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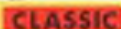
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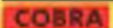
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MAP **HOBBY MAGAZINE**

Comment

AS WE GO TO PRESS this month we are just able to bring news from the recent World Free Flight Championships held in Taft, California. Unfortunately our British Team did not excell themselves – partly due to the extreme weather conditions which affected many teams. In glider, all our competitors dropped their first flights, a bad start, but John Cooper placed highest at 22nd. The amazing Thomas Koster won F1A, proxy flying for fellow Dane Per Grunnet – Thomas now having won all three FAI Free Flight Classes! Per Quarn-

strom the young Swede was second with Americans Lee Hines 3rd and Jim Wilson 4th, helping win the team prize for USA. In F1B our flyers did better with Ron Pollard, the last-minute replacement for Dave Hiperson reaching the fly-off to place 5th, our best result for many years, and Bob Wells dropping just a single flight. Italy won the team prize and despite some unlucky flights for third man John Cooper, the British Team led by Manager Mike Fantham gained third place – well done lads. Israeli Itzhak Ben-Itzhak won the coveted Wakefield Trophy with Australia's Paul Van Leuven 2nd and Canada's Dan O'Grady 3rd after remarkable fly-off dramas which produced headaches for

competitors and organisers. The Power flyers, perhaps our strongest team, were knocked out with massive down draughts for Stafford Screen and Ray Monks, spoiling one flight each. Only Pete Harris reached the fly-off to be credited with a double over-run zero score. Italian Mario Rocca placed first using the new Alberto Dall'Oglio 15 motor with Japan's Keiichi Kibiki 2nd and Frenchman Michel Iribarne 3rd after more processing drama for America's Doug Galbreath, team honours going to France. Summing up a great, if down-draughted Championships, attended by 26 countries including the welcome participation of flyers from the People's Republic of China.

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On the Cover

Famous for both his models and paintings for over 40 years, Rupert Moore's fabulous 1937 Vintage Rubber-powered interceptor fighter takes to the skies once more flying across the nostalgic canvas of yesteryear. Rupert's model is our APS Plan feature this month, turn to page 714 for full story and details.

Model & Allied Publications Ltd., 1979.

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Next Month

1979 World Free Flight Championships full contest report with all the news from California. R.C. Sport Flyers got started with constructional advice on the kits featured in our trainer survey. More help too for first time builders in our Junior Aero Aces Flying High series. Plus lots of information on all branches of model flying, on sale December 21st.



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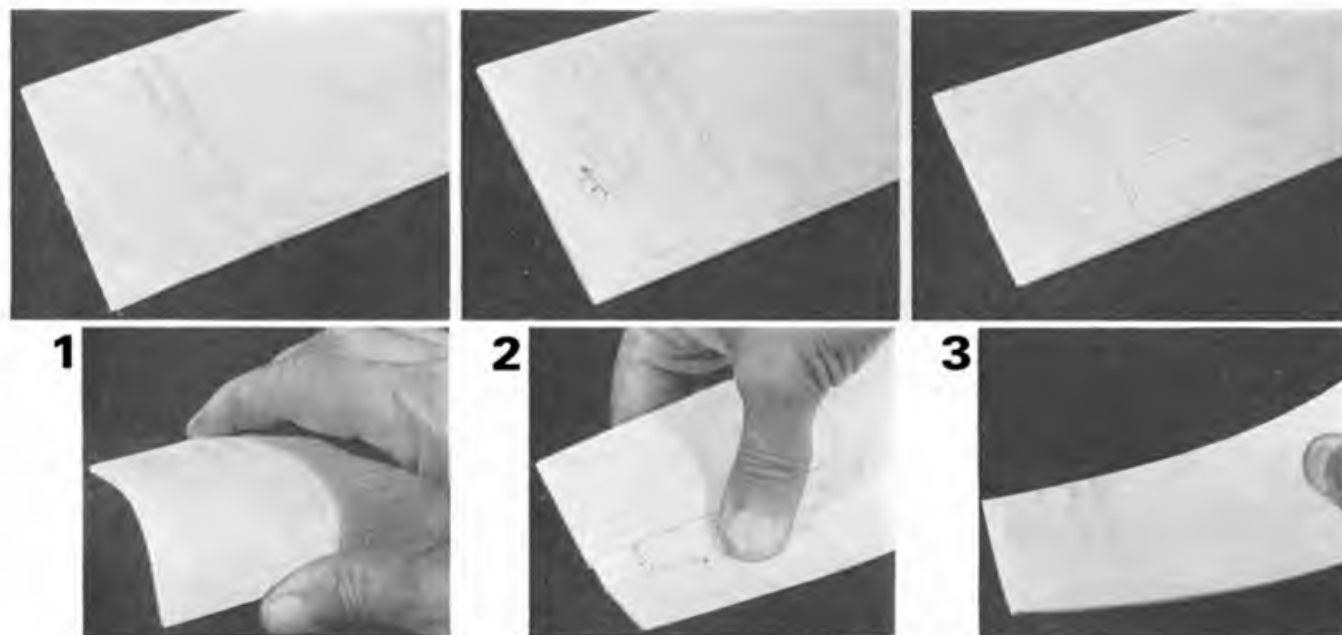
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Let's talk about the 'cut' of Balsa sheet. Balsa arrives in this country in the form of rectangular shaped blocks of lumber. After passing inspection for quality and density these blocks are planed true and 'square' (and further inspected at this stage) before sawing into 'slices' or sheets. This is where 'cut' comes in, which determines the properties of the final sheets.

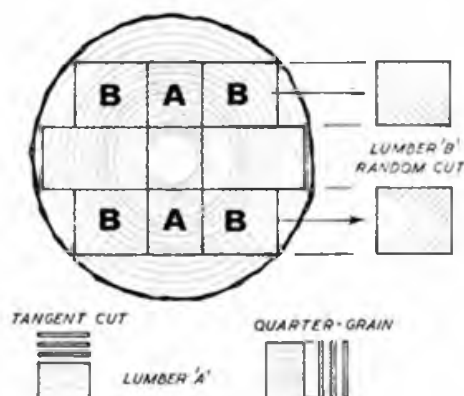
Lumber blocks A (in the diagram), for example will have the annular rings running roughly parallel to two faces. If 'sliced' parallel to these faces, the result will be *tangent-cut* sheets. Cut the slices at 90 degrees to the run of the annular rings and the result will be *quarter-grain* sheet.

Tangent-cut sheet will bend readily edge to edge (photo 1). The right type of sheet to choose for covering curved surfaces. *Quarter-grain* sheet will be stiff and rigid edge to edge. Try to bend it and it will split (photo 2). This is the sort of sheet to choose for ribs, all-sheet tail surfaces and other parts that need to be stiff.

Now look at lumber blocks B. Whichever way sheet is cut from these blocks the annular rings will run at approximately 45 degrees through the sheet cross section. This is known as *random cut*. A general purpose sheet which is slightly bendable (in thin sizes), but at the same time fairly rigid (photo 3).

The diagram also shows that blocks yielding random cut are more prolific than those capable of giving tangent-cut or quarter-grain sheets. A wider block A, for example, selected for cutting into quarter-grain sheet would yield first random cut, progressing to quarter-grain and then into random cut again.

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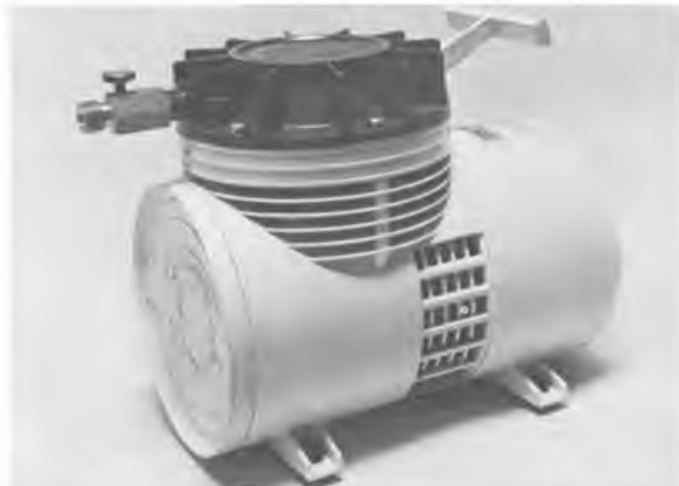
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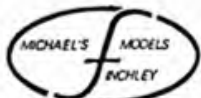
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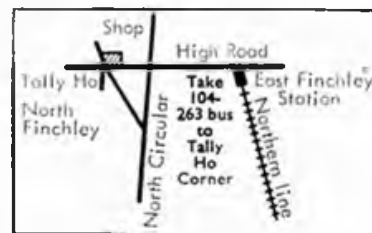
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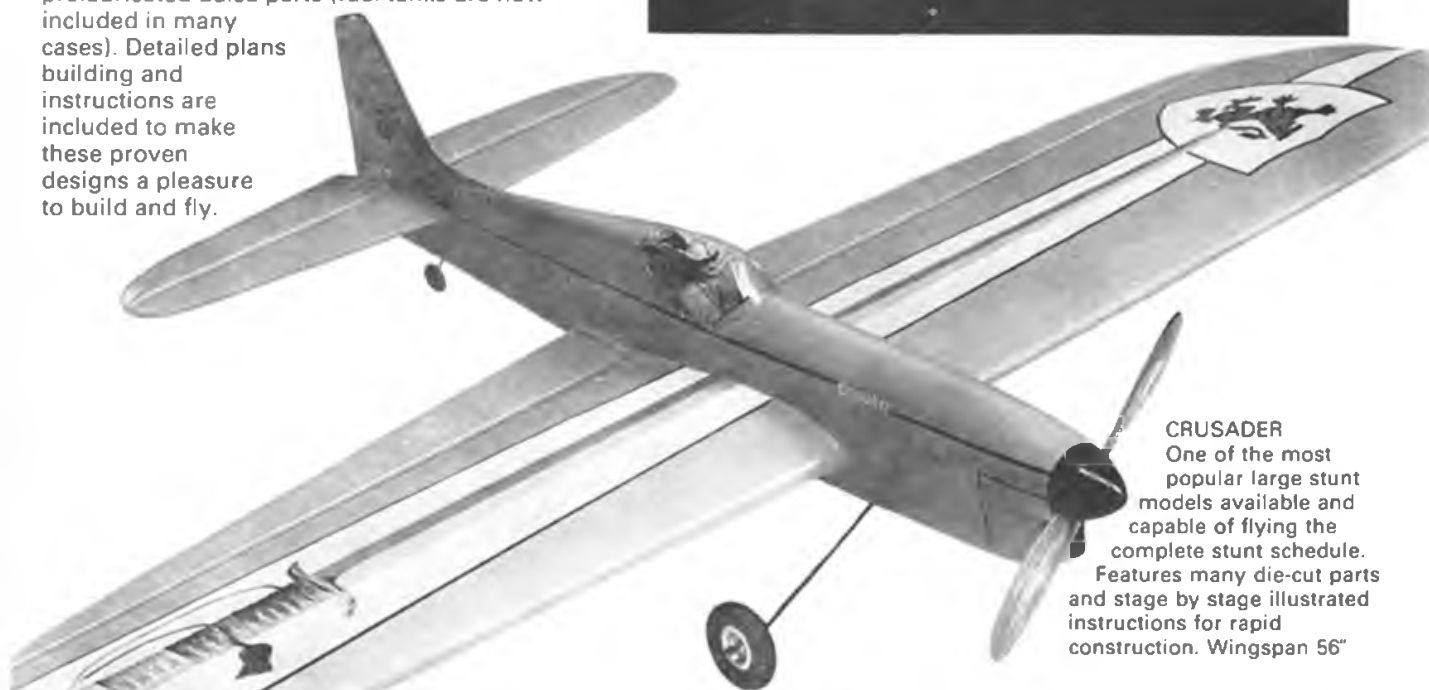


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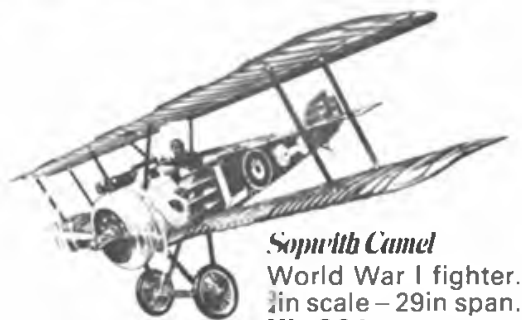


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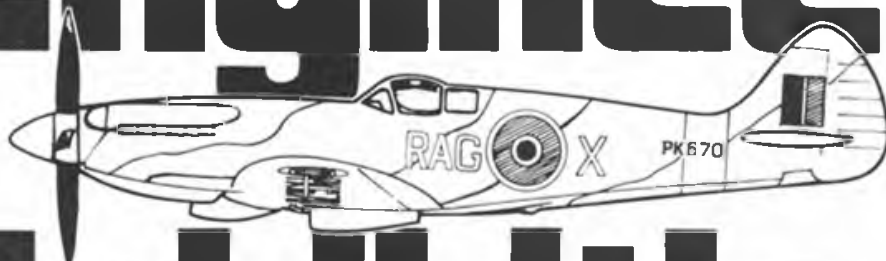
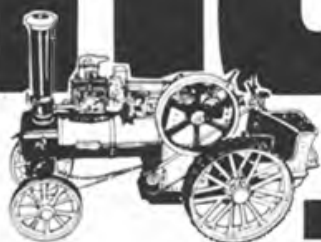
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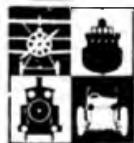
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SCHOOL PROJECT

Alan Barnes, who is 16 years old has just finished a special two year engineering course at Bishop Stortford Boys High School. Although not an aeromodeller previously, he decided to tackle the job of designing and building a control line model aircraft. The first version was constructed from conventional balsa materials and powered by a DC Sabre. To investigate the result of using a different technology, an identical model was constructed but this time the fuselage, wing ribs and covering were of aluminium. Comparisons were then made of the weight, C of G, adhesives, methods and ease of construction. At this stage, the two models were spotted during a visit to the school by John Stroud, and an offer to carry out some test flying resulted in Alan coming to our All-Scale Day back in June. Even though the day was rather windy the conventional version proved to be an excellent flyer. John recommended Alan to fit a longer control horn to make the control less sensitive, this being the only change to make it into an ideal trainer. How's that for a first attempt! The airframes, without engine, weighed 5oz for the conventional one and 7 oz for the aluminium one. The C of G of the heavier one is slightly further back and this will be corrected before further flight tests are made. Wingspan is 530mm and the wing section is similar to a Clark Y.

If you are looking for a project for school why not embark on one connected with model aircraft. In the whole spectrum of our hobby there must be investigation and research work to suit almost any level of technology and ability, and combine work and pleasure, and do not forget to write to us if you think we might be interested or of help.

PS. Alan Barnes won the school prize for the best all round student on his course.



Matty Sullivan

Alan Barnes with his two prototype Control Line trainers, a balsa construction model on the right with the aluminium model, including trial wing section with drilled ribs, to the left. This project, completed at school, helped win Alan the school prize for technical study.



CO₂ SAFETY MESSAGE

Having studied Ian Peacock's article *It's a Gas* in our November issue, the British Oxygen Corporation, manufacturers of Sparklets CO₂ Bulbs used by modellers have contacted us to emphasize that they cannot recommend the following on grounds of safety:

(i) Brazing or welding any sort of adaptor to a sparklets bulb; (ii) Fabricating the twin nut adaptor; (iii) Using the Telco adaptor on a long flexible hose. Readers are reminded that the gas pressures inside CO₂ cylinders can be between 800-1500 lb per square inch, and that mishaps resulting from imperfect workmanship on home-made chargers could lead to a potentially very dangerous situation. All equipment should be pressure tested by experts to a satisfactory safety margin and should be regularly maintained.

NFFS INTERNATIONAL PLANBOOK

Conceived by Hardy Broderson, edited by Dave Linstrum, and printed by Doug Galbreath for the National Free Flight Society, this landmark volume is now available by mail order. It was published as part of the FF World Champs and contains over 109 drawings (in 8½in x 11in form) of models flown in Championships, Nordic, Wakefield and Power, and photos back up the technical presentation of plans and text. This is a collectors' item and should be on any serious F/Fers bookshelf. There are also historical articles and photos for Vintage fans.

If you did not attend the WC at Taft, get a copy by ordering yours now from: NFFS Plans & Publications, 4858 Moorepark Ave, San Jose, Calif. 95129 USA. Price is \$10 plus postage. Book rate postage in USA is \$1 and 1st class (Priority) is \$2.25; these rates also apply to Canada and Mexico. For Air Mail to Europe, add \$3.50, and to the Far East add \$5 postage. All payments must be in US funds and payable to the NFFS.

MATTY SULLIVAN

All modellers who have used the well-known 'Pylon' brand control line wires or Sullivan accessories will mourn the loss of the inventive personality who launched so many of these original ideas in the USA. Matty Sullivan was among the staunchest of all aeromodelling supporters around the world. The innumerable plastic components which have become part of almost every modeller's control line or radio control systems will forever be his lasting memorial. We shall particularly remember him for his sparkling Irish humour and his very generous donations to overseas modellers at the US based World Championships.

HANNA REITSCH

The most famous of all European aviatrix, Hanna Reitsch, the diminutive but yet so skilled figure who featured largely in the testing of wartime prototypes with great valour, will be missed by all of her German compatriots and innumerable other admirers around the world. Hanna first achieved fame by flying the twin rotor Focke-Achgelis helicopter *inside* the Berlin Sports Hall in 1939 and piloting a V1 Buzz Bomb. She was the keenest of advocates for utilising aero modelling as a basis for aeronautical training.



Hanna Reitsch

Letters

SPONSORED COACHING?

Dear Sir,

I read with interest your comment column in the recent issue of the *Aeromodeller*. I started to build flying models in the early fifties, and although not currently an enthusiast I keep pace with the hobby through your magazine and through others on the market.

I feel that the way to encourage young modellers is through a sponsored coaching scheme such as that run by the British Sub-Aqua Club in their snorkel award scheme and also by other similar schemes run by Sports Councils. This scheme could operate through model clubs, schools, the Air Training Corps and other youth organisations.

The 'Trade' who make their living from aeromodellers could be approached to provide funds for such a scheme. I feel that in any case like most leisure industries the prices charged are high, and this would be a way of ploughing back some of the money they make into the hobby. If the scheme produced more modellers then obviously this would produce more customers.

Canonbie, Dumfries-shire

D. L. Trail

ORANGE BOX SEQUEL

Dear Sir,

Orange Box, the 72in span R/C soarer presented free with *Aeromodeller* March issue seems to have another point in its favour! It doubles very well as an open power

Squadron Leader T. C. Potesta's latest project, the triple motor Junkers 52, which ingeniously uses a single diesel engine in the nose with the outboard two propellers free wheeling to simplify flight trim with maximum realism



model! To explain... I had some very enjoyable slope flying with mine the other day and then popped a Mills .75 power pod on top to fly in dead calm weather. The receiver aerial was unfortunately caught by the launcher at the moment of take off and snapped some two inches from the Rx. Not seeming to care my *Orange Box* took off like the proverbial rocket and headed for the sky! In the glide phase it hooked an enormous thermal and was last seen as a speck over Bradford! Luckily the press were kind enough to give me coverage and the model was returned the next day with only a bent nose and one tissue tear. Gents... this one's a cracker! My felicitations to the designer!

Bradford, Yorks.

John McAloy

MORE FIGURE EIGHTS

Dear Sir,

In September 1978, I broke the existing Belfast Model Flying Club's record of 50 figure eights, by 100, flying with a dead engine i.e. 150 figure eights. The model was an own designed Combat flying wing fitted with a Veco 19. This flight was observed by four other club members. Belfast, N. Ireland.

John Black

CURRENT PROJECT

Dear Sir,

Enclosed are some photos of my 52in span Junkers 52. Construction is similar to that of my Savoia-Mitchell SM81 which is already on your lists. However despite the size I have kept weight to a minimum and 1 to 1 5cc power is sufficient for free flight.

Innsworth, Gloucester Squadron Ldr. T. C. Potesta RAF

What's Happening?

CONTESTS

Nov. 18th

N.A. INDOOR EVENT. PEANUT, EZB & IHLG 30ft ceiling. Venue: Colne Valley Leisure Centre, Slaithwaite, Nr Huddersfield. Contact: Jim Mosley Tel: Leeds 864026.

Dec. 2nd

AEROMODELLER COUPE INTERNATIONAL. AEROMODELLER CUP 80 gram and MRA TROPHY 100 gram plus substantial prizes. Venue: RAF Halton. Contact: Aeromodeller office Tel: 0442 41221 Ex. 283.

Dec. 9th

NE AREA INDOOR MEETING. EZB, IHLG, SCALE, NOVICE, DURATION. 1-6pm. Venue: Spennymoor Recreation Centre. Contact: Jeff Anderson Tel: Stokesley 711200.

1980 DATES

Jan. 6th

OPEN MEETING - IMPROMPTU EVENTS, EZB, PEANUT AND INDOOR CHUCK. DEMONSTRATION ELECTRIC RTP. Venue: Deben Community Hall. 2pm-7pm.

March 2nd

NE AREA INDOOR MEETING. EZB, IHLG, SCALE, NOVICE, DURATION. 1-6pm. Venue: Spennymoor Recreation Centre. Contact: Jeff Anderson Tel: Stokesley 711200.

May 4th

BKFA KITE DAY. Venue: Old Warden, Beds.

June 22nd

AEROMODELLER ALL-SCALE DAY. Venue: Old Warden, Beds.

Aug. 17th

AEROMODELLER ALL-VINTAGE DAY. Venue: Old Warden, Beds.

Oct 5th

BKFA KITE DAY. Venue: Old Warden, Beds.

Mar. 16th

1st FF AREA CENTRALISED. F1A (KMAA - PLUGGE), O/P (FROG SENIOR). O/P. Venue: local area.

Apr. 5th, 6th, 7th

CENTRALISED FF THREE DAY. SAT - O/P, O/G, O/P CLUB CHAMPIONSHIP. SUN/MON - F1A, F1B, F1C, EURO TRIALS. Venue: Barkston Heath?

Apr. 13th

INDOOR SCALE NATS. CO₂ OPEN RUBBER PEANUT.

Apr. 13th

1st CL CENTRALISED. 1/2A TR, F2C, CSS, OPEN CARRIER.

Apr. 20th

2nd FF AREA CENTRALISED. F1C (HALIFAX - PLUGGE), O/P (GAMAGE), O/G. Venue: local area.

May 3rd-6th

INDOOR. Venue: Cardington.

May 11th

3rd FF AREA CENTRALISED. F1B (WESTON - PLUGGE), O/P (WHITE), O/G. Venue: local area.

May 18th

INDOOR. Venue: Cardington.

May 22nd

2nd CL CENTRALISED BTR, F2B, F2C, F2D. SPEED, RAT RACE.

May 31st

INDOOR. Venue: Cardington.

Jun. 8th

4th FF AREA CENTRALISED. TEAM GLIDER (MODEL ENGINEER - PLUGGE) F1C (ASTRAL), C.D'H. Venue: local area.

June 15th

INDOOR. Venue: Cardington.

July 3rd

SCALE FLY IN. F1F, C1L, R1C.

July 13th

INDOOR. Venue: Cardington.

July 20th

INDOOR. Venue: Cardington.

July 27th

MINI CENTRALISED A11, C.D'H., 1/2A, HLG, CO₂ DURATION. Venue: Bassingbourne?

Aug. 3rd

INDOOR. Venue: Cardington.

Aug. 17th

INDOOR. Venue: Cardington.

Sep. 7th

INDOOR. Venue: Cardington.

Sep. 11th

CL TEAM TRIALS. F2A, F2B, F2C, F2D.

Sep. 13th, 14th

CENTRALISED FF TWO DAY. F1A, F1B, F1C. Venue: Sculthorpe?

Sept. 21st

5th FF AREA CENTRALISED TEAM POWER (KEIL PLUGGE), F1B (GUTTERIDGE), A11. Venue: local area.

Sep. 27th, 28th

CENTRALISED FF TWO DAY. F1A, F1B, F1C. Venue: Sculthorpe?

Sep. 28th

INDOOR. Venue: Cardington.

Oct. 5th

INDOOR SCALE. PEANUT, CO₂ OPEN RUBBER.

Oct. 5th

INDOOR. Venue: Cardington.

Oct. 12th

6th FF AREA CENTRALISED TEAM RUBBER (FARROW - PLUGGE), F1A (SMAE), 1/2A. Venue: local area.

Oct. 19th

INDOOR. Venue: Cardington.

Nov. 2nd

MINI CENTRALISED A11, C.D'H., 1/2A, HLG, CO₂ DURATION. Venue: Driffield?

FLASH BACK

When Rupert Moore's *Viper* was first revealed to *Aeromodeller's* readers in October and November issues 1937, he could hardly have foreseen the long connection which Rupert was to have with this magazine. Rupert's paintings have become world famous. His flying scale models are equally well known by their extreme popularity through *Aeromodeller Plans Service*. But there always has been one particular design which the old us will remember, and that is the "Viper". Occasionally, over the years we have discovered versions of the *Viper* being flown just for fun, not always with the original geared rubber drive arrangement, sometimes with a Mills '75 or even a Mills 13, maybe a DC Merlin but always with the same degree of appreciative enthusiasm for this classic concept of an interceptor fighter.

Now we have great pleasure in reintroducing this classic and including it in celebration on our cover some 42 years after it was first published. We are sure it is going to be well received and look forward to seeing many more *Vipers* on the club flying grounds in coming months.



IN ITS ORIGINAL FORM *Viper II*, K-2715, took off under its own power on its first flight, from Ventnor Golf Course in June 1938, just forty years ago. After twenty-two years flying and eighteen in retirement she still hangs in my studio, a little decrepit but still handsome.

Trimmed for glide and short power hops before setting out, she was given half turns and left to her own devices. The ensuing flight was successful, adding some 35 feet or so to the altitude of the golf course, which itself was at the top of the highest hill in the district, she broke away for a prolonged glide down the valley to be retrieved by some of the hospital staff of which I was then a patient. That this was not a fluke was demonstrated by the fact that the replica, built by Leonard Taylor, (also a patient) K-2716, built at the same time as the original, almost repeated the performance a few minutes later.

In retrospect, these two models, in their original form were named **Viper I**, to differentiate from the slightly improved version which won the Coronation Cup in 1937.

During 1938 a number of improvements were incorporated, the first being a new airscrew carved from a block of satin walnut to replace the original one. Owing to lack of carving facilities in the hospital, this was built up from steam bent blades, glued and screwed to a hard wood boss the blade roots and spinner being built up with hard balsa laminations. With a new and improved undercarriage and greatly reduced tail areas, she became **Viper II**.

This model is in a class which was rare enough pre-war and I believe non-existent today, it is a **FREE LANCE SCALE MODEL**,

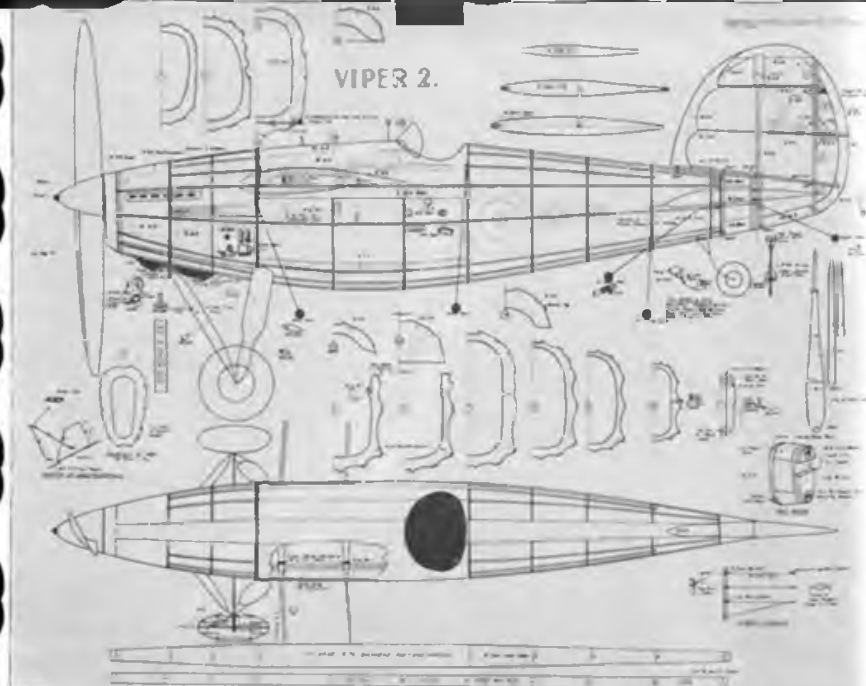
that is, a flying scale model of an original idea for a full sized aircraft.

I felt so strongly about the antiquated 'new types' of biplanes being issued to the RAF Fighter Squadrons at that time, that I thought I'd have a go myself, in model form.

The side view of a Rolls Royce 'Kestrel' was drawn to scale (with a scale diameter

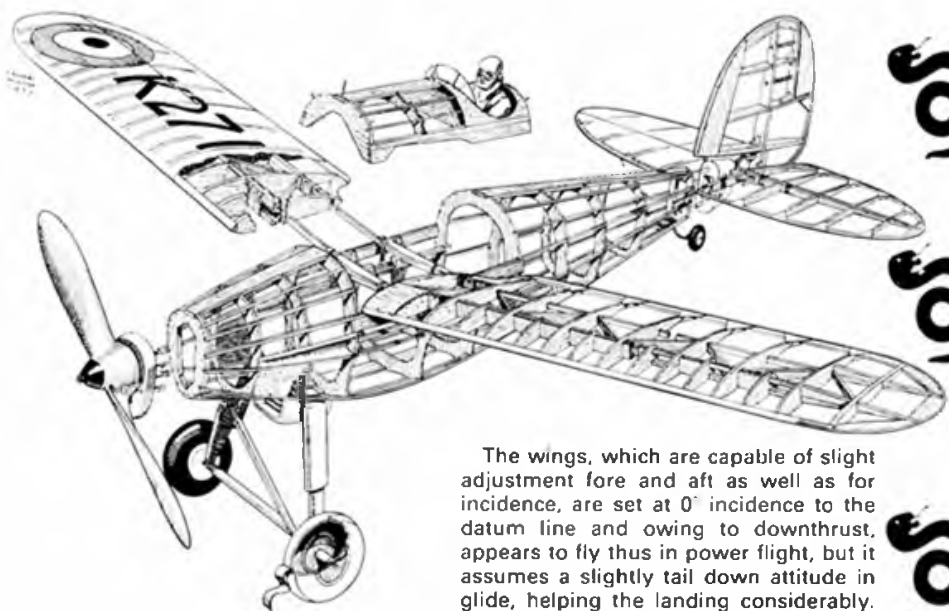
airscrew) behind which was drawn the seated side view of Fl/Lieut. Balsa-Woodhead, NGB, and two Baas, also to scale. Around these, the outline was developed to include guns, tankage and all other necessities, as done in full sized practice. Designed as an interceptor fighter where a high rate of climb was more important than all out speed (which

Viper I



should naturally be high) a shoulder wing layout was chosen because, as demonstrated later by the Canberra, it has various aerodynamic advantages (enhanced by the reduction of root chord). At that period it was believed generally that the aerodynamic gain of a retracting undercarriage was more than outweighed by its extra weight its unreliability and complication for the ground crew. At speeds in the 200-240 mph range this was probably true, it was at 300 mph plus, where it comes into its own and of course with it came the almost universal, low wing lay out. (May I remind you that my *Typhoon* and later flying scale models had fully automatic retracting and detracting undercarriages.) This model flies, as it should, at its true scale speed of 1/8th full size, between 20 to 24 mph. The rig of this model may be of some interest. First it must not be forgotten that at that time most of the aerodynamic problems, peculiar to rubber powered flying scale models were yet to be solved and *Viper II* played its part in solving some of them particularly the reduction of tail areas to scale sizes.

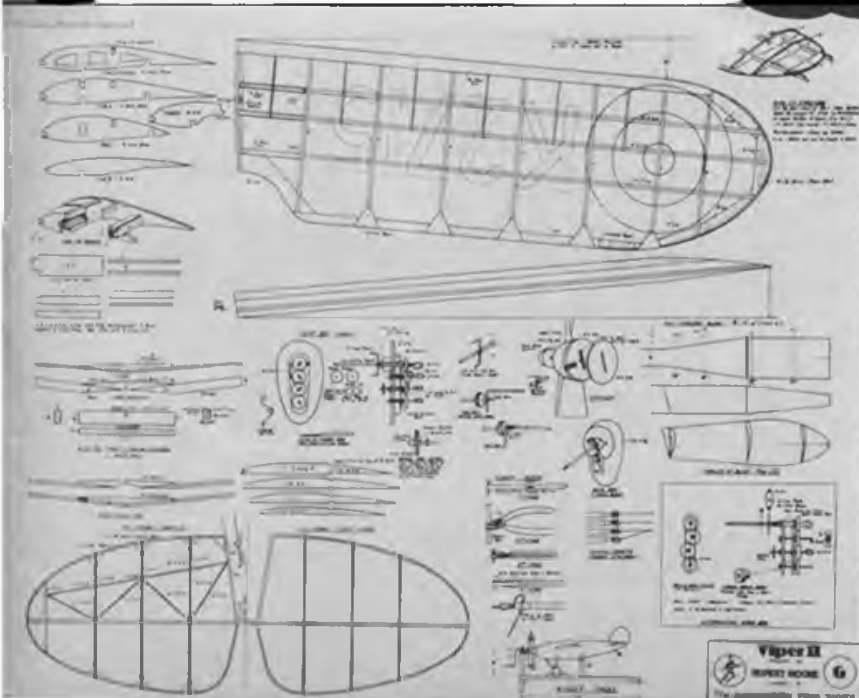
Unlike the concentrated weight of a petrol engine, the weight of a rubber motor is distributed evenly along most of the fuselage, with its centre of gravity at the mid-point between the rubber hooks, usually in line with the wing trailing edge or behind, necessitating ballast to rectify the balance, hence the gears as ballast earning their keep. The inertia of this widely distributed weight required a much larger or more powerful tail to control



longitudinal stability and it was on this model that I solved the problem. Substituting a lifting section tailplane of much smaller area than the original symmetrical sectioned one, which was set at -2° incidence, the new one was set at -2° below its no lift angle some -6° true.

In normal attitudes, it functioned as the original but during any tendency to stall when *Viper* assumed a nose up attitude, the tail retained a positive angle of attack in relation to the air stream, when the lifting section came into its own. It simply could not stall, and the model was lifted from 'both ends'. This considerably improved the climb and therefore, duration.

RUPERT MOORE'S 1937 CLASSIC 49in SPAN RUBBER POWERED INTERCEPTOR FIGHTER



The wings, which are capable of slight adjustment fore and aft as well as for incidence, are set at 0° incidence to the datum line and owing to downthrust, appears to fly thus in power flight, but it assumes a slightly tail down attitude in glide, helping the landing considerably. After wind tunnel tests, to find out exactly what was to be gained by freewheeling airscrews, (fully reported in *Aeromodeller*, July 1938, P.398 and repeated in the May issue of 1948, P.314), it was found out that, while it is true that a freewheeling airscrew of this pitch offers half the resistance that it does when locked this is less than half the problem. The size in relation to span is just as important and so is the gross weight of the model in relation to the resistance. The inertia of a heavy model can often cancel out much of the advantage of freewheeling. From what I could figure out, a gain of probably a second was to be expected therefore I decided that it would be a greater advantage to arrange for it to lock horizontally, in the interest of good landings. Given a reasonable surface, *Viper II* normally stays on its wheels. The locking device was so arranged that the airscrew was slowed down before finally locking otherwise the model was apt to 'rock' rather badly.

The colour scheme of aluminium dope all over the vermillion white and ultramarine roundels, no rudder stripes and black serial numbers, carried for a short period above as well as below the wings was contemporary, the serial number of course was bogus, as there was no full-size prototype.

Beyond saying that steel knitting needles are no longer obtainable, piano wire will have to be used and that the modern equivalent of DMC sewing silk for binding the rubber skein ends, is Twilleys Stalite or other good make of crochet cotton. Select a thickish kind. Crochet cotton feels as soft as wool and therefore does not cut the rubber, but it is too strong to break easily. I do not propose to suggest other modern equivalent materials.

Full size copies of the plan, reproduced here to 1/8 scale is available as plan D/1380 price £2.25p plus 30p postage and packing. Export orders obtainable from appointed agents or direct from Plans Service, P.O. Box 35, Bridge Street, Hemel Hempstead, Herts HP1 1EE.

Built from a Comet kit, this twin CO₂ powered Lockheed Lightning made many long impressive flights at the Aeromodeller All-Scale Day in June. Minimal scale detail and paint scheme keeps weight low and performance high.

This Britten Norman Islander marketed by Harry Butler is specifically designed for twin CO₂ operation. High wing layout makes the model a stable flyer.

CO₂

it's a GAS!

BY Ian Peacock

PART 7 – MULTI MOTORS

NO OTHER POWER SOURCE is more suited to twin and multi engined models, for not only is there a more stable flight pattern, due to the gradual slowing of the motors, but if both motors are fed from a common tank or tanks, then they both die off at the same rate, removing the dreaded 'one engine' syndrome so unhealthy to multi motor flying.

One of the fundamental effects found in the operation of CO₂ motors is the manner in which the power drops off as the gas source is expended. Unlike a glow or diesel motor which as often as not, stops suddenly, the CO₂ motor will run down slowly towards the end of the tank producing a much more gentle transition from "power on" trim to that experienced in the "power off" mode. This problem which was alien to most internal combustion engine freaks, can be turned to an advantage, offering the "small scale" enthusiast a smooth transition from power to glide which is just as applicable to multi engined free flight.

At present, only Telco produces a

genuine "twin engines with tanks", even these are not widely advertised. In fact, you may have to take this magazine with you when visiting your model dealer, to convince him that such items exist! Insist that he orders one from Telco for you – they do exist. However, if you are any good with a small soldering iron, you can make your own as *any* CO₂ motors can be coupled in multiples as shown. It is important that engines, tank and fillers are carefully dismantled before any soldering takes place and the rubber 'O' rings removed to prevent them being damaged by the level of heat applied.

To achieve the ideal twin performance, both motors are required to work at a common pressure and to this end, re-plumbing of the capillary tubes is required to provide an equal twin supply. Dependant upon the lengths of tube involved two approaches may be used.

1. Remove the filler from the end of the tube (take plastic parts and 'O' rings off first!) on *both* motor assemblies. Carefully drill a second hole in the filler and plate and equally carefully solder *both* filler tubes back into the brass plate. Check that pipes are not blocked up with solder by either blowing through the pipe (from the tank end!) whilst soldering, or putting a thin pin (stain-

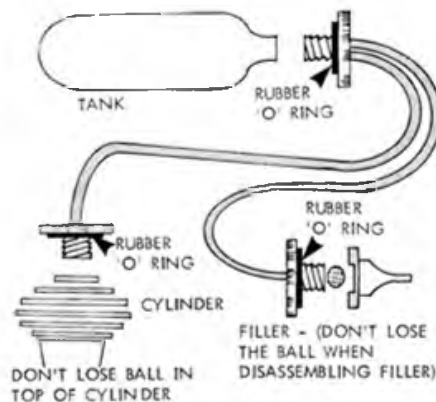
less steel variety) into the end of the pipe. Use a *hot* iron and one of the good quality non-corrosive plumbers' fluxes.

2. Obtain spare copper tubes (all UK manufacturers use similar tubes and will supply spares on request!) and a small piece of brass or copper around 1in cube. Such a small piece may be filed from an old brass screw or even from an electric plug part. Drill one hole right through and another at right angles. Carefully solder pipes as shown.

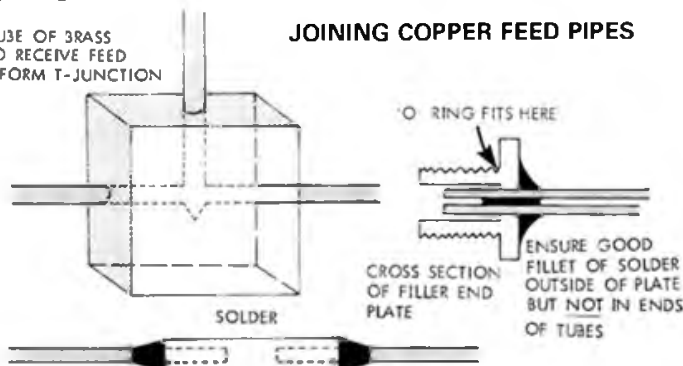
Remember to work slowly and methodically for one is dealing with gas pressures of around 1000psi which demands a good job on the grounds of safety. Finally check all plumbing to ascertain that there are neither leaks nor blockages. Multiple tank and engine assemblies are basically very straight forward, simply add tanks and engines until the desired numbers are reached.

Motors should ideally have matched performance. It is preferable to operate a pair of similar vintage although even this is no guarantee of success. Most manufacturers produce motors in batches varying from one to the next and it is fair to assume that two motors bought at the same time from the same retailer are likely to be from the same batch. The similarity

DISMANTLING CO₂ MOTOR



1/4 IN. CUBE OF BRASS
DRILLED TO RECEIVE FEED
TUBES TO FORM T-JUNCTION



JOINING COPPER FEED PIPES

SIMILARLY TO EXTEND PIPE RUNS, SLEEVE
PIPE JOINTS WITH SHORT LENGTH OF BRASS TUBE

in performance of two such motors will vary from manufacturer to manufacturer but in the unlikely event of them being seriously dissimilar, the manufacturers concerned will most probably be able to help out. In practice it has been found that motors need *not* be exactly matched as regards performance as each engine can be adjusted individually although you should strive to achieve some degree of matching. It would not be prudent say, to use one Humbrol and one Powermax motor on a twin installation for despite external similarities, constant updating of design and manufacturing procedures may well manifest themselves in different "insides" resulting in vastly differing performances. Needless to say, one should not couple Telco or Brown motors with, say Humbrol or Powermax, for each being of different swept volumes it is unlikely that any matching could be achieved at all! Bear in mind though, that exotic three engine models such as the Britten Norman Trilander, Ju52, Ford Tri-motor etc, could well use a matched pair in the nacelles with an 'odd' motor in the central position.

Incidentally, when running multiple engines, there tends to be a marked rush to get airborne as motor one is consuming gas whilst 2 and 3 etc are started. Don't let gas wastage panic you into failing to check that *ALL* motors are going the right way! Launching the model with reversed thrust on one side produces interesting if unprofitable flight patterns! In fact, if the filler is readily accessible then the flight tank may be topped up after all motors are running, taking care that the fresh charge of gas does not cause too much of a reduction in motor speed due to temperature drop. If in doubt, release the gas refuelling source immediately you detect a reduction in engine revs!

As regards motor revs the ideal situation is to set up each motor to a common speed using a rev counter or tachometer (if you've got a buddy who is into pylon racing he may just have such a device!) However few situations are ideal and it is not too difficult to set up a pair of engines "by ear" so-to-speak. In fact one may suspend the model from its C of G by a short length of string and start both motors. A



Two more interesting multi motored models flown at our All-Scale Day, this Semi Scale triple motored Rohrbach Airliner and an in line pusher-puller Cessna Skymaster, both from Geoff Smith of Rugby illustrating the immense scope of subjects for CO₂ power

marked attempt to revolve about its own axis reveals seriously out of balance thrust. Because of the very gradual transition from full power, through cruise, to powered glide spoken of earlier, minor trim imbalances may be achieved with trimming tabs to good effect. Trials indicate that imbalanced revs are of less effect than motors from differing batches, or indeed, one new motor and old one well run-in. My initial efforts were thwarted in this way because engines that were set to equal revs for a GAS charge (used on trimming flights) exhibited a marked difference in performance when subjected to the full power of a *LIQUID* charge. In fact it was only a chance meeting with Doug McHard which sorted out the problem and encouraged me to progress further into this challenging area of Twin CO₂ flight.

So! What about the models then? Well, following in the same vein as the preceding sections of this series, multi engine kits were the obvious place to start and there are a few about, although one has to shop around a bit to find them. The first two that we looked at are from the COMET range mentioned a couple of months ago and are the P.38 Lightning and the B26 Invader. Both these models are constructed on the 1/2 keel principle and are not at all difficult to build or fly. Weight is, however, of paramount importance, and should be watched with caution. Performance of the P.38 seen at Old Warden this

year verified this very point. Devoid of much of the scale surface detail and covered in unpainted tissue, it out performed our own example by a considerable amount. So go easy on paint in one's quest for realism. The first step towards a twin engine project of this nature is to say the least, mildly frightening and thoughts of thrust line changes, C of G shift etc caused grave concern. As it happened we hit on a simple stepping stone and using the kit plan as a guide, we built an all sheet, profile copy of the kit. Being of simple construction this profile model was very quick and cheap to build and offered plenty of scope for adaptation and modification should these be called for. Once trimmed to fly correctly, one can push ahead with the kit, building in any side or down thrust that was found necessary on the profile. In fact the sheer simplicity of these profiles prompted us to produce a range of our own "design" from scale 3 view drawings – well worth further investigation.

Both the Douglas Invader and Lockheed Lightning fly OK on any of the current range of motors. Other twins and multi-motor models worthy of mention are the Guillows B25 Mitchell and DH Mosquito. Both of these are produced with free flight style structures yet are marketed as Control Line models. Weight needs to be watched with a much closer eye for a considerable number of plastic and cardboard



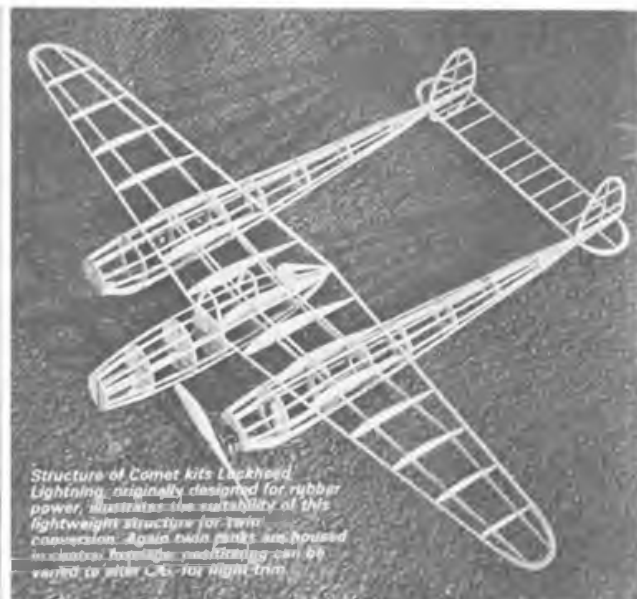
For readers who may still have doubts about flying twins, a profile prototype is the answer. Built in little more than an hour or so, and quickly decorated with felt tip pens, it makes the ideal test bed for thrust lines, angles of incidence, tail areas, CG balance position, wing warps etc.

Close up detail right, reveals the functional simplicity of construction with motors mounted on triangular balsa fillets faced with ply, twin tanks strapped to fuselage, side and top mounted filler that allows topping up after motors have been started. This model proved a curved plate aerofoil to be a better choice for future profile prototypes.





Hot off the building board, the Harry Butler BN Islander takes shape. Twin tanks are mounted inside the fuselage with feedpipes running out to cowled motors. Side windows are left unglazed to permit air circulation and prevent tanks freezing. Air exits through slot under tailplane. CO₂ motors are mounted on simple balsa frames under wing which also support undercarriage legs. Vacuum formed cowlings then enclose motor



Structure of Comet kits Lockheed Lightning, originally designed for rubber power, illustrates the suitability of this lightweight structure for twin CO₂ conversion. Again side tanks are housed in cowling. Furthermore, modification can be varied to enter C.A.S. for flight trim

parts are provided which may need modifying. Our Mitchell, when finished, weighed 7½oz which did little to help the flight performance. Wheels were made "plug-in" as with the Corsair, Zero etc (P532 Sept 79 *Aeromodeller*). We "chickened out" with the Mosquito for it was felt that the highly tapered wing may well produce severe tip stalling tendencies. Is there anyone out there brave enough to prove us wrong? Instead it was kept back for yet another project we are keeping up our CO₂ sleeve until later. Another excellent twin which was originally passed over due to its size, is the Magnificent P61 Black Widow. This is marketed by Stering (via Ripmax) and is typical of the approach to kitting that we have seen in earlier chapters. Being in excess of 3 feet wingspan, it was considered too large for a pair of Telcos or anything similar. However, now that the Czechoslovakian 'Modela' is becoming readily available through Micro-Mold and the Modellers Den, aircraft of this size are no longer a problem.

If two engines are insufficient for you (some people are just gluttons for punishment!) then how about the Ford trimotor or the B17 Flying Fortress, both

from Sterling. Without doubt though the best starting point in this quest for multi-engined free flight stems from the prolific building board of that RTP genius Harry Butler. Like most of Harry's kits, the Britten Norman Islander has been really well thought out and contains full details for twin CO₂ installation as well as the established RTP approach. As can be seen from the photographs construction and installation is not only simple but is well documented on the plan and instruction sheets. Furthermore, as first models of a type go, the Islander is a natural, having good pendulum stability with its high set wing. Talking to Harry at Old Warden this year, I voiced the opinion, that a conversion to the Tri-lander would seem quite feasible, only to be told that it had already been done. There's just nothing new under the sun!

Of course the story doesn't end here. Throughout the series it has been the object of the exercise to guide the reader through the steps from foam ready-to-fly, up to the point where they could confidently tackle plans from the MAP plans range. It will have not gone unnoticed that more than one multi-engined CO₂ model

has appeared in Alan Callaghan's Scale Matters column and these are often subjects where no plan yet exists, the results reflect the ingenuity of the builder. Remember that a simple 3 view profiled drawing enlarged from the many hundreds of Scale Drawings in the *Aeromodeller* Plans Service or one of the many excellent books on aircraft recognition or history, will provide sufficient information and once satisfied that all works OK, with a balsa profile prototype simply 'add' a structure along the lines of those that you have built already.

NEXT MONTH

What else is there left to do? Well there still exists an area of CO₂ flying yet to be conquered – controlled flight. New products both in terms of bigger, more powerful motors, and larger tanks are exhibiting major advances over existing possibilities. At least one UK manufacturer is considering ultra-light R/C equipment with CO₂ power in mind! So, next month we look at CO₂ as a power source for spheres of aeromodelling other than Free Flight.

One of the cover subject models from our August '79 issue, the B25 Mitchell, built from the Guillows kit. Wheels and undercarriage legs are tube and socket mounted for static display only and are removed for flight. Detail right shows tank, tank assembly and mouth of scale detail achieved using vacuum formed parts in the finished model which has been underbrush camouflaged



1979 EUROPEAN CONTROL LINE CHAMPIONSHIPS Aug 30th - Sept 2nd MARVILLE: FRANCE

F2A - SPEED by Jo Halman

Practice and contest flying of Team Race and Speed shared the same 'cage' and so practice time was limited. For the British, this was not too much of a problem as we only had one Speed entry: Peter Halman. It was a far from ideal arrangement even though speed was only supported by France, West Germany and Finland with full teams and Holland a two-man team, thus making a low total of twelve fliers. Short notice of the Championships may have been the reason for the absence of the Italians.

Peter was using his usual sidewinder asymmetric models with one long winged version for calm weather and Fi Rossi engines with ABC piston/liners. The fuel system was the almost universal CFS with a Rossi/Halman pipe and Halman (both designed and manufactured) carbon fibre props - single blade and two bladed. Halman was the only flier using hollow metal wings; all the others used balsa with metal skin a la Lenzen and Rumpel. Emil Rumpel and Ingo Schmidt had both sidewinder and upright asymmetric models, while Helmut Gorcizca had an upright semi-asymmetric model. All three had Fi Rossi engines with ABC piston/liners using the CFS fuel system and carbon fibre single blade props made by Bartel of Germany and Jensen of Denmark. Gorcizca and Rumpel had Rossi/Rumpel pipes and Schmidt a Rossi/Schmidt pipe. Enfroy, Constant and Bellelle had upright asymmetric models with Fi Rossi engines and CFS fuel systems. Enfroy and Constant used AAC piston/liners and Rossi/Rumpel pipes while Bellelle had an intriguing pipe that appeared to be made of glass fibre with metal header and tail pipes. All the French would say was that it was based on a Rossi/Rumpel pipe but was much lighter. Their props were as the Germans. Of the Finns, Jaakkola and Fagerstrom were flying upright models with asymmetric wings and semi-asymmetric tails while Valo, at twenty the youngest member of the Finnish team, flew an upright asymmetric model with both wing and tail set inboard. All three had Fi Rossi engines with ABC piston/liners, CFS fuel systems and pipes made by Personen, a fellow Finn. Valo and Jaakkola and Fagerstrom used carbon fibre single blade props, the former self made and Fagerstrom's by Matalainen. Both Brands and Bak of Holland also used Fi Rossi engines with ABC piston/liners, CFS fuel systems and Rossi/Rumpel pipes. Brands flew an upright asymmetrical model and used carbon fibre single blade props while Bak flew an upright semi-asymmetric model and used carbon fibre single blade Bartel, and his own glass two bladed props.

On Friday, with hot sunny weather, Speed was due to begin at 10.00am and end at 12.00pm which left two hours for practice before Team Race began. Halman arrived early to practice before the rounds began. His best engine still sounded sick with erratic engine runs. The second engine sounded consistent but was too slow to be considered and, only twenty minutes before the start he had no choice but to fly the sick engine and hope a tweak on the needle would produce results. On the official flight the engine sounded too lean so Peter used the cut off, landed, tweaked the needle, refuelled, started and took off. This time the flight sounded too rich so he

decided on a re-flight. Back in the pits he concluded that the erratic engine sounds indicated that the fuel system may not be working properly and so all the tubing was changed, the tank checked and flushed out and a bench run indicated that everything was OK. On the reflight the erratic engine runs recurred and so those hectic three minutes went like this: take off, two laps rich, cut, land, tweak, refuel, start, take off, two laps lean, cut, land, tweak, refuel, Time ran out!

Discontented at having a no flight in the first round, Peter Halman went off for a drastic re-think. Meanwhile the rest of the teams were flying. Rumpel, Schmidt, Jaakkola, Bak, Brands and Halman all had second attempts but only Schmidt received a time - all the other attempts returned no flights. Rumpel hit the ground and destroyed a single blade prop. So, of twelve fliers, six returned first attempt flights of which only three were to be their fliers' best times; six had second attempts but only one returned a flight!

First day flights are often cautious but this seemed out of all proportion. There were many complaints about the fuel supplied by the organisers. It turned out that the fuel had a 3% additive to de-nature it. This may not have had an effect on the engine runs but what may certainly have contributed to the disastrous results of the first day was the fact that the official fuel was not available on the practice day. This made the first round, in effect, a "practice day" for many who had to re-set their engines.

Meanwhile back at the ranch, or in this case, pits, Peter Halman fitted his best engine into the model with the proven fuel system and practiced at the end of the re-flights. This produced 152.2mph - not too fast but it proved that the other fuel system was at fault.

He was not the only one with problems. Emil Rumpel was out practicing and again hit the ground with the engine running destroying yet another expensive prop. The CFS was simply not working. Ingo Schmidt had cracked a crankshaft and was busy building a substitute motor. Both he and Emil were bench running engines: a most unusual thing for the German team at Championships of this level. The French were not happy either: all three were out practicing - when you have done 162mph you are not satisfied with anything less. The Finns too had long faces. Jaakkola had problems with the engine going off after two laps; Fagerstrom and Valo with it not really coming on at all. The Dutch were busy with Bak's motor, trying to make sense of it all. At the end of the day tension was high: what would tomorrow bring?

The second day dawned clear and bright, another hot sunny day. Flying order was reversed and the GB entry was on second last of the afternoon's flying. Bellelle flew first and recorded exactly the same speed as the day before, 157.12mph, at his first attempt. Rumpel flew second and recorded a first attempt flight of 150.16mph. Valo got nowhere on his first attempt as did Enfroy who

did not look in the least bit happy as his engine cut as soon as it was airborne. He took off again and the same thing happened but this time the model landed heavily. Gorcizca recorded a comparatively slow speed of 144.16mph at his first attempt. Fagerstrom's first attempt was a slow burbling run and his time ran out. Bak had a slow rich run and his time, too, ran out. Constant flew next and recorded 157.45mph while Schmidt recorded a very slow speed of 135.43mph. Jaakkola put in a speed of 149.75 to give him his first, and only, official flight of the Championships. Halman flew his best set-up and put in a respectable 152.20 which was just a little rich all the way through. Brands just managed a very slow run of 128.95 which was exceedingly rich all the way through. Of the four re-flights, Valo, Fagerstrom and Bak recorded no flights (the Valo and Fagerstrom flights went rich after two and four laps respectively) while Enfroy put in a 147.87 with which he appeared disgusted! So, the first round produced five no flights and the second and third rounds three no flight. All these fliers may have recorded flights if they had had shut offs to enable them to cut, come down, re-set their engines and take off again with the three minute limit. With the upright designs there is no room inside in which to fit a shut off as there is with a sidewinder model, but it may be that in future, fliers might deem it more prudent to have a sidewinder and shut off, than an upright model that can lose them flights - and, when the engine dies, the sidewinder glides and lands much better than an upright model.

Day three, Sunday, and the last day of the Championships and nerves were stretched to almost breaking point. The weather did not help either: cool and cloudy and rain at 1.00pm. The last round began at 10.15am with Halman on sixth. Ingo Schmidt told me he had retired. Since his cracked crankshaft he had not been able to get anything together and he felt that there was little point in going on. Jaakkola and Fagerstrom had returned no-flights and Gorcizca, Valo, Rumpel, Bellelle, Brands and Halman had re-flights. The weather had altered so much that the previous engine settings were now irrelevant. Gorcizca recorded 151.59mph and Rumpel 155.59. Valo put in 156.02mph but Bellelle, with 156.68, was a little slower than his first round flight. Brands recovered a little from the doldrums and recorded 145.00mph while Pete Halman, even after screwing the needle in, recorded the same as his previous flight: 152.20. Bak, after two no flights, managed 139.66mph while Constant and Enfroy both produced their fastest times of the Championships at their third round first attempt. Constant with 159.01mph and Enfroy with 158.56mph. Constant and Enfroy had dominated from the beginning and, bar Enfroy's regression in Round two, the results never looked in doubt: it was just a matter of who would take first place and who second. We will say one thing about a French 1, 2, 3 - they offered superb champagne to their fellow fliers! However, Peter Halman can be said to have made history by having two female helpers! I had injured my back prior to the Championships and pitting for Peter had aggravated the injury and so Christine Heaton, wife of Team Manager Derek Heaton, kindly offered to collect the dolly (there's a lot of running involved in that) during the last round's flying.

By 12.30pm it was all over; the winners had begun to celebrate and the rest were quietly packing away and wondering: if they had done things differently, would the results have been any different?

*Clean sweep for the French Speed Team
Constant 1st, Enfroy 2nd
and Bellelle 3rd, plus,
of course, the Team Prize.*

F2A SPEED

	Speeds in MPH	1st flight	2nd flight	3rd flight
1. P. Constant	France	154.303	157.452	159.018
2. D. Enfroy	France	153.562	147.877	158.568
3. J. F. Bellelle	France	157.120	157.120	156.680
4. J. Valo	Finland	153.141	—	156.025
5. E. Rumpel	Germany	—	150.160	155.590
6. P. Halman	Great Britain	—	152.203	152.203
7. H. Gorcizca	Germany	147.488	144.161	151.590
8. K. Jaakkola	Finland	—	149.758	—
9. R. Brands	Holland	—	128.956	145.002
10. V. Fagerstrom	Finland	144.348	—	—
11. J. J. Bak	Holland	—	—	139.662
12. I. Schmidt	Germany	137.600	135.435	—

Team Results

1. France 763.809; 2. Finland 724.267; 3. Germany 712.497.



F2B – AEROBATICS by Pete Tindal

The European Champs were this year held at short notice. Since two members of the selected '78 Team decided not to go due to other commitments, Bill Draper and Barry Robinson took their chance as reserves. There was quite a feeling of confidence with only seven countries competing. Pete Tindal had flown against many of these fliers in a recent lot of Continental meetings. Given a little luck all the British team would make the fly-offs.

The flying site is owned by the Three Frontiers Model Flying Club and consists of a Club room and office, shower room and toilet, two grass circles for Combat (fenced in wire mesh), one team race and speed circle (also fenced) and one Aerobatics circle, together with enough paved area for at least three more circles.

ROUND ONE

Round one was started on the Friday morning at 9.30 in absolutely flat calm conditions which prevailed all day, allowing all manoeuvres to be performed away from the sun. Scores for this round were very close with only 100 points separating 4th to 21st positions and a further 60 points to 1st place, with three Frenchmen in 1st, 2nd and 3rd positions. Bill Draper was 4th and Barry Robinson 6th, both having put in steady patterns. Bill with his Hawk (variation of APS CL1240 Kitty Hawk) and Barry with a Tindal Chipmunk (APS CL 1338) Pete Tindal was way down at 18th place but was not unduly worried as instead of flying second in the morning, would be flying around lunch time in the second round so thought the judges would have warmed.

Of the flying in general, Gerard Tayeb of France is soon to be the French No 1 flier as he is still under 20 years old and far more consistent than his fellow team. Salvatore Barile of Belgium was one of the most accurate fliers seen at the meeting and many felt should have placed a lot higher, with all pullouts at a 'consistent 5' and good corners. Possibly his intersections let him down although from the flights I saw, I wouldn't have thought so. The Finns are flying the same models from three years ago and still fairly fast. The new team member (Karma) was flying on a 4 blade wooden propeller 9 x 6 at a lap speed of 48 seconds and was using industrial work gloves!

ROUND TWO

Was flown in the reverse order to round one and started in flat calm conditions as in the previous round. However, the wind started to blow at about 10am and gradually increased to a good 12-15 mph by noon. There were no really outstanding points in the second round so let's dwell on some of the models.

Billon (F) OLYMPUS, Merco 49, 1930 grams, 2 degrees engine offset flown on maximum length 18 thou' lines. The wing in this model is approx 12 years old and judging from the incisions in the fuselage, Billon is obviously a frustrated brain surgeon!

Tayeb (F) Own design based on STILLETO, but smaller than McDonald's 660, tissue and black dope trim - Enya 45 with Topflite 11.6 - weighs 1405 grams. Probably the most stable model at the meeting.

Lavalette (F). See Billon (F). Virtually the same model. I had the privilege to fly this model after the meeting and was very impressed with the way it flies although from the inside of the circle it looks like an overgrown Gnat - horrible, but very sleek from the outside!

Trudler and **Rosenburg** of Israel both flew GENESIS but with built up wings - a la Stiletto. **Maor** of Israel had a Stiletto as did a couple of other fliers.

The cut-off point for the fly off was at 15th place as with all FAI Meetings so everything was dependent on the last day for Barry and Bill. Peter was left out in the cold. Bill was in a good position at 4th place and Barry was at ninth.

For the first flights of the fly-off, the weather was slightly sunny with a gentle breeze building up to quite a strong wind by the end of the round. This in itself was not too bad, but the wind was coming over a factory building about 50ft high which was causing awful turbulence which had most of the models rocking about and very few fliers were able to maintain good straight and level flight.

Doctor Ceza Egervary of Germany flew a steady pattern at 5.07secs per lap with his Marionette and had fairly consistent pull outs and good intersections and round manoeuvres. Then Barry Robinson of GB flew his Chipmunk very slowly at 5.48secs lap and a very steady 6-7ft high pattern followed a mediocre wingover. However, the slow run used too much fuel and the motor cut on the vertical exit from the clover. Barry could only stand and watch his motor and model return to kit form! There was a discussion of some length between the judges before the clover points were awarded as there was disagreement as to whether the manoeuvre was completed!

Gerard Billon of France followed with a consistent 6ft high flight but with amazing corners, his flying speed was at 5.14secs/lap on near maximum length lines. During Billon's flight the wind changed direction and the manoeuvres were repositioned accordingly. However, only two of the judges moved to the correct position, the others moving at the end of the flight. The flight was by most people's comments, the sort we have come to expect from the flier that has been in the top five or six of the World Champs for a long time.

Once again the judges were caught out by the changing wind when Salvatore Barile of Belgium flew fairly rapidly at 4.57secs/lap with all pullouts between 4 and 5 feet and good corners, not as sharp as Billon but much sharper than we are used to in England.

Bill Draper of GB must have been one of the unluckiest fliers in the fly-off as both of his flights were in very bad turbulence. Considering the conditions, he flew with his usual ability but was very disappointed, and rightly so.

Claudio Orsini of Italy flew in the vivacious Italian style, fast and on long lines. Nothing spectacular but neat.

Third highest score of the round came from Boaz Trudler of Israel who flew his Genesis to very good effect, with a very tidy flight containing few errors and the whole schedule at a consistent 6-7ft.

After the British Nats, where he was a much respected competitor, Marc Lavalette must have felt cheated by his model when he had an engine cut so robbing him of the chance to become the European Champion - which is well within his ability.

Individual and Team winners in Aerobatics: the French trio Billon 1st, Lavalette 4th and Tayeb, kneeling, 2nd



F2C – TEAM RACE by Dave Clarkson

There were three notable features in this Championship. The most obvious was the low entry caused by the complete absence of representatives from the CEMA countries (USSR, Czechoslovakia, Bulgaria, Hungary, Romania, GDR etc) and, equally surprisingly, from W European countries like Spain, Portugal, Norway etc, even mighty Denmark was represented by just one team. With absences like these, a Holland-England-Italy battle could have been expected, and that is the way it turned out.

The second factor was the site altitude at around 300 metres. Few competitors had much experience at altitude and the Nelson AAC users in particular rapidly learnt that altitude strongly favours small props and big venturis. Finally, the vast improvement in model airspeed over the last 18 months was obvious to all - few if any models in official practice were slower than 21 sec/10 laps and the fastest close to the magic '20 seconds' barrier. These high airspeeds are not solely because of Henry Nelson for it was the FMV-AAC of the Metkemeijers, the Flugl of Smith/Brown and the Cipollas of the whole Italian team that were the fastest.

Processing on the Thursday was pretty uneventful. The only incident was the attempt by the Metkemeijers to have no less than six tanks processed - being balsa wood(!) and averaging around 1.8gm weight, they felt it prudent to have lots of spares available in the contest in case their working life proved short. However the FAI Jury thought otherwise and ruled that the tank is part of the model, not the motor as the Dutch contended, so just two tanks were allowed for the start of the contest. To the relief of the British, considering the controversy Steve Smith's one-sided tail caused at Woodvale last year, the flying wing concept passed the semi-scale rule requirement seemingly without comment.

THE HEATS

Friday and Saturday saw the running of the two rounds of heats: 'heat' was the word, for we saw some 'hot' racing and the weather was torrid. Fortunately the low entry made for a relaxed schedule allowing more than enough time for the competitors to check settings and equipment for their flights despite the limited (and rough) practice facilities available.

Right from the beginning, the F2C Jury of Dave Rudd (GB), Ed Meijer (NL) and Roland Surugue (F) had a hard job to do, for there are a lot of very determined pilots around these days and in Round 1 heats 2 and 7 Hans Visser (NL) and Alberto Cipolla (I) flew right on the edge of legality to record 3.43.4 and 3.41.6 respectively. The only other real quicky in this first round of heats was Smith/Brown (GB) with 3:47.0 despite seeming a bit hot towards the end of the race. The rest of the Brits were troubled, Clarkson/Woodside in heat 3 much over-compressed, leading to a comp adjust and difficult restart at their first stop. Over compression spelt a poor

EUROPEAN C/L CHAMPIONSHIPS – MARVILLE 1979

F2B – Aerobatics

		Rd. 1	Rd. 2	Semi 1	Semi 2	Final	
1.	G. Billon	France	941	964	958	985:33	1,949
2.	G. Tayeb	France	894	921	932	947:33	1,868
3.	B. Trudler	Israel	857:33	852:33	874	881:33	1,738
4.	M. Lavalette	France	890:66	894:66	830:66	449:33	1,725
5.	E. Mayer	Finland	818:66	842:66	867:66	817:33	1,710
6.	B. Robinson	Great Britain	849	773	793	861	1,710
7.	L. Aaltio	Finland	843	866:33	837	822	1,703
8.	F. Balesio	Italy	833	869	830:66	826	1,699
9.	G. Egervary	W. Germany	820:66	846	828:66	851:33	1,697
10.	C. Orsini	Italy	816	852:33	844:66	806:66	1,697
11.	W. Draper	Great Britain	877	747:33	816	773:66	1,693
19.	P. Tindal	Great Britain	805:66	793:33			805

Team Results: 1. France 5,543; 2. Finland 5,076; 3. Great Britain 5,002; 4. W. Germany 4,984; 5. Israel: 4,951; 6. Italy 4,944; 7. Belgium 4,930.

F2C – Team Race

		Rd. 1	Rd. 2	Semi 1	Semi 2	Final
1.	Visser/Buys	Holland	3:43.4	3:52.0	3:46.5	7:41.5
2.	Cipolla/Cipolla	Italy	3:41.6	—	3:44.9	Disq.
3.	Peracchi/Cipolla	Italy	3:52.3	4:01.5	3:51.6	3:51.5
4.	Metkemyer/Metkemyer	Holland	4:07.1	3:43.8	4:02.6	Disq.
5.	Smith/Brown	Great Britain	3:47.0	3:55.6	4:08.1	Disq.
6.	Voghera/Menozzi	Italy	Disq.	3:50.5	4:31.4	Disq.
7.	Clarkson/Woodside	Great Britain	4:09.5	3:51.1	4:17.5	4:00.3
8.	Wakkerman Van de Weerd	Holland	3:53.1	4:02.9	4:09.4	3:56.0
9.	Samuelsson/Axtelius	Sweden	Disq.	3:55.3	4:22.5	Disq.

time for the brothers Tribe in heat 4. Mind you, Ulf Larsson from Sweden (now turned pilot and using a Nelson) gave us a giggle when he landed on finishing his race, new team-mate Hans Andersson caught the model, arresting its progress, but not its prop which flew on!

Round 2 saw Bert Metkemeijer fly a 'strong' race using the Nelson. Their 3:43.8 sewed up the Team Prize for the 'old enemy' Holland. (Do you realise that even before we started flying team race, England and Holland fought no less than six wars – thank heavens we now have F2C.) Italy gave them a hard chase for to the Cipolla brothers 3:41.6 and 3:52.3 in the first round. Voghera/Menozi added a 3:50.5 to miss the team prize by just 4.1 secs. Meanwhile the Brits remained trouble-ish: Clarkson/Woodside, under compressed this time (but now with a warp-free model after a hour in the kitchen the previous evening steaming it true) in at 3:51.1; a multi-function system failure spelling doom for Tribe/Tribe. A poor 3rd team placing for us this time – quite a change from Woodvale.

THE FINALS

Sunday, the day of the semi-finals and the final, opened cloudy and cool, it stayed that way all day; what a contrast to the blue skies and beating sun of the previous days. Three Dutch, three Italian, two British and one Swedish team started the contest all over again, for as always the semi-finals are a contest apart.

As frequently happens, the ones who make it to the final are the ones who don't have trouble. Trouble hit the Metkemeijers, using the FMC-AAC, now doing 19.6 sec/10 laps for 38 laps, for in their first semi, the prop fell off at a pit-stop, and in their second semi, the fuel shut-off re-set failed. Trouble hit Smith/Brown in the form of inexplicable overheating, leading to impossible re-starts. (A motor strip afterwards revealed a loose induction rotor driving screw.) Yet again, the 'right' compression setting eluded Clarkson/Woodside – too much the first time and too little the second time. Out of all of this emerged the three finalists: it required better than 3:52 to make the final, sadly no Brit made this target.

Three models capable of 20.5 sec/10 laps in traffic should have resulted in a super-fast final, but it was not to be. At an early stage of the final Peracchi/Cipolla ran in on launch despite having the central pitting segment. Meanwhile, Eep Buys and Paulo Cipolla were having nervous times in the pits – slow stops. Out in the middle Hans Visser picked two warnings for obstruction and Alberto Cipolla got two for crude whipping at overtaking (he had the faster model). Finally, at lap 196 Alberto hauled over for the last time to gain the lead and up went the big DQ leaving Visser/Buys the sole finishers and European Champions of 1979. Congratulations Eep and Hans, over ten years of trying finally brought its reward to two of the nicest people in team-racing. A pity it was yet another poor final.

10. Delor/Guillomes	France	4:01.5	4:14.4
11. Bobberg/Siggard	Denmark	4:07.3	Disq.
12. Rylin/Appring	Sweden	4:13.5	4:17.0
13. Uzan/Uzan	France	4:16.8	4:14.7
14. Curt/Cidon	France	4:27.6	4:14.7
15. Tribe/Tribe	Great Britain	4:19.6	Disq.
16. Meder/Nore	Finland	Disq.	4:21.2
17. Lieber/Dessauy	Belgium	4:21.7	4:22.0
18. Desmedt/Delrue	Belgium	4:31.6	4:55.8
19. Lenzen/Pieper	W. Germany	4:33.2	Disq.
20. Brandel/Kuckelkorn	W. Germany	Disq.	4:39.0
21. Larsson/Andersson	Sweden	5:05.2	Disq.

Team Results: 1. Holland 11:20.3; 2. Italy 11:24.4; 3. Great Britain 11:57.7; 4. France 12:30.9; 5. Sweden 13:14.0

F2D – Combat

1. V. Hunt	Great Britain	13. M. Tiernan	Great Britain
2. F. Meijer	Holland	14. H. Ostman	Sweden
3. P. Stjarnesund	Sweden	15. J. C. Janssens	Belgium
4. K. Kehravuo	Finland	16. P. Lanfredini	Italy
5. A. Reichle	Germany	17. I. Larsson	Sweden
6. P. Salerma	Finland	18. J. Niskanen	Finland
7. G. Benincasa	Italy	19. J. M. Scherer	France
8. D. Wood	Great Britain	20. B. Gysberten	Holland
9. R. Maestrelli	Italy	21. R. Vandemaële	Belgium
10. P. Henry	France	22. M. Postma	Holland
11. G. Vernier	France	23. M. Feger	Germany
12. J. Close	Belgium	24. K. Martin	Germany

Team Results: 1. Great Britain 7; 2. Finland 10; =3. Sweden 11; =3. Italy 11; 5. Holland 13; 6. France 14; 8. Belgium 14; 8. Germany 15.

F2D – COMBAT by Derek Heaton

At the Team Managers' meeting before flying started the following rule interpretations were stated:

- 1) Any mechanic running round the circle between the 19/22 metre circles who actually impeded the other competitor will incur a 50 point penalty.
- 2) All models and equipment to be kept outside the 22 metre circle.
- 3) Models to be launched from the edge of the 19 metre circle with pilots having at least one foot inside the pilot's circle. No adjustments to the engine to be made inside the 22 metre circle.

First problem for the Combat Jury came when they were informed that they were expected to actually organise and run the event! Not that they were not capable of the task but they could hardly then perform their legitimate jury duty of impartially dealing with protests of bouts they themselves had run and scored. In fact it is perhaps a tribute to their ability that only two protests were lodged throughout the meeting – that's nothing for a Combat event. The last day highlighted the lack of preparation by the organisers when the jury found themselves making wet weather streamers reinforced with Sellotape; future organisers take note!

In the **1st Round** contestants were drawn into 12 bouts and first away was Britain's Dave Wood who won comfortably against Marja Postma (Fred Meijer's girl friend). She had a poor engine run and suffered a lot of ground time.

Third bout was Vernon Hunt against the very promising young Swedish flyer Haken Ostman, things went very well for the Swede who beat Vernon comfortably 5 cuts to 3.

Reigning British World Champion Mick Tiernan lost all his streamer very early in his opening bout and then proceeded to take 3 cuts for a very convincing win against Italian Piero Lanfredini.

The **1st Round Repêchage** saw a definite improvement in quality of Vernon Hunt's flying – he was aggressive throughout his bout against Holland's Bert Gysbertsen and won in good style 5 cuts to 2.

Because there were now 18 competitors left, the **2nd Round** consisted of 2 bouts only in order to bring the numbers down to a knockout multiple; the draw was Larsson S v Tiernan GB and Niskanen FI v Hunt GB. The British were very unlucky here to have two fliers drawn in this eliminator round as it could have had serious repercussions on the team prize, but they made no mistake in dispatching their opposition.

Mick's opponent, Ingemar Larsson, was the only competitor still using Oliver Tiger motors in his large area thin section models. Most other fliers sticking to standard equipment, the Super Tiger G20/15 with just a few Rossis in use. Mick quickly took two cuts before the Swede took all of his streamer except the knot and then flew into the ground. Being well ahead, Mick flew very safely with lots of level circuits as by then Larsson couldn't have won even by taking the knot. Similarly Vernon had little trouble dispatching Finland's Juka Niskanen.

Drawn to fly first again in the **3rd Round** Vernon beat Philippe Henry by 3 cuts to 2, but had a 50 point penalty applied for having had his model launched from the 22 metre line – hence the result was very close when the ground time was taken into consideration.

The 4th bout of the round had Dave Wood against the young Swedish star Haken Ostman who had been the first round victor over Hunt. However he could not take a second British scalp and Dave won by 2 cuts to 1 with the young Swede being left with no models well before the end of the bout.

The next bout Tiernan versus Finland's Pentti Salerma was a tragedy from the British point of view. Mick's flying was superb with his opponent unable to even get close to Mick's streamer. Mick followed only a couple of feet behind his opponent's streamer for a minute or

more, taking two brilliant small cuts and then suddenly he lost both his models. The first into the ground following a line tangle and the second in a mid-air collision in less than two minutes. He therefore went out of the competition in a bout he never looked like losing, because of the current rules of double ground points, the losing margin 18 points or just 9secs airtime.

The current FAI ground time rules place far too much emphasis on pitting and not enough on pilot skills. All the countries present agreed this – so how do such rules ever get accepted by the CIAM? The rules under question were proposed by the Russians, and they have never taken part in an international contest to the new FAI rules!

So to the **Quarter Finals** – Hunt GB v Reichle D, Wood GB v Kehravuo FI, Meyer NL v Salelma FI and Benincasa I v Stjarnesund S.

First away, Albrecht Reichle immediately swallowed the whole of Hunt's streamer giving Vernon plenty of time to take the necessary 2 cuts to win, which he did without any great problem. At the end of this bout there was an unfortunate incident where a member of the FAI Jury accused the British of having a short string to Vernon's streamer. This accusation was totally denied by the Combat Jury who had been close by the streamer prior to the start of the bout.

In the second quarter final, Dave Wood completely outflung his opponent and was winning by 2 cuts to nil when he lost his first model in a line tangle with the lines breaking both at the handle and near the model. The British pit crew speedily retrieved the streamer and the second model was launched at which point Dave was instantly disqualified for launching his second model without clearing the original line tangle. Since this line tangle was a loose piece of line near his opponent's model which was still airborne it was clearly impossible to effect a line clearance. The British team therefore submitted an official protest against the disqualification. The FAI rejected the protest on a majority decision in spite of a recommendation by the Combat Jury for a re-fly. Again a British flyer suffered at the expense of the inadequacy of the current rules.

Unless Kerko Kehravuo chose to land Dave could not get access to his own lines and therefore could not legally take off. All Kerko had to do was fly on to ensure victory, that's what the rule book says. Another loophole – is this how we wish to choose our Combat Champions?

At last the **Semi Final** Hunt GB v Kehravuo FI and Meyer NL v Stjarnesund S. Vernon, first to fly yet again, was given the chance of avenging Wood's defeat and this was accomplished by a clear cut *fouci* victory. Fred Meijer had quite a close contest in his semi but emerged the winner to set up the final hoped for – in lieu of an all British final of course.

And so to the **Final**, featuring two very similar models. Vernon's original huge foam and halsa Zinger and Fred's version which featured a separate tail group. Fred took the whole of Vernon's streamer right at the start. It was now a question of whether Vernon could carefully take two cuts or would he do the same as Fred? Halfway stage and Vernon took one cut – if he could stay cool victory was assured. Yes – a second cut to Vernon after some very good British attacking and Dutch evasion saw the whole British pit crew dash into the circle to celebrate Vernon's victory.

The Combat event improved as it went along with the better bouts coming in the later part of the competition. The end result being 1st place in both the individual and team categories for the British who were superbly supported throughout the competition by the excellent pit crew of John Hammersley, Bob Morgan and Steve Malone, highlighting the importance of pit crew being considered as part of the crew for team travel arrangements in the future. Thanks too from the team for generous trade support from PowerMax, Michaels Models and MicroMold, who helped with team travel funds and accessories.



WHAT LIES INSIDE the box, under the eye catching, attractive, box top illustration? As we all know, sometimes to our cost, attractive packaging does not always mean the best product. Neither is the cheapest kit necessarily the best value.

There are dozens of kits available for the novice to build his or her first trainer model, either power or glider. Invariably any advice given is, or should be, on the basis of personal experience. This means that the newcomer will almost certainly end up with a large number of personal recommendations which can be just as bewildering as being faced with a shop full of attractive boxes. It is not our intention to recommend any particular kit or model (unless it is from the range of plans offered by MAP!) but rather to consider a representative range of commercially available kits, and to use this exercise to highlight some of the points to be taken into account when making a final decision.

All of the kits mentioned below are currently being constructed for our R/C Sport Flyer series and in later articles we will be commenting, in the shape of brief kit reviews, on building, covering, and flying performance. Of particular interest is the fact that some of these kits are currently being constructed by complete novices to model flying so that we can obtain a feed back on any difficulties or advantages found when constructing the kits in question.

All kits for trainer models will include the materials needed to construct the basic fuselage, wings and tail group assemblies. The question of choice is complicated by the fact that certain kits will include extra items such as wheels, fuel tanks, control rods, engine mount, nuts and bolts etc. These items, if bought separately, can involve the modeller in additional expense which may make the cost of the original kit look less attractive. Covering materials are rarely included, although some kit manufacturers always provide sheets of modelspan tissue paper. It is therefore advisable to check with the model shop proprietor exactly what additional items are required to complete the model and to cost these out and add them to the price of the kit itself. In this exercise the cost of propellers, covering materials, and dummy pilots may be ignored as generally they are a common factor required to complete all models. Some kits do include such items as glue, modelling knife, pins, clamps and even sandpaper! These should of course be considered as 'extra' extra items, affording the complete newcomer some saving to the overall cost of starting in the hobby.

In order to assist in the overall costing exercise we list the normal extras which need to be purchased. This list can be used in conjunction with the following table to arrive at an approximate idea of the final price of the completed airframe. For



obvious reasons, engine and radio control equipment are additional costs.

All prices quoted are approximate retail prices for the appropriate accessory at the time of writing.

Fuel Tank (4oz-6oz)	£1.00
3 Wheels (2 1/2 in)	£1.70
Wheel Collets	50p
Engine Mount plastic	70p
metal	90p
Control Horns (2)	15p
Control Snakes (3)	£2.50
Ends and Clevises (6)	£1.00
Nuts & Bolts	40p
Heat Shrink covering	£2.70
Glues:	
Epoxy	£1.00
PVA White Glue	70p
Polyester Resin and Hardener	£1.50

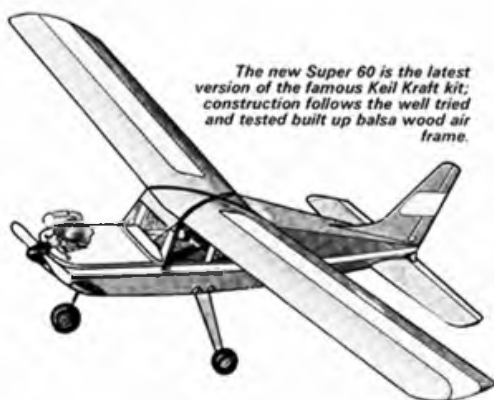
Approx Total £11.50-£14.50

In a previous issue we discussed some of the different types of radio available. Extending the above exercise, let us now consider typical costs of control equipment. The price of new sets are subject to very wide fluctuations so the following information can only be taken as an approximate guide. This is especially true of second hand equipment.

- 2 channel TX, RX, 2 servos (dry battery) - £50.
- 2 channel TX, RX, 2 servos (rechargeable ni-cad) - £90.
- 2 channel TX, RX, 2 servos (second-hand) - £40.
- 3 channel TX, RX, 3 servos (dry battery) - £70.
- 3 channel TX, RX, 3 servos (rechargeable ni-cad) - £110.
- 3 channel TX, RX, 3 servos (second-hand) - £60.

Model	Motor Mount	Tank	Wheels	Linkages	Plan	Instructions	Extras	Fuse.	Wings	Price	Comments
Yamamoto T.L.	★	★	★	★	★	★	★	Sheet Balsa	Foam	£24.95	Glue, pins, razor blade, wing tape and bands.
Veron Robot			★		★	★	★	Built up Balsa	Built up Balsa	£14.50	Tissue supplied. Nuts and bolts
Tyro Major	★	★	★	★	★	★		Sheet Balsa	Built up Balsa	£20.22	
Instructor	★			★	★	★		Sheet Balsa	Foam	£28.22	
Instructor	★			★	★	★		Sheet Balsa	Built up Balsa	£24.44	
New Super 60	★	★	★	★	★	★	★	Built-up Balsa	Balsa	£35.45	Glue, pins, knife, wing tape and bands, P.E. sheet to cover plan, sandpaper, control snakes
Ripmax Trainer	★	★	★	★	★	★	★	Balsa	Balsa	£28.27	Glue, pins, knife, sandpaper, wing tape & bands, spinner, P.E. sheet to cover plan, building clamps
Super Fly				★	★	★		GRP	Foam	£28.70	ARTF minimum of building work
Galaxy Escort	★	★		★	★	★	★	Sheet Balsa	Balsa	£13.25	Wing bands
Graupner Beta				★	★	★	★	Sheet Balsa	Balsa	£34.20	Covering tissue, glues, ABS moulded parts, control snakes
M.M. Mini Phase				★	★	★	★	Sheet Balsa	Balsa	£14.86	Control snakes
Capstan				★	★	★	★	Sheet Balsa	Foam	£19.95	Moulded wing fairing, wing seat tape
Apogee				★		★	★	ABS	Foam	£33.75	Glue, ARTF
Big Impala				★	★	★	★	Sheet Balsa	Balsa	£21.23	Covering tissue, ABS moulded ribs

The new Super 60 is the latest version of the famous Keil Kraft kit; construction follows the well tried and tested built up balsa wood air frame.



Cambria's Instructor is available in two alternative forms with balsa construction or ready veneered foam wings to suit individual tastes.



The Ripmax Trainer, another straightforward design using all balsa construction to produce a stable, easy to fly model for the novice.



Savings on radio control equipment can be made by purchasing one of the several self-build kits which are freely available at the moment. Although it is said that the minimum of electronic knowledge is required to complete these kits, coupled to some soldering skill, I feel that there are enough variables and uncertainties to trip up the novice without introducing further complications. The exception must be the person who already has a high level of practical knowledge and skill in this field. The cost saving is difficult to assess since the majority of kits offered are four channel TX and RX combinations at about £55, servo kits are £10-£12 each. One way of gaining experience in building your own equipment would be to make up a servo which could be used in conjunction with your current commercial set.

For those wishing to enter the field of gliders, the only other expenses may be a towline, 100-200 metres 25kg breaking strain nylon fishing line, or a bungee set

which can be obtained at a price of about £16, which includes stake, bungee cord, line, and drogue parachute.

The power flyer will of course need an engine. With the same reservations about prices quoted we offer the following guide:

Engine Size	New	Secondhand
.20 cu in	£20-£25	£12
.25 cu in	£25-£30	£16
.35 cu in	£32-£40	£25

To summarise then, the overall cash outlay for the first model can be seen from Table 2. The total outlay of course can be 'staged' into four sections. Model kit and extras, covering material, engine, and finally radio equipment. This will allow construction of the airframe to continue, followed by finishing and fitting controls in a logical sequence as time and budget allow. Always look upon the purchase of the radio gear and engine as an investment, in the sense that they need not be dedicated to one model but can be moved quite easily from one to another.

One way of easing yourself gently into power flying would be to purchase a three channel set with two servos and a glider. Having mastered some of the basic arts, a further servo, engine and powered kit may be purchased. By selling the glider air frame, presuming this is still in good condition, the additional cost may be offset to some extent. Some of the larger model shops offer a package deal to the newcomer, considerable savings can be achieved by taking advantage of these offers.

POWER

Built up construction 3ch (dry battery) - £130.

Built up construction 3ch (Ni-cad) - £170.

Built up construction, foam wings, 3ch (dry battery) - £135.

Built up construction, foam wings, 3ch (Ni-cad) - £175.

ARTF 3ch (Dry Battery) - £150.

ARTF 3ch (Ni-cad) - £190.

Secondhand airframe, engine and radio - £110.

GLIDER

Built up construction 2ch (dry battery) - £73.

Built up construction 2ch (Ni-cad) - £112.

Built up construction, foam wings, 2ch (dry battery) - £75.

Built up construction, foam wings, 2ch (Ni-cad) - £115.

ARTF 2ch (dry battery) - £86.

ARTF 2ch (Ni-cad) - £126.

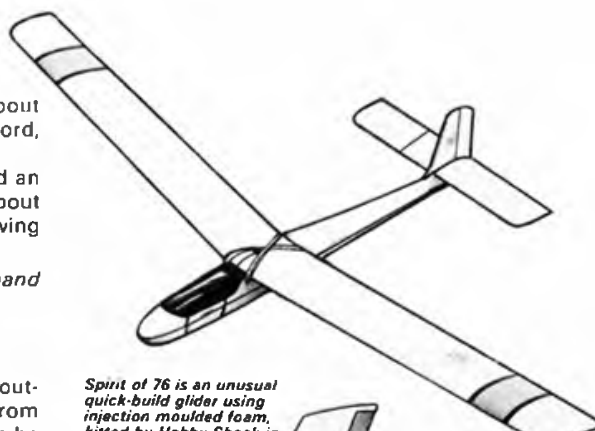
Secondhand airframe and radio - £65.

GLOSSARY OF TERMS

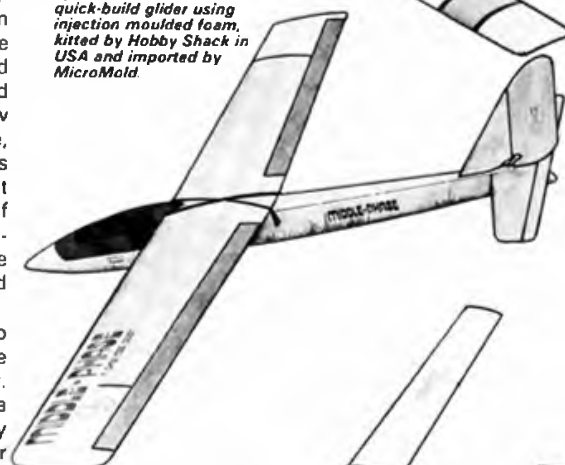
ARTF - Almost ready to fly.

Clevises - Metal or plastic mouldings fitted to the end of pushrods or snakes with a screw thread to give adjustment and providing the connection to the control surface horn or servo output arm.

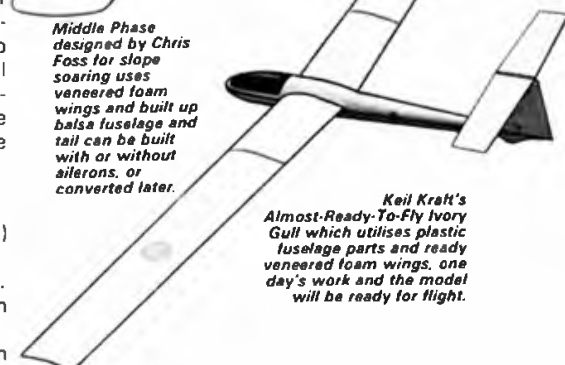
Spirit of 76 is an unusual quick-build glider using injection moulded foam, kitted by Hobby Shack in USA and imported by MicroMold.



Middle Phase designed by Chris Foss for slope soaring uses veneered foam wings and built up balsa fuselage and tail can be built with or without ailerons, or converted later.



Keil Kraft's Almost-Ready-To-Fly Ivory Gull which utilises plastic fuselage parts and ready veneered foam wings, one day's work and the model will be ready for flight.



Control Horns - Usually moulded plastic parts which bolt to the movable control surface to which the clevises are clipped.

D.E.A.C - Rechargeable battery named after the original manufacturers, Deutsche Edison-Akkumuloren Company.

L.E - Leading edge, of wing etc.

Ni-cad - Nickel Cadmium rechargeable battery.

R.O.G. - Rise of ground - take off.

R.O.W. - Rise of water - take off.

R.X. - Radio receiver.

Snakes - Either rod, tube or cable inside outer tube control run to connect servo and control surface.

T.E - Trailing edge, of wing etc.

T.X. - Radio Transmitter.

U/C - Undercarriage.

Next month we get down to the 'nitty gritty' of building technique starting with fuselages and progressing to wings in the following month.



STARTING THIS MONTH:

A NEW SERIES FOR JUNIOR MODELLERS ON HOW TO BUILD AND FLY FREE FLIGHT MODELS

THE RECENT SERIES of articles appearing in the Aero Aces section of this magazine has been concentrating on the construction and flying of simple control-line models. Whilst some of this information is applicable to all branches of aeromodelling, there is a lot of extra knowledge which is desirable for those embarking on a free-flight model for the first time, and it is the intention of this and future articles to point the way and overcome the problems that can arise.

Like John Stroud, who has been writing the series on control-line models, I have had the assistance of a number of young local modellers, most of them complete

with a little more experience, tackled the slightly more advanced rubber driven and engine driven designs, and their progress with these models will be related later in this series.

Before we start looking at glider construction in detail, however, perhaps we should look at the basic requirements for building a model aircraft, with particular emphasis on the free-flight model. Control-line machines are much more forgiving in performance if slight inaccuracies in construction occur, than a free-flight model. It is therefore essential that a good, flat building board is acquired. Any flat surface of adequate size

consisting of strips of pine, faced with thin ply, alternatively 12mm plywood is OK if a little too hard and chipboard is not really suitable, being very difficult to stick pins into. Almost any wooden board is suitable providing it will remain flat without warping.

A good supply of pins is essential, and can be 'borrowed' from the family sewing box. The modelling pins obtainable at your local model shop are simply glass-headed dressmaking pins, and are suitable for pushing into a soft wood building board. They will not, however, withstand hammering, as the glass heads will shatter, and for harder boards conventional



Typical layout of contents of All-Sheet free flight kit, this Graupner Penny includes plan, instructions, preformed and diecut balsa parts, plastic mouldings, hardware pack, transfers and literally only requires simple assembly of parts.



Most kits include parts in the form of die-cut balsa sheets which ensures clean and accurate shapes and prevents smaller parts getting lost before they are needed. A knife may be needed to release parts from sheet, preventing damage to outlines.

novices, in building the kits provided by various manufacturers. All the kits were of the type likely to be bought by the beginner in free-flight modelling, and ranged from the traditional type with a bundle of strip wood and sheets of printed balsa, requiring a fair amount of cutting and assembly, to the modern pre-fabricated type, which required little more than a shake of the box to assemble the model! The kits that were the simplest to build were gliders, containing many pre-formed parts, and these kits were given out first to my crowd of novices. Young modellers

that will hold the plan and receive the pins that are going to stick in it. An old wooden table top would be ideal, but if you need to purchase a piece of wood, decide on what minimum size you will need. The longest single item on any medium sized free-flight model is generally the fuselage, and rarely exceeds one metre in length. The wings are built in separate panels, being joined together later by rigging on any flat surface. Width of the board should be sufficient to accommodate the widest item, probably the wing, and 300mm would be ample. 20mm thick blockboard is ideal,

pins should be used. If the pins have been tapped in, then a pair of pliers should be used to withdraw them; the pliers should be of the fine nosed type, and can also then be used for various wire bending jobs on the model.

An engineer's 300mm steel rule, or better still, 600mm is used as a straight edge guide when cutting long lengths of balsa; the knife blade will not nick it, as with plastic or wooden rules, and it is heavy enough to clamp down onto the wood.

Modelling knives can be chosen from a wide range, but I much prefer to use an

Few tools are required for assembling kits; balsa knife or scalpel, steel rule, pins, pliers, sandpaper, balsa glue or white PVA, rubber bands and razor saw. A flat wooden board is also required on which to build wing and tail panels and fuselage assembly.

around is a two-part epoxy resin. A "five-minute" epoxy will come in useful when joining dissimilar materials together, such as metal undercarriage legs to wooden frames, or engine mounting bolts into bearers. For repair work on the flying field, one of the modern cyano-acrylates is perhaps worth the expense, but watch out, it is the best skin glue around!

Choosing a Kit

Many a prospective aeromodeller has been lost to the hobby by starting out with an unsuitable kit, with the consequent disappointing results. The attractive packaging of many complex designs leads him to believe that it is a simple matter to produce a super flying version of one of the scale plastic models that he has no doubt been making. Please do not fall into this trap; scale models should only be attempted by experienced modellers, and even in their hands, the flying performance often leaves something to be desired.

For the raw beginner, with no previous experience in constructing flying models, the first choice should be a glider, and a good selection of designs is available on the market. The simplest types have their flying surfaces made up from sheets of balsa wood, the thicker pieces sometimes

industrial scalpel, fitting a new blade every time I start a new model. The blades are exceedingly sharp when new, and retain their keen cutting edge for a reasonable time. Stronger knives are useful for carving block balsa, and a simple pen-knife is adequate, although the knives supplied by X-acto and Humbrol can be fitted with a variety of blades and saws.

Useful aids to construction are assorted rubber bands and spring clothes pegs, and household sellotape, being employed in holding together newly made assemblies while the adhesive is drying. For smoothing down and shaping various parts of the model, a packet of assorted

plan, and when the structure is lifted off, the plan gets torn. To avoid this happening, a sheet of transparent polythene or grease-proof paper is interposed between the plan and the model, and this successfully prevents adhesion. Another alternative is to rub the plan at the likely trouble spots with a piece of candle, or even a piece of green household soap.

Very few kits can be bought these days that contain a tube of glue, so finally, which adhesive should be used? There are many exotic adhesives available, of various prices but that good old faithful balsa cement, is still the most useful for most of the joints to be encountered, because it



Some kits supply parts printed on balsa sheet, which then require cutting out with sharp balsa knife. Always hold blade vertically and make cut progressively using two or three strokes for improved accuracy. Never cut towards other fingers.

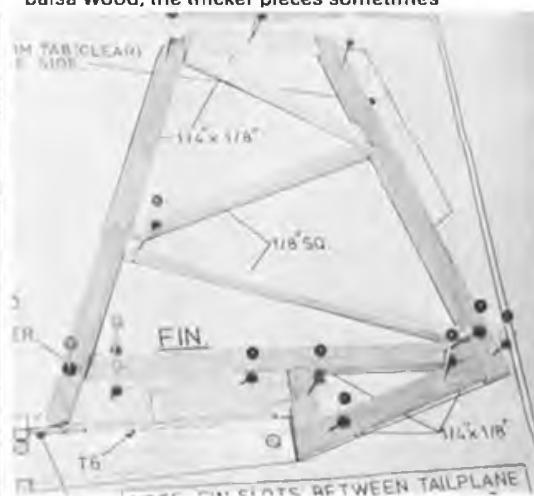
grades of sandpaper from the hardware shop will provide you with sufficient abrasive for several models, and by cutting up one sheet into smaller pieces, these can be pinned to a piece of wood to make a simple sanding block. The block keeps the sandpaper flat and firm, and helps to avoid waviness occurring in the relatively soft balsa.

Most of the structure of a free-flight model is built directly on the plan, the various parts being held in position by pins while the adhesive is drying. Some of the adhesive unavoidably runs down onto the



A razor saw, although not essential, can be useful for cutting through thick section strip wood. Again keep the blade vertical and saw slowly. Also useful for keying parts for gluing by drawing saw edge across to score surface.

dries quickly and has some gap filling properties. Its main disadvantage is that it shrinks on drying, and if the joints are not made accurately, stresses can be set up in the framework. A good alternative is white PVA adhesive, sold commonly as Woodworkers' Glue. It takes longer to dry than balsa cement, but does not shrink, thus allowing longer working times. If bought in large containers, and transferred as required to a smaller applicator, it works out relatively cheap. Although either of these adhesives should be sufficient for most modelling work, a useful one to have

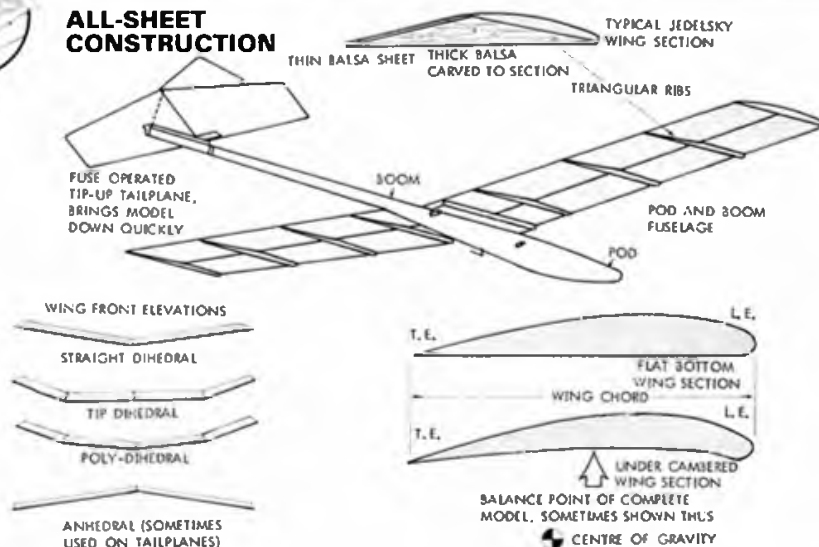


Built up frameworks are assembled flat over printed plans on flat building board protected with polythene sheet to prevent parts sticking, glass headed or ordinary household pins are used to hold parts in place until glue has dried.

being pre-shaped to the correct aerofoil section. Most of the glider kits with sheet wings that we made used variations of a special form of construction, known as a Jedelsky wing, which has proved to give excellent performance in model sizes. The models we have built that incorporated this wing construction were the Veron Domino, Humbrol Mistral and Sirocco, Graupner Penny, Peerless Models Yardstick and Carrera Dax. The last named might not be considered to be a beginner's model as it is a high performance 1½ metre span sailplane, but the ready made



ALL-SHEET CONSTRUCTION



My budding modellers, however, found that even the most detailed instructions used terminology that was unfamiliar. The sketch shows a typical model glider, with the various major parts named. As this series proceeds, I shall try to avoid using technical terms without explanation. Next time we will look at the construction of the gliders in greater detail, pointing out some possible pitfalls, and then later we will progress to the finishing of the models and preparation for flight. Having dealt with the gliders, we can then turn our attention to simple rubber-driven and engine-driven models. See you all next month.

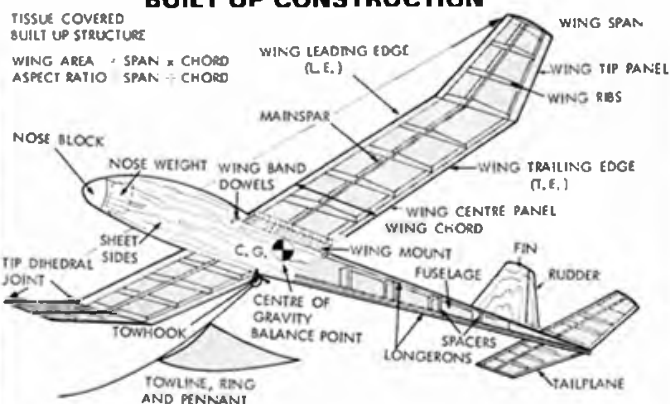
parts and pictorial assembly procedures allow the model to be built by anyone with only a limited prior knowledge of aeromodelling. The Cambria Hobo was pre-fabricated, pre-decorated, and easily assembled, requiring about two hours to complete, but did not use the Jedelsky wing section.

Wings using rib and spar construction

Fine array of some of the simple gliders built for the series by local youngsters to be featured in later chapters. From the right anti-clockwise are the Graupner Uhu and Penny, Veron Dominette, Cambria Merlin and Hobo, Carrera Dax, Humbrol Mistral and Peerless Models Yardstick.



BUILT UP CONSTRUCTION



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I HAVE ALWAYS BELIEVED a .20 cu in powered stunter can offer many advantages over the traditionally larger powered alternatives. Less weight; less noise; smaller fuel tank – creating less fuel surging problems when nearly empty; choice of higher aspect ratio could produce same size model as current .35 cu in powered models; less frontal area, drag etc; thinner control lines can be used i.e. .012in diameter; should fly well on 50–60 ft lines. Certainly there's a lot to be said for smaller stunters, and with these points in mind I started to design a model based on the Aircraft Described Scale drawings of the Fournier RF4 presented in the May 79 issue of *Aeromodeller*. I very quickly realised that a model very close to scale should be possible, which could easily be made exact scale with little modification by any true-scale buffs.

WING

The present trend by Stunt flyers to use foam wings, allows the use of higher aspect ratio wings than are in common

use at present, without structural weakness. If you have never built a foam wing before, this is a good time to start. There is almost certain to be someone in your club who has built a foam wing before.

The design and construction of the wing is fundamental to the performance of any aeroplane including models. In the case of a model like this one, with its slim high aspect ratio wing with a laminar flow section, the structural and aerodynamic problems can become complex. Cantilever loads at the wing root are high because of the small root and long span and a long span wing is more vulnerable to damage from handling and flying incidents. An accurate wing section and an absolutely warp-free structure are also vital if the aerodynamic efficiency is to be maintained and the benefits of the planform realised.

In order to meet these requirements, a modern wing using an Expanded Polystyrene core, skinned with obeche veneer was chosen which proved to be simple to build (and repair!), very strong, light weight, aerodynamically efficient and sufficiently accurate to permit the use of an advanced laminar flow section.

When the wing is being prepared, the following points should be borne in mind:

1. Ensure that the hot wire is well tensioned.
2. Cut the cores from the trailing edge forward.

3. Get someone to help you to cut the cores ensuring that you enter the trailing edge and exit from the leading edge at right angles without allowing the wire to stop at either end. Marking off the chord in 10 increments across the template ribs helps judge speed of cut at each end of wing.

4. Use the lowest wire temperature that will satisfactorily cut the foam.

The safeguards will ensure that the wing core is accurate and that the section is maintained, ensuring laminar flow. This wing is slim enough not to need the wing cores hollowed.

The construction is started by cutting root and tip rib templates out of hardboard or thin plywood (1/16in or 1/8in). Obtain 2in thick expanded polystyrene sheet from builders' merchants, damaged sheets can often be purchased cheap, mark out wings on sheet with felt tip pen and using right angle card triangles pinned on to foam as shown, cut blanks. Mark centre line along each end of blank and pin rib templates on centre line, note templates overhang each end of foam blank. Wings are best cut by two people, one controlling the wire at each template. Carefully cut wing form from blank (working from TE to LE) keeping the wire in the same relative percentage chord position in relation to wing section as the cut is made i.e. 3in root being longer than 7in tip, will require wire to move slowly at tip and twice as fast at root. Turn wing over, using off cut to keep foam square, and repeat; the foam wing is then cut.

Once the cores have been cut, remove any blemishes by sanding with flattening paper (220 to 300 grades are adequate). The cores can now be skinned using Copydex or SM's car trim adhesive, coat

The wing ribs of the Fournier RF4 are well represented in this extremely simple model, even the cockpit canopy is a standard commercial moulding – it just couldn't be easier.



one side of this foam core and one piece of obeche veneer. Cut slightly oversize and carefully apply the veneer to the core; fit the wing outcut part of the blank and repeat the process to the other side of the core. When both sides are complete place the wing back into the blanks, put suitable heavy weights onto the block and leave overnight. Carefully trim the veneer back to foam core and then using white glue (PVA) add 1/4in sq balsa LE and 1/4in x 3/8in TE and wing tip blocks, not forgetting 1½oz lead in the outboard tip. When dry sand LE and TE and tips to shape.

The wing panels are now ready to be joined. On a polythene sheet, lay one wing panel upper surface upwards (which tip did you put the weight in?) Align the other wing panel, blocking up the wing tip to give the correct dihedral angle, butt join using 5min epoxy, and pin the panels together through the leading and trailing edges, pushing the pins fully home so that the heads are indented into the wood (use dressmaking type pins not glass-headed ones!) There is no need to try to trim the wing roots to fit one another at the correct dihedral angle, only alignment of the leading and trailing edges being of any significance.

From 2oz/sq ft glass cloth cut a strip marginally narrower than the fuselage and half an inch shorter than the leading and trailing edges, with the warp and the weft at 45° to the wing chord. Work moulding resin into the cloth with a stiff brush, ensuring that it is properly wetted, that the bonding agent in the cloth is fully dissolved and that all air bubbles are properly worked out. Try to avoid excess resin running into and around the wing. A second strip of cloth, the same length but half an inch narrower should be laid over the top of the first one (again having been cut with the warp and weft at 45°) before the first strip has begun to gel. Work in the resin as before and leave to set. When this initial lay-up of glass fibre has gone hard, the wing will be sufficiently rigid to handle and to ensure that alignment and dihedral will not be disturbed, but beware of mov-

ing the wing while the glass fibre is "green" and pliable.

The wings may now be turned over and, now cut a ribbon of 2oz/sq yd glass cloth, fuselage width and long enough to wrap over the leading and trailing edges to overlap the original lay up by a quarter of an inch at each end, the warp and the weft again lying at 45° to the chord. Carefully work in the resin and then overlay another strip of cloth, the same length and cut in the same manner but half an inch narrower than the original. While the resin is still wet, take a piece of kitchen cling film, stretch it around the wing root, ensuring that there are no wrinkles or air bubbles trapped beneath the film. This will give a fine, smooth finish to the glass fibre, where it is exposed under the wing root, and practically eliminate the need for any preparation before final finishing. When the glassfibre is hard, remove the cling-film and the wing is now complete and ready for assembling to the fuselage. The line guides should be made and fitted to the inboard wingtip after the final assembly of the model but before finishing. The positions of the line guides should be taken from the drawing. The fitting of the undercarriage outriggers, if they are to be fitted, should also be left until final assembly.

Cover the wing panels in lightweight Modelsplan using 50/50 dope and thinners as an adhesive, make sure there are no cracks in the veneer otherwise the dope will melt the foam underneath!

If this is your first foam wing, you will be amazed at the ease of construction, its strength and the quality of the finish. It is not possible to build a wing of such quality using old-fashioned ribs and spars.

Crash damage on a wing of this sort usually results in one wing panel being sheared off at the fuselage side or very near to it. This can be repaired by smearing both broken faces with quick-setting epoxy, including the edges of the veneer, reassembling the broken panel and smoothing off any excess adhesive. When the adhesive is hard, the strength of the wing

will be unimpaired.

Modellers choosing to construct the built up wing should make a set of taper ribs by the sandwich method, then lay each rib over its position on the plan and slot for spars. Pin bottom spar to plan and then using a slow setting glue such as white PVA, glue ribs in place over plan followed immediately by top spar and LE. This will allow working time to true-up mis-aligned ribs by eye or using a straight edge. When dry remove from plan, add 1/16in sheet TE strips, then sheet cover in front of spar and finally add rib cap strips and TE cover strip before sanding to shape and joining wing halves.

FUSELAGE

Any average builder will find it very easy. Begin by marking out the 3/32in balsa fuselage sides and 1/16in ply doublers. Cut them out and stick the doubler in place using a white glue or a contact adhesive – the latter is quicker. Be sure you make a left and a right side (I know everybody says it, but I'll bet everyone has done it!)

Cut the engine bearers to shape, and from the drawing, mark out the position of U/C hole and bellcrank holes in the lower one and drill. Bend the U/C wire to shape and fit with thread and epoxy.

Cut out the formers F1, F2 and F3 from 1/8in ply, F4, 5A, 6A and 7A from 1/8in balsa. Make up formers F5 and 6 from 1/2 x 1/8in strip balsa and you then have the basic 'kit' of parts prepared. Don't forget the diagonal cut at the tips of F2 and F3 to allow for the triangular fillets used later.

Epoxy the bottom bearer into F3 and F4, making sure all is square. When dry, epoxy to one fuselage side/doubler assembly, and allow to dry thoroughly.

Using a razor saw, cut through the doublers just in front of F2 and along the diagonal mark on the doublers on both sides of the fuselage. Put the tank in position and fit the second fuselage side using epoxy glue. When dry, pull the front fuselage sides in to meet the former F2. This

Below: Cutting foam wing blanks using electric hot wire, stations marked on rib profiles help in keeping cutting speed at root and tip equal



will mean cracking the fuselage sides – don't worry about this as it will be strengthened later by regluing. Glue F2 in place on the bottom bearer, glue the sides and add the top bearer, making sure that the tank centre line is in line with the spraybar of the motor – use balsa packing to fill and when sure, fix the tank with silicon rubber bath sealant.

When dry, repeat the fuselage cracking at the back and glue in the formers F5 and F6, and the 3/32in sq sternpost and make sure all is square. At F7 position just put in cross pieces top and bottom. Fit formers 5A, 6A and 7A, together with the 1/4in x 1/8in balsa keel pieces. Add triangular balsa fillets between F2 and F3 (see Photo 3).

Skin the turtle deck with 3/32in balsa using white glue. This can best be done with two pieces – making a paper pattern first if you are not sure of your ability to cut and fit in one go.

Mount the engine, and solder a piece of wire across the bolt heads to fix them securely. Using 1/2in sheet balsa block up the nose, using the top of F3A as a guide to the height. Use 3/8in sheet for the sides just piercing a hole big enough to clear the cylinder head and the air intake on the starboard side. Remember only to spot glue the side over the engine. Fit the 1/8in ply former F1 split vertically, to allow you to get the engine out later. Remove the engine, spot glue the side sheet back in place, add F3A, retire to the garden or garage with a sharp knife and lots of sandpaper and make as much mess as you like producing the smooth shape of the front end – it doesn't take long.

The apple cheeks are made from 3/8in sheet as shown on the drawing – the exact size will depend on the cylinder head of your particular engine. The outside can then be sanded to shape and fitted to fuselage by holding a piece of sandpaper against the fuselage and using the cowl, rub it against the fuselage until it will fit well against the side: then glue in place. Make smooth fillets to fair them into the fuselage.



Assembly complete, ready for final finishing. Light coloured areas indicate where filler has been used to remove blemishes.

TAILPLANE AND FIN

Cut out the tailplane, elevator, fin and rudder. Glue the tailplane in position and lightly sand. The elevators are joined with a piece of wire and attached to the tailplane with R/C type hinges. Fit the fin using 1/2in triangular balsa fillets.

Mount the bellcrank on a 6BA bolt and install. Line up the leadout positions and cut the exit holes in the fuselage sides. Fit the leadouts and solder in position. Bend the pushrod and fit from the underside of the fuselage to the elevator and bellcrank – solder securely. Again if you are confident in your wire bending, this can be done in one piece – if not – make in two pieces and join with a brass tube that will allow for adjustment and can be soldered up when all is aligned.

Sheet the bottom of the fuselage with 1/8in balsa and sand in a curvature. Give the whole fuselage a final sanding and then give two coats of clear dope, sand lightly and cover in lightweight tissue. Apply two coats of sanding sealer, sanding lightly between coats. The cockpit area can be lined with plasticard using polystyrene cement to fix it and then cut the standard Micro Mold V5 7in open ended canopy to shape and glue in place.

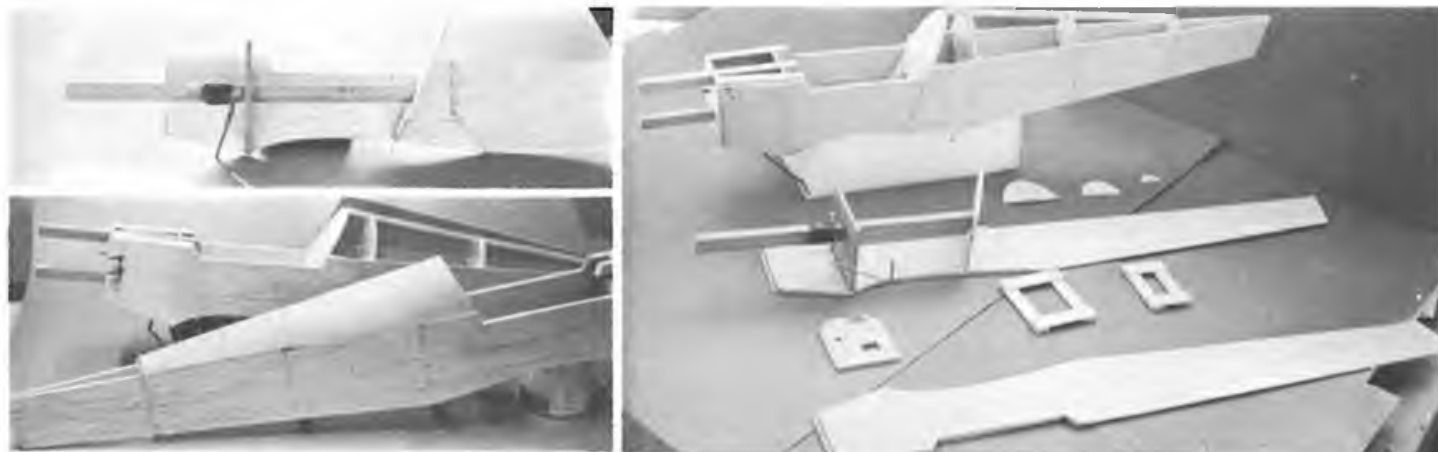
Now offer up the wing, and make sure it fits squarely, and that the dihedral is equal each side and in line with the tailplane and fin, by measuring from tips to rear fuselage. Epoxy in position and allow to dry thoroughly.

Make the wing root fillet from 1/16in balsa and securely glue in place. The wing to fuselage joint can now be finished with a small fillet of glue or body putty.

Finishing: Personal choice, use what you find easiest. The original models had solarfilmed wings and white painted fuselages using a polurethane paint. Trim was with red *Solarfilm* and car trim tapes. Fuel proof the engine bay, fit the engine and glue the cowl in place. Solder on the wheels, add propeller and spinner and you are ready for off.

The model flies well on 60ft lines and will perform the Novice schedule with ease, the only difference being that line tension is not as great as a 35 stunter. Take-offs from grass present no problems and the model copes with the local football pitch with no trouble.

Below Layout of fuselage parts during construction showing bearer and former assembly and top decking pinned in place over formers.



TOPICAL Twists

by Pylonius

illustrated by Sherry

WHIZZ KIDS

Looking in upon a model helicopter meeting I was taken back to my childhood days when I used to flip rotating prop discs off a spirally metal rod. But the machinery needed to get these modern devices helicoptering was a bit more sophisticated than a flipping thumb – in fact, it called for a flipping lot of money, unless of course, you were an engineering whizz kid capable of turning out your own gadgetry.

Gazing at all this impressive hardware I couldn't help thinking how much the model scene has changed since the oiled silk and spruce contraptions battled with wind and gravity for a few seconds of dubious levitation. Come to that, it wasn't all that many years ago that, at one of the great All-Britain rallies, a round of applause would greet any helicoptering device that even got off the ground. Now it seems another world in which the most fantastic aerial feats come so easily to the transmitting toting exponents of today. In fact, these magnificent whirly-toys are almost – I was going to say human – but doggy would be a more accurate term, for they respond to an inspired touch of the controls in a most animated, eager to please, manner – just like pet dogs. Whether the buzzy little beasts can be made to beg, I am not sure, but at least they will walk to heel just like any canny canine.

What is surprising and a bit shocking about the model helicopter side of our hobby is that it is almost totally commercially inspired. There were no early fumbblings and experimenting on the home-spun flying field. One moment there was nothing, and the next a complete functioning, radio controlled machine. Back in the old days the model exponent was always two steps ahead of the Trade, but in the modern helicoptering business the Trade is god; the fount of all aeronautical wisdom and the cornucopia of all the gleaming goodies and gadgets. There is no need to design anything or make anything; it is all there, either in an eye catching package or a ready made component. The few individuals who do make and fly their own equipment are looked upon with awe and wonder. Einstein isn't in it.

But what do the helicoptersisters do with their costly charges? Here it seems to be something of a let down, for the meeting I attended seemed to be something between a mechanised dog show and a kiddies sports day. After each whirly bird was buzzingly paraded (in strict rotation, of course) it was put to the ignominious task of picking up an action man in a dinghy. Following that bit of hover-bover it went on to knock down skittles. I left before the egg and spoon and three-legged races.

RISEING COSTS

Arguments are always going on about the cost of modelling. The most vocal people are those trying to excuse themselves for giving the family budget another hefty bashing. "Alright, so I spent £200 on radio gear, but over the year I'd whack out a lot more chasing golf balls – or women". And, appalled though we are at the extravagance of those who find all the latest goodies so irresistible, it is a jolly good thing that we have these open-handed spenders, for if it was left to us old balsa misers – we even re-cycle the dust as a filler – the model shops would not be available for our humble needs nor the Trade in such a healthy state. We all benefit from the



"You would have to have one of those"

rich dilettante in search of instant pleasure for whom the latest in radio controlled gadgetry adds to social prestige.

Looked at in the most pessimistic way aeromodelling can be a most expensive indulgence. It is much on a par with the car which, if you worked out the overall cost on a mileage basis you would either trade in the old banger for a bike, or take up jogging. Coincidentally, one of the biggest expenses of model flying is that transporter of personnel and gear, the car. The contest flyer thinks nothing of doing a 200 mile round trip to put in, say, five flights of around the three minute mark, if his luck holds. The cost calculations per minute of flight must be appalling.

Other kinds of model flying, operating closer to home base, make up for the petrol usage in sheer wallet, cheque and cheque card outlay. Generally, the radio project puts a lot of highly fragile eggs in one highly fragile basket, and with Citizen Band, flying saucers, sun spots and Australian cabbies making their take over bids for control, every heart in mouth flight is a dice with the family budget, or next month's rent if you're single.

But money is just money. The sort of back up we now get from the Trade is such that if your model does make it to the deck by the shortest route it is not likely to bring on an attack of work bench fatigue, painful as it might be to your bank account. A bit of foam here and a bit of plastic there and you're back in business.

BIG DEAL

Idly nosing my way along a set of stalls upon which model goodies of all sorts of wallet-ravishing appeal were on show, I could hardly believe my eyes upon perceiving, among it all, sets of perambulator wheels and large aluminium saucepans. A second look, though, made me realise that an even bigger threat than Citizens Band Radio is about to burst upon our flying fields: the super size scale model. For those perambulator wheels were just undercart components for Farmans, Bleriot and other early birds, whilst the saucepans were but cowlings for WW1 craft.

So far, it seems, all this gargantuan gear is being sold as separate items. I just can't imagine the size of box needed if it came in kit form. You'd probably need an articulated lorry to get it home. And where would you put it then? Perhaps it could truly be called a breakthrough.

Still on the subject of kits, I was reading a report on one highly priced product, and was surprised to learn that the kit manufacturers are still making the traditional goofs after all these years of packaging experience. This leads to something of a conundrum. Is the glossy advert photograph a picture of the model upon which the kit was based or is it a picture of a model built from the kit? If it is a model built from the kit, why were not all the errors and oversights discovered during the building? Or were they discovered and nothing done about it? Makes you think.

OUTDOOR RUBBER SCALE CONTEST

What may very well have been the very first contest to be held exclusively for this type of model in this country took place under absolutely perfect conditions at Old Warden Aerodrome on 15th July. It seems that more and more people are disregarding the old wives' tale that these models cannot be made to fly well, if the fifteen-strong entry is anything to go by. This total exceeds that of the last three years' Nationals FF Superscale events combined, but still does not altogether represent the number of models present, which must have been well over two dozen.

Most of the entrants are known from indoor scale flying activities, and it made a pleasant change to see models circling against sky and clouds instead of brickwork and steel girders! Extra spice was added to the contest by the spread of prizes down to 10th place, with a very worthwhile first prize of a hank of Pirelli, generously donated by Henry J. Nicholls, going to Andrew Moorhouse with his rather simple but excellent flying 1:8 scale "Comper Swift", which in mid-afternoon was seen to put in a thermal-assisted flight of between four and five minutes. The wind and general drift was so light that the model had travelled only into an adjacent field.

The contest was run to a very simple schedule of rules in which the models were marked for scale accuracy, scale flight realism, and flight duration, in three sections each offering a maximum of 50 points. Two models easily managed a 50-second flight maximum, and a third made 43.75 seconds, whilst the majority were in the 20-30 second capacity.

One feature of the static marking rules allowed that a very simple subject with a complicated colour scheme would be on reasonably equal terms with a complex subject with a very simple scheme. This was introduced to try to encourage a wide selection of suitable subjects to choose from, with no one particular type having an obviously boosted bonus over others, which has been seen to occur with other rules. The second-highest static score was given to Barrie Hotham's "Heath Parasol", which, based on the American Gene Thomas's Classic Kit, has one of the most tricky colour schemes imaginable. Running very close to Barrie was John Blagg with his small "Isaacs Fury I", which carries a simple scheme of silver with white letters, but was structurally the more



SCALE MATTERS

by Alan Callaghan



Over from Ireland, Brian McNeill's Fox 45 powered P.47 Thunderbolt takes off dramatically in a cloud of exhaust smoke at the Barkston Heath Nationals which was Brian's first CL contest!

complex of the two. The "Heath" also scored well from its superbly detailed engine which was complete down to the spark plugs and ignition leads.

For their scale realism, flight competitors were allowed the option of a handlaunch or ROG, with the latter having a higher K factor. It is quite possible to mark a handlaunch with a scale model, since the flyer has to be quite sensitive to the model's natural angle and speed of climb, and the general smoothness of release contributes much to the quality of flight. Skill is needed!

The long grass prevented normal take-offs being made and so all ROG's were taken from a 6ft x 2ft decorator's pasting table brought specially for the occasion by John. About 30in high, it gave everyone the same advantage and some excellent flights resulted from it. Perhaps next year we will see some Navy carrier-borne subjects – the rate of acceleration of some, but not all, of the entries would easily emulate a full-size catapult launch! The best and smoothest take-offs came from Mike Hetherington's large gear-driven "Fw 56 Stosser", which slowly lifted off and climbed straight into the wind in a way

that I have rarely seen bettered by any type of flying scale model. Mike's model is quite unique in being built from paper, with all rib locations, stringers, and other formers being scribed onto the reverse surface before assembly much in the same manner of the plasticard scratch-builder's technique. This meant that the largely plywood covered wings of the "Stosser" and the relevant metal paneling and rivet work looked superbly realistic. With relatively few lightweight internal balsa formers and spars the model was anything but heavy, and a set of scales would have been necessary to prove that it was any heavier than the more normally built models of a similar size that were present.

A brief run-down of other subjects



Pete Farrimond prepares the Zlin Z11 of Milan Kacha, the only rubber entry to qualify at Woodvale.

RESULTS – Old Warden Rubber Scale Contest

[Fifteen entries]

		Static Scale	Flight Realism	Flight Duration	Final Score
1.	Andrew Moorhouse Comper Swift	31.5	31.5	50	113.0
2.	Geoff Spencer Monocoupe 90A	27.0	32.0	50	109.0
3.	Mark Hinton Corben Baby Ace	11.5	30.5	43.75	85.75
4.	Mike Hetherington F. W. Stosser	42.0	29.5	12.5	84.0
5.	John Blagg Isaacs Fury I	35.0	27.0	21.0	83.0

shows a good variety of choice: David Kew, "Percival Proctor"; Richard Falconer, "Bellanca Airbus"; Charlie Newman, "Blackburn Firebrand"; "Fieseler Storch"; "F.W. 189"; John Blagg, "ABC Robin"; Geoff Spencer, "Monocoupe 90A"; Chris Chapman, "Heinkel 100"; and several others all added up to the sort of interesting cross-section of aircraft types that should make up every scale contest but infrequently does.

The success of these two events has suggested that they may now become an annual fixture.

CL SCALE AND WINGS

One of the newest projects on my own building board at the moment is a control-line scale model. I have always found control-line models enjoyable to fly, since it was through these that I gained my first introduction to aeromodelling. In fact the second scale model I ever built was an APS CL "Douglas Invader" which flew quite well on two small diesels but which was something of a handful due to being forced to be flown over grass which did little to aid the quality of take-offs and landings. There are a number of CL scale flyers today who manage very well over a grass surface, but there is nothing quite like flying CL over a smooth tarmac surface to achieve those really slick take-offs and landings.

Unless you have access to an aerodrome, finding a suitable site for this type of flying can be more difficult at times than finding an RC strip, since most RC clubs operate from grass surfaces, too. In the London area, however, there are two excellent CL flying sites, one at Croydon Aerodrome used by the *Three Kings Aeromodellers Club*, and another purpose-built one at Fairmile Common near Esher and run by the *Elmbridge Model Club*. These sites offer smooth tarmac with carefully marked out circles and rank amongst the best in the country for almost any kind of CL flying.

Having flown at Croydon in recent years the temptation to build another scale model and make good use of the site has led to the beginnings of a 1:6 scale "Miles

Satyr" biplane which at the time of writing is approximately three-quarters finished. The model is 42in span, and is to be powered by a Super Tigre 46 RC motor which ought to make it quite aerobatic with a reasonably light wing loading. I hope to be able to cover a number of construction details featured on the model in subsequent months, but to begin with the wings.

One of the most difficult things to achieve on any flying scale model are really thin trailing edges to the flying surfaces. A common solution is shown in sketch 1. Here normal trailing edge stock is used and sanded down almost to a knife's edge. The front edge of the balsa at point "A" is partially disguised by running separate strips of rib-tape on top of the wing covering right back to the tip of the trailing edge, ie to point "B". An undesirable side effect of this method comes from the process of shaping the triangular TE strip. Whether it is made from pre-shaped strip or flat sheet, most of the necessary sanding is carried out on the top surface rather than the bottom one, and this has a natural tendency to curl the strip upwards. The stiffness of the rear portion of the wingribs is usually insufficient to overcome this curving effect over the length of the wing, which therefore tends to curl up towards the rear of the wingtip, giving wash-out in fact, and which in some cases may actually be of benefit to the model's flight performance, but which is unnecessary and to be avoided on a CL model. On the "Satyr" I am trying two slight variations on the same theme in order to do this. In sketch 2, the triangular stock is replaced by a 1/2in wide strip of 1/64in plywood which is slotted into the TE of the rib at an angle that bisects those made by the top and bottom edges of the ribs. The trailing edge proper is then added by means of two strips of 1/16in x 1/32in spruce glued to the top and bottom of the plywood to balance each other. The second variation, sketch 3, shows the two strips of spruce replaced by a single strip of 1/16in square, butt jointed to the plywood. The advantage of method 2 is that the clearance at point "X" between the plywood and the wing covering is kept constant and carefully under control. The advantage of method 3 is that the square stock will easily form around any curve in the planform of the wing, but a consistent clearance between the ply and the covering is entirely dependent upon great accuracy in aligning the square section along the edge of the plywood. Each version is capable of taking quite a hard knock on the extreme edge without damage due to the hardness of the materials used, whereas balsa will not. Also, a slightly uneven undulation of the TE may develop over the length of the wing. As this commonly occurs on many full-size aircraft which, like the "Satyr", are of mainly wooden construction, it is not really a disadvantage.

WOODVALE SCALE INTERNATIONAL

by Bill Dennis

On the 4th August I travelled North to attend the Woodvale Rally which this year included a F/F Scale contest in addition to the usual R/C Scale event. We were staying with Tony Creedy, which afforded an opportunity to see his nearly completed Be2C. This really is a large model, spanning some 55in and will be an impressive sight in the air. The tailplane alone spans two feet! Tony estimates the final weight will be around three pounds, and he hopes a 1.5cc diesel will be sufficient, although he now has a PAW2.5 in reserve, just in case.

There were 12 entries at Woodvale including several foreign models which had remained in England after last year's World Championships. The flying conditions on Saturday evening were perfect and one might have expected more than half of the models to have qualified. As it was, all but one of the rubber/CO₂ models failed to achieve 30 seconds. The exception was a very nicely built ZLIN ZXII by Milan Kacha of Czechoslovakia. Another which must have come very close was W. Binn's CO₂ Flanders Monoplane which achieved an excellent R.O.G.

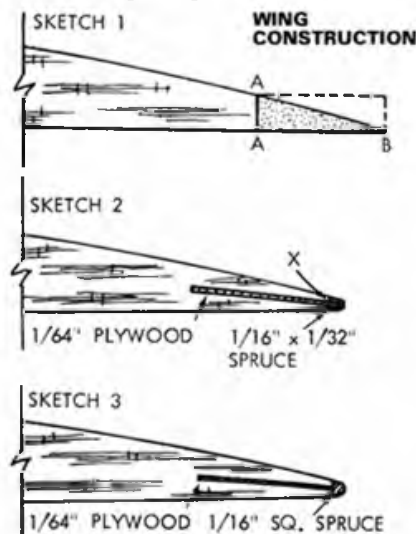
However it was the contingent of large power models which swept the board, with a close tussle for first place between Eric Coates and Terry Manley. Eric's DH9A performed as faultlessly as ever but Terry had quite a struggle with his off-trim model before recording a good flight, marred only by the torpedo dropping end over end from a 'scale' height of around 2,000 feet! Incidentally the now defunct FAI F/F scale rules were being used which still includes options on the flying schedule. Both Eric and Terry's models dropped bombs and it is probable that their positions would have been reversed without this option. Hopefully, bomb dropping has now well and truly had its day!

Third spot was taken by Bill Dennis who was flying his A.W. FK8 due to the demise of the Handley Page 0/400. Tony Creedy was having problems with his veteran DH9A but eventually overcame them to place fourth. Local flier K. Brown's Be2e from the APS plan was performing good flights in spite of the lack of dihedral on the top wing!

This was a most enjoyable meeting, and hopefully it will be repeated next year with a little more support. There was also an exceptionally generous prize list whose value far exceeded the entry fees.

RESULTS

			Static Flight Total
1.	Eric Coates	DH9A	485 1190 1685
2.	Terry Manley	Blackburn Swift	532 1135 1667
3.	Bill Dennis	A.W. FK8	454 880 1334
4.	Tony Creedy	DH9A	378 920 1298
5.	Milan Kacha	Zlin ZXII	350 515 865
6.	K. Brown	Be2e	255 555 810
Six did not qualify			



FREE FLIGHT IN FRANCE

THE ATTRACTION of a Continental holiday combined with international competition increasingly attracts British modellers to make an annual pilgrimage. Unfortunately programming of our own British Nationals prevented the triple Poitou, Trebod, Zulpich; however the first two events in France were well attended.

During World Champs years, entries in these French events are usually swelled by teams visiting Europe but with the Champs this year being in California, it was instead a last opportunity to see the top continental flyers in action as a preview of performances later in the year.

POITOU

Bad weather over Europe this summer produced breezy overcast conditions that probably favoured the British better than the cloudless calm usually associated with such events. Traditionally the Poitou event flown on the vast plain of Assais, opens with an afternoon chuck glider event before the three main classes. Models developed for the Sweepette series here in England were well in evidence and the British contingent proved to be above average standard. The contest is run to progressive maxes, 20, 30, 40, 45, 50, 55, 60 sec maxes with three attempts at each max. Flown from two timekeeping positions the event attracted a good gallery of spectators and generated great excitement as numbers thinned out as the max was increased. Finally there were only four competitors to reach the magic minute max, after which the deciding flight was to be the best from two made during a 10 minute period. After a short wait, most flyers made their first flight and only last year's winner, Thierry Fradin, appeared to benefit from any lift. John Buskell and Andy Crisp, already downwind from their first flight, launched into the same air followed by Thierry with his second flight but it was Andy's model that made the most of it to score the first victory for GB. Andy had only decided at the last minute to attend the contest and hitch-hiked across France with some balsa wood for a chuck glider in his rucksack. On arriving at the contest he sanded the parts to shape and epoxied the model together and went on to win! Equally difficult, he made the return journey hitch-hiking with Silver trophy and a bouquet of gladioli!

Monday the Wakefield day was to be the only calm, sunny day. Certainly the first few rounds could have been flown on a football pitch as models circled overhead to glide or DT back to earth almost at launch point. Such conditions brought out the remarkable high aspect ratio, low power, long motor run French Wakefields. Their performance in such calm was most impressive perhaps capable of a genuine 4-4; minutes still air. Should such conditions be repeated at Taft they could well produce a French champion and contradict the trend of extreme models never winning. Even Wakefields they flew in later breezy rounds had enormous wing spans by British standards. By the end of the day, six competitors remained for the 4 minute fly off, only George Matherat, the first to fly, and Valthev fell a few seconds short to leave four remaining for the 5 minute fly off. Notable was the Bulgarian, Valthev, who used a delayed prop release for these fly offs. As all the competitors were well downwind, Pierre Chaussebourg the Contest Director, chose to delay the next rounds to ensure their return. First to launch was Roy Miller who found good air and maxed comfortably, the pressure was now clearly on the other flyers who had to equal his performance and they waited in vain for similar conditions. So a second victory for GB, with Steve Marriott, back from Saudi Arabia for the contests, in 10th place having dropped 24 secs in the opening round.

On Glider day, many modellers were already on the field at six o'clock under the stars waiting for the sun to rise to practise their circle towing for those elusive early morning thermals. Amongst those practising was Mike Fantham who had arrived at the contest with a new wing and tail plus a car full of tools and had spent the Wakefield day hack-sawing and filing a circle tow hook system and fabricating a model having lost his only other circle a few weeks previously in England. The model flew well, but dropped its first contest flight with a score of 2.46. It was to prove Mike's only mistake of the trip. Successive rounds thinned the perfect scores until only Swiss flyer Heinz Bluer, winner of the classic Dutch Nats Fly-Off earlier in the year (see p493, Aug issue), and Bulgarian, Michael Nicholov, remained with Britain's Fantham, Jack and Warren close behind him in 3rd, 4th and 5th positions. Round 5 and the Bulgarian dropped to stay just 1sec clear of Fantham, Mike Warren, mysteriously DTed early at 42sec, no doubt confused by his double timer! Only the fantastic Bluer could preserve his

Free Flight Scene



Top left, Jean Claude Cheneau flew typical high aspect ratio French design in early rounds, easily capable of 4 minutes plus. Top right, Bill Hartill of World Free Flight Press fame with hastily rebuilt model just prior to unsuccessful fifth flight. Above, tremendous victory for Britain's Roy Miller, winner of F1B with two fly-off maxes. Right, surprise visitors from Bulgaria included Michael Nikolov, kneeling left, who placed 2nd in F1A. Will we now see more Eastern countries competing at the European Internationals?

perfect 1260 score to collect his second major victory of the year.

Power day the wind blew, the clouds rolled by, and a line of trees a few hundred metres downwind of the launch line produced many out-of-sight flights for those not way up in good air. High drama came in the 4th round for Bill Hartill, over from California specially for the event. His flight maxed but as the tail popped up to DT it jumped the mount and skewed vertically to spiral the model down breaking fuselage and wing in two. With only one model and a perfect score Bill set to repairing with instant glueing 'Hot Stuff' and 5 minute epoxy. Feverish activity assisted by his friends had the model back in one piece with only 10 minutes of the 5th round remaining. A sideways gust on launch tightened the climb and again spun the model down for an attempt, but no time left for another re-build.

Coupe, flown concurrently between rounds 2-6 was naturally blown out by the conditions. No sign of the large lightweights, compact fast climbing models being the order of the day. The scores of the four leaders in round three, Fradin, Joly, Dowsett and Rapin of 80sec, 50sec, 42sec and 10sec, illustrate their problems! Best British performance came from Brian Kenny whose model was sportingly oroxy flown by Dave Goodwin, forfeiting his own entry, when Brian became ill.

The final Power round, and positions were still changing hands. Of those remaining the Bulgarian Vassilov put his hand in the prop of his Rossi to require medical attention before his flight which he dropped. Roy Collins made a disappointing 2.45 and only Gerhardt Heidemann came through with a full house. A look at the score board showed that if German flyer Hubler could max he would dead heat with Collins. Attention now swung to his flight which was good, requiring a Fly-Off. Roy was better at picking air but the German's model climbed much higher. Hubler's tactics therefore were simple; he waited for Roy to fly and then launched into the same air. So it was that both made 4min flights and returned to attempt five. Clearly Hubler's tactics would be the same and there was much encouragement for Roy to deliberately pick a down draught and overrun the engine to encourage his opponent to fly, and then take advantage of his second attempt to try to max. The outcome however was a carbon copy of the earlier Fly-Off with Hubler higher up in the same air to take 2nd place.

The banquet speeches welcomed the participation of the Bulgarians and expressed a hope that next year other Eastern bloc countries might attend. Next year's International F/F Calendar already includes an event in Czechoslovakia, followed by Portugal and the European Champs, both to be held on the plains of Assais, plus the Trebod and Zulpich and the French Nationals. The message from the French, was next year to take your Free Flight holidays in France - clearly they meant move to France!

POITOU RESULTS

HLG: 1. A. Crisp GB 80+117, 2. T. Fradin F 60+99, 3. J. Buskell GB 80+89, 4. B. Trachez F 60+52, 5. B. Simms GB 50+52.

F1A (130 entries): 1. H. Bleuer CH 1260, 2. M. Nikolov BG 1246, 3. M. Fantham GB 1245, 4. A. Jack GB 1241, 5. A. Hecken NL 1240, 18. B. Baines 1178, 21. P. Owens 1161, 22. J. Williams 1160, 26. B. Nicholson 1149, 30. M. Dilly 1143, 35. C. P. Williams 1128, 40. M. Warren 1106, 53. K. Proctor 1066, 56. P. Hawkins 1060, 67. R. Miller 1014, 74. D. Goodwin 992, 75. S. Marriott 990, 82. G. Le Vey 950, 83. P. Masterman 941, 84. L. Dowsett 941, 85. B. Kenny 940, 86. W. Simms 939, 95. M. Cowley 898, 104. D. Parker 847, 111. M. Gilmore 790, 112. D. Barnes 787, 115. W. Blake 761, 124. I. Kaynes 198.

F1B (57 entries): 1. R. Miller GB 1260+240+300, 2. A. Landeau F 1260+240+255, 3. P. Bertin F 1260+240+216, 4. M. Orthwin D 1260+240+121, 5. Valthev BG 1260+223, 10. S. Marriott 1236, 11. B. Kenny 1235, 16. C. P. Williams 1201, 21. K. Proctor 1170, 27. M. Duce 1134, 29. A. Jack 1112, 38. P. Masterman 1046, 39. I. Dowsett 1041, 41. P. Hawkins 1031, 43. I. Kaynes 1010, 49. A. Crisp 832, 50. D. Goodwin 878, 56. J. P. Buskell 361.

F1C (126 entries): 1. G. Heidemann D 1260, 2. H. Hubler D 1235+240+290, 3. R. Collins GB 1235+240+270, 4. A. Jack GB 1222, 5. A. Weber D 1214, 7. F. Chilton 1190, 16. K. Faux 818, 23. P. Rowledge 246, 24. M. Cowley 212, 26. J. P. Buskell 036.

F1G (35 entries): 1. M. Lara F 556, 2. R. Allais F 551, 3. L. Dupuis F 530, 4. R. Champion F 521, 5. B. Kenny GB 493, 6. M. Dilly GB 489, 10. I. Dowsett 461, 14. R. Miller 433, 17. A. Crisp 423, 21. I. Kaynes 336, 25. P. Masterman 262, 31. D. Goodwin 168, 32. S. Marriott 156, 33. D. Parker 079.



Left: two experienced RIC flyers Bill Blake and Dave Parker, editor of SMAE News, who have recently progressed to the challenges of free flight, attended their first international. Above: Bernd Silz, German National Champion, clinched F1B at Trebod. Bottom left: Mike Fantham's main hobbies include standing on winners' rostrums in foreign countries, drinking champagne and yet he still finds time to fly F1A glider.



downwind to check the air and then he was away. Thirty seconds later Bartschi followed but it was soon apparent that he couldn't make it. Another win for Mike Fantham; of the four Internationals this year he has won two 1sts plus a 2nd and 3rd; a convincing record to make him Europe's numero uno.

So to the final day, Wakefield and Power, where the start was delayed by 30min due to low cloud and mist which prevailed throughout the day with low lift conditions. Wake flyers were hardest hit with perfect scores dropping rapidly. Of those who dropped the Kristensens, father and son, were working their way up the scoreboard by virtue of good back-up flights. Their consistency, and talent for thermal picking, plus their excellent models must make them favourites for a top place in California. Only the German National Champion Bernhard Silz continued to max eventually winning with the only perfect score.

Meanwhile the Power flyers were finding it less difficult to max out and the contest developed into a two horse race between Germany and Britain. Siegfried Reda dropped out in the 3rd round with 2:59, Thomas Heidemann 6th with 2:58 and Alan Jack in the 7th with 2:28. But after 7 maxes four remained, Faux, Chilton, Schley and once again Gerhard Heidemann. The Fly-Off was an exhibition of bad power patterns. Ken Faux's model went flat and stalled on transition, Gerhard's model rolled left and Richard Schley's nearly spun-in off the top with several tight turns on a wing tip. Only Fred Chilton had a perfect climb and he overran to leave Richard Schley the victor with a saving thermal and the only max.

For many years Britain has had to be content with indifferent results at International events with just the occasional individual success. This year has proved something of a turning point with seven top placings and many good runners up. Let's hope this trend is continued in California by the British team to whom we wish the very best of luck.

PIERRE TREBOD RESULTS

F1A (130 entries): 1. M. Fantham GB 1260+154+150, 2. A. Bartschi CH 1260+154+140, 3. J. Leleux F 1260+152, 4. K. Salzer A 1250, 5. C. Williams GB 1246, 6. B. Baines 1245, 7. S. Marriott 1238, 14. A. Jack 1190, 16. M. Warren 1182, 24. J. Williams 1136, 29. M. Gilmore 1107, 84. G. Le Vey 861, 102. P. Hawkins 712, 105. M. Cowley 668, 108. W. Sims 640, 114. R. Miller 533, 118. D. Barnes 487, 121. K. Proctor 442.

F1B (46 entries): 1. B. Silz D 1260, 2. P. Kristensen DK 1258, 3. F. Gaensli CH 1257, 4. J. Kristensen DK 1220, 5. D. Tomczyk F 1212, 10. R. Miller 1169, 17. C. Williams 1078, 32. S. Marriott 929, 38. J. Buskell 783, 39. K. Proctor 772.

F1C (23 entries): 1. R. Schley D 1260+240, 2. K. Faux GB 1260+198, 3. G. Heidemann D 1260+151, 4. F. Chilton GB 1260+124, 5. S. Reda D 1259, 11. A. Jack 1228, 14. R. Collins 1175, 23. M. Cowley 166.

*Dave Hipperson
reports....*

CO₂ MOTORS FOR MAXIMUM PERFORMANCE

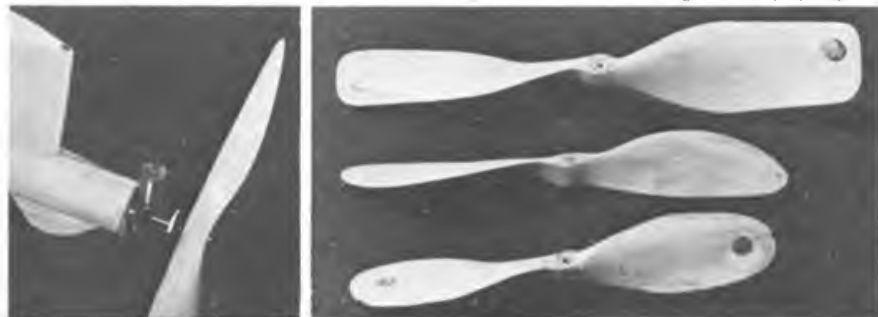
I have been experimenting with filling techniques and temperatures to find out just why it is that so many people report inconsistent runs from CO₂ motors. You have probably noticed already that the second charge from a bulb is usually best and this was the key to the investigation.

My initial attention was to the Sparklets bulbs themselves – I weighed a large number of these quite accurately. They varied from anything between 27 and 31 grams (this included some of the foreign 'gold' bulbs that we had been told were so consistent). As the empty weight is pretty steady at 22 grams you can see that this variation represents enormous fluctuations in actual CO₂ available. Initially I thought this could have a bearing on performance, so discarded the very light ones and for the sake of simplicity have used only 29 gram bulbs in these tests.

A standard Telco unit was used, and fitted with a 5 x 7; Balsa ballasted prop. The unit was mounted firmly to a piece of 1in x 3/8in hardwood which was in turn held in a vice. The tank and piping was allowed to 'flap about' behind the engine and directly in the prop wash. The motor was set up at a reasonably fast rpm level and *not* altered during the test.

A number of bulbs were run through the unit in this position. As you can see, in the first case the second fill gave the best run. However continued tests with no interval between runs showed the first charge from a bulb to be better than any other in all the next four tests. The sixth bulb was run through after it had been warmed to body temperature (in the filler inside my pocket for 15 minutes prior). Immediately the run was improved and the second and third fills benefitted too. Remember there had been no alteration of valve setting.

The next series of tests were done the following day in similar conditions. Once again, using a cold bulb the second charge was better from the first bulb but tests that followed immediately showed the first charge to be the best on all subsequent bulbs.



Above: Close ups of Dave's carved wooden props. Black spots are lead ballast to achieve flywheel effect.

Once again a bulb was warmed to body heat, and once again a considerable improvement in run was achieved. As a final trial, a bulb was warmed by electric light to approximately 40 degrees above ambient (100 F), just warm to the touch. Once again the run was improved even over the length achieved with just body warmth. As a final test a bulb was taken in controlled conditions to 120 F. (This is a dangerous level and something both I and the manufacturers recommend against.) The run from this fill was a staggering 5 mins plus once again without any adjustment. In these latter two tests the motor ran slowly at first and gradually increased speed until the end of the run with a little burst just before it ran out. This I have come to recognise as a good charge in a well adjusted motor. However in the case of the very hot charge, the speed of the initial part of the run was such that it probably would have had little practical use even in the lightest of indoor models.

Conclusions from this part of the experiment were clearly that it is beneficial to fill with warm CO₂ into as cold a tank as possible. Heating the bulb increases the pressure in it and thus injects more CO₂ into the tank which if it is already chilled, cools some of the CO₂ and allows even more in before pressure becomes equalised

between bulb and tank. However, although these seem to be acceptable up to a point it can be overdone as with the very hot pre-heat which seems to create so much back pressure in the engine valve that the unit runs too slowly for too long. Perhaps in this case throttling up would be the cure. This would need more tests. Certainly it seems that at any practical setting considerable improvements in run length and consistency can be brought about by heating the bulb to 30°-40° F above ambient – usually the pocket is enough for this.

One more point on pre-cooling the tank. Don't run the charge out by turning the prop. A short cut is to bleed the charge out of the filler again. This can be done by pushing in a pin with a flat ground end into the nozzle until it dislodges the ball valve. The ensuing rush of gas cools the tank very quickly and to a lower temp than running the prop.

SPEED ADJUSTMENT

Of course, speed adjustment on these units is not the same as compression adjustment on a diesel – some people are treating the two similarly. The valve in the cylinder top is opened and shut by the crown on the piston. Each time the piston hits TDC the ball valve is opened and the pressurised gas squirts in and pushes the piston down again – momentum of the prop etc keeps it going until the next 'stroke'. If the valve is adjusted to open too much, then although the power derived from the squirt is more, so also is the back pressure as the valve is opened earlier and some gas escapes before the piston is at TDC and is thus both wasted and slows the stroke. Bearing this in mind, I have found these units to operate most efficiently with the smallest valve opening possible.

However it is reasonable to assume – as with all other similar duration events using lower power – is rubber – the larger the prop the better the performance. With CO₂ this theory is in doubt. Large props are undoubtedly more aerodynamically efficient but due to their size and hence resistance to turning require a more open valve setting. At such a setting the prop will still be turning slower than a prop of smaller diameter and therefore the valve is open long enough to waste a certain amount of gas on each stroke. You will get that popping sound. Thus I believe it is most efficient to use the smallest size prop possible and this is, of course, also beneficial on the glide-in terms of reduce drag when the prop stops.

PROPS

From my experience, the standard plastic props particular in the case of the Telco is very inefficient, particularly at low speed. I use a similar size prop, ie 5in diameter 7in pitch, but carved from balsa with much larger blades than the original Telco. This has to be ballasted with 13 grams of lead in each tip to maintain the flywheel effect necessary. More recently I have had some success with 6in x 6in pine props carved once again helically from a full X blank. These are just that little bit more robust and due to their higher density, do not require ballasting. Therefore I would recommend them for general use if you can get the wood.

WEATHER EFFECTS

As if all this isn't enough, I have noticed humidity has a considerable effect on performance at any given setting. Generally it has been found that runs lengthen appreciably in humid/raining conditions. In dry 65 F conditions, a test unit was adjusted to run off at a consistent 90 seconds – the ideal sort of setting for outdoor duration use. However this same motor at the same setting with the same ambient and charge temperature ran slower but for over double that duration on a rainy day. It might therefore be reasonable to maintain run length and power – some throttling up on wet days will be necessary.

WEIGHT OF BULB

As I mentioned at the start of this piece, the 29 gram bulbs were used in these tests. Further tests – with which I will not bore you – have proved that as far as the first two or three charges are concerned the weight of the gas in the bulb is not critical. Its only effect – which seems reasonable – is that the better filled bulbs go to perhaps four or five reasonable fills whereas the light ones are useful for only three. This is irrelevant to contest use where it is recommended to use only the first or at most the second charge from a bulb anyway.

CO₂ MOTOR TEST

All Sparklet Bulbs used full weight 29-29.5 grams; Ambient Temp 68 F (Weather dry and bright); 5in x 7in Balsa prop (Tank in prop draught).

Bulb	1st	2nd	3rd	4th
1	1.23	2.12	1.57	1.45
2	1.53	1.50	1.35	1.12
3	1.48	1.46	1.37	1.36
4	2.28	2.00	1.35	1.31
5	2.10	1.57	1.38	1.28

Tank wiped dry next bulb at body temp (30° F above ambient)

6	3.05	2.27	2.13	1.17
Break of 12 hours. Test re-commenced, weather similar				
7	1.29	2.00	1.50	1.33
8	1.53	1.48	1.42	1.30

Next bulb at body temp (30° F above ambient)

9	3.35	2.33	2.08	0.56
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Next bulb at approx 40° F above ambient – just warm to touch

10	3.40	3.17	3.00	1.25
Final bulb at approx 120° F				
11	5.13	4.00		

FAI, SPORTS COUNCIL DEMO

Bassingbourn, 12th July

It would have been reasonable to expect that to run a contest mid-week would drastically limit entries. People have to work after all and anyway surely they would think 'Thursday' was mis-pint? Not a bit of it! The FAI Sports Council Demonstration meeting had better than average Sunday attendance and attracted noteables from all over England!

The success of the venture as a 'demonstration' to the attendant Sports Council Officials is difficult to assess but they were certainly impressed by the numbers of people engaged in the activity. As far as flying it was quite the most thermally day Bassingbourn had seen this year. The max was reduced to 2.30 in an attempt to keep models on the 'drome and so as not to make the seven flight schedule too gruelling. This move was only partly successful.

Over 30 entered Glider and ten finished their flights as results were close right up to the last round. Young Laurence Gray looked in fine form after a first round 1.40 with a string of five maxes and was leading when he came out for the last round, but the model slipped off the line low down when momentarily dazzled by the sun and the resulting 54 second flight robbed him of the chance of even a place.

RESULTS: F1A Glider 1. J. Cooper (Biggles) 16.24, 2. B. Baines (RAFMAA) 15.58, 3. M. Gregorie (St Albans) 15.31. **F1B Wakefield** 1. P. Williams (Richmond) 17.30, 2. G. Foster (RAFMAA) 16.58, 3. J. O'Donnell (Whitefield) 16.44. **F1C Power** 1. P. Harris (Birmingham) 12.14, 2. R. Moore (Biggles) 7.24, -3. S. Screen (Birmingham) 2.30, -3 B. Spooner (Croydon) 2.30.

SMAE 5th Area Centralised, 9.9.79

RESULTS: Open Power – 1. J. West (Brighton) 9.00-5.41, 2. J. Bailey (Biggles) 9.00-5.27, 3. M. Gregorie (St Albans) 9.00-5.27, 4. T. Payne (Biggles) 9.00-5.08, 5. J. Fletcher (St Albans) 9.00-4.38. **Team Results** – **Kell Trophy** – Croydon 'B' (Jellis, Digby, Hipperson) 26.49, Birmingham (Screen, Monks, Baggett) 26.40, St Albans 'B' (Gregorie, Johnson, Bailey) 26.24, Tynemouth (Reavly, Anderson, Jack) 25.45, Anglia (Wells, Collins, Bond) 25.42. **F1B Wakefield** – **Gutteridge Trophy** – 1. R. Pollard (Tynemouth) 15.00-8.05, 2. P. Jellis (Croydon) 15.00-3.51, 3. G. Walker (Birmingham) 15.00-2.59, 4. M. Evatt (Biggles) 15.00-2.27, 5. D. Morley (Grantham) 15.00-2.15. **A1 – Glider** – 1. M. Cowley (Biggles) 10.00-2.38, 2. J. O'Donnell (Whitefield) 10.00-2.18, 3. K. Amos (Biggles) 10.00-1.44, 4. C. Edge (Welland Valley) 10.00-1.40, 5. M. Scott (Leicester) 10.00-1.38. **Plugge Totals** – 1. Biggles 1283, 2. Croydon 1102, 3. St Albans 1090, 4. Bristol & West 889, 5. Norwich 797.

SOUTHAMPTON GALA

Beaulieu, 15th July

Traditionally weather is windy at this Southern site – even the locals complain about it. Beaulieu's saving grace is that it is enormous. On 15th July it didn't need to be – a miracle prevailed and it was calm, occasionally flat calm, humid and with a hazy sun occasionally breaking through the light over cast. Although this led to some rather unpredictable lift in the early stages of the day flyoffs nevertheless filled up steadily partly through the re-entry facility.

Virtually the entire Open Rubber entry reached the flyoff and the story was very similar for those on trim in Power. Mini, a combined event with K factors that even took into account the difference between 80 and 100 gram coupes, had a remarkable standard of flying. At the end of the day only one complete score was under 9 minutes and half a dozen were in the flyoff.

The single FAI event proved a little more difficult as any sort of glider towing was seen to prove quite a problem for many contestants, as there was, from time to time, no wind at all! Ray Elliott showed the way home here with the only full house and once again Laurence Gray was in with a shout and a useful 14.01 total that gave him third.

The flyoffs got underway soon after six although there were no hooters blown and one wonders how everyone knew what to do and when to do it in the growing excitement.

Power was first away and Stafford Screen climbed very high and seemed to be holding height followed by Pete Harris. As it turned out these first two topped the power results with 'sensible' times. The sillyness was to start with the Mini flyoff which followed. Peers was first away with his 1/2A model and both he and Harris, once again, were in good air. Pete however had an engine stutter at launch and the subsequent over-run made the long thermalling flight unnecessary. Hipperson had been deliberating as to whether to use a power model but a pre-flight check revealed a defect and not wanting to risk it he switched back to Coupe. His launch towards the end of the period coincided with the release of John Fletcher's high climbing 1/2A. The decision to fly the Coupe was a correct one as Fletcher's model was down in less than 3, whereas Hipperson's Coupe held a reasonable climb height for 5.47 to win Mini without the need to factor the score. A glider also figured in the final placings as Foster had done a creditable 3 mins plus with his A1. Peers early 1/2A flight took 2nd.

Open Rubber followed almost immediately and all the models but one were in strong lift from the moment of launch – a bump that lasted the entire period and most of the remainder of daylight hours, if following events were anything to go by. Final times were, as one would expect in these conditions, dependant on visibility and length of fuse. The slight drift just discernable at launch died away completely a few moments after and Russell Peers – not usually known for DTing at all – had anticipated this change beautifully to DT way up and well in sight at 12 minutes odd and touch the ground nearly 4 mins later, on the far side of the heath just in front of the trees. He not only won, but by dint of his enthusiastic chasing had stayed under the model the entire flight and returned with it very quickly. Other high flights were not so lucky. John Fletcher who has had his share of misfortune in past contests, just getting into the flyoff, made sure on this occasion with an enormous climb but the slim fuselaged Bob Bailey design is not known for its visibility and he was neither on the leader board, nor successful in finding the model. Rodgers was second with a little over 11 minutes and Chapman, also flying a large model, made third and recovered the model.

We thought we had seen the 'spectacle' of the day but those that stayed to watch the glider flyoff were in for a treat. Most models launched together and seemed to hold height for a couple of minutes before cantering into good lift and ascending steadily and drifting east very slowly. Six-minute DTs were not enough and those that simply wound their timers around were popping only hundreds of yards away albeit at a great height. The eventual struggle resolved itself after about 13 minutes, when Chapman's model although highest got impossible to see. A little lower, Mike Bull's glider did the thing one always dreams of in this situation – it started coming back again! To be more accurate, it came around in a huge circle. This left the owner somewhat puzzled and chasing in circles under his model! His eventual winning score of 16 plus was easily still in sight and there was some doubt as to whether the time keepers saw it land or just got bored and packed up!

RESULTS: F1A Glider 1. R. Elliott (Croydon) 15.00, 2. P. Williams (Richmond) 14.17, 3. L. Gray (Jnr) (Falcons) 14.01 **HLG** 1. J. Fletcher, 2. A. Billam **Open Power** 1. S. Screen (Birmingham) 9.00 - 7.01, 2. P. Harris (Birmingham) 9.00 - 5.05, 3. F. Chilton (Crookham) 9.00 - 4.11, **Mini** 1. D. Hipperson (Croydon) 10.00 - 5.47 (Coupe), 2. R. Peers (Falcons) 10.00 - 4.26 (1/2A), 3. J. Foster (RAF-MAA) 10.00 - 3.01 (A1); All scores actual times. **Open Rubber** 1. R. Peers (Falcons) 9.00 - 15.44, 2. L. Rodgers 9.00 - 11.06, 3. C. Chapman (B&W) 9.00 - 10.57. **Open Glider** 1. M. Bull (IC/M) 9.00 - 16.46, 2. C. Chapman (B&W) 9.00 - 13.12, 3. J. Clements (B&W) 9.00 - 7.15, 3. E. Tyson (Soton) 9.00 - 7.15. **Junior Trophy** L. Gray (Falcons).

EASTERN COUNTRIES

CHAMPIONSHIP – Pazhardjik, Bulgaria, reported by Ivan Horejsi

As some of the Eastern bloc countries will not enter the World Champs in California this year, this was their major contest of the year. All three free flight classes and F3A and F3B class R/C models were flown from July 19th to July 23rd at Pazhardjik, the training field for the WC '75 in Plovdiv.

Teams gathered from eight countries: Bulgaria, Czechoslovakia, East Germany, Hungary, Mongolia, North Korea, Poland and USSR, the hosts having two teams and the list of participants included eight recent or reigning World Champions: Abadijev, Dvorak, Kim, Klima, Loeffler, Oschatz, Paik, Tschop.

Weather for all three events was similar, being above all very hot – over 30 C with blue sky and mild winds.

In F1A Glider, the competition was very tough. All three Russians, Lepp, Tschop and Isaenko, met bad luck. By the end of the day there were 9 full scores from the 27 participants of which 22 had more than 1200secs!

The fly-off started at 7.30pm. Almost all of the flyers circle towed for all the 15 minute period but only North Korea was happy to find some lift.

F1A Glider (27 participants):

1. Kang Jong Sik	North Korea	M - 240
2. Hans Juergen Wolf	East Germany	M - 216
3. Ivan Horejsi	Czechoslovakia	M - 197

Teams: 1. Hungary; 2. Bulgaria I; 3. Bulgaria II.

The winning model was of typical Korean layout. The wing was of a bit higher Aspect Ratio and the aerofoil remaining the popular 86356b. The structure consisted of double I beam spar, without D-box, and the wing was surprisingly weak in torsion as witnessed by wing flutter during the launch. All the Russians had high A/R back-up models with spans of about 2200mm which they claimed glide better than their more conventional models but their fortunes did not allow them to demonstrate this in the fly-off.

Below, F1C power model as flown by the Mongolian team, newcomers to the event this year, but tomorrow, who knows? Right, winning F1A Glider by North Korea's Kang Jong Sik about to be launched, structure utilises twin I beams without conventional D box leading edge. Below right, past Double World F1B Champion Joachim Loeffler and team mate Fischer make some shade as fellow East German Dr Albrecht Oschatz winds in the fierce sunlight.



The hot weather on the second day proved very difficult for the Wakes. Rubber motors kept blowing with the heat. The East Germans were especially unhappy, blowing three motors while winding was the rule rather than the exception for each of them. The Czech team used three umbrellas to keep the rubber in shade during winding. Only two modellers survived the day with full max scores, young Russian Stepanchuk and the World Champion Kim Dong Sik, but in the fly-off it was the Russian model which climbed better and won. The winning model was of high A/R with swept rounded tips and the D-box type wing structure.

F1B Wakefield (26 participants):

1. Stephen Stepanchuk	USSR	M - 240
2. Kim Dong Sik	North Korea	M + 213
3. Victor Roshonok	USSR	1249

Teams: 1. USSR; 2. Poland; 3. North Korea.

Sunday, July 22nd, was the Power day and the hottest of the contest. Nine modellers maxed out. After the 4 minutes max fly-off, seven still remained and after the 5 minutes max, three contestants remained: Verbitsky and Mozyrsky of USSR and Kaiser of the Czech team. The final 10th round began at about 8.30pm. Verbitsky flew perfectly to win the contest.

F1C Power (25 participants):

1. Eugene Verbitsky	USSR	M - 240 - 300 - 360
2. Valentin Mozyrsky	USSR	M - 240 - 300 - 292
3. Jiri Kaiser	CZECH	M - 240 - 300 - 218

Teams: 1. USSR; 2. Czechoslovakia; 3. Hungary.

The Russians especially Verbitsky, set new standards in F1C construction and flying. All had models of Eugeny's design, featuring dural covered wings and tails. Verbitsky's newest model VE-39 has high A/R wing about 2000mm span, with 6.5% thick mildly under-cambered airfoil and double tapered plan form.

The fuselage is long, allowing for a small slab tail no more than 5dm sq weighing 20gms located on top of the fin, forming a T tail. The Rossi 15 motor is swinging a folding prop, the halves of which are moulded in carbon fibre.

Except for the usual gadgets, Eugeny moves both halves of the wing separately for power and glide. At the top of the power climb the model bunts off the top controlled by the VIT tail.

Most impressive was the consistency of the power pattern of all the Russian models with climb heights claimed to be about 180 metres.

The participation of these top model flyers from the Eastern bloc countries will be sadly missed at the World F/F Champs in California later this year. Fellow Free Flight modellers from around the world hope it will not be long before they can be re-united in World competition.



WITH AN UNBROKEN RUN of good weather going back many years, there must have been some who thought that now, at last, one of the *Aeromodeller*-organised meetings at Old Warden was going to encounter weather problems. A windy day would be especially unpleasant or even impossible for the Old Timers, and in some parts of the country it was already quite windy at 7.30am and, in places, raining.

As they arrived at Old Warden, however, the faithful were rewarded by the now almost-guaranteed flat calm. It was quite dull and overcast some of the time, but there was no rain and conditions were just about ideal for vintage models.

"Vintage Day" has now divided itself up into three separate sections. There is the control line section, perhaps the least numerous but with the only formal contest (not very formal, perhaps!) the "Fireball Trophy" presented by the enlightened Mike Beach. Then there is the "radio-assisted" section. Both these groups are allocated relatively small areas to which they confine themselves, so that the rest of the field can be used to best advantage by the biggest section, the free fliers. With a slight breeze, this usually works out OK, but on this occasion, there was either no wind at all or it was very light and variable which made free-flight patterns unpredictable, and this resulted in quite a number of incidents with wayward FF models gliding to all corners of the field. However, the FF Vintage model does offer the best possible fun-day for "proper" aeromodellers i.e., those who have been around for some time and those who are not too narrow in their interests. This writer, who has been at it a "long time" cannot remember any events *back in the dark days* that were as enjoyable as these Old Warden meetings, and this view seems to be shared by many other modellers. This year, with doubts about the weather, it seemed that numbers were perhaps a bit down on last year, but the meeting was still very well attended and there were interesting and unusual models in profusion.

Some of the more spectacular ones came from the Cardiff area, typified by the double size "Tambe" by Tony Ryall and the scaled up "Scram" by Lynn Walters, both beautifully built and good fliers, with



All-Vintage Day Old Warden

as seen by
Peter Russell

R/C assistance. R. Brightwell had a magnificent Mick Smith "Mercury" fitted with an opposed twin ohv engine of his own construction which not only flew the model very well, but was very quiet in doing so. The four stroke invasion continues with exactly twice the number of models so powered, compared with last year. The O.S. FS60 predominates but there were one or two old timers on spark ignition as typified by Pat Mardell's 15cc Kestrel powered "G-ADAR", the writer's "Goodship", powered by the 10cc C.I. Special again after a spell with the O.S., (which was this model's tenth engine) whilst two other models were powered by obviously elderly four strokes of unknown origin. One four stroke model that was particularly impressive was the O.S. powered "Astro-Hog" by Geoff Goldsmith. Definitely a vintage R/C model within the strict meaning of the word, if not in the generally accepted sense, the original

"Hog" was perhaps the first of the fully aerobatic R/C models, and Geoff's replica goes through all the recognised manoeuvres easily and quietly.

Interesting as all these models were, however, there were few really authentic old timers with appropriate engines, fittings and flight patterns. The writer can afford to brag a little here with his original Junior 60. Stentor powered with K.K. Airwheels, "Truflow" propeller, Austin timer and no visible radio gear. The only model that compared with this was the Bowden Contest of Tony Rees, another of the Cardiff group, who used an appropriate Comp. Special and also had concealed radio gear. His flight pattern was mostly free flight, with just a bit of "radio assistance" to ensure that it landed back in the designated area – which is exactly as it should be done. Even Tony's model has modern wheels, but these were not too obvious.

Unfortunately some of the R/C assistance chaps haven't really got the idea, and are flying them just like ordinary sport R/C models, which is not quite the object of the exercise. One modeller was heard to complain that his free-flight pylon-type model was not too good on aerobatics, as it tended to roll out of loops!

The Fireball Trophy for vintage control line models brought a slightly bigger entry than last year, sixteen in fact, though this writer is surprised that the entry isn't at least double that number, as for many it is the only possible way to get in a few flights

Heading photo illustrates the R/C Assist park at Old Warden, foreground includes Tony Ryall's Ross Twin powered twice-size Tambe, two Playboys, a Bowden Contest and Lynn Walters' enlarged Scram.

Left: distinguished line up of long service Aeromodeller contributors with over 200 years of accumulated modelling! Len Ranson, Howard Boys, Rupert Moore and Dennis Fairley caught inspecting historic A-frame pusher flown by Howard, who also produced his elderly tailless record holder.





with old, noisy stunt models. The writer's "Super Profile" which won its last contest in September 1948 is still mostly original, apart from a recently fitted tailplane. The Ohlsson 60 is actually older than the one it originally used. In spite of which it took the ancient 50 incher through the old schedule surely, whilst the noise it made ensured that everyone on the field turned to look. Donor Mike Beach was also taking advantage of the "silencer amnesty" to fly his unsilenced K&B powered replica of Ron Moulton's "Voetsak III", the original of

ting clobbered! Difficult to miss, however, was Noel Barker's latest, a 1935 Ehling designed 8 1/2 footer, which joins his K.G. and Miss Philadelphia monsters. Perhaps the most unusual flight performance of the day was the repeated demonstrations by Marc Hinton's ancient looking rubber-powered "A"-frame twin pusher. Unlike most models of this type which had arrow-like trajectories, this one was a lightweight which, with slowly turning propellers climbed in a steep spiral and then glided quite slowly. This belongs to

hands of the designer but also such North country experts as the Lees, father and son, "Dickie" Skinner and a few others who managed to master the art of keeping that 1/16th-sheet-and-1/16th-square fuselage intact.

So it happened that, after more than eight hours intensive model flying, when the prize-giving took place at 1800hrs, several hundred modellers were still hard at it, and only the Old Warden staff know what time they were all finally persuaded to go home.



Top left: Brian Yearley's impressive Flying Minutes. Top right: elegant Streamlined Cyclone flown by Colin Watts.



Left: Alex Imrie produced a 'new' Garami Molecule, complete with Atom engine. Collision with Hinton's A-frame set the down thrust angle just perfect for subsequent flights. Right: George Goldsmith's OS 4-stroke Astro-Hog R/C, a perfect combination.

which was just about the first control liner seen in public in this country. Another noisy entry was Richard Cooper's Coasby-designed "Yoicks" (the original was powered by a Fox 59) 36in stunt biplane. The early-type Nordec 10cc racing engine was going a good deal better than the average Nordec and sounded like it! Mike Clanford had a big "Stuntwagon" which would make an ideal model for this event powered by an Aftwood, as it combines all the vintage requirements with performance that would be as good as modern aerobatic control-liners. G. Moore, last year's winner, flew one of the original Comp. Special powered "Kandoo" flat-fish models of a similar layout to the Super Profile.

The free-flight section at Old Warden is always a bit difficult to take in, partly because of the dispersed nature of it but mainly, perhaps, because you have to spend a disproportionate amount of time, keeping a 360 degree lookout to avoid get-

ting the end of the "birch-and-silk" era, when, instead of straight "distance" flights, the advent of balsa wood enabled the weight of these oldies to be vastly reduced and consequently some of the then-experts managed to do quite long thermal flights with them. Enough to make you sign the pledge!

Another model capable of long thermal flights was the subsequent winner of the FF rubber section, Brian Yearley's "Flying Minutes". This Len Stott designed pre-war streamlined parasol-wing Wakefield had a great record in its day with many long flights and contest wins, not only in the

Nobody seems to know who invented this type of free-and-easy fun-for-the-modellers meeting – probably Ron Moulton – but it is certain that he is the one who has developed the idea to its present level where it is rapidly ousting the formal type of contest from popularity. All credit too to Mike Beach who has had the difficult task of persuading the vintage fraternity that control-line flying has been around nearly as long as free flight.

There must have been many modellers like the writer who spent most of the trip home dreaming up Old Timer projects for next year's "All Vintage" – Aug 17th 1980

AWARDS

Fireball Trophy (16 entries)
Meritorious Control Line
Meritorious Free Flight Rubber
Meritorious Free Flight Power
Most Appropriate R/C
Best R/C Workmanship
Best Novice R/C

Peter Russell
G. Moore
Brian Yearley
Colin Watt
Tony Rees
R. Brightwell
Elaine Harrison

Super Profile
Kandoo
Flying Minutes
Streamlined Cyclone
Bowden Contest
Mercury
Junior 60

Engine Test Review

with Peter Chinn

MILLS P.75

Country of Origin: UK (now made in India).

Type: Compression-ignition, 3-port with bronze bushed main bearing. Fuel tank included.

Bore: 0.330in (8.38mm).

Stroke: 0.520in (13.21mm).

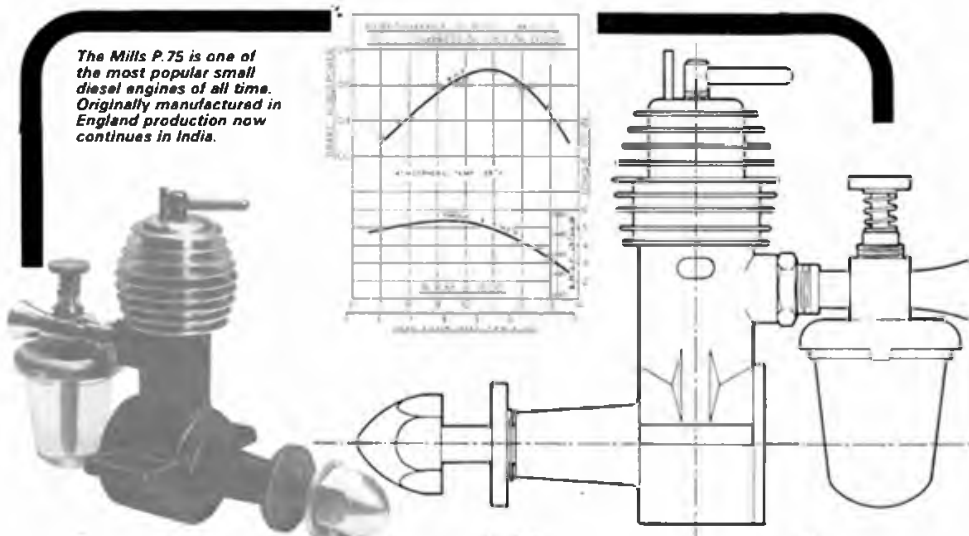
Swept Volume: 0.0445cu in (0.7288cc).

Weight: 50 grammes – 1.75 oz (UK original); 57 grammes – 2.00 oz (current Indian made model).

The Mills P.75 was originally manufactured in the UK, production beginning early in 1950 and continuing until Mills Brothers withdrew from model engine manufacture in 1964. The Mills was one of the most popular small diesels ever made and its reintroduction by an Indian company, some years ago, has been welcomed by all who remember the engine for its easy starting and docile handling qualities. There are only minor modifications to the Indian version and most users agree that it performs just as well as the original British made motor. The engine is distributed in the UK by Irvine Engines and is also available in certain other overseas markets including the USA.

Like many early diesels, the P.75 has a very long stroke and is of the simple three-port type, ie mixture is drawn into the crankcase through a third port in the rear of the cylinder which is uncovered by the bottom edge of the piston skirt as the piston approaches the top of its stroke. There is a single transfer port in the front of the cylinder and an exhaust port each side. The cylinder liner complete with contra piston is located in the main casting by

The Mills P.75 is one of the most popular small diesel engines of all time. Originally manufactured in England production now continues in India.



a flange and is secured by a machined finned aluminium jacket which screws over the upper part of the casting and carries the usual compression screw. The piston is coupled to an aluminium alloy connecting rod and the counterbalanced crankshaft runs in a bronze bushed main bearing. The engine is equipped with a bowl type free-flight fuel tank suspended beneath the machined aluminium intake venturi and needle-valve assembly and the complete unit can be rotated and locked in any position for inverted, inclined or side mounted running.

Ever since its introduction, the Mills 75 has enjoyed a reputation for being the ideal beginner's diesel. There has been quite a variation in the power outputs of

individual examples of these engines but, almost without exception, they have been very easy to handle. The power and torque curves show the performance of a typical average example as tested for *Model Aircraft* magazine, the engine reaching an output of .055 bhp at 11,000 rpm. Typical prop rpm recorded for another example included 7,200 rpm on an 8 x 3 1/2 Top Flite wood prop, 9,000 on a 7 x 4 Top Flite nylon, 9,400 on a 7 x 3 PAW wood and 10,800 on a 7 x 3 Top Flite nylon. The best choice of prop for peak performance would therefore appear to be a 7 x 3, but the engine is quite happy pulling the larger sizes where these may be preferred for a larger, slow-flying, lightweight model.

OTM KOLIBRI

Country of Origin: USSR.

Type: Compression-ignition shaft rotary valve with plain bearing. No fuel tank.

Bore: 10.5mm (0.4134in).

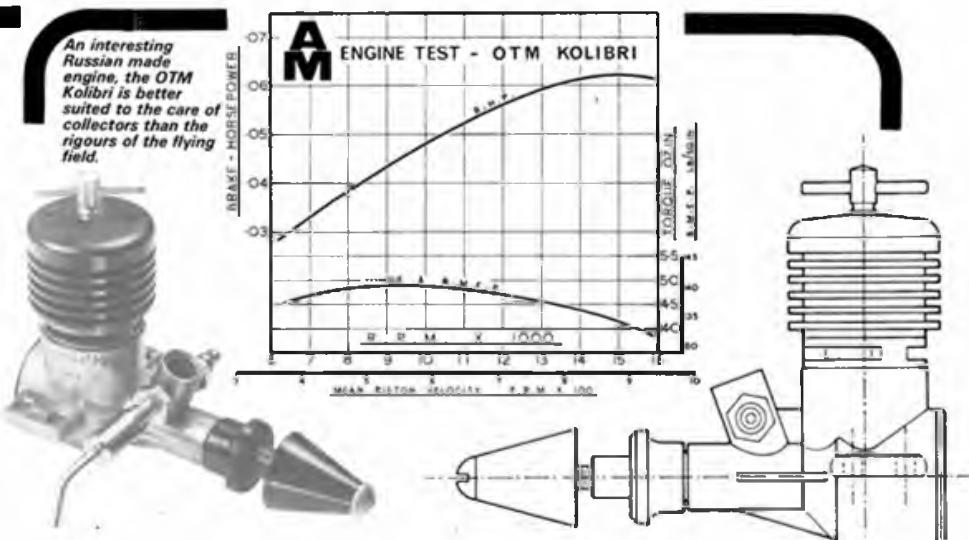
Stroke: 9.0mm (0.3543in).

Swept Volume: 0.7793cc (0.04676cu in).

Checked Weight: 45 grammes – 1.59 oz.

The Russian-made OTM Kolibri diesel is, according to the UK agents "a collector's engine". The Modeller's Den Ltd of Bristol who first began offering this engine some four years ago, advertised it as "a fascinating addition to your engine collection". Michael's Models of Finchley also currently list it – together with two other Russian made diesels – as *For Collectors Only*.

An interesting Russian made engine, the OTM Kolibri is better suited to the care of collectors than the rigours of the flying field.



Because of its origin and on the grounds of novelty, the Kolibri can claim that it deserves consideration as a collector's item, but we suspect that the vendors are also happier about the engine being allocated such a role, rather than its being exposed, as a working power unit, to comparison with western products. Our findings with the test motor certainly suggested that these little engines may, in general, fall a trifle short of the standards to which British modellers have been accustomed.

For example, although the piston diameter is 10.5mm, the gudgeon-pin on our test engine was only 9.1mm long and, after allowing for a 0.5mm chamfer on each end of the pin, only about one third of the 1.75mm thick piston skirt was being used to support the pin. The pin is a press fit in the piston but, examined at the conclusion of our tests, it was found to have loosened and was now free to float axially to the extent that, because of its chamfered ends, it was no longer properly supported at one end. This allowed the pin some vertical movement at that end, as a result, considerable wear had taken place in the small end of the connecting-rod.

Another fault concerned, not the engine, but the otherwise useful combination tool supplied with it. This, intended,

supposedly, for tightening or loosening the prop screw, cylinder jacket, backplate and cylinder, worked well enough on the first two items but, had we tried it on the cylinder, would almost certainly have burred it. Any attempt to rotate the shaft ruined both the cylinder and piston. This was due to the fact that the keyed end, intended for hooking round one of the posts dividing the radial exhaust ports, actually bore against the *inside* edge of the port and would, almost certainly, have would then have badly scored the piston.

Hopefully, these faults, originally made known in our full test reports on the engine, will have been corrected in more recent models of the Kolibri.

In general, the Kolibri is of traditional small diesel design, being a plain bearing shaft valve unit with a radially ported screw-in cylinder threaded to a simple diecast crankcase and topped by a screw-on finned jacket. It is of quite neat appearance and is also very light, for a .8cc diesel, at 1.6 oz.

Although the instruction leaflet (printed in Russian, English, French and German) quotes the normal operating speed of the Kolibri as 9,000–10,000 rpm, we found that, on test, its peak output was delivered at very much higher speed (15,000) where an output of .062 bhp was determined.

The engine was, in fact, rather happier when allowed to rev beyond 10,000 rpm. Static prop rpm recorded included 8,900 rpm on a 7 x 4 Taipan glassfibre-nylon, 10,000 on a 7 x 3 Top Flite wood, 11,400 on a 6 x 4 Tornado nylon, 11,800 on a 6 x 4 Top Flite nylon and 13,000 on a 6 x 3 Top Flite nylon.

Very small diesels are often a bit tricky to start and the Kolibri is not an engine that one would recommend to a beginner, although the experienced diesel enthusiast should not have too much difficulty. Initially our test motor suffered a fairly severe loss of power, as it warmed up from cold, but this improved as the working surfaces became bedded in and was almost entirely eliminated when the engine was propped for speeds of over 12,000 rpm.

Handling qualities were good. Starting, either by hand or with the starter spring, was very good. When starting from cold, a few moments' running were required (as with the .010) before the final needle adjustment was made for maximum performance. Warm restarts were achieved simply after sucking-in – no exhaust prime being necessary. Tests were carried out over a 12,000–26,000rpm range and the engine ran steadily at all speeds and particularly sweetly at around 20,000rpm.

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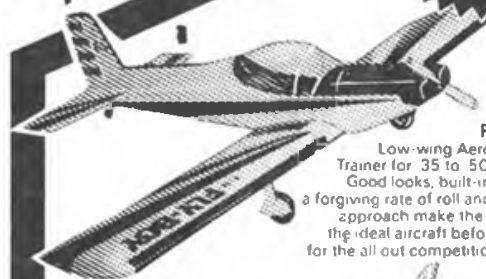


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CLUB NEWS

IN SPITE OF today's emphasis on instant flying, with commercial enterprise and modern knowhow cutting construction requirements to a bare minimum, and, in many instances to none at all, the building aspect of our hobby remains the most important. Nothing is more satisfying than the production of a model capable of flight, and however eager people may be to savour the pleasures of the flying field – particularly where radio control is concerned – those who have a continuing interest in the hobby become more and more involved with design and constructional factors. This is evident in the increasing interest in Scale modelling which calls for all the patience and resourcefulness of which the model builder is capable. Instant modelling or no instant modelling, it seems we spend just as much time at the workbench as ever we did – and a good thing too.

A lot of background building goes to make up the flying field activity we read about in **Northern Area News**. It opens with a valedictory farewell to the Model Shop in Merrion Road, Leeds; a business that has been in existence during all the change and growth of the hobby during the post-war years. It is a sad day when, through re-development or non-viability in today's commercial jungle, the model shop on the corner has to close. But flying still goes on apace. In common with the shrinking of our flying fields comes the diminution of our normal free flight meetings. Typical is the Micro-Mini meeting held at Heath Common on August 12th. It was graced with the title of International in deference to the involvement of two holidaying visitors from Toronto.

Next we have a report from Squadron Leader George Foster of the **RAFMAA**, on the Combined Royal Navy and Royal Air Force MAA Championship. It was held at RNAS Yeovilton on 21/22 July. Weather was a bit rough on the Saturday, but calmed off on the Sunday to give a pleasant day's flying. The contest schedule was complicated by the large number of full size aircraft movements on this operational drome, but, even so, sufficient flexibility was introduced to run all the events with the exception of Free Flight Scramble, although the strong winds did depress model flying activity on the Saturday. Overall, entries were up on last year and competition in the various events was very keen. Control line was a focus of interest, with a Scale event introduced this year. The turbulent air gave trouble but the 'A' Rat Race was hotly contested, and looks to be a popular event for the future. A barbeque on Saturday evening brought radio, free flight and control line enthusiasts together in common modelling gossip. The prizes were presented by Rear Admiral Anson, Flag Officer Naval Air Command.

Cosmo members at recent club evening show strong Control Line interest together with healthy junior section.





Group of Free Flight modellers at this year's RAFMAA Championships held at Yeovilton.

The newsletter of the **Cosmo MAC** goes under the name of 'Cosmutterings', but the club can be forgiven that as it harbours amongst its members the Team Race duo of Ron and Mick Tribe who have currently gained a team place for Europe. A well deserved opportunity. Not that Ron and Mick are the only C/L luminaries in the club; in Stunt Keith King and Rob Etherton have been keeping the club flag flying high in National contests. While up and coming, if he hasn't already got there, is the terror of the Combat areas, Adam Willis, age nine. In keeping with Adam being the first man, or boy, he came first in 1/2A Combat at the 1st Elliotts Gala. But the seniors were far from humbled, as in 1/2A they were the last nine when bad light stopped play. The final round, held a week later in Danson Park, resulted in a win for Adam's father, Dave. A splendid family effort. Cosmo also means demo, for they have held a number of displays throughout the year, with Pete Hackwood providing a very professional commentating service. Another member is engaged in making a film of club activities, interspersed with shots of full size aircraft. Something for the club to look forward to in the Winter. Now almost upon us. *Sec: H. Jones, 173 Wessex Drive, Erith, Kent.*

G. W. Wishart is the Secretary of a new club being formed in that land of oil and ponies, the **Shetland Isles**. No name available, but it is designed to cover all modelling interests, boats, trains and planes. If you live in those far away regions you can contact *Mr Wishart at Arisdale, Gulberwich, Shetland ZE2 9JX.*

One of the lesser rewards of being a columnist is that you can't half put your foot in it. According to Ray Favre, Chairman of the SMAE, I have dipped my size twelve into a rather deep hole in suggesting that friends and families were not admitted to certain airfields. Seemingly, they are only too welcome; so, if you are an old innocent like me who takes things at their face value, do not be put off by any notice to the effect that "In order to comply with requirements for any model flying meeting held on an MoD airfield, ONLY SMAE members will be admitted". It seems that your granny will be as welcome as you are, providing she accompanies you, an accredited airfield user.

Pushing my hoof into even greater depths I ventured the opinion that the restricted entry (which isn't) was for insurance as well as security reasons. Apparently this is not so; the special airfield indemnity does not provide any general hindrance to spectators on MoD land, though what recourse a spectator would have in the event of damage to his person or property (his car) we do not know.

Let us hope this clears the matter up, and that, in future, official caveats are couched in precise terms.

Away from controversy, then, to club affairs. Or are we away from controversy? The report sent in by Mike Cook, gives reasons for the forming of the **North Yorks Free Flight Group**. The Group, which was set up during the winter of 1978/9, is, in effect, the free flight section of the original York Club. Mike refers to the recent expansion of radio flying in the club over the past four years, smothering the free fliers and raising subscription fees to Radio

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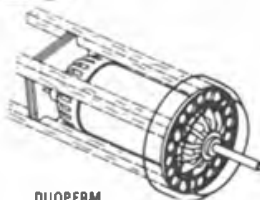
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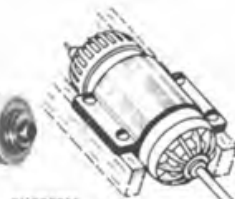
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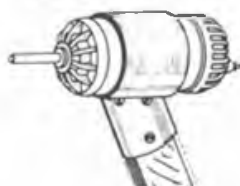
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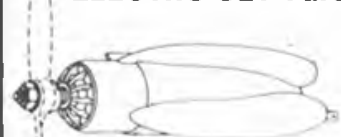


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FROM ALL RIPMAX STOCKISTS

requirements. Nor has the first year of the Group's existence been a notably happy one, for they have lost two first class airfields: Elvington and Rufforth (for reasons already widely circulated), leaving only Dreadful Driffild and the very limited use of Church Fenton. The only success the members have had this season is that of Nick Walton's win in Open Glider at the Vintage and Pannet meeting which, Mike says, contrary to reports issued, was a complete washout. Some consolation though, in Mike's chuck glider win at the Northern Area Rally. He concludes by asking anyone daft enough to want to join the somewhat depressed group to contact Secretary, Doug Bartle, through Mike at 88 Northgate, Cottingham, E. Yorks.

Gloom, too, over Wymeswold, according to the **Leicester MAC** newsletter. The concessional licence is coming up shorter and shorter in time. Reduced now to three months, the future beyond the end of September is uncertain. It is a case of living from hand to mouth. Other airfield users are similarly affected, if that's any consolation. Not all that much enlightenment either from the saga of Gerry Ferer and company in the wilds of Everleigh in search of the Nationals. Bravely they made camp in an area of rough grass and hutments, but then, without invitation, visitors started to drop in - from the skies. Fearing the two Hercules might start dropping tanks they hurriedly lowered the tent and spent the night in the car! Sec: P. Toyne, 1 Sherrard Drive, Sileby, Loughborough, Leics. LE12 7SG.

More of those fit and determined people who fly F/F models make up the **Maidstone Free Flight Group**, whose newsletter is to hand. They keep on terrain-ing in the gorse and gulleys of Ashdown Forest, where, too, they appear to conduct a peculiar courting ritual, in which the ardent swain does not pursue the dimpling damsel, but allows the blushing maiden to pursue his models over hump and hillock. Clever stuff, particularly as in the case mentioned, the bride-to-be was a PE teacher, as nimble as she was nubile. Much of the newsletter is taken up with encouraging

CAPTION CONTEST



members to have a go at rubber powered flying. The major problem is making up that tricky folding prop assembly. Recommended is the one on Dave Hipperson's 'Artoo' Coupe, published in the March 1978 issue of this journal. An alternative is to opt out of the prop complications by building a P.30 plastic prop job. *Sec: Dr R. Dines, 50 Tuscan Drive, Walderslade, Chatham, Kent.*

The newsletter of the **Timperley & DMFC** appears to indicate much intensive club activity, particularly in club events. For instance, the Coupe D'Hiver contest held at Tatton Park on July 29th had no less than 8 entries, even though the moderate breeze kept flight times on the low side. There were five entries, too, for the Vintage Event, also at Tatton Park on September 2nd in the Club Vintage contest. Oldest model design was a Tulsa Stick of 1936. Again a stiff breeze kept flight times on the low side. An odd reversal of fortune noted in the newsletter. Notwithstanding numerous o.o.s. flights not one free flight model has been lost this year, but Mike Ducker got his Radio Glider tangled up in a large lump of lift. Diving out the tail blew off and the glider disappeared into the blue. A very full event calendar for Autumn and Winter covering Thermal Soaring and free flight. It is hoped for good club representation at Bob Wells' pre-53 Wakefield event at Watton in October. Two 1936 designs, the Judge Wakefield winner and a Copland, have already appeared, along with several other interesting oldies.

The big news in 'Nitro', the newsletter of the **Belfast MFC**, was of the long, over-water trek to the Nationals at Barkston Heath. C/L is the main club interest, and this experience was put to good effect with some excellent flying in the Gold Stunt Trophy. Even more effective in Goodyear Novice in which Maurice Doyle (Pilot) and Robin Kane (Pitman/Builder) comfortably won the two up final.

Why not let us have a look at your newsletter, or better still send us a report.

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OCTOBER WINNER – M. BLASSE, NETHERLANDS

Runners up from the October Caption Challenge were Mrs Sue Catlow, Leicestershire "LOOK, I'M NOT SURE ABOUT THIS. IT'S USUALLY BOATS THAT TOW WATER SKIERS". R. Wilson from Stockport says "YOU SHOULD SEE THE BOX IT CAME IN!" and K. Grimward of Amersham confides "YES, AFTER HIS OPERATION HE WENT RIGHT OFF PEANUT SCALE". John Bray from County Durham tells us "IT COSTS ME A FORTUNE IN CONTROL LINES". While Geoff Spencer, Tipton, West Midlands, thinks "HE'S TAKING A CHANCE FLYING THAT WITHOUT A SECOND VOUGHT". Finally on a more topical note J. Baghurst from Corby suggests "I GUESS JIMMY DIDN'T READ THE SMALL PRINT ON S.A.L.T."

The photo originally appeared in Hangar Doors in October 1957 and as you will have guessed is the product of a little extra work in the art department who converted the F7U-4 to U-control.

If you would care to join this month's contest and try winning a year's subscription to *Aeromodeller*, send your caption to *Aeromodeller*, P.O. Box 35, Bridge Street, Hemel Hempstead, Herts HP1 1EE. Results February issue.



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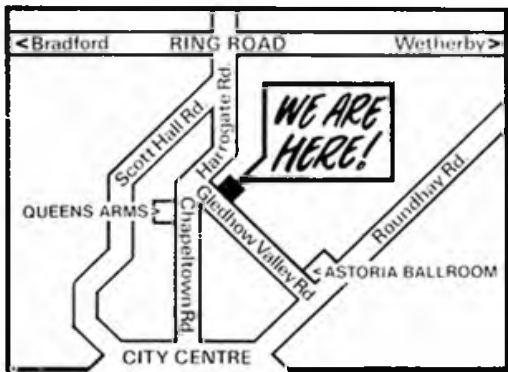
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