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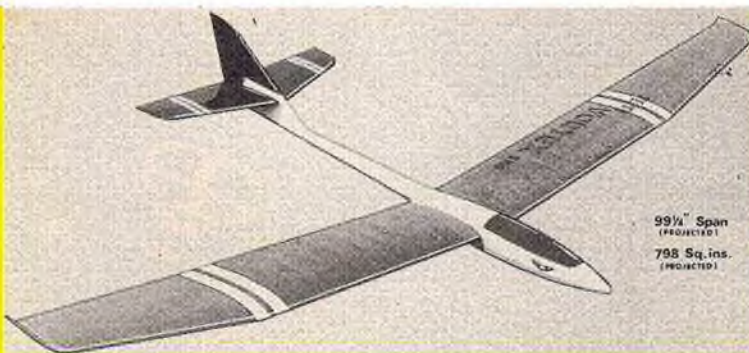
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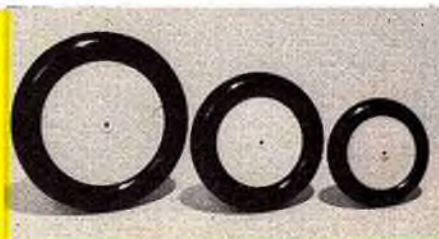
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Comment

WEMBLEY CONFERENCE CENTRE is again the venue for our Model Engineer Exhibition which reaches a real milestone this coming January with the 50th in the series. Lord Gretton, who has had a long association with the model engineering movement in this country will open the Exhibition on January 1st.

Entry lists in the model aircraft competition classes are longer than at any time in recent years so that aeromodellers may

look forward to a really interesting show of model aircraft.

Once again 'live' activities will include electric RTP flying, with extended facilities this year to permit extra days of flying to alternate with R/C car activities. Full details of the RTP flying programme will shortly be available through our Exhibitions Department and RTP flyers intending to take advantage of our 'open-house' flying sessions can help us enormously by notifying the days on which they will attend, during the January 1st-10th exhibition period which *excludes Sunday 4th*.

Modellers intending to travel to the Exhibition by rail should check the favourable rates advertised on Page 594 of November issue.

**AEROMODELLER STAFF
WISH ALL OUR
READERS A
MERRY CHRISTMAS
AND ALL THE VERY BEST
IN MODEL FLYING FOR
THE NEW YEAR**

Contents

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Volume XLV No 539

- 654 HANGAR DOORS
- 655 LETTERS
- 655 WHAT'S ON
- 656 A REVIVAL OF UNLIMITED FUN
Control line wing design
- 659 AIRCRAFT DESCRIBED — Zlin 50L
- 663 CARRIER DECK FLYING
Part 1 by the late Stan Perry
- 666 AERO ACES
- 668 MOJO — rubber power free-flight
- 669 SIEBEL Si201 — profile scale
free-flight

- 670 SCALE MATTERS — Flying Aces
Nationals
- 672 LATEST ENGINE NEWS
- 674 FROM THE HANDLE — Control-line
racing and combat news
- 677 TOPICAL TWISTS
- 678 R/C SPORT FLYER
- 681 FREE-FLIGHT SCENE — European
Championships
- 684 CLUB NEWS
- 685 CAPTION CONTEST

On the Cover

Alan Fritz of Three Kings with his K&B 40S powered Falrey Barracuda and Alan Church of Witham (Meteor 40 powered Douglas Dauntless) at the Nets Carrier Deck event, plus the incredibly ageless 'Unlimited', the practically unbreakable control-liner of the '60's revived by John Stroud, and the sleek Zlin 50L now drawn impeccably by Pat Lloyd in this issue.

Next Month

We conclude Stan Perry's feature on control-line carrier deck flying and publish plans for a free flight scale model of the Messerschmitt Bf109E.



Page 659



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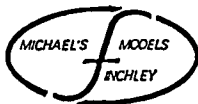
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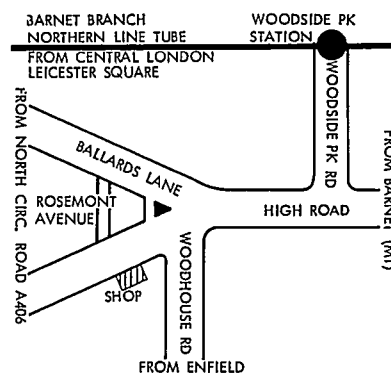
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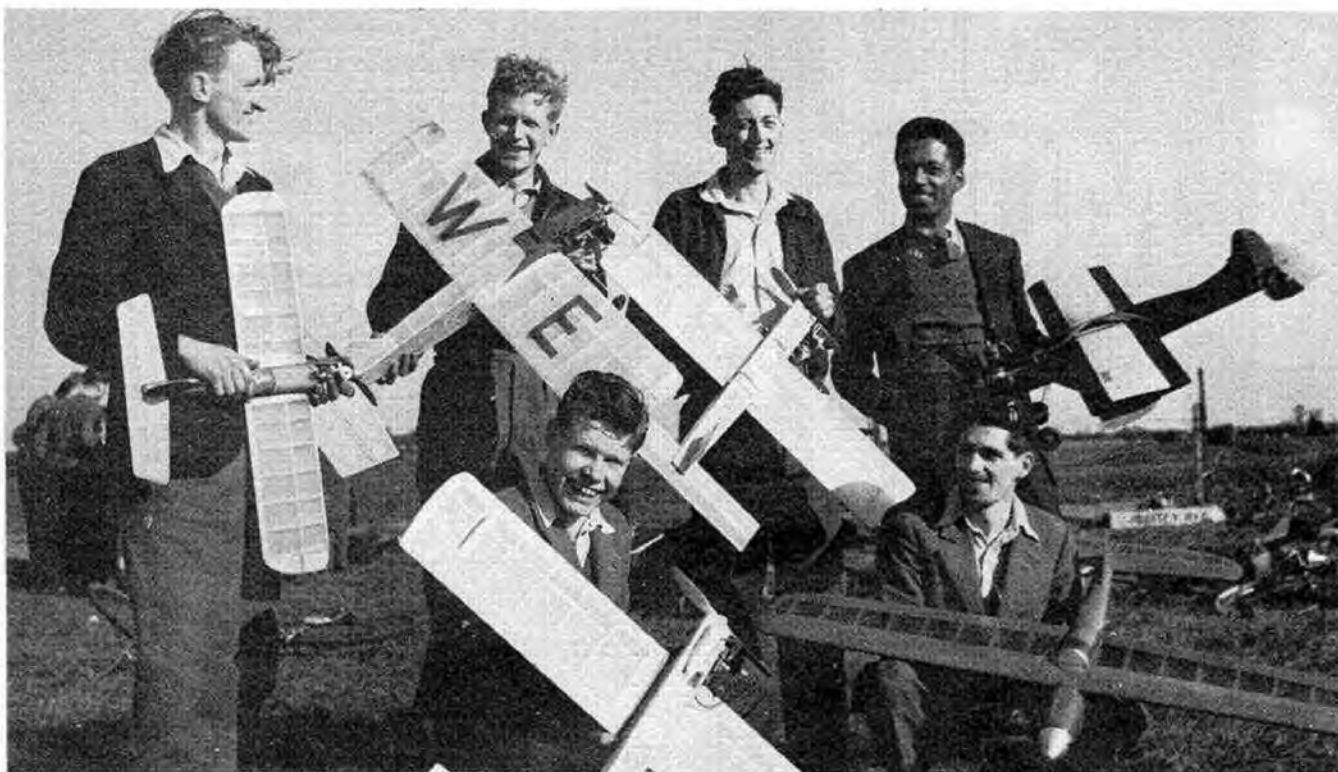
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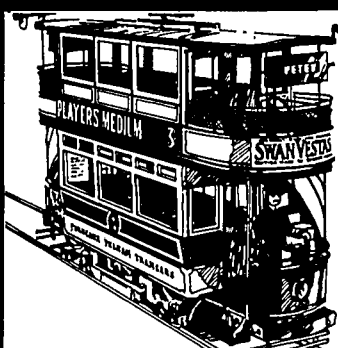
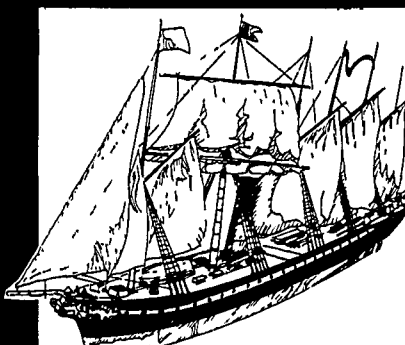
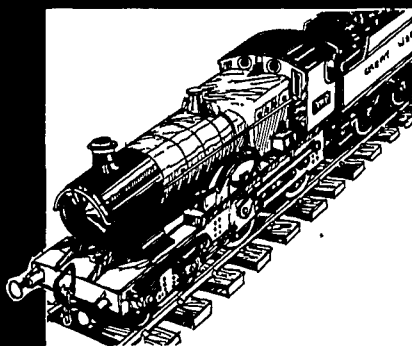
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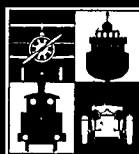
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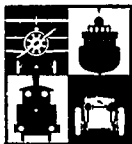
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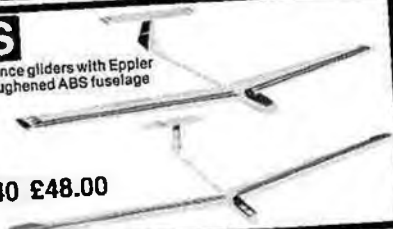
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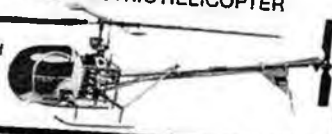


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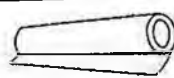
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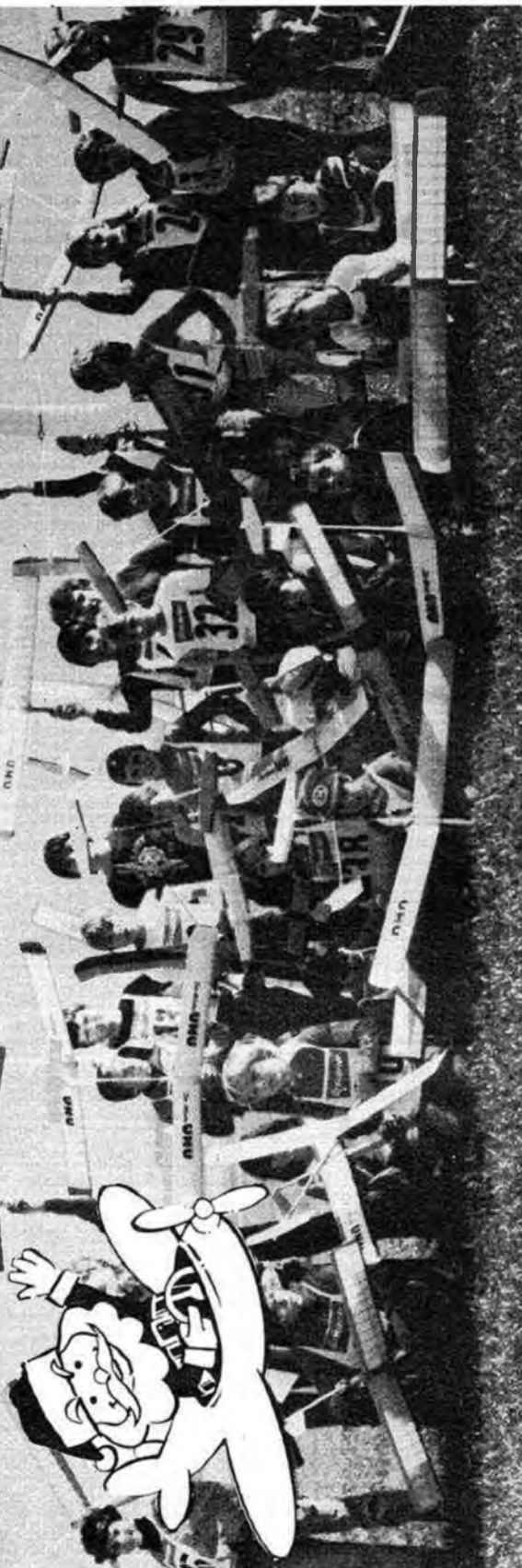
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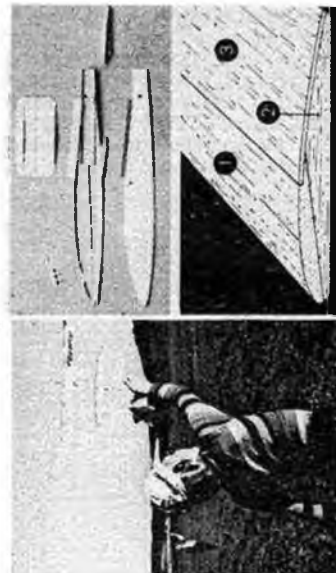
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The 33½" span **PENNY**, for example (bottom left), features injection-moulded fuselage shells and wing mount; easy-to-assemble Jedelsky contest-type wing; and latest T-tail configuration. All parts preshaped and the kit (price £7.25) even includes adhesives and rubber bands. And on top of that, its performance as a towline glider is terrific! Other *Graupner Gliders* are shown opposite.



UHU Mark III span 48"
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Another outstanding prefabricated kit with plastic fuselage shells and other parts, die-cut balsa ribs, etc. and complete with shaped wire parts for auto-rudder and D/T.



PILOT span 43"
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A simple-to-build model which conforms to A1 contest specification. Extensively prefabricated again and the model incorporates a dehermaliser — with its super soaring performance, it needs one!



JUNIOR A1 class 53" span
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Preshaped parts throughout, including easy-to-assemble profiled high aspect ratio balsa wing with tubulator for added lift. Fly it against the PILOT, NANCY or 45" span JOLLY (not illustrated). A1 class plus dehermaliser £10.75



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A compact, easily built soarer and aerobatic glider specially designed for rudder and elevator control with low-cost 2-channel radio. Makes a super 'trainer'.



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A classic Continental design with built-up wing and tail and featuring auto-rudder and dehermaliser. Kit includes milled and slotted fuselage nose, stripwood, die-cut parts, etc.



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GRAUPNER kits are distributed by RIPMAX. There are many more models in the range. So see them all at your local model shop.

Hangar Doors

Right: want to make a boomerang? December edition of "MODEL MAKER" has all the information.

SMAE AGM and Prizegiving

SMAE members gather for their Annual General Meeting (2pm) and subsequent Dinner/Dance/Prizegiving at 8.00pm at the Post House, Leicester, on November 22. If it's your scene and you have not received notice — apply for tickets to the shindig from the Secretary, SMAE, Kimberley House, Vaughan Way, Leicester.

US Nationals facts

Statistics from the US Nats held at Dayton, Wilmington, Cincinnati, Wright Field and other parts of Ohio, make interesting comparisons of entry statistics. Of the total of almost 1,400 participants, almost half (543) were in the Radio Control events, 327 in Control Line and 395 in Free Flight. Best supported contests were 1/2A Gas (142), A Gas (138), Chuck Glider (107) C/L Aerobatics (91) and B Gas (89) whilst at the opposite end, the least attractive were Precision R/C Scale (5), Jet Speed (6) and three helicopter contests with seven in each. This proportion is practically identical with British trends — except that we decline the pleasures of jet speed. It confirms the free flight habit of taking models for several classes whilst R/C'ers concentrate on just one entry per person. There were nine Indoor classes, 21 in C/L and 18 each in free flight and radio control. Two contests which had enviable support were Peanut Scale (46) and Profile Carrier (50) and for all the 'impressive' facts in superb reporting, try columnists in AMA's Model Aviation. The new "Giant" R/C Scale contest was won by Dick Graham's 9ft. Piper Pawnee which genuinely cropped at scale speed, weighing 20 3/4 lbs (1), just two points ahead of Howard Mottin's 8ft. 2ins. Spinks Akro at a mere 19 1/2 lbs — and they weren't the heaviest either. A 1/4 scale Waco HKS-7 by Norm Rosenstock with Hustler engine scaled 32lbs!

A rule book error which allowed braced wing so-called Easy B models to mix with the tissue covered relatively simple designs, will lead to revisions for the next

time. Top time was 16:44 by Earl Van Garder with his tissue model to the old rules which must prove something!

R/C frequencies

Radio frequency recommendations from the SMAE and Model Hobby Trade Federation will be for 10Kcs spacing on 35MHz following the National Poll for consumer opinion. It remains to be seen if the protracted negotiations approve 35MHz to this high standard. Meanwhile in the USA, 50 channels at 20Kcs spacing in the 72-76 MHz bands are proposed by the AMA for aircraft use in a ten year plan which recommends that present 72 MHz equipment be phased out. There are four spots for aircraft and three for cars/boats on 72 MHz now, plus other frequencies, for example 27 MHz which will remain unaltered. Sounds like the crystal business is in for a boom.

Rotorcraft competition

The Royal Aeronautical Society Rotorcraft Section has announced details of their 1982 competition for Rotorcraft (Helicopter) duration. The aim of the contest is to produce a remotely controlled (model) rotorcraft capable of sustaining controlled flight over a 10m x 10m sq for maximum duration. The only restrictive specification is that the rotorcraft must not exceed a maximum take-off weight with fuel of 5 kgs. At present the world record for model helicopters stands at three hours, 35 minutes and six seconds. Officials of the R. Ae. S. Rotorcraft Committee believe that with research, this record could be trebled maybe even quadrupled.

Backed by full size helicopter manufacturers, operators and the aircraft industry the Mini Rotorcraft Competition carries a first prize of £1,000 for the longest flight duration plus a secondary prize of £500 to the Rotorcraft judged to show the greatest ingenuity. The object of the exercise is clearly to evolve new techniques in model helicopter design leading to greater

efficiency of rotors, controls and engine management. There are no restrictions on the use of commercial equipment but it is obvious that a serious contender will have to apply considerable thought and research into rotor blade design, power/weight ratios and fuel consumption in order to achieve competitive success.

Who knows? The winner may well produce an extraordinary new development with subsequent industrial applications? For competition regulations, entry form and details send to the Secretary, (Mini Rotorcraft Competition), The Royal Aeronautical Society, 4 Hamilton Place, London W1V 0BQ.

Junior fun

One highlight of the British Nats at Barkston Heath was the hangar where film shows took place during the evenings and indoor model flying during the day. David Rawlins of DPR Models set up a Junior Workshop for youngsters to build and fly simple models. Over the weekend David reports that he accumulated in excess of 300 entries in the Fly-for-Fun competitions with enormous enthusiasm from the young participants. Seats around the building tables in the Junior Workshop were occupied all day long and kept David so busy it wasn't until the closing hours of the Nats that he was able to emerge and see daylight. Good show — keep them at it!

Results

Saturday: Glide with 'Gloy' 1st David Sweetland, 2nd Neil Mannall, 3rd Ewing Galloway.
Sleak Streak Scramble 1st Carl Hiffle, 2nd Richard Waddington, 3rd Gary Church.
Sunday: Glide with 'Gloy' 1st Richard Illingworth, 2nd Peter Edkins, 3rd Alistair Bridden.
Sleak Streak Scramble 1st Elizabeth Bibby, 2nd Adam Whitlock, 3rd Tim Frankham.
Monday: Glide with 'Gloy' 1st Martin Moorhouse, 2nd Andrew Read, 3rd Alistair McKensie.
Sleak Streak Scramble 1st Richard Waddington, 2nd Nicholas Dudley, 3rd Mark Stanton.
Cassna 180 and Racer — Rubber Duration 1st David Sweetland, 2nd John Ashcroft, 3rd Matthew Knott.

Below: junior aeromodelling fun with DPR Models at the Brean Sands Model Makers' Festival during October. Many of the youngsters taking part each day had never before even held a balsa knife! Below centre: Karl Williams, Junior winner of the 'Glide with Gloy' Trophy at Brean Sands Model Makers' Festival using DPR Models "Chuckie". Below right: Christopher Salmon won "Cassna 180 and Racer Rubber Duration" Trophy at Brean Sands.





A repeat of this Junior Workshop theme followed at the model maker's festival at Brean Sands through October from where Dave reports enormous success. Many youngsters took part in his daily building sessions and flew their models in contests arranged indoors in the huge ballroom or outdoors according to the model type. The long list of winners which Dave provided for us is too much to publish here but all who participated are sure to remember the fun

they had with such simple models. Dave discovered when talking to the majority of these junior builders that they had never handled balsa wood for flying models ever before despite having experience of building plastic kits. This situation is becoming increasingly difficult but it should serve as a warning to the model trade in general, especially retailers that they should never forget the young newcomers if aeromodelling is to survive.

Another significant statistic is that the Brean Sands Holiday Week produced as many girl modellers as boys! Another good sign for the future? Dave's stand at the forthcoming Model Engineer Exhibition, Wembley Conference Centre, next January will have some of the entries in their Junior Drawing Competition on display. This is another encouraging aspect of DPR activities.

'MODEL MAKER' Boomerang feature

When you think about it the Boomerang must be the earliest purpose made flying machine produced by man — and by very primitive man at that!

The flying qualities of this device have always held a certain fascination and a real challenge too. December edition of 'MODEL MAKER' magazine carries the

other ones like rifle shooting, scuba diving and motocross.

The one vital ingredient present in Eastern bloc model flying is an aim — some sort of competitive structure, with various performance standards to achieve and excel, and a resulting genuine regard for model flyers' successes, records and standing in the world, and the government and industrial backing to enable any model flyer to aspire to compete successfully at international level. This results in the miracle ingredient, enthusiasm, rather than the rather passive, 'pastime' kind of attitude we have from many dabblers here in Britain; unless we do a major 'Operation Bootstraps' and pay more attention to our own standing in the community, things will only get worse.

As an instance, the recent European Free-Flight Championships in Yugoslavia were sponsored by the country's leading aviation concern, SOKO-Mostar, the local town council and the National Aero Club; the opening speeches left no doubt that the skills involved in the design, construction and flying of high-performance model aircraft are regarded as an important national asset and are encouraged at a high level.

West Wickham, Kent

Martin Dilly.

means to meet and master that Challenge with a full how-to feature for making and operation of a Boomerang, with construction plans.

The December edition actually features no less than eight projects to build including a major work on a simple steam powered beam engine and the Model Maker 'Searcher' electronic detecting device.

It's a fascinating modelling mixture, on sale November 4, price 55p.

RTP at the ME Exhibition

Few readers can have failed to notice the bold advertising campaign for the 50th Model Engineering Exhibition to be held from January 1-10, 1981 at the Wembley Conference Centre. Many will have been regular visitors over the years and we trust will remember their 'conditioning' and attend yet again.

Last year's organisers MAP Ltd., hired the central auditorium for three days of RTP flying interspersed with R/C electric car demonstrations. This year three extra days of RTP activity can be enjoyed. January 5-10 inclusive, sharing the time with R/C cars throughout. If you are interested in bringing a model to fly at the ME you will be most welcome.

Martin's comments concerning the state of aeromodelling in Communist Eastern European countries is the result of first hand observation. For a long time now in these countries, all sports have enjoyed a status quite different from that of Western countries and in particular United Kingdom. In the Eastern bloc, sporting achievement carries far more "status".

Whether the force feeding of the competitive element in aeromodelling is a desirable thing is debatable — the essential element must surely be enjoyment.

However the most fundamental point in Martin's letter must surely be the apparent appreciation in Eastern Bloc countries of the instructional and skill-developing value of the aeromodelling hobby.

When a nation has more than two million unemployed but still, according to leaders of industry, cannot fill skilled vacancies, then Martin's comment concerning the encouragement of youth interest in technology through aeromodelling is surely a very valid point.



A matter of priorities

Dear Sir,

An item in the November Club News wonders how the East Bloc countries manage to produce such excellent model flyers when it seems so hard to obtain even a stick of balsa there; having spent some time with model flyers in Hungary, Czechoslovakia and Yugoslavia, perhaps I can shed some light on the apparent mystery.

First, it is not necessary to have a huge range of materials and sophisticated and almost finished equipment in order to become a good model flyer. In fact there is plenty of evidence that skills are developed more readily when aircraft are built from basic materials, rather than bought ready-to-use in an expensive package as a result of heavy advertising.

What is available in Eastern Europe is expert help with the basics of structural design, aerodynamics and principles in the various disciplines of model flying. Further, the three major disciplines of free-flight, control-line and radio control, are not regarded as some sort of ascending sequence through which to progress, but as equally challenging branches of a sport in which one's ultimate aim is a high place in our own equivalent of the Olympics, the various World Model Flying Championships.

The model magazines in most Eastern bloc countries regularly carry articles on aerodynamics, written by professionals, with airfoil lift/drag polars, and extensive and useful design data, flying techniques, extensive contest results and reports, and a far deeper coverage of principles and development (an eight part series in the Czech magazine Modelar, for instance, on the mechanics and aerodynamics of R/C helicopter rotor systems). Of course, not having to consider advertisers before using copy may help, but having well-planned beginners' kits in almost every toy shop (and contests for them, too), helps more, even with hairy hardwood in them instead of the die cut balsa and ABS shells that we find in kits here.

But the almost total absence of any planned teaching, either in schools or via clubs, whether government-supported or otherwise, is what keeps us so backward in Britain; in the East bloc model flying is seen in at least three ways — as an aviation sport in its own right, with the same international prestige as parachuting or gliding, as a vital encouragement of youth interest in technology, the real physical world and in cause-and-effect thinking, and as an activity with useful military spin-off, along with

What's Happening?

EVENTS

November 23, 1980

NA INDOOR MEETING EZB, IHLG, SCALE. 11am-6pm. Venue: Colne Valley Leisure Centre, Slaithwaite, Nr. Huddersfield. Contact: Bernard Hunt, Tel: Huddersfield 862353.

CONTESTS

STOP PRESS - NEW VENUE

December 7, 1980

AEROMODELLER COUPLED 'HIVER INTERNATIONAL 80gm Aeromodeller Cup - 100gm Bernard Bouillier Trophy. Plus substantial prizes donated by Model Hobby Trade. Venue: Shuttleworth Airfield, Old Warden, Beds. Contact: Aeromodeller Office, Tel: 0442 41221 ext. 283.

NEW ANNOUNCEMENTS

December 21, 1980

NE AREA SMAE INDOOR MEETING EZB, IHLG, SCALE. 10am-3pm. Venue: Spennymoor Recreation Centre. Contact: Jeff Anderson, Tel: Stokesley 711200.

January 11, 1981

NA INDOOR MEETING EZB, IHLG, SCALE. 11am-6pm. Venue: Colne Valley Leisure Centre, Slaithwaite, Nr. Huddersfield. Contact: Bernard Hunt, Tel: Huddersfield 862353.

February 1, 1981

NE AREA SMAE INDOOR MEETING EZB, IHLG, SCALE. 10am-3pm. Venue: Spennymoor Recreation Centre. Contact: Jeff Anderson, Tel: Stokesley 711200.

February 8, 1981

SOUTH EAST AREA INDOOR MEETING, EZB, HLG, PEANUT, CO² OPEN SCALE RUBBER. Venue: Crawley Leisure Centre. 12.00-6.00pm. Contact: J. Dolding, 22 Loxwood Walk, Ifield, Crawley, Sussex RH11 0HY.

February 15, 1981

GRANTHAM & DIST MAS SCALE RTP CONTEST. Venue: Smeley's Canteen, Spalding. Contact: Gerry Gibbons, 11 Apeldorn Gdns., Spalding, SA.

March 1, 1981

NA INDOOR MEETING EZB, IHLG, SCALE. 1pm-7pm. Venue: Colne Valley Leisure Centre, Slaithwaite, Nr. Huddersfield. Contact: Bernard Hunt, Tel: Huddersfield 862353.

May 17, 1981

RAFMAA DUCTED FAN FLY-IN R/C, C/L and F/F, SCALE AND NON SCALE. No entry fee, spectators welcome. Venue:

Contact: G. E. Whitehead, Officers' Mess, RAF Upwood, Huntingdon, Cambs. Tel: Ramsey 812082 Ext. 242.



John Stroud presents a revival of **UNLIMITED** Fun

First published 30
years ago, this
simple, low cost,
easily flyable model
is as relevant today
as it was then!

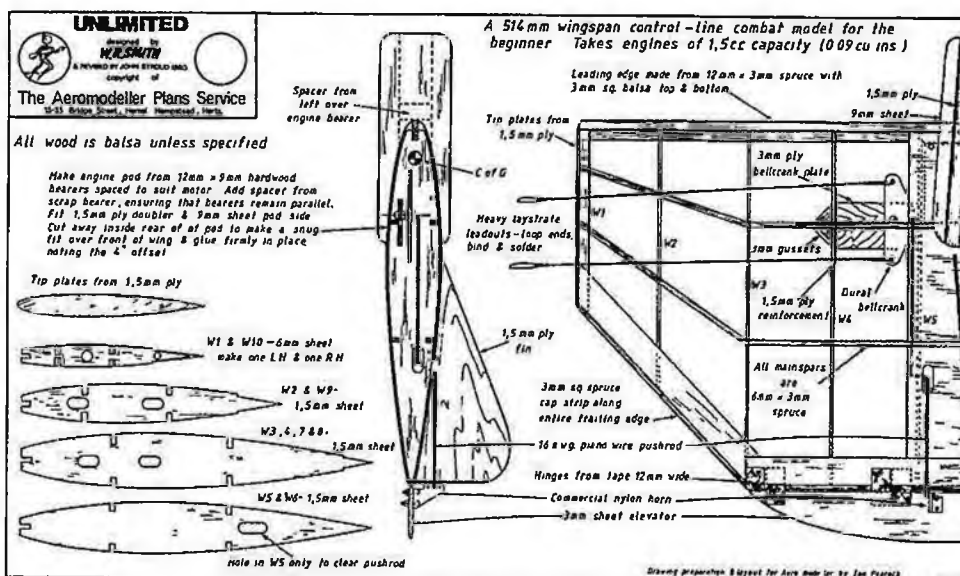
A Revival of Unlimited fun

When writing the "Flying Start" series, I had the help of a number of young lads who live in my village. They helped to remind me of the problems I had, trying to learn to fly control line just over 30 years ago. Modern modellers make progress now much faster and it rather surprised me how quickly they were ready to start aerobatics. Tough Nut was my answer in order to start aerobatics using the Davies Charlton engines. Because their models were a bit heavy and not too well made, I could see they were disappointed in the performance. The trusty old DCs could drag them round wing-overs and loops although anything else was out of the question - but at least they survived for quite a long time.

Activities then went into an unfortunate and rather expensive phase. Firstly, some 2½cc combat wings were tried. Slightly overweight, clapped out second hand engines, rearward C of Gs and not too well made. Unintentional loops out of the hand were commonplace and these models proved almost impossible to fly in inexperienced hands. Gloom. A new PAW 2½cc was obtained and a model was made with a proper tailplane. Smiles. Fast, easy to fly and fairly manoeuvrable. However the first real accident wrote it off. I decided to sit down and think this age old problem through again. What we needed was a combat wing which will survive, is not difficult to fly and does not need an expensive motor. Thinking back 30 years, what did I get through this phase with? An Unlimited fitted with an Elfin 1.8. I remember it being an absolute revelation after dozens of fruitless experiments with a MkII Frog 100. I am fairly certain it was the designer, W. R. Smith, who first let me fly his at Eaton Bray. Later I also built an enlarged one for the 3.5cc Amco when stationed at RAF Yatesbury. It was very impressive but plagued by tank trouble.

IN MY OPINION *UNLIMITED* is a classic and fully deserves all the fond memories us oldies have of it's pleasures. It must have been the making of a whole generation of control line stunt pilots. Bearing in mind the modest power of our engines then, it was exactly right. Aspect ratio very low (about 2:1) for strength, lightweight structure and a thick section to help low speed flying characteristics. Working on the principle that re-inventing the wheel is a waste of time, I sent off to APS for the plan and tried (unsuccessfully) to find out the power output of the Elfin 1.8. My first temptatton

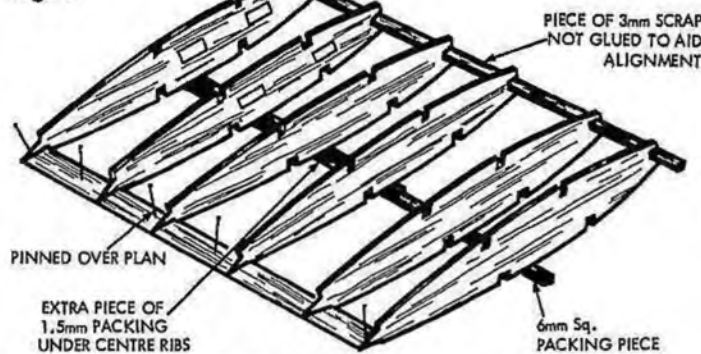
was to fit a nice OS Max 15 I had doing nothing at the final. It is light enough and would certainly be exciting to fly but I decided it would be too much of a handful for my pupils. In the end I went out and bought the new 1.49 PAW with the Schnuerle type porting and it has proved an ideal motor. On an 8x4 it's not too much for my pupils and I get a kick out of it on smaller props. However the latter was not the object of the exercise and my pupils are still a bit intimidated by it if I let them fly it on a 7x4. Martyn Cowley told me he flew one for ages with a good Frog 100 installed which



Full size copies of the plan, reproduced here to ½ scale are available as Plan CL/369, price £1.70 plus 35p postage and packing, overseas readers may obtain copies from their local agents, full details of which can be found on page 638 of November Issue, or from Plans Service, PO Box 35, Bridge Street, Hemel Hempstead, Herts., HP1 1EE.



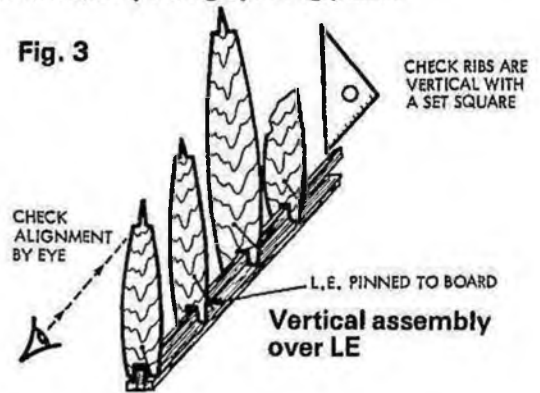
Fig. 1



Flat assembly onto trailing edge

Flat assembly using spacing pillars

Fig. 3



Vertical assembly over LE

must prove the power requirements are modest!

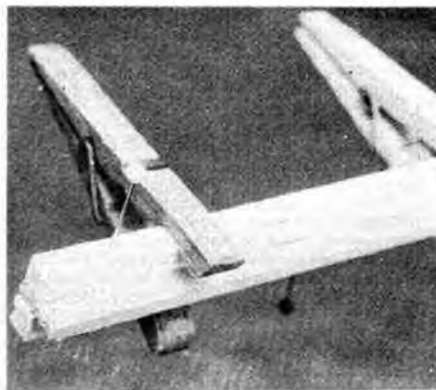
Before the plan arrived I decided I would make as few changes as possible and definitely leave the aerodynamics strictly alone to preserve the lower speed flying characteristics. Some features of the old plan came as quite a shock. What an oddly shaped little tank! What trouble we went to to save weight! $\frac{1}{16}$ " sheet balsa elevator! $\frac{1}{32}$ sheet tips! Power 1.5cc to 3.5cc and was the wing really $1\frac{1}{2}$ " thick? Keeping my firm resolve in mind I made the following changes. Because engines now use more fuel I enlarged the size of the tank. The larger tank got in the way of the bellcrank so that was moved to the next inboard bay. I decided to put in a tip weight although the plan shows none. The fuselage and fin were removed and replaced by a conventional pod (the fin was later put back to improve overhead line tension). Finally structural changes were made to increase strength as there is not the need to keep the weight quite so low with more powerful

engines.

Due to the deep symmetrical section and the way the wing thickness decreases towards the tips, *Unlimited* cannot be built pinned flat to the building board. There are three fairly common ways of overcoming this and I offer all three for you to choose from. Unless otherwise stated the balsa to be used is medium hard and suitable adhesives are PVA and balsa cement.

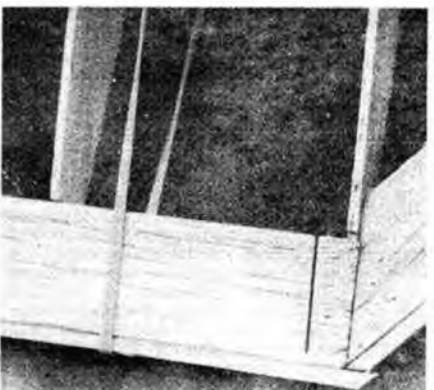
Method 1

Cut out all the ribs as shown on the plan and glue on the little vertical strengthening pieces.

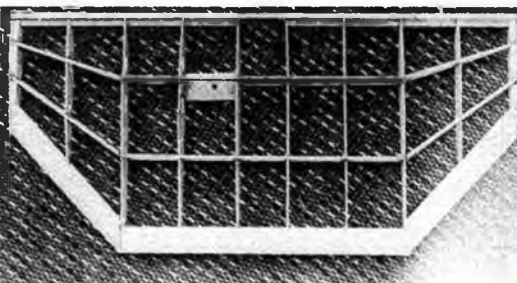
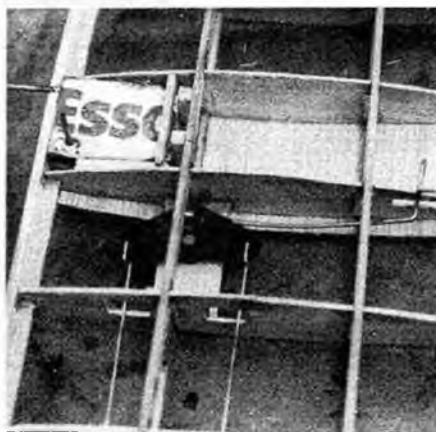
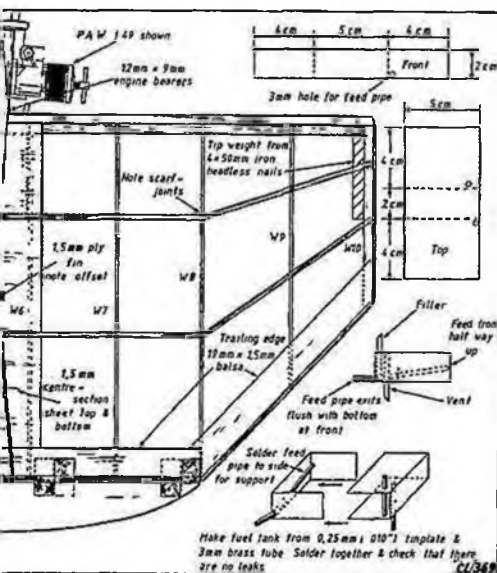


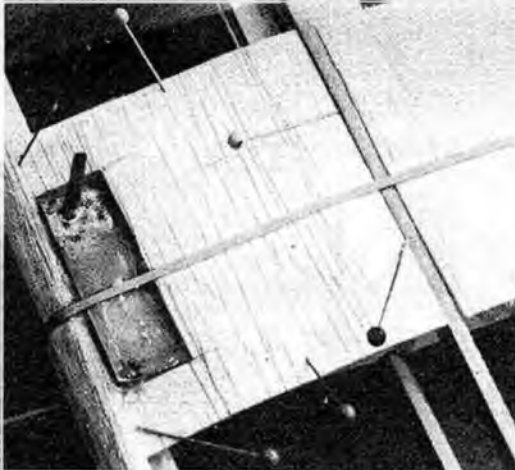
Above: preparation of the wing leading edge, complete assembly is one step in Method 1 construction and the first operation in both Methods 2 and 3.

Cut out the centre trailing edge pieces and pin one of them onto the plan. Using some extra scrap 1.5mm to pack up W4 and W5, glue the 6 centre section ribs to the trailing edge, pinned down. A piece of scrap 3mm strip can be put into the leading edge, slot to help alignment. See figure (1). Whilst this is drying, assemble the leading edge from 12mm x 3mm spruce and two pieces of 6mm sq balsa. Hold together with pins and clothespegs whilst it dries. When the leading edge is dry, roughly shape to the correct section leaving some material for final sanding later. Mark and remove the centre piece of spruce to accommodate the tank and glue the leading edge in position leaving the six ribs still pinned down. When completely set, remove from the plan. Glue and pin ribs W1, W2, W7 and W8 to the leading

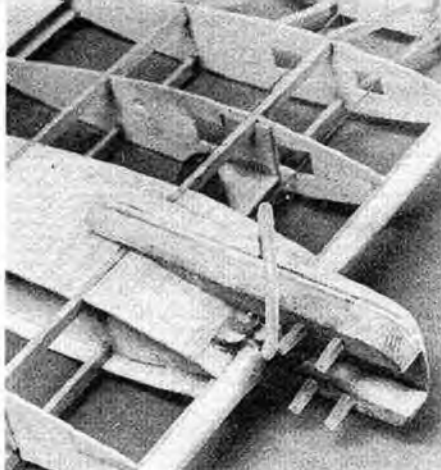


Above: close-up detail of the wing trailing edge. Note pinning and rubber band retainer. Below: basic wing airframe complete and ready for installation of bellcrank, fuselage and fuel tank. Below left: close-up to show bellcrank and elevator push rod installation and fuel tank.





Centre section is sheeted and fuel tank built in, prior to addition of 'fuselage' and elevator.



'Fuselage' is really no more than a motor mount. Note the fuel tube sleeving over the motor holds to protect the threads during finishing operation.

edge, lining them up by eye with the rest of the structure. When dry, add the rest of the trailing edge and the spars. This completes the basic structure of the wing.

Method 2

Glue together the 12mm x 3mm spruce and two 6mm sq balsa to make the leading edge. Hold together with pins and clothespegs to dry. Draw a centre line on the plan on each of the ribs shown. Draw another line on each rib 2.5cms below the centre line. At a convenient place near the leading and trailing edges, draw in a 1cm wide pillar as in Fig. (2) for all the ribs. Cut out all the ribs with the two pillars on the bottom and stick on the little vertical strengthening pieces. Roughly shape the leading edge when it is dry and remove centre pieces of spruce to accommodate the tank. Glue and pin all the ribs to the leading edge, and place the structure over the plan to check alignment. Put some small weights on the ribs to ensure the pillar is resting on the board. Carefully add the spars and trailing edges, one or two components at a time, leaving the glue to set between stages. This completes the basic structure.

Method 3

Pin and glue the leading edge together from 12mm x 3mm spruce and 6mm sq balsa. Cut out all ribs as shown, and glue on the little vertical strengthening pieces. Pin the leading edge nose down on the plan after removing the small centre piece of spruce to accommodate the tank. Glue and pin the ribs vertically onto the leading edge and align by eye. See Fig (3). Add the spars and trailing edges, when the glue has set checking the alignment by eye continuously. This will complete the basic structure.

Of the methods, I should think Method 3 is the quickest and Method 2 is the most accurate. I use the first method for no better reason than I am practised at it.

Completing the structure

Add the 3mm sq spruce capping pieces to the trailing edge and the 1.5mm ply tip ribs. Glue in the bellcrank mount and it's support pieces. Make up the tank and epoxy glue (slow drying) into position. Remember the tank must be as close as possible to the engine and *exactly* on the centre line. Also epoxy 4x2" nails (heads removed) as tip weight. Cut out the elevator and hinge it with tape or sewing. Make up the leadouts from heavy-weight 'laystrate' and install the bellcrank. Make up the push/pull rod and install so that it goes through W4 and out of the top of the centre to the horn. I used a bicycle spoke which was far too long and finished up with an awful shape. Sheet in the centre section top and bottom. Use Araldite where the tank protrudes. When dry, sandpaper the whole wing carefully with the sandpaper on a large block.

Cut out the 3mm pod doubler to fit exactly to the wing contour. I made it a good fit by making a cardboard template first. Cut the bearers to length and glue to the doubler the correct distance apart for your engine. When dry, trim the bearers to the wing contour and round off the front. Glue the pod very firmly to the wing at a slight angle to give about 3° sidethrust as shown. Attach the 1.5mm ply fin. Temporarily fit in the engine and propeller in place with elastic bands. Adjust the engine position to put the centre of gravity 2cm behind the leading edge at this stage. Covering and finishing will ideally move it back to 2.5 — 3cm. I do not recommend going any further back as I have tried 3.5cm and found it very unstable in level flight. Mark and drill the engine bolt holes. Epoxy the bolts in and fit the engine making sure you keep the Epoxy off the engine and nuts. Build up the pod with 1cm balsa. Remove the engine when the Epoxy has set.

Fill any unwanted gaps and give the whole of the airframe a coat of clear dope. Lightly sand with fine sandpaper. For strength, the model should be covered with nylon although tissue can

be used if you are weight watching. Cut the nylon very slightly oversize for each of the four wing surfaces. Put the first piece of nylon in water and squeeze out most of the moisture. Dope round the wood at the outside of the panel to be covered and lay on the damp nylon. Pull the nylon fairly tight using pins to hold in place if necessary and putting more dope on top of the areas to be stuck down. If it does go all wrong, take the nylon off whilst it is wet, throw it away and start again. It is not worth spoiling the model for a 'Ha'pporth' of nylon. Cover the rest of the centre section, pod, fins, and elevator with a number of small pieces of nylon. Paint the whole model with at least 4 coats of clear dope until the pores of the nylon are sealed. Decorate the model with coloured dope or polyurethane paint but resist the temptation to paint the whole model mainly because it adds too much weight and frequently looks awful. Paint the whole model with clear fuel proofer. I used clear polyurethane varnish. When dry, bolt the engine back in and carefully check the C of G position. If you are a learner, a temporary weight to give a position between 2 and 2.5cm back from the leading edge is a good idea, moving back to 2.5 to 3cm when you have got used to the plane.

Flying

Flying over grass on 40ft lines (lightweight Laystrate) and choose a calm day for test flights. Keep the elevator neutral for the hand launch otherwise the model will flip on it's back. *Unlimited* is capable of all the round stunts. If built well, it will survive many crashes — mine has with no damage whatsoever. Providing you don't kill the airspeed with too much control movement, it will fly in any part of the circle. If the model slows down too much, it "wobbles" in the air as a warning to ease the control movement and make the manoeuvre bigger.

Development can achieve faster flying simply by reducing the wing thickness to 32.5mm or even 25mm but keep that for your second *Unlimited*.



Left: tanking up. *Unlimited* prior to a test flight, our Aero Aces club member is all set for a new kind of control line fun. Note the slightly offset fin to maintain line tension. Above: built light and without too much paint. *Unlimited* gets away smartly from a hand launch.



ZLIN 50L

The Czechoslovak company Moravan have long had a well deserved reputation for producing championship winning aeroplanes. Most famous and certainly longest serving of these must be the Z-526. This design has been overtaken by the demands of Championship competition and had it's wings clipped, aileron power increased and ultimately designated the Z-526 AFS. Some success resulted from these modifications, but now the trend has changed to the smaller, more powerful "Hot Ship" aerobatic machine — largely inspired by the inimitable *Pitts Biplanes*.

In 1975 Jan Mikula and his team had evolved a *Zlin* version of the trend and in Autumn of that year the Z50L appeared. Fully 1350mm shorter than it's predecessors and with the now almost universal fixed undercarriage plus a 260hp engine, the Z50L looks the part.

Thus far we haven't had a 50L flying here in the U.K. Most of the current production has been shared between Czechoslovakia and Poland, with a few examples registered in Romania. Notable western exception was one Romanian registered Z-50L, "borrowed" by W. German, Manfred Strossenreuther (of *Akrostar* fame) and flown in the '78 World Championships in Czechoslovakia.

Successful placings in the World Championships in both '76 and '78 indicated the potential of the original design concept while 4th place at the World Aerobatic Champs '80 at Oshkosh without doubt confirmed this promise.

The detached observer really has an unenviable choice; does one find that the elegant grace with which a larger machine like a Z526 or YAK 18 (both with retractable



Every inch a purpose designed aerobatic aeroplane, the Zlin 50L makes an excellent subject for either control line or radio control scale aerobatics. Small dimensions make this a monoplane reply to the Pitts biplane series in terms of zippy performance.

gear) progresses around that invisible box in the sky, deeply satisfying, or should the howling bee-like progress of a *Pitts* bouncing off the confines of the same box be marked higher?

Certainly the 260hp fully aerobatically equipped Lycoming should both sound and perform like a *Pitts*, as well as providing enough reserves of power for vertical manoeuvres. All this power is absorbed by a 3 bladed Hoffmann propeller (3 blades — smaller diameter) in turn having the usual hydraulic constant speed control.

The Z50L follows its forebears in having a

mainly metal airframe, fuselage being monocoque and the wing one piece, with the tail unit of metal construction but fabric covered. Rigidity of the stabiliser is assured by adequate struts each side.

A departure from the retracted elegance of the Z526 has been the adoption of a spring blade Cessna (Wittman) type undercarriage, equipped with wheels having drum brakes, not the normally expected discs. Tailwheel suspension is also a spring leaf, like the main gear, in titanium.

Innovative too is the large canopy which is one piece without a separate windshield

AIRCRAFT DESCRIBED

No. 245



By
A. A. P. Lloyd

ZLIN

50L

and must make entrance and exit very easy indeed. The engine cowling is unusually split vertically into two, having peg and tube fixings which are clearly seen in our photo of the engine installation.

First prototypes had a cowl with six separate ejector type stub exhausts, one for each cylinder, looked like the local car customiser had been at it — now thankfully refined. The wing had the almost standard aerobatic airfoil NACA 0018, which when tapered out to the tip, results in approx NACA 0012, traditionally long *Zlin* externally fluted ailerons are fitted which give precise roll control. Both are equipped with largish servo tabs and the port wing has adjustable trimmer as well. Servo tabs are also fitted to rudder and the starboard elevator, whilst the port elevator has an adjustable trimmer. A "grey area" of information is the fitting of auxiliary wing tip fuel tanks. There is no photographic evidence showing these in use on a Z-50L but I photographed similar tanks on a Z-526 (equipped with a Lycoming four cylinder) a long while ago. The drawing conveys the approximate size and shape of these additions. The external clear pipe is the

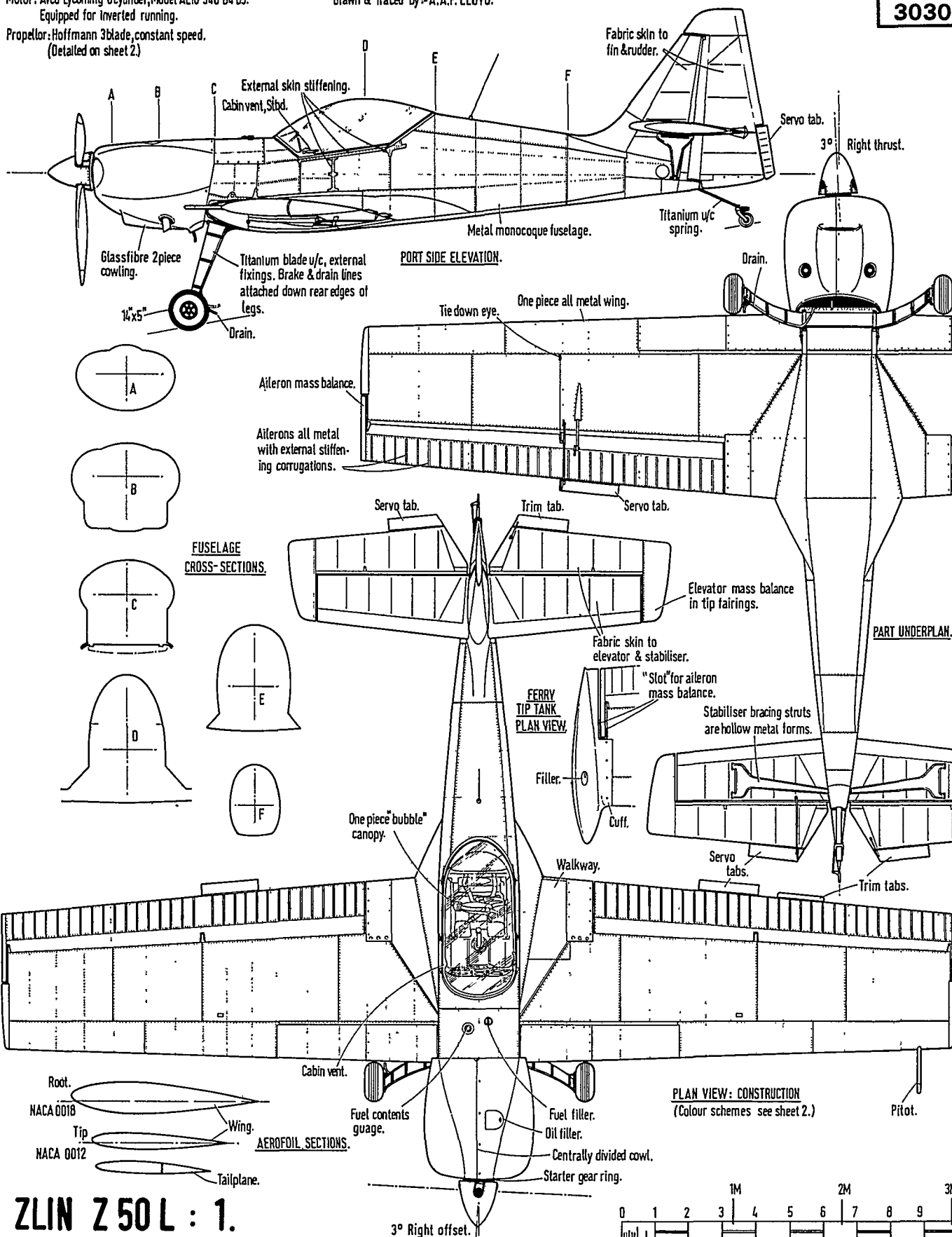
Motor: Avco Lycoming 6 cylinder, Model AE10 540 D4 B5.

Equipped for inverted running.

Propeller: Hoffmann 3 blade, constant speed.
(Detailed on sheet 2.)

Drawn & Traced by:- A.A.P. LLOYD.

3030



REPRINTS OF THIS FEATURE WITH 1/48th SCALE DRAWINGS PLUS DYLINE PRINTS OF THE 1/24th SCALE ORIGINALS ARE AVAILABLE AS PLAN PACK 3030, PRICE £1.25 INCLUSIVE OF VAT PLUS 25p p&p FROM AEROMODELLER PLANS SERVICE, PO BOX 35, BRIDGE STREET, HEMEL HEMPSTEAD, HERTS., HP1 1EE.

ZLIN Z50L : 1.

Drawn & Traced by: A.A.P. LLOYD.

External clear tube reads fuel contents in litres.

FRONT ELEVATION: HOFFMANN PROP.

SCRAP STARBOARD
ELEVATION OF TAIL.

To show tab pushrods etc.

Filler.

View on arrow 'X'.

FERRY TIP TANK.

View on arrow 'Y'.

SCRAP FRONT
VIEW: TIP TANK.Colour separation lines,
see main views for colours.Single leaf
tailwheel spring.

Red.

Matt Black.

White.

PART FRONT ELEVATION:

Aircraft doped overall: Silver.

Registration letters: Black.

Natural Metal.

Port only.

White.

Red.

Wood, Metal lead-
ing edge covers &
sheathed in glasstibre
cloth.Titanium spring
blade undercarriage.

At rest position.

Maximum unloaded position.

Matt Black rear faces to blades.

PLAN VIEW: PROPELLOR.

Hoffmann HO-V123 K-F200AH,
3-Blade constant speed.

HOFFMANN LOGO.

Black & Silver; Each blade.

White stripe,
Upper surface only.

Airframe serial:

Red.

Czech flag: Red, White, Blue.

OK-GZB

OK-GZB

PART PLAN VIEW: FUSELAGE & ST'D. PLANES.

To indicate colour pattern layout.

SIDE ELEVATION: COLOUR SCHEME.

"ZLIN 50L" Black.

DETAIL. 3.
One or both sides
of fuselage.

Z 50L

DETAIL. 1.
Company logo: Varied in
both size and position.

ZLIN

Black.

DETAIL. 4.
Company Trademark.

MORAVIA

MADE IN CZECHOSLOVAKIA

DETAIL. 2.
Lycoming Engine badge.

AVCO

Gold on Black ground.

DETAIL. 5.
Black & White on OK-GZO.

Red.

OK-GZB

HALF UNDERPLAN: COLOUR SCHEME.

OK-GZBA

REG. LETTER GEOMETRY: SIZE AS WING.

Registration Letter alternatives: OK- GZA, GZB, GZC, GZD, GZE.
OK- HZA, HZB, HZC, HZD, HZE.
OK- IRF.N.B. Photographs indicate that most Czech
machines have the colour scheme as drawn,
details differ mainly in size & position of
badges, logos, etc. At least one aircraft
had a Gold colour spinner.

ZLIN Z50L:2.

FEET: 100 1

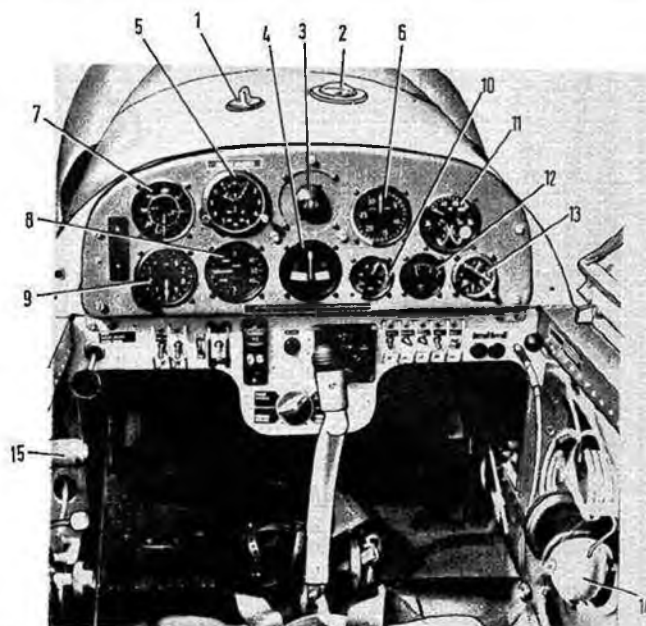
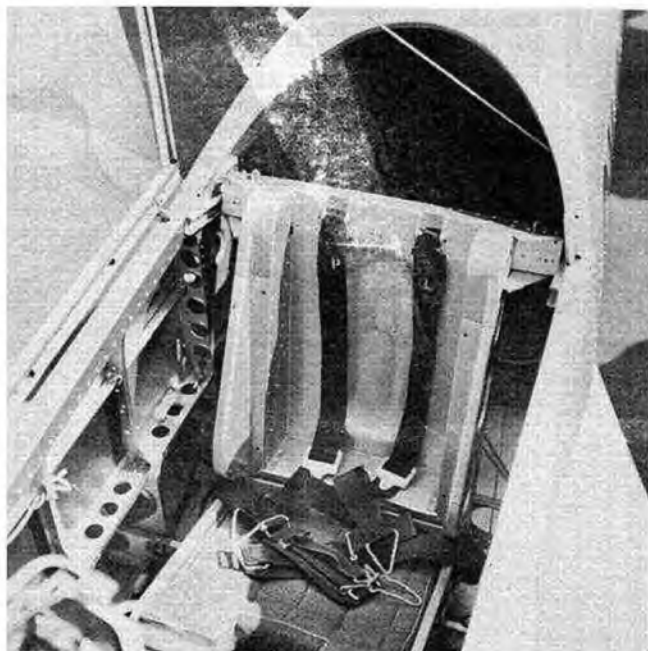
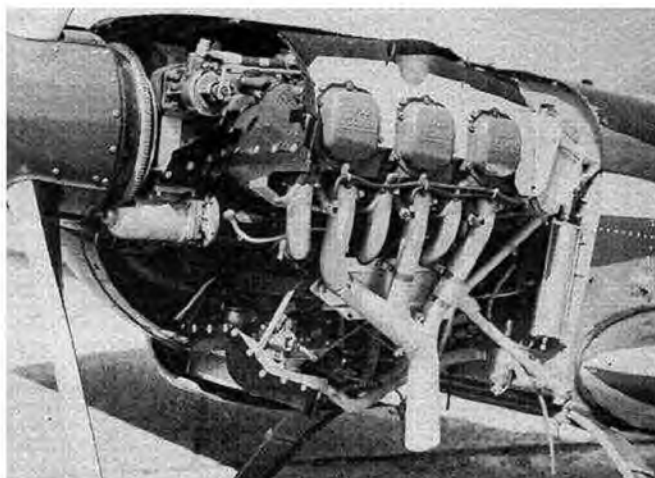
often used "Marriotte Bottle" principle.

Colour details are given for the Czechoslovak aircraft, other sources will fill this gap after this year's World Championship meeting. Scale radio model of the Z-50L have fully emulated the full-size up to 1/4 scale and kits are already available on the Continent for it. As a 'model' subject it lends itself ideally to the FAI schedule — the next best to actually piloting the real thing.

Span	8.60m (28' 4")
Length	6.58m (21' 7")
Height	1.84m (6' 1")
Weight	580kg (1257 lbs)
Full max	800kg (1586 lbs)
Engine:	Lycoming AE10 540 D4 B5 6 cylinder aircooled (Inverted System) 260hp (Electric Starter)
Prop:	Hoffman 3 blade HO-V 123K-F200AH Constant Speed. Wooden blades, metal leading edges covered in fibreglass cloth
Max speed	175 mph
Econ cruise	156 mph
Climb	2500 ft/min
"G" limits	+9 -6

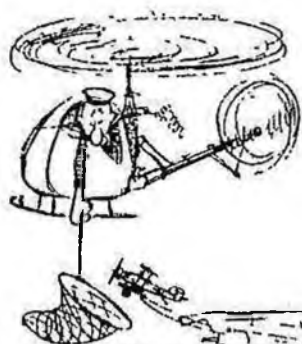


Right: 260HP Avco Lycoming horizontal six cylinder motor is a tight fit under the cowl. Below: details of the cockpit showing seat and internal structure.



COCKPIT LAYOUT : ZLIN Z 50L

1. Fuel filler, 2. Fuel contents indicator, 3. Camps, 4. Roll-Slip ball ind., 5. Clock/duration timer, 6. RPM counter, 7. Altimeter, 8. Climb/descent rate, 9. Airspeed indicator, 10. Manifold pressure, 11. Temp, oil, fuel pressure (combination gauge), 12. Oil temp., 13. 'G' recording accelerometer, 14. Headphones, 15. Throttle.



Why not
try

NAVY CARRIER FLYING

*The late Stan Perry
outlines the
technique of this
specialist but
fascinating control
line class*



PART 1

THE SMAE CARRIER DECK was launched at the Yeovilton Nationals in 1968, having been donated by the Royal Navy. Since that date, competitions have been held annually at the Nationals and sporadically at other major UK rallies, and this has produced a band of enthusiastic carrier fliers. These modellers have developed several techniques for building and flying the specialised models required, and some are discussed here. There are features of operating the carrier itself which may also be of interest and this series sets out to give a summary of the state of the art, as seen by the writer who has been 'Honorary Officer-in-Charge of Flying' at five Nationals and several other major rallies.

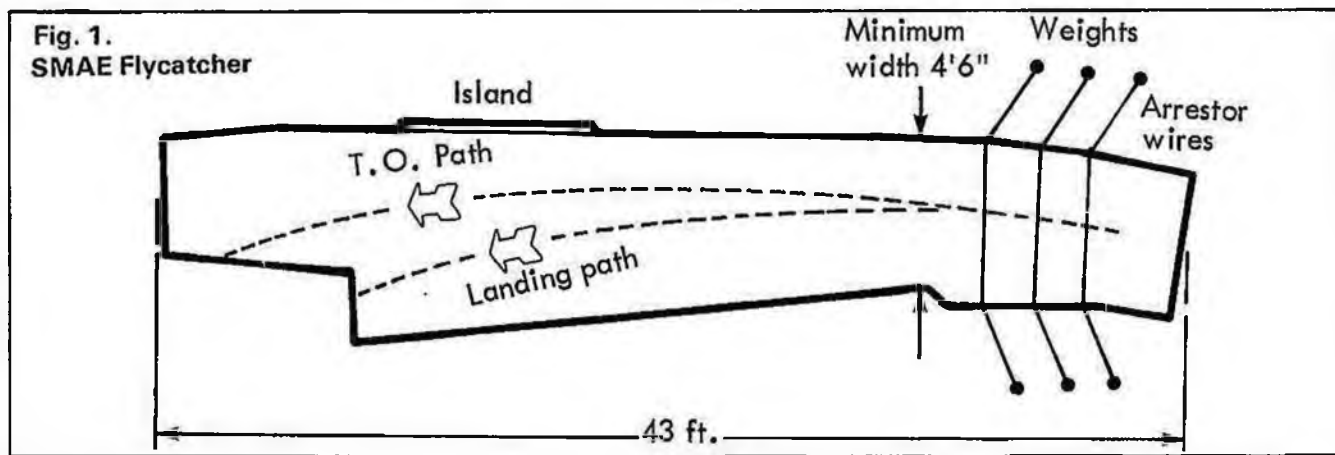
Historically, the first carrier for control-line flying in the UK is thought to be the CMAC Enterprise built and operated by the Cheltenham MAC in 1954, the project being inspired by Mr Frank Palmer, a veteran modeller whose experience went back to World War 1 days. The writer achieved the first ever 'hook-up' on the Enterprise in 1954, and thus may be able to claim the honour of the first ever UK model carrier deck landing. The problems of storage and transport, combined with a run-down of the Cheltenham Club's affairs, led to the scrapping of this first effort.

Some notes may be of interest relative to the Enterprise and the models used on the carrier at that time. The Enterprise was 36 feet

long and 4 feet wide, ie. somewhat smaller than *HMS Flycatcher* the currently used "model carrier." It has features not used on Flycatcher these being a peel-off chain system for the arrestor wires, this enabling the model to peel-off the amount of chain required by its particular weight and landing-speed characteristic, an auto-release system for take-off, using the landing hook as the model attachment, and the third feature being that the carrier controller sat inside the island from which station he effected release of the model for T.O., and erected and re-set the arrestor wires. The writer can vouch from personal experience that sitting in the island during flying operations was a most hair-raising experience.

As throttled motors were not then generally available in the UK, a clapper-plate over the carburettor intake was used for throttling purposes, a small bleed-hole in the plate providing adjustment to give the desired tick-over. These worked but really only gave full bore or tick-over engine speeds. All the models used diesels — particularly the *ED 3.5cc Hunter*, the writer's model being an 'own-design' variant of the *Skystreak 40*.

Now to the SMAE *Flycatcher*. This, as stated earlier, was manufactured and donated by the Royal Navy. It is larger than the CMAC Enterprise and the overall size and plan shape is shown in Fig. 1.



The deck stands on legs to a deck height of 13" and has three arrestor wires approximately $\frac{3}{4}$ " above the deck. The whole is coloured in a manner representative of the Navy carriers circa 1968. The deck is constructed of wood and comprises eight detachable sections, 34 short detachable legs and a profile island, the whole being transportable on a custom-built road trailer.

Managing the carrier deck

Firstly, storage and transportation are major problem areas, as they were for the Cheltenham Carrier. However, the *Three Kings Club* provided a custom-built trailer, this having undergone some modification by the present custodians, the *Wolves MAC*. At present, the carrier deck can be easily towed behind any car utilising standard caravan towing attachments, the outfit being remarkably stable and easier to tow than a caravan.

Normal maintenance of the trailer is needed for roadworthiness, and before a season's use, the carrier is inspected and repairs effected as necessary — usually involving some minor repairs to the deck (it is surprising how much damage is done to the deck by propellers cutting the top plywood layer and these can provide quite serious obstructions on the deck). Usually a washing operation is required to clean-off fuel deposits, and an occasional coat of polyurethane varnish sees it ready for operations. The SMAE has been very good in reimbursing the hardware costs involved despite the fact that competition entry income does not, by a large margin, cover the maintenance and transport costs involved.

Operating the carrier

Whilst the erection of the carrier requires 3 to 4 people (usually competitors), the first problem is siting the carrier relative to the wind direction, bearing in mind that moving the carrier during the competition to compensate for a wind direction change is not really practical. The problem is the risk involved in taking-off into a strong wind. An into-wind siting gives a slower approach for landing, but there are marked hazards should either the engine falter due to pressure surge during take-off, or if the model take-offs with too much up-elevator. The model is incidentally, most vulnerable during an overshoot just after missing the arrestor wires. If, to avoid the above hazards a down-wind siting is used, then higher ground speeds are experienced during the landing approach, and the flight at low-speed across the up-wind side of the circle can be difficult in gusty conditions. So far, experience favours placing the carrier in the just-down-wind quadrant, i.e. so that at take-off the model travels through the down-wind point and builds up speed before encountering the into-wind component. The inadvertent wing-over into wind immediately at take-off is also avoided. This also still allows the model to fly slowly for the landing approach after the up-wind side of the circle has been passed before picking up too much down-wind component. See Fig. 2.

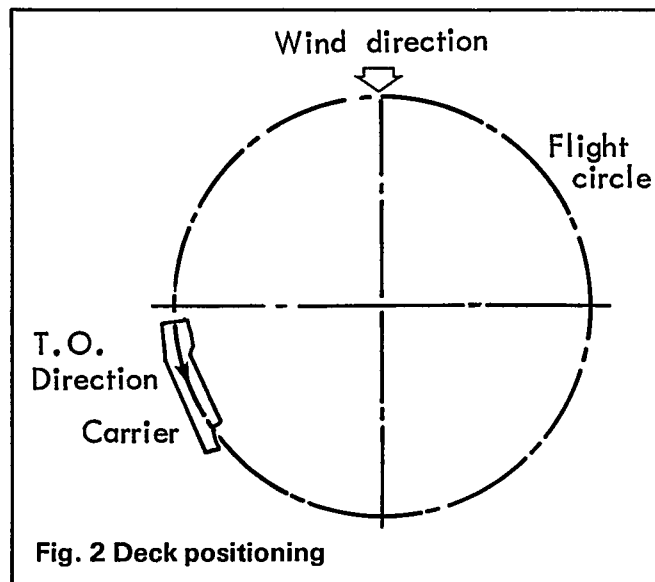
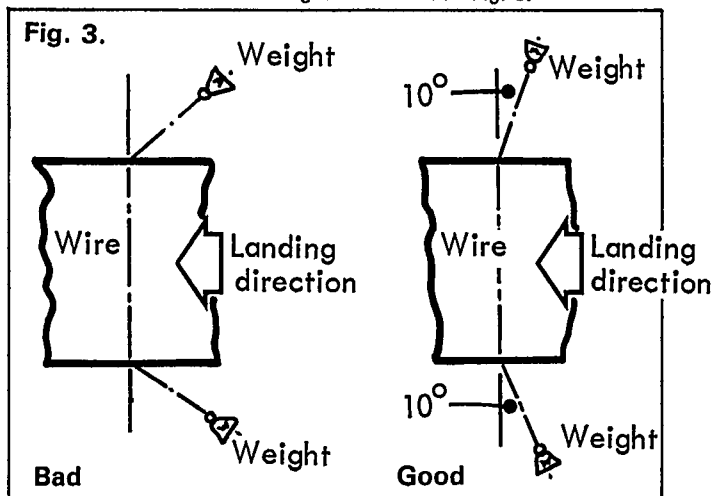


Fig. 2 Deck positioning

One other feature to note is the way the weighted arrestor wires are arranged. Many different weights and speeds of models are involved, and the system of weighted wires allows each particular model to automatically use the amount of decelerating force required. However, if the wires are arranged so that the weights trail backwards from the wire attachment points on the deck, a 'brick-wall' effect becomes obvious. The trick is to only trail the wires aft far enough to ensure correct contact with the attachments on the deck. About 10° of trail is shown by experience as adequate and since this has been adopted, the number of models experiencing torn-out hooks or undercarriages has been markedly reduced and the numbers of successful landing increased. See Fig. 3.



The models

As the SMAE carrier deck competition is basically a speed event, the usual requirements apply for the high speed component in that the maximum power in the smallest airframe is the starting point. However, the model must also be able to take-off in the length of the deck, to fly as slowly as possible (as well as fast as possible) and survive the high deceleration forces at hook-up onto the arrestor wires. The most popular sizes of motor are .40 and .60 cu.ins., and the models vary in general from about 33" to 42" span and from 2½ to 4lb., with very little to choose in terms of either high or low speed capability between these spans and weights. The most obvious requirement is for reliable throttling of the motor as the seven slow laps required demand up to 100 secs of flight at very low revs, coupled with the requirement for maximum power reliably available on demand both during the slow flight to cover effects of incipient instability, especially if a semi-stall is encountered in gusty wind conditions, and to go round again after a missed landing. Although the SMAE rules cover two classes of model, based on engine capacity, in practice over the last few years, all the competitions have been run as "open class" due to lack of numbers of entrants. However, exploitation of the advantages in the rules relative to the classes should be undertaken, i.e. reduced flying wire diameters for the smaller motor class.

With regard to the scale points (which form a considerable proportion of winning totals) it should be borne in mind that this is an all-or-nothing award i.e. a suitably qualified scale model gets 100 points, but an unqualified model gets nothing. Experience to date indicates that the possible advantages of using a non-scale model are more than outweighed by the automatic loss of 100 points, and most modellers compete with scale models, some of which are worthy of entry in Class 2 scale competitions in their own right.

Another class of model being promoted is a profile semi-scale class intended to enable cheaper and simpler models achieving successful carrier flying. The basic rules are as follows:

- Any size of model — not necessarily of scale profile.
- Max. motor size 3½ cc.
- Minimum propeller dia. 9".
- Profile fuselage (thickness as for Goodyear class)
- Max. hook length: $\frac{2}{3}$ length of model.
- Must have a recognisable scale — type naval paint scheme.
- Line length, as for Goodyear i.e. 52' 3".
- Timing runs over 8 laps, all other flying rules as for SMAE carrier.

Some suitable plans are available.

Constructional features

There are several features, most of which require constructional accommodation, which have been tried out as aids to achieving higher or lower speeds, and also towards achieving better landings.

Firstly, tuned exhaust pipes have been used, together with pressurised fuel systems, but so far, these, although achieving enhanced performance, have generally proved unreliable, especially in accommodating surge at take-off and panic throttle openings during low speed flight or on overshoot after a missed landing. Bilston Club member Robin Clews has certainly shown the way in achieving the magic 100 mph high speed and it seems unlikely that this figure is

a movable rudder, usually linked to the throttle actuation, but sometimes with the flaps and hook lowering action. These do not seem to have an appreciable effect, it having been noted that they are vulnerable to damage and that competitors often seem to abandon their use after some trials.

It seems logical that the most effective way of producing a large drag, in modelling aerodynamics terms, is by inducing a large yaw angle, obviously desirable to be out of the flying circle. Two methods have been tried by UK modellers, one by increasing the control line rake-back as part of the flap lowering exercise, but this apparently produces some pitching instability especially when increasing speed for some reason after a slow flying stage. It concert with the flaps

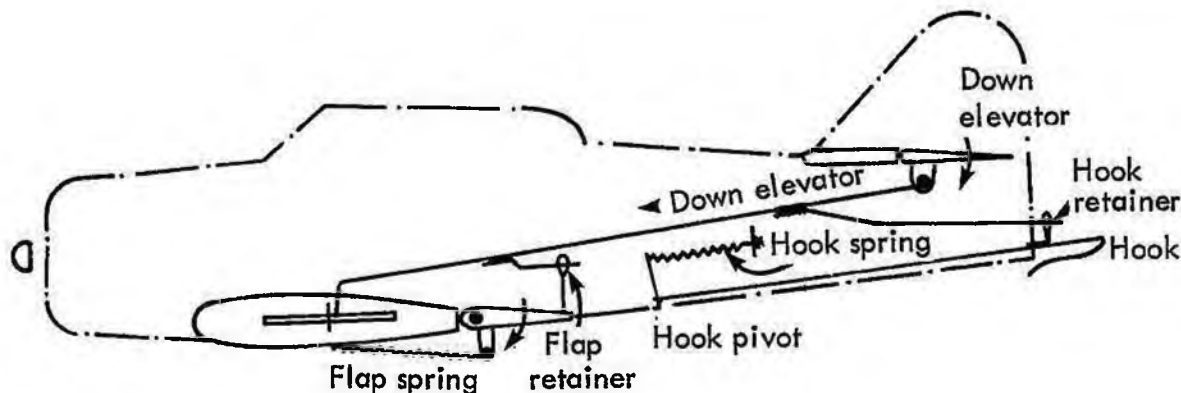


Fig. 4 Flap and hook systems diagram

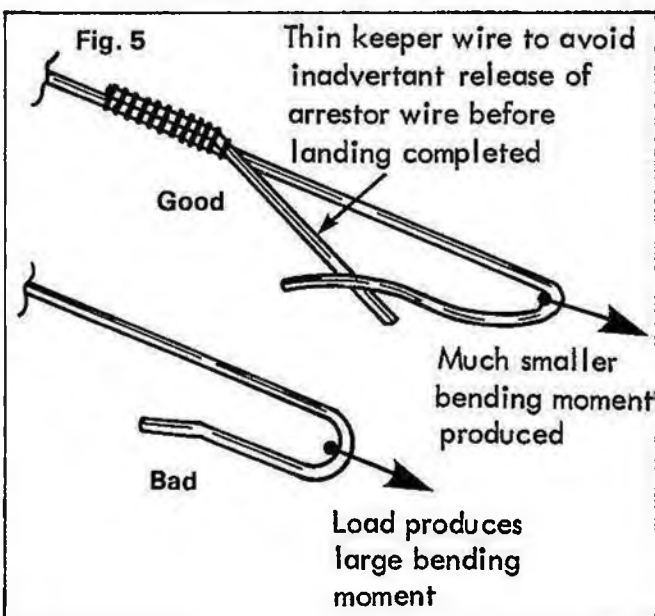
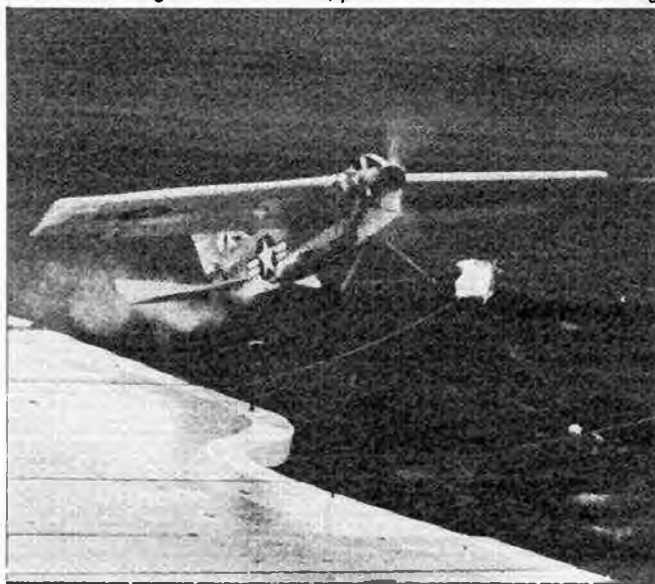
currently achievable without a tuned pipe.

All the other features discussed here are aimed at low speed achievement and landings. Flaps are commonly used to effect slower and more stable low speed flying, often with some usage of differential ailerons to assist in keeping the lines tight. Experience seems to indicate that flaps used at less than 90° down create ballooning problems, especially in windy conditions, but small aileron angles up to say 10° work well. The lowering of flaps and/or ailerons is usually linked with the arrestor hook such that a brief application of down-elevator effects release from the high speed positions. This is similar to the Team Racer engine cut-off technique but of course involves arrangements to spring load (usually by rubber bands) the hook, flaps etc. to the down position, and provision of an up-position restraint connected to the elevator, see Fig. 4.

At least 10° of elevator down should be allowed before release of the hook, flaps etc. to accommodate possibly coarse use of the elevators during take-off. Some experiments have been made using

would avoid the pitching problem but mechanical linkage problems are encountered. The other method is by attaching another control-line to the extreme back end of the fuselage, and then by simply pulling on the line, induce an amount of yaw to a degree determined directly by the pilot. It is known that one modeller, flying a well-proven AM Plans Service *Seamew*, tried this out and certainly an astonishing amount of yaw with a marked reduction in speed was shown. However, control problems in pitching were very evident, the pilot reporting that it was extremely hairy. However, there may be some development potential to this method.

The conventional rounded hook design can be shown to be inefficient, and assuming that the rest of the arrestor hook construction and attachment is adequate for the arresting loads involved, the hook itself can be straightened out by these loads and an otherwise good landing spoiled. Fig. 5 shows the best design.





The great ping-pong VTO race!

Right: Winner Martin Ulliyatt shows his machine to Dr. Martin Lowson of Westland Helicopters Ltd. Below: second placer Mark Chislett of Hollyrood School, Chard, watches his machine in action. Below right: Michael Clark of St. Dunstan's Glastonbury, takes evasive action.

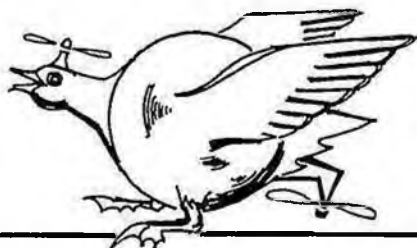
TAKING THEIR CUE from the nationally televised 'Great Egg Race', Somerset Education Committee earlier this year set youngsters in their area an equally zany challenge to make a vertical lift-off flying machine capable of sustained flight on the motive power of a couple of small rubber bands.

Entrants were given a demanding set of rules which in outline, demanded a device — any device — to lift a ping-pong ball into the air for the longest possible time, powered only by the energy of two 'official' rubber bands (size 125mm 44 x 1mm) provided on the day.

Supported by Westland Helicopters Ltd., A. A. Cambs Ltd (Rubber Bands), Halen Table Tennis Balls and Somerset County Education Authority, prizes ran to the Westland perpetual trophy, plus individual trophy and £30 for 1st place, £20 and trophy for 2nd place and £10 plus trophy for third.



We told Orville and we told Wilbur — but they wouldn't believe us!



Not surprisingly with this sort of incentive, there were plenty of takers, more than 600 for the various eliminators, but for the grand final J. A. Trickett takes up the story with a first hand account:

The Final

After much flapping and whirling in local school heats, 32 devices were assembled for testing in the Sports Hall of Buckler's Mead School, before an audience of 150 schoolchildren, representatives from industry, newspaper reporters and television cameras. To announce times achieved by each device a loudspeaker system and scoreboard were used to convey the ongoing state of play to the audience the school computer kept a continuous record of the best five times.

The atmosphere of anticipation which preceded each test flight must have been quite unnerving for the competitors, but, they responded with verve and

enthusiasm, to produce a final which was both interesting and exciting.

A variety of design were evident. Some competitors decided to counter the torque reaction of the body by fitting vanes while others made use of the rotation of the body and gained additional lift by fitting rotors to it. There was a variety of fuselage designs and difference in size, weight and the construction materials.

Different techniques were used to overcome the frictional losses of the rotating parts, and rotor design also varied from standard aeroplane propellers to large diameter home-built rotor blades.

During the contest, the sight of the competitors making modifications to their machines was better than any pit stop in a Grand Prix. Often, entire rebuilds were made between tests using spare parts from an old suitcase or a plastic bag. Urgent discussions took place concerning the number of times the rotor should be wound and the technique to be used to release the machine.

Results (26 flew)

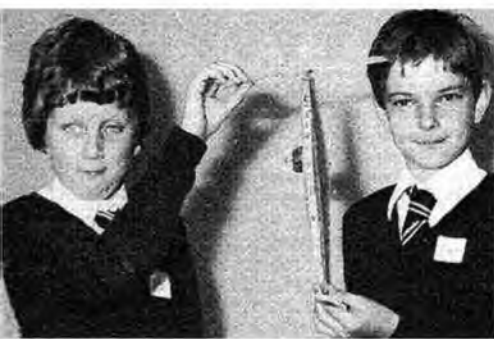
1. Martin Ulliyatt	Crispin School Street	10.3
2. Mark Chislett	Hollyrood School Chard	6.3
3. David Morton	Hollyrood School Chard	5.5
Nigel Dodge/Gregory Willis	Buckler's Mead	5.5
5. Daniel Mousseau	Hollyrood School Chard	4.9
6. Alan Dicker	Buckler's Mead School	4.8
7. Simon Ring	St. Dunstons Glastonbury	4.5
8. Paul Channon	King Arthurs Wincanton	4.4
9. Peter Beavon	Buckler's Mead School	4.3
10. Andrew Harding	Castle School Taunton	4.0

The performance of the machines varied greatly. There were some which whirled and vibrated but failed to get airborne, except for the occasional hop and there were those which flew and deposited structural members on the floor of the test area. There were others which accelerated so rapidly that it was thought they might penetrate the roof of the hall. However, on hitting the roof these machines fell exhausted to the ground.

The successful machines were those which had efficient slowly rotating rotors. These lifted serenely into the air and fluttered about in the apex of the roof. Needless to say, spontaneous applause broke out from the audience when the winning time of 10.3 seconds was achieved. It may not sound a very long time to those with their feet on the ground, but it seemed a lifetime of flight. This machine belonged to Martin Ulliyatt of Crispin School, Street, who received the Westland Trophy for his school £30 and a commemorative plaque for himself.



Second left: Ricky Bazley and Andrew Netherton of Bucklers School with twin rotor vertical configuration machine. Left: similarly styled larger machine by Simon Bromel of Westfield School. Below left: 'Spiro Pod' by Nigel Dodge and Gregory Willis of Bucklers Mead School. Below centre: the H-line style as displayed by Andrew Frost of Wells Blue School. Below: single rotor style was used by David Morton of Holyrood School.



Holiday fun!

On Sunday 10th August, the Guildford Model Flying Group turned their flying field into a classroom when they invited 50 children between the ages of 10 and 15 to fly with them. The day was arranged through *Guildford Holiday Fun*, a voluntary organisation that co-ordinate a wide range of activities for children during the school holidays.

the controls. On the Chuck Glider base, every child made his or her own glider which had been specially designed by John Coker of the 2FSA, who also provided instruction in building, trimming and flying all day. He was also assisted by the groundsman Brian Shelley who should have been on Power but spent most of his time retrieving high fliers from roofs and trees. The glider kits had all been previously cut out by group members and we made sure that every child had their own glider and a certificate to take home.

During the lunch break which was held in the Sports Pavilion, the children were amused by some of the large amount of film

of group activities taken over the last 14 years. The Chairman's Jack Russell also entertained when he decided the pavilion curtains were too dry for comfort.

At the end of the day we had several dented models, 50 very happy lads and a completely worn out GMFG, but it was voted a very worthwhile and entertaining day's activity. Our special thanks must go to Pete Squires of the Godalming & District MAC who kept the RTP going all day.

We hope to have the chance of another day next year and we definitely recommend this type of activity to any other club if only to make a lot of friends out of local residents.



Guildford Holiday Fun day run by Guildford Model Flying Group was much appreciated by youngsters seen below learning about RTP flying. Right: John Coker instructed on Chuck Glider construction. Below: control line construction came under Jym Leddy. Below right: taking turns at the transmitters for R/C power flying instructed by Brian Shelley and Ray Egglestone.

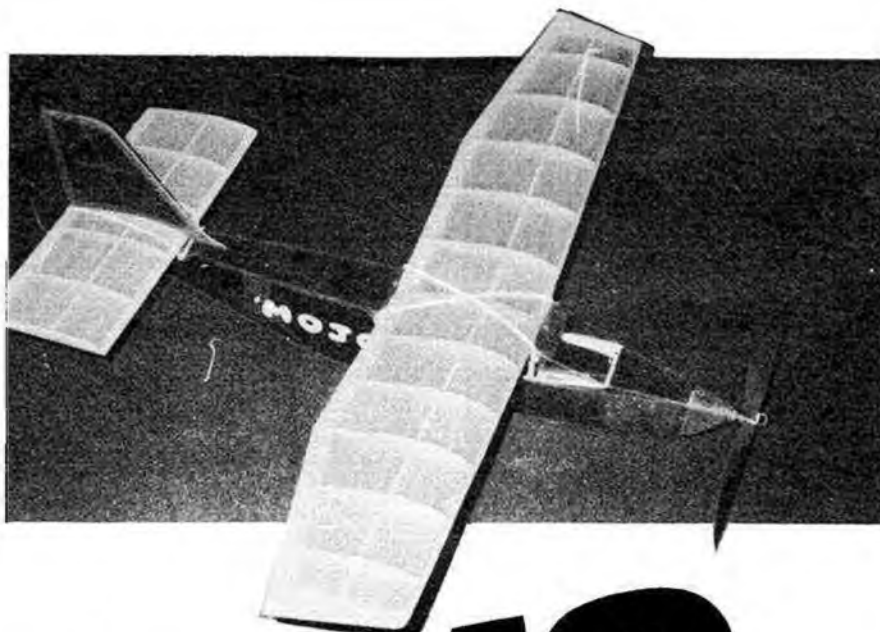


The GMFG have been providing stewards for coach trips to the Royal Air Force Museum at Hendon for several years for *HOLIDAY FUN*, but this year we were asked if we could introduce some youngsters to the joys (!) of aeromodelling.

The day lasted from 9.00am to 4.00pm and we were blessed with weather that is normally reserved for the Old Warden Scale Rally. The children were divided into six groups each with their own coloured badge for quick identification. Each group then spend an hour at six different bases. The six bases were R/C Gliders, R/C Power, Control Line, RTP, Chuck Gliders and R/C Electric cars.

Each base was manned by group members and friends and the children were all encouraged to ask questions and try out





MOJO

A sporty 26-in. span
flyer for rubber
power

By R. PRESTON

AFTER BEING an Aeromodeller for over 25 years and progressing right up to R/C flying, I suddenly realised one day at the flying field that I was taking my hobby too seriously and that a lot of the genuine fun was lacking. It was while watching a small rubber powered model flitting round the evening sky that made me decide that I had to go back to some basic modelling and flying to bring back some fun and to give my son the opportunity to learn something about the hobby in which he was then only qualified as a felchamite. Out come some scrap paper and after many doodles I finally arrived at a design that had a very basic type of construction but looked more up to date than a lot of the established small rubber models. I dispensed with the undercarriage because of its extra weight, it looks ridiculous with a long spindly wire U/C and when it is hand launched it has a headstart of about six feet altitude anyway. *Mojo* incidentally is a good luck charm.

Now lets get started on construction, the choice of balsa for the fuselage is quite important in that the upper longerons have to be stiffer than the lower ones to keep the whole fuselage straight. Fuselage is very straightforward using slab sided construction, building one side over the other. After the sides are complete and removed from plan, cement F2 & F3 to one side ensuring that these are square. When dry, cement the other fuselage side to F2 & F3 all the

time making sure everything is square and that it 'looks right'. When the cement is set, pull the tail end together and cement, holding it with a rubber band. F1 can also be cemented into position at the nose once again holding with a rubber band as pins can split the balsa at the ends if they are used. When these are dry all the cross bracing can be cemented into position and the sheeted areas positioned and cemented. Make sure that the two cross-braces running parallel to each other at the front of the windscreen are only cemented at their ends because the tab on the wind-screen forward end is eventually cemented between these braces.

The nose block and prop assembly can now be made up and the right amount of downthrust is incorporated. The wings, tailplane and fin are quite straightforward, the only point to watch is that the two wing

YOUR TV CHRISTMAS

halves are square to each other when the rod end ribs are joined, i.e. they both have the same incidence.

Lightly sand the whole structure before covering with lightweight tissue, using slightly thinned down dope for all the covering, especially the flying surfaces. The prototype's motor was made up from two loops of $\frac{1}{8}$ " flat rubber well lubricated which seems good enough for docile, easy-to-trim flights of good duration. Any more power would probably make it a bit harder to trim out on power. The 8 inch diameter plastic propeller (green) was obtained from 'The modellers Den' who have a first class selection of goodies for the 'fly for fun free flihter'.

Before test gliding, try to make sure that the propeller will free wheel as this improves the glide quite considerably and also make sure the noseblock is a good push fit. (A dangling nose block assembly makes a very effective D.T.) About a $\frac{1}{8}$ " of packing was required under the wing leading edge to obtain a good glide and when this is obtained the packing can be cemented in position. After ensuring that all the flying surfaces are warpfree and fit squarely on the fuselage you can start trimming and flying. Build up the number of turns gradually up to a maximum of about 600 turns using the stretch winding method. *Mojo* is very stable in flight and will penetrate wind quite well. Add side thrust packing as necessary to counter any tendency to turn excessively when under power. The lack of an undercarriage has not caused it any harm on landing due I'm sure to the light weight of the model, besides Wakefields don't use them do they! *Mojo* has given us a lot of fun and its surprising how many radio flyers have taken an interest in it at the local flying sight, it sure beats having a fag when someone else is on your frequency, so why not have a go and have a *Mojo*.



AS EXTRA PLANS

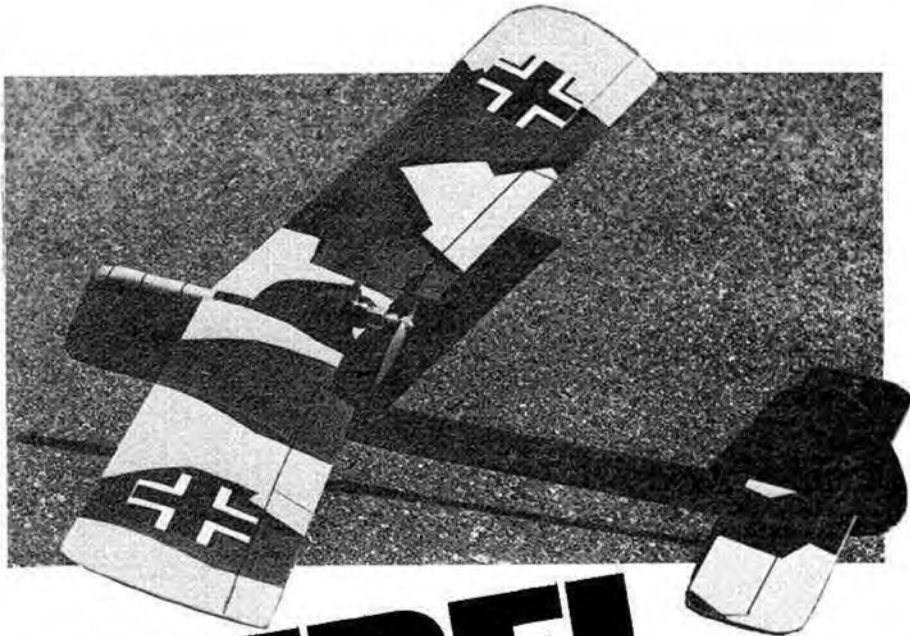
THE SIEBEL SI201, the subject of our free-flight model, was a design which never really got off the ground, if you'll pardon the pun. It was designed to a specification that was quite common before World War II, that of an "Army Cooperation" aircraft. There were three contenders produced to meet this particular Luftwaffe specification, the now well known Fiesler "Storch", the almost unknown Siebel 201, and the even more obscure Bf163.

However, back to our Siebel. This was quite an unorthodox type, much effort being directed to providing the observer with a splendid view, with little or no obstruction. However, in order to make use of this magnificent observation post, some reasonable flying qualities were desirable, and this is where a note of sadness creeps into our story. At low speeds the Siebel's flying characteristics were found to be not too good, and at the other end of the speed scale, tail flutter occurred, no doubt due to too much flexibility in the tail boom. It was also discovered that the aircraft had an exceedingly small permissible C.G. travel, so at this stage the design was abandoned. I don't know what the German equivalent of "Well, back to the old drawing board" is, but if anyone had said it then I'm sure it wouldn't have got much of a laugh.

Luckily, we don't have to concern ourselves with things like C.G. travel on our models... the C.G. stays firmly in the place that makes the model fly best. Similarly, things like tail flutter can be fixed by sticking a bit more balsa here and there, and so a design which was a failure in full-size can be made into quite a successful flying model.

Begin construction with the fuselage, which starts out as a $\frac{1}{4}$ -inch sheet of balsa 4 inches wide. Find a good strong piece of wood for this purpose. Mark and cut out the basic outline, the ballast hole, and the notch for the undercarriage block, then cement on the small extra piece for the engine nacelle. Next cement the $\frac{3}{32}$ -inch short doubling pieces on both sides of the fuselage and part way up the tail boom, but don't as yet cover up both sides of the ballast hole. Add the $\frac{1}{4}$ -inch triangular stock for the tailplane mounting, and the two small blocks on each side of the engine nacelle.

While all this is drying the undercarriage can be built. Drill two holes in a piece of $\frac{1}{4} \times \frac{3}{8}$ inch hardwood, bend the legs from $\frac{1}{16}$ -inch piano wire and solder together at the wheel and the outboard ends. Jam these inboard ends into the holes in the hardwood strip, with a good coating of epoxy. The wheels should not be added



SIEBEL SI 201

By JACK HEADLEY

Profile scale
free-flight power
Sportster

until after the paint job is applied.

Drill the locating holes for the wing dowels, then cement these firmly into place. Make the engine mount, which is shown drilled for the Cox .020 Pee Wee. We suggest that you use this engine as it runs O.K. backwards (in fact mine usually prefers to run this way). Mount the engine on this plywood plate, then cut holes in the nacelle block to accept the mounting screws and nuts. Apply cement liberally to the plywood and all around the nuts, and glue into place on the nacelle. Put this on one side to dry, and we can begin the wing construction.

Cut out the required ribs, and carefully drill the two root ribs for the wing panels from $\frac{3}{32}$ -inch sheet, which should be reasonably hard but bendable. Pin down the wing ribs to the plan, and then cement the wing panels into place. If the wing panels won't bend too easily, wipe the top surfaces with a damp sponge, then bend to shape. Note that the root rib should be angled to allow for the wing dihedral. The wing struts are made from $\frac{1}{4} \times \frac{1}{8}$ -inch hardwood, and should be made slightly oversize initially, then cut to the correct length on final assembly.

While the wing panels are drying it's a good idea to remove the engine from the nacelle, which is where we left it, and this will prevent it getting clogged up with sawdust, which is definitely a no-no! Now to the tail assembly. The various pieces are cut from lighter weight $\frac{3}{32}$ -inch sheet, which above all should be free from warps. After a good sanding cement them into place. Note that a small rudder tab is

required, and also an elevator. These items are attached with hinges made from scraps of tinplate.

The wings should now be dry enough to be cemented into place on the fuselage, using the two locating dowels, then the wing struts can be cut to their final length and cemented down. Two small balsa blocks fit over the struts at the fuselage end to provide additional anchorage.

Now for the balancing. Put the engine, prop, and wheels into place temporarily, then add lead to the ballast hole until the C.G. comes out as indicated on the plans. Since the addition of the final finish usually moves the C.G. back some, it is best to balance the plane nose-heavy at this time to compensate. When the correct balance is obtained, cement the remaining piece of $\frac{3}{32}$ -inch over this cavity, and this completes the construction.

Flying the model should present no problems, assuming that you've first checked and corrected any warps that have crept in. Check again that the C.G. is where it should be, then try a low powered flight. If this goes O.K. then try a little more power, but remember that this is supposed to be a slow flying observation aircraft, not an interceptor, so stay with low power, and just let the model putter around the flying field, it's much more realistic this way.

SCALE MATTERS

FLYING ACES NATIONALS

REPORT FROM
ERIC CLUTTON



Left: away they go in mass launch Thompson Trophy event. Right: every weather man should have one! Head gear modelled by Gerry Cunningham of Cleveland, Ohio.



THE FLYING ACES NATIONALS were held at Wright Patterson Air Force Base, Ohio, on August 8th, 9th and 10th, immediately prior to the AMA Nationals. AMA and SAM (vintage) free flight events were also held at Wright Patt, as were R/C Helicopter and R/C Thermal Soaring, C/L events and Radio Scale were at Wilmington, about forty miles away (just down the road by U.S. standards).

As I attended the EAA Convention and Fly-in at Oshkosh in northern Wisconsin the previous week, Friday night saw a monumental effort to drive to about fifty miles south of Chicago, then up again early next morning and hurtling the rest of the way to Dayton, Wright Patterson being just outside this town. As the overall speed limit in the U.S. is 55 mph, one is not supposed to hurtle anywhere, and I collected a warning from the Indiana Highway Patrol, driving much more carefully after this!

Wright Patterson is the home of the Air Force Museum so there was plenty to do

and see when I arrived. Huffman Prairie, where the Wright's did much of their early flying, is actually a corner of the Base, and modellers were allowed in by the 'back door', passing through all kinds of exotic installations quite unescorted — can you see this happening at Farnborough?

The Air Force Museum is of course quite fantastic boasting a B-36, B-52, Valkyrie, Ju. 88, SR-71, Blackbird, X-15, Ryan VTOL and Lysander (!) to mention just a few. Entry to the field and museum was free!

However, I had really gone for the modelling, and the weather was fantastic by U.K. standards. Temperatures in the upper 80s and 90s with very little wind. Three minute flights were landing within easy retrieving distance, the field being quite flat and with over 600 acres available by my estimation. The Flying Aces events were held in one corner of this vast area and it proved to be completely adequate in the prevailing conditions. Entry fees were \$1.00 per event (42p).

Individually, the most interesting models were probably the twin engine types represented by a *Lockheed P-38 Lightning*, a *Grumman Tigercat* and *Martin B-26 Marauder*, not forgetting the incredibly ambitious four motor Russian 'Bear' bomber by Dennis Norman. All these were rubber powered of course; the *Lightning* showed potential, but the *Tigercat* and *Marauder* were well trimmed and flew impressively. The *Bear* was on its first outing and testing was done with only two of the rubber motors fitted, but it showed promise in spite of the first hard landing pointing out some weak areas around the

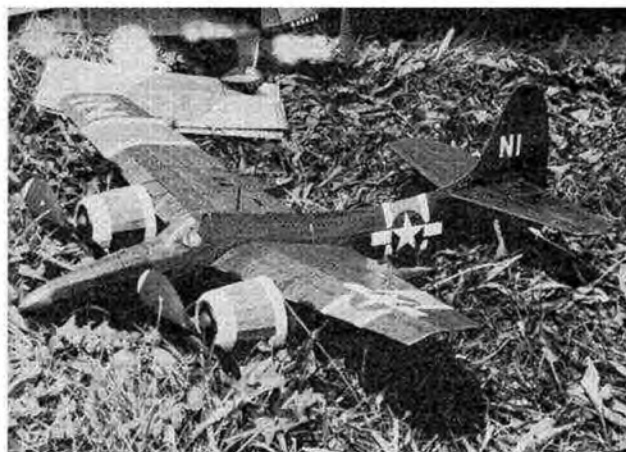


Left: Jumbo scale DH Moth Minor by Leon Bennett of New York used 12 strands of the flat rubber for real power! Below: super flyer - this Martin B-26 Marauder (twin) by Pres Bruning. Props rotate same way.





Beautifully produced Douglas Dauntless jumbo scale by Don Snull. Note the winding tube and wealth of panel line detail.



Twins rule OK it seems! Grumman Tigercat by Dennis Norman is another with props that rotate in the same way.

wing-fuselage junction. Damage was not great and Dennis has probably reinforced it by now. Don Snull had a whole bunch of beautiful models and they all flew well. No one can figure out how he finds the time to make so many — he is also into radio scale in a big way! Truly a master builder.

Jumbo scale rubber had its usual bunch of devotees; these large models are very majestic in flight and I didn't see any disasters, but they obviously don't have the 'bounce' potential of the smaller models. Some of the rubber motors involved would have done justice to a Wakefield, and a number of fliers used motor tubes when winding.

Expatriet Gordon Roberts test flew his Jumbo Boulton-Paul Defiant and then proceeded to win the special 'Battle of Britain' mass launch event with it. Three minute flights are quite normal for this model! His Jumbo Chambers Chambermaid racer flew at scale speed (of the Hindenburg) for the regulation three minutes plus.

The mass launch events were as popular

as ever — this just has to be the best way to run a contest. They included the Thompson, Greve and Aerol Trophies for racers, World War One Dogfight, World War Two Combat and the Battle of Britain competition limited to models of types flown at that time.

The Schneider Profile event for 3/4" scale models produced some interesting entries which looked really good in the air. Flight times were generally high in all events and in W.W.2 Peanut Combat for example, you had to achieve over a minute to stand a chance of qualifying with a 'normal' low winger.

Other notable performances were put up in the Embryo event. Some of these models were truly outstanding and made me wonder why anyone bothers to make duration models any bigger. Embryos are also awarded semi-scale appearance points, so there were many very attractive and unusual models.

The AMA free-flight scale events made an interesting contrast. Although the standard of modelling was generally high,

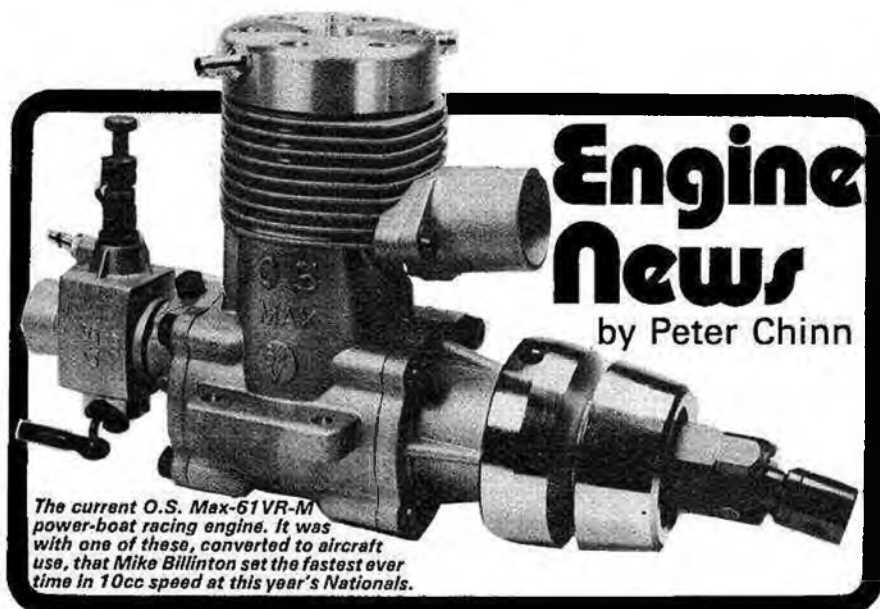
the take-off requirement and other bothers made it rather less interesting and was certainly more hazardous to the models. Entries were also comparatively few, so why don't 'they' change the Free Flight Scale rules? The same thing applies over here of course.

I did hear some complaints about the weather — some said it was too hot! Wouldn't it be nice to be able to complain about that at our Nats?



Above: Canard Embryo Bipe takes off from regulation cardtable. Left: this Vari-Viggen was limited by propeller but flew quite well. Right: quite the most ambitious model seen at meeting, this Russian 'Bear' bomber by Dennis Norman was damaged in test flight using only two of four rubber motors, which will eventually provide power.





The current O.S. Max-61VR-M power-boat racing engine. It was with one of these, converted to aircraft use, that Mike Billinton set the fastest ever time in 10cc speed at this year's Nationals.

200 mph!

To forestall enquiries from readers wanting to know about the O.S.61 speed engine with which Mike Billinton recorded the fastest ever in C/L speed, at this year's Nationals, we had better point out that this was with a converted O.S. Max-61VR-M marine unit, not a regular O.S. control-line speed engine.

With the replacement, last year, of the side-exhaust Max 60RSR and 65FSR series engines, by the new rear-exhaust Max 61VR-M and 65VR-M, O.S. ceased offering control-line speed versions of these rear rotary-valve racing engines. However, the 61VR-M uses the same main casting as the 61VF shaft-valve aircraft engine, which means that it has cooling fins and can be turned back to front, enabling the exhaust to remain facing aft when the drive take-off is at the front of the engine, instead of the rear, and conversion to aircraft use is quite simple.

The Max 61VR-M is of the ABC type but, like other recent high-performance O.S. motors, the cylinder does not have just a chromium plated bore. Instead, the entire cylinder liner — i.e. its o.d., i.d. and ports, rather than the bore surface only — has a special hard plating of nickel-aluminium-oxide which is claimed (with some justification, it seems) to be superior to all other bore treatments.

Port opening periods for the 61VR-M are longer than those of the 61VF or the 60RSR. According to our measurements, the ringless low-expansion gravity-cast aluminium piston uncovers the exhaust for 165 degrees of crank angle, while the two main transfers are open for 132 deg. and the third port for 130 deg. of crank angle. The piston weighs just over 10g, or 13.3g when fitted with its 6mm o.d. tubular gudgeon-pin. The machined conrod is bronze bushed at both ends and is 40mm between centres.

The crankshaft runs in a 12 x 28mm 8-ball steel-caged ball journal bearing at the rear and a $\frac{3}{8} \times \frac{7}{8}$ in. steel-caged shielded bearing at the front, both contained in a robust pressure cast housing that is attached to the crankcase with 4mm socket head cap screws. The shaft itself uses a 360-degree crankweb with peripheral balancing slots each side of a 6.5mm dia. crankpin which has a 4mm dia. spigot for the rotary-valve drive.

The counterbalanced valve disc is machined from a steel investment casting. It is hardened and ground to a fine finish, is 2mm thick, is mounted on a 5mm bronze pin in the backplate and uncovers a large sector shaped port in the face of the backplate. This, fed smoothly from a 13mm i.d. intake, is timed, according to measurement of our Max-61VR-M, to open at 35 deg. ABDC and close at 55 deg. ATDC. As

supplied for R/C power boat racing, the 61VR-M is equipped with an O.S. Type 7F carburettor having automatic mixture control and an effective choke area of some 75 sq.mm. The intake boss i.d. is 15mm and, if need be, the choke size of a straight racing venturi could be anything up to 13mm i.d.

Conversion of the Max-61VR-M to air-cooling merely requires the replacement of the cylinder head, since only this component is water-cooled on the standard marine engine. The marine head has a bowl and squishband combustion chamber with a 15mm dia. x 4.4mm deep bowl, surrounded by a 4.5mm wide sloped squishband. Fitted with an 8 thou. gasket, our engine has a nominal compression ratio of 12.5:1.

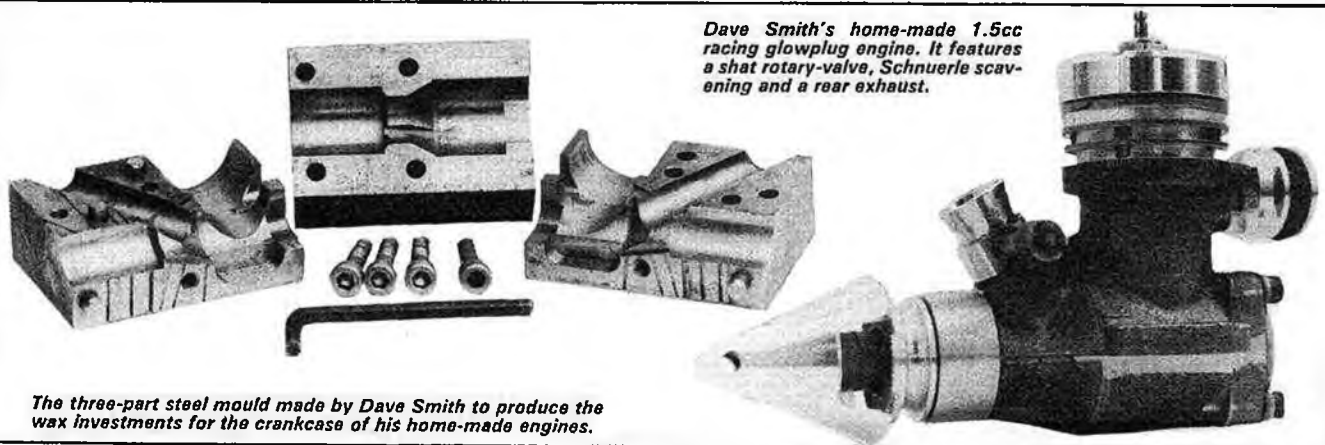
Conversion from flywheel to prop-driver can be easily accomplished by fitting a late model (16mm shaft) Max-60FSR prop-driver and collet, or a complete prop-driver/spinner-assembly from a 60RSR or 65RSR C/L speed engine. Our Max 61VR-M, fitted with an RSR spinner assembly, air-cooled head and a racing venturi and needle-valve, tipped the scales at 19.6 oz., a reduction of over 9oz on the standard marine version. The 61VR-M has the standard 24 x 22mm bore and stroke and is therefore within the FAI 10cc limit at 9.953cc or 0.6073 cu.in.

Interesting home-made 1.5

Just before leaving *Aero Modeller*, ex-editor Martyn Cowley passed on a letter from Dave Smith of Basildon, Essex, describing a contest type 1.5cc engine that he had designed and built. As the photos show, the engine has been made in two versions: a front induction speed glow model and a rear induction diesel for Half-A team racing.

The two engines are based on a common crankcase, investment cast in the widely used LM4 casting alloy, which also includes the cylinder casing and front housing, but not the transfer passages as these would have caused additional headaches with tooling and casting. Instead, the engine has a dural sleeve into which are machined cutouts for the transfer passages and this is installed between the case and the steel cylinder liner. All parts were machined on the ubiquitous Myford ML7 with the exception of the crankshaft, which is ex-Webra 1.8 because Dave Smith did not have facilities for grinding. Describing

Dave Smith's home-made 1.5cc racing glowplug engine. It features a shut rotary-valve, Schnuerle scavenging and a rear exhaust.



The three-part steel mould made by Dave Smith to produce the wax investments for the crankcase of his home-made engines.



Evolution of an investment cast crankcase. Left to right: (a) wax pattern; (b) solid crankcase as cast in LM4 aluminium and (c) rough machined and heat-treated unit ready for final machining.

how the various parts were produced, Dave writes:

"As shown in the photograph, I made a three-part steel mould into which I poured Flexiwax (wax used for investment castings). The crankcases were then investment cast from the wax patterns in LM4 aluminium by a friend of mine. They were cast in solid form as the foundry suggested this would be the easiest way. I then rough machined each case as shown in the photograph and sent them away to be heat treated. After this process, the cases were ready for final machining using the numerous jigs that I had to make.

"The cylinder liners are made from EN.1A free-cutting steel and incorporate all the latest ideas in Schnuerle porting. The glow engine liner is run soft, as machined, but the diesel liner is hard-chromium plated to withstand the long lean runs encountered in team racing. The pistons were machined from Meehanite, then lapped to size using an adjustable brass lap and diamond paste. The piston pin is retained by one circlip as the reamed hole does not go right through the piston.

"The head on the diesel is the two-part aluminium type so successfully used on the Bugl, Nelson, FMV, etc. The speed motor uses a conventional head with separate glowplug at present, but tests are proving that one-piece insert heads, like the Rossi glow-head, are superior. The conrods are made from high tensile aluminium alloy and standard items like carbs, backplate, cylinder heads, prop drivers, etc. are all turned from dural.

"There are numerous different variations to try out, i.e. I will try a K&B type drum-valve back door as used on the Nelson and FMV - which appears to work very well, especially on low oil-content team-race fuels."

Dave Smith completed these two engines some months ago and perhaps he will be able to let us know at the end of the season what success he has enjoyed with them.

Found! A stock of Amco parts .

Arising out of the enquiry, published in the August issue, about spare parts for Amco 3.5 engines, we have been contacted by Mr. A. R. W. Taylor of 5 Chiltern Lane, Eccleshall, Stafford ST21 6JJ. Mr. Taylor advises that, many years ago, he acquired what is believed to be the only remaining stock of (not only unused but, in many cases, unfinished) parts for Amco 3.5, 3.5-Glow and 3.5BB motors.

Practically all parts for these engines,

with the exception of 3.5BB backplates and valve rotors, are available, including hundreds of needle and spraybar assemblies, but Mr. Taylor would prefer to dispose of the stock in bulk, rather than deal with a lot of odd items. He has said that he will make a list of all the parts available, so that anyone interested can obtain a copy by sending him a stamped, self-addressed envelope at the address given above. Alternatively, he can be contacted by telephone on 0785-850172.

It is stressed that the Amco castings are mostly unfinished and that crankshafts, pistons and cylinder liners require lapping, etc. — not that the need for final working by the owner was entirely unknown in the heyday of the Amco when fitting allegedly finished parts. We well remember the occasion, way back in 1951, when brother John's Amco broke its shaft, a few hours before an important national free-flight contest, and our subsequent frantic efforts to lap in a much oversized new shaft to fit. At that time, one used Amcos because, for all their shortcomings, they had the advantages of compact dimensions and light weight — in fact they were lighter than some 2.5cc engines, would give a higher power/weight ratio and had the ability to turn a bigger diameter prop. So, if one could design a 2.5cc size model that would handle the extra power, one was onto a winning combination, which was exactly the case with brother's *Ascender*, an 18-oz HTL model that won the Halifax Trophy in 1951 and went on to amass the highest overall flight average of the 1951 season.

Mystery Motor from the Antipodes

John Ensoll of Christchurch, New Zealand, has sent us a photo of a vintage spark ignition engine which he would like



Picture from the display of the Amco diesel: a youthful John Chinn with 1951 Halifax Trophy-winning Amco 3.5 powered 'Ascender'.

identified. We have to confess to being stumped by this one. Does anyone recognise it?

As the photo shows, it has piston controlled induction but is unusual in that the rear intake and bowl type tank unit is attached to the back of the cylinder by means of a large rectangular plate, while the exhaust port is at the front and discharges each side through a T-shaped outlet. The "carburettor" matches the exhaust in that its inlet is also T-shaped. These features, alone, should be enough to identify the engine, but other features include a drain plug in the bottom of the crankcase and what appears to be a non-detachable cylinder head.

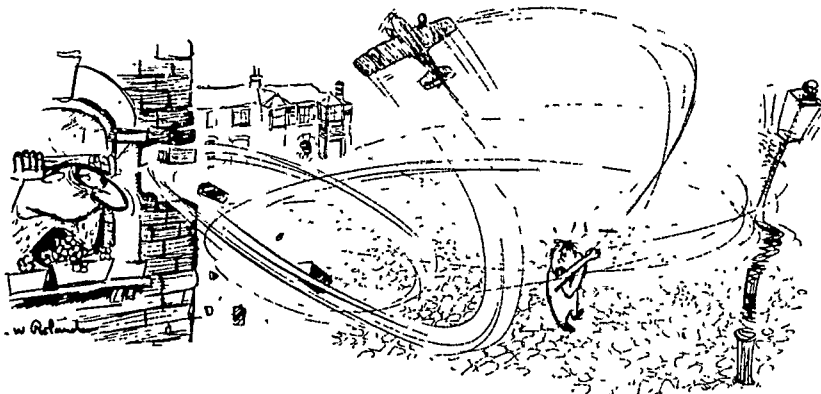
Mystery Motor No. 2

Dennis Nixon of team-racing and Punctilio prop fame brought this one along in the hope that we could put a name to it but, if it was ever commercially produced we certainly don't remember ever having seen one before. It is very much in the 1940s spark-ignition tradition — probably 1946-48 and, one would think, from its general appearance, British. As can be seen from the photos, it has an integral fuel-tank-cum-radial-mount and an unusual feature is the integral fuel passage in the bottom of the crankcase which conveys fuel from the tank to the angled rotary-valve intake beneath the main bearing. The one-piece cast-iron cylinder with integral fins and bolt-on transfer cover and exhaust pipe are in keeping with the 'forties period.

Does anyone recognise this one?



FROM THE HANDLE



RACING

by Dave Clarkson

Goodyear at the 1980 Nationals

Goodyear at the 1980 Nationals saw quite a change for it was the first Nationals run using the new '2.5cc diesel only' rules. To me, the new rules seemed popular with the participants, for the entry approached twice that of last year, the last Nationals run to the old rules which permitted 3.5cc glow motors. Compared with the racing to the old rules, this year saw a lot less carnage and a lot more close racing. 'More fun, less fear' would seem to be the result of the new rules as typified by the Open Final where all three teams finished within a 1.5 sec. time bracket. My conclusion is that the new rules are a success. For those interested in joining this success story, a review of some of the lessons learned this year may be appreciated.

MODELS— APS plans dominated with the 'Mike Argander Special', 'ol'Blue', 'Li'l'Quickee', and 'Miss San Bernardino' proving the most popular.

MOTORS— To be competitive, it would appear that either a Rossi Diesel (FI or RV— both work) or a Nelson 15D (CSI or ACC) must be used. This constitutes a problem because the Rossi diesels are out of production and the Nelson is a long delivery item. Of course the second-hand motor market exists and I suspect that there are a lot of 'useless' Rossi diesels and Nelson CSIs around (useless for FAI-TR that is) that FAI-TR enthusiasts would either wish to employ or sell. It may well be that other motors may emerge and one obvious candidate is the new MVVS Schnuerle.

PROPS— By far the most popular props were the Bartels GFRP 7x6, in original and copy form, and the Talpan 7x6 with the GFRP prop somewhat better. Most users of the Bartels prop and copies of this were using a peak pitch of 150-155mm and a diameter of 165—170mm.

SYSTEMS— This is one area where two distinct approaches were evident. To get the maximum BHP out of a 2.5cc diesel, a Venturi diameter of between 5 and 6mm would seem necessary. With a front-induction motor using such a large venturi, fuel-feed via the necessarily long fuel tube from the tank to the motor suffers at take-off so pressure feed has to be used. Not good from a pitting point of view for at the Nationals only the winners seemed to get it right and even they had trouble at the one stop in the final where they had to refuel. Rear-induction motors have very short fuel lines and, as long as the tank fuel pick-up point is no more than about 5mm outboard of the needle-valve, take-off seems trouble free with conventional suction feed. Of course, suction-feed allows the use of FAI-TR style multi-function valves and pressurised re-fuellers which make life easy for pitmen.

RULES— Much controversy existed this year concerning the interpretation of the model rules. Controversy which had to be resolved by means of written protest and an official protest jury followed by critical examination of all of the semi-final qualifiers. The interpretations that emerged are summarised as follows:

Motor safety cable

The current rule which states that a seven strand cable must connect the motor to the bellcrank was enforced strictly for reasons of safety. Seven strand cable was taken to mean Heavy Weight Laystrate at the minimum.

Model weight

Again on safety grounds, the rule that required the model weight in grams to be written in figures at least 20mm high on the inboard wing-tip of the model was enforced.

Model finishes

As a minimum standard the fuselage must be painted with coloured paint with the cockpit outlined or preferably painted on in a contrasting colour. Clear finish wings are acceptable (but not encouraged) provided that the control surfaces are shown in outline.

Racing numbers

The appropriate racing number ('39' for a Mike Argander Special, '97' for an Ol'Blue, '71' for a Li'l'Quickee, '31' for a Miss San Bernardino etc.) must appear in suitably large figures on the upper surface of the wing and on both sides of the fuselage.

Motor Cowling

If when viewed from vertically above and below the model, any part of the model covers the motor outboard of the thrust-line of the motor, then such covering is deemed to be cowl of the motor. The rules specifically ban cowl of the motor.

The point is that Goodyear is Goodyear and not some form of rat-racing, and equally that safety is of paramount importance. Some may consider it odd that, after 10 years of Goodyear in this country, only now did the Nationals see this rather basic processing of models. In my view FAI-TR is the event for strict rule enforcement, not Goodyear, which, after all, is supposed to be a beginners event. However, when the spirit of the Goodyear rules is questioned as it was this year at the Nationals, then enforcement has to be practised to ensure fairness for all. Let us all hope that people hold to the spirit of the rules as interpreted at this year's Nationals and that as a result written protests remain the rarity they should be.

Goodbye from me — and hello from him

For more years than I care to remember, I have been writing this column. It has been hard but enjoyable work and from the volumes of correspondence received over these years, I know that many of you have appreciated the results. It is sad but true that all good things come to an end and to my own regret, that applies to my scribbles in this column. From the first of October my home became South Africa and I will be here for the next couple of years. It has been a considerable wrench to

leave the European aeromodeling community for there can be no doubt that it is the best in the world. However, my new job in South Africa is full of excitement and promises a much improved standard of life for my family and I. I have avoided making the choice between a good life and the toys for more years than most; if only I had not had to make that choice but circumstances have forced it and it was no contest.

Now my friend and team-mate Jim Woodside takes over. I know that Jim is a better writer than I (after all English is his business) and that he knows more about TR than I for he is a pitman, and pitmen do all of the tricky stuff in TR. Therefore, I look forward as I am sure all of you do to reading the new 'King' Jim Woodside. I hope that the years of my writing this column have made some contribution to enlivening the subject of Control Line Racing around the World; I know Jim will.

If I may reminisce just a little. My first C/L Racing victory was in Goodyear ten years ago in 1970. Now in 1980 I bow out with what may be my last win, again in Goodyear. The pleasure these first and last wins have given me will last for ever and ensure that Goodyear remains close to my heart. In the hope that Goodyear can continue to flourish here, I leave you with my last contribution which surprise, surprise, is on the subject of Goodyear.

COMBAT

by Paul Smith

Recently I have been corresponding with Victor Tan, a young combat flyer in Singapore. In his last letter he informed me that he had won the Junior (under 18) class of FAI combat at his Nationals. He used Superstar III's powered by a Cox Conquest and a G20. He also sent me a list of questions that could be useful to combat flyers everywhere, especially those who are isolated from the mainstream of competition.

Q: Is 2.45 sec per lap a good speed? A: Generally combat models are timed for 8 laps and the time divided into 1800 to compute miles per hour. $8 \times 2.45 = 19.6$ sec. $1800 / 19.6 = 91.8$ mph. In the metric system, time for ten laps and divide into 3600; $3600 / 24.5 = 146.9$ kph. In FAI combat you should be in the 90 to 100 mph range. If over 100, you have an exceptional engine. If under 90, you definitely need to improve. So your plane is in the competitive range.

Q: Where can I obtain plans for the Voodoo? We find the foam planes difficult to build over here. A: I agree that in a low production operation, foam can be more trouble than it's worth. Especially if the alternative is assembling kits. In my location, an equivalent amount of balsa costs almost five times as much as foam, so I build foam. The Voodoo is kitted by Carl Goldberg Co., and has been America's most popular combat model since it was introduced in 1961. Plans are no longer available for most designs that were kitted. The price of the plans was so close to the kit price that everyone just bought a kit and used that for a plan.

"The Rongeur", designed by Chuck Rudner was published in the December 1979 issue of "Model Aviation". It is available as plan 284 at a cost of \$5.00 US. This model is very similar to the Voodoo. (815 15th Street N.W., Washington D.C., USA 20005).

Several other Balsa kits that have successfully been used in FAI combat are the Sneaker, the Demon, the Matador, and the Nemesis. All of these were originally designed for .36 engines, but with smaller motor mounts

and a little lightening up, actually fly better with .15 glows. You should look in any U.S. magazine for the ads from the discount mail order houses. They frequently sell whole kits at the same price as a set of plans.

Q: We have temperatures of 34°C (95°F) and humidity of 95%. We don't go over 25% nitro because of blown plugs and overheating. Also, we wear out engines too fast. How do you deal with these problems? **A:** Head clearance is the key. Right now in my home town of Detroit, Michigan we are experiencing the same temperature and humidity you have described. Cool and dry is better than hot and humid, but very good performance can be attained in any conditions if head clearance and nitro content are right.

Before running each engine you should measure the head clearance I consider .15" (.39mm) as a good starting point. If the temperature and humidity are low and you are using little or no nitro, you should use less. For high temp, humidity, and nitro you must use .020" or more. In a very careful test, we found that a good Rossi didn't lose much power until the head was raised above .025". Too little clearance can cause you to break a rod or a shaft, as well as blow a lot of plugs. A dial caliper or depth gauge would be a great help if you don't already have one.

Good FAI combat engines do blow a lot of plugs, but to worry.

Q: What do you do with engines that are worn out? Do you simply throw them away? **A:** The first part to go is generally the piston/sleeve. We replace them with new parts from the factory. Fox and K&B have good factory-direct mail order systems. Cox does also, but they have the bad habit of grouping parts together, thus forcing you to

buy more than you really need. For example, the piston, sleeve, rod, wrist pin, and clips are one part number. One plus for the Cox is that the piston and sleeve are 100% interchangeable with Rossi. I've seen them mixed both ways with no difference in speed. (Some people will argue that.)

A few engine companies have little or no parts-backing. This may vary with your particular location. With some engines it may be completely impossible to get parts. Buy a different kind next time.

Some speed flyers have succeeded in building up worn sleeves with hard chrome or teflon. I have payed several different shops to do this job for me and have been disappointed with the results every time.

Q: What modifications could I do to the ST G20/15 glow? **A:** I do not own that particular engine, but I will comment on reworking engines in general.

Basically most of the engines we were originally designed for speed or free flight, not combat. Therefore they usually are already higher performance machines than we want. The problem is to get them to run smoothly and dependably for four minutes in manoeuvring flight when they were built to run few seconds flat out. Also, the speed, racing, or free flight men need only work with one or two engines, while the combat flyer needs four to six front-line motors. We simply can't make pets of them like they do.

I haven't done any grinding or machining on any of my combat engines. The head clearance is set as noted before. The engine is kept clean. The proper size propeller is used, never more than 7/4, sometimes less if the RPM appears to be low (under 20,000 if you have a tachometer). High nitro can be used in any weather with

the right head clearance. Venturi size should be as SMALL as possible without loss of speed. I use .250" to .270" on the Cox.

With the number of engines we need, you can't get too deep into modifications.

Q: How do you run-in engines over there? **A:** I put them on a test stand and run them 3 ounces at a time with a 7/4 cut to 6/4. Lapping is only done on unusually tight engines. Lapping an engine unnecessarily can ruin a brand-new piston and sleeve.

Q: What do you think of glass and carbon fibre props? **A:** A new one, the "Master Airscrew" by Windsor Propeller Company, P.O. Box 112, Windsor, California, USA 95492, has just become available. I am very happy with it and have used it in two contests. It runs very well on engines that blew the blades off Tornado whites. It required a little trimming at the tips to get the revs up. The best part is the price (less than wood). All other glass and carbon props are far too expensive for combat.

Q: What's your favourite glow plug? **A:** The K&B 1L. They don't last forever, but they get you through the match, the quality is consistent, and the price is right.

Q: Do you still have Rossi 15's available in the US? **A:** Very few, and they are three times the price of a Cox. I have two Rossi's. One has a blown crankpin and the other is now running with a Cox piston & sleeve. My four Coxes have always been equal to the Rossi's.

I hope that my answers have been helpful to some of the readers. If I can be of help to you or if you are to add anything to the above, please contact me via *Aeromodeler*.

Winner Uffe Edslev of Denmark (right) in action against Tim Bertram of Great Britain during the semi-finals.



DUTCH COMBAT INTERNATIONAL

by
Richard Evans

AMERONGEN HOLLAND 9/10 AUGUST 1980

IT SEEMS VERY DIFFICULT to believe that this is the ninth occasion on which this competition has been held.

The flying site on a sports ground in Amerongen was superbly set out as usual. The camping area immediately next to the circles was convenient as was the clubhouse with never ending supply of local beer.

Seventy two entries were received in all, being largely made up of roughly twenty flyers each from U.K., Holland and West Germany. To the eyes of the writer there were many new faces and names although a few 'old stagers' from the diesel era remained.

As usual the early rounds on the Saturday produced little exciting flying. Few good fliers were brought together in the draw but Sergio Tommelleri (I), Neil Gill (GB) and Bert Gysbertsen (NL), all good fliers, were out in the 1st round. Both Neil and Bert (who took second place at the World Champs) also failed to re-enter by means of the losers re-fly. The highest score of the day, and as it happens of the whole meeting, went to young Adam Willis of the Cosmo Club who took four clean cuts for Forbech of Denmark and spent no time on the ground.

Unfortunately Adam, who was then drawn against Loet Wakkerman (NL) in the elimination round lost due to

spending too much time on the ground. Wakkerman flew well with his "A-BO" design (Anti Boomerang) which was also in use by several other Dutchmen.

Other British losers in this round included World Champs team member Dave Wood. Dave had problems in his bout against Eugen, a teenager from France. Eugen's version of the Boomerang fitted with a very fast Rossi, was probably the most impressive model seen on this weekend. Ray Sibbald and Dave Willis were both seen "having a go" with it and pronounced it very nice indeed.

From now on the competition became more intense, and certainly more interesting for spectators and competitors alike. The first bout of the third round again saw Wakkerman performing, this time against Tim Bartram (GB). Tim was on top form and took four cuts from the Dutchman who soon realised that his model was definitely inferior.

"Boomerang triumphs over Anti Boomerang". Exit also the second Willis. Dave went out to a relatively little known Belgian, Van de Maele. Next Pete Tribe (GB) did a convincing job on Ron Kaptijn of Holland. Ron a very experienced flier, used models which looked rather out of date and simple could not cope with the likes of Pete who never came down in the whole four minutes.

The main upset in this round came when Red Meijer went out to Eugen after a re-fly. During the first flight which Fred won, the Frenchman was disqualified for attempting to fly a badly damaged model. On seeing that he was disqualified, he then made the only official protest of the weekend over a rather difficult matter that also involved advice given by the centre marshal. After much deliberation, the jury eventually awarded a re-fly and this time the result was reversed. However in Fred's favour, it is only fair to add that if you give a relatively inexperienced pilot a top notch combat model to fly — anything can happen!

At this point all but sixteen had been eliminated and several top fliers were really beginning to show their paces.

Uffe Edslev (DK) now saw off Mike Willance (GB). Looking very cool in his 3 — 1 victory, the Dane did some very impressive flying with his enlarged Superstar type model. Having flown his model later, the writer finds it difficult to understand how it could be flown with such obvious control. With the engine set into the leading edge



and using vast amounts of up and down elevator, changes of direction were almost too quick for the eye. His main evasive tactic was to perform consecutive loops or eights within inches of the ground. No other flier dared to try to follow him there. Edslev's philosophy of combat seems very much in the Wilken's mould. His models are put together with no attempt to embellish or even make strong. When flying he will follow when possible but often break off and fly away.

Ray Sibbald (GB) went out in the next bout losing to the Italian with the unfortunate name Silvio Faachin (it is actually pronounced Fatching).

However Sergio Tommameri also of Italy (and famous to the British for spaghetti eating) was beaten by Peter Wike (GB). In retaliation, it seems, Faachin then went on to beat Wike in the quarters.

Definitely the most controversial bout in the quarter finals was between Tribe and Edslev. During their first attempt to find a winner, a very strange thing happened. Within the opening moments the two pilots followed each other into consecutive outside loops. Neither wishing to give in, and reaching a point where it was impossible to fly out, the usual tangle and crash occurred. Pete could not untangle his lines, so was cut out by his pitman. He then took off with his second model only to be seen with lines tangled around his feet. As expected he was disqualified, but straight away the circle marshal consulted the jury and stated that in fact he had cleared the lines from the centre but in error dragged them back in again with his feet! After discussion, a re-fly was allowed and again within seconds a collision occurred and Peter released the handle. This time he was disqualified for good.

Tim Bartram was thus the only British flier to reach the semi final, and did this by beating Van Heugten (NL).

As usual each round was freshly drawn and much to

everyones dismay, Bartram was drawn against Edslev and Figs against Faachin.

The Bartram/Edslev duel looked set to be a classic but as often happens, it turned out to be a relative let down. Both pilots and models were really going well but within a half of a minute Bartram removed all of Edslev's streamer. A look of triumph appeared on Edslev's face and he gave a wave to his pit crew. Soon he took one large cut and then the knot to clinch victory. A great let down for the British.

In the other semi, Figs who nobody had taken much notice of until now, became the other finalist by beating Faachin by 3 cuts to 0.

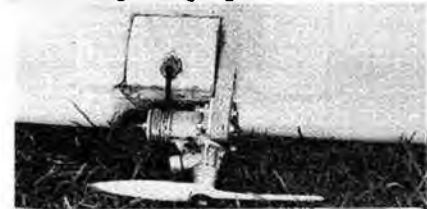
At this point in the proceedings, the organisers then took the four highest scoring under-18 participants and flew them off for a separate prize. Roland Forster of Germany was the winner with out Adam Willis beating the large Markus Wagere into fourth place.

The actual final was not particularly inspiring and had to be re-flown due to a technical problem. Each pilot tried taking the whole business very easily to start with and attempted following each other from a distance. However, Figs was soon in the ground and Edslev took one cut and remained airborne to win.

In retrospect, this event was always was exceptionally well organised. Other countries could well take lessons from the Dutch in how aeromodellers from all different classes can come together and produce a warm, friendly and yet very competitive atmosphere.

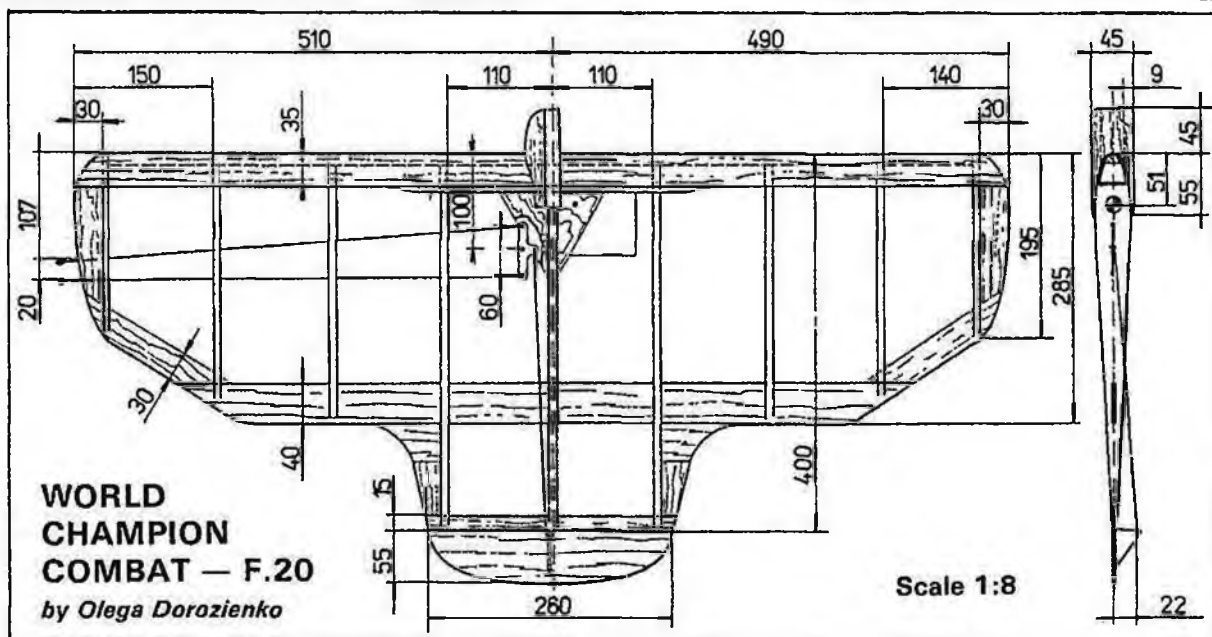
Next year will be the tenth anniversary of the event and it is rumoured that there will be a great effort made to bring back previous winners and those who have frequently supported the event. It would surely be a wonderful occasion if all the top fliers from the seventies could get together again. Let's hope they hear about it and make that special effort.

Above far left: young Adam Willis, dwarfed by his Boomerang. 3rd left: Sergio Tommameri of Italy with beautifully finished taper wing model fast with AD15 power. Above left: Thievery Ougan of France with superb SuperBoomerang - note the lightning holes in foam core wings. Above: winner Uffe Edslev of Denmark, whose model is detailed below showing engine set into wing leading edge.



RESULTS (70 flew)

1. U. Edslev	Denmark	22. M. Jarrett	Great Britain
2. N. Figs	West Germany	23. P. Vallins	Great Britain
3. T. Bartram	Great Britain	31. D. Willis	Great Britain
4. S. Faachin	Italy	32. D. Willis	Great Britain
5. P. Wike	Great Britain	32. E. Burles	Great Britain
6. N. Usala	Belgium	35. I. Kennedy	Great Britain
7. P. Tribe	Great Britain	36. D. Wood	Great Britain
7. P. Heugten	Netherlands	39. T. Frost	Great Britain
9. M. Whillence	Great Britain	41. P. Grange	Great Britain
10. R. Forstner	West Germany	48. A. Willis	Great Britain
11. R. Sibbald	Great Britain	55. J. James	Great Britain
15. P. Jayes	Great Britain	61. T. Jenner	Great Britain
19. R. Edwards	Great Britain	69. N. Gill	Great Britain



Offhand comment

I often think it is unfortunate that human beings have such restless urges. I know that novelty and change add to the excitement of life, but there are times when it is all a bit much. Take the latest in radio comps for instance. Over the years the competitive possibilities of radio controlled flight have been exhaustingly explored. Just think of all the spots that have been landed on, the forests of pylons piloted around, the tonnage of bombs dropped and sheer volume of balloons burst. Even the purgatorial depths of Limbo have been explored in the quest for new and exciting experiences. But now we have what surely must be the ultimate, a game known as 'hands off flying.' This seems to be a cross between Russian Roulette and poker. You just let go of the transmitter and leave the

Night starvation

Before getting the next item under way it has occurred to me that we have a serious rocket problem in this country. Those new dumpy milk bottles will be useless as rocket launchers on fireworks day.

Reading a wifely lament in a club magazine has made me realise that aeromodelling imposes more strains on the happy marriage than is generally thought. We are all aware that a home geared to the purposes and practices of model building is not the wife's idea of a cosy little love nest, particularly if the latest in radio gear takes precedence over a new washing machine, but now it seems that a further strain is the way all that late night building diminishes the conjugal bliss. Admittedly, whilst hobby hubby is tucked away in his work room he is not hogging the television for football and

aspirants, whose quality of wreckage goes a long way towards success. It hardly becomes the recipient of the trophy to have that winning wreckage back in flying condition. Generally he is apt to trample things around a bit to impress the judges. He likes to see the wreckage spread over a large area with the engine buried X number of feet.

Whilst on the subject of 'Crash of the Month,' I see that one club has expanded the award to a 'Crash of the Year' trophy. May I suggest that this be run on a points basis with special bonuses for loss of airfield and withdrawal of club insurance. Also there could be a consolation prize to the flyer who had made a splendid effort and who would have had a spectacular crash had not a spectator cushioned the impact.

TOPICAL TWISTS

by Pylonius
Illustrated
by Sherry

model in a state of non-control for just as long as your nerve will stand the strain or until the model has either flown away or reached zero feet. It might add a certain zest to the predictable routines of the Sunday morning flying session but is not likely to be eagerly taken up as an official contest, nor to endear itself to the insurance companies.

But this new type, non-control competition may be an indicator that things in the model world are moving full cycle, in that we may be returning to our primitive, uncontrolled beginnings, though suitably fortified by electronic gadgetry. Already we have those lumbering vintage gassies kept under suitable restraint by the judicious application of a spot of radio rudder, and the day of the radio assisted free flight model cannot be far off. Chasing models over brook and dell was idyllic stuff when there were green fields to chase across, but now that the countryside is just heaps of dirt fostering, valuable, shalt-not-be-trampled-on crops such scamperings are best left to the rabbits, who, after all, do present a rather smaller target to the twelve bore than the average model flyer. There is no reason why the requisite radio gear for single field operation cannot be encompassed in the weight and space taken up by a d/t timer. Might not we cannibalise this from some radio controlled 'Snoopy' of the future?

And what price timekeepers in the new computerised age? The old manual type, with its bleary vision and uncertain allegiances will be out. In will come the in-built electronic timer issuing a flight time print-out for Control. "Yes, I know your wife's been timing you for years but we must insist upon the use of the new system."



"A pretty good haul this Christmas. Two good timers, the best part of a towhook system, and one or two good bits for a noseblock."

other anti-feminist programmes, but there are times when the wife is in need of a little late night comfort, and that may be when the new, retracting undercart is reaching the exciting stage of positive action. What is a tear or two on the pillow compared with the heights of bliss offered by a fully functioning undercart, if not a fully functioning hubby.

Things are even worse if the lodger is a model builder as well.

Crash course

Someone has suggested that we should take our crashes more philosophically. Not because it may be good for our souls or our mental balance, but simply because the salvage possibilities are better appreciated by a calm mind than a distraught one — the calmer the more collected, as it were.

This advice, though, may not go down all that well with 'Crash of the Month'

Look! No wings!

We, in this country, have come to regard the ultimate in model flying expressed by the multi function radio scale model and the radio helicopter. There is nowhere to go from there, you may well be right — in this country, that is, but in the States they have been enjoying — if that is the right word — for some years the ultimate of ultimates: the model rocket. Try to launch one over here and that is what you'll get — a rocket, apart from a full scale turn-out of Civil Defence. In the States, though, they do not seem to worry much about a four minute alert initiated by a rocket flyer making an attempt on the club record, and where we are mowing and rolling our take off strips, our American counterparts are busy preparing their silos and safety bunkers.

"Do you put your names and addresses on your rockets?"

"No, not since we learned there was no life on Mars."

This month we complete the kit reviews of models which were supplied and built for the series. It is not proposed that any concluding recommendations should be made apart from reminding the newcomer to consider the total cost of the kit and extras required to complete the model. Your choice must be made on the basis of personal preference following the collection and analysis of as much information as is available to you.

E.M.P. Apogee

Designed and kitted by Dick Edmonds the Apogee is one of a number of slope/thermal soarers in the range. The model gets its name from the terminology used when describing the orbit of satellites or planets. The highest part of an elongated orbit is called the *Apogee*.

The kit is ARTF (Almost Ready to Fly) and comprises two ABS vacuum formed shells which are ready joined to produce an attractive fuselage with a trim tape covering the join, plywood reinforcement plates, suitable wood stock for fin/rudder, all-moving tailplane, and a pair of beautifully cut foam core wings with integral leading edge. Glue is supplied but no plan as such, since the well written instruction book includes all the required information, sketches, and tailplane plan. Each assembly is contained in its own polythene bag with a check list of parts. The only additional purchase is covering material for wings, tailplane, and all moving rudder.

Sanwa two function radio was fitted with

Above: the EMP Apogee comes almost ready to fly with APS vac-formed fuselage and foam core wings. Suits two functions R/C equipment for simple soaring. Below: Cambria Capstan also features foam core wing panels, while fuselage is boxy and simple to construct.

The nose simply dropped with no tendency to drop a wing. The landing was perfectly straightforward with full control being maintained even at low speed.

On the tow line, Apogee performed very well with no tendency to swing or roll off the line. There was little or no thermal activity (that I could find) during the day, so flights were not particularly long. However, enough was seen to expect that a reasonable performance could be expected from the model when its wing loading was taken into consideration.

Conclusion

A well presented ARTF kit which performs well off the slope and can be used for thermal soaring. Although conventional

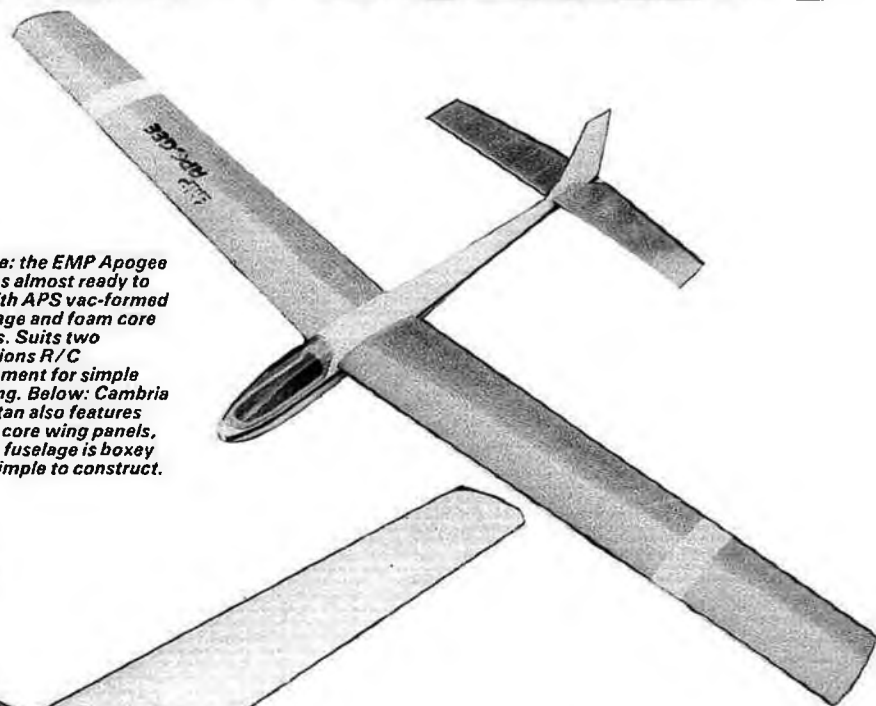
the battery pack in the nose followed by servos, then receiver (RX). The balance was checked and 2 ozs of lead fitted in front of the battery pack to achieve the correct C.G. *Control movements were set:*

Elevator $\pm 1\frac{1}{16}$ "

Rudder $\pm \frac{5}{8}$ "

Finished weight was 2 lbs 9 ozs giving an approximate wing loading of 12 ozs/ft².

First flights were from the slope with a perfect steady wind of about 12 mph blowing straight on. Apogee climbed away from the slope, like it was on strings! A touch of down trim and the model floated back and forth gaining height steadily. When sufficient height was gained, full up elevator was fed in until the model stalled.



building techniques are not used, the novice should have no difficulty if the building instructions are carefully followed. A stable and forgiving model in flight.

Cambria Capstan

This model is designed as a trainer for slope soaring, and the kit under review was indeed built by one of our first time modellers.

The kit itself is highly prefabricated with foam core obechi veneered wings, plastic mouldings for both canopy and wing fairing, and fuselage parts which are ready shaped. A very clear plan and concise building instructions are included together with hinges, horns, clevises and wing seating tape.

SOLARFILM was used for covering the model.

The finished weight, before radio installation, was 1 lb 14 ozs. Another 11 ozs of radio gear, and the finished weight was within 2 ozs of the top recommended figure. *Control movements were set as follows:*

Rudder $1\frac{1}{4}$ " \pm

Elevator $\frac{1}{2}$ " \pm

On the day of the first flight, the wind was blowing at about 15 mph directly onto the face of the slope. The Capstan flew away smoothly and steadily gained height. The stall was found to be quite gentle with no tendency to drop a wing. General control response was excellent, being smooth and positive, no vicious qualities at all. One of the 'landings' ended up as a cartwheel but the strength of the model was shown by the fact that there was no damage.

CONCLUSION

A well presented kit with simple, clear instructions enabling an attractive semi-scale model to be built. No problems were experienced by the novice who built this kit. Flying characteristics are docile and the model designed with strength in mind. An ideal first for the new modeller who wishes to take up slope soaring.

D. B. Models — Tyro Major

Designed as a 54" wingspan model for .15 to .30 cu.in. engines, the Tyro Major features simple box construction and stable flying characteristics.

The kit itself contains all the necessary hardware and wood which is of good quality. The only additional items required are glues, covering material and paints. The plan is clearly printed and rolled. The instructions are clearly written but some details are not mentioned although shown on the plan. A material list is given which helps the beginner to identify parts against the plan but this would be improved if all the parts were numbered. Die cutting was excellent, the wing ribs separated from their "mother sheet" cleanly and without the use of a knife.

The instructions mention "soaping the drawing". This refers to rubbing soap over the plan, especially where joints occur, to prevent excess glue sticking to the plan. A more acceptable method these days is to cover the plan with a polyethylene sheet.

The review model was covered with Solarfilm and ready to fly weighed in at 3lbs 3ozs. Controls were set at $\frac{1}{2}$ " each way for rudder and $\frac{3}{8}$ " each way for elevator. MacGregor 3 channel radio and an Enya .35 were installed.

The model balanced at the C.G. shown on the plan and was flown for the first time off



The Ripmax Trainer has already taught many R/C pilots the art of controlled flight. Our test model used Super Tigre 23 power and Sanyo radio.

a mown grass strip. Take off occurred after only about three yards and the climb out was fast and steep. Control response was very sensitive so the model was landed and by moving the receiver battery the balance point was brought forward by about $\frac{3}{4}$ ". The following flights proved the model to be quite docile.

CONCLUSION

A very complete kit requiring a minimum of extra items with good quality balsa and clearly printed plans and instructions. These latter items would benefit from 'up dating' to remove reference to single channel operation with an escapement and to show a typical installation for modern radio. Also the reference to sewing on rudder and elevator could be changed to showing, explaining, and supplying hinges.

Construction was simple and straightforward, and once the centre of gravity was altered after the initial flight, the Tyro Major proved to have docile flying characteristics and to be an ideal first powered trainer.

Ripmax Trainer

To be asked to review this kit was particularly pleasing as having flown Mode 1 for a number of years, I had thought of building a trainer in order to learn to fly on Mode 2. For those new to RC modelling, the

transmitter configurations for Mode 1 and 2 are as follows:

	Left stick	Right stick
Mode 1 (3 Channel)	Elevator only	Engine Speed Rudder
Mode 2 (3 Channel)	Engine Speed	Elevator Rudder

Being able to fly on both modes is useful when helping newcomers to the hobby and perhaps rescuing a "learner in distress". There are many arguments for and against each mode but a newcomer should choose the mode which is predominant in his local club, so that the maximum of help is available to him during the learning stage.

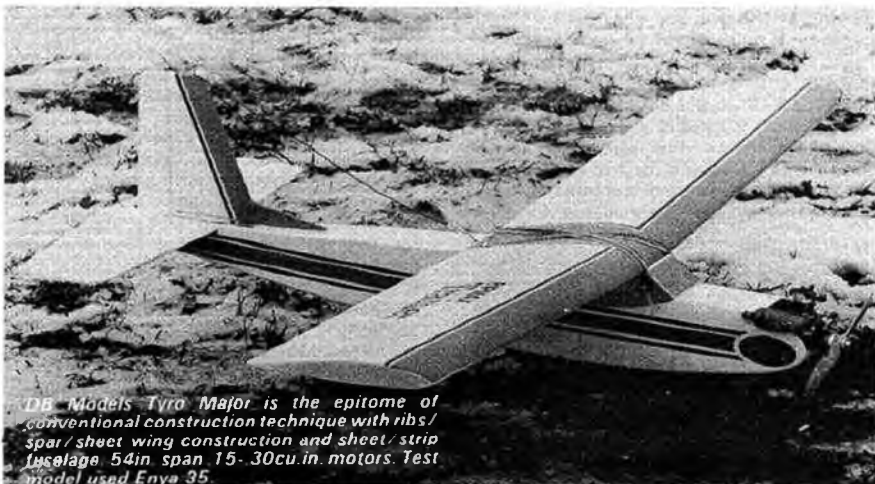
This is one of the most complete kits seen and includes many extras such as glue, sandpaper, pins and plan protection. The balsa is of very good quality and quite accurately die cut, but the fuselage sides were badly dented by the hardware in the box. To be fair though, this may have been caused by the handling of the kit during its trip from the factory, via a multitude of "let's look" people, to me.

The building instructions were very detailed and written for someone building their very first model. However, there are a lot of modelling expressions used which may not be too clear to a first timer.

Perhaps the most difficult of the construction jobs associated with this model are the wings, although the manufacturer has given every aid he can. All the ribs have building jigs, the dihedral is pre-set with plywood braces and the main spars are slotted to fit the ribs. The building details are very accurately described but patience is required to make a well built set of wings without warps.

With heavy landings in mind, I decided to cover the entire model with nylon. This of course, would add weight compared with plastic film, but as I had a Super Tigre 23 engine, I thought that the extra power from this would overcome the weight problem.

I first coated the entire model with clear dope and allowed it to dry. The nylon was then cut into convenient "panels", wetted and laid on the doped balsa structure. Dope thinners was then brushed on in the areas requiring adhesion and left to dry. It must be remembered that water will not shrink nylon. Wet nylon stretches and when put on in this condition it dries to its original size thus giving a tight and very strong covering.



DB Models Tyro Major is the epitome of conventional construction technique with ribs/spar/sheet wing construction and sheet/strip fuselage. 54in span 15-30cu.in. motors. Test model used Enya .35.

The covered model was then given three coats of clear dope (although coloured dope can be used if preferred) and one coat of polyurethane varnish. At this stage the transfers were put in place and a further two thinner coats of polyurethane applied to complete the finish.

RADIO INSTALLATION AND FLYING

I used *Sanwa* equipment and fitted it exactly as described in the instruction booklet, taking care to get the centre of gravity right. All the push rods and connectors for the controls are included in the kit and these were used.

The first flight proved the model to be very stable. All the basic manoeuvres of turning, climbing and looping were effortless! The model stall turned with precision but was far too stable to roll on rudder, although by using full elevator and rudder it would spin well and stabilised very quickly on neutralising the controls.

CONCLUSION

All in all a nice trainer that is relatively easy to build, easy to fly and a very well presented kit.

Keil Kraft New Super 60

This model comes from a long line of well tried and tested designs. It differs from its immediate predecessor in construction by making more use of sheet balsa for sides and using laminated ply/balsa formers. In exterior design this model has a nose leg whereas the previous model was a 'tail dragger'.

The kit is very complete with only covering material for the builder to purchase. Apart from a supply of suitable adhesives, pins, a modelling knife, glasspaper and even polyethylene sheet is supplied. The latter item as protection for the plan. The plan is well printed and the instruction booklet clear and concise with step-by-step instructions. Wood quality was good in the review kit although sheet provided for fin, rudder and elevator was quite hard.

The model was covered in red heat shrink film and white panelling to match the box top illustration. The acetate sheet windscreen and side windows were fitted using epoxy resin and as a final touch, black film was used to form letters.

The only modification was to the undercarriage which I felt might spread under the load of heavy landings. Fig. 1 shows a method of preventing this.

An *OS 35* engine was fitted with a 10x6 propeller and the *MacGregor* three channel control system was installed in the position suggested. When the centre of gravity was checked, the balance point was not right so



Keil Kraft's new Super 60 is a bit bigger than most trainers and is the latest '60' in a line that started with 'Junior 60' back in the early 1950's. The line has probably taught more novices their art than any other trainer.

4 ozs of lead was bolted to the underside of the engine.

Although guidance is given in the instruction booklet regarding control surface movements, this is limited to suggestions as to which holes in servo arm and control horn are used. The review model was set up as follows:

Rudder $\pm \frac{1}{4}$ "

Elevator $\pm \frac{1}{16}$ "

Final weight, ready to fly, but less fuel, came out at 5lbs 10ozs.

First flights were carried out from a tarmac runway on a cold blustery day. Far from ideal for a novice but conditions which would give a good idea of the model's stability. In fact take off was smooth, with a gentle climb away. The model was stable in flight with good control response and was quick to return to stable flight when deliberately put in 'unusual' attitudes. Control response was maintained at low speed during landing.

CONCLUSION

A well presented kit, very complete, but definitely a 'builders' model. Flying characteristics give good inherent stability with the option of developing the model to 'full house' by the addition of aileron control. Meets all the required parameters for a first R/C model.

M.F.A. Yamamoto

This kit review is perhaps a little different from the usual report in that the builder is a novice to model aircraft and therefore was looking at the project very much from the beginner's point of view.

The first instruction on the leaflet was to drill the engine mounting and then clamp this to the 3mm ply engine bulkhead and drill through to enable the mounting to be bolted on. Then the plastic mounting brackets were drilled for the noseleg and fitted to the other side of the bulkhead. Unfortunately, this assembly did not quite line

up as on the drawing as the type of bolt shown was not in the packet of small components.

The reinforcing side panels in the area of the cockpit were stuck to the long sides and the reinforcing fillets stuck and pinned into place, with the fine wire pins provided in the kit. The provision of such an elementary essential item was impressive, as the beginner usually starts with absolutely nothing.

The P.V.A. adhesive — also supplied in the kit — set up and fixed the components a lot faster than was expected and therefore it was decided to continue and fix all the formers.

Two parallel lines the full width of the fuselage were drawn on a chip board base and the position of the three bulkheads were drawn in position on the board. A sheet of clear polyethylene was pinned on top to prevent sticking to the board. The line of the bulkheads was marked on the inside face of the sides and the whole assembly was glued and pinned to the base board.

The time taken to set the wing up accurately was sufficient for the bulkheads and sides to be firmly fixed. The fuselage was unpinned from the board and the tail-end of the sides was carefully shaped so the two sides came together neatly. This was then glued and held with a 'Bulldog' clip, care being taken to ensure that the joint was on the centre line of the aircraft.

The next stage was to fix the top and bottom surfaces of the fuselage from sheet balsa with the grain running across the length of the aircraft to give stiffness.

No attempt was made to pre-cut the shape to fit the fuselage. Instead, rectangles were cut from the 3" wide sheet, so that it overlapped the outside of the frame. In this way it was possible to get the edges glued and butted tightly together and pinned in position until fixed. When dry it was possible to clearly trim away the overhanging material with a razor blade — which was also supplied in the kit!

The thickness of $\frac{3}{32}$ " and grade of balsa for the underside of the fuselage was adequate and made for a smooth strong finish. However, the sheet for the top surface which was of a softer grade, left something to be desired.

The tailplane was very straightforward to make, being produced from a good grade of $\frac{1}{8}$ " thick balsa. All that was required was a small amount of shaping with the razor blade and careful sanding with very fine sandpaper.

Continued on page 686

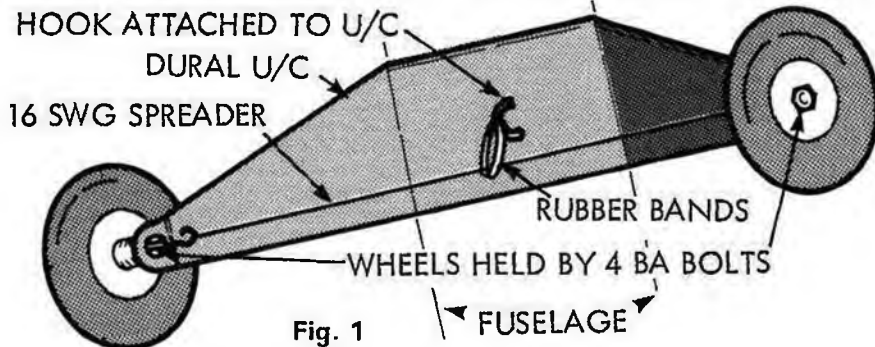


Fig. 1

Free Flight Scene

Free Flight European Championships — Mostar 1980 — Yugoslavia

MOSTAR, THE SITE of the 1980 European Championships, lies roughly half way between Split and Dubrovnik, about 40 kilometres from the Adriatic coast. Mostar has the reputation of being one of the hottest places in Yugoslavia in August, a reputation which it lived up to during these championships. The field was extremely large, being 12 kilometres long by 4 kilometres wide. It is a silted up lake bed and therefore extremely flat and covered with short grass; the only obstacles being the odd gully, a small river at one end and a few sheep and cattle. The event itself ran smoothly and to the timetable; however little information was given as to what was happening at any particular time. In fact we received copies of the programme 2 days after the start.

Thursday F1-A

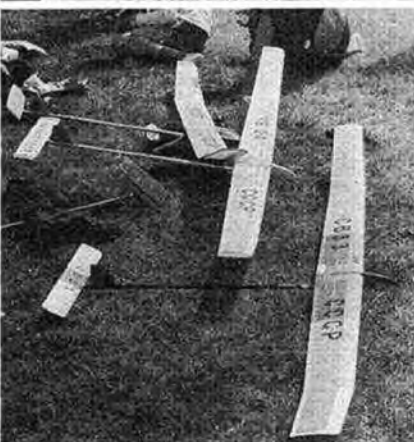
Contrary to practice days, Thursday morning at first light was rather cool, dull and overcast. However although the air seemed dead, there was more than sufficient light lift about to produce three minute flights. The British team made a reasonable start, with Brian Beines unfortunately dropping eight seconds on his flight but Gerry Levey after a second attempt, getting away in the dying seconds of the round behind the Rumanian, who was eventually to be placed fourth. Two most important casualties were Victor Tchop and Ivan Horejsi, both of whom dropped some twenty seconds. With conditions for the second round almost identical to the first, the majority of people maxed and others came very close. This time Andres Lepp managed to drop six seconds to put himself out of contention. His model featured a fully tapered wing of about 2.4 metres span with slight elliptical dihedral and Hoerner tips and also featured a T tail. Notable was the height gained from the catapult launches — considerably more than we see in the UK.

By the third round the sun had come out and it was obvious that the event was, as usual, to become a sudden death affair with a flight less than a max putting one out of the running. Unfortunately by this time, despite long tows and good launches, all the British Team had dropped time and it was just a case of plodding on and hoping that the others would fail likewise.

For Round 6, after the lunchtime break, a stiff breeze had risen and with it came thermals of a reasonable strength. The final round saw several upsets, the Dutch were leading the team placings but Messrs. Breeman and Kappelhof both dropped 40 seconds in the last round, depriving themselves of a place in the fly-off and their country of the team award. Also in the last round, the new Russian glider flyer Victor Stamov, even with help from Tchop and Lepp, dropped nearly a full minute, to leave a four man fly-off.

At the commencement of the fly-off signal, all four started to circle tow. After several minutes of protracted towing, the Yugoslav launched into what was to be the only good patch of air. The Norwegian Arild Larsen, who was his country's only representative in the contest, tried to launch into the same patch of air but despite the attention of many flapping Scandinavians, his model was unable to reach the same time as the Yugoslav, whose team took the team prize possibly as a result of local knowledge of the field and weather conditions.

Right: Valentin Mozinsky of USSR, third in FIC releases vertically into misty conditions during 6.30 am flyoff. Below: Mike Woodhouse holds for John Bailey during F1A first round. Second down: three USSR A/2s — from foreground by Stanmov, Tchop and Lepp. Below right: F1A winner Branko Lastosek of Yugoslavia setting out for fly off.

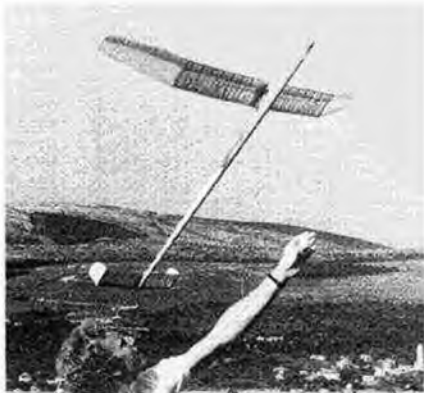


Friday F1-B

Friday morning commenced with rain but this soon decreased to a light drizzle and kept the temperatures to a reasonable level. Again the first round was extremely calm and by the time flying had commenced, the drizzle had stopped. All the British team maxed in the first and the second rounds.

Again by the third round the sun had come out and with the sun came the commencement of our troubles. George Foster launched into very marginal air from which despite a great deal of flapping, the model would not recover. I launched badly into the biggest hole of the round to produce the lowest score of Round 3, and with these flights

Below left: lighting up time (Dethermaliser that is) for Ian Kaynes and Chris Holinggum on F1B. Below: Danish left-hander Peter Rasmussen launches Wakefield. Prop features radial carbon fibre reinforcement. Below right: F1B Wakefield winner Alain Landeau of France.



EUROPEAN
FREE FLIGHT
CHAMPIONSHIPS
Reported by
Mike Woodhouse



went out chances of a team position. One thing which became very apparent during these early Wakefield rounds was that although our models were adequate for flying at home, there was a difference in climb height achieved between us and the best of the continental opposition some of which loss could no doubt be attributed to the altitude of the field. The Russians were all flying a model similar to that flown by Samokish in the 1977 Championships in Denmark. These models had relatively short climbs, just over 30 seconds, the initial part being almost straight up to about a hundred feet then turning into the normal spiral. Another very fast climbing model was that of Jens Kristensen of Denmark; however, he was to fall foul of bad air in the sixth round. Despite their very good climbs and the noisiest (!) bubble machine on the field, the Russians gradually fell from grace, their biggest disaster coming when Evgueni Gorban DT'd short in the fourth round. This event caused a considerable eruption in the Russian camp and the Team Manager taking to task every flyer involved in the incident!

The air had warmed up considerably for Round 6 after lunch and a light breeze was blowing across the field. During the sixth round more time was to be lost than in any other round, and more perfect scores were to be



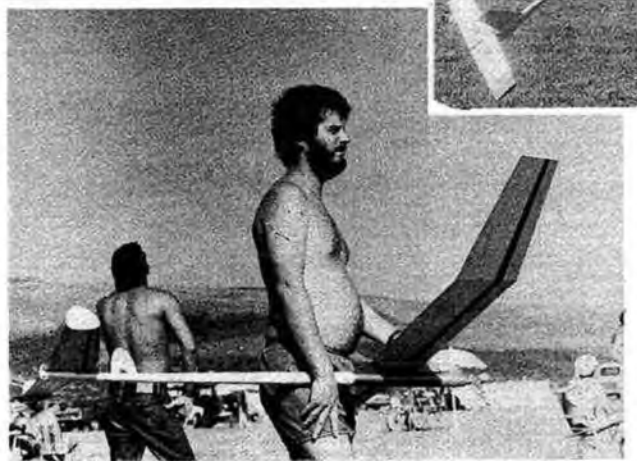
Above left: detail of Wakefield used by USSR's Eurgueni Gorban. Uses dural pylon at rear of nose mounted timer housing. Above right: airfoil on Mvozinski's dural-skinned F.I.C. wing.

spoiled during this round. Ironically the three in the British team without difficulty. At the end of the sixth round, six flyers were left with a perfect score; they still remained at the end of the seventh, a round in which only two flyers returned less than the full three minutes.

By the time the fly-off had commenced, the air had become calm and quite pleasant. For the four minute round the first flyer away was Louis Dupuis of France whose model encouraged the remaining five to get into the air as quickly as possible. All save Enzo Blazarini of Italy managed a four minute flight. In the five minute round, Alan Landeau of France climbed higher than the rest of the field by some fifty feet or so, and this was more than adequate to ensure that he was the only flyer who made five minutes, beating Polv Kristensen of Denmark into second place. Landeau's model was for him typical, having a very short nose and a long tall movement arm, similar to that he flew in 1971 achieving a time of 5 minutes which although the air was good, did not seem to flatter the model to any great extent.



Above: F.I.C. winner Nikolai Nakonecni of USSR with metal surfaced model. Above right: Peter Manrer of Switzerland flew unusual shoulder wing model in F.I.C. Right: Stafford Screen of UK obtained good local sponsorship to aid travel costs as model box lid indicates. Left: top Briton was Ken Faux, only ten seconds short of second place in F.I.C. after fourth round flyoff.



Saturday F1-C

Though the morning dawned bright and sunny, things were not bright and sunny in the British camp for Alan Jack who had trouble finding an adequate trim. His problems persisted with the result that he had to launch in the last few minutes of the round only to have the glide trim set in before the motor had cut, spoiling the pattern and resulting in a flight of just over a minute. After this unfortunate incident, Alan's models then decided to fly correctly but despite maxing in the last five rounds, Alan was only able to finish one off the bottom. In the calm hot conditions the event followed the predictable pattern, everybody waiting for everybody else to fly, each round being marked with two or three mass launches. Stafford Screen maxed steadily throughout the day having no problems whereas Ken Faux was making but living somewhat more dangerously. On the fourth round, Ken's transition was not up to his usual standard, the model stalling all the way down to record just three minutes!

As with the other events the sixth round which followed lunch, marked a change in the weather conditions. For the

first time, a breeze of a reasonable strength appeared switching in direction to that of the morning, the result being that models were taken to up-wind of the start line into the arid foothills surrounding the field. During the sixth round both Stafford's and Ken's models went missing. Stafford's model was found in the front garden of one of the local's whereas Ken's model flew considerably further and was not located until an aerial search took place the following morning, and recovered from the top of a tall tree.

As on the previous days, conditions for the fly-off calmed down considerably, a fly-off for which there were 19 contestants. In the four minute round of the fly-off, 9 contestants were successful; one of these was Ken Faux, unfortunately Stafford Screen launching late in the round contacted very poor air and was down for less than three minutes. The five minute round produced the best piece of air that we had seen in these Championships. All 9 models including a second attempt following an overrun by Mecznar of Hungary, flew into a very large comfortable piece of air, all D/Ting down within feet of where they had been launched from. This air persisted for the six minute

round, seven of the competitors achieving the required score, Ken Faux in fact landing at about 8½ minutes. By this time, daylight had run out and the organisers decided very wisely, to continue the event first thing in the morning when the contest was quickly decided on one flight with the Russians taking first and second places.

Nikolai Nakonecni's winning mode was extremely good, being of typical Russian style, the wing covered in thin aluminium foil and the climb trim being straight up and converting into the glide by bunting off the top rather than turning as is customary practice.

In conclusion, the event was very enjoyable, well organised and for the first time at any of the events which I have attended, not one complaint was voiced regarding the quality of the timekeepers. All these guys appeared to be modellers themselves and carried out their task with enthusiasm, reliability and accuracy.

Martin Dilly reports...

An Isaenko Hook Timer-Start

The on-going range of useful modifications to the basic Isaenko circle towhook grows again this month with the addition of an ultra-simple timer start system originated by Biggles all-rounder John Bailey, our top-placing glider flyer at the 1980 European Championships.

Unlike the system that Steve Helmick and I developed (Free-Flight Scene, June 1980), John's can be installed in about five minutes, quite possibly without the need to remove the hook from the aircraft. A wire lever is bound and soldered to the latch of the hook, and runs upwards, outside the fuselage, towards the hook pivot, where it is bent downwards the timer, as shown in the photograph. A line, preferably of stranded wire, runs from the end of this lever to the timer start trigger, which is lightly spring-biased to the 'run' position.

The principle is that when the hook is latched, the timer line is pulled, via the wire lever, and, because the effective point of pull is close to the hook pivot, the timer is held stopped, even when the hook swings back during circle

RESULTS EUROPEAN FREE FLIGHT CHAMPS

Class F1A (55 flies)
1. Leszek Branko
2. Larsen Arild
3. Roman Goldowski
19 John Bailey
29 Gerry Levey
41 Brian Baines

Yugoslavia
1260 + 234
1260 + 202
1260 + 172
1222
1206
1167

Total
1260 + 234
1260 + 202
1260 + 172
1222
1206
1167

Class F1B (48 flies)
1. Alain Landeau
2. Polv Kristensen
3. Alpey Zdravko
18 Ian Kayne
28 George Foster
41 Mike Woodhouse

France
1260 + 240 + 300
1260 + 240 + 238
1260 + 240 + 222
1217
1208
1151

Total
1260 + 240 + 300
1260 + 240 + 238
1260 + 240 + 222
1217
1208
1151

Class F1C (46 flies)
1. Nikolai Nakonecni
2. Patek Canak
3. Valentin Moschak
8 Ken Faux
17 Stafford Screen
45 Alan Tack

USSR
1260 + 240 + 300
1260 + 240 + 300
1260 + 240 + 300
1260 + 240 + 300
1260 + 240 + 300
1260 + 240 + 300

Total
1260 + 240 + 300
1260 + 240 + 300
1260 + 240 + 300
1260 + 240 + 300
1260 + 240 + 300
1260 + 240 + 300

Class F1D (17 Nations)
1. Bulgaria
2. Yugoslavia
3. USSR
11. Great Britain

Score
3725
3714
3705
3678

Class F1E (20 Nations)
1. Yugoslavia
2. USSR
3. Romania
8. Great Britain

Score
3712
3697
3682
3595

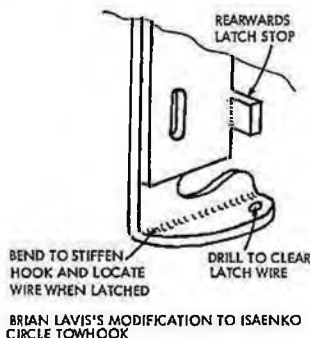
towing. Only when the latch and lower end of the lever spring rearwards on unlatching can the upper end of the lever move downwards to let the timer start as the connecting wire slackens. Wire thickness for the lever is 20 s.w.g. (0.91 mm.) and a little banding may be needed to get things working absolutely reliably; however the springiness of the lever takes care of quite large separations of the effective 'pull point' from the hook pivot.

When connecting linkages like this, whether with stranded wire or with nylon monofilament, I find that by far the easiest way is to use short lengths of aluminium tubing about 6mm. long as crimpable ferrules. Make the loop in the nylon, adjust the length by pulling the loose end and use small round-nosed pliers to put a couple of hard squeezes into the ferrule to grip the line tight; squeezing in the opposite direction will open the ferrule enough for the line to be slid out if any alterations are later needed.

The timer bias spring that holds the start trigger in the 'run' position is easily added to the current batch of KSB timers, which are now assembled with miniature cross-head screws. A modification I employ is to replace the rivet which acts as a very stiff pivot for the start trigger, with a 10 B.A. screw and nut, after drilling out the existing rivet. Be sure to remove the faceplate from the timer before doing this! A coil of thin spring steel wire (33 s.w.g. control-line wire is fine) fits round the nut, one end is bent to bear against the knurled knob on the trigger, and the other loops round the crosshead screw adjacent to the trigger pivot. This system is far less prone to problems than an external rubber band, which perishes, or a coil spring attaching to a timer mounting screw, which can catch on things at awkward moments. The photograph shows how it works out.

A Simplified Isaenko Hook

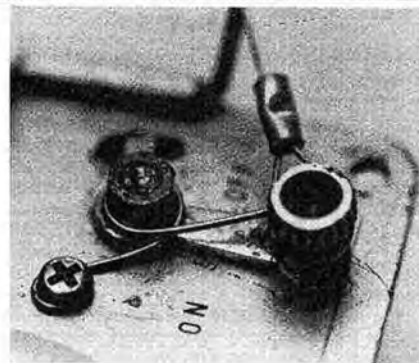
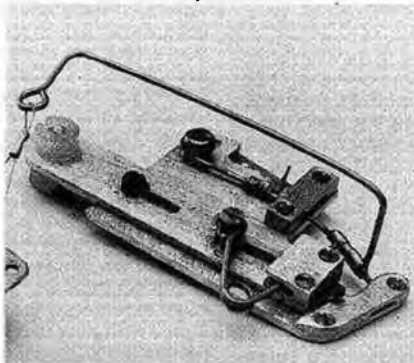
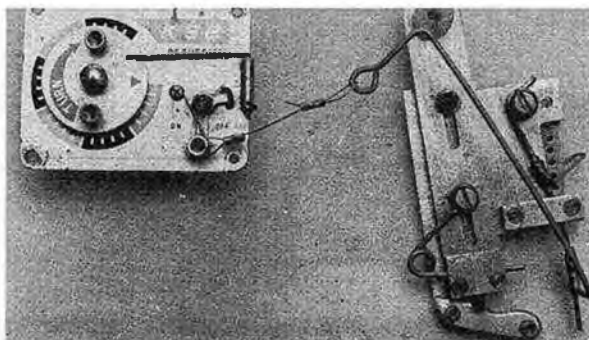
Another item to file under 'Isaenko' is a simplification, rather than an extra facility, and I discovered this on Brian Lavis's A/2 while bringing it back upwind for him at Sculthorpe during the Trials. Brian has avoided some of the tapping, drilling and filing on the original hook (F/F Scene, Dec. 1976, page 726) by bending a right angled tab at the rear of the main plate of the hook to act as a stop as the latch opens and springs rearwards. This replaces the separate latch retainer held to the original hook by a pair of machine screws. He also avoids making the doubler that forms the lower part of the hook proper, onto which the ring loops and into which the latch slips during tow, by bending a horizontal tab on the bottom of the sliding part of the assembly and drilling a hole at its rear to take the latch. Diagram shows these alternatives. My only thoughts, without having discussed the matter with Brian, are that bending the integral tabs might possibly cause some slight distortion of the 16 s.w.g. dural plates that slide together as the hook operates. On the 'all flat version' originally shown, I always flatten these plates by rubbing them on wet and dry paper until all high and low spots are removed once the drilling tapping and filing are completed; the presence of tabs could make this a little harder.



A Soviet Timer

A sample of the timers used by the Soviet A/2 team recently came my way. It has the useful feature of allowing a rudder delay to be operated by the same timer as the D/T. It is based on the Zenith camera self-timer mechanism; a similar one is fitted to Zorkis, and the basic mechanisms may be obtained as a spare part from Technical & Optical Equipment (London) Ltd., 278, Colindale Lane, Edgware Road, London, NW9 5BB, price £3.75. Don't confuse these self-timers with the separate Autoklips type that is an external accessory.

ISAENKO HOOK TIMER-START. Right John Bailey's neat timer start unit for Isaenko circle tow-hook. Timer start trigger rivet is replaced by 10 BA screw and blassed to running position. Hook shown in unlatched mode. Below: 20 swg wire lever is soldered to existing latch wire (seen here latched), with stranded wire running from upper end to timer start trigger. Below right: close up of modified KSB timer. Start trigger rivet replaced by 10 BA screw around which a coil of 30 swg wire is round with one end secured under face-plate screw.



The chief alteration to the original self-timer is the replacement of the drive spring with a much longer, weaker one, which extends the running time from around 20 seconds to some four minutes. This new spring is fitted into a machined light alloy case on the back of the pivot plate of the timer, and on the other end of the same shaft is fitted a five-groove scroll similar to a Seelig one, but with a larger diameter disc at its base. This retains the rudder delay trigger and can be slotted to allow this trigger to snap free a couple of seconds after the aircraft is released from the line. The pivot plates on my specimen are drilled with lightening holes and the all-up weight of 16 grams compares with the 20 grams of a normal KSB D/T timer, which has a slower-running shaft and gives the D/T function only.

A Czech International

Mike Fantham and I competed in the Fourth South Bohemian Cup, held in August at a grass airfield at Sezimovo Usti, about fifty miles south of Prague, and on the FAI's Open International contest calendar for 1980. While the site was a trifle small, we were lucky with the wind speed, and in fact a larger airfield is under consideration for the future. However, the event was one of the best-organised contests that I have flown in, and the £11 total entry fee included three nights comfortable accommodation, food, transport to the airfield if needed, and the closing banquet, making excellent value for money compared to some more famous internationals. An imposing opening ceremony, complete with mayors and other civic dignitaries, set the scene, there was fairly thorough model processing and the 70 minute rounds certainly led to no problems for us with four Czechs sharing our pole. All classes flew on the Saturday, with the glider flyers' launch points separated from the Wakefield and Power competitors at the other end of the line, and the occasional Blanik glider being aero-towed from the airfield slotted in quite safely between rounds of model flying.

A 7.00 a.m. start kept lift to a minimum at first, and the grass still had a heavy dew on it, which encouraged some

pretty fierce mosquitoes. Mike managed six maxes but then dropped 23 seconds on the seventh round to place 18th among the 83 entrants in glider. As is now the case in most International events hardly any straight-towing aircraft took part; a nine man fly-off went to a ninth round with Czechoslovak flyers in top four places. Several of the local flyers were using a similar timer to the Soviet one described above to give a rudder delay of about 2 seconds after the zoom release.

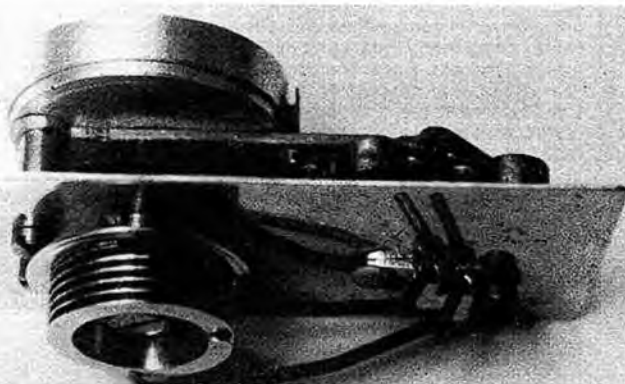
In Wakefield, only two Swedes managed seven maxes and duly celebrated the fact with some enthusiasm at the prizegiving and banquet, while in F.I. Cenek Patek of Czechoslovakia's second place heralded a similar result a few days later in the European Championships at Mostar. Third placing Popa Cringu from Rumania used a neat Rossi model with a screw-on fuselage boom, so the model could be packed easily for transport.

To ease any time-hogging problems, the organisers imposed a 'five minute starting' rule at Sezimovo Usti; once a flyer had his line out he was allowed five minutes to start the timed part of his flight; failure to do so did not count as an attempt, but meant that he then went to the bottom of the flying order queue. In practice it worked quite well, as long as the glider flyer had the time counting down on a stop watch with him, or used a signalling system from the timekeepers or a helper.

Fourth South Bohemian Cup — Sezimovo Usti — August 16, 1980

F.1.A. 1. J. Gablas (CSSR) 1260 + 240 + 300; 2. O. Pavlik (CSSR) 1260 + 240 + 181; 3. V. Levy (CSSR) 1260 + 240 + 177; 4. M. Bucko (CSSR) 240 + 175; 5. W. Korczak (Poland) 1260 + 240 + 101; 18. M. Fantham (Richmond) 1237; 39. M. Dilly (Croydon) 1160 80 flew; F.1.B. 1. B. Soderstrom (Sweden) 1260 + 176; 2. P. Wittsater (Sweden) 1260 + 147; 3. J. Krajc (CSSR) 1258; 4. M. Krejci (CSSR) 1253; 4. A. Gey (GDR) 1253 31 flew; F.1.C. 1. V. Patek (CSSR) 1260 + 222; 2. C. Patek (CSSR) 1260 + 217; 3. P. Cringu (Rumania) 1260 + 194; 4. P. Wachter (GDR) 1260 + 193; 5. M. Nogga (GDR) 1260 + 182. 24 flew. 11 nations competed at the event.

Right: Soviet made glider timer used on team models during European Championships is converted from camera built-in self timer and gives two functions — dethermaliser and rudder delay. Unit weight 16 grams.



Club News...

Club News...

Club News...

I WAS READING in a newsletter of an editor being somewhat chagrined to learn that some people read not the whole newsletter but merely the section that dealt with their particular interest. He tried to make his 'parochial journalism' appeal to as wide a readership as possible whatever the subject in hand. Much the same applies to these columns which are hopefully presented for the delectation of the general reader, which is why we do not go too deeply into the competitive side of things, trusting that this aspect of model flying is adequately dealt with elsewhere in this and our sister journal. We do try, though to give as rounded a picture of club life as possible, with particular emphasis on any story or item that other clubs would wish to know about.

We start off this month with a letter from Mr. Stephen Bould, giving us news of a new model club that has been formed in the Stoke on Trent area. The club, appropriately called the **Five Towns M.A.C.**, held its first committee meeting on August 31, where discussion centred on the ways and means of acquiring a regular clubroom and flying ground. There are nine members at present, with interests covering radio, C/L, RTP and a little free flight. Mr. Wilde, the club chairman is a well known RTP, flyer in the Stoke area, and the new club owes much to his guidance and enthusiastic support. Anyone in the area interested in swelling the ranks of new club can contact **Mr. Bould at 38 Dartmouth Street, Burslem, Stoke on Trent, ST5 1HB.**

Another letter we have comes from John Davis of the **Humberside MFC**, in which he graciously acknowledges the coverage we have given the club in these columns. He goes on to say that a big day for the club was a demonstration given at the Withernsea Gala. The two half hour flying spots were well appreciated by the public and the local press, especially the sight of three pilots flying combat at its hairiest.

Mr. J. Smith, PRO, of the **Wharfedale Club**, makes no bones of the fact that he's a hundred per cent team race addict, and since he is the only one in the club eager to proclaim his faith he does rather hog the newsletter with his team racing news and reports, albeit in the nicest possible way. However, he informs us that other interests are represented in the club, even if they are not publicity conscious. There are, for example, R/C, F/F, C/L Stunt and Combat, but as the newsletter would not exist but for the scribings of Jeff all the news we have is of the team racing events. Wait, though, at the tail end of the newsletter there is a report on building a large stunt model kit. Good value for a cheapish kit, giving something both lively and impressive for say, a Merco 35 to pull around. Implicit, though, there seems to be a warning that such projects are not to be lightly undertaken by the novice.

Roger Brown, PRO, of the **Northampton MAC**, has sent along the September issue of the club newsletter, *'Flying In-formation'*, if you will excuse the rather ponderous pun. The newsletter opens with a bit of thoughtful advice on why you should take that prang philosophically. Apart from the fact that pulling your hair out by its roots does nothing for your love life, ask Samson, it does nothing for your model flying either. You should contemplate the wreckage not in despair but with a critical eye to salvage and possible restoration. It is amazing what can be done with the bits and pieces, particularly now there are so many aids, such as epoxies and fibre glass, to effective repairs. Howard Boys, the doyen of the club, whose only crime is thinking up that newsletter title, recalls the day when models were low powered and of distinctive design. His 'Fantail' was designed not on the lines of a pigeon, as you might think, but a seagull. Tailless and radio controlled it was gently nudged along by an Old Mills .75 engine. You could almost make a song about it, "There's an Old Mills..." A club event of note was static and aerial show put on at the Grendon Hobby and Craft Fair. Dead on target was Bill Harding's Toffee Bomber unloading its 'bomb-bombs' on to the near toothless children.

Emblazoned on the cover of the **Grantham & DMAC's 'Hot Air'**

magazine there is the proud slogan "SMAE, Free Flight Champions 1980." The title was earned earlier in the year when they battled it out at Barkston Heath with other top clubs in the three classes: Rubber, Glider and Power. A notable club effort. The newsletter deals scantily with derring-do on the flying field, giving over its pages to the whimsical outpourings of the flying field widows: the wives and girlfriends. There are some nice pieces of verse lamenting the plight of they who stay at home and sweep. But they should feel quite at home on the flying field with all that talk of sink and the wafting of all those soap bubbles.

The **Feltham & DMAC**, has realised that the club name has not been appearing in these columns of late, and hastens to make amends. Well known as a control line club it is not little surprising that they were well represented at the World Champs in Poland. They sent along two team race teams (Gray/Haycock and Smith/Brown) accompanied by Dave Rudder, there to serve on the T/R jury. Hopes were high but a line tangle led to the Smith/Brown team being involved in a re-run which, for some unknown reason, never took place. The Smith/Brown team, incidentally, were using a revolutionary flying wing type machine. Another C/L interest dear to Feltham hearts is Carrier, of which Vaughan Miller is a particular exponent. One second place, followed by two firsts, has put the Feltham name in the forefront of this type of contest. The question is asked: Is Feltham to dominate yet another class in addition to FAI Team Race, Goodyear and Speed?

The September issue of the **Sittingbourne & DMAC's 'Bourne Flier'** sees Peggy the 'Orse in sedentary mood, idling in an old rocking chair, with pipe in mouth and beer jug in hand. And, nice touch this, he has his wings hanging up. Does this represent the club in end of season mood, or is there some subtler implication? A somewhat thin newsletter content, though. Quite a chunk is taken up with cautionary words to those unwise enough to ignore the tenets of Field Safety. Some may get a thrill out of hairy flying, but the point is made that such behaviour is not tolerated on our roads and should not be on our flying fields either.

From the newsletter of the **Market Harborough MAC**, we learn that the club has 63 senior members and 32 junior members — quite a large affair. We are also told that the club finances are in good heart, and that the club meets every Thursday evening, with electric RTP on two nights per month. It would appear that the club has its



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

own flying field and a strong radio interest. The newsletter, which has reached us belatedly, contains the summer programme — an extraordinarily full one with plenty of popular contests. The clubroom programme was also a full one. All fine but for one tiny reservation. Now, without wishing to be too pompous or censorious, I do feel that trophies for spectacular crashes are just not the thing in these days of disciplined radio flying. A crash, which would cause damage to persons and property, is something to be deplored rather than celebrated. Quite often it results from an ill-prepared model, or faulty or over zealous piloting. Would the most spectacular crash of the year be one that went through a car windscreen on a nearby roadway?

The editor of *Northern Area News*, Jim Mosely, has been evaluating the content of the newsletter in the light of the contributions received from the three main sources: free flight, radio and control line. He finds that whereas he gets quite a bit of reportage on free flight and control line, particularly free flight, radio is represented only at glider level, with never a mention of power flying. He wants to know, perhaps just as much as we do, what the power flyers get up to. It could well be that serious contest flying in power radio is on a very limited order, particularly since pylon racing has faded out of the picture. Sport flying seems to be the thing now, with contests of a like nature. Not everyone's idea of fun, perhaps, is endurance flying. It sounds good fun, though, in the lively account of a club attempt to notch up a record number of hours aloft given in the newsletter. Four members of the **Huddersfield & DMAC** made the attempt from an eminence known as Tinker's Monument. All flying gliders, of course, with well topped up Nicads, and even equipped with navigation lights for late evening flying. Highest time was put up by John Rowe with a flight just short of 18 hours.

The **Three Kings Aeromodellers** had quite a turn out for the Nationals at Barkston Heath; no fewer than 14 members trekking to the 'Bedouin' camping site over the August holiday, according to the 3K newsletter, 'Court Circular.' Main targets were Carrier and Scale, both strong events for the 3K flyers, and hopes were high. Weather was perfect, with many good looking craft tugging at the lines. One of the best looking craft, Alan Callaghan's 'Miles Satyr', was sadly eliminated through a baulky engine, but there were plenty of other 3K flyers to take care of the placings, one, two and three, with 'Dicky' Bird's SA Bulldog taking the honours.

Nick Goodman, PRO, of the **Coventry & DMAC**, sends along the

club newsletter, '*Wings and Fins*,' together with a short report on the present state of the club. Membership is quite high at 70-80, with thermal flying as the main interest. Yet another instance of the way this branch of the sport has taken over the radio scene, perhaps an escape from all the problems that attend power flying. Even so, there is a growing interest within the club in R/C power flying, as there is for free flight. Yet a further dimension is added with the use of a hangar at Bramcote Barracks for indoor flying during the winter. It will be available on the second and fourth Wednesdays of each month for members to try their hand at EZB, Peanut and HLG. That thermal soaring interest to which we referred was estimably displayed by the good turn out of members for the Nationals at Cranwell in August. Apart from the flying life on the camp site had its moments, too, with a barbecue put on by the accompanying wives, and disco music supplied by John Sault. In the contest itself all the Coventry members were placed well up the result sheet, with Al Wisher, a well-known figure on the thermal scene, reaching the fly off. A notable club occasion.

The **Watford Wayfarers** newsletter carries a most informative article on the whys and wherefores of obtaining those fascinating 'goodies' advertised in the American model mags. The two sources of monetary transmission are the post office and your bank. Either way seems somewhat costly when postage, duty and VAT are taken into account, roughly doubling the advertised price. The other main item in the mag concerns a somewhat unusual radio comp. It was for the longest time a flyer could go without touching the controls. One entrant, desperate to win, let his model drift out of range, but there is no mention of anyone actually crashing. Not the sort of competition to win official approval, but makes a change from balloon bursting.

'*Aeolus*' is the newsletter of the **Banbridge Aeromodelling Club** in Northern Ireland, and the latest edition to hand makes for some entertaining reading, quite apart from the nice word of thanks to the Aeromodeller for recommending the club to some slope soaring visitors to the province. A report of a display given at a remote spot called Shelagh recalls those days in this country before people became blasé over the flying of radio models. A large, excited crowd bore in upon the radio flyers, eager to get as near as possible to the source of the spectacle. And they got the full works, including a sweet bombing raid on the kids and the unusual sight of an autogyro in full flight. We are reminded that Desie Cheney, the club secretary, is visiting Canada to take part in the Scale '80 World Champs. A colourful letter from him describes the somewhat bizarre model scene in Ottawa. The model shops there, few in number, are stocked with plastic models and rockets. But he found life on the University campus an exhilarating experience, something to do with the females going around 'unharnessed.'

The newsletters of the **South Bristol MAC** are largely taken up with reports of contests flown and attended by the club during a very busy summer. The club maintains a closely packed contest programme with a strong emphasis on free flight, clearly indicating the fascination that this original branch of the hobby continues to exercise on succeeding generations.

The diversity of our hobby in these technological times can make for a rather scattered club life, with members dispersed over the various flying facilities. This is very much true of the **Leicester MAC**, a large club operating in most spheres of model flying. Now and again, though, it is nice to get the members together for a unified occasion, and this is the sentiment expressed in the club newsletter. Already the now well known Winter Building competition has proved a successful co-ordinator of the various groups, and it is hoped that the club gala day will prove another. Yet another feature making for a unified club is a demonstration of modelling technique given by experts in the different fields. There is always something useful to learn even from outside your particular interest.

The September issue of '*Nitro*' is the newsletter of the **Belfast MFC**, is much concerned with control line matters, the main pre-occupation of the members. In now what is fine old tradition several members made the pilgrimage to the Nationals. Good weather, good camping but no successes to record. A most worthwhile trip, though.

Giving good service to control line enthusiasts, the *Claptrap*, newsheet of the **C/L Aerobatic Pilots Association** offers detailed results of the major stunt and combat events, plus design notes etc.

There is still much to learn about the behaviour of our flying craft. From '*From Flight Down Under*' the **New Zealand Free Flight Digest**, I learned that the more forward the CG position the tighter the possible turn. The comment applies in this context to Wakefield models and their ability or otherwise to stay in a thermal where the tighter the turn the better.

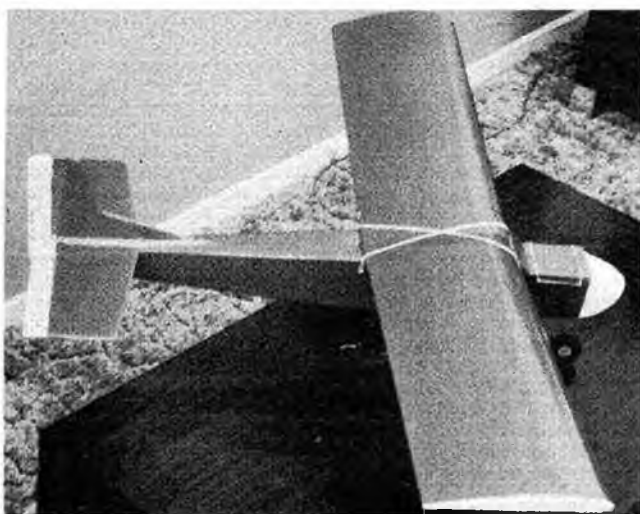
That's all for this month. Keep those reports and newsletters rolling.

Clubman



OCTOBER WINNER - B. J. BAYTON, SWINDON

Our aeromodelling humorists responded well to our October edition challenge seeing a wide variety of "funny sides" to this particular Caption Challenge. Bob Brown of Newbury captioned it "I THINK IT'S GOING TO BITE THE HAND THAT BUILD IT" while F. G. Voisey of Littlehampton, W. Sussex suggested "THAT'S WHAT COMES OF USING BOMMERANG SECTION INSTEAD OF CLARK Y." D. Barnes of Portsmouth captioned it, "IF ALL THESE PEOPLE KEPT BACK, I COULD SEE LONGER LEADS ON MY R.T.P. MODEL" and J. K. Taylor of Shadwell Leeds offered "OOPS - NOW ITS NOT ONLY THE WINGS THAT NEED WASH-OUT!" From overseas we received "THE MOSQUITOS ARE REALLY BIG THIS YEAR" from Willy Blom in Alta, Sweden, and from USA, a whole string of suggestions from Henry Sherrerd Dexter, ME including "IF I WEREN'T STANDING ON THE CUFFS OF THOSE BAGGY TROUSERS, I'D GET OUT OF THE WAY..."



R/C SPORT FLYER

Continued from page 680

Completed test sample of the MFA Yamamoto put together by a complete novice to R/C flying. Model features foam core wing panels.

WINGS

While waiting for the sides and formers to set, the two halves of the wings were stuck together on another bench. The wings were the foam filled type covered with a sheet of thin balsa wood on the outside. This form of wing is obviously very robust and takes a lot of the hard work out of building an aircraft. However, it felt a bit like cheating, as in the past, hours had been spent cutting out ribs and spars to make a wing; but that was thirty years ago, and things have progressed a little since then.

One half of the wing was firmly fixed to the bench and a strip of polyethylene was

placed in position under the centre joint. A coating of rapid setting epoxy resin was made on the wing end and the mating section was fixed in position with the tip supported to give the total dihedral of 5 inches for the wings. This joint was left over night to set.

It was now some seven hours since the assembly work had started and the outlines of an aircraft were now apparent.

To complete the assembly of the wings the joint between the wing halves was now coated with polyester resin and glass cloth, which was placed over the joint and saturated with resin and left to dry.

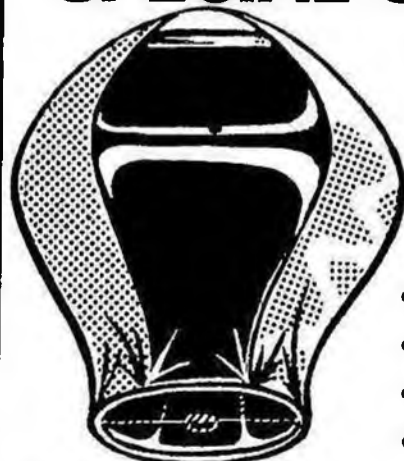
The wing tips were also glued in position and left to dry.

FINISHING

The fuselage was gently sanded with fine glass paper. The wing needed a good deal of attention with fine glass paper in the region of the fibre glass as the surface was rough, the resin having taken the pattern of the weave of the cloth. Also the balsa wing tips were quite a bit larger than the wing form and had to be carefully blended. The control surfaces of the tailplane were fixed with the mylar hinges provided.

It was decided to use an iron-on type of film and it was then realised that the covering should have been completed before the control surfaces were fixed. The film was tacked into position with the tip of an ordinary domestic electric iron on a low setting. It could then be shrunk by turning the iron setting up high and held with the flat surface $\frac{1}{8}$ " from the film, according to my advisers. This, however, was easier said than done; the hand inevitably shook and the hot iron touched the film and melted a hole in the film. Therefore, a small domestic fan heater held close to the surface was used to provide hot air for shrinking the film. This worked reasonably well, but it was interesting to notice the different rates of heat absorption of the film as two different colours, i.e. white and metallic blue, were used. The blue film tended to move suddenly when heated and a number of attempts had to be made to get an even coverage on the fuselage. The wing was much easier to cover being a more even surface.

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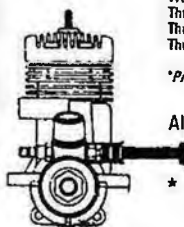
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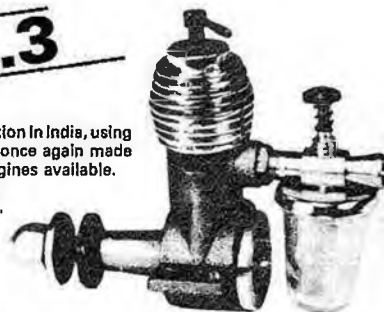
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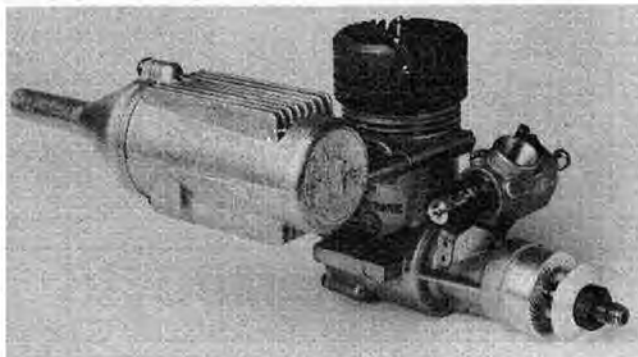
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Due to soaring postal charges many retailers are unable to answer postal enquiries unless accompanied by a stamped addressed envelope.
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RUNWAY SOUTHWEST
16 DEVENPORT ROAD
STOKE, PLYMOUTH
Mon.-Sat. 9 am-6 pm
(Late night Friday 8 pm)

PORTSMOUTH Tel: 25049
RAY BROWN MODELS ★
10 KINGSTON ROAD
Open: 10 am-5.30 pm
Lunch 1 pm-2.30 pm
Closed all day Wed.

TORBAY Tel: 0803 521767 ★
MANSEL'S MODELS
PALACE AVENUE, PAIGNTON
Open 9.15 am-5.30 pm
Mon.-Sat. Inclusive
Half day Wed.
Late night Fri. 7 pm

SOUTHAMPTON Tel:
EASTLEIGH MODEL EASTLEIGH
CENTRE 617849
2a HIGH STREET, EASTLEIGH
Open 9 am-6 pm. Half day Wed.

AUSTRALIA

MELBOURNE 3000 Tel: 347 8029 ★
RIVERSIDE HOBBY CENTRE
16 LITTLE LATROBE STREET
9 am-5.30 pm Mon.-Fri.
9 am-12 noon Sat.

BLETCHLEY Tel: MILTON
TAYLOR & KEYNES 70478
McKENNA LTD
16 THE CONCOURSE
BRUNEL CENTRE
Mon.-Thurs. 9 am-5.30 pm
Fri.-Sat. 9 am-6 pm

DORSET

BOURNEMOUTH Tel: 424038 ★
R. F. AUSTIN — MODEL SHOP
156 SEABOURNE ROAD
SOUTHBOURNE BH5 2JA
Open: 9 am-5.30 pm Mon.-Sat.
Closed 6 pm Thurs.-Fri.
Half day Wed.

SOUTHAMPTON Tel: 25919 ★
HOBBY LOBBY LTD
62 COMMERCIAL ROAD
Open 9.30 am-5.30 pm Mon.-Fri.
Sat. 9.30 am-5 pm

AVON

BRISTOL Tel: 662644 ★
BEV'S MODELS
35 WEST STREET
BEDMINSTER
Mon.-Thurs. 10 am-6 pm
Wed 10 am-1 pm
Friday 10 am-7 pm
Sat. 10 am-5 pm

CAMBRIDGESHIRE

CAMBRIDGE Tel: 59620 ★
MODEL MANIA
17 KING STREET
Open: 9.30 am-5.30 pm
Mon.-Sat. Inc. Lunchtime

BOURNEMOUTH Tel: 517032 ★
J. & H. MODELS
823 WIMBOURNE ROAD
MOORDOWN, BH9 2BA
Mon.-Thurs. 9 am-5.30 pm
Fri. 9 am-6.30 pm. Sat. 9 am-6 pm

HERTFORDSHIRE

HATFIELD Tel: 63404
DESIGN & HOBBIES
5 MANOR PARADE
Tuesday-Friday 9.30 am-6 pm
Closed 2-3 pm for lunch
Saturday 9.30 am-5.30 pm
Closed all day Monday

BEDFORDSHIRE

BEDFORD Tel: 60884 ★
J & A MODELS
6 WENDOVER DRIVE
Tues.-Sat. 10.00-6.00
Sun. 10.00-1.00
Monday closed all day

CHESHIRE

MACCLESFIELD Tel: 0625 29467
HOBBYCRAFTS
(MACCLESFIELD) LTD
PARK MILL
HOBSON STREET
Open: 9.30-5.30 Mon.-Sat.

BOURNEMOUTH Tel: 763480 ★
WESTBOURNE MODEL
CENTRE
59 SEAMOR ROAD
WESTBOURNE
Open: 9 am-5.30 pm Mon.-Sat.

HEMEL HEMPSTEAD Tel: 53691
TAYLOR & McKENNA LTD
203 MARLOWES
Mon.-Thurs. 9 am-5.30 pm
Fri.-Sat. 9 am-6 pm

ESSEX

BRENTWOOD Tel: BRENTWOOD
ARNOLD'S GIFT CENTRE 226787
4 HIGH STREET
Open: 9 am-6 pm.
Half day Thursday

HERTFORD Tel: 50101 ★
MODELLERS WORLD
4 OLD CROSS
Open: 10 am-6.30 pm
Closed Thursday

BIGGLESWADE Tel: 313840
IVEL MODELS & HOBBIES
94-96 SHORTMEAD STREET
Mon.-Sat. 9.00-6.00
Wed. closed
Friday 9.00-9.00

SALE Tel: 061-962 4561 ★
HOBBYWORLD
200A MARSLAND ROAD
Mon.-Sat. 9.30-6.00
Wed. early closing

CLEVELAND

LEIGHTON BUZZARD Tel: 0525-376134 ★
D H MODEL CRAFT
106 NORTH STREET, LU7 7ET
Tues.-Sat. 9.00-6.30
Friday 9.00-8.00
Half day Monday

MIDDLESBROUGH Tel: 211212
HOBBYDROME
283 LINTHORPE ROAD
Open: 9.30 am-5.45 pm
Late night Friday 8 pm
Closed Wed.

HARLOW Tel: 21697 & 418817 ★
K & C MODELS
PARDON MILL
PARDON MILL LANE
Mon.-Sat. 9.30-6.30
Sunday 10.00-12.00

ST ALBANS Tel: 53954
S A M S
12 HATFIELD ROAD
Mon.-Fri. 9 am-6 pm
Sat. 9 am-5.30 pm

DERBYSHIRE

LUTON Tel: 36218
TAYLOR & McKENNA
73 ARNDALE
Open: 9 am-5.30 pm Mon. to Thurs.
9 am-6 pm Fri. and Sat.

DERBY Tel: 0332 46579 ★
THE Balsa TREE
16/18 HOWE STREET
DE3 3ER
Open: Mon.-Sat. 9 am-8 pm
Tues. 4 pm-8 pm

HORNCHURCH Tel: 40016 ★
RADIO ACTIVE
94 ARDLEIGH GREEN ROAD
Open: Mon., Tues., Thurs. & Sat.
9 am-6 pm, Fri. 9 am-7 pm
Half day Wednesday

HONG KONG

HONG KONG Tel: 3-680507 ★
RADAR CO LTD
3 OBSERVATORY ROAD
TSIMSHATSUI, KOWLOON
Open 10 am-7 pm. Closed Sundays

BERKSHIRE

READING Tel: 51558 ★
READING MODELS
5 CHATHAM STREET
9 am-5.30 pm each weekday

DEVON

EXMOUTH Tel: 72540
EXMOUTH MODELS
78 EXETER ROAD
Mon.-Sat. 9.00-6.00

WICKFORD Tel: (037 44) 2621 ★
WICKFORD MODEL EXCHANGE
ST PETER'S TERRACE
LONDON ROAD
Open: 9.30 am-6 pm Mon.
Fri.-Sat. Late night Thurs. 7 pm
Closed Tues. and Weds.
Sun. 10 am-1 pm

HONG KONG Tel: 3-684184
WINNING MODEL & HOBBY
SUPPLIES
2a AUSTIN AVENUE
KOWLOON, HONG KONG
Open 10 am-7 pm. Closed Sundays

BUCKINGHAMSHIRE

AYLESBURY Tel: 85752
TAYLOR & McKENNA LTD
46 FRIARS SQUARE
Mon.-Thurs. 9 am-5.30 pm
Fri.-Sat. 9 am-6 pm

PLYMOUTH Tel: 0762 21851
PLYMOUTH MODEL CENTRE
11 OLD TOWN STREET
9 am-5.30 pm Mon.-Sat.
Late night Friday 6.30 pm

HAMPSHIRE

FAREHAM Tel: 234136 ★
G. M. H. BUNCE & CO LTD
206 WEST STREET
Open 9 am-5.30 pm. Closed Wed.

ISLE OF WIGHT

RYDE Tel: RYDE 64051
WIGHT MODELS
84 HIGH STREET, PO33 2SU
Open 9 am-6 pm Mon.-Sat.

KENT

BEXLEY Tel: CRAYFORD 522308
BEXLEY MODEL CENTRE
 18 BOURNE ROAD
 Mon.-Sat. 9-5.30
 Thursday closed all day

BROMLEY Tel: 01-460 0818
AVICRAFT LTD ★
 15 CHATTERTON ROAD
 Open: 10 am-6 pm
 (not closed for lunch)
 except Wed. 10 am-1 pm

CANTERBURY Tel: 69888
THE MODEL SHOP ★
 83 NORTHGATE CT1 1BA
 Open 9 am-5.30 pm inc. Sat.
 Closed all day Thursday

MAIDSTONE Tel: 51719
THE MODEL SHOP ★
 19-23 UPPER STONE STREET
 Open 9.30 am-1 pm, 2.30 pm-
 5.30 pm. Closed all day Wed.

TUNBRIDGE WELLS Tel: 36689
E. M. MODELS ★
 42 CAMDEN ROAD
 Mon.-Sat. 9 am-5.30 pm
 Closed Wed.

LANCASHIRE

FARNWORTH Tel: 0204-74688
JOYCRAFT ★
 3 BOLTON ROAD, MOSES GATE
 Open Mon.-Sat. 9 am-6.30 pm
 Closed all day Wednesday

LIVERPOOL Tel: 051-709 8039
STAN CATCHPOLES ★
MODEL WORLD
 85 BOLD STREET
 9.30 am-5.30 pm. Six days

MANCHESTER Tel: 061-834 3972
THE MODEL SHOP ★
(MANCHESTER)
 209 DEANS GATE
 Mon.-Fri. 9.30 am-6 pm.
 Sat. 9 am-5 pm

PRESTON Tel: 51243
PRESTON MODEL CENTRE ★
LTD.
 (Opposite Polytech.)
 2 FYLDE ROAD
 Open: 9.30 am-6 pm Mon.-Sat.

WIGAN Tel: 45683
G. FORSHAW & SON
 58 MARKET STREET
 Open: 9.15 am-5.45 pm
 Early Closing Wednesday

LEICESTERSHIRE

HINCKLEY Tel: 30952
PUNCTILIO MODEL SPOT ★
 6 WATERLOO ROAD
 Mon. 9.15 am-7 pm
 Tues., Wed., Thurs. 2 pm-7 pm
 Fri. 9.15 am-7 pm
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LEICESTER Tel: 666363
THE LEICESTER MODEL ★
CENTRE LTD
 STAFFORD STREET CORNER
 MELTON ROAD
 Mon.-Sat. 9.00-6.00

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STAMFORD Tel: 4524
SPORTS & HOBBIES ★
 4 ALL SAINTS STREET
 Open 9 am-5.30 pm.
 Half day Thursday

LONDON CENTRAL

FULHAM Tel: 01-385 9864
PATRICK MODELS ★
 107-111 LILLIE ROAD, SW6
 Mon.-Sat. 9.00-5.30
 Thurs. 9.00-1.00

BISHOPSGATE E1 Tel. 01 283 9870
HADLEY HOBBIES ★
 131 MIDDLESEX STREET
 Sun. 9.30 am-2 pm
 Mon.-Fri. 9 am-6 pm
 Very close to Liverpool Street
 Station

LONDON NORTH

CAMDEN TOWN Tel: 01-485 1818
AERONAUTICAL MODELS ★
 39 PARKWAY NW1
 9.15 am-5.30 pm Tues.-Fri.
 9.15 am-5 pm Sat.
 Closed all day Monday

LONDON Tel: 01-607 4272
HENRY J. NICHOLLS & ★
SON LTD
 308 HOLLOWAY ROAD, N7
 Open: Mon.-Sat. 9 am-5.30 pm

LONDON NORTH WEST

MILL HILL Tel: 01-959 2877
H. A. BLUNT & SONS LTD ★
 133 THE BROADWAY
 NW7 4RN
 Open: 9 am-6.30 pm Mon.-Fri.
 9 am-6 pm Saturday

LONDON SOUTH

ELTHAM Tel: 01-850 4324
ELTHAM MODELS ★
 54 WELL HALL ROAD SE9
 Mon.-Sat. 10 am-5.30 pm
 Closed Thursday

LONDON Tel: 01-703 4562
MODEL AIRCRAFT ★
SUPPLIES LTD
 207 CAMBERWELL ROAD, SE5
 Open: Mon.-Sat. 10 am-6 pm
 Fri. 10 am-7.30 pm
 Closed all day Thursday

LONDON Tel: 01-653 4943
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MODELS LTD
 3 ORTON BUILDINGS
 PORTLAND ROAD, SE25 4UD
 Open: 9.30 am-1.30 pm —
 2.30-6 pm Mon.-Sat.
 Early closing Wednesday 1 pm

LONDON Tel: 01-228 6319
E. F. RUSS ★
BATTERSEA RISE, SW11
 Open Fri. till 7 pm
 Other days 9 am-6 pm
 Early closing Wednesday 1 pm

LONDON EAST

LONDON Tel: 01-520 7397
ARNOLD'S GIFT CENTRE
 132-134 HOE STREET, E17
 Open 9 am-6 pm Mon.-Sat.
 Closed Wednesday

PLAISTOW Tel: 01-472 2471
A. G. HERMITE ★
 633 BARKING ROAD, E13
 Open 9 am-6 pm
 Closed all day Thursday

MIDDLESEX

HARLINGTON Tel: 01-897 2326
RADIO CONTROL MODEL ★
CENTRE
 214 HIGH STREET
 Mon., Tues., Thurs. & Sat. 9.15 am-
 6 pm, Fri. 9.15 am-7.30 pm
 Closed Wednesday

HARROW Tel: 01-863 9788
THE MODEL SHOP
 190-194 STATION ROAD
 Mon.-Sat. 9.30-6.00
 Wednesday 9.30-5.00

ISLEWORTH Tel: 01-560 0473
RADIO CONTROL SUPPLIES ★
 581 LONDON ROAD
 Open 9 am-6 pm, Fri. 9 am-8 pm

WEMBLEY Tel: 01-902 4823
WALLY KILMISTER LTD
 6 & 7 NEED PARADE
 Mon.-Sat. 9-5.30
 Closed Wednesday

NORFOLK

KINGS LYNN Tel: 63164
BARNEY'S MODEL SHOP
 SOUTH EVERARD STREET
 Open 9 am-6 pm

NORWICH Tel: 0603 42515
GALAXY MODELS ★
 88 CATTON GROVE ROAD
 Open 6 days a week

NORTHANTS

NORTHAMPTON Tel: 31223
THE MODEL SHOP ★
 230 WELLINGBOROUGH ROAD
 Open 9 am-6 pm.
 Half day Thursday

NORTHAMPTON Tel: 35718
STAGG MODELS ★
 22 BRIDGE STREET
 Open 9 am-5.30 pm
 Early closing 2 pm Thursday
 Late night opening Friday until 7 pm

NORTHAMPTON Tel: 27726
TAYLOR & McKENNA LTD
 41-43 PRINCES WALK
GROSVENOR CENTRE
 Mon.-Thurs. 9 am-5.30 pm
 Fri.-Sat. 9 am-6 pm

NORTHUMBERLAND

NEWCASTLE UPON TYNE Tel: 22016
THE MODEL SHOP ★
 18 BLENHEIM STREET
 Mon.-Fri. 9 am-5.30 pm
 Sat. 9 am-6 pm

NOTTINGHAMSHIRE

NOTTINGHAM Tel: 204040
M. A. CHAPMAN MODELS
 18 MANSFIELD ROAD
DAYBROOK SQUARE
 Open Mon.-Sat. 9.30 am-6 pm

NOTTINGHAM Tel: 50273
GEE DEE MODELS LTD ★
 19-21 HEATHCOTE STREET
OFF GOOSEGATE
 Open 9.30 am-5.30 pm
 Early closing Thursday

WORKSOP Tel: (0909) 472855
RUSSELL MODELS ★
MODEL CENTRE, RYTON STREET
 Open Mon.-Sat. 9.30 am-5.30 pm
 Thursday 9.30 am-1 pm

OXFORDSHIRE

OXFORD Tel: 42407
HOWES MODEL SHOP ★
 9-10 BROAD STREET
 Open 8.45 am-5.30 pm
 6 day week

SCOTLAND

GLASGOW Tel: 041-632 8326
RIDDEL BROS ★
 61 MOUNT ANNAN DRIVE
 Mon.-Sat. 9.00-1.00; 2.15-6.00
 Tuesday closed all day

GLASGOW Tel: 041 339 0994
U-CONTROL MODELS ★
 171 BYRES ROAD
 Open 6 days a week 9 am-6 pm

WEST MIDLANDS

PAISLEY Tel: 041-840 1381
DUNNS MODELS ★
26 GLASGOW ROAD
Mon.-Sat. 9.00-5.30
Tuesdays closed

WOKING Tel: 66493
WOKING MODELS ★
9 GOLDSWORTH ROAD
Open 9 am-6 pm Mon.-Sat.
Closed Wednesday afternoon

BIRMINGHAM 10 Tel: 021-772 4917
BOB'S MODELS ★
520-522 COVENTRY ROAD
SMALL HEATH
Open 9.30 am-6 pm
Early closing Wed. 1.30 pm

DONCASTER Tel: 27255
EVANS MODEL CENTRE
D. C. EVANS & CO.
(HOLDINGS) LTD
65 SILVER STREET
Open: Mon.-Sat. 9 am-5.30 pm
Closed all day Thursday

SUSSEX

PERTH Tel: 24540
DUNNS MODELS ★
29 SCOTT STREET
Mon.-Sat. 9.00-5.30
Wednesday Closed

BRIGHTON Tel: 418225
HARRY BROOKS ★
15 VICTORIA ROAD
PORTSLADE
Open every day except Sun.
8.30 am-5.45 pm (no half day)

BIRMINGHAM Tel: 021-373 5945
021-373 3535
JIM DAVIS MODELS
311-313 MARSH LANE
ERDINGTON
Mon.-Sat. 9.30 am-6.30 pm

KEIGHLEY Tel: 0535 65662
AIREDALE MODELS ★
156 STATION BRIDGE
BRADFORD ROAD, KEIGHLEY
WEST YORKS
Mon.-Sat. 9.30 am-6 pm, Tues.
closed, Thur. 9.30 am-7 pm

STAFFORDSHIRE

BURTON-ON-TRENT Tel: 64240
J. & N. MODELS ★
22 DERBY STREET
Open 9 am-5.30 pm.
Closed Wednesday

CRAWLEY Tel: 21921
HEATHER CRAFT ★
60 HIGH STREET
Open 9 am-5.30 pm Mon.-Sat.
Closed all day Wednesday

COVENTRY Tel: 0203 76409
MODEL CRAFT
61 SPON END
Open: Mon.-Fri. 10 am-5.30 pm
Sat. 9 am-5.30 pm
Closed Wednesday

LEEDS Tel: 646117
FLYING MODELS ★
88 CROSSGATES ROAD
CROSSGATES
Mon.-Sat. 6 am-6 pm
Sun. 8 am-1 pm

STAFFORD Tel: 3420
JOHN W. BAGNALL LTD ★
18 SALTER STREET
9 am-5.30 pm
Closed all day Wednesday

EAST GRINSTEAD Tel: 21750
SOUTH EASTERN MODELS
5 THE PARADE
LONDON ROAD, FELBRIDGE
Open: Mon.-Sat. 9.30 am-5.30 pm
Closed Wednesdays

SOLIHUL Tel: 021-744 3374
SHIRLEY MODEL SUPPLIES ★
62 STRATFORD ROAD
Open: Tues.-Sat. 9 am-2 pm & 3-6 pm
Late night Thurs. 8 pm

LEEDS 17 Tel: (0532) 684809
JUST MODELS ★
120 GLEDHOW VALLEY ROAD
Open: Mon.-Sat. 9.30 am-6 pm
Closed all day Tuesday
Sun. 9.30 am-12.30 pm

STOKE-ON-TRENT Tel: 263574
JOHN W. BAGNALL LTD
30 PICCADILLY, HANLEY
9 am-5.30 pm
Closed all day Thursday

WORTHING Tel: 207525
SUSSEX MODEL CENTRE ★
10 TEVILLE GATE
9 am-5.30 pm. Open six days a week
Monday to Saturday

WALSALL Tel: 23984
GEOFF PARKER MODELS
123 WOLVERHAMPTON STREET
Mon.-Sat. 9.00-5.30

NORTHALLERTON Tel: 0609 3334
T. & F. M. GROVER LTD
216-217 HIGH STREET
Open 6 days a week
8.30 am-5.30 pm

WALES

WOLVERHAMPTON Tel: 26709
WOLVERHAMPTON ★
MODELS & HOBBIES
BELL ST., MANDERS CENTRE
9 am-5.30 pm Mon.-Sat.
Early closing Thursday

CARDIFF Tel: 29065
BUD MORGAN ★
22 CASTLE ARCADE
SOUTH GLAMORGAN
CF1 2BW
9 am-5.30 pm
Early closing Wed. 9 am-1 pm

SWINDON Tel: 26878
SWINDON MODEL CENTRE ★
2 CIVIC CENTRE
THEATRE SQUARE
(Next to Wyvern Theatre)
Open daily 9 am-5.30 pm
Open all day Wednesday

OTLEY Tel: 466535
MODEL SHOP (H. & S. CLIFF)
FLYING MODELS
57 GAY LANE
Mon.-Sat. 6 am-6 pm

SUFFOLK

IPSWICH Tel: 51195
BOWMANS OF IPSWICH ★
37-39 UPPER ORWELL STREET
Open 9 am-5.30 pm Mon.-Sat.
Early closing Wednesday

CARDIFF Tel: 31367
RYALL & WALTERS RADIO ★
MODELS
34 LLANDAFF ROAD
Open 9 am-12.30 pm; 1.30 pm-
5.30 pm; Monday 8 pm. Closed Wed.

WORCESTERSHIRE

KIDDERMINSTER Tel: 2179
P. & R. MODELS ★
1 SEVERN GROVE
RIFLE RANGE ESTATE
Open: Mon., Tues., Thurs., Fri.
9.45 am-5.30 pm
Sat. 9 am-6 pm
Closed all day Wednesday

YORK Tel: 0904-34281
YORK MODEL CENTRE ★
17 DAVYGATE CENTRE
DAVYGATE
Open Mon.-Sat. 9 am-6 pm
No half day

YORKSHIRE

BARNSELY Tel: 43561
DON VALLEY SPORTS ★
28 NEW STREET
Open 9 am-5.30 pm Mon.-Sat.
Closed Thursday

BRADFORD 8 Tel: 26186
MODEL DROME ★
182 MANNINGHAM LANE
9.30 am-5.45 pm.
Closed Wednesday

DONCASTER Tel: 62524
B. CURTISS & SONS
40 DUKE STREET
Open: 9 am-5.30 pm
Closed all day Thursday

SURREY

ADDLESTONE Tel: WEYBRIDGE
45440
ADDLESTONE MODELS LTD ★
63 STATION ROAD
Open 9 am-6 pm
Closed all day Wednesday
Late night Friday 6.30 pm

PONTPOOL Tel: 58070
TREGARON MODELS ★
40b GEORGE STREET
GWENT NP4 6BY
Open: Mon. 12.00-7.00; Tues.,
Wed., 9.30-5.30; Fri. 9.30-7.30;
Sat. 9.30-5.00; Closed Thursday

NEW MALDEN Tel: 01-942 0012
MICK CHARLES MODELS
33 COOMBE ROAD
Mon., Tues., Thurs., Sat. 9.30-5.30
Fri. 9.30-8.00
Closed all day Wednesday

SWANSEA Tel: (0792) 52877
SWANSEA MODELS & ★
HOBBIES LTD
PLYMOUTH STREET
SA1 3QQ
Open: Mon.-Sat.
Late night Fri. 6 pm

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buy with
confidence
from the
shops in this
Shop Guide**

★Shops offering a mail
order service are
denoted by an asterisk.

SANWA

Mini Propo

GC-2200E

***Big on performance
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pocket —
here's the
sport R/C
system you
have demanded.***



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performance and most
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2 channel 2 servos

GC-3300E
3 channel 2 servos

NEW TRANSMITTER
6.10" x 5.51" x 2.04" compact size
12.3oz (less batteries) weight
HIGH OUTPUT
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Provision for fitting nicads charging
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RECEIVER
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1.76oz
SENSITIVITY 50 Micro volts/meter
Output+pulse 3.5v

SERVOS
NEW ROBUST DESIGN
Size 1.53" x 0.78" x 1.61"

Tx/Rx Nicad packs & charger available.

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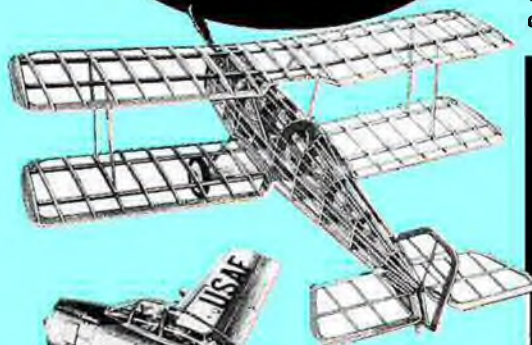
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BRUNSWICK WAY, NEW SOUTHGATE, LONDON N11 1JL

KEILKRAFT

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America's top-selling kits. Super FLYING model designs. Authentic scale — many with special working features. Super-complete kits presented in lavish style boxing. Fifty-three different models — far too numerous to illustrate them all here. In ten different series. Your local KeilKraft stockists can show you them.



series 900
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series 500 F6F HELLCAT



series 200 RUMPLER C-5



series 800 DH MOSQUITO



series 2000
LOCKHEED
LIGHTNING



KEILKRAFT are sole U.K. distributors of GUILLOW'S kits. You can find them at all KeilKraft stockists.

series 200

The last word in scale realism for the super-detail fan — great flyers for those who build to fly. Fly on rubber power or with .02 glo motor. Kits contain scale WW-1 plastic wheels, full sets of decals, superb plastic parts and plywood firewalls for glow engine mounting.

each
£5.95

Model	Wing Span
Thomas Morse Scout	24"
British SESA	24"
Nieuport 11	24"
Fokker DR-1 Tri Plane	20"
DeHavilland 4	27"
Rumpler C-5	24"

series 300

Whether built for flying or scale only, the eight planes in this series represent the finest in design, construction and light characteristics. For rubber power or .02 glo free flight. The Fairchild 24 and Arrow are Build-by-Number models — rubber or .02 glo engine power.

each
£3.65

Model	Wing Span
Aeronca Champion 85	24"
Cessna 170	24"
Piper Super Cub 95	24"
Piper Cherokee 140	20"
Beechcraft Musketeer	20"
Cessna 150	24"
Fairchild 24	25"
Arrow	28"

series 400

Fabulous ¾" scale World War 2 models for rubber power, .02 glo control line, .02 free flight and .02 R/C. The ultimate in scale design and construction. From the extra special instruction sheets and plans through the eye-popping contents, these kits truly represent the last word for those seeking the unusual in value, quality and completeness.

each
£7.70

Model	Wing Span
Messerschmitt BF-109	24½"
N.A. P-51 Mustang	27½"
Supermarine Spitfire	27½"
Mitsubishi Zero	27½"
Curtiss P-40 Warhawk	28"
Focke-Wulf FW 190	25½"

series 500

Authentic scale rubber powered World War 2 models — 16½" wing span except Rufe (16"). Kits contain canopies, cowls, propellers, decals, rubber motors and beautiful die-cut balsa parts plus a 24 page model building booklet.

each
£2.45

Model	Wing Span
Curtiss P-40 Warhawk	
Focke-Wulf FW 190	
Grumman F6F Hellcat	
Supermarine Spitfire	
Messerschmitt BF 109	
Hawker Hurricane	
Nakajima AGM2-N Rufe	
Junkers JU-87B Stuka	
Grumman TBF Avenger	

series 600

Build-by-number rubber powered models

each
£2.10

Model	Wing Span
Cessna 180	20"
Piper Super Cub	20"
Javelin	24"
Lancer	24"

series 800

Camel, Cessna 172 and PT-17 designed for .049 to .15 control line, .049 free flight and rubber powered flying. Mosquito and B-25J for .020 to .049 control line or display only. Exceptionally beautiful models with all the scale detail that have made Guillow famous. Full decal sets, scale wheels, etc.

each
£10.50

Model	Wing Span
Sopwith Camel	28"
Cessna Skyhawk/172	36"
Stearman PT-17	28"
DeH Mosquito MkIV	25½"
N.A. B-25J Mitchell	26½"

series 900

Model No. Amer. T-28 Trojan 16"
Cessna O-1E Bird Dog 18"
DeHavilland Chipmunk 17"
Douglas A1H Skyraider 17"
No. Amer. P-51D Mustang 17"
Hawker Typhoon 1B 18"

each
£1.95

series 1000

Giant ¾" scale World War 2 models with true-to-life operating features. Built for static display or flying fun. Fly them rubber powered, control line (.09 motor), free flight (.049 motor) or simple R/C. Retractable landing gear and tail wheel, movable tail surfaces and ailerons, sliding canopies, superb decals and pilot/gunner figures.

each
£14.70

Model	Wing Span
Rep. P47-D Thunderbolt	30½"
Junkers JU-87B Stuka	34½"
Douglas SBD-3 Dauntless	31½"
Vought F4U-4 Corsair	30½"

series 1500

Beautiful scale models for .049 — .051 engine power and 2- or 3-channel radio. Models that build the easy way — and have smooth flight and handling characteristics. Top quality kits contain all balsa parts plus formed plastic nose cowls, formed landing gear and hardwood parts for stressed areas. Detailed plan supported by profusely illustrated building and assembly instructions.

each
£21.00

Model	Wing Span
Cessna 170A	45"
Bellanca Cruisemaker	42½"
Piper Tomahawk	42½"

series 2000

LOCKHEED P-38L LIGHTNING
Truly beautiful replica of one of the most famous of WW-2 fighter planes. ¾" scale — 40" wing span. For .049 to .09 engines — control line, free flight rubber or simple R/C. Many operational features such as moveable control surfaces, retractable landing gear and droppable bombs. Super decal set — beautifully formed plastic parts — the finest model of its type available in kit form!

£21.00



Guillow's

MOJO

A sports rubber power
free flight model
By R. PRESTON

SUPPLEMENT TO
AEROMODELLER DECEMBER 1980

POWER. 2 LOOPS $\frac{1}{8}$ " RUBBER
OR $\frac{1}{4}$ " FLAT RUBBER.

ADD SIDE THRUST
PACKING AS
NECESSARY.

USE 8" PLASTIC PROPELLER

NOTE DOWN THRUST
ON PROPSHAFT.

LEAVE GAP FOR TAB
ON WINDSCREEN.

PLASTIC
NOSE
PLUG

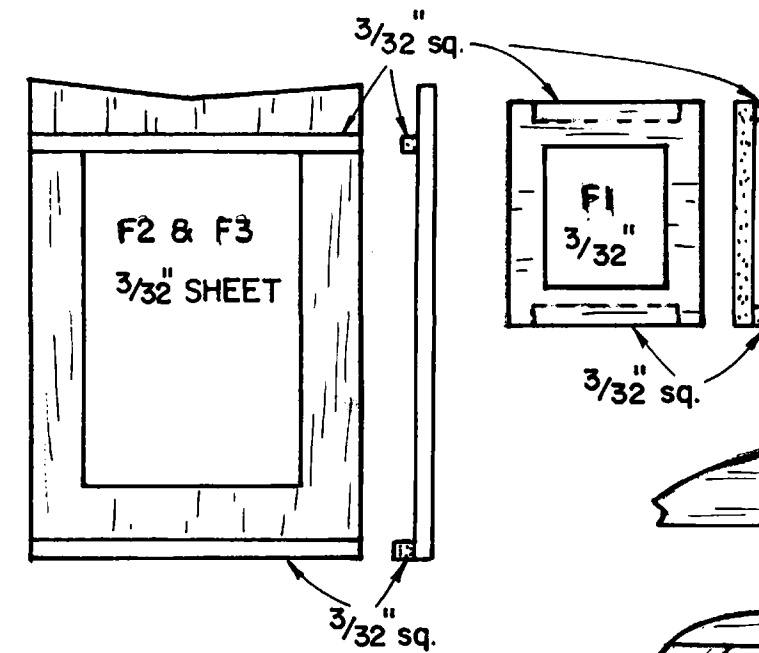
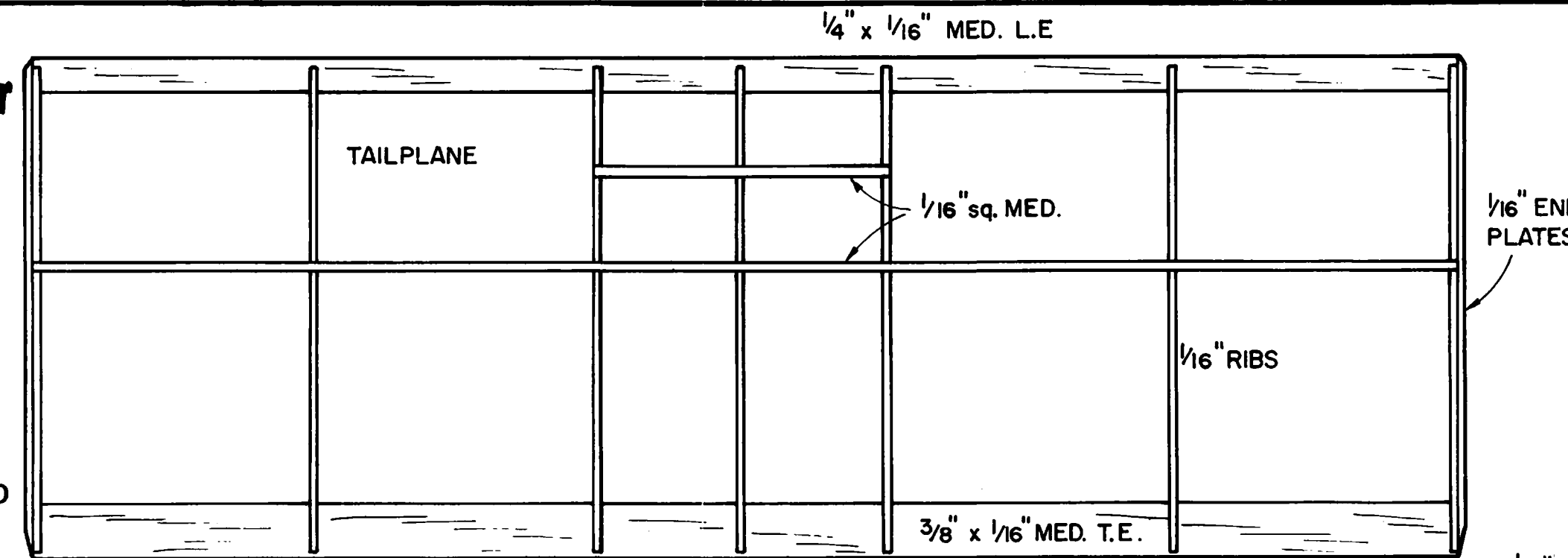
WINDING
HOOK

$\frac{1}{32}$ "
PLY RING

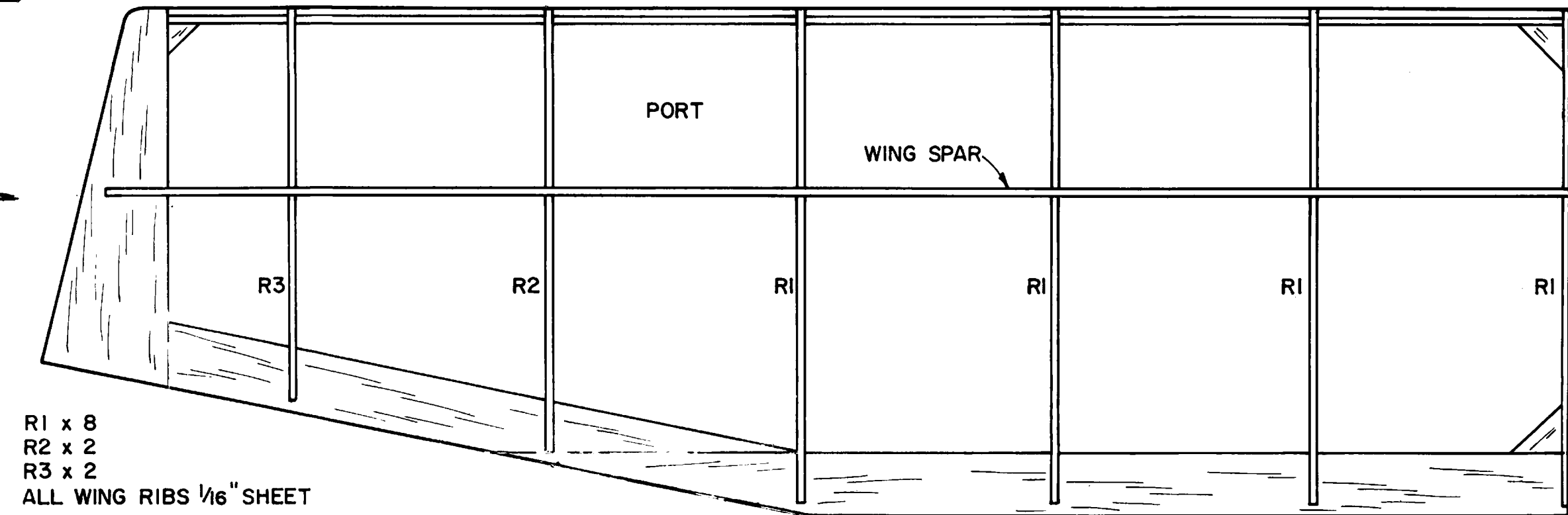
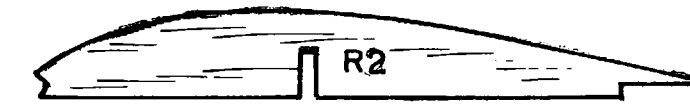
SOFT
BLOCK
NOSE

$\frac{3}{16}$ " SHEET SCRAP
NOSE BLOCK
LOCATING PLATE
CEMENT TO REAR
OF NOSE BLOCK.

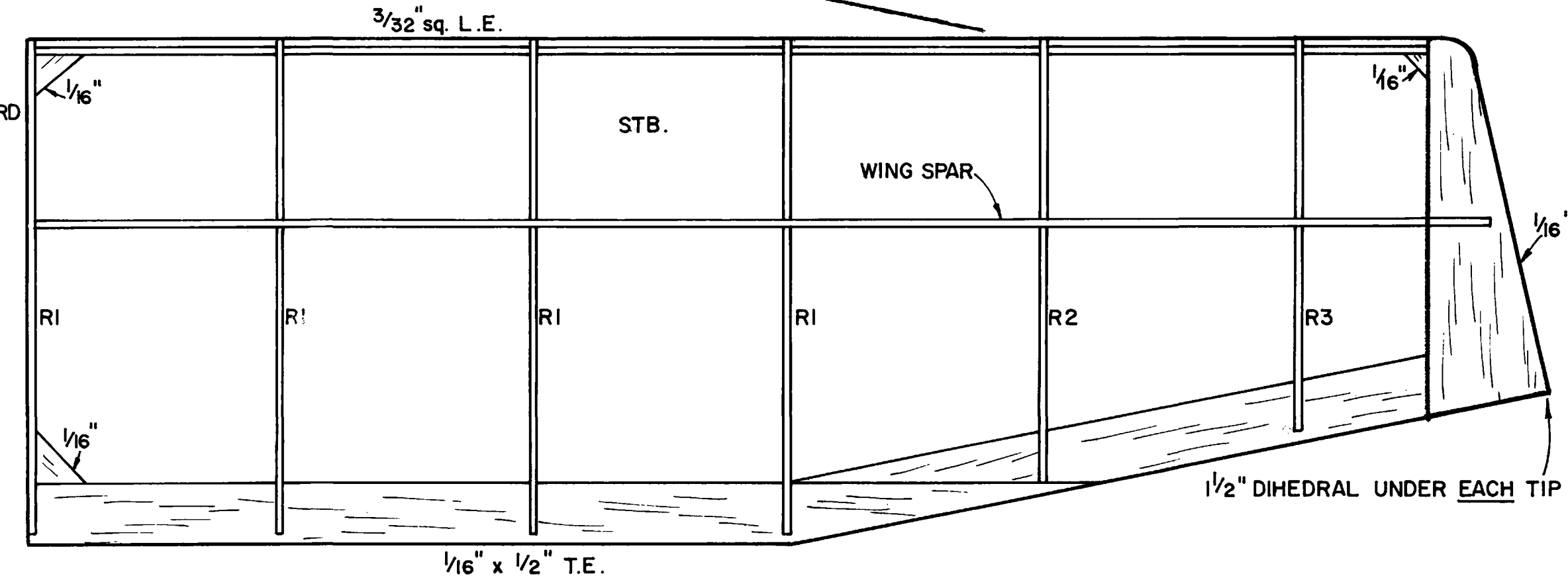
ALL FUSELAGE LONGERONS, VERTICAL & CROSS BRACES ARE $\frac{3}{32}$ " sq.



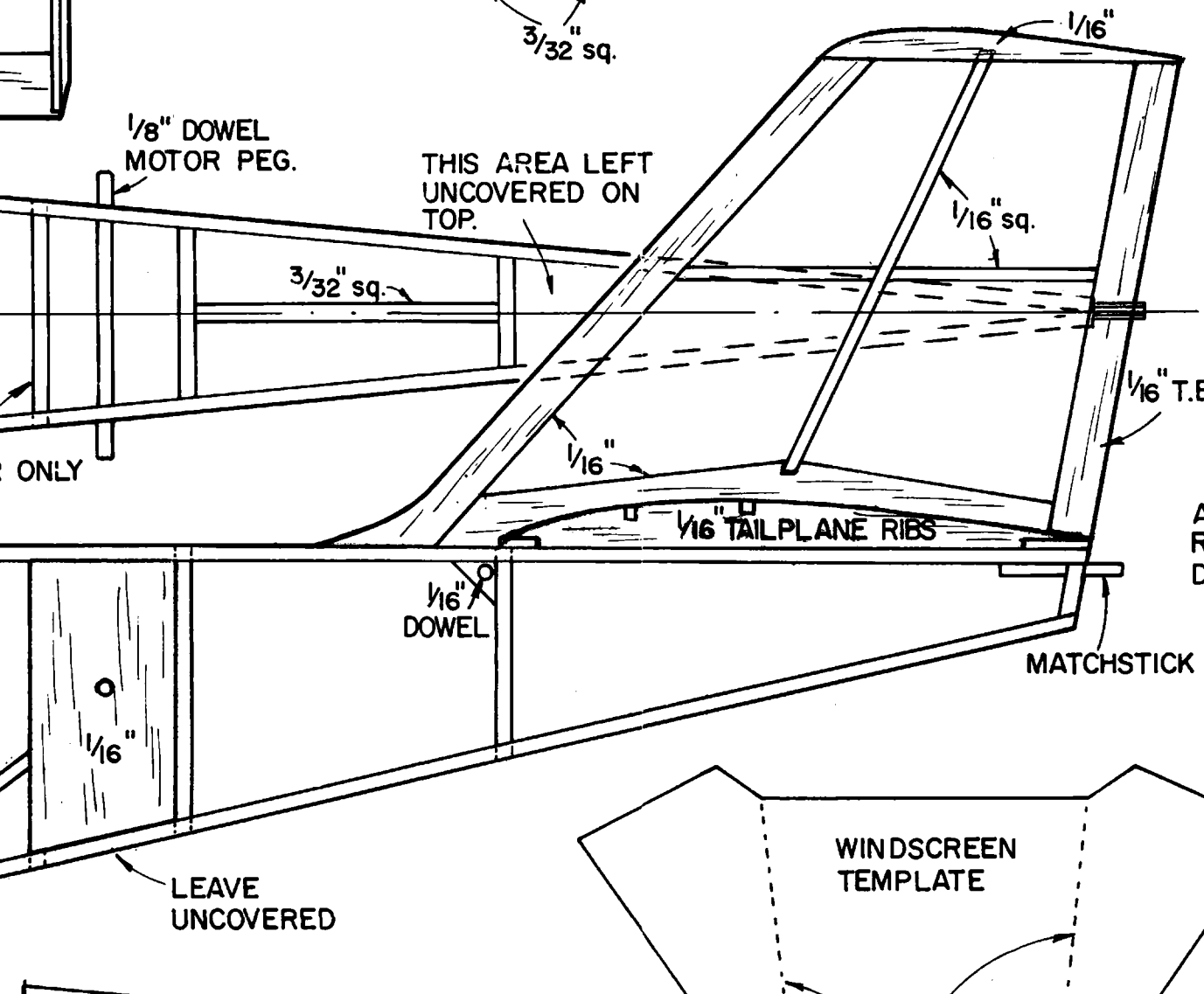
COVER STRUCTURE WITH
LIGHT WEIGHT TISSUE



R1 x 8
R2 x 2
R3 x 2
ALL WING RIBS $\frac{1}{16}$ " SHEET

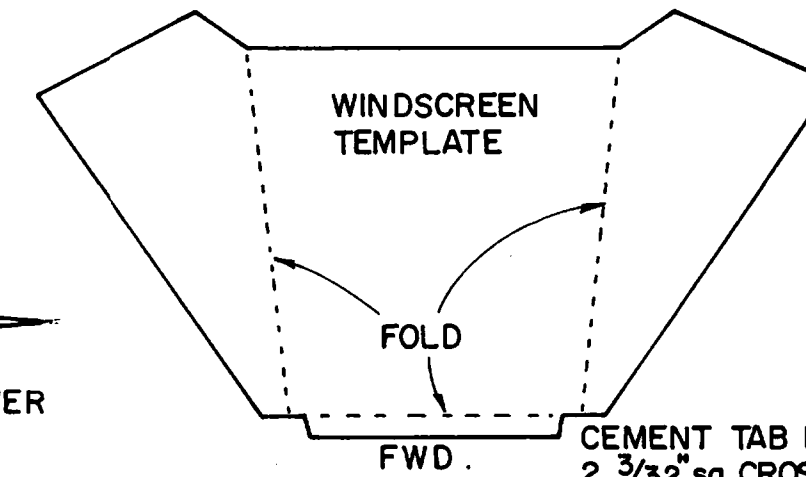


$\frac{1}{16}$ " x $\frac{1}{2}$ " T.E.

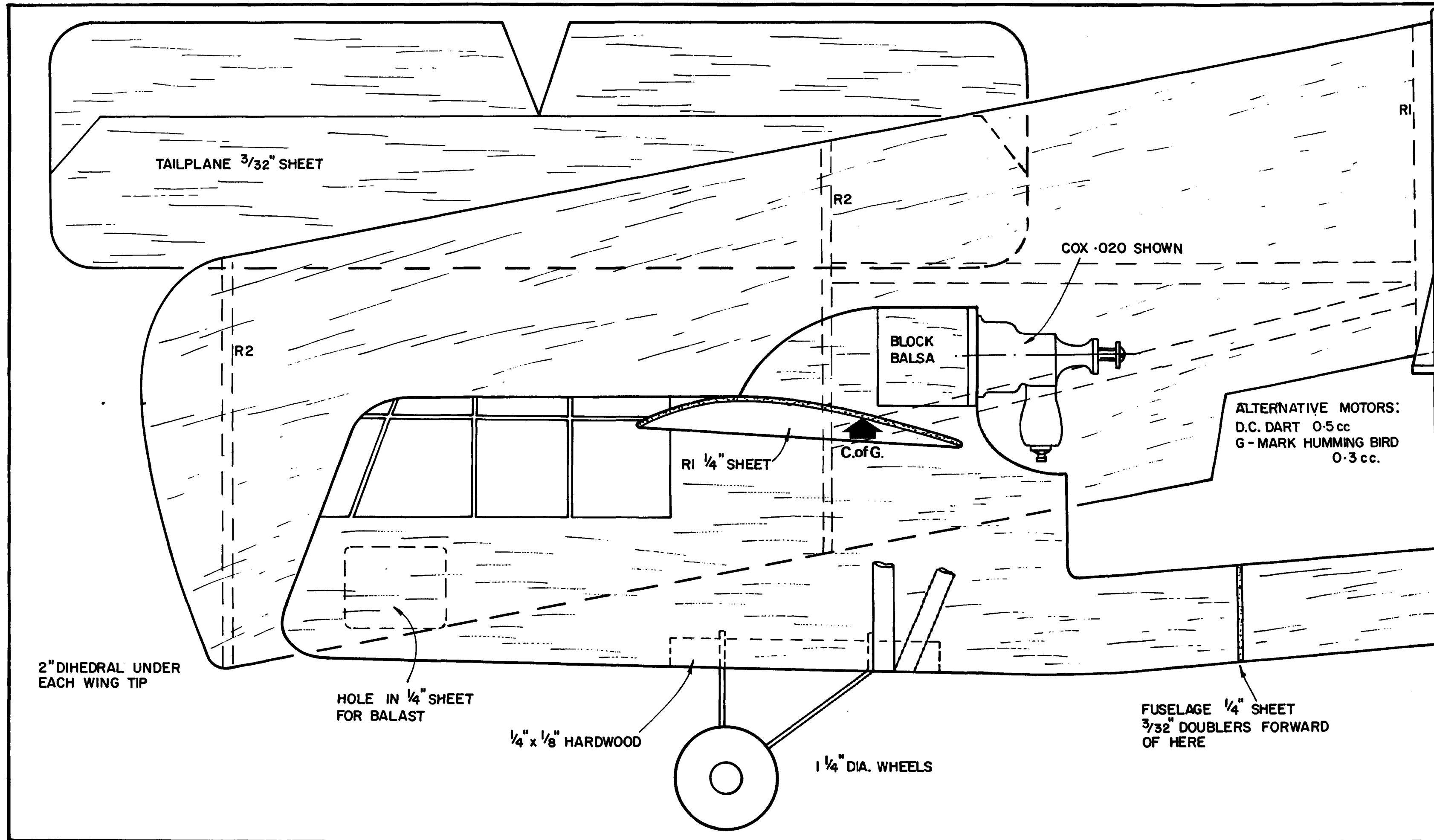


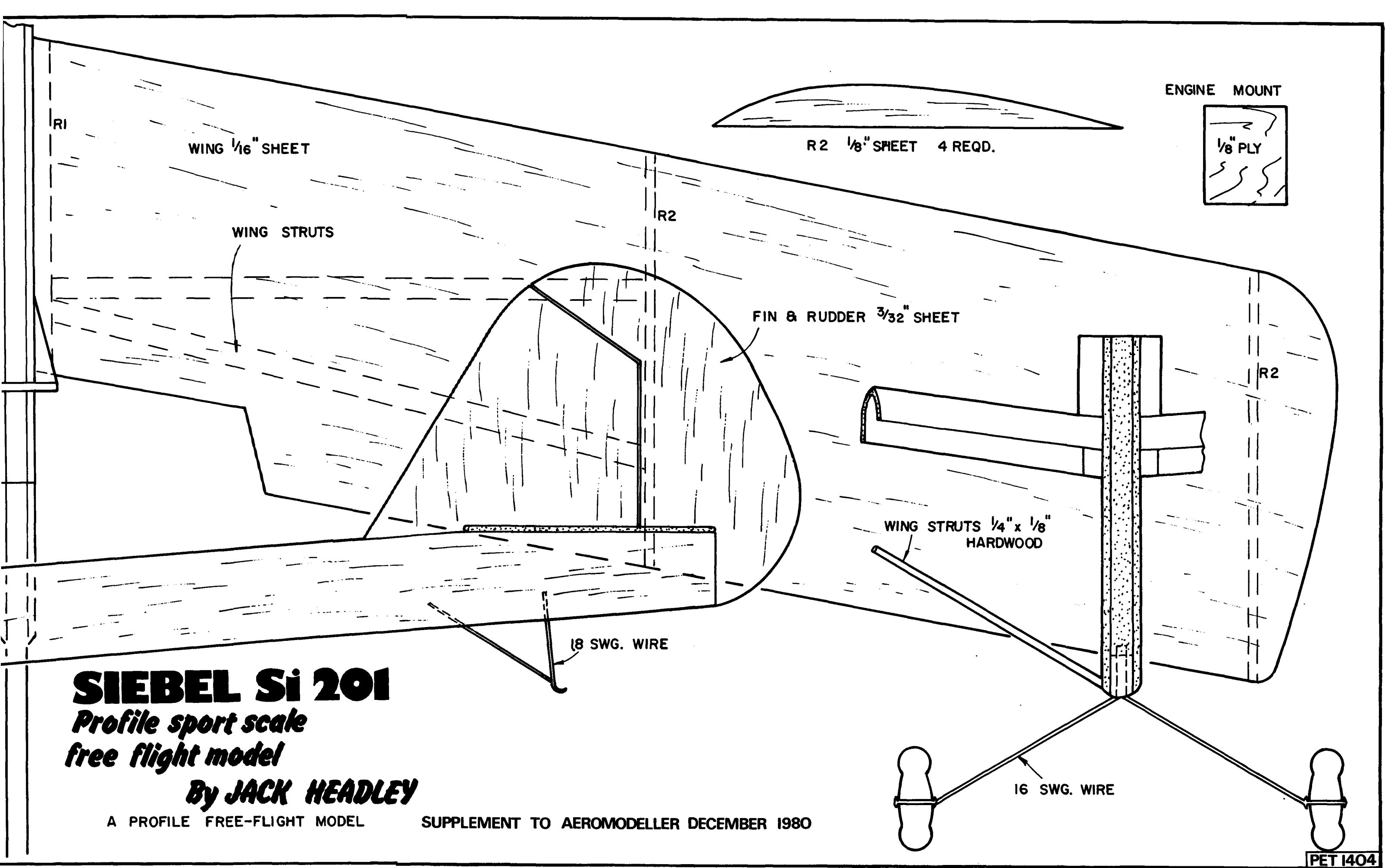
ANGLE INBOARD
RIBS FOR
DIHEDRAL.

MATCHSTICK



TAILPLANE KEY. CEMENT TO LOWER
SURFACE OF T/P. ENSURE T/P IS
SQUARE TO FUS.





SIEBEL Si 201
*Profile sport scale
free flight model*
By JACK HEADLEY

A PROFILE FREE-FLIGHT MODEL

SUPPLEMENT TO AEROMODELLER DECEMBER 1980