good chance of winning contests; if so, then Pink Elephant could be just the model for you. My first gliders were own designed creations which only flew well in about one contest in three. After several seasons of placing in the lower half of the contest results, I decided that I needed a radically different sort of model if I was ever to win a contest. The most reliable and consistent model around at that time (the late 1960s) appeared to be Dave White's Rolling Stone (APS plan G876 price £1.30 inc p&p) and so I built a couple of those and slowly started to gain contest successes.

Since that time all my models have been derivatives of the basic Rolling Stone although some of the models look so different that a casual observer would not realise their parentage. Development has produced three different styles of model, each for use in different weather conditions. All the models have the same basic layout i.e. wing chord, fuselage length and tail size. The variations are in the wing section, wing structure, tip shape and the towhook system. The three styles of model are:

WINDY WEATHER MODELS, using a thick well-undercambered wing section with a very hefty I beam spruce bar and a semi godetic structure. These models will withstand being towed in any wind strength yet encountered and are strong enough to take most rough landings with only superficial damage.

CALM WEATHER CIRCLE TOW MODELS, these use either a thick Shoaf wing section with a light I beam spar, a small turbulator spar and a semi geodetic structure, for use in thermally conditions, or a Benedeck 6356b wing section with a D box sheeted leading edge for "dead" air conditions. Both use a Russian style circle tow hook system.

GENERAL PURPOSE MODELS, these are used for any wind strength between 5 and 15 mph i.e. the conditions most usually encountered in Britain. Pink Elephant is this type, and is the model which most shows its Rolling Stone ancestry. These models use a fairly thick Mike Burrows wing section featuring plenty of undercamber and with a multi-spar, straight rib wing.

Presumably, due to the turbulating effects of the three upper spars on the airflow over the wing, this type of model displays a far better ability to centre into thermals and rapidly rise to the top of a pack of thermalling models, than models with different wing surface structures.

Five models have been built to the plan presented here and each one has had numerous contest successes, most importantly helping me to qualify for four consecutive World Championships team places and reaching the flyoff at the 1973 World Championships (the less said about that flyoff score the better!)

Construction of Pink Elephant is fairly simple and could be undertaken by someone who has built one or two medium size beginners free flight models, I can build one in two days and go flying on the third. Since the construction is generally straightforward, only the deviation from normal practice are mentioned.

Wing and Tailplane

I cut my ribs for both wing and tail overlength by using the template sizes shown and only cut them to size at the final construction stage. After pinning the leading and trailing edges to the plan, the ribs are put in the correct positions and the rear end is then cut to ensure that the rib fits exactly for length. Each trailing edge to rib joint is then gusseted. Although this method is rather fiddly it does give a stronger structure than that obtained by use of the more usual notching which can weaken the trailing edge.

This remarkably straight forward model owes none of its unique success to complexity or sophistication. Years of careful development have produced a simple design which has helped John to win a place on four consecutive British Glider Teams. Strength, consistency, and the ability to maximise the effects of thermals are the prime qualities of this classic model

All wing and tail spars are inserted after removal of the relevant panel from the building board. Attempting to insert the spars whilst the panel is pinned to the board often results in cracking the ribs. The wing tip panels, less spars, are joined to the finished centre panel and the tip spars are then inserted one at a time. This should give a far better joint at the dihedral break than any attempt to trim all spar ends to the correct length in one operation hoping they will all meet!

The weak point in any multi-spar wing is the dihedral joint, hence the use of spliced spar joints as shown on the plan. Since using this method I have not broken any wing tips off on rough landings. Before this a broken dihedral joint seemed to be a regular occurence.

A critical aspect of all two piece wings is to ensure that both wing halves are joined at the same incidence. The easiest method that I have found to achieve this is to use a template to drill each plywood rib joiner hole, making the rear hole on each rib a little oversize. Then epoxy the joiner tubes in place and join the wings with straight wire joiners. Pin the assembled wing on a flat surface and allow to dry, the rear tubes should then align themselves in an unstressed position in the oversize holes in the ribs. After the epoxy has set, the wire joiners can be removed and bent to the correct dihedral angle.

I cover my tailplanes in the lightest tissue available, the best being lightweight Japanese tissue available mail order, and the wing in heavyweight Modelspan. If the wing is covered in lightweight tissue it will result in frequent patching of the surface when the model lands on rough surfaces. Dope the panels until the tissue just begins to go glossy. I find one coat of 50/50 dope/thinners is about right for the tailplane and two coats of full strength dope is right for the wing.

Unwanted surface warps should be checked for after each coat of dope and removed immediately by twisting straight over a steaming kettle.

Fuselage

The plan shows details for both a fibreglass rod or a balsa box fuselage version. Use of a Ronytube fibreglass rod is recommended since it will result in a virtually unbreakable fuselage. The construction of both styles of fuselage is self-explanatory from the plans.

Set the approximate towhook position by suspending the assembled model inverted, from the towhook and move the hook until the model balances about 20° tail down.

Trimming the model

Don't bother with test glides since this is a sure recipe for damaging wing tips and tailplanes. Put about 9mm packing under the rear of the tailplane and set the D.T. for about 10 seconds. Tow the model on a short 20m towline and release immediately if the model starts to veer badly, the short D.T. should guarantee that the model comes to no harm. Concentrate on getting the tow reasonably straight by adjusting the rudder stops before bothering to adjust the glide.

With the amount of tail packing shown the model should be well over-elevated. Slowly reduce this packing each flight and adjust the rudder stop until the model recovers from the top of the towline in one or two stalls and then glides in approximately 50m diameter circles.

To finalise the towing trim it is necessary to fly in a reasonably strong wind and the tow stability will be tested to its limit. Use a combination of adjustments to the rudder and towhook positions until the model tows with a very slight weave and veers slightly towards the glide turn when towed very fast. The model should now be ready for contest flying and the secret of success is to practice flying with the model until you are totally familiar with all its quirks and are competent at releasing it into thermals consistently.

Next month: John describes in detail how to trim gliders for straight towing, and adjust them for best possible performance.

Right. *John holds aloft one of his earlier models, now eight years old. Thick aerofoil and multi-spar structure produce strong wing for all-weather flying.* Middle. *Alternative screw adjuster rudder stop used on some models. Note torsion spring wire running along hinge line.* Below. *Fuselage details show D.T. timer installation and name and address label just in case.* Bottom. *Adjustable hook for tow trim slides along slot, locked in place by clamping bolt.*

THE U.S. WAY

CALIFORNIAN TOPICS

Fun in the sun – a typical variety of So. Californian week-end activity. Left: *Cliff McBaine with a vintage classic – Ed Lidgard's Hi-Ho which rockets up on 14 strands of ¼in rubber.* Right: *Don Weitz arrives at Taft well equipped with his tool-case stand for his Goldberg Zipper (O.S. 25 converted to ignition). Background shows Cliff Silver, one of several handicapped flyers who enjoy free-flight.*

Above left: *Dan Parsons with O.S. 60 powered R/C scale Martin Baker MB-5.* Centre is *Colonel Bob Thacker and his Hughes Racer and* Right: *Jerry Ortego with an Fw 190 in winter camouflage – all at Mile Square model flying area in Fountain Valley where for a single dollar the modeller has an aerodrome at his disposal!* Left: *truly vintage is this Premier Lion, a British design from the original model shop in Hornsey Rise, London, managed by the late C. A. Rippon. Bud McMorgan has fitted a repro Brown Jr made by Herb Wahl.* Right: *Big forty open exhaust O.P.S. 60SPA in Steve Beebe's Satellite is a Taft privilege – at dusty risk!* Bottom left: *Tom Heiser makes beautiful models, his Rocketeer (OS15 ign) American Ace (Forster 29) and Brooklyn Dodger (OS 25 ign) fly well too.* Centre: *Larry Clark and the "Foo-2-U2" with OS25 ignition and* Right: *the Taft essential, a m/cycle plus vintage Goldberg Zipper (Forster 29) by Walter Parker. Taft is to be the scene for the 1979 World free flight Championships, October 3-10th.*

AIRCRAFT DESCRIBED

No 236

SPORTAVIA

FOURNIER RF-4D

Drawn by World R/C Scale Champion. MICK REEVES

Flight photo of an RF-4 shows panels where outrigger undercarriages fit from the underside – a feature not evident on Bravo Juliet, the subject of Mick Reeves' model and drawing, as in photo below.

REMEMBER the Jodel D-9 Bebe? Or the Druine Turbulent? Of course – but why? We'll tell you – because whereas once upon a time these pioneer single seaters were the first to use a Volks engine, nowadays we take it for granted that the VW can power *two* seaters – even aerobatics. The b.h.p. has gone up over the years, so has the reliability factor. When the Bebe first flew it was almost a mind over matter situation. Thanks to steady development the airframes have become cleaner, more efficient to improve the breed.

One designer who has contributed greatly to this change is Rene Fournier who first built his VW home-built RF1 in 1960. It was a new approach with bigger wing area than usually accepted yet there was little speed penalty. Then came the RF-2, and the RF-3 which was produced by Alpavia in the South of France.

Though the RF-3 gained enormous popularity, it has been the subsequent refinement of the RF-4, out of the German firm in Sportavia which really established the Fournier as a type *par excellence*. But it was no longer the inexpensive lightweight single seater, due to a beefed up spar, Frise ailerons (previous RF types have plain 'barn door' ailerons), mechanical starter, etc.

Aviation has produced many ideal 'modellers aircraft', and as a positive modelling subject the Fournier RF-4 is a natural for control line or radio. (The 2 seat RF-5 is better for free flight.)

Shaped to glider-like proportions, the RF-4 is designed as an 'Avions Planeur' and although superficially a powered glider, the aircraft was designed first with the accent on *Avions* (powered aircraft) with *Planeur* (glider) as a secondary consideration.

Its carefully developed aerodynamic shape and excellent structural design have imparted a performance which has taken some of them to remarkable extremes. For example, after switching off the motor at 19,000ft one RF-4 was soared all the way to 35,000ft.

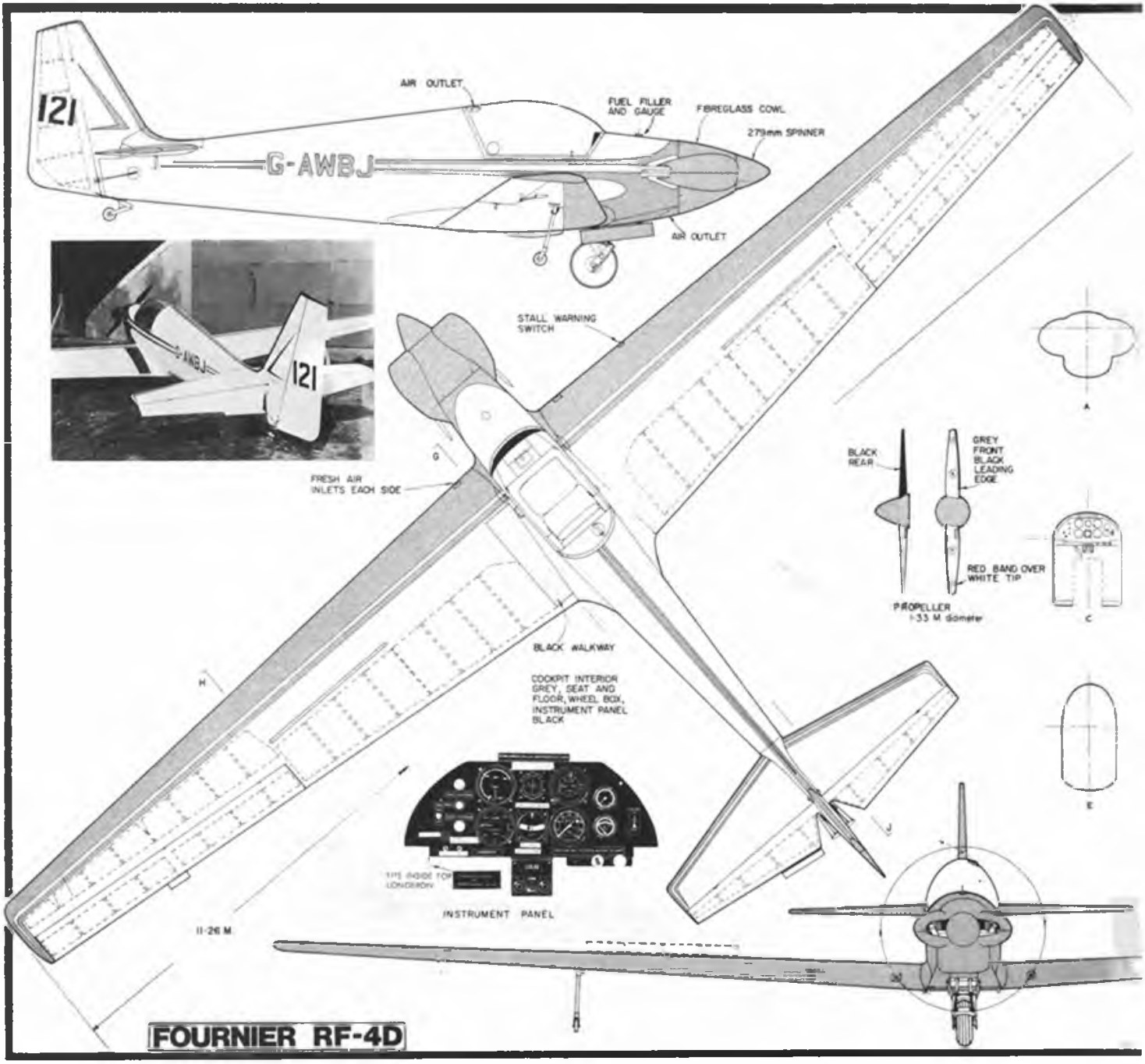
The RF-4 will cruise at 112 mph for 4 hours on just nine gallons of fuel (that's 50 mpg, by the way) yet by use of on/off engine technique the endurance has been extended to a remarkable 15 hours, covering a distance of 1,300 miles in the process – and all on two gallons of fuel! Delivery flights to Africa have spanned 6,000 miles in 500-600 mile hops!

Yet performance does not end there – the RF-4 is also an aerobatic aircraft, stressed to +6 and −3g at gross weight it is capable of most normal manoeuvres. The airframe has been tested to destruction at 13.8g.

Maximum level speed at take-off weight is 118 mph (190 Kph), it can be dived to a maximum of 168 mph (270 Kph) and it stalls at a gentle 43.5 mph (70 Kph). Yet all of this performance envelope is achieved on the power of a 40 hp 1200cc modified Volkswagen engine.

CONSTRUCTION

Wing of the RF-4 uses the NACA 23015 section at the root, tapering to 23012 at the wing tip. With an aspect ratio of 11.2 the wings are all wood, single spar construction, with plywood and fabric covering. The wing is built as a single assembly and fitted to the fuselage using four bolts. Ailerons are wood and fabric covered, the aircraft is without flaps, but an air-brake is installed in each wing panel in three sections to extend from a slot in the upper surface.



FOURNIER RF-4D

The fuselage is also of all wood construction and entirely plywood skinned, while the tailplane has wood framework and fabric covering.

A single, fuselage centre line mounted main undercarriage retracts manually forward into a cowling and employs rubber chord shock absorption. The remainder of the undercarriage includes a steerable tailwheel and fixed wing tip outriggers, adequate for grass field operation. Access to the cockpit is via the side hinged Plexiglass canopy which offers unrivalled visibility and comparative comfort for so small an aircraft. In fact one RF-4 was ferried from Germany to California over the Greenland Icecap by Mira Slovak – and that cannot be achieved without a draught proof cockpit.

The four cylinder 1200cc Rectimo Volkswagen engine delivers 40hp with single ignition and carb, driving a Hoffman two blade wooden propeller, with a clockwise rotation.

Factory colour scheme has always been overall white, with red trim in the form of fuselage cheat lines and wing leading edge. Very few variations have been seen, but the registrations cover almost every nation where sport flying abounds. A popular aircraft with modellers, the RF-4 is a regular mount for well-known personalities in the German, American and British model trade.

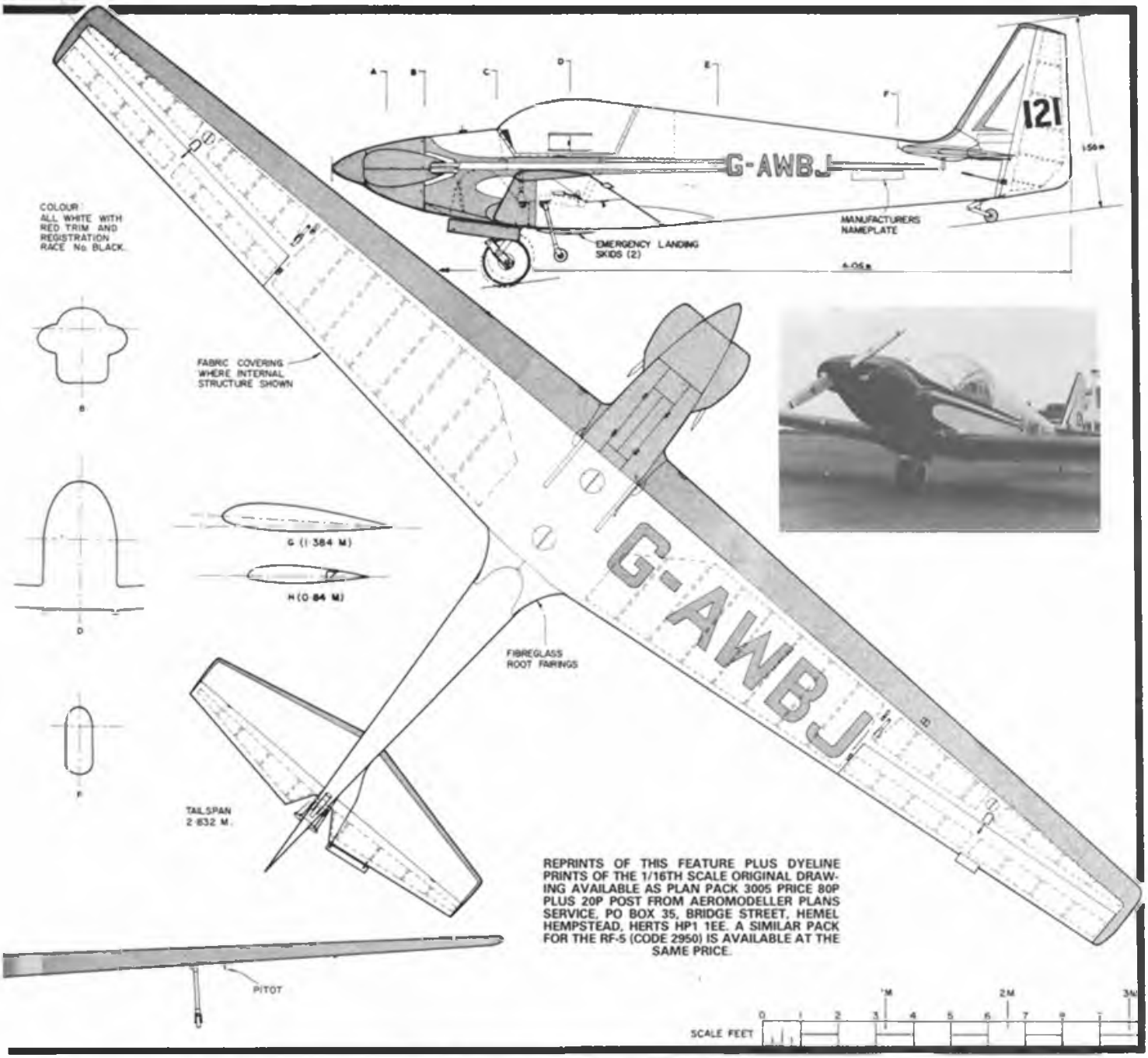
PHYSICAL DATA

Wing Span	36ft 11in (11.26m)
Length Overall	19ft 8in (6.05m)
Weight Empty	562lb (255kg)
Max. Take-off Weight	
(Aerobatic)	794lb (360kg)
(General purpose)	838lb (380kg)

PERFORMANCE (at Max. Take-off Weight)

Max. Level Flight	118mph (190kph)
Max. permitted Diving Speed	168 mph (270 kph)
Max. Cruise Speed	112 mph (180 kph)
Stall	43.5 mph (70 kph)
Service Ceiling	19,700ft (60000m)
Range with Full Fuel Load	410 miles (660 km)

The Sportavia Fournier RF4 has proved to be very popular with light plane pilots. Here Bravo Juliet, our subject aircraft fires up her 4 cylinder air cooled VW engine as a fellow pilot does likewise. They are ideally suited to the small grassy airfields typical of the local flying clubs.



1. Under the instrument panel, left to right. Throttle is push-pull, brake the umbrella handle type, radio in centre and at right, the big lever for wheel retraction. Interior is a grey with blue tinge – almost pale blue. 2. Side hinged canopy has numerous screws holding it to frame, a prominent scale-point. 3. Shrouded rudder and elevator hingelines rudder cable and return link to steerable tailwheel. 4. Port view of same shows elevator balance tab link plus external tail mount bracket

5. Hoffman prop has trademarks on each blade. Cowlings are slightly different Port and Starboard due to staggered cylinders. 6. Wheel close up, plus two external skids (in case of wheel failure!) Wire guides either side of wheel yoke open the spring loaded doors. White area is engine air outlet. 7. Rear of cockpit, red cushion on black vinyl, seat luggage area has extinguisher clip and radio. Constructor's number plate on bulkhead at top

8. External stiffeners on wheel doors, wire guides in front of wheel yoke, and expanding hub brake detail 9. Air brakes extend from upper surface as spoilers, in four elements each side. Wing fabric has light gloss finish 10. Outrigger started as a hoop, then had single strut (flexible) with small solid wheel. 11. Vent at upper rear starboard side; clear view and opening ventilator is on port side only. Decal in red and black is for attendance at Aspenair Int'l Air Race.

THIS MONTH:

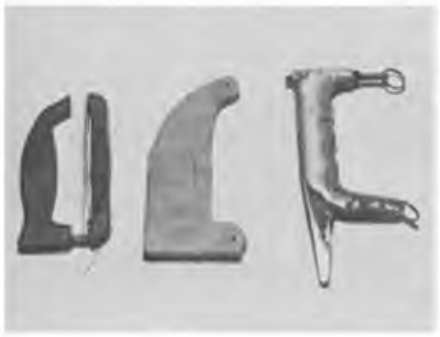
Pre Flight Preparations: Control Lines Flying Fields Launch Assistant

with John Stroud

AFTER COMPLETING the construction and thoroughly checking out a control line model there are still a few things left to be done before you can move off to the flying field. This month I shall be dealing with these preparations. 1. Lines and control handles, 2. Choosing a flying field, 3. Briefing a launch assistant.

Lines and control handles

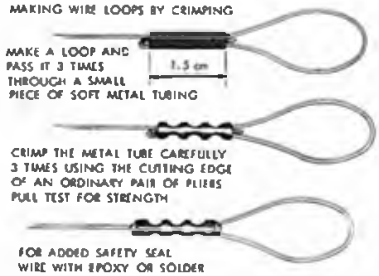
In any club you can find an enormously wide variety of control line handles in use and they all perform the job adequately. The poshest ones, costing a few pounds, incorporate a reel in the handle to store the lines on. They are very handy because one can lock the reels in any position and one set of lines can be used at various lengths. However, I eventually gave up using the one I had because every now and then the lines caught in the winding handle causing me to crash the model! The simplest handle is just a piece of stick with the lines tied to the top and bottom. Between these two extremes is a sensible balance which is either easy to make or cheap to buy. There are only two things a handle *must* do. Firstly it must provide secure attachment for the lines and secondly it must be shaped so that it is *very* obvious which is the correct way up. I have seen even extremely experienced modellers pick up their handle upside down in the heat of the moment resulting in an immediate dive and crash on launch. With the handle upside down, up is down and down is up – if you see what I mean. My handle is a well worn and trusty old one made by Davies Charlton, which has certain features of note. The spike makes it very obvious which is the right way up! It also allows one to stand it up by sticking it in the ground. This is particularly useful in long grass when handles seem to hide themselves and are never where you think they are. (Painting the handle a bright colour is also a good idea). The DC handle also provides for adjustment of the top line so that it can be adjusted to become exactly upright when the controls are exactly neutral. I find this feature particularly useful because I frequently swap the handle to use it with various models and sets of lines. The handle shown next to the DC is an inexpensive plastic one by Keil Kraft. Although one must adjust the actual line lengths to get the neutral right, it does provide adjustment for sensitivity as described last month. (When the lines are close together the controls are less sensitive to handle movement). If you don't want to buy a handle then cut one out of ply as in the photo. It will be perfectly adequate for all your early flying.

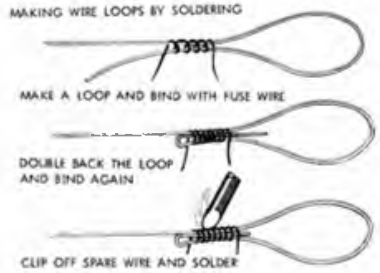


Left: ***Terylene lines stored on a lightweight Keil Kraft handle which has variable line spacing.*** Middle: ***Simple home made handle from ¼in ply.*** Right: ***D.C. handle with adjuster on top line.***

Above: ***Soft metal tubes crimped to hold looped ends, must be sealed with solder or epoxy to prevent lines slipping. Double loops add strength at point of wear, another point of safety.***

Above: ***Loops formed by binding with thin fuse wire before soldering. Neutralise flux after soldering by washing with baking soda solution to prevent corrosion from weakening lines.***





Control lines fall into three categories which are in common use. Nylon or thread, single strand metal and multi-strand metal. For beginners, flying trainer aircraft, the nylon or thread lines are probably the best because they are the easiest to take care of as well as being cheap. Storage is easy too because they can be wound round the handle. They do have some disadvantages in that they cause a lot of drag and slow the model down, have a slightly soggy feel and worst of all they do not slide over one another well to give control when the lines are twisted together. Even one or two twists is enough to give trouble and it is essential that the lines are sorted out before each flight. Providing your boy scout knots are up to standard, then nylon lines are very reliable.

If you can be bothered to make them up and look after them properly the lightweight 3 strand metal wires are my personal choice. This type of line scores over nylon lines on three counts. Firstly there is far less drag to slow the model down. Secondly they are responsive and not soggy. Thirdly they will slide over one another to give good control even with quite a few twists on the lines. Later, if and when you get round to doing some aerobatics, this feature is absolutely essential because flying a loop twists the control lines. The trouble with metal wires is that they are more difficult to make up

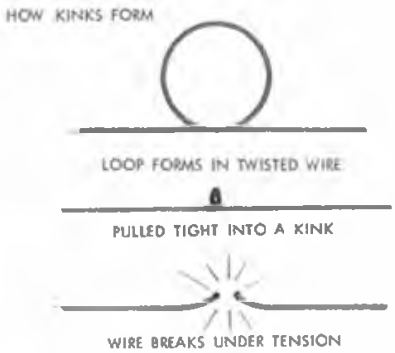
Above: ***David is briefed how to hold model ready for launch, the pilot must be able to see elevator, to check for neutral at launch.*** Below: ***the correct method of winding lines onto storage drum.***

and need to be looked after carefully. To make up a set of wires cut two lines the required length and form loops at each end either by soldering or crimping using thin soft metal tubing. Metal lines must be stored on a drum and not wound round the handle or over sharp corners. When putting metal lines on or off the drum you must always do so by rotating the drum. If it is done by winding the lines on in the same way as winding a ball of wool a twist is put in the lines with every revolution. Not only are these twists a bother to get out but there is the danger of getting the dreaded kinks. Kinks are death to control lines and models too because eventually the kink weakens the line and it will snap. When one line snaps, the model either gets full up elevator or full down depending on which line snaps and flying comes to an abrupt end when you "run out of height". Multistrand lines are also made in 7 strand heavyweight thickness which are far too heavy for training models.

For ultimate performance some modellers use very thin lightweight single strand lines. Whilst these are excellent lines they are very difficult to keep and store safely. Most of the line breakages I have seen have been on this type of wire and they are totally unsuitable for the beginner. The table gives a summary of my opinion and experience of these various types of control line.

Choosing a flying site

This is a subject to which beginners often give little thought but it can be the cause of both aggro and accidents. Let us start with the aggro first. Models make a noise which annoys; that is fact. The tone, volume and persistance of a control line model engine seems to touch a very raw nerve in some people. Hence if they live within earshot of where you choose to fly, they will complain. The trouble is that once they have complained it is very difficult to satisfy this sort of person even when you do make changes like moving farther away or fitting silencers. The trick is not to give grounds for complaint in the first place. Luckily engines of 1.5cc and below, of the type beginners use, are not very loud and are reasonable without



silencers. Always bear this in mind and remember that a site which is OK now, might not be so if you move to larger engines. If you can see someone's house, then they can hear your engine. At what volume depends upon the distance and wind direction. Any house over ¼ mile away is probably acceptable but it might not be, depending on how loud your engine is and the sensitivity of the occupant. If there are trees or other obstructions between you and an occupied house, this

Strap your model to your back . . . as long as it is not too big.

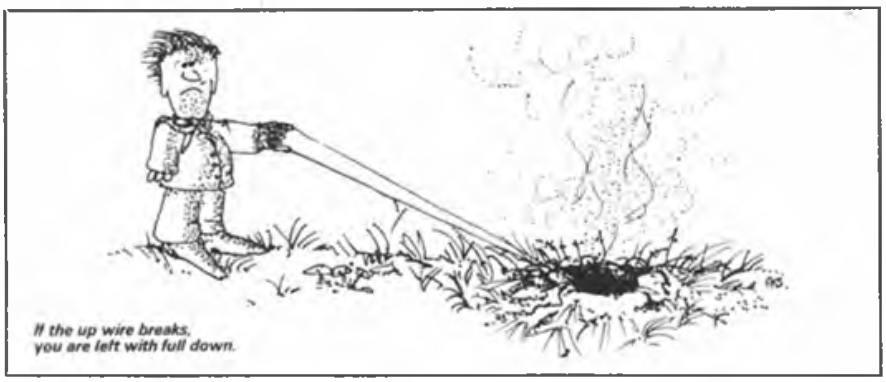
will help a lot. Many school playing fields and parks fail this first test and a cycle ride into the country becomes essential. Having found a site away from houses, we now consider the surface. For your first flights and for all flights without wheels on the model, grass is the only acceptable surface, and the longer the grass the better. Leave flying over tarmac or concrete until you are more experienced and the model is fitted with wheels. Next you must look for overhead obstructions.

ELECTRICAL OVERHEAD CABLES RULE OUT THE SITE COMPLETELY

Control line pilots have been killed by flying their models near overhead electric cables.

Now you have found your ideal site it will be necessary to identify who it belongs to. If it is a public place and you are certain you will not cause a public nuisance, annoyance or danger then I suggest you try using the site. Remember that if the spot is very popular you could have trouble with the spectators. You will need to keep them out of the circle.

If your chosen spot turns out to be a farmer's field then you **must** ask him before you fly. My personal experience is that they usually want to be helpful. In



If the up wire breaks, you are left with full down.

Summary Table of Control Lines	*Nylon*	*Multistrand (3 strand)*	*Multistrand (7 strand)*	*Single Strand*
Easy to make up	5	3	3	1
Easy to store	5	3	3	1
Liability to kinks	5	3	3	1
Drag/weight	1	4	3	5
Feel/control when twisted	1	5	5	5
Cost	5	3	2	4
Suitable lengths and engines	Up to 30ft Up to 1.5cc	Up to 55ft Up to 3.5cc	50ft–70ft 3.5cc & larger	Any Length and engine depending on diameter

Scoring 5=Very good down to 1=very poor.

Above: *Ian's father, Dick, is an experienced pilot and will teach him how to fly using a twin handle set-up. If Ian gets into difficulty, Dick pulls back, to take up line tension thereby taking over control.*

return you must keep the usual country code of honour and **never leave anything** on the field. If cattle or sheep get tangled with old control lines, eat broken props or elastic bands, they can die and are very expensive.

Because I live in the country I have never found it difficult to locate a flying site. However when I flew every weekend with a group of enthusiasts we did take precautions. The first was to obtain some form of insurance. *Aeromodeller* offers the Modellers Accident Protection Scheme giving £250,000 cover for a £2 annual premium. In addition we identified a number of flying sites and used them in turn. In this way we spread not only the risk of annoyance but also we lumbered different Mums for such things as tea, eats and perhaps thawing or drying out. We flew regardless of conditions.

Briefing an assistant

It is impossible to fly a control line model without an assistant unless you are prepared to go to a lot of rather unnecessary extra bother with launching jigs. Whether or not your assistant is an experienced modeller it is always worthwhile going through a set procedure to avoid mistakes, such as a launch when the pilot is not ready etc. Before you even leave the house check you have all the things you are likely to need. If you want to be really efficient, make out a checklist and use it. Some sort of bag or box is essential to carry all the bits and pieces.

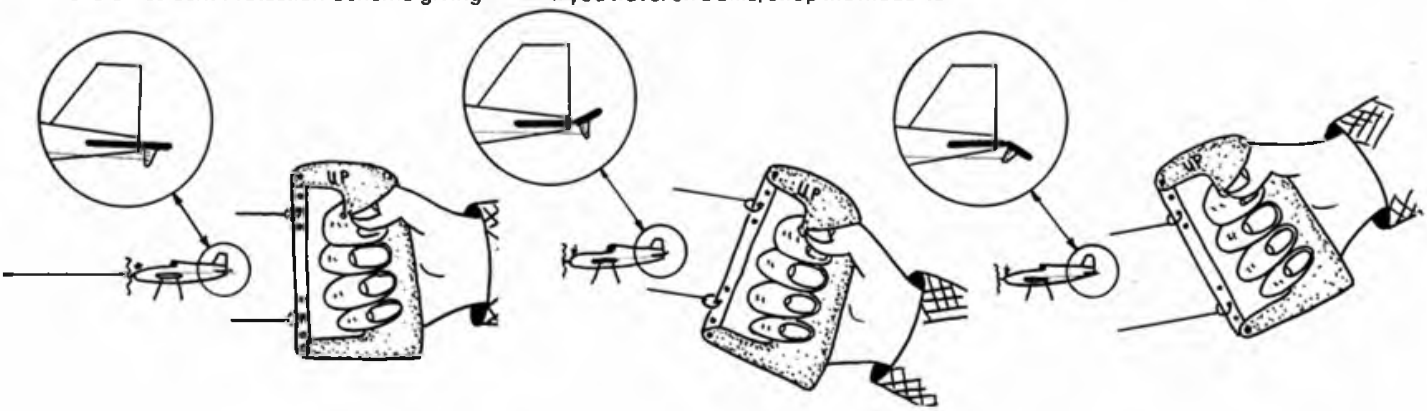
If you travel on a bike, strap the model to your back, or to the bike, rather than risk an accident riding one handed or risk dropping the model. When you arrive at your chosen field, select the site and connect up the model, lines and handle. If you use fishing line connectors choose stout ones because the smaller ones have been known to open up. Good quality split rings are better although they are more of a fiddle to put on. Untwist the lines if necessary and lay them on the ground a couple of feet apart. Get the assistant to hold the model securely by the fuselage, take up the handle and carry out a pull test. The whole system should stand a fairly firm pull but there is no need to use all your strength.

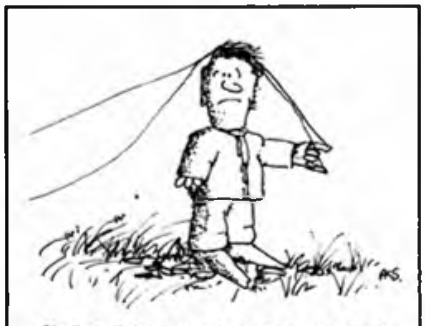
Check that 'up' is 'up'. Make sure there are no obstacles either in the flying circle or at least 30 feet outside it. This is because in the excitement of flying some people wander quite a distance from the original piloting spot. I put down some sort of marker, like a piece of rag which helps me keep in the same spot.

If your assistant is new to the game explain that you want him to launch the model only when you have signalled you are ready. Whilst he is waiting he should hold the model in such a way so that the pilot can see the elevator. This will allow the pilot to make a final check that the controls are free and moving correctly when he picks up the handle. At a prearranged signal the assistant should run a few steps and launch the model with a smooth level throw. The launching run should be in the arc of your flying circle keeping slight tension on the lines.

Experienced pilots and assistants usually use an underarm throw to launch their models. For learners I always feel it is better to use an overhead throw because it does give a little extra height and speed at this crucial point of the flight.

At last we have reached take-off point for your model. Next month I will deal with the problems of learning to pilot the model. Learning is far easier if you can get the help of someone who can already fly. Even Radio Control flyers might be able to help here! Or someone who once used to fly. It is worth doing some research among your friends, their brothers and their dads.





Similarly if the down wire breaks, you are left with full up.

Rob Metkemeijer and Enrico Flores continue the detailed account of the development and construction of their World Champs winning motor.

THE FMV STORY

Enter the Gladiators. Enrico follows as Rob steps into the flight circle for the Final at Woodvale, which he and brother Bart were to win with a new World Record time of 7:32.5 for the 20mk race. Right *The FMV stripped down to illustrate component parts. K&B rotor, Bugl prop driver, shortened Rossi piston pin and ball bearings are standard, the rest took 1½ years.*

LOCATING AND SEALING OF THE CRANKSHAFT, LUBRICATION OF THE FRONT BEARING

Because of the limited axial movement of both ends of the con-rod it was essential that the middle of the crankpin was located exactly (within 0.01mm) on the centre line of the cylinder. The measurements were carried out with the equipment drawn in fig. 6. From fig. 6 it is clear that, by measuring the distance difference to the dummy con-rod with the dial gauge in top and bottom position, the perpendicularity between the shafts-axis and the cylinder axis can be checked with the required accuracy of about 0.05°. The axial play of the shaft can be checked with the dial gauge on the crankweb by pushing and pulling the shaft softly.

In the case of the FMV the position of the shaft is set by putting a separate part into the front housing (see fig. 3). The thickness of the rear-ring determines the exact position of the shaft. This part also gives the sealing around the shaft.

A difficult point has always been the clearance necessary around the shaft to prevent touching. Since we want the clearance as small as possible to prevent excess fuel leaking through the front, calculations were made of the radial movement of the shaft at different places caused by the ignition of the motor.

Fig. 7 shows the approximate movements, for an 8mm shaft and 8-19-6mm and 7-14-3, 5mm bearings. With a stronger shaft and bearings (like the Nelson and Bugl have) these movements will be slightly less, but still of the same order of magnitude.

In any case it will be clear, that the best point of sealing the shaft is between the rear ⅓ and half the ballbearing centre distance, where the movements are smallest. This is unlike most commercial RV-engines having the sealing right in front of the main bearing.

A clearance of 0.06-0.08mm in diameter between the sealing ring and the bush around the shaft over a length of about 10mm has proved to prevent any touching and gives barely enough *leakage* to keep the front bearing wet (1 or 2 drops per tank). This lubrication is forced by average crankcase pressure through the small gap around the shaft. In most other engines this guidance of lubrication doesn't exist, because after passing the sealing there's no controlled way for the fuel to reach the front bearing.

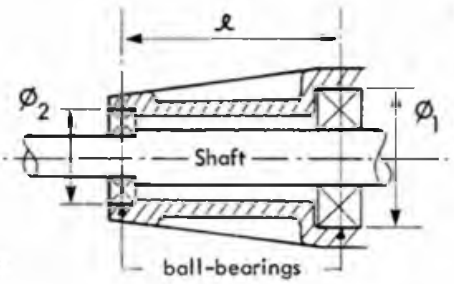


Fig. 5a – Shaft and bearings in an aluminium crankcase.

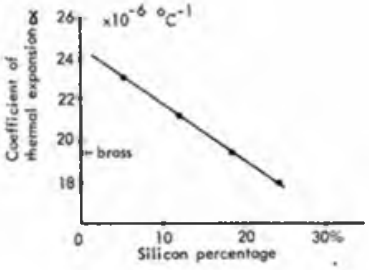
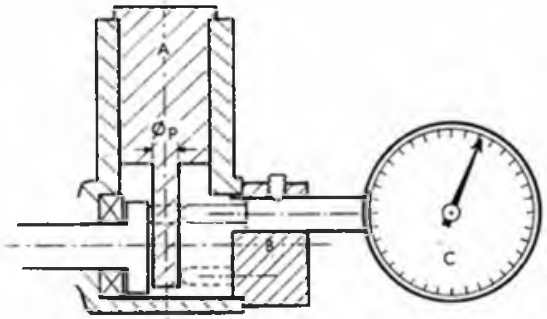


Fig. 5b – Curves of relationship between axial and radial clearance for Nelson bearings.

Fig. 6 – Measuring equipment to find the distance between the centre line of the cylinders and the rear plane of the crankweb. Part A fits closely in the cylinder hole and has a pin (ϕp), being concentric with the cylinder. This pin is the 'dummy con-rod'. The dial gauge, held in B, gives two readings, one for the crankweb and the second for the dummy con-rod. The distance between the centre of the cylinder and the crankweb can then be easily calculated, knowing ϕp.



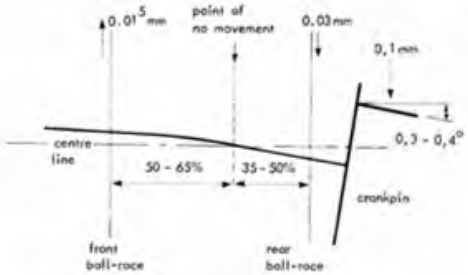


Fig. 7 – Radial movements of shaft during ignition. Figures are not exact, because peak pressures in combustion chamber are not known precisely. However, point of no movement is independent of actual forces. (Note that a bell valve fixed to the crankpin will move approx. 0.15mm!!)

BALANCING

Since we always found that vibrations (consider a pan not fully tightened), cause losses in performance, economy and consistency, we are convinced that keeping the dynamic forces, (the cause of vibrations) down to minimum is one of the ways to make a better engine.

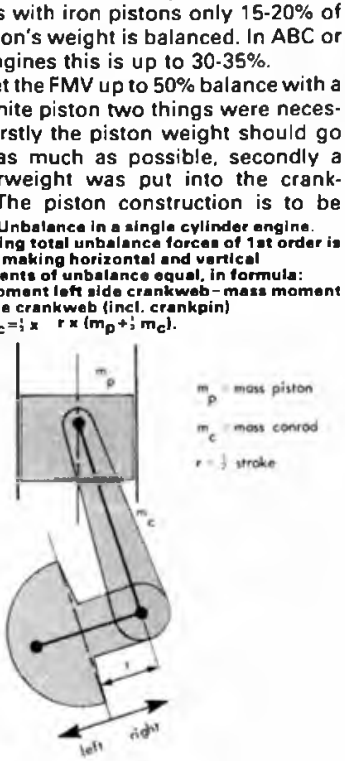
A great deal is known about balancing. One of the things being that it is impossible to completely balance a single cylinder engine, without bringing the reciprocating masses down to zero (except by using auxiliary rotating counterweight). One logical way of improvement is to lighten piston and con-rod as much as possible.

Is there any other reason, that aluminium pistons work so well?

The normal way to 'balance' single cylinder two-stroke racing engines is to counterbalance the shaft in such a way that first order horizontal and vertical reciprocating forces are equally strong, which means that the dynamic first order forces are minimized. See fig. 8 for explanation. In the presently marketed 2½cc engines with iron pistons only 15-20% of the piston's weight is balanced. In ABC or AAC engines this is up to 30-35%.

To get the FMV up to 50% balance with a Meehanite piston two things were necessary: firstly the piston weight should go down as much as possible, secondly a counterweight was put into the crankshaft. The piston construction is to be

Fig. 8 – Unbalance in a single cylinder engine. Minimising total unbalance forces of 1st order is done by making horizontal and vertical components of unbalance equal, in formula: mass moment left side crankweb – mass moment right side crankweb (incl. crankpin) $-r \times \frac{1}{2} m_c = \frac{1}{2} \times r \times (m_p + \frac{1}{2} m_c)$.




Right: Twin ball bearings with spacer bush, which clamps inner cages onto shaft, as prop driver locks back onto tapered collet on crank shaft. Bush is adjusted to right length using .02 and .03mm shims.

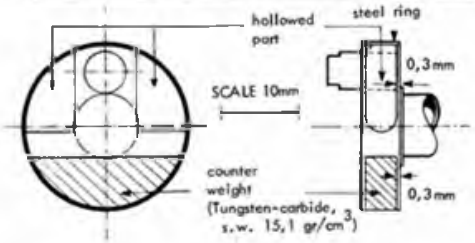


Fig. 9 – Crankweb of the FMV. Hollowing the crank web and counterbalancing with Tungsten-carbide weight helps improve dynamic balance, reducing engine vibration.

described later, the hollowing and filling of the crankweb is drawn in fig. 9. The counterweight is made out of Tungsten-carbide with a density of 15.1 gram/cm³ (about 1.5 times that of lead). A standard type cast iron piston, including pin (about 2 grams heavier than ours) would need a counterweight of gold or platinum! Financial problems therefore forced us to design a super light piston. With AAC piston/liners expected to appear this year, the problem of balancing will be solved more easily and with better results, with only a small counter weight in the shaft. (By the way, the FMV shaft with counterweight and bushing is as heavy as a standard Rossi RV shaft).

THE BIG END. THE ACHILLES HEEL OF THE MOTOR. INDUCTION SYSTEMS

The only real mistake in the design of the FMV was (and still is) the size of the crankpin: 5mm dia. x 3mm length. The reason to choose a short pin was to minimize the effect of non-perpendicularity caused by crankshaft bending (during ignition up to 0,4° rotation) and crankcase-bending due to temperature difference between front and rear of the cylinder (approximately 20°C, giving about 0.03° forward bending). With a short pin a small crankcase volume is obtained which is generally considered to be an advantage in a two stroke engine. Unfortunately because of the relatively small projected area (15mm²) compared with other motors (Rossi dia. 4,5 x 4,5; Nelson dia. 4 x 4,7; Super Tigre dia. 5 x 4,5; Bugl dia. 6 x 4,5) the generated heat per mm² is relatively high. (The specific generated heat is proportional to rpm, pin diameter, pressure and coefficient of friction.)

However, considering the small difference in area, it was difficult to justify why the FMV turned crankpins blue and ruined big-end bushes in the con-rod, while the Nelsons kept their crankpins and con-rods looking brand new even after hours of running.

The first ruined con-rod we saw in a Nelson (King-Rudd's) brought us the answer. King-Rudd had changed the induction system to a Natalenko type, having the same disadvantage as the Russian bell-valve type that we used at the time, which directs no fresh gas flow to the big-end.

An easy solution seemed to be to make a disc-valve on ballraces, admitting the fresh gases right in the bottom of the engine. But surprise, surprise, no improvement was found.

So at last we tried the Nelson (K&B) rotor, and it solved all our big-end problems. The explanation is quite simple after all. In a disc-valve all the heavy parts (droplets of fuel) in the fuel-air mixture were centrifuged to the outside without hitting the big-end. In the case of the K&B Nelson-rotor the particles will hit the crankpin on their way, also guided by the groove in the rotor front, thereby cooling and lubricating the pin.

The big-end of a motor really being a 'hot spot', could be used to help vapourising the fuel that arrives there, thus giving more efficient combustion (hope, hope!!).

At Woodvale, we had the opportunity to talk to Don Jehlik (World Champ. TR '66 and '68), more or less the supposed 'inventor' of this induction system used in his ETA and HP and it turned out that he had always known that this really helped to make those motors superior to everything flying around at the time.

A few things became clear now:

- Bugl had to go to a 6 x 4,5mm crankpin to solve his problems;
- Rossi RVs give more problems than Rossi FIs, especially at the big-end side;
- Our Rossi front-exhaust stopped being a 50-lapper after changing to a Natalenko drum.

The gas-flow of the Nelson-K&B rotor is identical to that of a front induction system, so why not use an FI-engine in TR? We think there are four main reasons not to do so:

- The crankshaft on a FI-engine is a little monster, stiffness and strengthwise.
- It makes the use of a bush between the inner rings of front and rear bearing nearly impossible;
- The carburettor will probably be exposed to turbulent air all the time and also to dust while on the ground;
- Too long a distance between tank and spray-bar will cause acceleration troubles and fuel pressure differences between flying and ground running, depending on the position of the fuselage.

Getting back to the size of the big-end, there are indications that a length-diameter ratio around 1, like Rossi and Super Tigre have, is a good compromise between sensitivity for the shaft's oscillation and that for end effects of an excessively short pin (pressing oil to the sides and shortening the length of the lubricated part considerably). Maybe this effect made the FMV big-end extra critical for the type of induction system.

A few words about the material of the pin. Although it is difficult to understand the reasons, the *hardness* of the pin has turned out to be of extreme importance.

The needle bearing rollers used in Nelsons, the FMV's and some other motors are very hard (over 1000 Vickers), which is more than any other crankpin in one-piece crankshafts. After a very interesting talk to Don Jehlik at the World Champs we plated the pin of one FMV with hardchromium (layer thickness 0.001mm) and found about 0.5 secs/10 laps improvement. A hard chromium plated surface, being extremely hard and also porous seems to have significant advantages. Be sure that the hardness of the chromium plating is at least 1000 Vickers. For example, the chromium plating on ST G15 and X15 big-end pins is far too soft to be used with a hard type bronze or cast iron bush in the con-rod, and fell off during a few experiments we did.

Since we really believe that a lot of the power of our motors is wasted in the big-end, our future investigations will be focussed on materials selection and design of this part, including improved cooling and lubrication.

THE TOP END OF THE MOTOR

Our ideas on con-rod, piston assembly and cylinder head, as well as on the thermal aspects related to cooling will be described here.

THE CON-ROD

Although a simple part, the con-rod plays an important role in the engine. Since its weight affects the balance of the motor, it has to be made as light as possible. Not having done experiments in thinning down con-rods to the point they will break, we still use our original rod. It's main body has a cross section of 7 x 2,5mm², the small end has a dia. 4 x 4,5 journal bearing and the big-end one of dia. 5 x 3mm. Its weight is 1,9 grammes.

Until now bronze bushes were used with a wall thickness of 0,25mm. There is absolutely no reason to use thicker bushes and it leaves more room for the dural (AISI 2024 type). Our bushes were mounted with a 0.01mm interference fit and loctite hot retaining compound. Minimizing vibrations is an important part of our design philosophy so we gave a lot of attention to the free-play of the con-rod in all possible directions. A play of ~0,025mm on both crankpin and piston pin fit was found to be right and a few experiments on tighter and looser fits gave no dramatic effects. This is probably due to the fact that the difference in thermal expansion between the steel pin and the con-rod is about ~0,01mm at 150°C. The fit of the crankpin into the big-end shouldn't be too tight anyway, to allow the crankshaft bending during ignition.

In the description of the crankshaft positioning it was clearly stated that we want the con-rod as well as big-end exactly on the piston axis. Limiting the con-rod lateral play on a big-end and small end location was the only solution we could find for the problem. At both ends a lateral play of 0,06mm has been used. See also fig. 10. Looking at con-rod small ends and piston pins told us, that in normal type piston the axial movement of the con-rod is considerable, introducing perpendicularity errors and increasing heat generation of both big- and small-ends.

PISTON AND CYLINDER. CHOICE OF MATERIALS, LUBRICATION

In order to minimize friction at higher temperatures it is necessary to make a piston of a material with a smaller expansion coefficient than the liner. The first experiments on Bugls, done by Enrico Flores and Visser-Buys, was to change from the original cylinder material (Phoenix-Triumphator with a coefficient of thermal expansion α of 10,0 up to 10,5. $10^{-6}\,°C^{-1}$) to a cylinder made out of a stainless steel type with a α of $14.5.10^{-6}\,°C^{-1}$. Supposing the piston and cylinder temperature to be equal, the piston fit for a piston out of Meehanite or similar: $\alpha = 10.0.10^{-6}\,°C^{-1}$ in the original cylinder remains about constant over a large temperature range. However, if the piston gets slightly hotter the fit gets tighter, increasing friction and thus heating up the piston more, eventually causing engine seizure. This probably explains the typical quick way that Bugls Mk I and Mk II seize. With cylinder material of a greater coefficient of expansion, friction reduces at higher temperatures, so the heat generation will be stabilized. This modified cylinder gave the Bugls a different character indeed! Even over-compressed or far too lean they would never seize, they only slowed down, but went on running

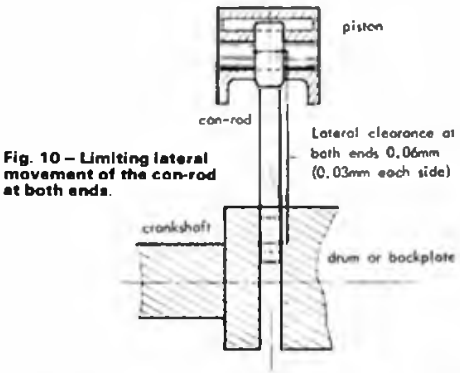


Fig. 10 – Limiting lateral movement of the con-rod at both ends.

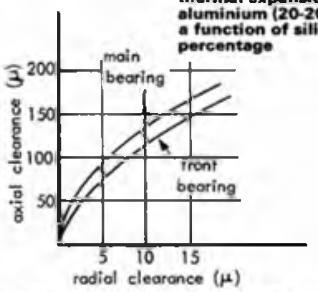


Fig. 11 – Coefficient of thermal expansion α of aluminium (20-200°C) as a function of silicon percentage

The advantage of a 'stable' system is that it can be set very near to the maximum performance, without risking an extra stop because of a sudden seizure. In the worst case the penalty will be a few 'hard' laps at the end of each tank. The old Bugls had to be set somewhat under maximum speed, in order not to risk a sudden seizure. Strangely enough some were better on this aspect (Louis Petersen!) and some were really critical. This could probably be explained by slight variations in the expansion coefficient of different samples of the same kind. In Louis' case, the 'lapping' of the piston to the only fit that would work in the air, still giving good starts, was probably of conclusive importance and also quite a difficult job as I can tell you! Also the tapering of the liner has strong effects, but this will be discussed later.

In the FMV, and the first production Nelson, Meehanite pistons were used in combination with very ordinary steel (free cutting steel) hard-chromium plated liners. Our type of free cutting steel is DIN 9 S Mn 28, an alloy suitable for easy chromium plating. These steel liners have a coefficient of about $11.5\text{-}10^{-6}\,°C^{-1}$. We'd like to find a steel, preferably free cutting (!) with a somewhat higher $\alpha \sim 12.5\ 10^{-6}\,°C^{-1}$, but haven't found it yet.

In ABC and AAC the difference between α's can easily be chosen by variation of the sillicon-percentage in the piston. Fig. 11 shows the relation between α and silicon percentage in aluminium. It shows also that an 18% Si-Aluminium alloy should be good for brass or a 12% Si-Aluminium alloy cylinder. The mentioned alloys can for instance be obtained in bars through dealers of Mahle – Germany. (Mahle 138 and 124 alloys respectively).

(continued next month)

TOPICAL TWISTS

by Pylonius
illustrated by Sherry

"Took a bit of time, but I got the temperature just right at last . . ."

Degrees of Change

After reading a learned treatise on the latest polysyllabic, ultra expensive, super adhesive, it occurred to me that the model builder of the future, if not the present, will need something in the way of a scientific degree to cope with the technological tide that is sweeping away the traditional ⅛" square strip in favour of polysaturated resinous fibre or whatever it might be. Elsewhere I was reading of the peculiar properties of the film covering that is giving the old tissue such a hard life, particularly the alarmingly high temperatures required in its application. I don't know how to measure the scorching heats required, but perhaps you need a degree in technology as well as science. Now, since everyone seems to be eager to have a go at model building you might see some change in the future participants in University Challenge. They will not be 'reading in Mediaeval Etruscan Literature', 'Social Origami' or the other obscure subjects that make for a progressive Britain, but in 'Comparative Aeromodelling', or whatever it takes to produce a fully equipped and trained model aircraft technologist.

What frightens me about all these wonder compounds foisted upon us is in the expanding ratio of the price tag to the miniscule amount of the substance supplied. It is the case of the incredible shrinking tube. I was in the shop reading a small card then looked around for the product it referred to. Failing to locate it I then noticed this tiny capsule on the card itself. I was reluctant to buy it mainly because of a process involved in tubal manufacture but not widely advertised: that of pneumatification, in that the exudation from the first squeeze of the tube is pure air. One fumbling nip at that tiny capsule and there might be hardly enough substance left to glue up an experimental finger or two.

The new materials could also have a most disruptive effect on family togetherness: doing nothing for the chap who likes to stick his bits of balsa together in the corner of the sitting room as the rest of the family engage in the normal domestic pursuits such as looking at telly, looking at telly, looking at telly. The crafty craftsman in the corner is not altogether uninvolved in this activity either, as waiting for the old fashioned glue joint to set he takes a look at the more exciting snatches of TV action, like the deodorant adverts.

The modeller can hardly continue in this nice, cosy family relationship if he starts juggling with the new deadly compounds. "Mum, why hasn't Dad moved since last night?" "I suppose he's just got stuck to the table again, son." Setting up a small scale chemical plant in the living room can pose a decided threat to the health of the Busy Lizzie and the Rubber Plant, not to mention the tropical fish and the family. Imagine what might happen if you were working up to a high temperature. It might not have anything to do with the explicit scene on the telly but it could upset your concentration enough to put you in danger of putting up a personal flight time in excess of anything your model may achieve. More and more processes will have to be carried out in the garage, even though the possibility of harming the family car is not likely to advance domestic harmony. The only consolation we have, future wise, is that very few people will be at work, anyway, and most of those will be on strike. This means that you will be taking your brief case each day to the Model Building Centre where, in special anti-fume masks and asbestos suiting you can enjoy the new style of model building to the full.

Splashing Out

Bognor Birdman waits his call.
Will he dive or will he stall?
Though on the pier
He need not fear
He hasn't all that far to fall.
But to those who by the seaside dicker
Pedal power could bring fame quicker,
And could by chance
Land in France
For a hundred thousand nicker.

Polishing Off

Looking at those super models in the colourful pages of our model journals is one thing but seeing them in the flesh, as it were, is quite another experience. I could only conclude that the models I saw on display at the M.E. Exhibition were the work of supermen, presided over by a smiling fortune that avoids all the botches and muck ups that attend on us lesser mortals. Not for them the twisted fuzz, the lop sided dihedral, or the blotchy, unpolishable finish; all is perfection, and a bit more.

What is more the very thought of all those eyes straining, nerve tensing hours that have gone into the construction of these supercraft not only makes me feel utterly exhausted but more than a bit guilty at my own lack of application in my 'quickest route to the flying field' style of building. When I think of all those useful hours wasted looking at television or just dreaming of the models I'd like to build if I could summon the energy to get out the building board, I feel quite ashamed. Yet I wonder if the restraint I exercise is wholly due to laziness. It could also be thought of what could happen to the outcome of all those industrious hours when the product gets on the flying field. I keep reading of marvellous scale craft not so much biting the dust as attempting to swallow unappetising runways. I just could not face up to that sort of situation – it takes me weeks to get over the loss of a chuck glider.

You can, of course, stamp a preservation order on your model by hanging it from the ceiling. And I see quite a lot of super models happily flying over the counters of model shops where they can be safely admired. But even these take on a dusty patina after a time, losing something of the old glitter and glamour; and looking a little sad like fine old working horses put in a field to graze. To my mind models are not models unless they are activated, and this is why there may be certain limits to which you should go in the way of fine detail and authenticity. What captures the eye on the flying field is the super gaudy decor to which our American friends give such exuberant expression – what you might call colour screams.

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Commentary by **D. B. Sound**
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SCALE MATTERS

CO_2 MODELS

THE CO_2 MOTOR has done wonders for stimulating interest in small scale models in recent years. Three nice examples of the variety of subject that can be confidently tackled have been added to David Deadman's stable over recent months. His Curtiss-Wright Junior was featured in this column quite some time ago in its skeleton form, but now has been completed in an attractive maroon/silver colour scheme together with a gent and a lady occupying the fore and aft cockpits respectively. Very respectively, in fact! The model proved to be something of a handful to trim at first. The high thrustline pusher arrangement combined with a very close proximity of the large tail surfaces caused some rather peculiar effects that were not consistent from flight to flight, and at one point Plasticine ballast was added to the wheels to try to provide some added stability by means of a lower centre of gravity. At this time a two-bladed propeller was being used and the model seemed underpowered. To try to get more thrust a three-bladed prop was made since the prop diameter was limited by the scale cut-out in the wing trailing edge. The prop was made from blades cut from Peck-Polymers rubber props and Araldited together at the hub. Exactly why it works remains a mystery, but this seemed to cure the model at once, and it will climb and circle relatively easily now. In fact some of the weight has been removed from the undercarriage, and the CG can be moved rearwards without too much adverse affect.

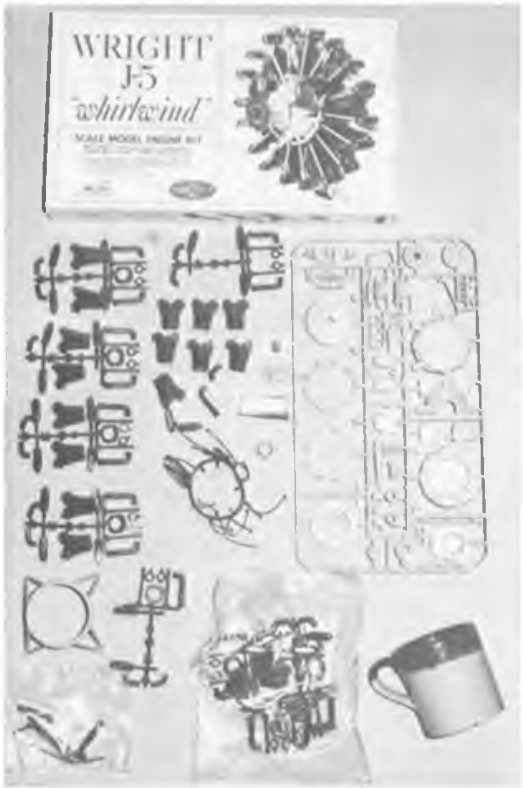
Another interesting trimming solution was found on the Fw 190. This model was built from a commercial kit and converted to CO_2 and so is not as accurate as the Junior. Built without undercarriage, it proved impossible to fly in any reasonable way, and so some extra weight was again added below the CG in the form of a rather chunky bomb. The model now flies. I have discovered this effect before on a low-wing model, and it seems that if the CG is kept low and fairly well forward you have the beginnings of a trimmable model – undercarriage retracted or not. The 190 shown here has all the trimmings in the way of a colour scheme applied by airbrush, and also features knock-off wings retained on short stub dowels by rubber bands through the fuselage.

David's third model is a scratch-built Hanriot HD1 powered by the Telco motor. Again, a neatly-applied camouflage scheme sets the model off really well, but this time the model has accurate rib-for-rib construction together with working rigging. To the familiar problem on this type of model of what to do with the filler valve to make it not too obvious, a clever solution has been found by disguising it as a typical rotary engine carburettor air intake found on the left side of the fuselage just behind the cowling. This is certainly a good arrangement since it not only looks quite convincing but also is fitted directly behind the engine-mounting plate at what is probably the strongest point on the model. The Hanriot also features a torsion bar sprung undercarriage as well as removable mainplanes held in place with small rubber bands. The 'W' configuration cabine struts make a very firm platform on which to mount the upper wing which is in one piece. The lower wings, like on the Fw 190, are located on short stub dowels with a small rubber band running through the fuselage between hooks in the wing roots. Thread rigging with thin elasticated loops holds the whole thing together.

DUMMY ENGINES

A highly-detailed engine is often the crowning glory of a well-built scale model, particularly if the builder has put in a bit of lathe work on it rather than using methods akin to the string-wound-around-half-inch-dowel techniques to be found on many an old plan. A totally accurate and convincing exposed engine of any kind involves a great deal of work – often as

Three of David Deadman's CO_2 models. Left: Curtiss-Wright Junior uses Brown motor operating pusher prop, filler concealed behind noseblock. Below: Fw 190, note heavy bomb under wing for trimming. Right: Hanriot HD1, 16in span. Telco power.



much as is put into the rest of the model altogether. Consequently such a feature on a fullsize subject where everything is on show is often a deciding factor in the debate on which model to build next. A type such as the Sopwith Camel on which the engine motor itself rotates is very difficult to do full justice to in the engine department without the major compromise of fixing everything solid, but even then *all* of the rotary arrangement should be on show when the subject is put under close examination. This can be a daunting proposition in the face of other possible subjects such as a Leopard Moth or even a Spitfire where most of the powerplant is tucked out of sight. It certainly would be ideal to have a fully usable rotary glow or spark ignition in your next WW1 subject, but the intricacies of such a device make a fully operational unit to a very small size comparable with the most commonly used motors an almost impossible proposition. The only working model of this type that I have come across is the 1:5 scale Monosoupape built immaculately by A. Walshaw which I saw running at a previous Model Engineer Exhibition. Although it ran well and was quite large, the amount of power given out was probably not enough to fly a model built to the same scale no matter how well materials can be chosen. So, faced with the problem of building even a dummy replica, one cannot expect the result to look very good especially to a large scale without a fair amount of effort and original work being necessary.

Right: ***Scale engine kits from Williams Bros. cleanly moulded with super detail. Alan's no mug, he included his coffee cup for scale!***

Many people must be aware of the excellent engine kits and dummy engine accessories produced by Williams Bros, who also produce wheels, pilots in various styles, and machine guns, to the same standard. The individual cylinder heads in very small scale which are available in packs are a very good basis to use to build up almost any kind of engine on an indoor scale or CO_2 powered model. It should always be borne in mind, however, that if these are used on a model that will be entered in contests regularly, to expect credit on your scoresheet from the motor department will require a fair bit of additional detail over and above the plain cylinders if the judges' eyes are as sharp as they should be.

I have used several of the small Williams accessories in the past on small models but recently went 'all out' and acquired one of their excellent large scale kits for a full engine. The one chosen was the Wright J-5 Whirlwind to 1½in=1ft, or 1:8 scale. One of the most famous of America's 'airplane' engines which powered many well-known types such as Lindberg's 'Spirit of St Louis', Ford Trimotors, Stearmans, Fokker Universals, etc., it also was used in some much more obscure craft such as a Hamilton 'Metalplane', Ireland 'Neptune', Yancey Monoplane – all unfamiliar names to most of us but which would be interesting to swot up some day.

The kit is fully detailed from the prop nut back to the mounting frame, and comes with the cylinder heads, rocker covers, and other small parts moulded in black plastic, most of the crankcase is moulded in grey plastic, and the ignition leads together with a few hoses are moulded in a soft flexible black plastic. There is a great deal of scope for some really subtle painting in order to represent a used but well looked after example, as well as some extra super-detailing, by someone who may have the necessary documentation to back it up. The finished item in this scale is almost six inches in diameter. The stablemate to the Whirlwind in this range is the Le Rhone rotary which is available in 1:6 and 1:8 scale.

Where and how to use it? The kit is quite good enough to build as a display model in its own right by any standards, but obviously would look very well on a flying model. I have not yet tested its resistance to hot fuels either diesel or glow, but suspect that this would not be very high. A large rubber scale model would be an ideal opportunity, since having additional weight at the nose is something of an advantage. As a matter of interest all the components as shown in the photo weigh 155 grammes, or roughly 5½ ounces, not forgetting that this includes the moulding sprue. As mentioned previously, however, no matter how neatly it was made, a contest judge should give a resounding '0' for a commercially available item that is simply bolted onto an original model. The best solution for the dedicated would be to use a kit such as this or the Le Rhone as a reference and documentation for a scratch-built copy, since in this way it would overcome the difficulty that some have in translating a scale drawing or photograph into a three-dimensional object. The Williams version could then be neatly painted and put on display in the model workshop or some other approved domestic location! I cannot advise as to the general availability of these full kits but this particular example was bought at Henry J. Nicholls where a good stock was in hand at the time of writing.

Below: ***Fokker Eindecker by Robin James won CO₂ event at Crawley with superb flights***

Crawley Indoor Meeting Feb 11th

To the many indoor scale fliers in the south this meeting heralded a very welcome start to the 1979 flying season which hopefully will bring forth a good deal of revived interest now that Cardington is back in the scale fan's contest diary. There is nothing to rival regularly staged meeting for reassuring interest in any class of model, even though, like Crawley, they are only held annually.

Of the two scale events held, CO_2 and Peanut, the latter continues to prove to be perhaps the most popular flying scale model event ever devised. The biggest attraction of Peanut scale lies in the complete freedom of approach that one has; it is just as acceptable to build a simple straightforward model and then get it to fly really well, as it is to attempt all the super-detailing one feels capable of on a model that may not be so good in the air. Neither extreme is grossly frowned upon, since the basis of the event is to have some fun, and anyone who has tried to trim a Peanut model properly will attest that this is true! No?

On the other hand the CO_2 scale model has yet to find a happy niche on the contest scene. Outdoors, many models are flown for fun, but the indoor flying contests staged so far over quite a period of time rarely draw more than a handful of entries. A model that copes very well with wind, gusty conditions, and heavy landings outdoors usually seems alarmingly fast, heavy, and vulnerable when flown at an indoor venue in flat calm. It seems obvious from this that the purpose-built indoor scale CO_2 model that best exploits the obvious potential has yet to make its appearance. At the moment most models are too heavy and too small to rival the rubber model, either Peanut or Open Scale, for quality of flying under indoor conditions.

The winner of the CO_2 event, Robin James' *Fokker Eindecker,* flew extremely well and in some way helps to make this point. Robin's best flights were on quite low power, for when the throttle was opened up slightly the model performed a somewhat stalled steep climb to altitude, hitting the ceiling at one point, and then did a rather steep landing approach before touching down. Perhaps over-elevated, it nevertheless maintained altitude very well on low power, but take-off and landing were much smoother. Built and converted from an APS RTP electric model plan, the *Eindecker* also featured scale rigging, which, as is noticeable on many models so adorned, does have a measurable effect in slowing the model down in the air. This slowing down does not automatically mean that the model is becoming more unstable and nearer the stall, since stability is maintained by adding a little more power. Many fullsize STOL aircraft require more power to fly really slowly than they do to cruise economically 'clean'.

Although it came tops in the static section, Butch Hadland's *Pietenpol Aircamper* was plagued with ROG problems and so most flights were hand-launched. This rather chunky red/yellow subject is beautifully detailed right down to the Ford engine, and was flying noticeably faster than the *Fokker* but in very steady banked circuits with a straightened landing approach that requires more space than the Crawley hall provides. Third place was taken by A. Sweetland with a *Piper Cub* that I did not see fly. Although not entered, Robin James also had with him a delightful little *Flying Flea* designed for outdoor flying. This little one captured much of the air of the real thing and the CO_2 gear was very well disguised indeed.

The Peanut event attracted 21 entries with fourteen actually appearing and making flights. It's always refreshing to see new designs and very impressive was Peter Frostick's OD *Wittman Tailwind.* This popular subject was immaculately painted and featured a number of special vac-formed components including the entire nose-section fabricated on a machine built by Peter himself. The low (12th) final placing was no reflection on the model itself but due to a lack of official contest flights. Not an oversight to repeat!

Others that caught my eye at the scale table included the simple tissue-covered *Chipmunk* by R. Argent, and the slightly more detailed *Boulton Paul Defiant* by P. Simmons. Keith Miller's very pretty *Avian* is now nicely trimmed for flight but only requires a little more duration through experimenting with prop/rubber combinations to put it in the running since being a highly detailed biplane it will always do well in static.

Top honours again went to Rex Oldridge's *Isaacs Fury* – the only model to achieve two one-minute maxs in its three flight schedule. This is even more remarkable in the knowledge that the model rarely goes over about twenty feet in altitude. The really long extended cruise is quite the most realistic of any Peanut that I have seen. My own *Widgeon* once again trundled into second place and is now looking quite well-worn due to various repairs and patches to the condenser paper covering, but still will return reasonable and reliable flight times. Although Rex's model is tissue covered,

More models from Crawley. Top: *unusual Peanut Boulton Paul Defiant by P. Simmons in black tissue finish. Nicely moulded canopies enhance a simple model that should fly well when trimmed.* Above: *Peanut Chipmunk by R. Argent was neat and simple.*

these two have approximately the same wing loading. My monoplane weighs approx. 5 grammes with rubber, whereas the biplane weighs approx. 11 grammes. The *Widgeon* needs 1400 turns on a 20in loop of .060 Pirelli, and the *Fury* 1700 turns on a 27in loop of .090 to return the times shown. The *Fury* turns to the left in banked circuits, whilst the *Widgeon* turns right unbanked, skidding somewhat, and was hitting the ceiling on its longest flight. A certain Mr Hadland again topped static with his *Lacey*, but returned some surprisingly low flight times to finish third overall. In fourth place came Bernard Aslett's ultra ultralight *Cougar*, and fifth, John Coker's *Luton Minor* came from an Andrew Moorhouse kit. These five quite contrasting models gave a spread of only 83 points from the system being used, and the 1 minute max. seemed a popular inclusion. Probably for the first time in this country the score placing system was not used in a Peanut event and although I may be accused of bias I feel that the straightforward score used here is a much better measure of the model and of course it does not produce ties.

This was a very enjoyable meeting with none of the overcrowded airspace in the scale sessions that occurred last year, in fact there was room for more. Watch out for next year's date and get your model nicely trimmed in good time.

Trevor Faulkner explains

How to Laminate Double Curvature Forms

Top: *¼in wide strips spirally wound around shaped plug. Balsa former used at nose to be finished with tapered block.* Above: *second layer added spiralling in opposite direction.* Below: *Balsa slivers added to fill larger gaps.* Bottom: *Nose block added and shaped before laminations are finally split lengthways to extract plug.*

Double Curvature Forms require a modified version of the process described last month as the first layer cannot be withdrawn from the former without cutting. In addition, in any example where the girth in the central area is greater than that at either or both of the ends, it would be tiresome to calculate the complex shape of the strips required.

The simple practical solution is very much on the 'suck-it-and-see' tradition of model-making (or quite a bit of engineering, come to that!)

A former of the appropriate internal dimensions is again made up and waxed. Should the shape come to some kind of point, it is worth considering whether to involve oneself in the rather more difficult problems that this will pose, or whether it might not be best to proceed as in the illustrations, finishing the last inch or so with a profiled block.

The strips to be used may with advantage be rather narrower (perhaps ¼in or so), than those for the boom as each strip will need to twist and bend at the same time.

The former is assessed to see which end is likely to provide the best starting point. A number of soaked strips are held at that end by a rubber band and skewed to the required winding angle. It is possible to arrange for a complete coverage of the starting end with these strips, adjusting the angle at which they lie to take up any gaps.

Work proceeds along the piece as a number of bands are added every inch or so to hold the strips in position. It is much easier to adjust these parts using broad elastic bands than to begin by bandaging. When all the strips are in place, a check for overlapping needs to be made and offending parts trimmed. Any gaps may be ignored at this stage, as, one by one, the bands may be removed to be replaced by bandage.

When the assembly is dry, a stage-by-stage removal of the binding will allow strips of masking tape to hold the formed parts firmly in place. The gaps mentioned earlier are now filled using more wet strips cut to shape, removing any intervening masking tape which prevents proper fitting, replacing this with a new tape when fitting is satisfactory. Once more the whole unit is bandaged, this time to ensure that the filler strips take up the curves required.

After bandages are removed from the dried unit (which is still held by the masking tape), a series of tissue strips (as used on the boom), are pasted between the strips of tape. The tapes are removed once the tissue is dry; the whole unit will be found to be held firmly to the former, and to have assimilated its shape.

If a balsa bulkhead has been used as in the illustration, a layer of glue may be introduced between it and the strips at their point of contact.

Because of the multiplicity of strips by comparison with the boom construction, it is inappropriate to seek to cover each edge joint with a tissue strip as this would reduce the available wood-to-wood gluing area unacceptably. Instead, the following method has been evolved which works well in practice.

1. A number of strips are cut and soaked until flexible.
2. These are placed on a flat surface so that the sides exposed to the air will dry more rapidly than those in contact with this surface. (They may also be found to curve slightly which is all to the good.)
3. The drier sides of the strips are then coated with PVA ('white') glue, and assembled over the first layer already on the former using rubber bands to hold them in position as before, but lying in the opposing direction.
4. Filler strips are added; these must also have been soaked, partly dried and glued. The holding bands may be eased temporarily to admit them.
5. Excess glue is wiped off and bandaging carried out exactly as before. (If ¹/₁₆in thick balsa is used, there is no need to remove the bands, as the marks they leave will be removed in the final sanding.)

At this point, the whole affair is left for a good twelve hours in a warm place, subsequently being unbound. Any nose block can then be glued in place, ready to be carved and sanded to blend with the laminates, which are also thoroughly sanded. Using a sharp slim blade, incisions are made to split the laminated shells apart. This is the thrilling part, as the beautifully moulded halves are eased away from the former. They should be glued together as soon as possible to prevent casual edge damage and to ensure that no 'springing' can occur.

It only remains to say that there is, of course, no limit to the number of laminate layers which may be used; although it is not recommended that the complete beginner to modelling or craft techniques should embark on such a project, anyone reasonably acquainted with hand processes for materials will find the method surprisingly simple.

Aeromodeller

We wrap up our ORANGE BOX plan feature with radio installation and flying technique details

Covering and Finishing

There are several ways the model can be covered and finished. Nylon, silk, tissue or plastic film are all suitable. The choice is largely dependent upon the builder's preference and whether the model will be slope or thermal soared. The prototype was covered overall in nylon, the fuselage and outer wing panels in day-glo orange and the remainder in white. I can recommend the use of a strong colour scheme when flown from the slope at long distances to help with orientation problems. However do not paint all the wings or tail as this adds too much weight. Dope, enamel, coloured nylon or tissue are fine on the fuselage. Plastic film has the advantage of solid colour even on wings for no additional weight but is not quite as durable as nylon. The name 'Orange Box' originated through the use of the above mentioned colour and boxy shape of the model. I do not propose to deal in depth with stage by stage notes on covering this model.This has been well dealt with in the model press and in books, and there are so many variations I could not hope to give more than brief details. In any case, this stage is the same whether a model is kit built or plan built and therefore, falls outside the original aim of the article. After covering, the rudder and elevator can be permanently hinged and pegged. Aim for an all up weight, ready to fly of about 28ozs, lighter for a purely thermal soaring where heavyweight tissue could be used, but do not exceed about 2lb for a slope soarer as the light wind performance will suffer.

R/C INSTALLATION

Rather than take the glib way out by telling you to install the R/C equipment as in the manufacturer's instructions, we will take you through a typical installation.

Fig. 1 shows a typical installation for the complete airborne pack of two servos, receiver and battery pack. Note that the battery, the heaviest single item, is at the nose. In the next compartment is the receiver and behind that, under the wing, are the servos. This layout is a compromise of convenience and necessity. The battery pack is positioned nearest the nose to ensure that, in the event of a crash, it does not tear forward and damage the more vulnerable receiver and servos as would be the case if the battery were placed at the rear. Ideally, the receiver, being the most vulnerable of all, should be placed behind the servos, but the practicalities of installation make such an arrangement inconvenient.

This general placement of equipment is helpful in achieving the correct balance of the model when complete, the final adjustment being made by shifting equipment components backwards and forwards in their installation compartments to achieve final balance.

Good installation begins before the airframe is constructed by laying the R/C equipment over the plan to give a general idea of the installation requirements. Any installation aids, such as servo rails, switch mounts, push rod guides, etc, which may need to be built into the airframe as it goes together can be planned at this stage.

Push Rods

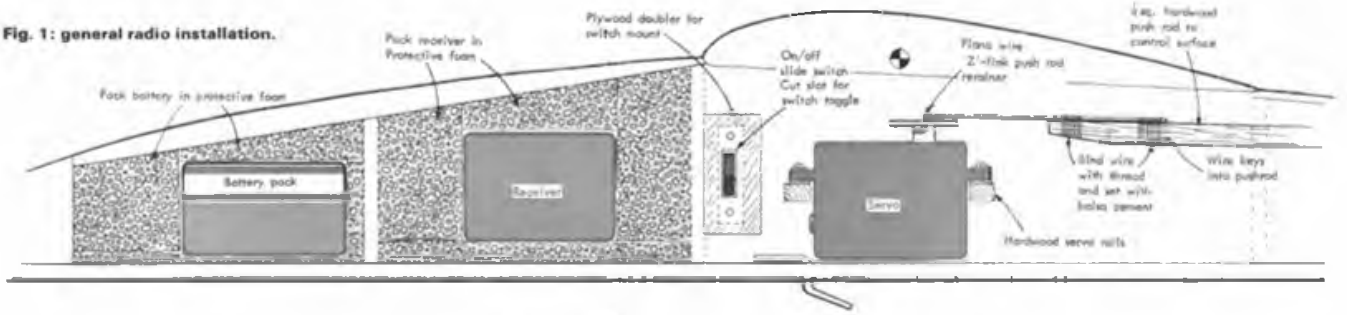
Early on in the construction stage you must decide which form of control linkage from servos to control surfaces is best suited to your model. Basically, you have a three way choice: balsa push rods; flexible "snakes" or a closed loop cable.

(i) **Balsa push rods.** Probably the oldest method of linking servo and control surface and in many ways still the best. Use hard ¼in or $^{5}/_{16}$in balsa dowel or ¼in sq strip for a model the size of *Orange Box*. Take an adjustable control clevis with threaded wire rod, shape the wire to pass through a slot in the fuselage and bind to the control surface end of the push rod sealing the thread with balsa cement. Fig. 2 shows how. Ideally, the wire end should not be more than about 3in long to remain stiff under air load.

The servo end of the push rod also ends in a wire rod, preferably 16swg. In the case of a rotary type servo output a "Z" link is used to connect up. Details of this wire end, and the method of shaping the "Z" end are shown in Fig. 3. The rotary output of the servo disc must be removed from the servo to slip over the wire end, but when replaced, the wire is safely retained and cannot be removed, even by force.

Linear output servos require a slightly different connection

Fig. 1: general radio installation.



ORANGE BOX

Fig. 2: push rod exits at fuselage rear.

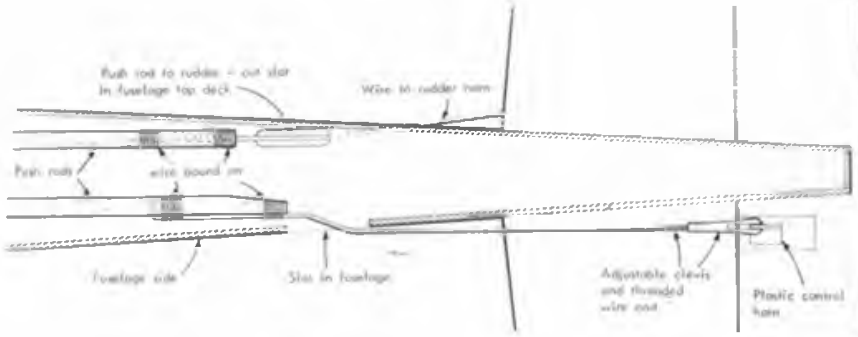
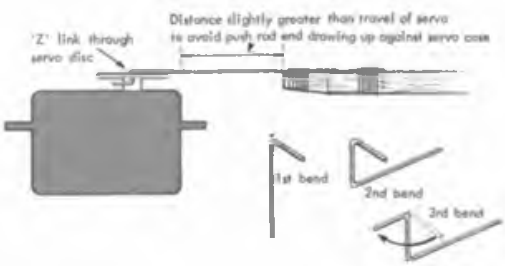


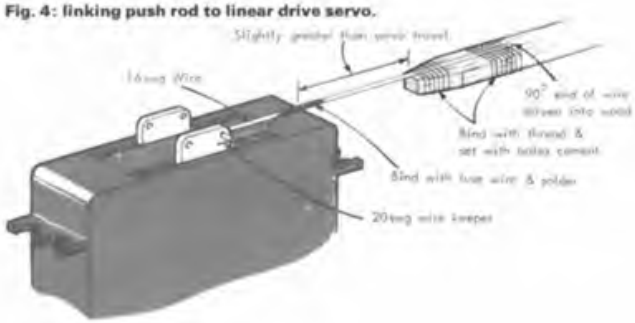
Fig. 3: detail of Z-link connection to rotary servo.



Bonding the Z-link.

arrangement. The output drive arm cannot usually be removed so that a simple snap-on/off keeper is required to hold the wire push rod end in place. See Fig. 4.

Fig. 4: linking push rod to linear drive servo.



(ii) **Snakes.** "Snakes" are flexible push rods consisting of either a Bowden cable in a plastic tube, or two tubes (inner and outer), the latter usually PTFE for minimum friction. The advantage is the ability to "snake" around internal parts of the airframe which, with a rigid push rod, would otherwise need to be either removed or re-positioned to permit free push rod movement. Disadvantages are that in practice there is a limit to the amount of "snaking" that can be introduced without a build up of friction which, in turn, loads the servos, which draws excess current and reduces battery life. Particularly in the case of *cable*-in-tube, care must be taken to ensure the bare ends of the wire cable do not accidentally become kinked which will seriously impair the rigidity of the rod and may, under air load allow the control surfaces to "blow back" toward neutral, thereby reducing control effectiveness.

Linkage ends to both servo and control surfaces are similar to those of the push rod and a typical installation is shown in Fig. 5.

(iii) **Closed-loop cable.** Fig. 6 illustrates the closed-loop cable system, which consists of multi strand control line wire, linked to a control horn on each side of the control surface. Properly set up, it achieves extremely precise control increments and has the advantage of minimising weight at the rear end of the fuselage. In practice, it requires two adjustable clevises and is the most complicated of the three systems to set up to best advantage.

Whichever system is chosen, time and care must be taken to ensure unimpeded, friction free linkage movement over the entire range of control surface travel. Any binding up, friction or fouling of the linkage will cause servo overload, leading to excessive battery drain. In really extreme cases, output transistors in the servo amplifier could be damaged – and that will cost you money!

Installing the System

Having roughly positioned components of the R/C system to achieve correct balance as far as possible, commence by installing the servos, which can be either wood screwed to hardwood rails or direct to the internal faces of the fuselage sides using double sided adhesive foam tape. See Fig. 7 & 8.

Fig. 7: Servo installation on hardwood rails.

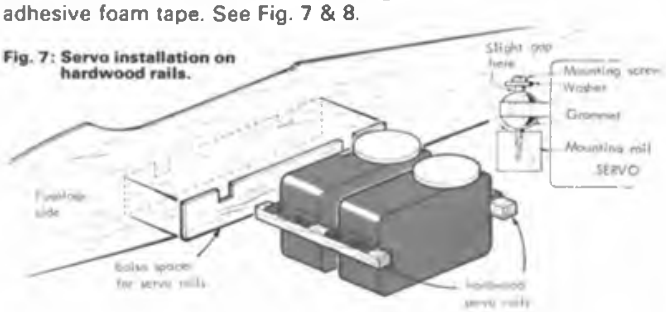
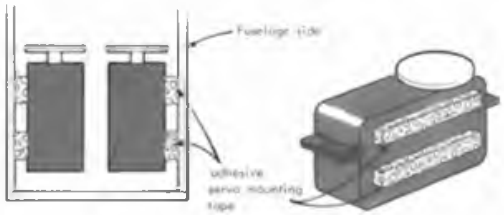


Fig. 8: Servo installation using double sided sticky tape.



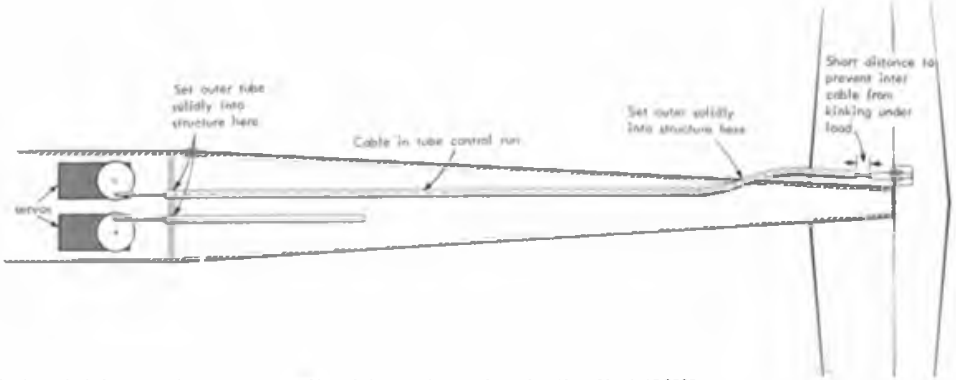
Finally, receiver and battery pack are installed into their respective compartments using foam packing so that each component is prevented from flopping around, but at the same time is not so rigidly packed that the cushioning effect of the foam is lost. Fig. 1 shows how, the general arrangement.

Ensure that the leads from receiver to battery pack and servos are dressed down away from the receiver and be sure to run out the receiver aerial as far away from the servos as possible to avoid picking up any "noise" interference generated by the servo motors.

FLYING

I feel initially it is easier to learn to fly this type of model from a slope. This form of flying with an experienced pilot on hand to

Fig. 5: Snake type push rod installation detail.



assist, gives more air space beneath the model, enabling mistakes to be corrected before the ground jumps up and smashes the model. The long flight time also helps to give continuity to embryo piloting, without the panic of needing to find landing spots with the limited flight time available from a tow – or "bungee" launch.

Choose a calm day for the initial hand test glide, which can be in a flat field. Check that the balance point corresponds to that shown on the plan by adding nose weight if necessary. Start with the tailplane packed under the leading edge with a piece of 1/16in sheet about 1in x 1/2in. This should give a safe glide path. Always launch the model nose level directly into the wind and have the radio switched ON. Check and double check that the radio is working correctly and that the control surfaces are connected in the right 'sense' – i.e. Left stick is left rudder when viewed from behind etc. However do not use the radio to control the model unless something is seriously wrong; the object of the exercise is to adjust the model for perfect glide without the need for radio corrections. Adjust the packing until a steady descent over 20–25 yards is achieved with the elevator at neutral. Adjusting the neutral position by using the transmitter trims will achieve a similar result using small amounts of up or down elevator.

When satisfied, first flight from the hill slope can be attempted in a gentle breeze. Wait for a day when the wind is blowing directly at the slope. Launch the model, preferably with a helper and from the crest of the slope, in exactly the same way as for the test glide. Keep the model heading straight out from the slope. If the model does not gain height or if it sinks well below the crest, do not turn it until well clear of the hill face and then attempt a landing at the BOTTOM of the slope. NEVER turn the model, even when experienced, back TOWARDS the slope unless it is considerably above the crest and at least 100 yards out in front of the slope. The only time that it is permissable to turn back is when a landing is being made on top at the back of the crest. Turns should always be made into the wind (see Fig. 9) in a series of 'S' turns.

During the first flight, should the model appear nose heavy, remove the 1/16in sheet tailplane packing or alter the transmitter trim. Do this a stage at a time noting what effect is achieved and make all adjustments in small stages. Trim until satisfied that the model will slowly penetrate into wind, gaining height in a steady level manner. Be prepared to do this at any time and even land if the conditions alter during a long flight.

Note there is a difference between airspeed and ground speed. The model may appear to fly backwards relative to ground but will still have forward airspeed relative to the wind. When properly built and trimmed, the model has no vices and is capable of loops and stall turns as experience is gained. It is also light enough to be kept flying when the wind dies down and grounds more heavily loaded models. In stronger winds, a little ballast at the balance position will increase the flying speed allowing penetration into wind, but don't overdo this and if the wind proves too strong, try again another day. In winds of more than a gentle breeze do not push the centre of gravity behind that shown on the plan. It is always safer to carry out a trim test flight with the model nose heavy as control will be retained, whereas if the model is tail heavy, stalling will occur with consequent loss of control.

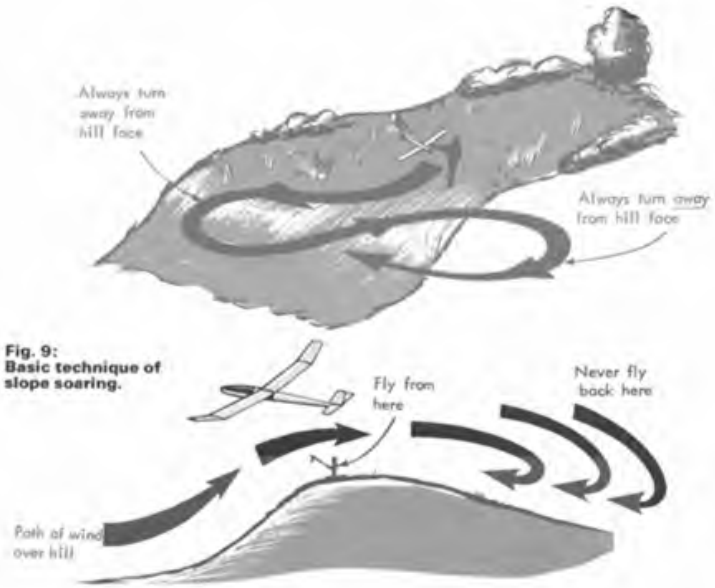


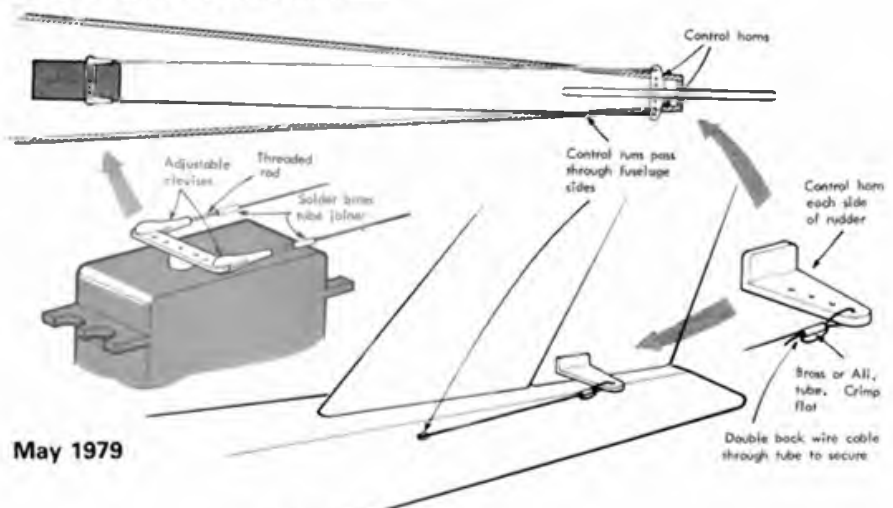
Fig. 9: Basic technique of slope soaring.

For tow-line or bungee flying, the test flights should also be carried out as already described. For initial flights use a tow line of about 75–100ft length. Develop an understanding and an agreed signalling system with your tow line operator before any flights are attempted. Test the controls, hold the transmitter in one hand and raise the model to shoulder height in the level position. When satisfied, signal to your helper that all is OK. Your helper should acknowledge this signal and in return signal that he is about to start running. As he starts to run, take several steps forward and launch the model nose up. Do not throw it but allow it to almost rise up out of your hand. Your helper should start running fairly hard initially (less hard the windier it is) to get the model climbing. Once the model is climbing steadily, your helper should adjust the speed of his running to maintain a steady pull on the line, even moving towards the model if necessary in wind or for gusts. Concentrate on steering the model along a straight path with the rudder only and leave the elevator alone. When the model reaches the crest of the flight path and your helper is cursing the day he volunteered to tow, he should ease off running and allow the model to fly over his head, disengaging himself from the tow line. In an emergency if the model does not start to climb after launching but veers round to right or left through over-control or a bad launch, your helper should immediately stop running and release the line. Quick action may be required to save the model,thus released the model will slow down and control can be regained (with luck!)

I do not recommend 'bungee' launching to begin with until experience has been gained in piloting the model, as once launched the model is committed until the 'bungee' power is exhausted. If a bad launch develops with a fully stretched bungee things happen QUICKLY.

The prototype has achieved many hours of flying time, mainly from the slope and has repaid the efforts in construction time and time again. I do hope you enjoy both building and flying this model and advance to more complicated types.

Fig. 6: Closed loop cable system installation.



Free Flight Scene

Mike Fantham reports....

CO_2 DURATION CONTESTS

For the first time ever, the SMAE are to run a series of CO_2 Duration events during the 1979 season for both Indoor and Outdoor models. The aim of the contests is to encourage the development of models powered by CO_2 motors to achieve high flight durations. In order not to inhibit the variety of design solutions there are no restrictions on wing area, model weight or type of propeller used.

Three outdoor CO_2 Duration contests are planned which will take place on: July 29th Centralised Mini at Bassingbourn; August 25th-27th F/F Nationals at Cranwell; November 11th Centralised Mini venue to be announced. In addition there will be a CO_2 Scramble also at the British Nationals. A series of four indoor events will be flown inside the airship hangers at Cardington on May 13th, May 26th, June 10th and September 16th.

SMAE Rules for CO_2 events are as follows:

1. The maximum capacity of the Carbon Dioxide tank and piping system shall be less than 3.25 cubic centimetres (0.1983in³). Note: Brown, Humbrol, Shark and Telco standard single cylinder tanks and motors meet the requirements of these rules.
2. Outdoor contests, the competitor is allowed six flights with a maximum score of two minutes for each. The best five of the six will count toward the final score. Indoor contests, the best two of six flights will count. (No maximum).
3. For contest flights, the CO_2 system must be filled from a Sparklets type bulb.
4. Non standard motors, tanks, piping or filling systems may be used if the contest director is satisfied that all reasonable precautions have been taken to ensure that the equipment is safe.

Sparklets International, the manufacturers of 8gm CO_2 bulbs are this year providing trophies and other prizes to the winners of the outdoor CO_2 competition to be held at the Nationals and to the winners of the series of indoor competitions to be held at Cardington. Sparklets will be providing all competitors with welded closure bulbs which will ensure a constant fill of CO_2 and which are to be used for the competition flights. These bulbs, which are different to the currently available CO_2 bulbs, will be available for sale later in the year.

Competition rules are as the SMAE Rules for CO_2 Duration Contests with some non-restrictive additions:

1. As SMAE Provisional Rules for CO_2 Duration Class amended as follows:
2. Non-standard motors, tanks, piping or filling/charging systems may be used provided the Contest Director and Sparklets International are satisfied that the equipment is safe.
3. For contest flights, CO_2 bulbs, supplied free by Sparklets International must be used.
4. For Indoor only, the overall result of the series of 4 indoor meetings will be taken as the best three of an entrant's 4 scores. In the event of only 3 meetings being held, the two best scores will be used.
5. The Outdoor competition will be held at the Free Flight Nationals held at Cranwell, August 25th-27th. The Indoor competition will be held on the following dates at Cardington: 13th May, 26th, May 10th June and 16th September.
6. Prizes will be awarded for both the Outdoor and Indoor competitions as follows:

1st Prize	SPARKLETS TROPHY and Sparklets Products, trophy to be held for one year.
2nd Prize	Sparklets Products
3rd Prize	Sparklets Products.
Best Junior	Shield and Sparklets Products.
For Indoor only	a special prize for the longest single flight, a special trophy to be held for one year.

CROOKHAM GALA February 25th

Was it the fact that the long suffering Free Flighters have been locked away all winter long, or was it the fantastic flat calm and blue skies that heralded the start to the flying season at Bassingbourn? Only a few days earlier snow had carpeted the airfield, yet whatever the reason, the turn out at the Crookham Gala was quite amazing. 141 entries flew in the four contests and at one point during the afternoon 126 cars were counted parked on the perimeter track! The low wind conditions prevailed all day, with 3 minute max flights rarely going more than 200 yards with regular flocks of a dozen or more models circling upwards together in the same thermal.

The future shape of F1C models? Thomas Heideman, one of Germany's top flyers, releases his latest model featuring a high thrust line pusher layout. Thomas's brother Gerhardt, has chosen to examine propeller thrust as part of his engineering studies and they are now applying his findings to their model designs. A clear cone of thrust behind the propeller arc, undisturbed by losses spiralling round the fuselage, produces significantly more thrust. The next stage, is to add a close fitting ring around the circumference of the propeller arc to reduce tip losses, with an impeller type arrangement. From tests performed so far propeller thrust efficiency can be improved from 55% to 65%, quite a significant increase

Long distance travellers down from the North of England included Ron Pollard, Tony Cordes, Russel Peers and Lawrence Gray, who incidentally could provide some tough competition in the Junior events this year following some successful flying on his home ground of Chetwynd last season. John Clements, a familiar name from a few years back returned to the fold, along with several other old faces, to show he had not forgotten how to reach the fly offs using a straight tow model. One surprise visitor was Gerhardt Heideman; no he hadn't made the trip specially from Germany but is now living and working in Windsor. Gerhardt and his brother Thomas are well known for their successes at International level, so there will be an interesting opportunity to inspect his German technology first hand at future events this year.

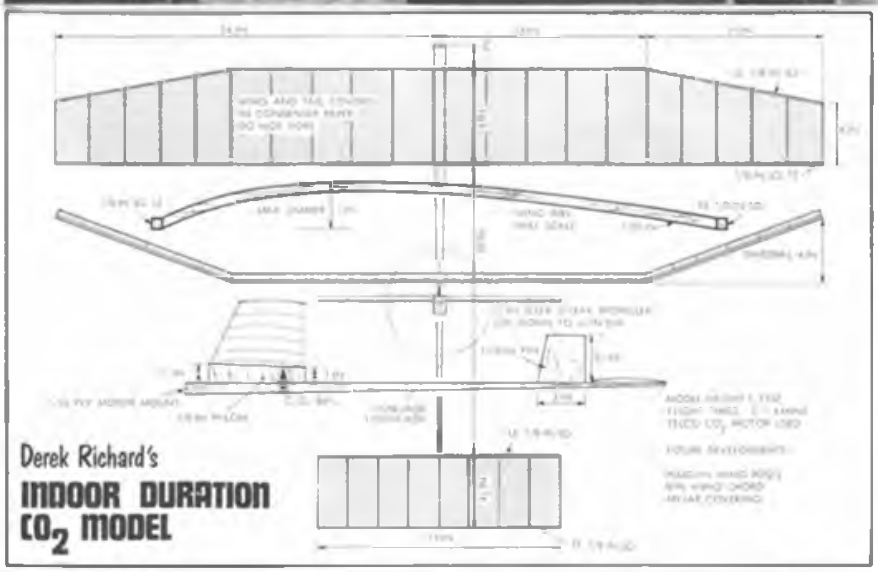
Large numbers reached the fly-offs quite early and frantic activity continued all day with flyers trimming out many new models built over the winter. Trevor Payne made his first flights with a K&B40 FSR powered open model featuring a fully enclosed tuned pipe built into the fuselage, exiting in a plume of white exhaust behind the tail plane!

A quick look at the size and scores of the fly-offs illustrate the quality of flying. Brian Spooner not unexpectedly topped combined FAI with his new F1C model, easily outclassing the rival F1A glider challengers. Another victory for F1c came with Ken Faux's win in Open Power, outclassing the clumsy 40s with a demonstration of sophisticated superiority as it out glided much larger models which were originally higher up in the same air. That there was weak lift still available was borne out by the Glider scores and the final sight of over a dozen Open Rubber models high overhead all set for good flights to end a memorable day. The drama however, was not yet over as Dave Hipperson, who returned from retrieving just in time to collect 1st place, later discovered a time keeping error due to misreading a faulty stop watch, and sportingly asked the organisers to alter the results accordingly.

RESULTS

Open Glider (43 entered, 21 in flyoff) 1. M. Bull (G/M) 9:00+3:32, 2. M. Fantham (Richmond) 9:00+3:24, 3. M. Scott (Leicester) 9:00+3:12. **Open Rubber** (35 entered, 18 in flyoff) 1. T. Gray (St. Albans) 12:00+8:30, 2. D. Hipperson (Croydon) 12:00+7:39, 3. C. Battey (Bristol & West) 12:00+7:20. **Open Power** (16 entered, 9 in flyoff) 1. K. Faux (St. Albans) 9:00+7:40, 2. S. Screen (Birmingham) 9:00+7:20, 3. T. Payne (Biggles) 9:00+6:06. **Allin FAI** (47 entered, 12 in flyoff) 1. B. Spooner (Croydon) 15:00+4:46, 2. C. P. Williams (Richmond) 15:00+3:15, 3. M. Woodhouse (Norwich) 15:00+2:59. **Top Junior** L. Gray (Falcons) Open Glider 9:00+2:19 13th in flyoff.

Above left: ***Derek Richard's duration model uses strong wing requiring no bracing.*** Above: ***Dave Hipperson favours super light approach, 42in x 6in mylar covered wing depends on cotton bracing lines to take flight loads.*** Below: ***'From the sublime to the ridiculous,' Ron Green couldn't believe his eyes after Tim Gray produced this creation. Built the night before, it hit the roof 180ft overhead after about one minute and regularly turned in two minute plus times.***



Derek Richard's

INDOOR DURATION CO_2 MODEL

Left: ***Matin Simkins testing out his CO_2 outdoor model, built up wing uses thin undercambered airfoil as used on French Coupe designs, tail is built up flat plate. Fuselage, as seen above, uses longeron and spacer construction using 1/8in sq balsa, triangular cross section encloses fuel tank underwing.*** Right: ***Ray Pavely flew his outdoor CO_2 model at last year's Silent Gala, parasol mounted wing and extra large tail area.***

Bob Bailey reports....

BRIZE NORTON

21st January

By courtesy of RAFMAA we were able to enjoy a visit to the fine flying site in the gym – our first session there for three years. Electric RTP ruled the roost until 12.00 – then the floor was cleared for duration. Although no contest had been announced, talk of an impromptu EZB comp attracted the Midland regulars Dave Pymm, Ray Monks and Derl Morley who are relatively well placed for the Northern comps and consequently had had rather more flying practice under their belts this winter than the lads down South.

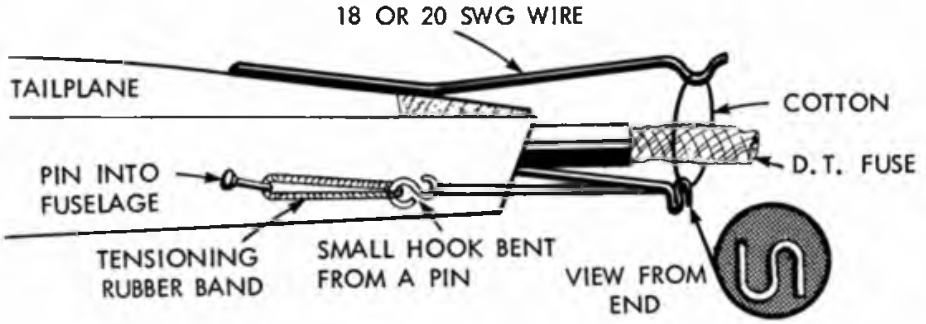
The conditions were cold, demanding thick motors to maintain a good cruise and let down. Dave and Ray were using orange Pirelli, Ron Green and I the new 1979 Pirelli which is not orange but is transluscent brown whereas older Pirelli is opaque. There is not much to choose between the former two but the orange is reckoned to be slightly better for indoor flying because of the more constant rate of energy release.

I started off with an 11.36 in practice but adverse drift and less than perfect choice of launch positions prevented me from repeating this in the contest. Ray Monks had similar problems but his last flight diced with death above the main girders, survived somehow, and Ray was rewarded with an 11.50 which gave him first place. Derl had a very nice 10.50 and was unlucky to slide down the wall from about seven feet altitude. Ron Green managed to slip past with some very steady flying from a new 'B' built specially to give him something to fly!

1. R. Monks 9:14+11:50=21.04, 2. R. Green 10:42+9:56=20:38, 3. D. Morley 9:10+10:50=20:00.

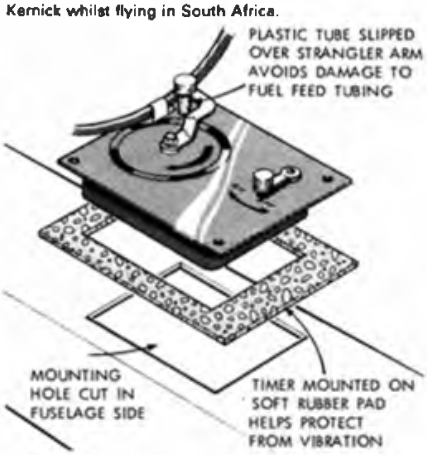
These are very good times for Brize particularly with the cold conditions; not only an indication of progress in EZB over the last three years but also of the exceptional quality of the new rubber now available. Given some decent weather, I expect to see some new records in Cardington this year.

Henry Tubbs, a regular visitor to Cardington, with his Manhattan class indoor model. Recent rule change will allow the lighter 4 gramme models to compete against 6 gramme models using a handicap system.



COTTON LOOP DTs

From time to time, flyers using fuse operated dethermalisers suffer a malfunction when the heat from the fuse fails to burn through an overlarge rubber band. Sometimes a source of small rubber bands is hard to find, limiting the number of flights to the number of bands. The solution to both these problems is to use a cotton loop as the weak-link in the tail hold down set up. Thousands of loops can be made from one reel of cotton and they burn through instantaneously on contact with glowing DT fuse. However, anyone who has tried using small cotton loops knows how hard it is to get the loops to the correct size. Robert Porter from Bristol, has sent me his solution to the problem which allows loops of widely varying size to be tensioned by a reusable rubber band or even a small spring. Robert tells us he has never suffered a DT failure since he has been using this system. Incidentally the use of a cotton loop is called the Kernick system, because that's who invented it, Bruce Kernick whilst flying in South Africa.



MOUNTING ENGINE TIMERS

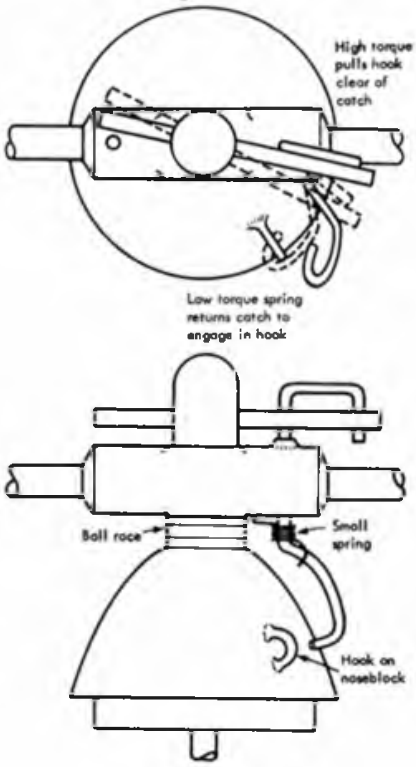
Large motors can generate a lot of vibration, particularly if there is not a strong, rigid mounting from the engine right through to the rest of the fuselage. Any weak spots will allow the engine and part of the fuselage to vibrate – this can be overcome by making sure the strength is transmitted to the pylon as well as the body of the fuselage. This vibration is very bad for engine timers – screws come loose and bearings wear badly. Result – inconsistent engine run times. Vibration can be reduced by mounting the timer faceplate on a piece of Dr Scholls foot pad which is thereby sandwiched between the faceplate and fuselage.

For ¡A models using a strangle type fuel cut-off, a piece of plastic tubing slipped over the fuel line strangler will eliminate damage to the soft fuel line. Pin-prick size damage can cause a lot of trouble in getting a clean engine run.

HANK COLE'S TORQUE HOOK

As a follow up to the rubber driven model prop hub assemblies described in July *Aeromodeller*, I have received details of another system currently being used by 79 US Team member Bob White, which appeared in the American *Model Aviation* magazine. It appears that Bob has suffered problems using the conventional Montreal type prop stop when flying at the sandy desert venues in California (Team members take note). It only takes a grain or two of sand or grit to jam the close tolerance sliding fits of a Montreal system so Bob chose to use a version of Hank Cole's Torque Hook method.

Hank's method utilises the torque of the fully wound motor to hold a pivoted hooked arm during the motor run down. As the torque drops right off, a small spring pivots the arm which swings inwards to engage positively in a projecting hoop on the nose block, ensuring the prop folds in the same position every flight, so it will not affect the glide trim. The tension of the little spring must be matched to allow almost all of the turns to run off before it actuates. Very simple to make from bent piano wire, less likelihood of a foul up due to the generous tolerances of a pivoting instead of a sliding fit and just as positive as any other prop fold mechanism I've come across, thanks Hank.



NEWS FLASH!

WORLD F/F CHAMPS TAFT, CALIFORNIA

Details now arriving for this year's Champs require early registration of team members, supporters and timekeepers. All those interested in going to California for this event or who might wish to join with the British Team's travelling arrangements should send their name, address, contact phone number and SAE to Mike Fantham, 7 Richard Knight House, Favart Road, London SW6 4AY.

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RACING
by Dave Clarkson

GOODYEAR – BAD YEAR! – BIG YEAR? America's answer to the excessive speeds of current rule models is their Big Goodyear class with 1/6th instead of 1/8th scale. Models worked out to 28–38 inch span, 260 sq in approx area and 28–35in fuselages. Above is Ron Duly's Sweet Pea which uses a built-up, rib and spar wing, and there he is in pitstop action below. No hot gloves, pressure refills or fuel cut-outs are allowed to put back some simplicity in the racing.

The Control Line Racing Symposium

Held early in February at the Europa Motel in Birmingham, this Symposium organised by the SMAE Control Line Committee was quite a success. Almost 40 active competitors gathered to have a chat and, more important, to be consulted by the CL Committee particularly with respect to the organisation of the Team Trials for the 1980 World Champs and also with respect to rule changes. By means of structured discussions, the following resulted.

Team Trials

An open entry two day Trials was strongly preferred as opposed to the present system of a one day Trials supplemented by heat times claimed from the SMAE Centralised meetings and the Nats. If necessary to keep numbers down to a reasonable maximum of no more than 21 entrants, the CL Committee will invite the fastest teams as shown by the SMAE organised contests. The major reasons for proposing this change were that most felt that a one-day Trials is too cramped and most felt that times not established at the Trials should not count directly because judging and processing standards are usually much higher than at other contests.

Rule Changes

The CL Committee wished to gather opinions on any rule changes felt necessary and to be effective for 1980 (it is too late to do anything for this year).

The first conclusion was that both Goodyear and 'B' Team Race are too noisy and therefore, measures will have to be adopted to quieten these events. Opinion split right down the middle on whether quietening in Goodyear should be achieved by making it a 2.5cc Diesel only event or by making it a silenced 3.5cc motor event. Motor size changes were not liked for 'B' Team Race and so silencers seem likely to become compulsory here.

¼A Team Race, Mini Goodyear and FAI Team Race were also discussed and it was concluded that no rule changes seemed necessary for these events. A suggestion that Mini Goodyear be limited to plain bearing motors only fell when it was realised that this would ban one of the cheapest and most popular motors in this event – the Russian MK17 motor.

A most successful afternoon – I am sure that the CL Committee can now proceed with their work feeling that they have more contact with and support from the competitors than in previous years.

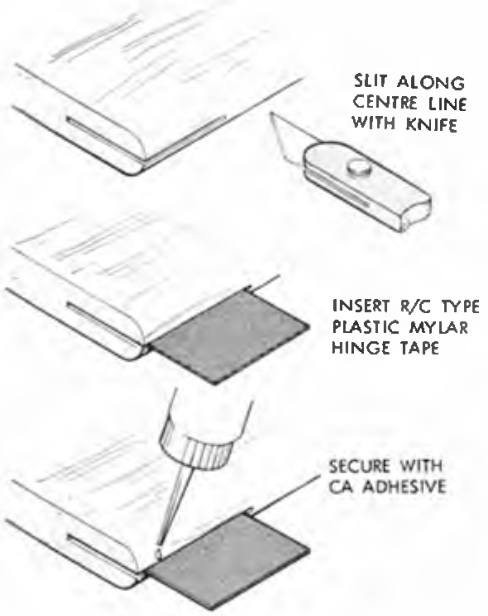
MAKE IT EASY – Hinging Elevators

Why devote space to such a minor topic you may say? And yet hinging elevators successfully is not that easy, especially if a clean, free and long lasting hinged joint is required (and it most certainly is!). Over the years I have tried sewn hinges – the thread frayed and the elevator fell off! (during a Team Trials heat, of all times to fail). Expoxied in metal folded sheet and wire hinges, . . . which came out, and splat went the model! Epoxied in nylon and wire R/C hinges – the epoxy got into the actual hinges and a lot of tedious scraping with a pin point only gave a barely free joint. Now I use mylar strip hinges fitted with cyano, and am convinced that this is the best method so far.

All that is required is to make a slot in the balsa, insert the plastic strip hinge dry and then a couple of drops of a low viscosity CA adhesive (like ZAP) has the plastic firmly held in the balsa.

Surprisingly the CA runs all of the way into the slit along the plastic strip and then sets really firm all over but leaving absolutely nothing other than the strip projecting. The projecting half of the strip hinge can then be pushed into a matching knife slit in the other half of the hinge joint – a few more drops of CA adhesive and ZAP, job done. If, like me, you GF cloth cover and surface finish the tail before cutting off and then hinging back the elevator, then a few more drops of CA, whilst you are doing the hinging operation described here, onto the bare balsa in the hinge joint has this surface finished too – nice and strong and fuel proof into the bargain.

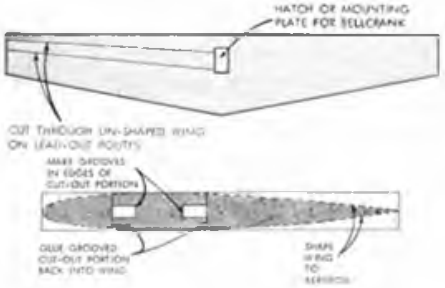
If you have doubts about the strength of the plastic strip-to-balsa joint this method gives, try a test using a



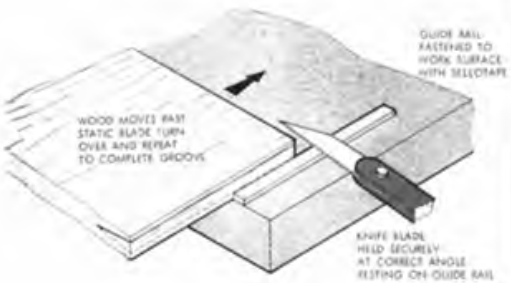
scrap piece of balsa and then try to pull the hinge out. You will have to use a pair of pliers and I bet you will not get the plastic strip out cleanly – my test before I did my first model this way resulted in destruction of the balsa. The plastic strip did come out eventually but with a great deal of balsa firmly attached to all of the surfaces of the strip that had been inside the balsa.

MAKE IT EASY – Leadout Grooves

Many of you will remember (and I hope even use) the method described under this banner, originally in this column, and most recently in the *Control Line Aeromodeller* special. As a reminder, the method consists of cutting vertically through your unshaped wing along your proposed lead-out routes so removing a portion of the wing. The edges of this removed portion are then grooved, any desired lead-out guides glued into the grooves (and the grooves fuel-proofed if necessaryl prior to gluing the grooved wing portion back into the wing. The result is neat job of getting your leadouts through a solid wing with the minimum of added weight and with an almost undetectable effect on the external appearance of the wing. The sketches shown here illustrating the method should be rather familiar by now.



The trickiest part of the whole operation as many of you have probably discovered, is making the grooves straight and neat with the minimum damage to the grooved face and (most important) keeping the groove centred and narrow such that no overly thin (or even absent!) groove walls result.



One excellent procedure for giving uniform, narrow and centred grooves has been discovered by my clubmate Ian Hutchinson. My own experience using this procedure is that it is easy and quick to do, and gives excellent results. What you need is a sharp knife, a very smooth and flat surface and a small scrap piece of wood.

A bit of experimentation with a test piece will give the arrangement to produce the groove you want. If you are using a circular bellcrank then the 'V' groove this procedure gives will be quite satisfactory. However if you are using a conventional bellcrank which will cause the leadouts to move laterally in the groove, a rectangular groove is better. Fortunately it is a very simple job to sand the groove rectangular using a piece of sandpaper wrapped around a piece of ⅛in or ¼in ply.

Circular Arcs for Curvatious Wings (and Tails)

Straight taper wings and tails are very easy to work with but perhaps boring? Curved flying surfaces are regarded by many to look better and more important, give more area for a given span and root chord. The major disadvantage of curved profile flying surfaces is the one of calculating and proving the area for wing (and tail in FAI-TR) which is part of the model specification. In the past few years circular arc profiles have become much more popular than elliptical profiles simply because the areas are much easier to calculate and prove. Below are given tables which relate arc radius to area, span and root chord for tails and wings: hopefully the dimensions you are wishing to see are included. In reading these tables, the following key applies.

WINGS

radius	*Span*	*Arc Chord*	*Arc Area*
	28	4.1	78
26	30	4.8	97
	32	5.3	113
	28	3.8	71
28	30	4.3	89
	32	5.1	111
	28	3.5	67
30	30	4.0	82
	32	4.6	100
	28	3.2	61
32	30	3.7	76
	32	4.3	93

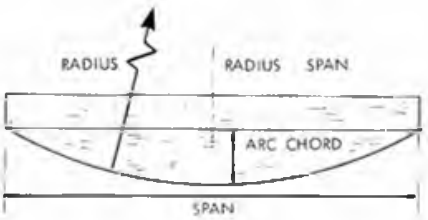
So, to take a typical example for an FAI-TR model, desired wing span say 30in, and desired wing area say 155 sq in. Try a TE radius of 32in so from the above table for 30in span

arc area 76 sq in
arc chord 3.7 in

So a final tip chord and root chord of

$\frac{155 - 76}{30} = 2.63$ tip chord (plus
3.7 arc chord)
6.33 root chord.

With wings it is conventional to make only the wing TE curved and to leave the wing LE straight. The reasons for the straight LE are that it is best for the lead-outs to emerge from the wing tip (and not from the LE which could happen if the LE was curved), also a straight LE is much easier for catching. This reasoning does not apply to tails (no leadouts and definitely no catching) so curving both the LE and TE is practical and desirable from both the appearance and area points of view. Therefore two ranges of radii are given below for tails.



Tails

Radius	*Span*	*Arc Chord*	*Arc Area*
	10	1.34	9.1
10	11	1.66	12.4
	12	2.01	16.5
	10	1.08	7.3
12	11	1.33	9.9
	12	1.61	13.0
	10	0.92	6.2
14	11	1.12	8.2
	12	1.33	11.0
	10	0.59	3.9
22	11	0.70	5.1
	12	0.85	6.9
	10	0.53	3.5
24	11	0.67	4.7
	12	0.76	6.1
	10	0.49	3.2
26	11	0.59	4.4
	12	0.70	5.7

Continuing with our typical FAI-TR example, this time for the tail, desired tail span of say 11in, required tail area – 35sq in *try*

TE radius 22in so arc area = 5.1 sq in
arc chord = 0.7 in
LE radius 14 in so arc area = 8.2 sq in
arc chord = 1.12 in

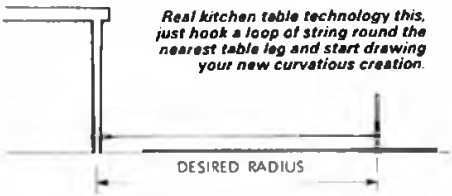
a tip chord of

$$\frac{35 - (8.2 + 5.1)}{11} = 1.97\text{in}$$

is required resulting in a total root chord of
(1.12 + 1.96 + 0.7) = 3.8in

But what do these flying surfaces look like? How do we draw using these large radii? How do we get the wing and tail accurately to these radii? Good questions to which the answer is paper patterns.

Find a large clear patch of floor and a conveniently positioned table leg. Loop a piece of string around the table leg and roll a Biro or pen up in the free end of the string until the distance from the far side of the table leg to the pen point is the desired radius. Keeping the string tight you can now draw a line of the desired radius onto any suitable piece of paper.



Real kitchen table technology this, just hook a loop of string round the nearest table leg and start drawing your new curvatious creation.

Once the curves of radius (radii) desired have been drawn, the completion of your profile is just a matter of using a rule and pen. Now you can cut-out your patterns and use these to transfer the desired profiles onto your wing and tail. It is a good idea to write all of the relevant dimensions onto your paper patterns so you can tell one from another but also so you can help the model processor to prove the wing area of your model.

Two new Team Race props from the Tribe Brothers, Jim Woodside's 6 x 7½in ½A prop for his Broadside racer (Aeromodeller April 79) with Luis Petersen's 7 x 7½in FAI prop below.

AEROBATICS

by Glen Alison

NOVICE STUNT

Are you interested in entering the competition field but feel that your flying ability and model are not quite up to scratch for a proper SMAE competition to the FAI schedule? Don't worry, provided you can do round manoeuvres and fly inverted then you should be capable of flying the Novice Stunt Schedule. Novice events are gaining in popularity all the time and are usually run in conjunction with most of the open competitions throughout the year. This has the advantage of allowing you to join in the atmosphere and get to know the procedure of the open events whilst competing in your own "low key" competition.

Virtually any model will do, even without an undercarriage so even combat models are quite eligible. Here is a description of the manoeuvres required:

1. Start the engine; if you can start and release the model within one minute you get 10 points or zero if it takes longer.

All remaining manoeuvres are marked out of ten and this score is multiplied by a 'K' factor of between 2 and 8 according to the difficulty of each manoeuvre. (For a more detailed description and illustration of the stunts see the SMAE rule book.)

2. Take off and two laps level flight (K=2).
3. Three inside loops (K=3).
4. Two laps of inverted flight (K=2).
5. Three outside loops (L=3).
6. Reverse wingover (K=8).
7. Two inside square loops (K=6).
8. Two horizontal eights (K=4).
9. Two vertical eights (K=6).
10. Two overhead eights (K=6).
11. Landing with undercarriage (K=5) OR without undercarriage (K=2).

There is one aspect where the Novice schedule differs from the open in that marks are awarded for the model's appearance. Marks out of ten are multiplied by a varying K factor according to the type of the model. Thus although you can compete with a flying wing combat model there is encouragement built into the rules to favour the more advanced types.

Example: K=1 Flying wing
K=2 Profile model with tailplane
K=3 More advanced model with u/c
K=4 Fully flapped sunter, cowled.

So there it is, if you like the idea come and join in, watch the latest Calendar for dates of a competition near you. There is no pressure in Novice events and no shame even if you do come last the first time. It's all good experience, you'll have lots of fun and you'll soon get the idea of competition flying.

For more help in stunt flying and details of smaller local comps why not join CLAPA the Control Line Aerobatic Pilots Association. It has the simple aim of promoting and encouraging all stunt flying and improving communication between those interested. There is a bi-monthly newsletter called *Claptrap* and the membership secretary is himself a well known stunt flyer. Drop a line for details to Jim Mannall, 27 Kestrel Road, Bedford, or better still join; it's only £2.50p per year.

Novice Stunt Design Competition

In order to encourage the current upsurge of interest in Novice Stunt competition flying, CLAPA has invited the readership to submit designs of a model suitable for beginners just entering the stunt scene. The rules are simple:

(a) Profile fuselage
(b) Max engine size 3.5cc (0.20cu in)

The entries will be judged by members of the CLAPA Technical Committee and the winning design published in *Aeromodeller*. Particular emphasis will be placed on simplicity, ruggedness and any special features to help warp free construction, accurate alignment or design details relevant to a Novice Stunt model.

Models can be semi scale appearance with simulated colour scheme or purely aerobatic models similar to their three dimensional FAI counterparts. Cockpits, mono wheel, dual or tricycle undercarriage flaps etc. are all options to be considered by the individual designer. Some of the most successful models in the Aeromodeller plans range are profile stunters: 'Wolverine' and 'Stallion' 40in span for 2.5–3.5 motors, and the greatest profile aerobatic trainer of all time, George Aldrich's 'Peacemaker'.

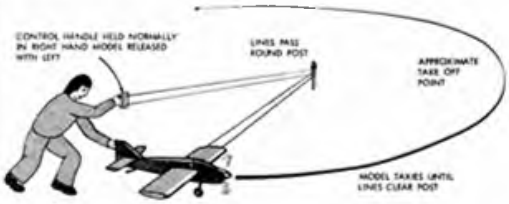
To show just how beautiful a profile stunter can be, see the photo of the model built by German flier Wolfram Reuter who hails from Nuremburg. The model was designed by guess who, yes it was Claus Maikis. For a follow-up he designed his own machine, the STRATEGE powered by a Webra 40 Blackhead which is also a very elegant design. I hear that Wolfram & Claus will both be attending our British Nationals later this year.

Two models from Wolfram Reuter of Nuremburg. Above: ***This model designed by Claus Maikis shows just what can be done with a profile design.*** Below: ***Wolfram's own design, the Stratege.***

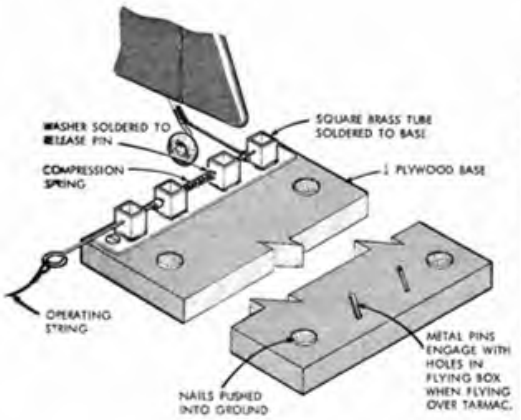
SELF LAUNCHING DEVICES

Are you ever prevented from flying because you don't have another flyer or helper to assist with launching your model? It can be frustrating especially if the weather is fine and your time is limited. Here is a couple of ideas to help you launch and fly solo.

Francis Donaldson of Sevenoaks uses a guide post hammered into the ground for the lines to run round. He starts and launches his model in the centre of the circle and keeps the model flying low until the lines have cleared the post. It would obviously be fatal if the lines slipped off the post so it is very important to make a good job of the line stop with no rough edges or crevices to snag the lines. The sketch shows the details, thanks for the idea Francis.



Personally I use a stooge operated by a line running to the centre of the circle. There is a wire loop soldered to the tailwheel leg which engages the release pin on the stooge. It has a safety spring to prevent accidental release! I normally practice over grass so the stooge is secured by pushing four 6in nails into the ground, but when flying over tarmac or concrete it can be fastened to my flying box, which then gets covered in exhaust



gunge. I engage the stooge before starting the engine which means having to learn how to start the engine in it's inverted position in the model. The technique is soon learned. You get a beautifully smooth launch this way but be careful not to get your feet tangled up with the release string in the centre of the circle . . . yes, I've done it!

AEROBATIC MOTORS

The Super Tigre 46 has been THE stunt engine over recent years. It set such a new standard of power and reliability over many of the lapped piston, plain bearing motors of a decade ago that nowadays many fliers would not choose anything else for their new power plant. However, there are equally good alternatives available even if a little dearer. The Austrian HP40 is one example. There is a new version now available called the Gold Cup. The crankcase and fins are matt black and the cylinder head anodised gold. The bore is chromed and is supplied with a stunt type venturi. Smaller and lighter at 9.5oz than the Super Tigre it has been used with success by fliers such as Bill Werwage and the Finnish stunt team. I hear that the Americans are getting improved performance and running characteristics by machining .030in off the top of the crankcase to let the liner sit lower and this modifies the timing of the engine. A 0.030in shim is then required under the cylinder head to maintain it at the correct height.

The Japanese OS40 F.S.R.Schneurle port was the motor used by Bob Hunt last year to such good effect in winning the World Championship at Woodvale. The motor is VERY powerful so it can be used to drive a big propeller on a steady four stroke and cope with any flying conditions particularly square eights and the overhead manoeuvres. It is a well engineered motor, twin ball races on the crankshaft. Con rod and piston bosses are bushed and the liner is plated so it looks like a good investment at £50 or so and there is also a 45 version.

If your allegiance is to Britain, then the Irvine 40 should be a promising stunt motor. Also with schneurle porting it is much less expensive than the OS at around £40 and servicing will also be much easier with the factory on the doorstep so to speak.

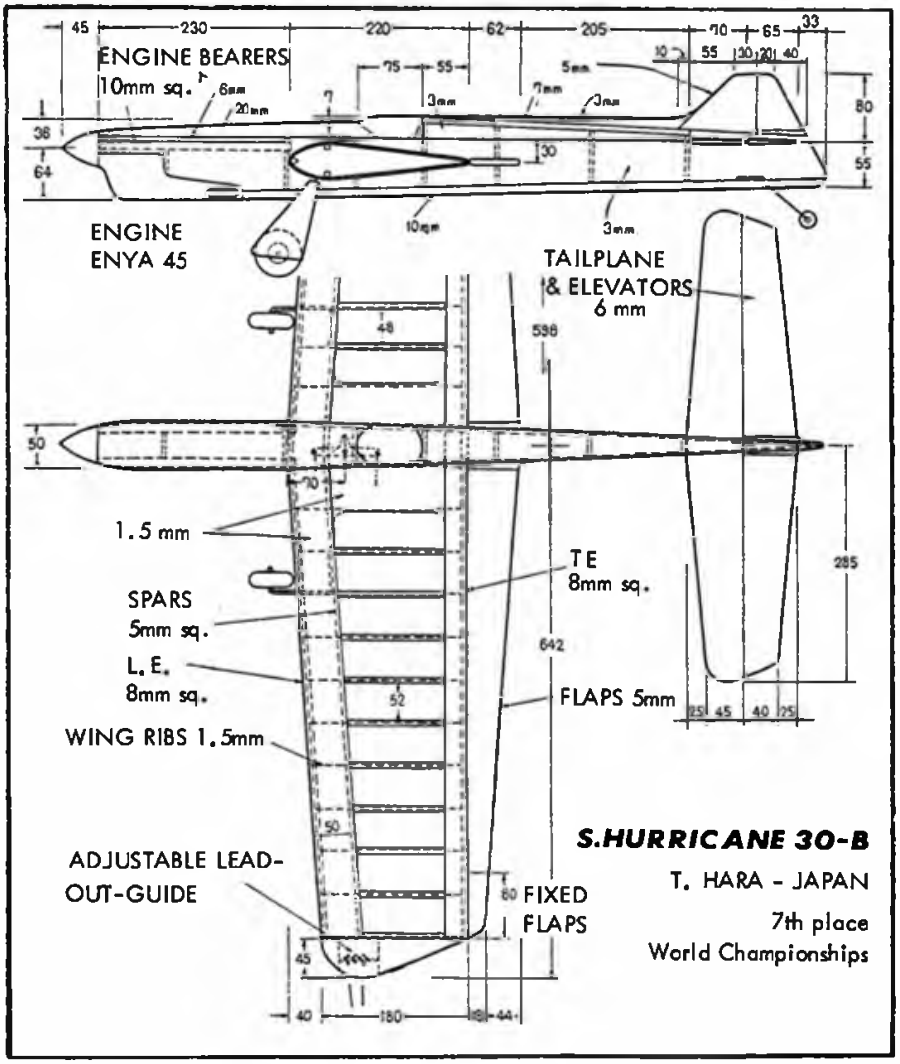
Coming full circle round the globe we arrive back in Italy where Super Tigre now have two new models. One is the 'COMO' 40 claimed to be more powerful than the 46 and also the ST45 which is a rear exhaust schneurle A.B.C. type motor. Although not designed for stunt use, it is ringed so should be able to run at the varying temperatures demanded of a stunt engine, relatively cool when 4 stroking in level flight but temperature rises very quickly when the motor is required to do some work. Witness the number of lapped motors that seize up when flying high and a little too lean.

CLAPA League Table

By the narrowest of margins, (only one point) Bill Draper of Nottingham has won the CLAPA (Control Line Aerobatic Pilots Association) League Table for 1978. He scored 345 points out of a maximum possible of 350 just pipping Pete Tindal of Dagenham with 344. Fliers get 50 points for 1st place, 49 for 2nd and 48 for 3rd etc. and their best seven results count towards the League. Bill had 4 wins, one 2nd place and two third places whilst Pete managed 3 wins, 3 seconds and a fourth.

In third place with 332 points and the winner of the Spitfire Trophy, awarded to the most improved stunt flier in the year, is Keith King of the Cosmo Club in Kent. Keith also entered the most competitions last year, competing in eleven events; that's dedication and enthusiasm for you!

Japan's top aerobatic flyer at last year's World Championships was T. Hara who placed 7th flying his famous Super Hurricane design. The Japanese teams were very popular with the crowds at Woodvale and performed to a high standard with both Hara and Masuda in the Top Ten after third man Sasaki had suffered a model failure during practice. No doubt by the time the next championships comes along they will be a top competition nation. Plan courtesy of C. L. Technique, Japan.



CLUB NEWS

THE WEATHER at the time of writing is just too fearful for even the most ardent model flyer. Even so, it is surprising how many modellers keep in touch with the flying field throughout the year. Winter model flying is like going swimming: a bit cold at first, but once you're in its fine. Quite invigorating in fact, and it's a useful way of blowing away the cobwebs and toning up those winter slack muscles.

Our first report comes from way up in Scotland, and is sent in by Mr T. C. Lawrie of the **Paisley MFC.** He informs us that the club AMG was held after many postponements due to the weather. We presume this has nothing to do with holding such functions in the open air, but is an indication of winter travelling difficulties up there. The main issue involved was the tightening up and clarification of membership and setting up of a minimum fee for club events. Treasurer, Ian Galt, presented an encouraging report of a solvent club and a new car, although the two things are not necessarily connected. Club Trophy events were weather ravaged, but, as always, suitable winners emerged. Tom McLaughlan took two club trophies to add to his SAA, Finlayson Plate for Open Rubber. The event was rounded off with a spot of indoor flying, proving, after all, it was not held outdoors. *Secretary Thomas Lawrie, 2 Durward Way, Paisley.*

The next report comes from Stuart Riley, the new secretary of the **Morley & DMAC,** which is based in West Yorkshire. Usually, these days, a club's main interest is given as Radio, but in the case of Morley it is free flight, with a backing of control line and indoor flying. No doubt the club is already swinging into the new season, but meantime we are given some of the top club placings for last season's home events. Brian Worthington won the Colin Bell Trophy for the highest accumulated time in free flight events, and Barry Judge the Open Glider Trophy for best time in that class. The Senior Trophy, flown off on the Club Day, went to Doug Scott, who also placed 4th in Vintage at the Nationals. Martin Godden took the Junior Trophy. *Secretary Stuart Riley, 1 Pennine Road, Dewsbury, West Yorks WF12 7AW.*

We next hear from the **Breckland MAC,** which, we are informed by PRO, K. Seymour, was formed four years ago in the Thetford district of Norfolk. From what I know of the Area it is rather thinly populated with plenty of open spaces. But this does not always mean good flying field prospects. In fact, the flying site, at Two Mile Bottom, is at present the subject of a planning application, but it is hoped that approval will be granted in the near future. The club, which has a thirty plus membership caters for Radio, Free Flight and Control Line. There is also a strong line in Indoor flying, a number of successful meetings having been held at the Thetford Sports Centre. Another interest is Thermal Soaring for which it is hoped to hold two meetings during the year: the first to be on Sunday, 13th May. I notice in the Diary Dates given that it is to be held on Barnham Common, suggesting that the club may have the odd useful flying site up its sleeve. Details of membership can be obtained from *Geff Ellis, 192 St Johns Way, Thetford, Norfolk.*

A cliff railway to the top and a nice cuppa on the way home. Such luxury is the home of the Aberystwyth Soaring Minority (!), we can only presume the sixth member is on camera duty. However, a plea to all holiday flyers to check frequency allocation with Club Secretary first to avoid interference problems from other adjacent sites, have a nice holiday

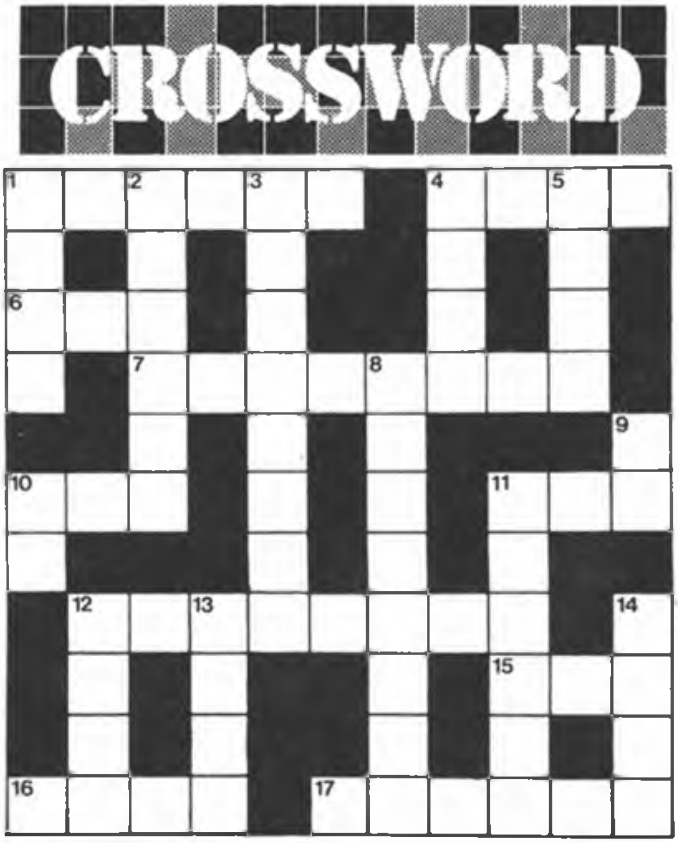
The rapid growth of radio soaring has established it very much as a major interest, so perhaps unexpectedly from Wales comes a group calling itself the **Aberystwyth Soaring Minority.** The club operates for the benefit of radio control glider enthusiasts in the rugged countryside around Aberystwyth, and members enjoy the use of several excellent cliff sites – one splendid one even having a cafe and access by cliff railway. A few flat areas around, though, for it is hoped to expand into thermal soaring. The club is not wholly parochial however, in spite of the homeground attractions, for members attend at the various soaring competitions, by which means they have raised the general standard of flying. The term 'minority' would seem to apply to the club size at present – just six members. If you wish to improve on this figure, contact the *Secretary, Mr T. B. Edwards, 14 Bryn Ysgol, Penparcau, Aberystwyth, Dyfed.* Please note, though – and this goes for visitors too, that a frequency allocation system operates in the area to prevent interference between the several adjacent slopes. Mr Edwards suggests it is a great place for a modelling holiday – he would be pleased to supply information.

Mr Noel Adams, PRO and Chairman of the **Bath MAC,** has sent us details of a club project which, it is hoped, will attract new members to this old, but rather small club, and bring together model flyers of all types, ages, and levels of experience within the Western Area. The idea is for a series of contests for a one design free flight model – or rather two design: free flight rubber power and free flight glider. The Glider chosen is the APS 'Crofter', and

rubber the 'New A.M. Cabin Duration'. To simple rules and five flight schedules it is hoped to hold the series of events on various club fields throughout the area, with the possibility of some sort of postal basis. Scoring could be on both an individual and club team basis, with an inter-club league running throughout the season. A small, nominal entry fee of say 10p would be levied. A good idea this, and Area clubs are asked to contact the *Club Secretary, Ernie Burles, 46 Coronation Avenue, Bath, Avon.*

A good lead-in, the foregoing, to a letter from the **Western Area Committee.** We are asked by Mr L. A. Rogers to give publicity to the Area and encloses and Area Newsletter full of mostly good tidings. He mentions in passing that the **Swindon MAC** has held a very successful round-the-pole meeting – which is certainly something in this up the pole world. Honours mentioned in the newsletter are the Plugge Trophy triumph of the **Bristol & West Club,** and George Lynn winning the Paul Tissandier Diploma for all the hard work he has put in. As Competition Secretary he will be looking after the interests of the motivated people seeking the trophies he gave out at the Prizegiving. Ron Audley took FAI, and Open Glider, Chris Batty Open Rubber, Rex Woodruffe the Minor Cup for the third year running, Philip Rogers the Junior Cup and Keith Penny Hand Launched Glider. More indications of our upside down world come in the way the Army is taking over the airfields. The latest one to become an extended parade ground is Colerne Airfield, which is good news for our commando style free flighters who have its use for the free flight rallies in the coming season. Appropriately, the Area is calling for good discipline from all visitors to the airfield, with meticulous regard to the regimental conditions. Other good flying news comes from the **Cirencester Club** which has the use on Sundays of RAF Kemble. And, finally, get those covered wagons rolling for 'Modelwest 79' being staged by the **Cotswold RCS,** at Cheltenham Racecourse on the 16th/17th June. Keep an eye on the modelling press for details.

A note from the **Elliott MEC,** says they have recently felt the 'lost flying site' twinge. Fortunately, though, not a chronic condi-



Jaws drop watching this slow fly past, as an EZB cruises overhead at a meeting of Teesside MFC in their new Community Centre clubroom.

tion as they were immediately offered a larger, flatter, superior area – its all a question of the car park being re-located. See 'Contest Calendar' for the two super rallies – refreshments available – being put on to warm up the new site. This active club still maintains a good mix of Sports and Competition flyers, and is sound enough in shape to keep membership fees unchanged for this year. More details later of electric RTP and 'simpler Goodyear' activities.

Alan Coligon has sent along a nice set of photos together with a report on the activities of the **Teesside MFC**. Coming back to normal, we could say, the main club interest is Radio, but it looks as if it might be getting some competition from Indoor flying since the club moved its meeting place to a Community Centre with a large hall. An invitation to members to bring anything flyable indoors along to an impromtu meeting brought out a number of Peanut Scale and Easy B models, and a hectic evening of flying ensued. Spectating members were amazed that model aircraft could fly so slowly. Among the nice collection of 'Peanuts' on show was an 'Eindekker' by Tony Oliver and the 'Andreason' Biplane of Bill Kitching, the Hobbydrome proprietor. There was also a flapping wing model on display: the RCM&E 'Hawk'. *Secretary Allan Colligon. 6 Aukland Avenue, Marton, Middlesbrough, Cleveland.*

CLUES ACROSS

1. Classic free-flight glider. (6)
4. Graupner sailplane – not A1 perhaps. (4)
6. Washer for prop shaft. (3)
7. Ocean watering place – right wing stiffener. (8)
10. Engine steerer? (3)
11. See 9 down.
12. Soldering aid. (8)
15. Aero outfit. (3)
16. Search forgotten yards for engine. (4)
17. Fit flyer. (2, 4)

CLUES DOWN

1. American airfoil. (1, 1, 1, 1)
2. Distributor's valedictory wishes for three minutes. (6)
3. Wing angle takes junction and loses church event. (8)
4. Radar image. (4)
5. Weeping tissue damage? (4)
8. Hard hitting control lines? (8)
9, (11 across). Not intended seriously. (2, 3)
10. Equestrian inhabitant of oceans of balance. (2)
11. Foreign Office kit manufacturer joins Queen for German aeroplane designer. (6)
12. Cape control gadget. (4)
13. Surface size. (4)
14. Little motor from Ripmax. (4)

More about soaring. It's golden days for this silent sport. Yet another club in the ascendancy is the **Wessex Soaring Association** which, we are informed by Michael Huggins, the Hon Sec, has been formed to promote fellowship and enjoyment of non-powered gliding in all its aspects. The slope sites of these 'Hardy' folk are located in the Dorset area. And for those who prefer to tow than trudge there is hope of a flying field for thermal soaring. The club meets on the first Friday of each month at 8pm at the Kings Head Hotel, Wimborne, Dorset. If interested, *phone Rod Lowe, Bournemouth 522288 or Mike Huggins, Wimborne 883965.*

The **Waveney MFC** newsletter is back in circulation again, albeit in a rather abbreviated form. Main items of news is the arrival of 'Nick's Coffee Shop' on the flying field scene. Means of identification is a Ford Corsair that appears to be on fire. Members are asked to refrain from any fire fighting activities but just to approach and offer up 10p for a cup of coffee. To cool the perhaps overhot coffee just stand underneath one of the many helicopters which are taking the glory away from the old fashioned slab wing affairs. Safe, too, now, for they do not crash so often. *Club PRO is Mr C. R. Wickham, phone Beccles (Suffolk) 715554.*

From another PRO, Mr C. W. Williamson of the **Melton & District Model Club,** we have a copy of a 'Press release!' on the nature and history of the club. Summarised, the club was formed in 1963 with just a handful of members. Since then, membership has risen to around 70 with Radio as the main interest, mostly model aircraft, but with other types of model craft as well. There are two farm flying sites and the use of two large rooms at Warwick Lodge. Winter activities include film shows, lectures, discussion groups, indoor flying, auctions etc. New members welcome at Warwick Lodge on Wednesday evenings or contact the *Secretary, Mr T. Main, 18 Tamar Road, Melton Mowbray, Leics.*

A nicely produced newsletter comes from the **Maidstone Free Flight Group** which includes one of those neat plan drawings which, a few years ago, were quite a feature of the more progressive newsletters, but which we now seldom see. The model is R. A. Dines 'Promoter 2', a likely looking FAI Glider. And there is a bit in

CAPTION CONTEST

the newsletter apropos to gliders, emphasising the important role of the launching helper. It is a role calling mainly for concentration as the wait for 'good air' can be a long and boring vigil. Just as you are about to fall asleep on your feet someone shouts 'right!' and you let go of the model, pointing, you hope, in the right direction. *Secretary Dr D. A. Dines, 50 Tuscan Drive, Walderslade, Chatham, Kent.*

We trust that the new newsletter of the **Grantham & DMAS** is not called *Hot Air* in celebration of club room emanations but refers to those elusive bubbles we all try to catch on the flying field. Anyway, John Ashmole tells us in his accompanying letter that the newsletter, coming out on a bi-monthly basis in the form of a small magazine, is designed to stimulate interest in club activities. A promising omen is that the 'Bring a Model' night in January had double the turn out of the previous year. *Secretary Mr N. Grantham (yes, Grantham), 115 Fifth Avenue, Alma Park, Grantham, Lincs.*

The recurrent theme throughout the year for the **Watford Wayfarers** has been that of flying sites according to their current newsletter. It is a case again of the Moor the merrier, for it still remains their main hunting ground, but a short and welcome sojourn on a school playing field gave some concern to full size users of nearby Elstree aerodrome. The Chairman is still writing enthusiatically about his trip to India. He compares the Indian Nationals to Eaton Bray in the late forties with the crowds rushing to see a Mills 1.3 in action.

Quite a heavy influx of reports and newsletters, and we apologise for not finding space for all the newsletters, though they have not been overlooked. Keep them coming. **Clubman**

CROSSWORD ANSWERS

CROSSWORD ANSWERS

ACROSS: 1. Nordic. **4.** Beta. **6.** Cup. **7.** Mainspar. **10.** Cox. **11.** (see 9), **12.** Heat sink. **15.** Kit. **16.** Enya. **17.** In trim.

DOWN: 1. NACA (National Advisory Committee for Aeronautucis, USA). **2.** Ripmax. **3.** Incident. **4.** Blip. **5.** Tear. **8.** Sullivan. **9** and **11** across. In fun. **10.** C.G. **11.** Fokker. **12.** Horn. **13.** Area. **14.** Atom.

MARCH WINNER

"A SCALE MODELLER'S DREAM . . . EVEN THE GUN WORKS!

D. BUTCHER
BROMLEY, KENT

Another mailbag full of wit this month produced many a guffaw at MAP so to share the jokes here are some of this month's runners up: "THIS IS THE LAST TIME I'LL ATTEND A CROP DUSTING DISPLAY".. R. Chegwin, Cardiff. "EXISTING PEANUT RULES RETAINED FOR ANOTHER YEAR – SCALE CROWD REACTS" from Alan Callaghan or "CARDINGTON'S FAMOUS SCRAP HEAP OF OBSOLETE TIMEKEEPERS FROM PREVIOUS INDOOR WORLD CHAMPS". "RIGHT LADS, ALTOGETHER NOW. BLOW!!". Conal England, Carshalton. "WHO SUGGESTED A KNOCKOUT CONTEST?". J. Vann, Saffron Walden. "IS IT A BIRD? IS IT A PLANE? CORI IT'S WONDER WOMAN!". Stephen Wigley, Yorkshire. "BUT THE AMERICANS LANDED ON THE MOON AT NIGHT". W. Denning, Tadworth. "WAKE UP LADS! THE PHANTOM TENT SNATCHER HAS STRUCK AGAIN". Graham Pugh, Moreton in the Marsh. "DRAT THOSE STINKY DIESELS". R. Christie, Glasgow. Incidentally, the photo is of spectators watching a high altitude R/C model at the 1954 Nationals at Waterbeach. If you'd like to try winning yourself a year's subscription to *Aeromodeller*, caption this month's challenging photo and send to *Aeromodeller*, PO Box 35, Bridge Street, Hemel Hempstead, Herts HP1 1EE, results July issue.

SHOP GUIDE

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