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AERO

MODELLER



P.652



P.669

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Cover:

We just couldn't resist Bert Ellis's crisp painting of this Majestic Major happily aloft above the snow... and here's the chance to remind you of our continuing top Vintage coverage which concentrates this month on the SAM 35 Championships. Turn to p.691 - and Merry Christmas, everybody!

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Throughout November 10 regional competitions will take place across Britain, winners in the regions will be entered in the National final which will take place at the Model Engineer Exhibition.

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Model Engineer Modelling Competition

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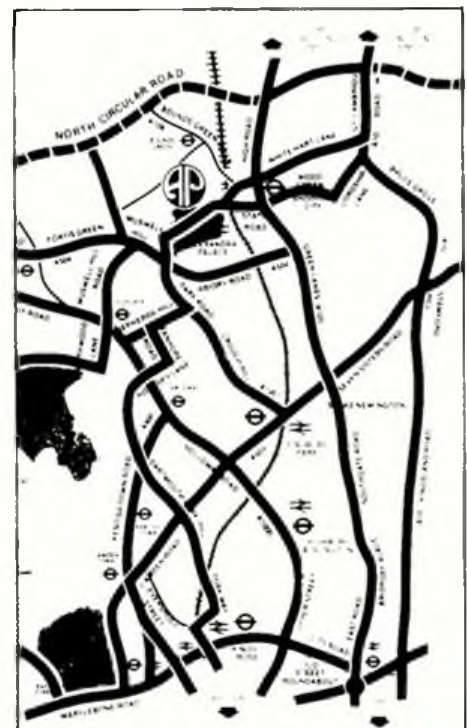
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Major roads and motorways round London link with Alexandra Palace and are well signposted to the venue.

BUSES

In addition to the numerous bus routes converging on Alexandra Palace, the W3 bus service provides a station to station link running to the Palace from Wood Green and Finsbury park. Alexandra Palace also provides a speedy shuttle service to and from Alexandra Palace station and car parks.



from Argus Specialist
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HANGAR DOORS

Reflections on the Nats

Once again the August Nationals has passed, allowing moments to think back. The message is, as ever, one of loyal support for aeromodelling, perhaps, we thought, with a touch of even greater enthusiasm this year. Control line scale continues to confound its critics; an improvement to ten entries hopefully signalling greater things for the one branch of scale endeavour where the pilot is actually linked to his creation. We'd still like to see more multis, though. What about that Yak 4 we featured in last month's Scale Matters?

Unhelpful weather (when are we going to be treated to a decent Bank Holiday?) meant it was generally a time for tried and tested favourites. Notable exceptions were in the boom area of Vintage Team Race, an event which has startled many by the cheerfull way in which it has been treated by participants. Even of the Oliver Tiger, as totally expected, is the unbeatable motor, many others are being tried. A competition class where personal favourites and nostalgia are still hand-in-hand with winning flair. Will it stay that way? Let's hope so...

Pre-Nats publicity again stressed the 'biggest model flying event in Europe' angle. If so, surely the time has come to treat it as more than just a competition. Perhaps there were no casual or first-time spectators; but what was there to keep the nats newcomer informed? This is not to belittle the efforts of those who organised, got on the mike and generally did their best (often

From Japan, Naomi Sturman hams it up for the camera with Dad Nathan's Novi stunter. When will she take the handle?



Right: Scale success for our R/C Team at the World Champs in Gorizia! Emphatic team victory was thanks to sterling work by Mick Reeves (Sopwith Camel), Peter McDermott (DH9A) and Brian Taylor (DH Mosquito). Below: More congrats! Jim Boys hands over the Pterodactyl Trophy to Bob Brown, winner of our Howard Boys Memorial event this year.



to better standards than in the past) but if the aim is to attract spectators, and to take their money at the gate, surely it is time for more extensive effort to tell them what's going on. Or do we just maintain the Nationals as a competition? Nothing wrong in that, but let's be honest about if we do.

Scale the heights

An Italian job well done -- that's the verdict on a superb British R/C Scale Team success at the World Champs in Gorizia, Italy. The combined might of Peter McDermott (who took second place to Philip Avonds' F15 Eagle in a nailbiting final round), Brian Taylor (DH Mosquito, fourth) and sixth-place Mick Reeves' Sopwith Camel was more than enough to keep over a thousand

points ahead of the Belgians, closely pursued in turn by the West Germans. For all the gen refer to our sister publications Radio Modeller and RCM&E. Well done, too, to our R/C Acrobatic team who took third place in the Eurochamps event, particularly Ken Binks who just missed the fly-off by three points.

Pterodactyl antics

If you missed our Four-Stroke day at Old Warden on 18th September then you missed one of the best flying meetings of the year. Autumnal calm coincided with late-summer warmth to create idyllic conditions for the few free-flighters who tried their luck with the extra space afforded by our 1988 field layout. Thanks to members of the British Space Modellers' Association, an impressive demonstration of

model rocketry attracted a crowd ten deep at the flight-line boundary, all eager for what was, for the majority, their first taste of whoosh and chute. Boost gliders, rogallo wings and scale craft each added to the variety. Also on hand was Arthur Bodily, Model Engineer enthusiast par excellence, who was happy to demonstrate his splendid Gnome and Bentley BR2 rotaries, plus an amazing nine-cylinder design of his own, to the evocative accompaniment of blipping throttles and sweeping whiffs of petrol and oil.

This was also the venue for our re-scheduled Howard Boys Memorial Trophy, rained-off at Golden Era Day. The accused postal strike hampered notification but little, and an assembled seven 'unorthodox' enthusiasts indulged in gentle competition, hosted with a good deal of informality by Jim Boys and your editor. Full report next month; meantime, congratulations to Bob Brown who put aside the autogyros for once to air his sleek BEC8 (Bob's Electric Canard No.8) to winning effect, just ahead of George Bushell's soaring Joey electric wing.

In similar vein, we announce that our Lympe-Scale '88 event is now carried forward to '89. Despite the most earnest wishes of half-a-dozen hopefuls at the Shuttleworth Model Society's Silent Day, a breeze enough certainly to curtain any full-size historic ultralight activity put paid to display from the mustered miniatures, despite frequent re-grouping to assess conditions. Golden Era Day 1989 is booked instead, so there's now no excuse for not building your favourite!

Communication — the name of the game

We say 'thank you' to all enthusiasts who, by submitting substantial (and often generous) bids for the motor kits and plans, on offer in our Vintage Engine Auction (September, Aero-



modeller) not only proved the worthiness of the idea but hopefully shamed the nameless trader who felt that forty quid for over twenty vintage engines was a fair offer to quote an aeromodeller's widow. By the time you read this the goods will have found their way to new homes. We have a thick file of bids, and of course, cannot reply to each individual, but again, thank you for helping. All of you. Incidentally, we kept the file open longer than first anticipated to cater for delays caused by postal strike - a communication glitch that hindered appearance of our account of the Control Line World Champs report. To prevent overloading this issue with competition reports, full Nationals coverage has been held over until the January issue. Major events should be reported in depth; an *Aeromodeller* tradition that will be maintained. So book your January now - it's well worth waiting for!

Top of page: Seen at the Nats - Doug McHard's fine APS Short Scion. See also Balsa Cuttings.



Anniversary Coupe

The French Coupe d'Hiver event celebrates its fiftieth anniversary in 1989. The event, scheduled for 26th February at Reau-Villaroche airfield twenty miles south of Paris will be organised by our friends from the '4A' vintage group. The favourite '80gm' category will be flown together with separate classes for Vintage (pre-1956), ladies, juniors and clubs. Plenty of reasonably-priced hotels and restaurants nearby, we're told. Interested? Write to organiser Michel Pierrard, 21 route du Chancelier Seguier, 78260 L'Etang-la-Ville, France. Or contact us at *Aeromodeller* and we'll see if we can arrange a group...

Aeromodelling at the M.E.

Entries are rolling in for the 1989 Model Engineer Exhibition - the first to be held at the airy and spacious Alexandra Palace. And if your image of Ally Pally is based on the flickering 405-line television image of over forty years ago, then think again. Freshly restored to smarter-than-original condition, the People's

Palace is a venue to delight - and to relax in, the better to enjoy all that modelling excellence can offer from 31st December to 8th January.

Quite apart from competition classes and club and trade stands, aeromodelling interest is robustly catered for by the DPR Model Flying Day on 1st January. Competitions are: the Hit the Kit target event for under-13s (times: 11am, 1pm and 4.30pm), the Junior Superfighters contest at mid-day, and - at 2.30pm - the Junior and Senior National Chuckie Championships, a duration event for the DPR Chuckie glider. The DPR Workshop will be open all day from 10.30am to allow latecomers to build on site - or you can build and test in advance if you wish. Super prizes on offer include R/C kits and models, trophies, DPR kits and magazine subscriptions. Exhibition admission is free for Chuckie Championship competitors providing your entry form is received by DPR Models before 21st December.

Write for details now to DPR Models, Unit 9, The Vanguards, Shoeburyness, Essex SS3 9QY, enclosing SAE. Good on you, Dave and Janine Rawlins, for your continued support for the youngster in aeromodelling - and for encouraging Chuckie glider enthusiasts of all ages! Lots of fun guaranteed - so see you at Ally Pally on 1st December!

Scale stop press!

Ray Johnson's Svenska SK8, this month's full-size plan subject, won Rubber Scale at the SMAE Autumn meeting (report next month!)

Left: Shiny Speedwagon with rare Mamiya .60 is the work of Thomas Leijon, one of a merry Swedish contingent at our Vintage Weekend.

'Now how do we get the Christmas Pudding back?'



Christmas approaches; Terry Rose's view at left...

WHAT'S ON

Clubs secs and PROal It's AGM time, and the new season's calendars are being organised. Don't delay - send us news of your events as quickly as possible for inclusion in What's on. Unless you don't care for free publicity, of course...

12-13th November RAFMAA INDOOR EVENT

Venue: RAF Upavon, 10am - 5pm Informal competitions for Helicopter, Scale Pylon Races, Portsmouth Duration, Pistachio Scale. SMAE members only. Pre-entry essential. Contact: Fit Lt A. Sephton. Tel: 0252 541009.

This is a date change from 29-30th October

20th November SOUTH BIRMINGHAM MFC. SAM 35, MECA SWOPMEET

Venue: St. Brigid's RC School, Frankley Beeches Road, Northfield Birmingham. 12 noon start. Contact: Peter Martin. Tel: 021 459 5520.

4th December AEROMODELLER COUPE D'HIVER CONTEST

Venue: RAF Henlow. Pre-entry essential. 80gm, 100gm, Vintage and top Junior prizes. Contact: Aeromodeller. Tel: 0442 41221.

31st December-8th January 1989 MODEL ENGINEERING EXHIBITION

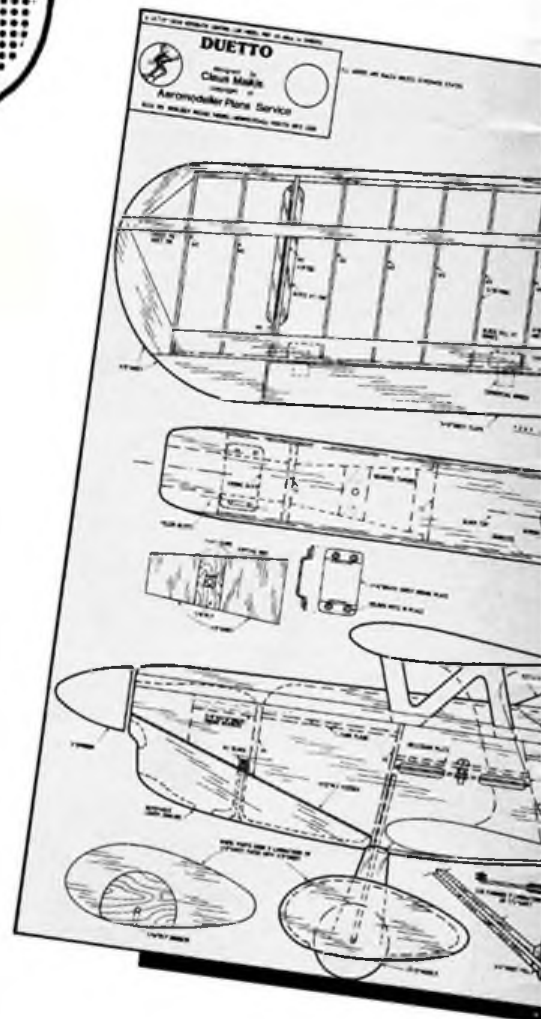
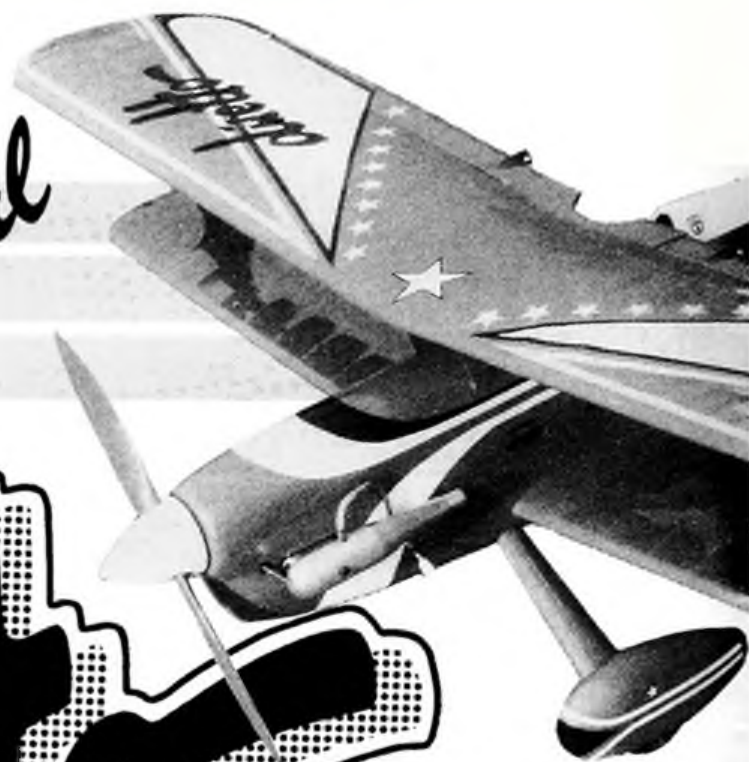
Come to the First M.E. Exhibition at Alexandra Palace! The light, airy splendour is absolutely right for displaying model aeroplanes - so now is the time to apply for competition entry. Plenty of room for all! And don't miss the DPR Model Flying Championships. Usual support expected from BMFA, SAM 35, BSMA and clubs. More information from Argus Specialist Exhibitions on 0442 41221.

9th January VINTAGE TEAM RACE RULES CONFERENCE

Venue: St. Brigid's RC School, Frankley Beeches Road, Northfield, Birmingham. Time: 1pm. Details from Peter Martin on 021-414-5351 (days); 021-459-5520 (evenings). Subject: Finalisation of Vintage T/R rules.

Be part of
the biplane revival
with...

Duetto



Biplane basics

I have already laid down basic thoughts on how a biplane should be designed. I built the Duetto exactly as outlined there. A scale configuration was out of the question; I thought the exercise was difficult enough already. A strictly functional design – as far as a biplane can be functional! – was chosen. Construction was kept as simple as possible. Particular built-in features ensure easy and exact alignment of the two wings. Only when flight characteristics could not be influenced were some nostalgic elements allowed – for example, cockpit layout, fin outline, wing tip shape and undercarriage design. Special attention was given to weight reduction because I was afraid of additional *avoir du poids* caused by the two wings and four struts.

I felt that the strongest engine available should be chosen. Normally this would call for a 60. However I decided on one of my four (!) ST 46's instead. If my biplane really flew well, there would perhaps be a number of flyers who'd like to build one, too. Since the 45 engine size is the most popular, the design was centred on that capacity range. Going below this limit doesn't seem practical because of the small wing span which would then result. The sound of a four stroke engine in a biplane was a temptation I was able to resist...

At last – the Doppeldecker (German for biplane) is here! Now this is an airplane which will once and forever stop the silly question 'Is it a modified Stiletto?' Duetto is not the first aerobatic biplane. Other flyers have designed them – and I've even drawn and built a whole squadron myself. However, Duetto was designed to fly the full FAI schedule, and to fly well – in competition, that is!

A group of stunt flyers in Southern Germany tried to find new ideas on how to keep the fun in stunt flying – and in contest flying. Building one 'serious' stunter after the other can easily become boring. It was felt that a new approach was needed to spark the interest beyond just flying contest rounds. I suggested a biplane. The reaction was not encouraging. 'Too much work', 'Difficult to construct', 'Too heavy', 'Wouldn't fly' were the instant replies. I had a different opinion, but I couldn't convince my fellow enthusiasts. So I got to work.



Go for two-winged aerobatics!

**Claus Maikis brings you a slick
stunter for .45 engines**

Plans of Duetto are available for £5.00 plus 60p postage from ASP Plans Service, 9 Hall Road, Maylands Wood Industrial Estate, Hemel Hempstead, Herts, HP2 7BH. Quote AM 1586 when ordering.

It would have to be a very strong one – that means: a 60. But then – the weight! I didn't want to start right from scratch. After all, I didn't intend to re-invent the wheel. Better well copied than badly designed! After all, I think that's what most of us actually do. Some design features were taken from proven, conventional airplanes; that is, from an average 45 size monoplane stunter. The fuselage dimensions are practically the same; tailplane area too. With the centre of gravity in the same place the only work needed was to draw the wings and to position them so that their combined CG point would coincide with the already fixed point in the fuselage. Given an almost identical fuselage it was expected that the CG of the finished model would be in the correct place again. As it turned out, it was!

Design features...

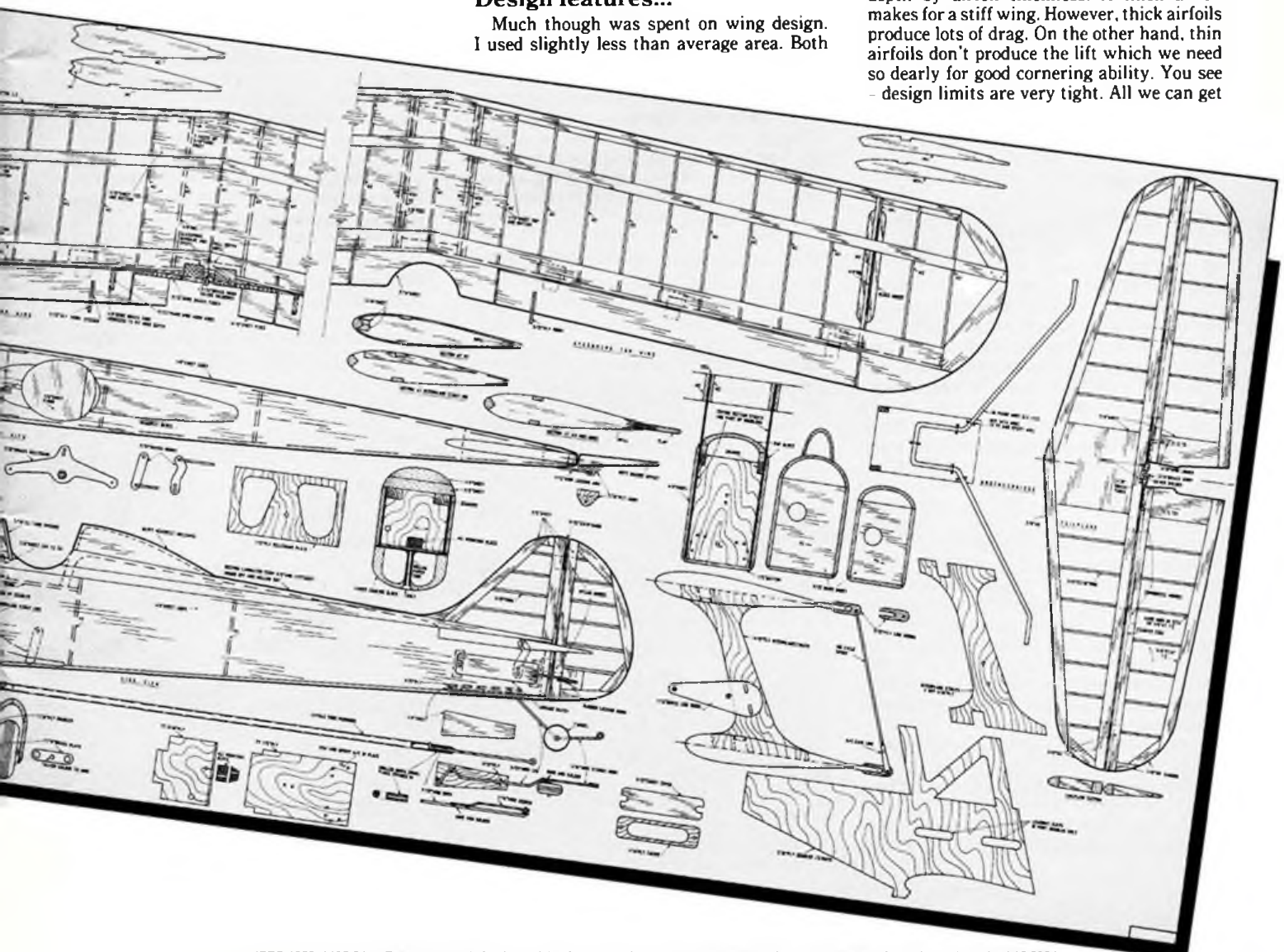
Much though was spent on wing design. I used slightly less than average area. Both

wings should have exactly the same size, shape and construction. So an area of $620 \div 2 = 210$ square inches was calculated for each wing. With the area fixed we must find the span and the chord. To do this we must first know the aspect ratio. Aspect ratio is the relation chord \div span. Since this formula doesn't help us here, use another. Aspect ratio = square area of span. This gave a figure of 1:6; however for practical reasons I came up with a ratio of 1:5.7. Now we calculate multiplied by area $5.7^2 = 1767$. This is 'span squared'. To find the span we figure out the square root of $1767 = 42$ inches. With the area and the span known, the chord had to be 7.4 inches. Remember that with rounded wing tips the wingspan has to be modified slightly.

I said that practical reasons resulted in the figure of 5.7 rather than 6:1. With increasing aspect ratio, the efficiency of the wing increases. It has less induced drag (think of those vortices at the wing tips – and a biplane has four of them!) and the distance of CG to line guide increases, too. This distance has a strong stabilizing effect around the roll axis. Alas, with increasing span (for a given area) the chord gets smaller. Smaller chord means a thinner wing. With weight reduction and simple construction in mind, I intended to build the wings without leading-edge sheet (wings rib look so neat, too!). But without sheeting, a thin wing is fragile. We can build thin wings with sufficient rigidity, of course – but then they are heavy!

Wings and things

On the other hand, we can control wing depth by airfoil thickness. A thick airfoil makes for a stiff wing. However, thick airfoils produce lots of drag. On the other hand, thin airfoils don't produce the lift which we need so dearly for good cornering ability. You see – design limits are very tight. All we can get



duetto

is a compromise with half the disadvantages which we try to avoid – and half the advantages we like so much. So in the end rigidity dictated the maximum aspect ratio. I settled with an airfoil thickness of 13.5% which, it was decided, would produce enough lift, not too much drag, and would build strong enough without LE sheeting. For simplicity – and looks! – a constant-chord wing was used. The typical three-degree wing sweep of aerobatic biplanes was employed.

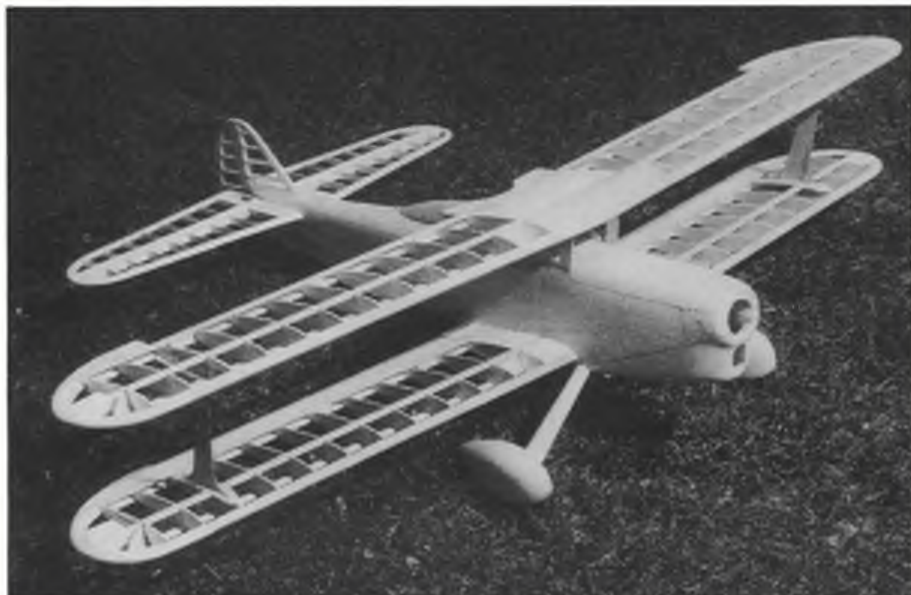
For reasons outlined in my design article I chose to use flaps. I'm fully aware that flaps mean drag, but I didn't dare forego the advantages of extra lift. 18% of the wing chord was considered enough flap chord, and the flaps are sufficiently inboard to avoid additional drag. To retain complete symmetry, both wings have flaps with identical chord, span and deflection.

Wing struts were designed with minimal drag and to position the line guide as near to the wing tip as possible. Fancy shapes might look beautiful here. But large area struts are a big handicap when our model is upwind. Those 'N' shaped struts certainly look nice, but they are more difficult to install, probably heavier, and certainly give more drag than a flat, I-shaped strut. Finally, the biplane shouldn't have too modern a look, so a Nobler – type engine cowl, a fuselage-mounted undercarriage, and some well rounded outlines were employed.

Practicalities

So much for aerodynamics and aesthetics. When drawing the plans ease of construction and low weight were of prime importance. I tried to keep both wings as similar as possible. Ribs of both wings should have the same shape, be in the same place; the centre planking should have the same width. With the exception of the strut mounting and horn installation of course, both wings are built the same way. This has several advantages. Firstly, the number of component parts is smaller. Secondly, construction is easier, hence more exact. Correct alignment of wings is assured; you just cannot install the wings wrongly. The fuselage side doublers are a big help here, too. Whilst this may not be the prettiest way of mounting the top wing, it is very practical. I just couldn't find a more simple and accurate solution. With a simple 'half rib' installed in a few places you just put the top wing against the stop – and it's exactly aligned automatically. Fuselage and tailplane are as conventional as they can be. Except for the cabane struts (which are part of the fuselage side doublers) and the fuselage mounted bellcrank there's nothing different from a monoplane.

I'll give just a few hints where construction differs from normal use. I like to start building with the wing(s) as this is a boring job. All ribs for both wings are cut out, including half-ribs. Leading edges, main spars, and trailing edge parts are cut to size.



Wings are built on a flat board with lots of balsa blocks as supports to ensure warp-free construction. While building, I constantly measure from leading and trailing edge to the board to control trueness. Note that between centre ribs and beneath ribs W2 the half ribs W2A are installed. These ribs are installed with their top outline to match the top of the wing. On the bottom wing the ribs W2A are glued to the bottom side of ribs W2. The bottom wing also takes the flap horn. There's nothing special about this installation except for the wire bearing in the flap sheet. Because the rotation axis of the horn wire and the flap itself are different, the horn wire cannot be glued into the flap. Thanks to the geometry, on deflection the bent part of the wire moves sideways relative to the flap. To avoid friction and strain, the wire is kept in a flat tube. I use an aluminium tube pressed flat so that the wire is kept tight, yet may still move. This is the only time-consuming work. Otherwise the wings build easily and quickly. Actually construction was faster than building the usual, single wing! In the bottom centre of the top wing, we cut the slots where the cabane struts enter the wing – between centre ribs A.

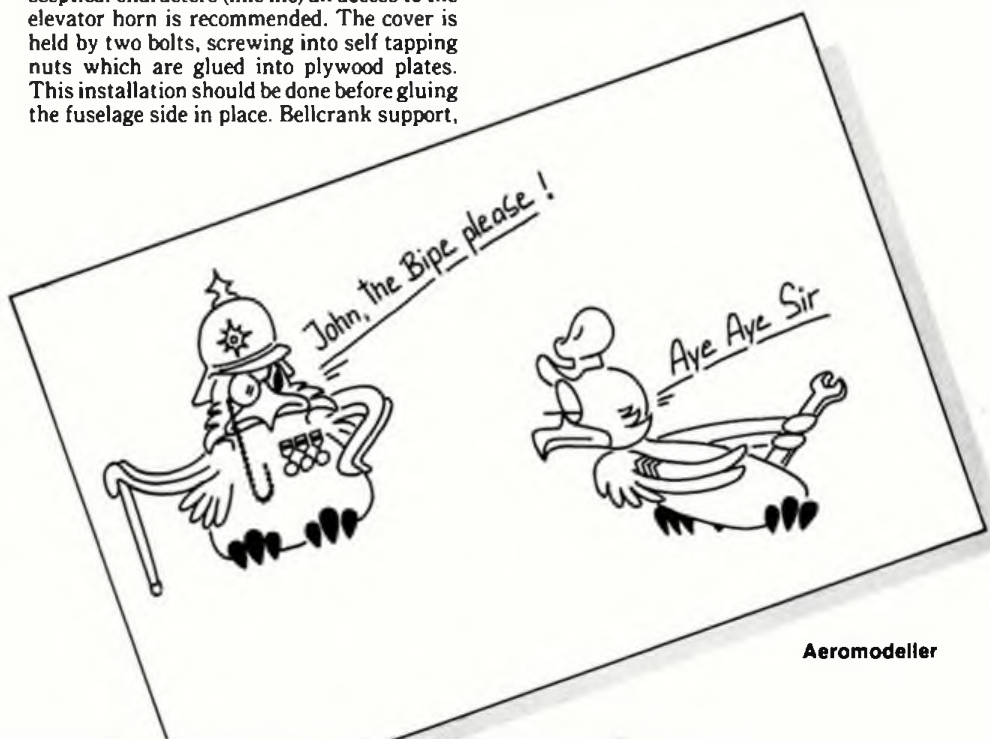
Fus – no fuss

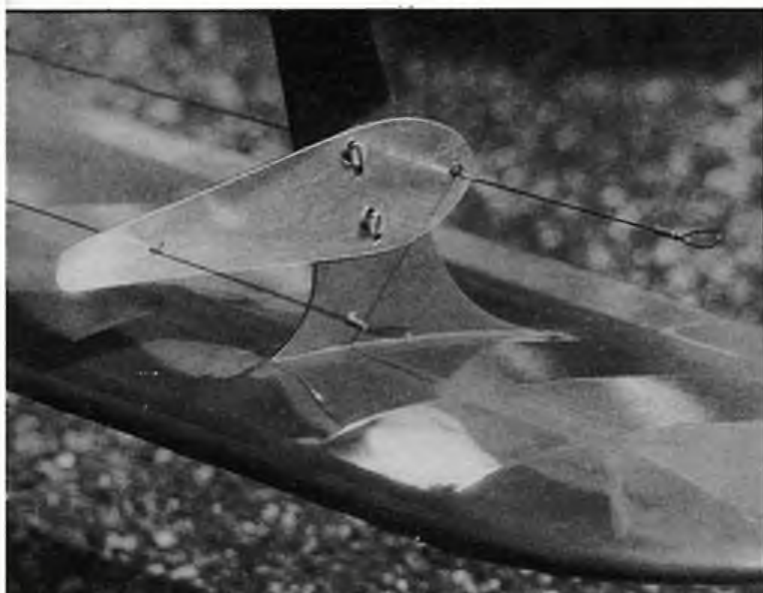
To build the fuselage we assemble engine bearers, formers, tank compartment floor, side doublers and fuselage sides. For those sceptical characters (like me) an access to the elevator horn is recommended. The cover is held by two bolts, screwing into self tapping nuts which are glued into plywood plates. This installation should be done before gluing the fuselage side in place. Bellcrank support,

bellcranks with pushrods, and undercarriage strut is installed now; also the engine mounting plate, tank mounting nut and cowl retaining block. The bottom wing is glued to the fuselage and *very* carefully checked for true alignment. The tailplane is installed and the pushrods connected to the horns. Now the fuselage can be completed. After gluing wing struts to the bottom wing the top wing can be added. We simply apply glue to all struts, push the top wing to the stop (those half ribs) and keep it in this position with clamps and pins. I prefer to use slow-drying epoxy glue for this purpose to be able to work slowly and exactly.

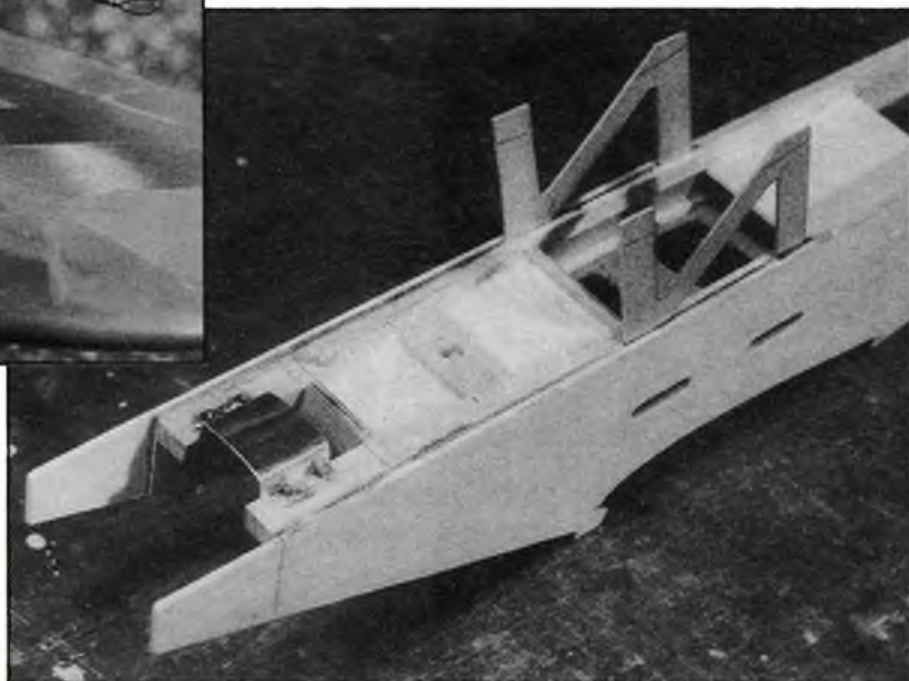
Concentrate!

I'm not going to give more detailed instruction on finishing the framework since I feel the plan gives enough information. Instead I'll concentrate on some particular items. Installation of leadout wires is easy. With full deflection the bellcrank arms extend from the fuselage, so the wires may be added when the paint finish is completed. I use 0.6mm piano wire. At the end of the loop the wire is tightly bent around itself about six times (leave it long enough to make those bends, then cut off the rest). Make the bellcrank loops first, lead wires through the line guide, then bend the inner loops. To keep the line guide light, I chose 1mm dural. Please note that without careful bushing the lead out wires will quickly saw into the Dural sheet.





Far left: Construction is crisp and simple. Two wings not much more work than one - try it and see! Left: Slotted mounting holes in line guide allow fine adjustment. Below: Centre section and engine bay detail. Nost substantial engine plate and simple ply struts.



The resulting rubbing affects control quite a bit, to say the least (I almost crashed the airplane). A small piece of brass tubing will solve this problem. However, to be able to change leadout position, a simple gadget made from brass bolts and nuts can be used. The 3mm bolts have a small hole for the leadout wire, and are slipped on the wire before bending the end loop. With a choice of several holes in the line guide, the bolts can be put into the desired hole and fixed with the nuts. Of course, the line guide has to have a horizontal slot for the wire to move.

I like to fix my tank absolutely, and I've never had any problems with my method. Given the requirement of a short fuselage nose, there simply is no room for mounting lugs at the tank's front and rear end. A clever solution is to mount the tank with a centre bolt. This bolt runs through a brass tube which is soldered vertically in the tank centre. An R/C plastic 6mm bolt will hold the tank. It screws into a plastic nut glued to the tank platform. Tank height is varied simply by placing balsa sheets of various thickness between tank and tank platform.

Since there's not enough room to mount the engine cowling between former 1 and the tank, I built a small aluminium block with

two 3mm thread holes (one vertical, one horizontal) which screws to the front side of former 1, holding the cowling with a bolt screwed into it vertically. I recommend two small pins to hold the cowling exactly in place (and to prevent it from sliding forward when the mounting screw is tightened). The control system is built as shown on the plan. Be sure to align the flap horn with the angle exactly as drawn. The pushrod may be a lot of work, but I cannot accept any other kind. A simple wire pushrod is an archaic instrument - forget it! This control system is designed for a four-inch line spacing at the handle.

Crowning glory?

When finishing Duetto, try to crown your work with a beautiful paint scheme. The sheer sight of pretty biplane doing precision

aerobatics will delight every judge, and the contest results will recompense your endeavours. Contrary to popular belief, a biplane is not heavier, nor more difficult or time consuming to build than a monoplane. Actually, the two wings proved to build easier, faster, and lighter than one wing of conventional layout. Whilst the framework appears flimsy, the completed construction with fuselage and wing struts has rigidity beyond all doubts. With an otherwise conventional construction and sparing addition of lacquer, a biplane can be built as light as a monoplane. Mine ended up at 1500 grams (53 ounces) which is the lightest 45-size model I have ever built!

Double the fun!

Now there's the question of performance. To put it quite plainly, the biplane will never quite reach the performance level of a highly developed monoplane. Two wings and additional struts will always produce more drag than we'd really like. Also, the short span may cause some stability problems. Flying in wind resulted in more 'swinging' and rolling than usual. Nevertheless, a biplane *can* be made to fly competitively. Duetto was an improvement over my previous bipes. Make no mistake: this is not a fun airplane with limited performance for pure Sunday flying. Duetto has already had some contest success, and with a little more trimming it will fly better than a badly-built-and-trimmed monoplane stunter. For those of you who intend to participate in competitions, expect to place one or two places lower in the result list. However, as far as fun is concerned there's hardly a rival for a biplane. So far I've heard only enthusiastic compliments. I was congratulated every time I appeared with my Duetto on the contest circuit. Not for winning - just for flying! My friends were just overwhelmed by the looks of a biplane doing precision aerobatics. Maybe the judges will be overwhelmed. I hope so. Are you?

Sporty lines of Duetto make it hard to resist. Go to town on the paintwork and create a showstopper!



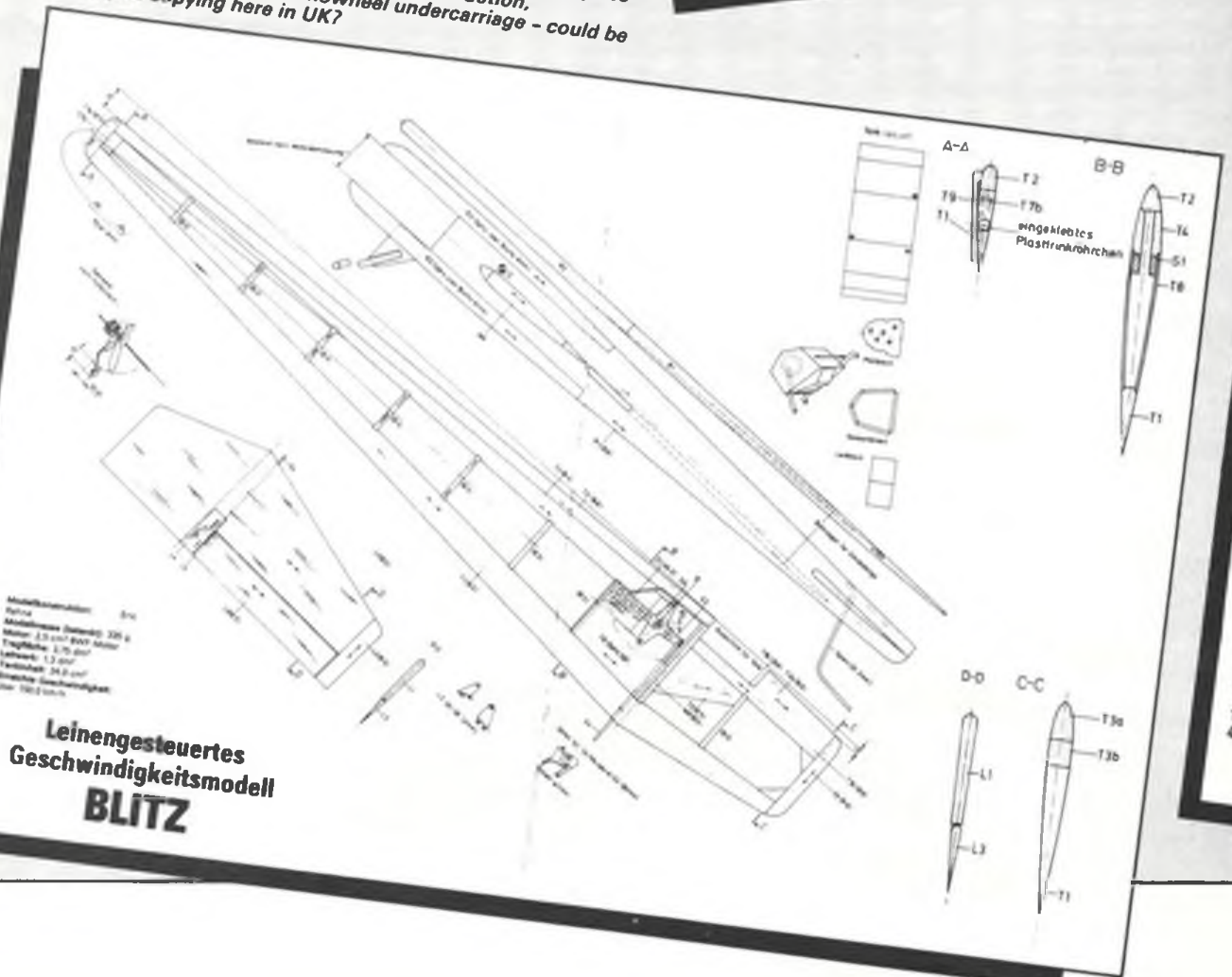
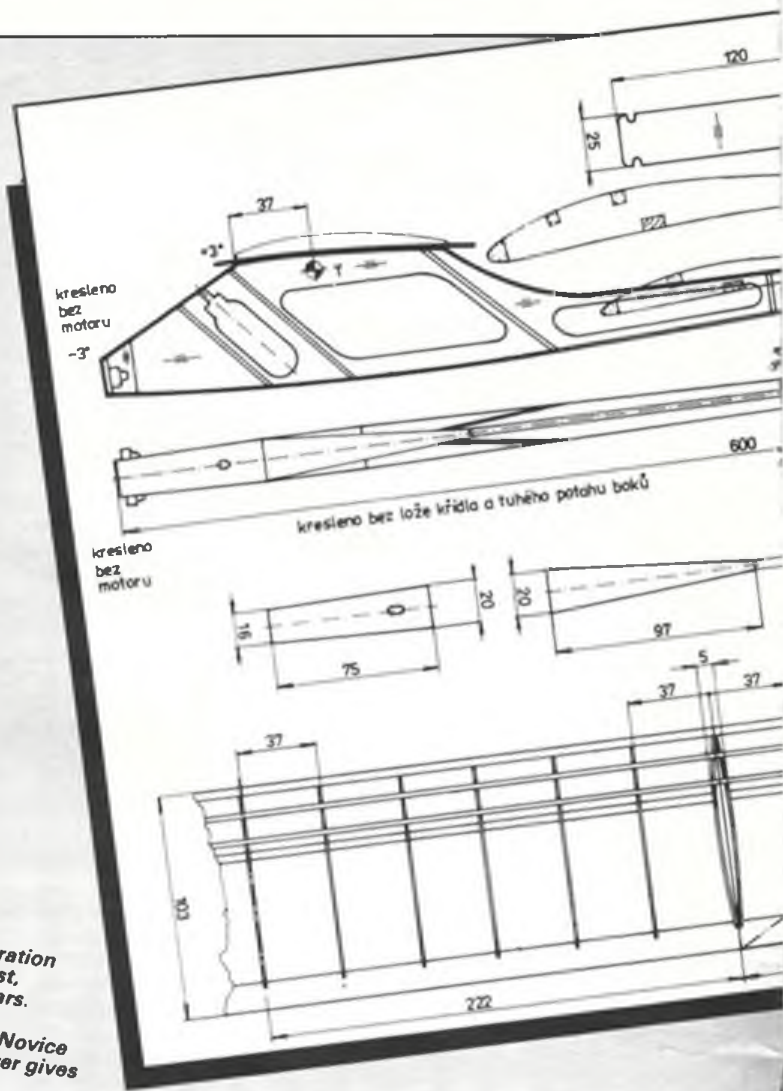
WORLD



SKETCH PAGE

Fragments from overseas captured for your interest

Above right: Czechoslovakian approach to CO₂ Duration bears close study. Note three degrees of downthrust, substantial longitudinal dihedral and turbulating spars. Modeler power, remember. Designer is V. Veprek; reproduction from Modelar magazine. Below: This 'Novice Speed' design hails from West Germany. 2.5cc power gives speeds in excess of 150kph. Simple construction, asymmetric layout and monowheel undercarriage - could be worthy of copying here in UK?



Venue: Kiev, USSR. Date: 5-11 August

1988 WORLD CONTROL-LINE CHAMPIONSHIPS



One of the best – that's the verdict after a slick Champs, according to GB's Team Manager and reporter Dave Clarkson

KIEV, CAPITAL city of the Ukraine, is known as 'the mother of all cities of Russia'. Its history goes back over 1500 years, and people have lived there for at least ten times longer than that. Today it contains more than 2.5 million inhabitants, including about 2000 control-line enthusiasts! Notable Kiev aeromodellers include the World Champions Vladimir Fedosov, Valery Kramarenko, Boris Krasnorutsky, Valenten Shapavalov, Victor Onufrienko and Eugene Verbitsky – all well-respected in the West. Now Kiev's fame extends to providing the World's finest control-line site – the Chaika air sports complex where the 1988 World Championships was held. None of the British Team will ever forget this meeting – the best C/L Championships yet.

Credit where due...

Much of the credit for the excellence of the meeting must go to the event juries. Your reporter, as British Team Manager, found no need to make a single official protest! Proof enough. The jury consisted of the following representatives:

| | |
|----------|--|
| F1J Jury | S Pimenoff: Finland, Chief Judge D Thumpston: UK V Bronson: USSR |
| F2B | K Gafner: Switzerland, Chief Judge S Rossi: Italy M Pinkanen: Finland O Morotse: Hungary V Eskin: USSR |
| F2C | D Jehlik: USA, Chief Judge D Fontana: Italy K Plotsynshe: USSR |
| F2D | V Hunt: UK, Chief Judge S Zhidkov: USSR G Michels: Belgium M Henry: USA, Circle Marshal |
| F4B | E Coates: UK, Chief Judge A Aarts: Netherlands R Clemen: France M Krizhan: Poland E Verbitsky: USSR |

Chief organiser Albert Nazarov and Vladimir Shevchenko moved heaven and earth to accommodate us. Had it not been for their work

in prising aeroplane seats out of Aeroflot and visas from the Soviet Embassy, we Brits would never have got there. Indeed, had I known in advance all the problems of the journey, I would never have accepted appointment as Team Manager... Although we all arrived on schedule I will never forget the hours spent queuing at border crossings in Eastern Europe; an overnight stop at an appalling 'doss house' near Terespol in Poland which also hosted drunken, fighting truck drivers; and at least 750 miles of badly-surfaced, utterly straight Russian roads with hardly a direction sign. On the other hand we remember the friendly truck drivers who directed us when we got lost – and the crowds who gathered round the British cars in Kiev every

time we parked. But we got there – and we competed! There was success and disappointment, laughs and arguments. What made it all worth while was that amongst the twelve Red Flags of the Soviet Union and the two Chinese red banners at the awards ceremony was a solitary Union Jack – but more of this later.

Testing time

There is always a set preliminary routine at events like this – you settle in, and then sort out the problems. In this case twenty-seven Brits (including women and children) were given leaking accommodation with wet beds and no washing or

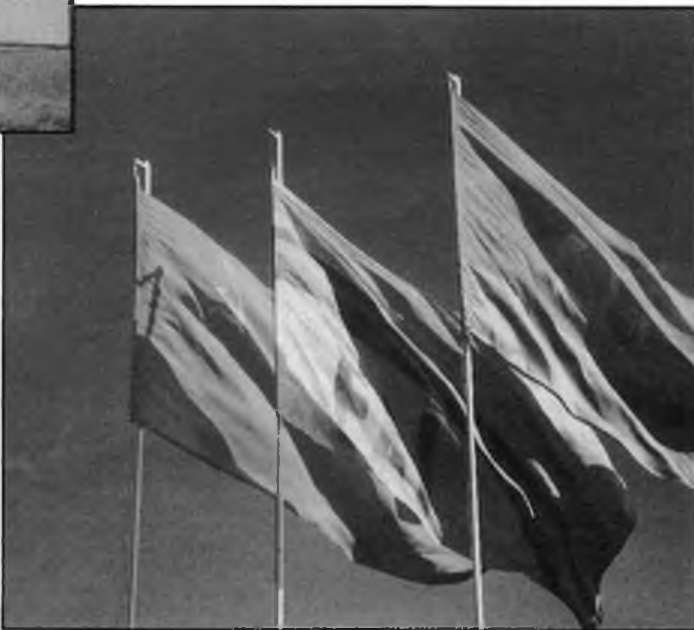


...Great performance in F2D by GB's Neil



Left: Superb facilities exemplified by the F2C circle. On-site organisation was excellent.

F4B (Scale) aircraft presented opposition as strong as ever. Of course, we had yet to see the Chinese in action. Impressive in speed were the Hungarian teams: and in F2C Delor/Surugue (France) and Voghera/Rossi (Italy) were clocking similar airspeed to the Russians. There was certain to be strong Combat challenge from the American, Danish and Swedish teams. The British did not show at their best in practice. Perhaps this was not surprising; arrival at Kiev was very late the previous night. In particular, our Combat motors were unimpressive - but Brits thrive in adversity and our performance in competition proper would surely improve. However, our preparation could be no match for the Russians, most of whom had been given six months off work to get ready, culmin-



Right: Reality of the Champs - the FAI flag flanked by 'hammer-and-sickles'... Opposite page, below: Most of the Brits - with Russian supporting cast...

F2A: Speed Report by Ken Morrissey

With 35 entries from 15 countries. Speed entries were higher than in previous years and the promise of a once in a lifetime Superchamps was anticipated by everyone. Facilities were of the highest standard with every country being allocated their own purpose-built lock-up workshop with folding-down work benches! Luxury for all competitors.

Under the watchful eye of ex-champion Anatoly Kohaniuk processing started early on Sunday followed by one half-hour practice slot for each country. The UK team were put to the end of the processing queue thanks to accommodation problems (and no sleep for 48 hours).

There were no real surprises in practice until early evening when the home team, Kalmykov (World Champion), Piskalev, Kostin and Schelkalin went into the circle and quickly turned in speeds of around 300kph.

F2A Speed is fast becoming a team event with Kalmykov/Piskalev, Kostin/Schelkalin, Newton/Nightingale and Mult/Segedi using similar equipment - and practicing together. We now have second-generation teams of father and son in Paramon/Paramon and Rachwal/Rachwal. The latter's son had his appendix removed only two months ago but still made the team - and he is only 16 years old. At the prizegiving he was presented with a motor cycle by the host nation for being the youngest competitor entered in the Championships - a truly great gesture meriting his overall 18th place.

After a World Championships of this magnitude it is difficult to express every detail, but the Russians must be congratulated on their excellent organisation by the FAS (the governing body of aeromodelling in the USSR) and the friendliness of fellow competitors and organisers. Everyone must have returned home with the definite feel of *glasnost!*

First away!

Monday saw the start of Round One. First off

Soviet teams reign supreme again...

toilet facilities. Nevertheless, some hard words got us moved from this 'Gulag'. During the hurly-burly of bumping into old friends - and making new ones - it was pleasant to find that the food was very good, and that a bottle of perfectly adequate local beer cost the equivalent of twelve pence! The planned accommodation was only a mile from the contest site - with a continuous, linking bus service - but our move to a hotel eight miles away, in the centre of Kiev, resulted in a split team. However, perhaps helped by the mutual problems on the way here, the social scene clicked rapidly. And, of course, the flying facilities were superb...

Fast, tough and manoeuvrable...

Next came official practice and processing. This was a non-event for the Chinese whose models had yet to arrive. Our fears were confirmed that the Russians would be hard to beat. Three of their four F2A (Speed) entrants practiced at over 300kph (almost 190mph). The Russians and Americans seemed in a different class from the opposition in F2B (Stunt); all four Soviet F2C (Team Race) teams looked ominously confident; their Combat (F2D) models were faster, tougher and more manoeuvrable than the rest - and their well-known

ating in a final month at a training camp with flying every day.

Chief of Processing was Boris Krasnorutsky, perhaps the best 'motor man' the world has ever seen; and certainly he is an enthusiast fully conversant with technicalities presented by the rules. The only Brit involved in work at this stage was Ernie Burtles, one of whose F2D motors, a brand new USE, proved to have a touch of sub-piston action. Substituting a liner shim for a head shim cured this - and the motor ran all the better for the modification.

Open up!

The opening ceremony occupied most of the next day. Thanks to the efforts of Ken Morrissey and financial help from Solarfilm and Irvine Engines, all the British Team looked very smart in new track-suits (quite the best of any nation at Kiev). There were - thankfully - few speeches and a relative lack of formality. Next came a highlight of the whole event - a superb full-size display of aerobatics, gliding, parachuting and more - plus two of the latest Antonov jets produced at that company's Kiev factory - the An-96 twin 'over-wing-jet' medium transport and the massive An-124 - both of which treated us (and many thousand of Kiev residents) to breathtaking, steeply-banked display turns and spectacular low flights.

By this time rain had ceased and there was an improvement to warm and cloudy conditions. When competitions began it was almost completely still, clear and hot - the norm for Kiev during the summer.



The victorious Russian Speed team - Khostin, Scholkalin, Kalmykov and Piskalev.

was Obrovosky (Czechoslovakia) with 267.46 kph. After several no-flights the only West German flyer, Gunter Rosenhan turned 270.88 kph with his traditional Kingfisher. CFS model, followed by Mult (Hungary) at 286.2 with his old Moki-powered model. Peter Halman (UK) returned a clean 285.49 with his Irvine-powered new model, nicknamed Midnight Special because it was built in just 48 hours after a line break destroyed his number one motor and model two weeks earlier in the UK... The first Russian team member to fly, Sergei Piskalev, returned an effortless 297.52 kph followed





by World Champion Alexander Kalmakov with an incredible 301.76. The second UK team member to fly, Dick McGladdery, suffered a no-flight because of a split tank. Kabakov (Bulgaria) followed with 257.14; then came Paramon (Spain) with 260.12 and Skelkalin's smooth 299.50 which was sufficient to take overall second place in the competition. Rachwal (Poland) turned an excellent 272.73 kph. Not bad for his first championships! Nagy (Hungary) followed with 279.72, with Gordon Isles (the third UK team member) with 261.82. Sun Sizhu (China) 276.92 kph was at the tail end of the round before reflights. A few competitors improved in the reflights. Andre Rachwal (Poland) with a creditable 280.37 was quickly followed by Stefano Zanin (Italy) with 280.03.

Hot and fast

Tuesday saw another hot, sunny day with little wind for Round Two. Kostin (USSR) improved to 293 kph and Gordon Isles found a few more rpm for 267.45. Chris Sackett (Canada), editor of North American Speed Times, was still ironing out the bugs in his Mk3 Rossi ship at 258 kph. Ding Yibo (China) improved his first flight to 281.25 and Dick McGladdery posted his first time on the board with 263.15 - but he was still trying to find a needle setting. Sandor Segedi (Hungary) put in a storming flight of 294.34 with four laps lean which turned a few heads. Zanin (Italy) improved to 284.81 with

his OPS-15 powered ship. As Alexander Kalmakov (USSR) walked into the circle for his flight there was hardly any space left around the cage for spectators. To great applause he turned in an effortless 301.55 kph. Carl Dodge (USA) followed with a credible 283.10 with his beautifully built home-made engine. J. Magnes' 274.18 kph was his France's highest placing.

Achievements and analysis

With similar conditions next day for Round Three John Newton (USA) put in a personal best of 270.47 kph with his glass fibre fuselage, Moki powered ship. Dick McGladdery improved slightly to 266.66; still with tank problems. Young Luis Paramon (Spain) posted 263.16 with a Kingfisher/CFS model similar to his father's. Schelkalin (USSR) slowed slightly to 297.77 but Del Bianco (Italy) improved to 271.49 kph. Jim Nightingale (USA) put in a clean 276.50 with his much modified Moki in a Newton-designed craft; Sergei Piskalev (USSR), with equipment identical to team mate Alexander Kalmakov, turned to 299.0 to secure third overall place. Ba-Lianli (China) improved to 275.23, this helping to net team spot for the Chinese. The last to fly was the reigning world Champion Alexander Kalmakov. He equalled his first flight of 301.76 kph to take the gold medal. A magnificent achievement from a deservedly great world champion.



Left: Ba Lianli (China) prepares. Third place team definitely the one to watch in the future... Above: Father-and-son team Rachwal helped consolidate Poland's fifth place overall. Foot of page: Compostella (Italy) placed seventh in F2B with distinctive four-stroke-powered design.

F2B Report by Bill Draper

The F2B circle was caged giving a strange horizon to UK flyers used to flying in the open. The instinctive tendency was to pull out high. All the UK team arrived early enough to practice in the cage before the start to accustom to the levels and to the sometimes turbulent air due to the surrounding buildings, stands and trees. Two preliminary rounds were flown with each flyer's best round score to count. The top 15 then went into a three-round flyoff with scores from the preliminary rounds discarded. Final positions were based upon the best two flyoff scores. A very high initial entry had been expected with teams from some 26 countries but in the event several teams did not compete and the number fell to 54 entries from 22 countries. This allowed a 8am start and 7pm finish.

Precision

Alan Resinger of Canada found himself making the opening flight, flying in the unusual clockwise direction with his ST 60 powered model. Gerard Billon of France was next with his OS50 powered back-up model; a practice crash had written-off his number one. Gerard set a score which led for most of the morning. Conditions were good and calm for the first half of the day but it blew blustery and turbulent during the afternoon. Italian flyer Balesio, third to fly, used an unusual serpent-wing model, pulled by an ST 46, which he considered gave very precise corners.

Fire UK team man to fly was Barry Robinson, using his standard Northwind powered by an ST 60. This model weighs only 62oz for 820 square inch. Pulled by an expensive Australian 13 x 6 prop it managed a competent, if slightly nervous, schedule. The scene began to develop later in the morning when Xiandong Zang from China jumped high into the lead with a very precise flight from his medium-sized plane of 645 sq.ins powered by a specially built 9cc motor. The next Briton was Nev Dickinson. He chose to fly an OS 40 FSR powered Nobler variant because of the occasional, unpredictable turbulence as the wind increased. Worthy of mention and flying about this time was Canadian Fred Tellier with a new version of his Showbird with HP 20. Fred had broke his 'flying' hand only ten days before. Strapping instead of plaster allowed freedom to fly remarkably well considering the difficulty (and his diet of painkillers, injections and sprays through the event).

Current European champion Luciano Compostella used last year's semi-scale aircraft, with a Webra 61 four stroke, to move up to second spot at lunchtime. As the round progressed, the



reigning champion Anatoly Kolesnikov, flying a new version of his 1986 model, made a strong challenge but was immediately followed by Xiandong Wang who topped the first round ahead of Zhang. Bill Draper's traditional Superhawk with Enya 40 earned top UK marks but was short of the flyoff. USA's strongest challenger, Jim Casale, made an impressive flight with the ST 60 powered jet styled Columbia to move into third place behind the two Chinese. The top USSR place was taken by Sergei Klychov with his 1986 model powered by home built 7.8cc motor.

Round Two on the following day was flown in near perfect conditions throughout. The sun posed problems for mid-morning flyers. Scores tended to rise over the entire round. Casale's flight lifted him into the lead. Bill Draper pushed up his score despite problems with sun glare. His chance of the flyoff faded later in the round as other flyers improved. Nev Dickinson changed his model to the larger Tara, flew more smoothly and pulling up some 10 places as a result. Well short of the flyoff, however. Kolesnikov piled on the pressure flying not too fast but smoothly to take the lead from Casale. A better flight from Barry Robinson earned more points but the UK team were all out. Zhang topped the round by one point, and a mighty effort by Gerard Billon earned him a place in the final.

Strange happenings

The flyoff round was opened by Gerard Billon, again in near perfect conditions. The top places were still being dominated by a three-cornered fight between USSR, USA and China with Kolesnikov holding the lead at the end of the round. The top half of the flyoff were flying well controlled schedules but some of the lower half were flying noticeably bumpy manoeuvres. Round two (started half-way down and in reverse order) was opened by Wadovich from Hungary who showed some nerves in the pullouts. Most repeated their earlier form, Xiandong Zhang leading team mate Wang with Kolesnikov in third place. Paul Walker was more in contention in the flyoff still flying his ST60 powered 64oz Bad News. The US models were noticeably quieter than in '86.

Strange happenings seemed to affect some motors in Round Three, or else flyers were uptight and not preparing correctly. After the opening flight by Tokaji (Hungary), Luciano Compstella's Webra 61 died halfway through the clover, losing the manoeuvre, but Luciano towed the plane around for enough laps to earn landing points. Kolesnikov could not equal his first flyoff score although he improved sufficiently to overtake Wang with the top score of the round. Wang could not recover his position. Walker's challenge faded, and although

Xhang's clean accurate flight only earned second place in the round he had done enough to hold. Wadovich's motor stopped suddenly only part way through the schedule; and the top USA challenge from Jim Casale faded when the motor kept going for over seven minutes to lose landing points.

The event closed with a deserved win for Xiandong Zhang of China. 1986 Champion Anatoly Kolesnikov was second ahead of Jiazhong Wang, the Chinese team taking first team place from the Russians. The UK team earned 8th place. They were a little disappointed with their scores and position after their 1987 first Team place in Sweden.

The flying style of the leading Chinese and Russian flyers was not only rather similar but well suited to the good weather which blessed most of the event. Speeds are moderate, and shapes clean and accurate with the whole schedule well presented, as one would expect.

F2C Team Race Report by Dave Clarkson

Fifty-nine entrants from 22 countries were expected; 47 actually arrived, and just four countries were unrepresented. Those who could not participate missed World Records for 100 and 200-lap distance - and the fastest, closest final ever. No surprise in a Russian 1-2-3 for their home-made F2C engines are absolutely the best, and their practice was intensive, even astronomic by Western standards.

Racing followed a fairly relaxed schedule, starting at 10am with a 4pm finish and two hours for lunch. A permanently-available extra circle plus the use of competition circles when unoccupied meant that there was every opportunity for practice.

Round one of the heats began with a Feltham Club reunion, for Stu Willoughby (now a Chicago dentist) was in the centre with Britain's Steve Smith. The Smith/Brown 3:29.3 was likely to be their fastest time, for a strip-down revealed gudgeon-pin scoring of the Nicosil-plated liner in the Cipolla. With no available spare parts of high enough quality there might be only minutes of life left in the motor...

The new Soviet team Shabashov/Ivanov put the writing on the wall with 3:27.6 which included a compression adjustment to their side-exhaust Suraev motor. By Heat 4 the writing was floodlit by Nazin/Vorobiev with 3:21.2 from a model and motor very similar to that used by Kuznetsov at the 1985 Eurochamps. Fred Meijer (Netherlands) flew the largest and heaviest F2C motor ever, the

famous FMV Monster, to record 3:40.3, but this was eclipsed by the fast Hungarians Radkai/Nagy at 3:34.2. First disqualification went to Italians Magli/Pirazzini who arrested the progress of Majorcan pair Sancho/Olive (Sancho, who flew at the '87 UK Nationals, is the only man on the International F2C circuit who holds his handle upside down!) and the re-fly meant retirement - and the beginning of a disastrous contest for the Spanish fliers. Brits Fry/Thorpe flew poorly in Heat 9 thanks to a Cipolla very difficult to start. Ex-World Champs Bert and Rob Metkemeijer from Holland ran a safe, three-stop 3:36.4, but good only for twelfth place. Their latest FMV features an integrally-finned dural-liner, chrome-plated by Peter Brendel; the contra-piston is from Mahle 138 aluminium/silicon alloy and the screw-in front housing is titanium. Quite a motor. Cipolla manufacturer Gino Voghera and new team-mate Carlo Rossi retired in Heat 10. Brits Mike Fitzgerald and Mark Thomason were



Top: Zhang's stylish Stunt winner.

December 1988



Top: Jim Casale ponders - what? Maybe the best paint job of the Champs... Above: The trio that captured fourth place for the US Team: Casale's model heads entries from Walker and Barron.

Left: F2B runner-up - ex-World Champ Anatoly Kolesnikov flew this latest version of his familiar design.

representing the UK for the first time with an old, reliable model, with Burford-cased Nelson parts providing the urge. Time: 3:48.3. A sensible approach...

Before the close of Round One the Bulgarians Jotiv/Hristov flew their BP-powered wing to a 3:39.0, ahead of compatriots Bodurkov/Papov, makers of this motor. Reigning Champions Barkov/Suraev imposed their presence with 3:22.5, with ex-Champ Pitman Onufrienko finishing in 3:31.3 after a big 'cook-up' - the best that he would achieve with new pilot Burstev.

Next day Round Two opened with a bang. Nazin/Vorobiev finished in two stops for the first sub-3:20 heat at 3:19.8. Motor is a front-exhaust, integrally-finned liner AAC with steel front housing and seven-ball 8 x 22mm rear ball-race - slower than when equipped with the flimsier 8 x 19mm bearing but less prone to self-destruct. More and more teams improved on first-round times but none threatened to make the semi-finals. Fry/Thorpe tried hard to assemble a competent motor but to everyone's disappointment managed only 4:06.7. Our fliers completed a bad day in Heat 13 when Fitzgerald/Thomason's controls failed, forcing retirement; while Smith/Brown flew their second-string model to a low 4:28.3, keeping their top models for the seniors. Old friends Delor/Surugue (France) went back to basics, abandoning their hot but tricky setup for a slower, safer setting to record 3:33.7. Would this be enough? Next up, Italians Voghera/Rossi boomed their way to a 3:28.5, their Cipolla-powered wing is fitted with a most distinctive sounding, single blade prop, large at about 190mm diameter. Unusually, Carlo Rossi sets this prop to lie horizontally at compression; he flips it backwards to start. Odd, but it works - and well enough for 4th place too. Tim Gillott from California flew one of the few conventional models to 3:30.5, to place sixth. Nice guys Axtillius/Samuelson (Sweden) two-stopped their rear-exhaust Nelson for a sweet 3:31.4 and a place in the semi-finals.

All this paled into the shadow of Shabashov/Ivanov who produced a World Record heat time of 3:17.8 after the Metkemeijer brothers retired early with a fuel shut-off malfunction. Nothing else in the round could approach this, which is perhaps how Li/Chen (China) got away with a bit of rule-bending after their Team Manager was seen spraying the Nelson engine with water for illegal cooling at pitstops! It worked too - for they made the semis with 3:32.8.

Semi-finals...

The top nine went forward, after a rest day, to the semi-finals to sort out the final trio. At this stage the Russians were ahead by a street, but the Chinese team, showing their great advance in F2C, showed well in second spot ahead of the Dutch. The Brits were down in 6th ahead of the American and Swedish teams. Nevertheless, we had one team in the semis, although it was going to be hard to beat Russia and the four members of his Red Army.

Burtsev/Onufrienko could manage only 3:58.7 in race two. The Russians were away. Nazin/Vorobiev qualified for the final with a splendid 3:20.4 and Shadashov/Ivanov did the same in Race Three of Round One thanks to a fine 3:22.4. These performances were unapproachable until the last semi-final. Barkov/Suraev were drawn to fly against Nazin/Vorobiev, who were already certain of a place in the final; their target was to better Voghera/Rossi's 3:30.6. To make this almost certain Nazin/Vorobiev did not fly, making the semi a 'two-up' against Li/Chen (China), who were now handicapped on restarts because their team manager and his water-cooling were banished from the pits! Result was a 3:26.4 for the Russian duo, but many questioned whether the rules should permit such an advantage to be taken... The three finalists were each permitted the regulation five minutes practice in the race circle. Time to examine the models.

...and the Final!

All were using flying wings. Nazin/Vorobiev and Barkov/Suraev's motors bolted directly into moulded carbon fibre fuselages via six hold-down bolts. Both models appeared to employ balsa filling at the nose to stiffen the fuselage and to allow optimum ducting for cooling purposes. Shabashov/Ivanov chose a different approach. Their fuselage

was all-balsa and hardwood (with very little of the latter). Interestingly, Nazin/Vorobiev operated a tank-mounted multi-function valve similar in design to Paul Schippers' well-known unit. The motors of Shabashov/Ivanov and Barkov/Shuraev looked very similar with steel front housings screwed into side-exhaust crankcases carrying Tufnol-like backplates with Nelson-drum-type induction systems and integral Oddy/Reichardt style multi-function valves. Both featured drop-in integrally-finned, chrome-plated aluminium liners, all pistons and 'push-pull' heads. Vladimir Suraev used a dural conrod brushed with aluminium and a Mahle 244 aluminium-silicon alloy liner/piston combination. All three motors were noteworthy for their highly-polished, thinly chrome-plated liners, the result of many hours of lapping and polishing liner and piston to a perfect fit.

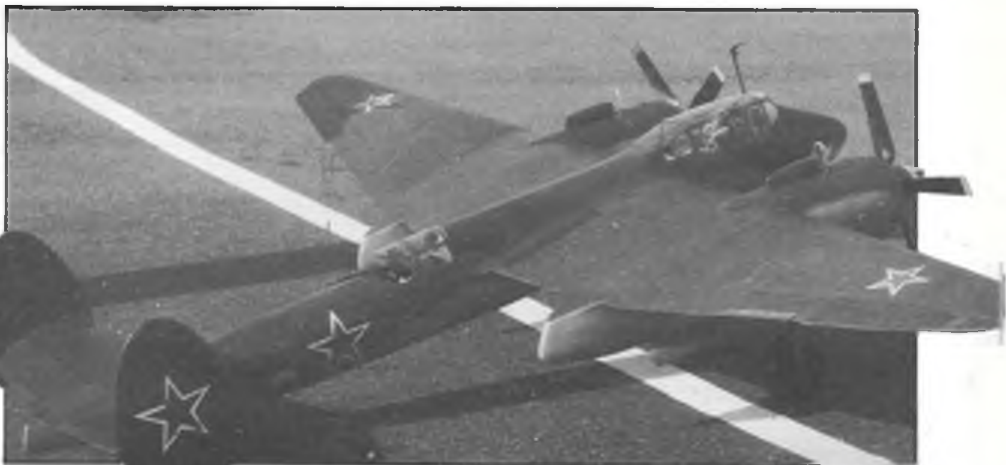
Suraev's technique was of interest. He opened the needle one turn from its running setting (scribed on the fuselage), started and stopped the engine. Upon re-start he timed the interval until the motor overheated. This period was apparently too long so he increased compression and repeated the procedure. This time all was spot-on so he stopped, restarted and launched for a cracking run at 17.8 seconds for ten laps with the needle back at the

running setting. Shabashov/Ivanov's performance was identical, while Nazin/Vorobiev ran even faster.

All three models were instantly in the air. Vorobiev's and Ivanov's motors cracked slightly, as in practice, but Suraev's motor didn't miss a beat. Nazin appeared slightly faster but his short stature prevented him taking true advantage. Barkov received his first warning for whipping, thus establishing his psychological right to overtake. This warmed-up the others to try for really fast catches at pitstops. Thus Shabashov/Ivanov worked their way back ahead of Barkov/Suraev. Poor Vorobiev missed his fourth catch in a big way and was forced to run ahead half-a-circle to retrieve. Because the front two segments were theoretically occupied he had to take the model all the way back to pit it, putting them firmly in third place. Meanwhile the others contested the lead with less than a lap between them. Barkov showed his experience at the end by taking his second whipping warning with force to recapture the lead and victory in a new World Record time of 6:42.0 - just .09 sec (half a lap) ahead of Shabashov/Ivanov. Time for the usually emotionless Russians to show their delight, for they were now World Champions for the third time. A credit not only to their country but aeromodelling too.



Top: Winning Scale Team - Russia's Fedosov (An28), Pavlenko (Li-2T) and Bulatnikov (AIR-1) finished 1-2-3. Decisive! Above: A closer view of the AIR-1. Below: Tupolev Tu-2 by Petrov (Bulgaria) placed eighth.



F2D Combat Report by Vernon Hunt

As with the other disciplines the contest site was excellent. The official circle was flanked on one side with a seated stand. During practice and contest the stand always housed a complement of local spectators, notably biased to the home, Soviet pilot.

Entry was lower than anticipated with no representatives from France, Brazil or Australia, and only single entries from Finland, Belgium and Canada. The Eastern block countries fielded strong teams in the Soviets, Czechs and Poles. Interestingly, the Czechs were making a first appearance in a combat World Championships but their equipment was Russian-copied and very effective. The other surprise package, who were at a loss with the rules, were the North Koreans.

The first round draw was kind to John Hammersley, who drew the Korean Kim Myong Su, and Neil Gill who flew Gutierrez of Spain. Neither posed problems. Ernie Burles was not so fortunate in having to fly Dorochenko of the Soviet team. Unfortunately for him, Oleg was on a good day and Ernie lost 4-0. Best match of the round went to Abrahamsson (Sweden) against Schou of Denmark, after a reply on the 'fly away' rule. Ingevar Abrahamsson won by two cuts to one.

Neil Gill was first out of the hat in the second round to fly Lanfredini of Italy; a tight match with Neil the narrow loser. John Hammersley flew Zapetal (Czechoslovakia) and destroyed both his opponent's models very quickly! Ernie Burles meanwhile drew another Czech in Kucera; he was less fortunate, as in the first round he was way down on performance by comparison. Dorochenko lost, surprisingly, to Gutierrez by taking all his streamer, and then giving away two silly cuts. Tom Fluker lost to Loet Wakkerman and Schou, highly regarded, lost a second match to Bossi of Italy.

Round 3 began on the second day of flying with some welcome hot sunshine (the first day having been cloudy and windy). Neil Gill drew his second Italian in Maustrelli and won comfortably while John Hammersley drew a second Czech in Mejlik but was out-performed by superior equipment. Neuchenkin lost to Forebeck of Denmark while his team mate Stig Moller lost to Dorochenko. Beliaev had a very untidy match with Pavlov of Bulgaria, and after a reply, lost his first life.

By round four 22 fliers were left from the original 43. Steve Kott of the USA took all the streamer against his Polish opponent Karwowski and lost the match 3-1. John Hammersley flew Gutierrez and won his match rather untidily. Neil Gill beat Abrahamsson the Swede, despite being down on performance, by two cuts to one.

Match of the round was John Stubberfield versus Dorochenko, the Russian winning by four cuts to two.

By Round 5 twelve fliers remained. Beliaev lost his second life to the Czech Mijlik in an appalling mass of scrap. Neuchuklin lost to Tom Fluker of the USA with the Soviet removing the whole streamer in one, Dorochenko then doing the same against Loet Wakkerman and going out of the competition. John Hammersley flew Stig Moller and lost against superior equipment as much as Stig's piloting ability. Neil Gill, despite a lack of model performance, put out Steve Kott of the USA after the American had removed all the streamer. Neil then anticipating well and taking two cuts. The 'unknown' Russian Boris Faizov, who had not lost a match so far, beat Timo Forss (Finland).

Timo lost a second time to Tom Fluker in Round Six, while the last remaining Scandinavian, Stig Moller lost to Neuchenkin Boris removed the remaining Czech pilot in Mejlik, this leaving Neil Gill to fly Loet Wakkerman. Neil suffered a bad motor run and spent two minutes 'slow inverted' avoiding Roet, Neil's pit-crew screaming all the while to get him to switch to the spare model. This he did with little time to go in the match taking one cut to secure his place in the last five.

This is where life can get complicated. The bye went to Boris Faizov leaving Gill versus Fluker and Neuchenkin against Wakkerman. In Neil Gill's match the American had superior airspeed in open manoeuvres but Neil imposed force and made the American fly his way. Small manoeuvres on on segment of the circle slowed Fluker down. Result - two cuts and two tail booms to Neil! Neucheukhin

beat Wakkerman by two cuts to one, the knot being the deciding factor.

This left a three-way final; an organisers nightmare. If Boris Faizov beat Neil and Neucheukhin then he would be World Champion as he had not lost a match and there was nobody else to fly. Second and third would be decided between Neucheukhin and Neil. This was the least involved permutation - and this is just how it happened. Neil matched Boris all the way, with the score 2-2, but Neil lost on ground time. After a line tangle the Neucheukhin/Faizov match was scrappy. Most observers had the score at 3-3 but the outcome of the official scorers was 4-3 to Boris Faizov and we had a new World Champion. In the flyoff for second and third the Soviet 'disease' continued with Neucheukhin removing all of Neil's streamer and Neil anticipating well to take two cuts.

The Soviets were probably the strongest team, but they looked vulnerable for a change. Their equipment was undoubtedly the best but against inferior opponents they seemed not to know what to do with it; nor could they change their style of flying to suit. The British team would be the first to admit that as far as performance is concerned their equipment was way down on par, but all credit must go to Neil Gill who used his experience to finish in a most creditable second place.

F4B: Scale Report by John Roberts

Before the competition the British team decided that because of continuing high wind, the new Roberts Chipmunk (a light and relatively untried model) ought to be substituted by the same fliers well-known Shuttleworth version of the same machine. Despite some minor static faults this is a trusted performer.

Bounces and banners

At to close of Static judging, which occupied a day-and-a-half, Fedosov (USSR) was in the lead with his familiar Antonov An-28. Indeed, at the top end relatively few new models to be seen.

The best score from three flights was to count. During round one Dick Byron's impressive B24 sustained considerable damage to the undercarriage after a very bouncy landing, resulting in the burning of some American midnight oil. Kusy (Czechoslovakia) scored zero thanks to engine problems with his Miles Magister. First Brit, Ron Truelove, flew his new He51 steadily enough, if a bit outerring-low, after it had flipped on its back during



Above: Balaev, ninth in F2D, works on a typical Russian model. Light, fast and manoeuvrable!



Below: Third-place Brits captured for the camera with a variety of 'foamie' wings.

the taxi manoeuvre. Chris Bradford put in a safe flight with his light Nieuport 17, but John Roberts discovered too late even for rectification before round two that the Chippie's landing lights couldn't be seen by the judges wearing sunglasses. Bulatnikov's 'waving pilot' was disallowed as a flight option to his AIR-1 man Pavlenko was in trouble with his LI-2 in round two. Two blades of one of the variable-pitch props parted company with the hub. Score zero.

Chris Bradford's Nieuport treated us to an immaculate, true ninety-degree wingover and a superb loop, both of which boosted his score considerably, and the other British team members also improved during this round. Kusy's Magister, its problems sorted out, flew beautifully - if a little fast - for his best score.

By round three conditions were much more calm, but many fliers encountered difficulties, notably Cerezo, the line Spanish entry. The inboard wing of his CASA 212 broke away in flight, complete with engine. As if this was not enough, a line snagged on landing and the disintegrating model chased him in the centre of the circle. The flaps on John Roberts' Chipmunk failed to deploy on landing and he ran out of time trying to sort it out in the air. cult, no taxi points. But, as ever, the Russians were very impressive. Winner Fedosov even taxied his An-28 in reverse - a real piece of showmanship.

Judging always lends itself to controversy; here it was three laps at forty-five degrees that was disputed by some watching enthusiasts. Models were marked down, unfairly, it seemed, when this elevation appeared to have been adequately met. No measuring devices were used; perhaps this is well and good at a domestic club competition - but not what one would expect at a World Championships...

And afterwards...

Friday, 12th August had been scheduled as a reserve day but thanks to fine weather and completion of proceedings it gave the opportunity for a relaxing morning preparing for departure. An afternoon cruise on the Dnieper River through the city centre was most enjoyable, allowing your reporter to record F2C details for this report!

Came the evening and the closing banquet. Good food, great company and not a drop of vodka. Things have certainly changed in Russia. Quite rightly it was the British Combat Team and not the Manager who collected their third place. It was, after all, the team's efforts that had achieved the result.

Thanks to a relatively early finish everyone was ready for the marathon journey home. Your reporter - and twenty others - drove back with all the tools and equipment - a much harder prospect than that faced by the twenty-five who flew home!

This was a splendid meeting - far from cheap to attend, but we were all rewarded by richness of experience. Especially, Neil Gill's second individual place in Combat made it all really worthwhile. Thanks to all who made it quite unforgettable. DC

1988 WORLD CONTROL-LINE CHAMPIONSHIPS

F2A: Speed

Individual (35 entries)

| | | 1 | 2 | 3 | Best (Kph) | |
|----|---------------|----------------|--------|--------|------------|--------|
| 1 | A Kalmykov | USSR | 301.76 | 301.55 | 301.76 | 301.76 |
| 2 | S Schelkalin | USSR | 299.50 | 295.56 | 297.77 | 299.50 |
| 3 | S Pit'skalev | USSR | 297.52 | 298.26 | 299.00 | 299.00 |
| 4 | C Segedi | Hungary | 282.13 | 294.35 | 0.00 | 294.35 |
| 5 | B Kostin | USSR | 266.47 | 293.39 | 274.39 | 293.39 |
| 6 | G Mult | Hungary | 286.62 | 287.08 | 0.00 | 287.08 |
| 7 | P Halman | GB | 285.49 | 285.26 | 281.47 | 285.49 |
| 8 | S Zanin | Italy | 280.03 | 284.81 | 280.81 | 284.81 |
| 9 | C Dodge | USA | 262.77 | 283.10 | 0.00 | 283.10 |
| 10 | A Rachwal | Poland | 280.37 | 281.25 | 282.13 | 282.13 |
| 11 | Y Ding | China | 270.07 | 281.25 | 0.00 | 281.25 |
| 12 | L Nagy | Hungary | 279.72 | 280.59 | 276.92 | 280.59 |
| 13 | S Sun | China | 276.92 | 0.00 | 273.56 | 276.92 |
| 14 | M Obrovsky | Czechoslovakia | 267.46 | 270.88 | 276.71 | 276.71 |
| 15 | J Nightingale | USA | 0.00 | 235.14 | 276.50 | 276.50 |
| 16 | L Ba | China | 270.88 | 273.97 | 275.23 | 275.23 |
| 17 | J Magne | France | 0.00 | 274.18 | 0.00 | 274.18 |
| 18 | T. Rachwal | Poland | 272.73 | 262.19 | 243.57 | 272.73 |
| 19 | P Del Bianco | Italy | 267.86 | 262.00 | 271.49 | 271.49 |
| 20 | G Rosenhan | FRG | 270.88 | 0.00 | 260.49 | 270.88 |
| 21 | G Newton | USA | 269.43 | 0.00 | 270.47 | 270.47 |
| 22 | L Paramon | Spain | 0.00 | 269.66 | 265.49 | 269.66 |
| 23 | T Hojnacki | Poland | 268.46 | 265.09 | 0.00 | 268.46 |
| 24 | G Isles | GB | 261.82 | 267.45 | 233.16 | 267.45 |
| 25 | R. McGladdery | GB | 0.00 | 263.15 | 266.66 | 266.66 |

Team (15 entered)

| | total | |
|---|---------|--------|
| 1 | USSR | 891.89 |
| 2 | Hungary | 862.02 |
| 3 | China | 833.40 |
| 4 | USA | 830.07 |
| 5 | Poland | 823.32 |
| 6 | GB | 819.60 |

F2B Stunt

Individual (54 entries)

| | | Rd 1 | Rd 2 | Final 1 | Final 2 | Final 3 | Total | |
|----|----------------|----------------|------|---------|---------|---------|-------|-----------|
| 1 | X. Zhang | China | 2933 | 3006 | 3049 | 3077 | 2985 | 6126 |
| 2 | A. Kolesnikov | USSR | 2868 | 3005 | 3068 | 2985 | 3015 | 6083 |
| 3 | J. Wang | China | 2988 | 2965 | 3010 | 3024 | 2903 | 6034 |
| 4 | J. Cassale | USA | 2949 | 2999 | 2979 | 2961 | 2806 | 5940 |
| 5 | P. Walker | USA | 2691 | 2949 | 2906 | 2955 | 2858 | 5861 |
| 6 | T. Liu | China | 2843 | 2989 | 2833 | 2963 | 2879 | 5842 |
| 7 | S. Klychikov | USSR | 2890 | 2880 | 2855 | 2901 | 2926 | 5827 |
| 8 | A. Morotz | Hungary | 2669 | 2925 | 2808 | 2891 | 2889 | 5780 |
| 9 | L. Compostella | Italy | 2717 | 2919 | 2858 | 2863 | 2705 | 5721 |
| 10 | R. Baron | USA | 2620 | 2822 | 2834 | 2827 | 2861 | 5695 |
| 11 | V. Strakhov | USSR | 2630 | 2812 | 2763 | 2883 | 2750 | 5646 |
| 12 | T. Tokaji | Hungary | 2552 | 2728 | 2772 | 2756 | 2652 | 5528 |
| 13 | J. Skrabalek | Czechoslovakia | 2610 | 2768 | 2703 | 2606 | 2813 | 5516 |
| 14 | Z. Wadovich | Hungary | 2728 | 2507 | 2650 | 2689 | 407 | 5339 |
| 15 | G. Billon | France | 2531 | 2801 | 2611 | 2676 | 2645 | 5321 |
| 16 | I. Cani | Czechoslovakia | 2645 | 2719 | | | | Best 2719 |
| 17 | C. Draper | GB | 2582 | 2698 | | | | 2698 |
| 18 | P. Rampoux | France | 2654 | 2685 | | | | 2685 |
| 19 | A. Nencioni | Italy | 2578 | 2669 | | | | 2669 |
| 20 | B. Robinson | GB | 2397 | 2640 | | | | 2640 |
| 21 | F. Ballesio | Italy | 2471 | 2635 | | | | 2635 |
| 22 | P. Zavada | Poland | 2630 | 2582 | | | | 2630 |
| 23 | RH. Gauthier | France | 2593 | 2534 | | | | 2593 |
| 24 | B. Rodrigues | Brazil | 2385 | 2574 | | | | 2574 |
| 25 | C. Chon | DPRK | 743 | 2570 | | | | 2570 |
| 26 | N. Dickinson | GB | 2200 | 2563 | | | | 2563 |

Team (22 entered)

| | | |
|---|----------------|-------|
| 1 | China | 18002 |
| 2 | USSR | 17561 |
| 3 | USA | 17496 |
| 4 | Hungary | 16647 |
| 5 | Italy | 16074 |
| 6 | Czechoslovakia | 15834 |
| 7 | France | 15787 |
| 8 | GB | 15080 |

F2C Team Race

Individual (47 teams entered)

| | | Rd 1 | Rd 2 | Semi 1 | Semi 2 | Final | |
|----|----------------|----------|--------|---------|--------|--------|--------|
| 1 | V. Barkov | USSR | 3:22.5 | 0 | 3:49.5 | 3:26.4 | 6:42.0 |
| 2 | Y. Shabashov | USSR | 3:27.6 | 3:17.8 | 3:22.4 | 3:27.4 | 6:42.9 |
| 3 | V. Nazin | USSR | 3:21.2 | 3:19.9 | 3:20.4 | 0 | 6:56.7 |
| 4 | B. Voghnera | Italy | 3:28.5 | 3:30.6 | 3:41.7 | | |
| 5 | S. Smith | GB | 3:29.3 | 4:28.2 | 3:36.4 | 3:33.0 | |
| 6 | J. Hollfelder | USA | 3:42.3 | 3:30.5 | 3:55.9 | 4:51.9 | |
| 7 | B. Burtsev | USSR | 3:31.3 | 4:11.6 | 3:58.7 | 0 | |
| 8 | B. Samuelson | Sweden | 4:02.1 | 3:31.4 | 3:34.0 | 3:33.5 | |
| 9 | A. Li | China | 4:18.9 | 3:32.8 | 3:39.7 | 3:36.4 | |
| 10 | B. Delor | France | 0 | 3:33.7 | | | |
| 11 | T. Radkai | Hungary | 3:34.2 | 3:39.2 | | | |
| 12 | R. Metkemeijer | Netherl. | 3:36.4 | 0 | | | |
| 13 | H. Jotov | Bulgar. | 3:39.0 | 3:50.2 | | | |
| 14 | D. Liu | China | 3:42.4 | 3:39.3 | | | |
| 15 | R. Pennisi | Italy | 3:54.8 | 3:39.9 | | | |
| 16 | J. Fischer | Austria | 3:51.8 | 3:40.2 | | | |
| 17 | F. Meijer | Netherl. | 3:40.3 | 3:46.7 | | | |
| 18 | S. Vang | China | 3:42.0 | 0 | | | |
| 19 | J. Dessaucy | Belgium | 3:45.3 | 0 | | | |
| 20 | I. Mohai | Hungary | 0 | 3:45.5 | | | |
| 21 | H. Borer | Switzer. | 3:46.6 | 3:49.7 | | | |
| 22 | S. Willoughby | USA | 3:47.1 | 3:55.4 | | | |
| 23 | M. Fitzgerald | GB | 3:48.3 | 0 | | | |
| 24 | J. Ahling | Sweden | 4:00.5 | 3:499.8 | | | |
| 25 | De Ridder | Nether. | 3:53.3 | 3:50.5 | | | |
| 26 | S. Goddio | Argent. | 3:52.3 | 4:52.3 | | | |
| 27 | G. Bodurcoz | Bulgar. | 3:53.3 | 0 | | | |
| 28 | J. McCollum | USA | 3:55.7 | 4:44.4 | | | |
| 29 | H. Marschall | FRG | 4:08.2 | 3:56.3 | | | |
| 30 | M. Bohlin | Sweden | 3:57.2 | 4:12.5 | | | |
| 31 | H. Nitche | Austria | 4:20.1 | 4:03.9 | | | |
| 32 | P. Brendel | FRG | 4:04.6 | 4:10.8 | | | |
| 33 | D. Fry | GB | 4:20.9 | 4:06.7 | | | |

Team

| | total | |
|---|-------------|---------|
| 1 | USSR | 10:09.0 |
| 2 | China | 10:54.1 |
| 3 | Netherlands | 11:07.2 |
| 4 | USA | 11:13.3 |
| 5 | Sweden | 11:18.4 |
| 6 | GB | 11:24.3 |

Part three of Chris
Coote's guide to
electric power looks at
motor basics



potential

WHAT ABOUT motors for electric flight? Almost all the simple DC (direct current) motors available are of the permanent magnet type. The magnets create a strong magnetic field in which the armature rotates. Copper wires wrapped around the armature carry the current from the batteries and create their own magnetic field around each wire. The field interacts with that of the magnets, just like toy magnets – like poles repel each other, and the armature is caused to rotate by the force of the magnetic interaction.

Fresh fields

Motor power output obviously depends on the force of this interaction, and this is dependent on the strengths of the magnetic fields. In the case of the permanent magnets, this depends on the quality of the material from which it is made, and how small is the air gap between the magnet faces and the rotating armature poles. Thus when selecting a motor, turn it over by hand and see if you can detect a strong magnetic pull as the armature poles oppose the magnetic poles. This should be noticeable on a good motor. Performance can then be increased by carefully packing the magnets within the motor casing to bring the air gap down to a practical minimum. Packing should be done with steel, or, even better, iron shims to preserve good magnetic contact around the motor casing. This contact can further be improved by slipping extra iron rings over the motor case to reduce the 'magnetic' resistance. However we are only talking of 5-10% improvements here – basically you have to have good strong magnets to fly. (Fig.3).

Turn, turn, turn...

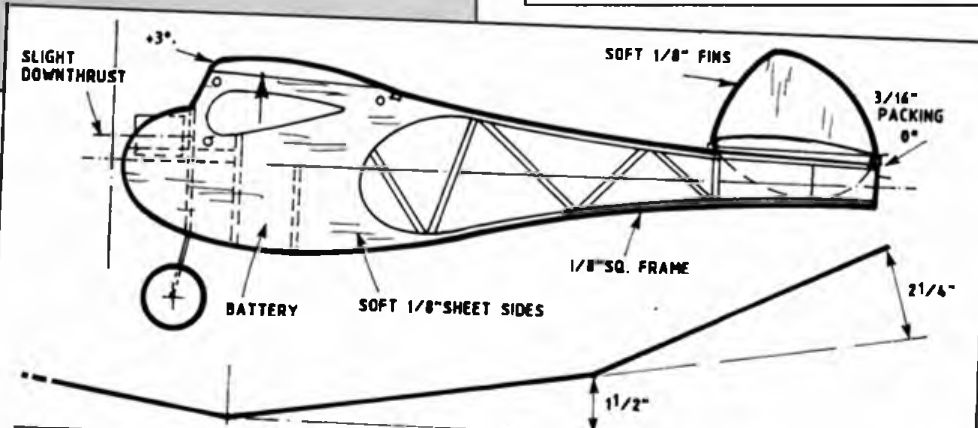
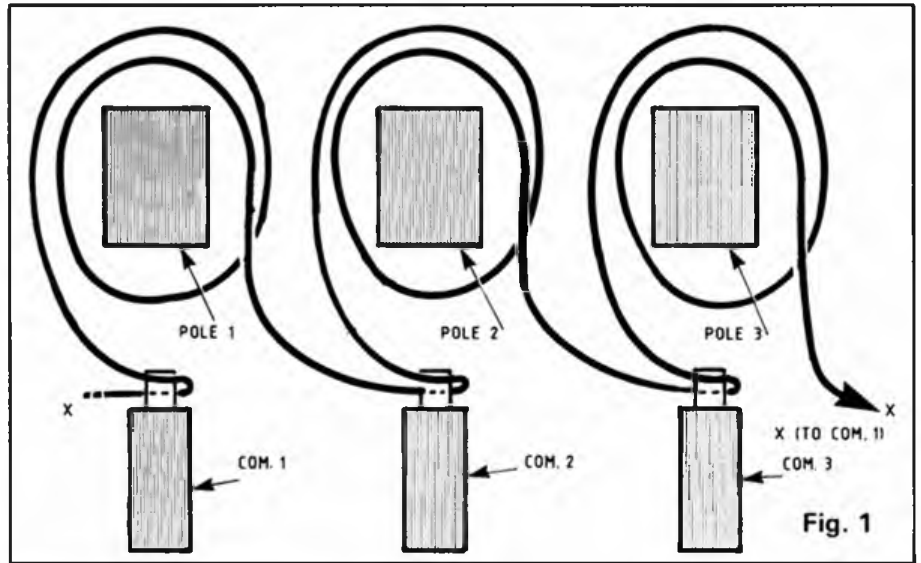
Magnetic effect produced by the armature wires is also dependent on the number of wires (or winding 'turns') and the magnitude of the current that can be induced to flow in them. So maximum power is achieved with many turns carrying lots of current. Unfortunately these two items work against each other in the practical situation. For a given battery voltage, the maximum armature current is set by the resistance of the wires used. This obviously increases in proportion to the number of turns (longer lengths of wire are involved). Also, lots of turns means using fine wire, which ups the resistance and limits the current-carrying capacity before it burns out. So the armature windings for our purposes need to be a compromise between a high number of turns and a thin enough wire both to carry the current required, and to allow sufficient current for flight to flow through the armature. In practice this means that relatively few turns of thick wire are needed – and often a mediocre motor can be transformed by rewinding the armature with fewer turns of thicker wire, or more turns of the same, packing the available space on the armature poles as tightly as practicable.

Motors and rewinding

For those of you who like to experiment, and for those of you who push their motors too far in terms of volts applied and excess load via too large props, some rewinding of motors will be required. This is a lot easier to do than most imagine. Nearly all the motors in common use for our purposes are of the three-pole type. In other words, there are three 'coils' of wire to be seen on the

armature, which correspond to three segments of copper on the commutator. In Fig. 1 I have shown the layout of such a motor; the circular construction has been opened out 'flat' so you can see clearly what is going on. You will notice that all three windings can be made from one piece of wire joined end-to-end at one of the commutator segments. In most cases you will find that the individual segments consist of small pieces of copper set into a plastic cylinder with a small tag sticking out at right angles to the cylinder. This tag is used as a post around which to wrap and solder the armature winding wire. (See Fig. 1.)

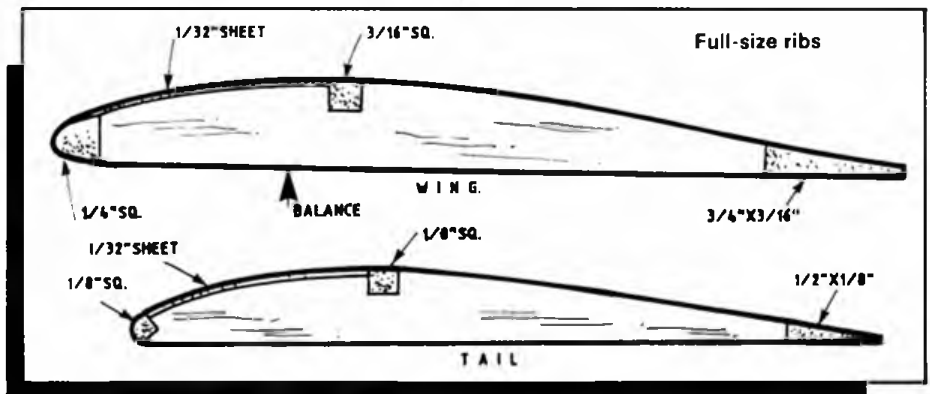
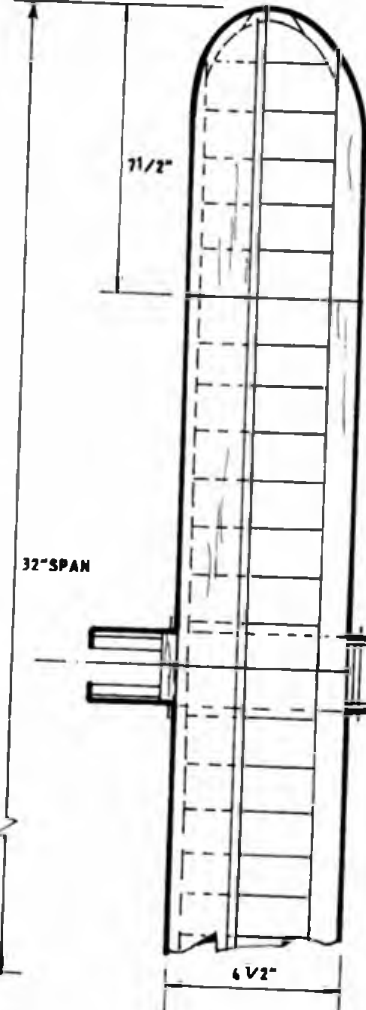
Before you start rewinding you first have to dismantle the motor. Nearly all the motors we use come from the same sources, so all are very similar. The end cap where the brushes and commutator are located is invariably held into the main motor case by a couple of 'bend down' tags. These can be carefully lifted using a small screwdriver or, better, by a piece of 14swg piano wire filed to a chisel point. Some care is now needed to remove the end cap. Often the brushes will catch and bend on the rear of the commutator if it is simply pulled clear. So the trick is gently to pull it just clear enough to peer inside and then by a combination of jiggling and judicious use of, say, a sharpened matchstick (in order not to damage the soft copper segments) lift the two brushes clear and remove the cap. There is usually some form of insulating washer fitted between the rear end of the commutator and the rear shaft bearing in the end cap. This is important to prevent shorts caused by the brushes contacting the metal bearing insert, so don't lose it! Usually this washer is a tight fit on



the shaft and it is this that the brushes hang up during assembly.

Bits everywhere

Now you have the motor in bits, the armature may be withdrawn from the main casing. You will be surprised how much force is required to do this; a measure of the quality of the permanent magnets fitted in the case. Stripping off the old wire is usually a simple matter of unwinding after cutting and desoldering at the commutator tags. It is always a good idea to count the number of complete turns the old wire makes around each pole, since this can be used to restore the motor to its original condition. The actual rewinding can then take place, after you have



Pee Wee Vintage design for F/F power

Model, also shown in heading photo, was originally built for ED .46 power but is much more lively with direct-drive M3 motor and four 180 maH cells!

decided which wind is necessary. All you have to do for a simple repair is to measure off, or match up the old wire with the new, and put the same number of turns on each pole. If you are aiming to increase performance for a given battery voltage, then you will be aiming to rewind with fewer turns of thicker wire. The actual sizes involved then become a matter of judgement as to how much you want to increase power and to what the brush get can stand in the way of increased current, and thus heat, without melting! I would suggest as a first try that you increase wire size by only 10-15%, and then pack on as many turns as the space on each armature pole allows. This in itself is a matter for judgement as the first pole always seems to have lots of room with the adjacent ones empty, so you have to imagine a dividing line in the centre of the gap between poles and keep the first wind inside these imaginary divisions.

High potential

Count the number of turns as you go, and make sure the same number goes on each pole. It does not matter which way you wind around the poles as long as you go the same way each time! It *will* affect the direction of rotation of the motor for a given battery polarity connection, and this can be embarrassing if you have to change a motor on the field and have no means of reversing it. To avoid this I always rewind in the following way:

- 1 Place bare armature on bench with poles furthest away and commutator nearest.
- 2 Bare end of enamelled copper wire by running through fine emery cloth.
- 3 Bend small 'u' in end of enamelled copper

wire and crimp to uppermost commutator tag.

4 Solder wire to tag using tinmans solder and Fluxite, which can withstand higher temperatures than multicore.

5 Take wire to left, and forward, of nearest pole.

6 Start to wind on turns in clockwise direction viewed from above, taking care to evenly fill available space from bottom to top of pole, and then in succeeding layers.

7 Finish first pole by bringing wire down towards you and to right of this pole.

8 Bare 1cm or so of wire where it will wrap around the next tag to the right, take one complete turn around tag and solder.

9 Rotate armature one pole to left as viewed from above; wind second pole as in 5,6,7.

10 Repeat 8 for third tag.

11 Wind third and last pole as in 5,6,7.

12 Finish by bringing end of wire to first tag, bare end, crimp and solder over the first soldered joint on this tag.

You can now make this winding secure for high rpm operation by Aralditing over the wires and baking the whole lot in a low oven. The 24hr epoxy will go liquid and soak into the wires, giving a very secure assembly. However, you will have to hacksaw it all off again next time you burn it out! This precaution is really only necessary for really high performance stuff and I would suggest you try without it until you find you need to. Thrown windings and mysteriously seized motors will indicate this.

A point of balance

After a rewind it is always a good idea to balance the armature. I do this in an exactly similar way to balancing a prop by putting the armature on a pair of knife edges (razor blades) and removing metal from the outside iron surface of the heaviest lot in the assembly. I find it hard to drill small counterbore holes in the laminated surfaces and usually prefer to grind small depressions in the material with a mini drill. The aim is to not remove metal over a wide surface area, as this reduces the magnetic effect between armature and case. You should aim to dig small holes about as wide as they are deep and of approximately 2mm diameter.

One problem with high speed, high current (and thus high temperature) running is that the soldered connections to the commutator segments tend to melt and spray liquid solder around inside the case. The wires then become detached and failure results. The better quality motors use a crimped connection to the commutator tags. This is something to look for when buying a motor. In order to alleviate the effects of centrifugal force on the critical commutator connections I wrap the wires between commutator and poles with thread, which is then heatproofed by soaking in epoxy. Use of a high temperature solder is an obvious precaution (also in step 4 above). See Fig. 5.

Correction to Part One (October issue)

Resistance is given by 'volts divided by amps', not a product of the two, so the following term should be substituted for that given on p.549.

$$\text{Resistance} = \frac{\text{volt drop across component}}{\text{amps flowing in component}}$$

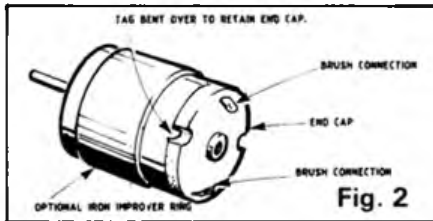


Fig. 2

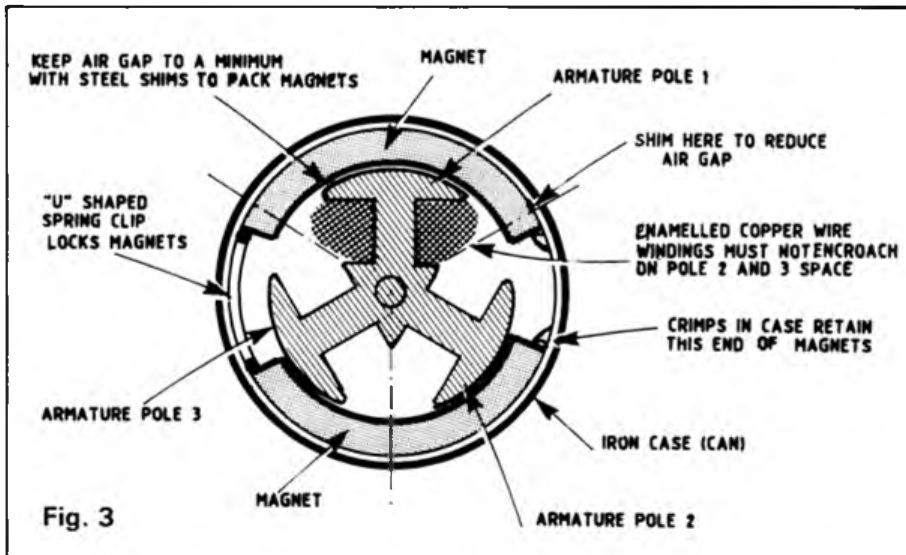


Fig. 3

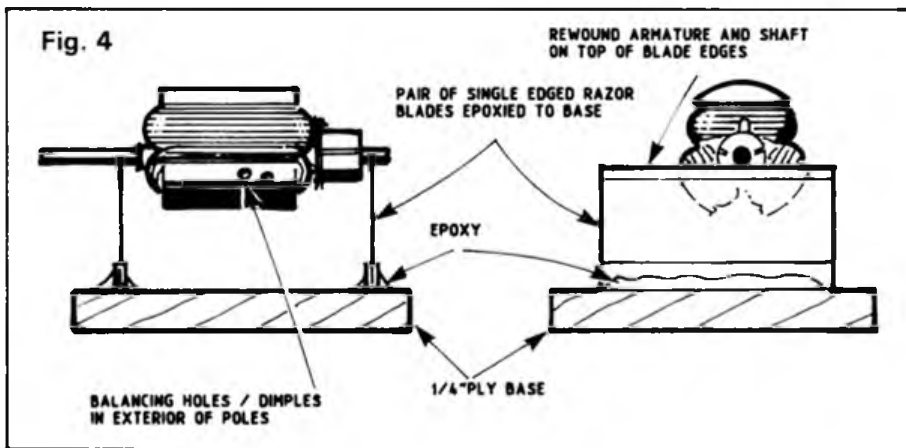


Fig. 4

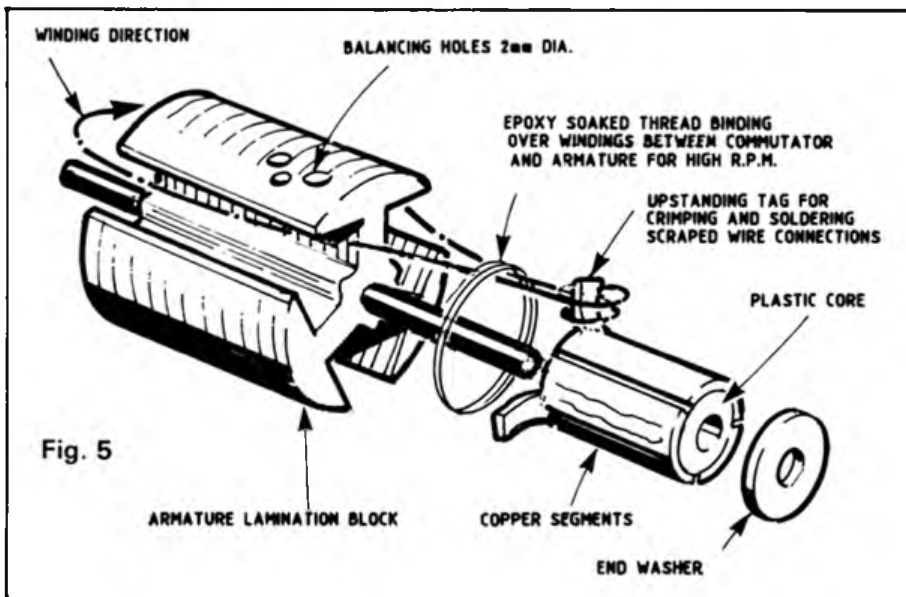


Fig. 5

BUILD FROM OUR
FULL SIZE
PLANS!



SUPER

SKOLFALKEN!

THE SK8 was used as a trainer in various Swedish squadrons between 1929 and 1938. Power was provided by an Armstrong Siddeley Mongoose five-cylinder radial. Air-cooled engines were better suited to the semi-arctic conditions found in Sweden. Cruising speed was about 100mph, an ideal speed for learner pilots.

I decided to build a model of the SK8 as it had several points that made it suitable for Rubber Scale.

(a) A simple cabane structure which would automatically set the correct incidence of top wing without the use of temporary jigs. Lower wings could be glued straight onto fuselage sides at appropriate incidence.

(b) A comparatively long nose for a radial engine plane – and a fairly easily produced radial engine.

(c) Dihedral on upper and lower wings.

(d) Reasonably large tailplane and fin and rudder.

(e) Constant chord wings without sweep back; easier to rig.

(f) Simple basic box fuselage with rounded top decking and two side stringers.

(g) A quite complex undercarriage, but it could work the same way as the full size aircraft.

(h) Simple colour scheme and markings.

Swedish strategy

The fuselage is a quite straightforward box with added formers, covered on top with 1/32in sheet from nose to tail. Soft block added between the first and second formers at top and bottom is then carved to shape. Don't forget the gussets and sheet fill-in at lower wing, u/c and rear dowel position. Add side stringers. The top and bottom wings are of quite normal construction. Make a template for wing ribs from ply or aluminium. Cut out ribs from 1/32in. and 1/16 sheet. Laminate tips from 1/32in strip soaked in

Ray Johnson's rubber scale Svenska Aero AB SK8 is ideal for indoor or outdoor flying

white glue diluted 50/50, wrapped around a waxed cardboard or balsa former, attached with 1/4in. wide strips of masking tape. Let it dry overnight. Use light but straight grained wood for leading edge, medium for spars and trailing edges.

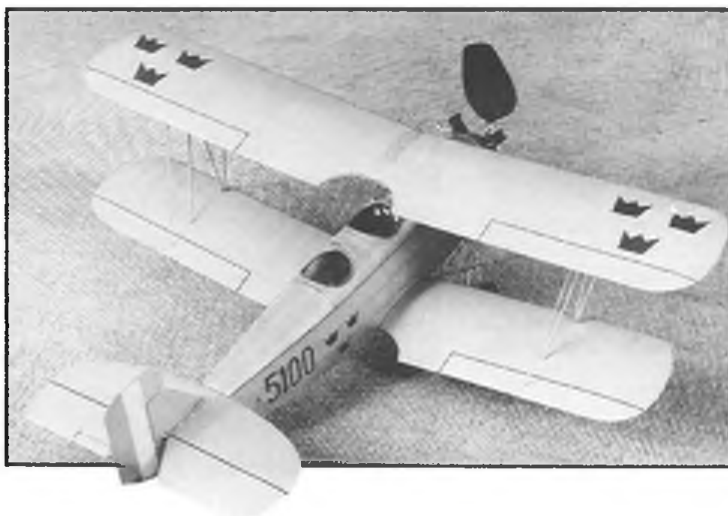
Make tailplane outline from laminated 1/32in. as per wing tip. Framework is built flat on plan. 'Ribs' are 1/16in sq.; main spar is 1/16 x 1/16in, and TE is 1/8 x 1/16in. Soft 1/16in sq. is added to top and bottom of the 'ribs' and sanded to streamlined section. Fin and rudder are of conventional construction; sheet and strip outline with 1/32in. ribs.

Hinge with soft wire. Cut cabane struts from 1/64in three-ply to pattern on plan. Cover both sides with firm 1/32 sheet, except for the top strip which fits between the centre ribs in top wing. Glue along top edges and stick together. When dry, bend apart wide enough to fit fuselage width, and reinforce the bend with cyano to stiffen at required angle.

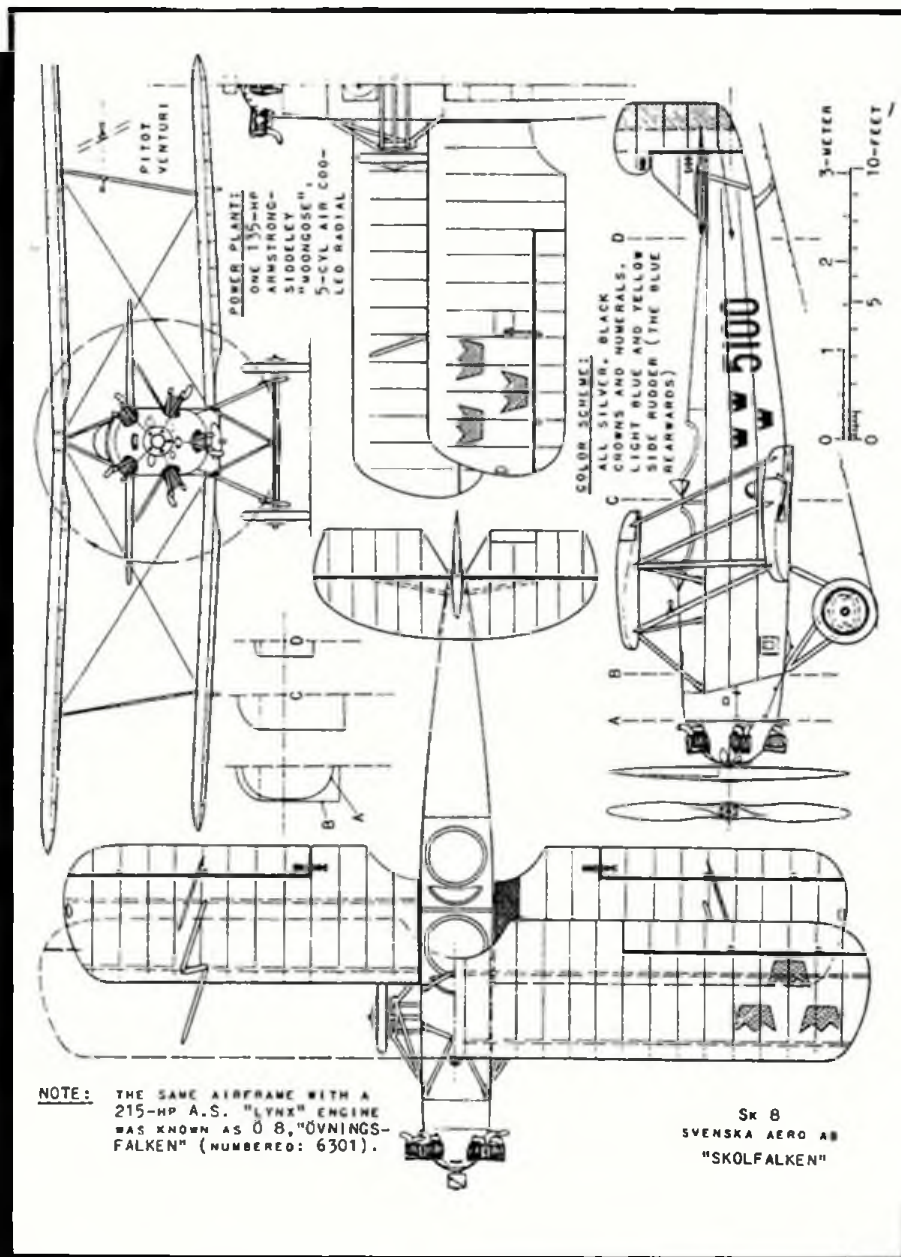
The undercarriage is of the same basic construction as cabane struts, but add 26 swg. piano wire to inside of u/c legs under 1/32in sheet. The top 1/2in. of wire is bent and epoxied into the fuselage. Use 1/16in diameter birch dowel as struts between u/c side frames. Bind 18 swg axle centre on cross piece, and wrap axle ends with shirring elastic to represent bungee of full-size aircraft. After bending the circular part of u/c frame reinforce with cyano as in cabane construction.

Details, details

Make up the dummy engine from Williams



Attractive Swedish trainer repays careful building. 26in. span model might even adapt to dieselised Pee Wee or TD 020 power...



tailplane with a rubber band. Spot glue fin and rudder in position and align with tailplane. Glue wings onto fuselage as indicated. Note that the port wing has half a degree more incidence than the starboard wing. This helps keep the wing up in a left turn. Check dihedral of bottom wings. Fit interplane struts, scaping tissue from ribs at strut position to get a good wood-to-wood joint. Rig with cotton or nylon fishing line. Install an eight inch Peck silver plastic propeller powered with six stands of 1/8in FAI rubber, 17 inches long.

Flying!

Test glide with the tailplane temporarily set at zero degrees. Trim for flat glide, adjusting tailplane incidence with packing. Set rudder at approx three degrees 'left' - and make sure you have a left turn in the glide! Wind on about 150 turns by hand and launch; model should slowly lose height and turn left on the 'power glide'.

Gradually increase turns to a max of 600 by stretch winding. On maximum turns the model should climb gently and slowly to about 20ft in medium circles. Duration will be about 27 seconds from a hand launch; quite enough for Indoor scale.

For outdoor, use a longer motor may be used (but don't forget to ballast the nose) for more turns and a flight of approx 40 seconds. You will find the glide a lot longer than you expect from a biplane!

References

FlygPlans Ritningar No. 1 (Swedish Air Force Trainers 1926-83) by Bjorn Karlstrom.

Final postscript!

Try and keep the weight down to 65 grams for indoors!

NOTE: THE SAME AIRFRAME WITH A 215-HP A.S. "LYNX" ENGINE WAS KNOWN AS O 8, "ÖVNINGS-FALKEN" (NUMBERED: 6301).

SK 8
SVENSKA AERO AB
"SKOLFALKEN"

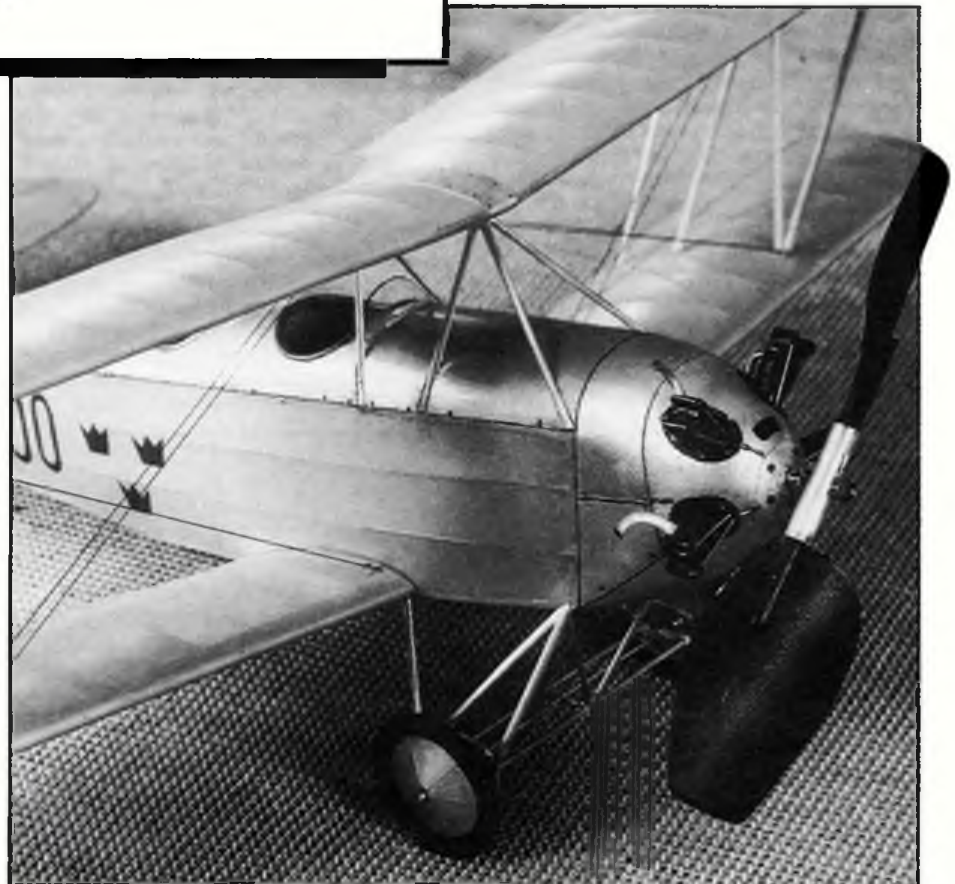
Above: Ray's reference was this fine drawing by Bjorn Karlstrom, taken from his splendid book Swedish Air Force Trainers 1926-83 (ISBN 91 85496 16 2). Right: Prototype model used an adjustable pitch prop but the 8in silver Peck alternative is less trouble to install.

Brothers plastic cylinders, with balsa cylinder heads and rocker boxes, and wire pushrods. Exhausts can be made by cutting out thick paper patterns, laminating between pieces of 1/16in sheet and sanding to section. Cover model with white Osaki Jap tissue. Water shrink and dope with two coats of well-thinned mixture. Give one or two coats of silver mixed with 30% white to all 'fabric' parts of airframe. Spray pure silver on all wooden or metal parts. Insignia and control surface markings are black. Use your favourite method; ruling pen, Rotring water-colour system (protected with clear lacquer; and so on).

Carve nose block from medium block or 1/4in sheet laminations. Drill five holes at 72° intervals to suit cylinders. Drill and bush for prop shaft ensuring it has 5 degrees down thrust and 3 degrees right. Drill three or four 1/4in holes in rear of block to stow nose weight if necessary.

Assembly

Glue top wing onto cabane assembly. Hold



BALSA CUTTINGS

Cyano de Bergerac takes a sharp look at aeronautical matters of moment

Per ardua ad nauseam

Yet another newspaper report of a convivial meeting between one-time foes; four of the crew of a German bomber and the Spitfire pilot who brought it down. There's a photo of it taken from the back end looking extremely untidy, great elliptical tail surfaces all black as the Earl of Hell's waistcoat, swastika standing out clearly, bullet holes everywhere – a 'Heinkel 3', they said. (A Heinkel *Three*? With sub-editors like that, who needs enemies?) All the participants are shown holding small shields bearing what is pretty unmistakably an RAF squadron badge. Whilst the philosophy behind this sort of exercise can be understood (well, almost understood) by the older generations, what must the youngsters think?

Little Helga: Great-Onkel Wolfgang, is that one of your war trophies on top of the piano?
Great-Onkel Wolfgang: Nein, Liebchen, that is the squadron badge of mein Britischer fighter-pilot friend who shot me into the Weald von Kent in August, 1940.

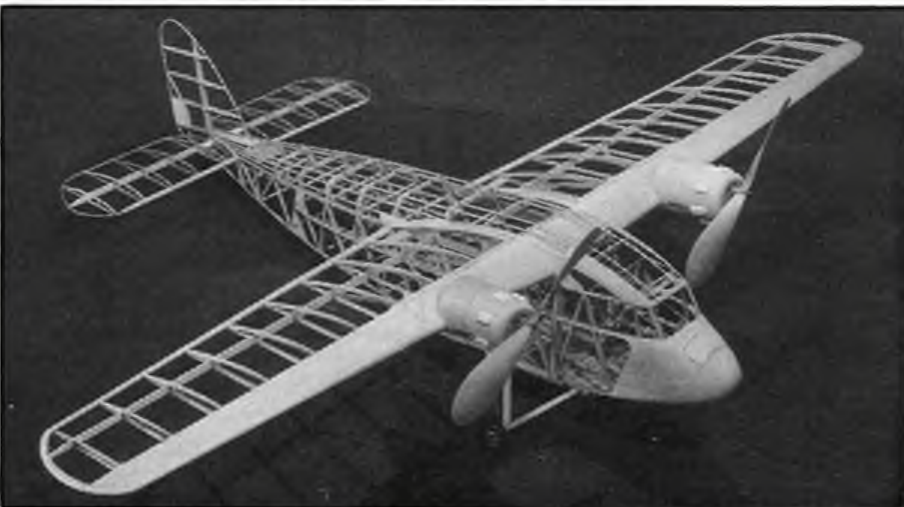
Little Helga: Uh-huh. Got many Britischer friends like that, have you?

One of these days, of course, we are going to run right out of people who are prepared to be good-natured about this sort of thing, and a public reunion is going to go entertainingly wrong. 'Zo! This is der Englander pig-dog who made me four years late home that night? For you, der schlog on der kopf!'

Gardeners' Question Time

Several honest fellows, a bit overawed by those who thunder against the perversion of Vintage models by the installation of radio

On the subject of Shorts - here's Doug McHard's lovely ASP Scion, Rupert Moore Drive and all. Model now aired - more news to follow...



control, have tried to salve their consciences yet keep within their little fields by going in for Radio Assist. In the form of Rudder Only. Against their better judgement, perhaps, but there you are. However, there are delicious reports from way back of chaps looping rudder-only jobs; multo, multo height, the spiralicious dive, smack her straight when into wind, and – over she goes! Well, actually, in quite a number of cases, over she doesn't go, and the question has been put – what, oh what do you do then, when you are faced with quite the mostest stall you are ever likely to see, accompanied by a solemn promise that its successors, although diminishing in severity, are certainly going to persist even unto the third and fourth generation. By which time your model is going to be well into the millstone grit, London clay or whatever else it is you fly over. Okay – answer simple. When the model has fallen off the top of the stall, has dove down and is on the point of swooping up again, bung on a good bit of preferably right turn, to soak up the Vee Squared. Then, let go! If it is based on some dear old classic free flight design, the model – given this chance – should then sort itself out. Any indication that it isn't going to will coincide with the onset of your realisation that this wasn't a suitable subject for rudder-only anyway.

Piston, piston, burning bright

There were four of them in this ancient Mini; two very tall, two very fat, all their field gear, spare bits, boxes, winders, stooges and lunch packs crammed inside, arms and legs sticking out of the windows, with the models stuffed into a Dracula-size coffin lashed to the saggy roof-rack. They missed

several garages because they were arguing about who won what when they went to the same meet last year, and when the driver finally swept them on to a forecourt they only had about a Texaco left in the tank. Now you know some garages will try to sell you anything from bagged coke to bottled Coke – for some undiscovered reason this one was promoting a not frightfully-well-known plonk and had a big notice up: Buy Petrol – Save on Wine. Amongst the four was a Great Wit, spelt with an extra T, and unhappily he chose this moment to unleash one of his Great Witticisms. 'Buy Wine – Save on Anti-freeze', he chortled. But the garage bloke, who might have had Austrian blood in his veins, didn't take this at all in the spirit in which it was meant, and said crisply that if that was the attitude they could sling their hook.

Press on to next garage, but soon a neurotic ticking from the petrol pump allied to a marked absence of Onward Go announced that the Famous Four had come to the end of the needful. But were they dismayed? Not a bit! Resourceful chaps like aeromodellers are never stuck for long. Knowing they could cadge, or at worst, buy fuel for their power models when they got to where they were going, they unhesitatingly poured the contents of the communal 5-litre can of five-per-cent glow juice into the Mini's tank. Their progress thereafter was spirited, smokey, and not particularly distinguished for its legality. However, they got there, and had a good day. As to how exactly the cost of an exchange Mini engine should be apportioned amongst the participants in this adventure, the debate, as they say, continues.

Shares a nicker apiece

The Government is relinquishing its hold on our old friends who gave us the Scion, the Sunderland and the Stirling. The City reassures us thus – 'Shorts to be sold to private sector as a single unit.' It's nice to know there will be no nonsense about one leg being flogged off at a time.

Flight into the future

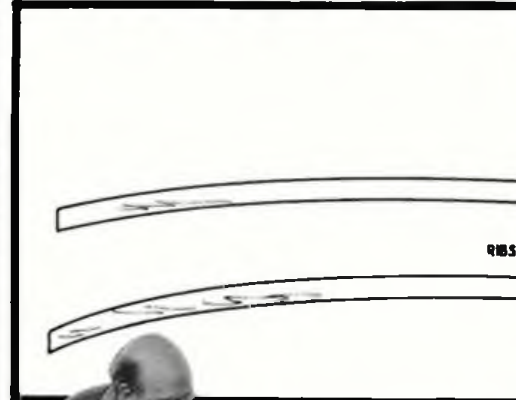
Although they first embarked on their project some time ago and this column can lay no claim to having been a source of inspiration, it is nevertheless delighted that the Northampton Club have bought their own flying field, and pours out congratulations.

The obvious benediction which springs to mind is 'Long may they enjoy it', but of course, with the set-up they have secured for themselves, the toast can be – 'Ever may they enjoy it!'

1988

INDOOR NATIONALS

We glance back at Cardington capers and focus on Mark Croome's CO₂ record breaker - 13 min 29 sec!



Top left and centre: Gently does it as Alastair Robertson lets go in F1D. Model repaid careful trimming on the day with a best time of 30:21. Top right: Wouldn't you look chuffed if you'd just broken a National record? Mark Croome's mylar-covered CO₂ craft was only a week old but won Index with 103.89%. Above: Bob Bailey was disappointed with this year's efforts but held second place in F1D - by just 17 sec... Right: Good to see Ed Liem from the Netherlands, even though he was plagued with wing damage. Far right: F1D winner Bernard Aslett prepares...

DESPITE fewer entries than last year, competition was as keenly fought as ever, helped by generally 'flat' air within No. 2 Hangar. The attraction of the Index event where the target is the National Record for each class of model (the flight score being factored as a percentage) is that all types of model can compete together. Pennyplane currently seems a good bet, with an accessible target of eleven-and-a-half minutes; but this year Mark Croome had built a mylar-covered, slightly larger version of his well-known 'foam' design - and despite getting 'hung-up' in the girders early on, a surprisingly long motor gave him worthy victory right at the end of the contest with a fine 13 min 29 sec, almost 104% of the target and, of course, a new UK record. The EZBs couldn't quite manage it, Bernard Hunt placing second again this year (after close, friendly battle with Pete Williams, whose model exhibited alarming structure flexing at times). Ever-present drift made steering a tedious chore for those with the smaller, lighter craft.

Oddly notable was Mark Benns' eight-inch model, capable of neat vertical rolls, if little duration! Chris Hutchinson enjoyed Peanut Duration flights in excess of five minutes, happily forgetting the ROG requirement in this class; and it was pleasant to learn from Peter Dean that the Indoor meetings at Wigan are proving continually popular. The new 'P15' class (about which more in a future *Aeromodeller*) seems responsible for attracting several beginners to Indoor flying. No doubt a trend which will be maintained.

Sunday Sunday...

Fewer than a handful of entries contested F1D this year. High times were the reward for careful steering, but model damage was common. Indeed, Bob Bailey suffered a wing fold during steering just 2:35 into his first competition flight.

Netherlands visitor Ed Liem, fresh from the World Champs and nobly assisted by Martin Aarts, started trimming early - with no hint of the battle to come; he was to spend much of the afternoon fighting to rebuild wings and trying to post a winning flight. Bernard Aslett flew generally with greater care than the others, and his best two flights were indeed the highest of the contest. Towards the end of the competition a relative scramble (if such a term can be applied to this genteel branch of model flying) saw all four models in the air at once; but despite early promise of a forty-minute flight, particularly from Bob Bailey who was judging his number of turns very accurately, cooling air caused all models to sink more rapidly than expected and that still-magic barrier (at National level) remained unbroken this time. Poor Ed Liem's story was the saddest of all. He had forgotten to allow for the time difference of one hour between this country and the Continent; and down to his last wing, was gradually working up to a supreme final effort he was unable to make before the clock beat him.

Victory, then to Barnard Aslett; commiserations to the others who fought through adversity. But where were the rest of you?

1987 Indoor Nationals Cardington 16th July

Index

| | | |
|-----------------|-------------------|---------|
| 1 M. Croome | CO. | 103.89% |
| 2 B. Hunt | EZB | 94.05% |
| 2 M. Benns | 12in HLG | 93.33% |
| 4 S. Sawyer | Novice Pennyplane | 87.90% |
| 5 S. Taylor | Fly Rod | 77.40% |
| 6 P. Burdett | 12in HLG | 73.33% |
| 7 C. Hutchinson | PND | 69.55% |

EZB (two flight aggregate for Houlberg Silver Medal)

| | |
|---------------|-------|
| 1 B. Hunt | 45.24 |
| 2 P. Williams | 42.10 |
| 3 D. Yates | 32.40 |

CO₂ aggregate for Sparklets Trophy

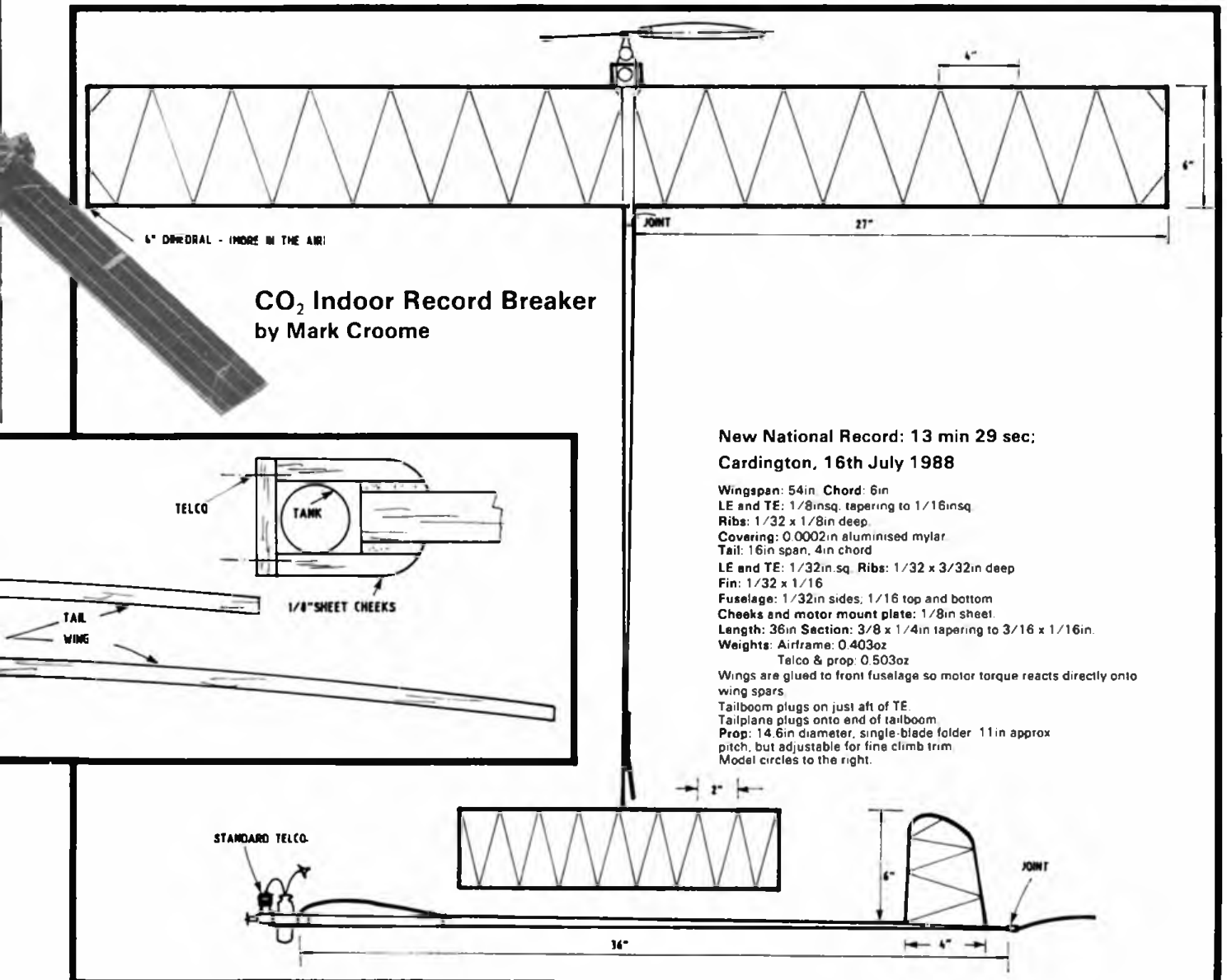
| | |
|----------------|-------|
| 1. M. Croome | 22.38 |
| 2. I. Dowslett | 18.44 |

CO₂ best single flight for Sparklets Trophy

| | |
|---------------|-------|
| 1 M. Croome | 11.55 |
| 2 I. Dowslett | 9.32 |

17th July F1D

| | | | | | |
|----------------|-------|-------|-------|-----------|-------|
| 1 B. Aslett | 3.38 | 36.14 | 31.21 | Best Two: | 67.35 |
| 2 R. Bailey | 2.35 | 30.37 | 27.45 | | 58.22 |
| 3 A. Robertson | 30.21 | 27.46 | | | 58.05 |
| 4 E. Liem | 18.42 | 29.47 | | | |



AERONCA C1



IN 1931 the Aeronca company was looking at ways to extend its range of aircraft. Several new designs were considered, one of them being the C1 Scout, a development of the original C2.

The Scout was designed with the sporting pilot in mind, as a racing and aerobatic mount. The wingspan was reduced to 29ft 4in and the airframe was strengthened to what was to become C3 standard. This modification entailed using heavier gauge tubing for the fuselage, increasing the size of the flying wires to 1/4in. 28 streamlined section and reducing the dihedral angle to two degrees. The wing structure was also strengthened; and the aircraft was capable of withstanding 8.5 G. Thanks to reduced span the roll rate was improved, but landing speed went up to 40mph.

Smart in spats

The first C1 was completed in March 1931

Philip Kent takes a look at a slick Stateside sportster

and was test flown by Al Bower on the 20th of that month. This aircraft, X11290, was painted in an eye-catching colour scheme of vermilion with maroon nose area, stripe and spats. A narrow black pin stripe separated the two main colours on the fuselage. The registration letter and numbers were in black with a standard Aeronca logo displayed on the fin. To improve performance for competition and aerobatics an Aeronca A engine (which had been developed for the C3) was installed.

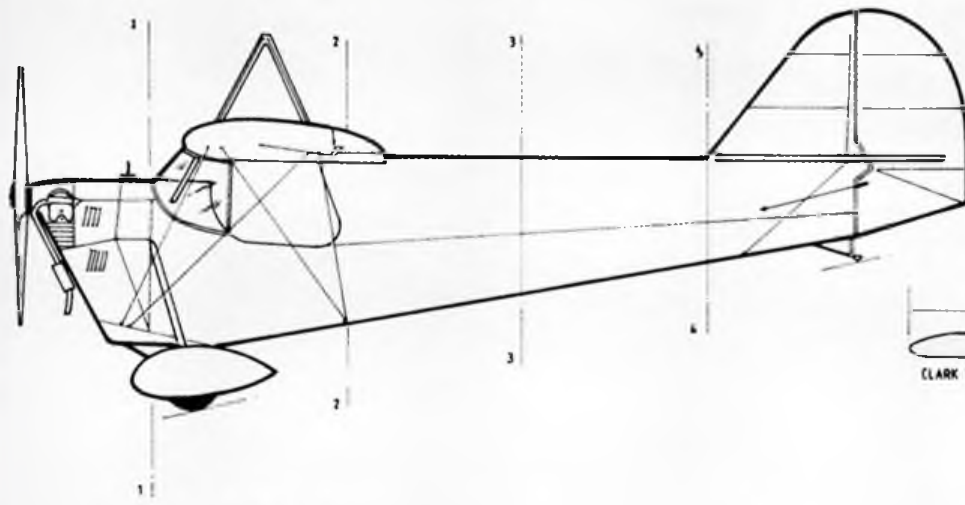
This - and a steel propeller - made the

Scout a very snappy performer, particularly when flown by Conrad G. Dietz, who that time was vice-president and general manager of the Aeronca company. He took delight in throwing the aircraft about at demonstrations, sometimes in what was considered a reckless manner. X11290 took all this in its stride without apparent sign of stress or strain, but on 12th September 1931 it crashed during one of these demonstrations and Conrad Dietz was killed.

Some say the aircraft side-slipped into the ground, others that the wings failed. The wreckage showed no sign of structural failure but Aeronca chief Jean Roche put an end to the project. One aircraft was converted back to C2 standard and the other two were supposedly crated and put in store. But for the accident the C1 could have become a popular aircraft for the sporting pilot. Suggested price at the time was \$1595 to \$1695.

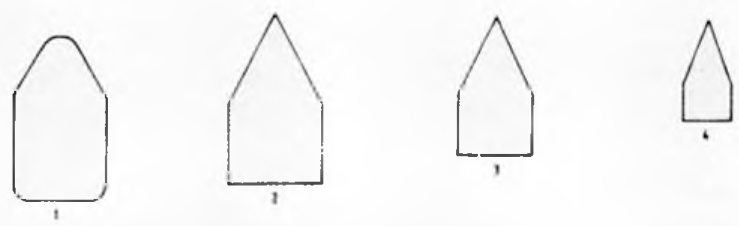
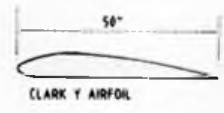


Heading: Aeronca test pilot Freddy Fluck gives scale to the petite C1. Posed photo, below, is of typical tail-on-trestle pre-war style. Despite advertisement the C1 Scout failed to reach production. (Photos via John Underwood).

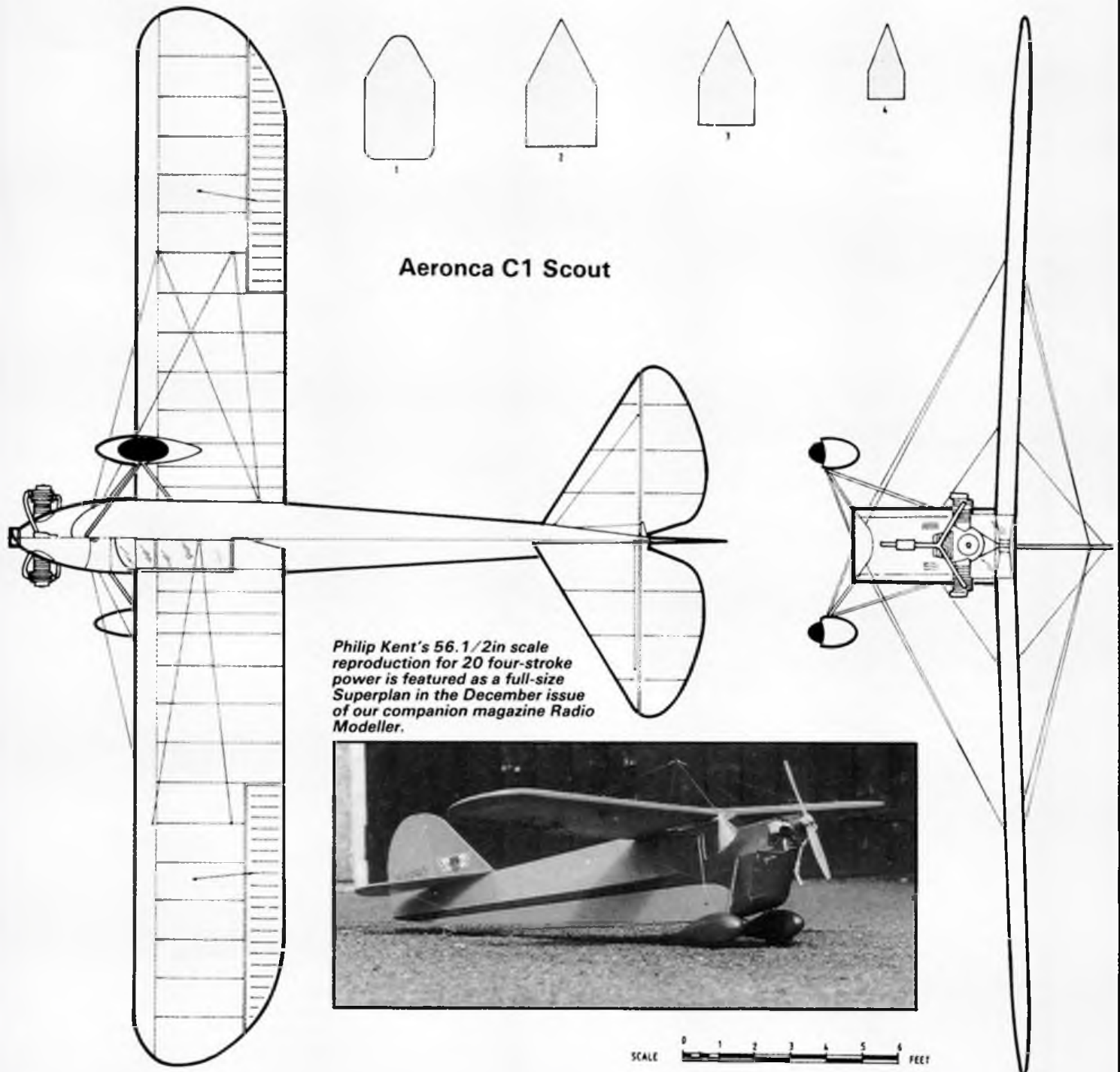


Wingspan
Length
Dihedral
Engine

29ft 4 ins
20ft 0ins
2°
Aeronca
E113A;36hp



Aeronca C1 Scout



Philip Kent's 56.1/2in scale reproduction for 20 four-stroke power is featured as a full-size Superplan in the December issue of our companion magazine Radio Modeller.



FREE FLIGHT SCENE

Dave Hipperson reports on latest meetings – and considers how to bring 'em back alive

SMAE 5th Area event

The best weather was in the extreme south for Team Power day. A ridge of high pressure calmed the winds, particularly at Beaulieu and Ashdown. It should have moved further up the country, but didn't, so elsewhere it was breezy; and in the far north it was very nasty indeed. No-one flew in Scotland.

Driffield had a very useful evening for the power fly-off with little more than 10 mph drift in which Steve Fielding and Ray King, both in the Morley team, made respectable flights. Already their team effort had been enough to clinch the Keil Trophy.

The Birmingham club (always the main opposition in power) were in all manner of trouble at Barkston. Stafford Screen suffered

a very destructive spiral dive off the top of his second climb and Pete Watson lost a model on his first. In fact, in Birmingham's case it was very much the second division to the rescue as the father-and-son team of Tony and Andrew Cordes produced two maxes and just a slight drop each from their FAI models, and Steve Philpott made a full house with his Slow Open model. Their total was enough for 2nd above a very on-form Lester/Bryant partnership from Walsall also flying at Barkston. Their club mate John Binnington went to pieces on his last flight. The top two individual times in Power came from Barkston with Lester's very fast OS powered models chasing Peers close for the top slot. Ewan Jones made his flight at Brunton where

After damage at the Nationals Dennis Davitt had to make some hasty trimming hops with his 500 sq. inch Open Rubber model (essentially a scaled-up SSTI) before the Northern Area flyoff. Flew very well when it mattered but D/Td too early, 10:26 and fifth place was the result.



| 5th SMAE Area Centralised | | | |
|------------------------------------|---------------|------------------------------------|--------------|
| 11th September | | | |
| A/1 Glider: no trophy (36 flew) | | | |
| 1 | C. Sharman | Merryfield | 10.00 + 1.04 |
| 2 | G. Madelin | Beaulieu | 9.36 |
| 3 | C. James | Beaulieu | 9.32 |
| 4 | J. Cuthbert | Barkston | 9.28 |
| 5 | A. Crisp | Merryfield | 9.20 |
| 6 | R. Clark | Barkston | 9.19 |
| F1B: Gutteridge Trophy (25 flew) | | | |
| 1 | M. Howick | Ashdown | 12.30 + 4.07 |
| 2 | M. Richardson | Ashdown | 12.21 |
| 3 | T. Dilks | Barkston | 12.20 |
| 4 | N. Lee | Ashdown | 12.16 |
| 5 | P. Uden | Beaulieu | 12.06 |
| 6 | M. Chilton | Barkston | 12.00 |
| Open Power: no trophy (49 flew) | | | |
| 1 | R. Peers | Barkston | 7.30 + 6.46 |
| 2 | M. Lester | Barkston | 7.30 + 6.33 |
| 3 | E. Jones | Brunton | 7.30 + 5.07 |
| 4 | F. Chilton | Beaulieu | 7.30 + 5.05 |
| 5 | R. Staines | Barkston | 7.30 + 4.23 |
| 6 | S. Fielding | Driffield | 7.30 + 4.02 |
| Team Power: Keil Trophy (18 teams) | | | |
| 1 | Morley A | Fielding, King. | 22.19 |
| 2 | Birmingham B | King, Philpott, Cordes. | 21.51 |
| 3 | Walsall | Cordes, Lester, Bryant, Binnington | 21.01 |
| Plugge Positions after five events | | | |
| Bristol & West | 1181 | | |
| Crookham | 924 | | |
| Vikings | 888 | | |
| Anglia | 875 | | |
| Biggles | 789 | | |

it had been windy all day. Other successes went to those at more southerly venues. Colin Sharman, was flying with his clubmates at Merryfield, the only person to max out in A/1. Mike Howick reported some very flyable weather (for a change) at Ashdown although no power entries were there; and difficult towing terrain hardly helped the A/1 flyers in the light wind. Mike's F1B score alone was enough to lift the Gutteridge Trophy; and he must have been very pleased with his flyoff time of over four minutes particularly as by then the breeze had picked up. His club mate Richardson also made best use of the weather to take second place only nine seconds short. At Barkston, it was mostly a story of four maxes and one dropped flight in F1B. Dilks was particularly unlucky with a last flight clocked off behind trees, just short of a max.

Plugge scores would suggest that the entire Bristol and West entry will have to come out with their wings on upside down for Crookham to have a hope of catching them in Team Rubber; they are over 250 points clear with only 300 available at the last meeting!

Northern Gala: Driffield, 18th September

Nobody believed the forecast the night before – but for once it came true. Driffield had some of the warmest weather of the season for the Northern Gala. Indeed, it was one of the warmest places in the country that day. Light winds and almost constant sunshine during the morning developed into a breeze after lunch with occasional cloud. Given these conditions the 2:30 max seemed



centralised events have to continue to 6pm. They don't; and this one didn't. In fact the early finish allowed the flyoffs to be run rather better than usual with decent gaps between and time for everyone to get ready. As a number of people were in more than one flyoff this was fortuitous, but arranging for the highest-performing models to be flown first was perhaps a bit unkind.

The rubber flyoff, with ten participants, got under way at 5.15 – much too early. Most of the top half-dozen were winding well before the start hooter and were thus able to launch into a distinct calm patch in the evening breeze of 10-15mph. Peers, Hipperson and Chambers went away first, followed a few seconds later by Ball and then Davitt. The early models climbed very high, Ball's and Peers' centring perfectly in the good air to descend again slowly at the other side of Driffield almost a quarter of an hour later – and some three miles away. Ball's model stayed aloft just along enough to win. Chambers' aircraft climbed less well but glided beautifully, even when low, to score nearly eleven minutes. It was joined by Hipperson's moderately-sized model (which had drifted out of the lift after about seven minutes) and Davitt's whopping 500 sq. inch which also D/T'd down too early – with height enough to fly another two minutes! These latter models landed in the edges of the town, very close to one another. Only Hipperson's was damaged. The rest of the field missed the lift, recorded 'sensible' scores and only just left the drome. The top five were all large or super-large models of between 380 and 500 sq. inches wing area. Together they put up nearly an hour of flight time!

There was then a decent break – 15 minutes – before the glider flyoff began. This involved



Above: John Carter prepares for Open Rubber flyoff at the summery Northern Gala. Smiles are justified – he won! Left: Roger Baggott waits for the right air before flying in Open Power; out of luck though. Below: Ian Davitt maxed on his first flight with this 1/2A model but then went to pieces...



Len Auckland's bike-mounted model box is shaped to wing dihedral for trouble-free retrieval on windy days!

seven of the original 19 entrants. Cuthbert towed for a while, and launched into ordinary air and was down in less than three minutes. John Carter, still under tow, suffered a line tangle with Gordon Beal whose model fell for a very short flight. Eventually John got away in good air which supported the model at towline height for a while before lifting it. John Cuthbert's was still the next best time so Carter's flight was overkill; it would have been even more so had it not shaken out of the lift and come down at a little over seven minutes, and at retrievable distance, as John

over-cautious; but whether a larger one would have made much difference to the size of the flyoffs is debatable. The 2:30 max is now very much the norm, but a larger max is probably more effective at reducing flyoffs when there is a breeze and spotting the lift is tricky.

There was little difficult about the Northern Gala and maxes of any length were virtually token flights. The contest came at flyoff time. There had been some groans about the early finish time too. Last flights by 5pm! There is a popular misconception that SMAE



Two reminders of the Nationals: this picture shows a classic F1B launch as Ron Pollard gets away in the flyoff. Placed third after timer trouble and resultant early D/T...

Northern Gala: Driffield, 18th September

Open Glider: Pilcher Cup (19 flew, 7 in fly off)

| | | |
|---|-------------|-------------|
| 1 | J. Carter | 7:30 • 7:07 |
| 2 | J. Cuthbert | 7:30 • 2:31 |
| 3 | M. Brown | 7:30 • 2:26 |

Open Glider: Pilcher Cup (19 flew, 7 in fly off)

| | | |
|---|--------------|--------------|
| 1 | P. Ball | 7:30 • 13:36 |
| 2 | R. Peers | 7:30 • 13:03 |
| 3 | T. Chambers | 7:30 • 10:50 |
| 4 | D. Hipperson | 7:30 • 10:43 |
| 5 | D. Davitt | 7:30 • 10:26 |

Open Power: Hamley Trophy (13 flew, 8 in fly off)

| | | |
|---|-----------|-------------|
| 1 | J. Hopper | 7:30 • 8:53 |
| 2 | R. Peers | 7:30 • 6:41 |
| 3 | E. Jones | 7:30 • 6:35 |

Senior Championships

Not quite the final story - but late season results show Russell Peers in an unassailable lead before the last two events of the year - the 6th Area meeting and the last Trials. His total of 76 will undoubtedly be higher

had umpteen minutes of fuse aboard - fifteen minutes for towing, in case he needed the whole round; then another six minutes' worth which starts the D/T timer (which is turn runs for six minutes). John reckons he had enough for a twenty minute flight!

When all this was over - surprise, surprise! Gordon Beal had taken another flight good enough apparently to rob Cuthbert of his second place. But of course attempts for line-crosses in glider flights were cut from the SMAE rules many years ago. Next year the FAI follows suit. Gordon, obviously in doubt, took a re-flight to be on the safe side. John Cuthbert was not amused, but fortunately the CD ruled it out.

Screen was first to launch in the power flyoff. He regretted it. With a short run and a dodgy transition the model never found good air. Minutes after his flight the drift reduced considerably and Hopper, Peers and Jones went off. It is incredible how Julian Hopper can pull them out of the bag when he wants too. He had flown only twice this year, yet here was the distinctive, elliptical Super-jacker higher than the opposition and outgliding it to win the Hamley yet again. Earlier Julian had been most complimentary about the climbs of some of his competitors but reflected that they seemed to have caught on to his ideas.

This was well illustrated by Ray Monks who had a model that looked distinctly like a Superjacker! The model he flew in the final was of his own design, and he was fooled by the drift that died away as the round progressed. He also D/Td down from a height and at no great distance. Julian got his dinner ticket and Peers had to be satisfied with another second place. Nevertheless, he is home and dry as SMAE Senior Champion again - and the first person to win it consecutively under the current points system. It remains to be seen if the last two SMAE events will supply him with sufficient points to better his tremendous '87 total.

Flyaways - not a lost cause!

Both Phil Ball and Peter Gaunt suffered much the same fate at Bottesford earlier this year when an enthusiastic member of the public picked their rubber models out of the fields and, not knowing they were vital for further flights, tucked them away safely indoors and later phoned their owners. Not a lot of help as both of them spent the rest of the daylight hours slogging through muddy fields and downwind woods. They missed the flyoff that evening.

Too often our models are actually stolen so we can be thankful when they fall into the hands of honest members of the public from whom we recover them eventually. But think how often their 'help' is the very last thing we require - not right away, that is. It's arguable how much regard a 'finder' takes of the name and address label and associated instructions. I believe they do read them, if not always immediately. I am sure if I found some interesting object in my garden I would look all over it for information as to its origin.

True, models are sometimes picked up by a passing motorist immediately on landing and are then driven away home from where the call is eventually made. There have been numerous instances of owners having to travel vast distances to collect models that have met this fate. It's odd how the helpful motorist always seems to be travelling away from the owner's home - never towards! I have many times considered writing 'DO NOT TOUCH' down the wing of my models in the largest possible tissue lettering in an attempt to overcome this problem. There have certainly been occasions when I wished I had, if only to delay the moment when the

over-enthusiastic 'Joe Public' waves the model at me, invariably holding it by its weakest part. That's agony!

The label itself

To be more practical, name and address labels should certainly say more than simply your name and address. There is no harm in giving the finder a bit of information. I still get my leg pulled over the essays on the side of some of my models. There are useful things you can say, quite apart from explaining how large, awkward models can be dismantled by removing or cutting through the bands holding the wing and tail or unplugging the wing halves. There should be at least one master notice as close as possible to the business end of the model. It is here the curious finder is sure to look - close to the engine on a power model, near the prop on a rubber model and under the wing near the hook on a glider. I also prefer such a notice to be situated where it will not be too quickly faded by direct sunlight - this is more powerful than you might expect, even in this country.

Typed notices work well and last a long time. Indian ink is another alternative. Don't use biro or felt pens - they run horribly with water, let alone fuel. Pencil is actually preferable but it isn't very clear even when new. Remember - the more professional a job you make of the address label then the more likely it will be that you convince the finder that you really want your model back.

Rewards?

The notice should explain what the model is and what it is being used for and that it is required for further flights that day. The finder should be asked to place the model in a prominent position, as close as possible to the landing spot, and to leave it there for an hour or so. Your name, address and telephone

before the end of the season but it cannot reach the magic 100. But John Carter is the sensation. After an average start to the year he came through to win Open Glider at the Club Champs, Southern and Northern Galas! He has more to come from the last two events and is very likely to hold onto his recently-won second place. His glider flying at the end of '88 was of truly astonishing standard.

John Cuthbert's season has quietened down since the Nats; he may lose his third place to Phil Ball who has come back strongly but is running the Trials so can't score in that meeting! Hipperson too has done little since the Nats but he should gain some points from the last meeting.

It must be understood that these figures are not the SMAEs final figures and may be subject to adjustment before the final tally.

Top of the Senior Championship Table with 2 events to go:

| | | | |
|---|-------------|------------|-----------|
| 1 | R Peers | Falcons | 76 points |
| 2 | J Carter | Falcons | 50 |
| 3 | J Cuthbert | Falcons | 48 |
| 4 | P Ball | Grantham | 44 |
| 5 | D Hipperson | Falcons | 43 |
| 6 | S Screen | Birmingham | 41 |
| 7 | J O'Donnell | C/M | 41 |



...and Stuart Rose prepares his fourth-place John Pool inspired CO₂ Duration craft. Do low numbers mean this class is doomed?

The European Rules

It is disturbing to learn that the FAI Jury at the recent European Championships allowed a flyer to use a model that he admitted he hadn't built himself. I wouldn't be surprised if there were a few contestants who would have actively protested had they known. Certainly the rule to waive the need to be builder of your own model at FAI International contests is to be implemented next year but why jump the gun for one man? Rule changes decided on this year come into effect for next season so that everyone has

a chance of learning them and preparing accordingly.

It was similarly astonishing to see the contest organisation across Europe this Summer (including the Champs themselves) allowing Thomas Koster to compete with a radio control equipped FIC model just because the rules will allow them in '89. One would have hoped with the time and effort that is expended on the management of the CIAM regarding the precise letter of the law, contest directors of the major international meetings would give them a little more respect....

number will enable the finder to contact you in case you don't turn up. Never mention a reward - it's an open invitation to blackmail and at the very least it can cause some embarrassment when collecting the model. Just what constitutes a reward nowadays? If the finder needs money for his trouble you probably aren't going to get the model back anyway. You will probably get one of those nasty phone calls testing out how high you are prepared to go.

When we used to fly at Chobham Common we regularly dropped models onto the Wentworth Golf Course, and often into the grounds of the numerous very large and expensive houses occupied by the rich and famous. Rewards become a problem then, too! My address labels simply promise a refund of all expenses - and then say THANK YOU in large capital letters. I rarely put more than one address notice on a model but it can do no harm to have small reminders of name, address and phone number on all the components likely to become detached and blow away after landing. All may be typed on tissue and then doped on. They will show up best on light surfaces and not at all on black! Thin paper is fine too. All notices should be doped or epoxied over to ensure they don't come off.

Who to contact?

If all is well your pronouncements have held off the over-helpful long enough for you to locate the model for the next flight or at least before dark that evening. If you don't find it and the public do - whom do they phone? You are probably either still out in the field or travelling home. If you are lucky you have a wife or parents at home manning the phone. Of course you can approach this situation with an answering machine but despite their increasing acceptance I still feel they might frighten the finder off or may confuse him into giving incomplete information. Nothing

more frustrating than hearing, 'I have found your model this evening - I live in Ancaster; perhaps you can give me a ring when you get in?' Someone at your end is safer!

Not wishing to subject anyone to my answering machine and already appreciating that my wife's assistance on the flying field is far preferable to her attendance at the end of a telephone in case a model gets lost I have always used my parents' address and telephone number. This has also allowed me to escape the inconvenience of relabelling fifty or so airframe on the three occasions that I have moved in the past twenty years. With the phone number manned you can ring it before you leave the field to check to see if anyone has picked the model up. If so you can go straight around to collect it thus saving a special - and probably lengthy - trip later. I have heard of people doing this during the day's flying and then carrying on with the same model.

One can take that idea a step further with a special return notice for each contest you attend informing the finder when and from where the model was flown and asking him to return it to the venue if possible. I have never gone to these lengths but John O'Donnell does and the system has worked for him on a number of occasions. It can do no harm.

Collecting the model

You have had the call, ascertained the finder's address and have arranged a convenient time to pick it up. I reckon to be armed with various ploys when I collect a model from the public. Hopefully I will have established the circumstances of its recovery over the phone - who found it, how difficult was it to recover, and so on. Never offer money except to refund out of pocket expenses unless children have found it - then cash is perfect. A bottle or two of wine and/or fancy chocolates is usually appropriate.

Very fancy chocolates for the very fancy addresses and so on. Always make a point of explaining what we do, without boring the poor unfortunate. If you are lucky enough to have a friend living in the area who will pick it up for you then be sure to write a short thank-you note to the people who found it once you have it back. Once again explain what we do and when we are likely to be back in the area. Remember there have been instances when the same guy has found the same model on two separate occasions a year apart! What is more, you never know whether your finder might be on the local Parish Council and in a position to affect whether we fly in that area again. It does no harm to oil the wheels a little when you have a chance.

Stafford Screen takes this very seriously. He canvasses the area of his losses so thoroughly that when the model eventually turns up he has quite a lot of paper work to do standing people down! This system has recovered models for him that would otherwise have stayed up trees. At the end of last season a chap actually looked quite disappointed when Stafford explained that he could stop searching his land now as the model had been found somewhere else. The fellow said, 'Never mind, perhaps it will come my way the next time.' Good public relations, eh?

I hope these ideas will go towards reducing your losses both during the day and afterwards. I find it shocking to see numbers of models with no legible address labels at all - like the Dixelander derivative I retrieved from the clutches of those youngsters at Bottesford in January. What made me chuckle was that the builder had been proud enough to get the designer's autograph - there it was, crystal clear on top of the wing - George Fuller's moniker; but the owner's name and address was just an oily purple smudge tucked away under the fin!

SCALE MATTERS

Bill Dennis talks of tubular techniques and we look at some intriguing subjects

INORMALLY devote the column in the December issue each year to a closer look at new, interesting models which appeared at the August Nationals, but this year I am afraid there is nothing dramatic to report. Even Eric Coates had reverted to the faithful DH 9A after new documentation on his Austin Whippet had proved somewhat incriminating! Several exciting projects I know were nearing fruition but didn't quite make it.

Instead, I will tell you about one or two aspects of my BE2e which, although failing to qualify, did gain the highest static score I have ever achieved. Some months ago I showed a photograph of the uncovered structure which has 22swg. aluminium tube outlines to the flying surfaces. Covering presented no problems, although with hindsight, unsupported lengths of more than three inches should have some bracing to prevent 'pulling-in' after doping. There is no doubt that this technique produces a far more realistic appearance than the traditional wooden structure, which looks grossly thick by comparison. From a practical point of view, there is great resistance to warping. The BE tail surfaces survived a rather torrid flying session unscathed. The wing tips were a different matter, and three quite heavy arrivals on the runway left the vulnerable leading edge sections somewhat mangled. No doubt a wooden structure would also have suffered, but would have been easier to repair.

A characteristic feature of all of the BE types as well as RE 8s, SE 5s, and similar types is that machines which had been in service any any time showed some quite alarming wrinkles in the fuselage covering in the region of the cockpit, and these were very apparent on the particular subject I was modelling. I tried two or three ways to reproduce the effect, and the final one worked very well. Firstly, because wrinkled covering imparts no strength, it is vital to use cross-bracing in the structure. I covered the whole fuselage in the traditional 'silk-on-tissue' and then cut away the relevant area. This was then re-covered in wet silk alone with the 'grain' going lengthways, and adjusted so that it was just a little tighter in this direction than vertically.

This was then given two full strength coats of non-shrinking dope. If you are lucky, some very realistic wrinkles will appear. I found that over a period of two weeks after



Above: Mike Hetherington's now famous enlarged Earl Stahl Spitfire flies by at the Nationals. Impressive subject is sure to inspire more efforts like this. Below: Mr. R. Waddington with neat orange and white Stinson - which failed to qualify for Rubber Scale at the Nats, but only just...





New Chipmunk by John Roberts replaces his 'Shuttleworth' replica as his top-line entry for C/L scale. Flew in a most stately way at the Nats. Below: Plethora of new Peanuts by Emmanuel Fillon includes many shapes unfamiliar to British eyes. Plans are neat and clear - we can supply details. Why not enlarge for F/F power?

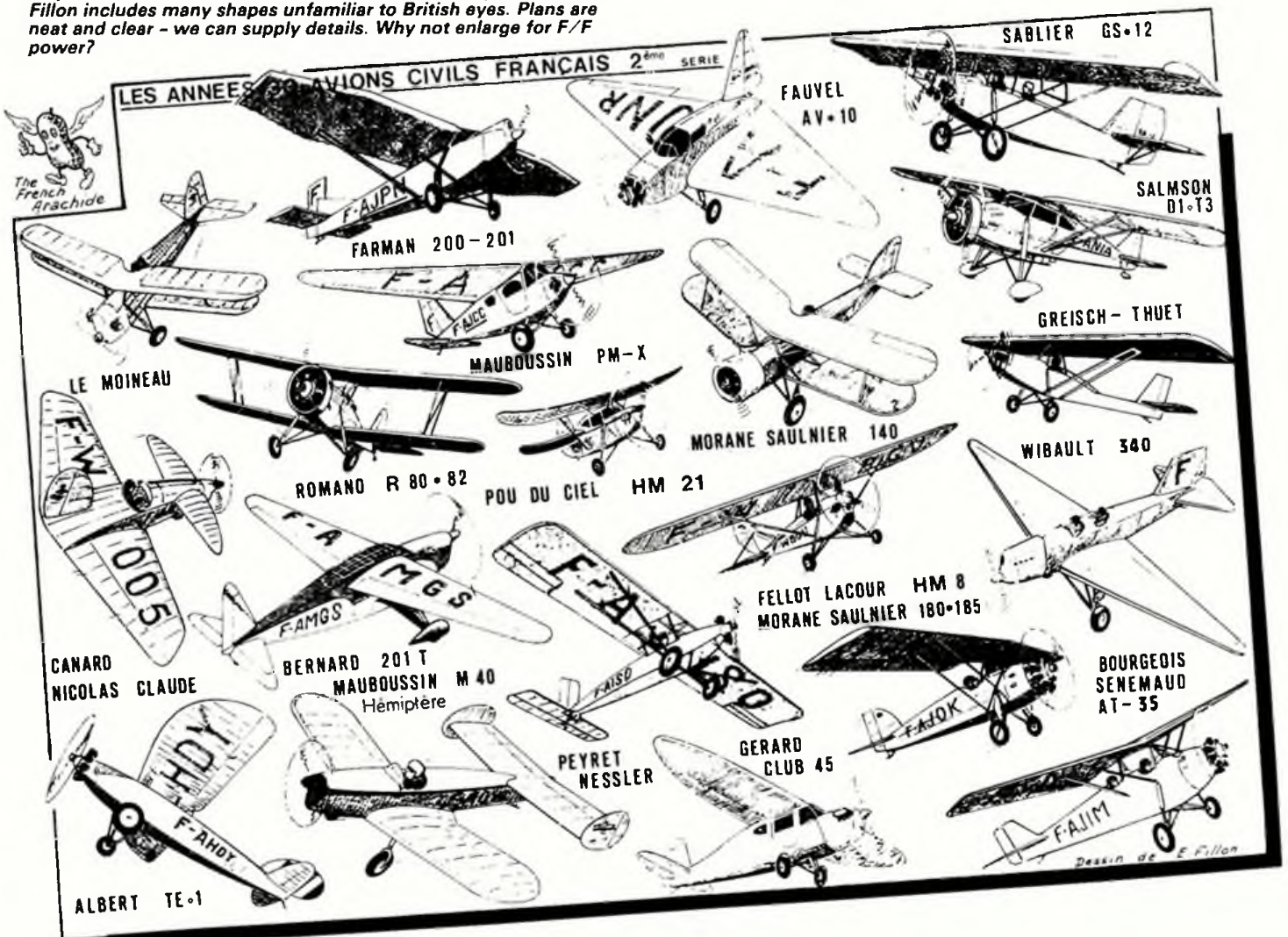
finishing, the covering had tightened up a little, so take this into account beforehand. It is quite easy to re-do the job and in any case, blemishes will often be covered by the stitching. While it is too much to expect the 'full-size' wrinkles to be reproduced exactly, the effect is very convincing.

Documentation...

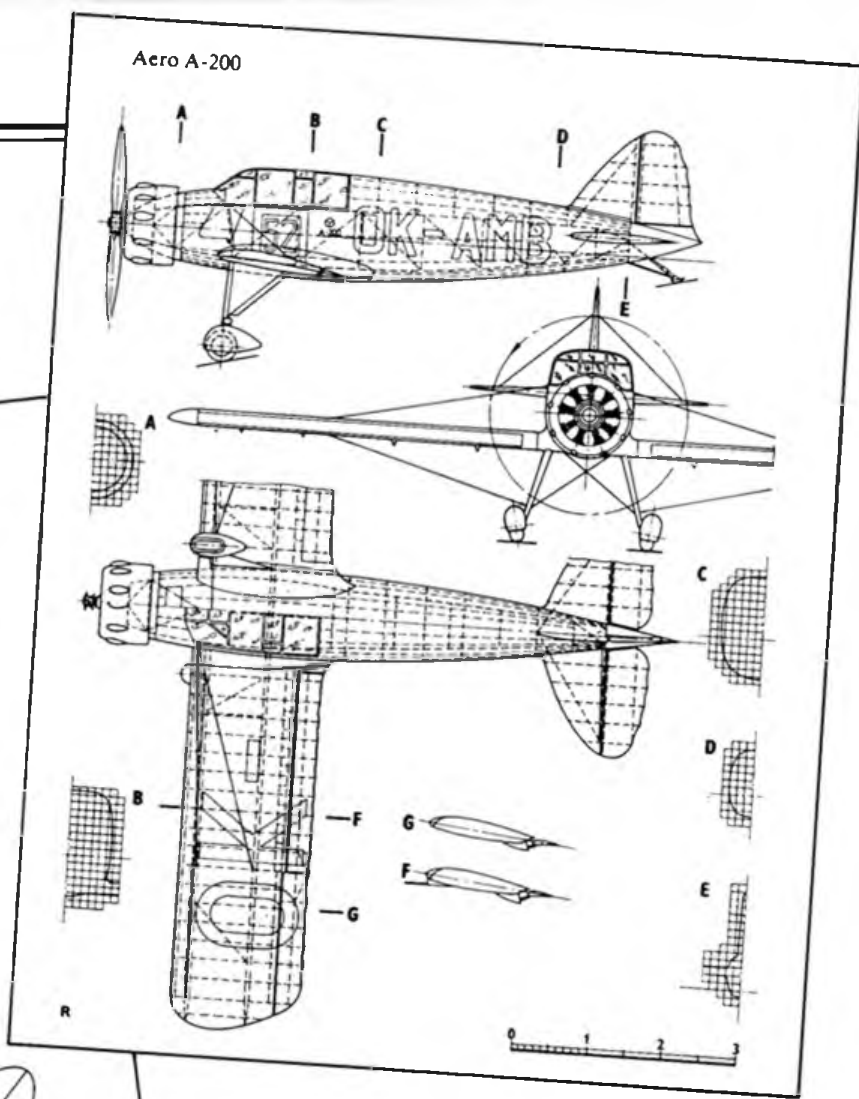
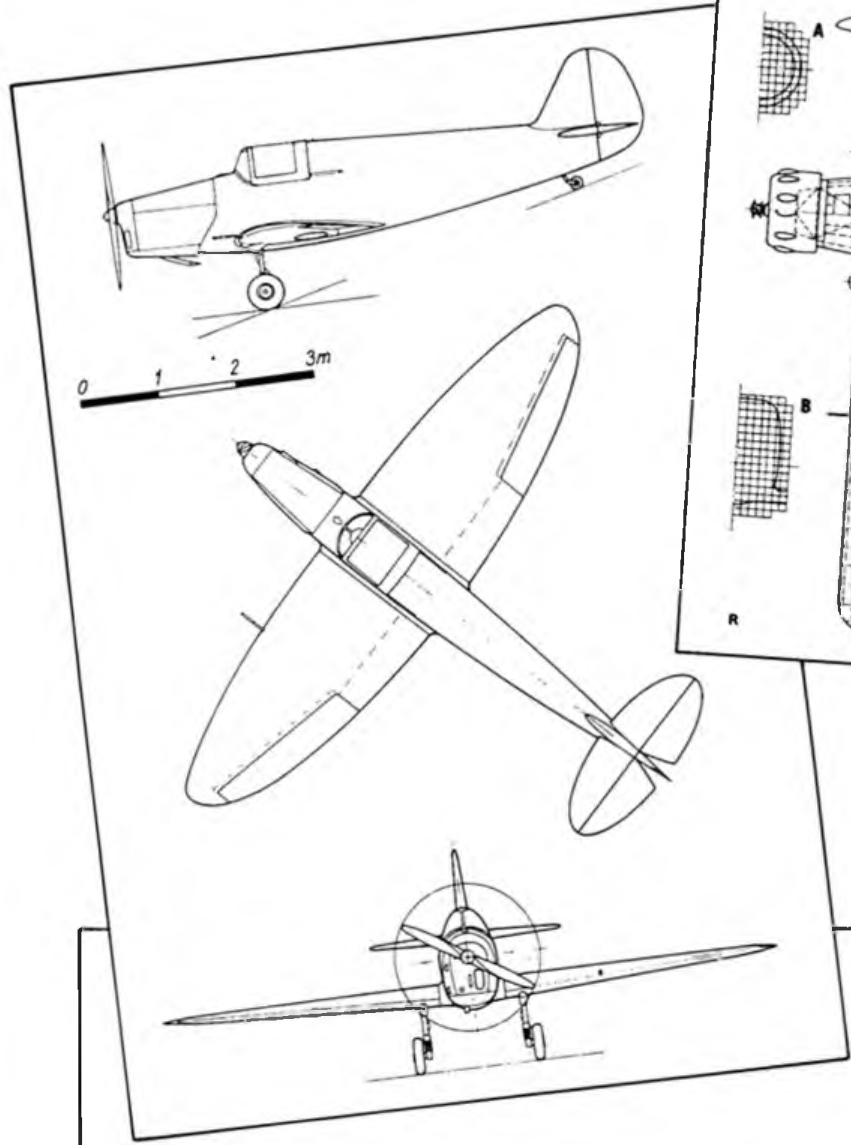
In his letter in the September issue, Jeff Anderson quite rightly picks up on my comments regarding documentation at the Indoor Nationals. My interpretation of the rule book is that if the documentation requirements are not met in full, then at best the model can only be judged for craftsmanship. What happens in practice - even at World Champs level, I am told - is that the model is marked in full but out of a lower maximum, say 7 instead of 10.

Personally this does not worry me as I believe in encouraging modellers to get it right next time, rather than telling them to clear off. What is essential is that this procedure is incorporated in the rules, rather than leaving it to individual CDs to decide. I understand that the Scale Technical Committee will be considering this.

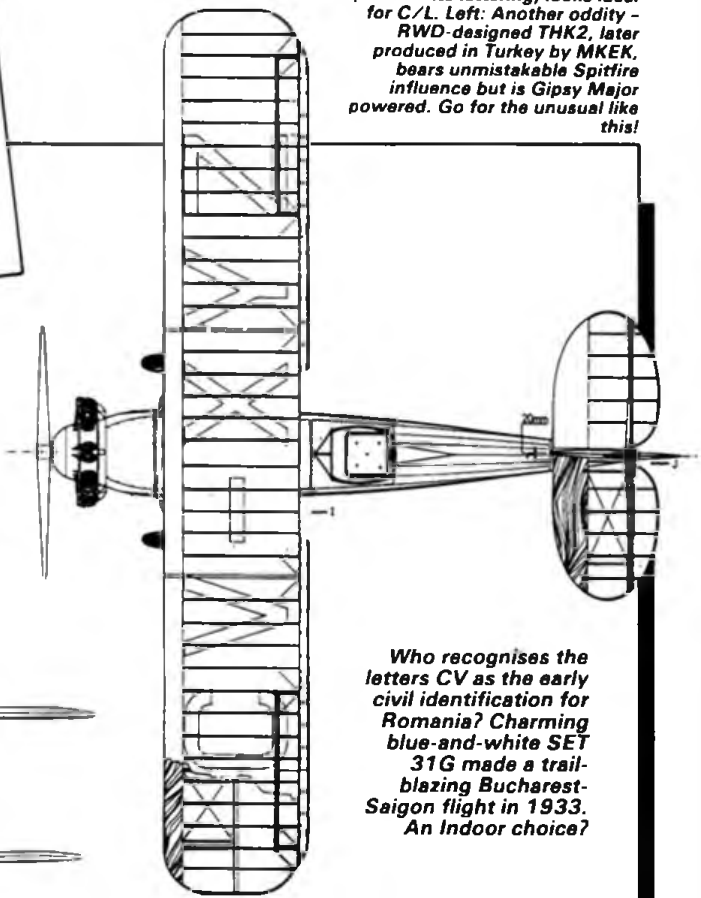
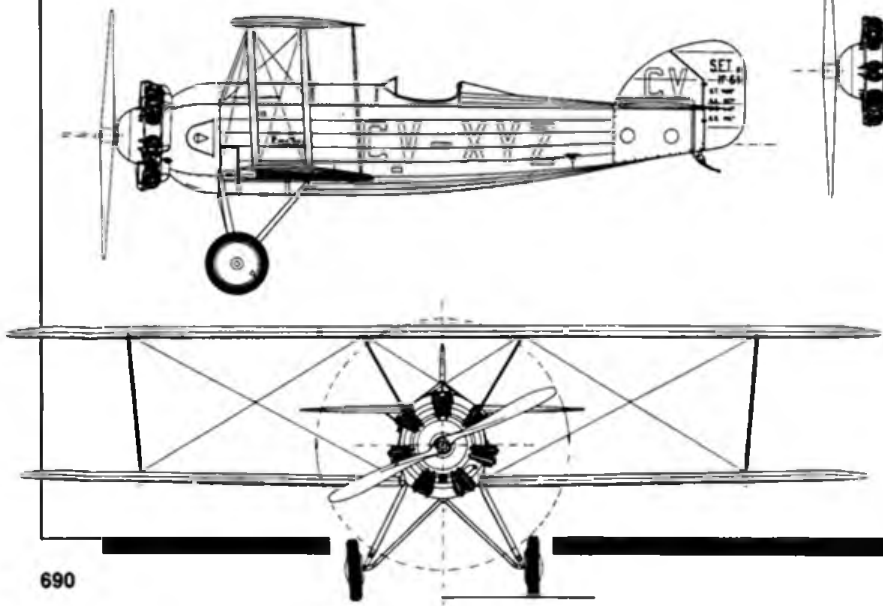
The placing of non-fliers higher than qualifiers in the CO₂ electric event was merely a teething glitch on the otherwise excellent computerised result service provided by Reg Boor.



Subjects for Scale?



Above: Vaclav Nemecek's fine book *Ceskoslovenka Letadla 1918-1945* provides this Aero A-2000 three-view. Green aircraft (with white lettering) looks ideal for C/L. Left: Another oddity - RWD-designed THK2, later produced in Turkey by MKEK, bears unmistakable Spitfire influence but is Gipsy Major powered. Go for the unusual like this!



Who recognises the letters CV as the early civil identification for Romania? Charming blue-and-white SET 31G made a trail-blazing Bucharest-Saigon flight in 1933. An Indoor choice?

VINTAGE CORNER

Alex Imrie visits the

SAM 35

Championships...

AS IS USUAL at this time of year, mail from vintage enthusiasts tends to accumulate unanswered thanks to pressure of the flying season, so it is opportune to publish some of the more interesting excerpts. We also report on the SAM 35 Championships.

Readers may have noticed that this column sometimes gives scant coverage to items relating to rubber duration models, including Wakefields. Although I endeavour to cover all aspects of the vintage scene, on the sort of roving commission that I undertake at our meetings I somehow seem to miss most of the Wakefield activity. The answer, I suppose, is to take root at the contest director's desk and follow such events through as the results come in. Then, of course, one tends to miss the actual flying, getting instead a pretty thin slice of the enjoyable cake that our major meetings provide. On the other hand, this columnist is not expected to be a one-man-band, and I can only report what I actually see, or use material that is contributed. So, should you wish to boost your particular interest in Vintage Corner, please write and tell us, or, better still, take some photos and send them in with details!

SAM 35 Champs

THIS eagerly anticipated event was blessed with glorious weather; almost no wind and plenty of sunshine from a blue, unclouded sky. This was a free flight modeller's dream - a fine open field to fly from with large unobstructed areas of grass and the smooth surface of Barkston's runway for those ROGs that are so often elsewhere denied the Vintage enthusiast. But here we had it all, thanks to a high-pressure weather system, the RAF and the Grantham and District Club whose home ground this is.

Fun, fun, fun

The emphasis was on Fly for Fun but behind the scenes the usual competitions were taking place, namely eight and four-ounce Wakefield, the Normac Trophy, two precision Power events (the Mills Trophy and the Sigma Shield) and a competition for Gliders. The meeting was honoured by the attendance of a four-man Swedish contingent which included Sigurd Isacson, the designer of the Sunnanvind glider, and it goes without saying that a number of models of this design were present. Fielder of the biggest model and the largest Sunnanvind fleet was E. Wisbey from Rotherham who aired three sizes, the normal 38in craft, a six-foot version and a



Above: Peter Harvey, Eastern Area SAM 35 representative, at the SAM Champs with his red and yellow ED Bee powered Tomboy finished only a few hours earlier! This picture: Recognise that hat anywhere! SAM 35 SPEAKS editor Andy Brough displays Pfeffer-powered Mamselle. Another popular Vic Smeed design...



Ernie Wisbey with his Sunnanvind trio including the 12ft monster, brought along to show designer Sigurd Isacson who attended the meeting with a Swedish contingent.



giant 12ft machine that made its maiden flight late in the day when the wind was rising; one could see the flying surfaces flexing from gusts which had not yet arrived at the tailplane! The same builder had another interesting but unfinished machine with him, the German Record Tailless Glider designed by K. Schmidtberg. The original's amazing 37 min 41 secs from a level hand launch was not bettered for over ten years. This replica was made from the plans in the 1938 Zaic Yearbook; and we look forward to hearing more of this all-hardwood-and-ply record breaker.

Diesel delights

Amongst the varied assortment of models I particularly liked the 36in beautifully-built Geoff Dunmore designed Dizzy Diesel by Paul Hoey from Norwich, which was powered by an ED Bee Mk II. This model was covered in transparent yellow and orange Litespan. Paul's nice Wedgy was similarly covered in blue and red. Plans for Dizzy Diesel are available from ASP as PET 276 for £1.75p plus 50p postage from ASP. Mick Radford's Red Ripper seemed to be continually in the air, flown by son Tony; Mick himself aired his lesser-known Halifax Hermes, Mills .75 powered. David Goddard's Paul Plecan designed Hummingbird was made from plans in a 1950 issue of Flying Models and was taken aloft by an ED Baby Mk II. He had only just finished it the previous evening. Peter Harvey was another late builder, having completed his Bee-powered Tomboy that very morning! Ray Hall of the Morley and District MAC had built a So Long from the Air Trails article (January 1941) for a cabin duration event held at Church Fenton some months earlier, but had wrecked it on its first outing. Nevertheless, here was the repaired model, performing beautiful ROGs from the tarmac. Ray also flew a red and yellow Jimp, the 48in. pylon design by CA Allen that won the free-flight event at the 1949 Northern Heights Gala in 1949, and was subsequently described in the Ian Allan Model Aviation Series (1951 Model Planes Annual). Ray's model is powered by a Kingcat

de Luxe diesel, complete with chrome plated exhaust pipes. He tells me that there are eight Jimps in the Morley Club, and all fly regularly in their competitions; this was the first Jimp that I have seen! (*Get out more, then. GC.*)

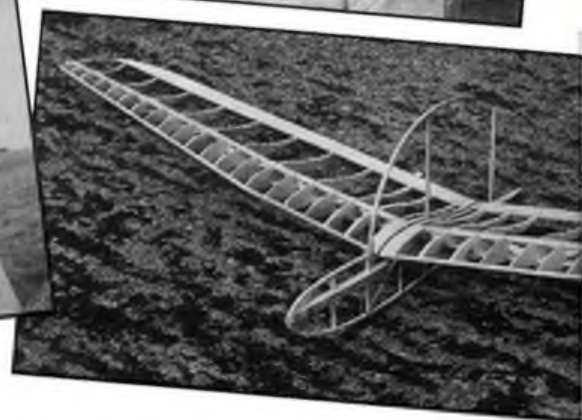
Despite fine weather this meeting was not overly attended, and there was only a total of 27 entries in both Wakefield competitions. Fred Chapman flew his Aries III, Doug Tennant an Isis, Ernie Wisbey chose Herbert Fish's 1937 model and George Stevenson a Korda, to name only a few. The eight-ounce winner was John Pool, Denis Davitt was second and Mike Kemp took third position. All had recorded three maximums during the day so the final placings were the result of a fly-off. Winner in the four-ounce class was Peter Michel, followed by Phil Ball in second place and Bernard Jukes third.

Surprisingly, despite numerous Sunnandvinds, the glider competitions (which were really three-in-one) did not attract many competitors, and Brian Harvey won all three categories! During the day, models were evaluated for excellence of construction and finish, and a Concours d'Elegance award was made to Johann Diroff, one of the Swedish visitors, for his 1949 Blomgren Wakefield. Andrew Longhurst won the coveted pre-war Normac Trophy which was presented for the leading light weight rubber flyer. In the power events, the Sigma Shield went to John Kemp flying his Performance Kits Greater Duster

(which we are informed is an enlarged Super Sunduster) with only 23 seconds error. Runners-up were Phil Cox (Junior 60) and Tony Penhall (Black Magic), all prominent ignition men, for this was a spark ignition only event (Sigma means Spark Ignition Gas Model Association). In the Mills Trophy, which was a precision competition for any Mills powered model (and not restricted to the normal Vintage cut-off date of 31st December 1950) the winner was Phil Stubbs flying a Bob Woollett designed low-wing Linnet, runners-up being M. Redwell (Keil Kraft Scorpion) and Tony Radford (Halfax Hermes). I do not know why more modellers in these two power competitions did not take advantage of the excellent weather conditions and smooth tarmac at Barkston to fly their rounds ROG (only two competitors apparently did this) and thereby gain another 10 points per round on this optional extra.

Prizes!

At the prizegiving Sigurd Isacson made the awards for the Wakefield classes, and Gordon Counsell, Chairman of SAM 35, presented the Swedish visitors each with a tankard as a small token of the Society's appreciation of their attendance. When accepting his, Sigurd commented, quickly glancing inside the tankard, 'hopefully full of beer', but it wasn't! Finally Keith Harris, the event organiser, wound up the proceedings by stating that the monies collecting on entry to the aerodrome



had amounted to £101, and that a cheque for this sum would be paid to the Royal Air Force Benevolent Fund. A very enjoyable, low-key meeting that reflected the SAM 35 approach to Vintage flying, and a very good time was most certainly had by everyone.

SAM 35 Champs Top ten Wakefield placings

Four-ounce

| | | | |
|----|--------------|----------------|------|
| 1 | P. Michel | Lanzo Duplex | 8:56 |
| 2 | P. Ball | William Ying | 8:31 |
| 3 | B. Jukes | Gordon Light | 8:04 |
| 4 | K. Horry | '36 Copland | 7:54 |
| 5 | K. Cooper | Lanzo Duplex | 7:53 |
| 6 | R. Alban | Northern Arrow | 7:43 |
| 7 | K. Thomas | Gordon Light | 6:33 |
| 8 | A. Lanchurst | Northern Arrow | 6:17 |
| 9 | D. Beales | Roy Wriston | 6:04 |
| 10 | S. Willis | Veron Eagle | 5:58 |

All three-flight totals

Eight-ounce

| | | | |
|----|--------------|-------------|--------------------------|
| 1 | J. Pool | Bandbox | 9:00 plus 4:10 in flyoff |
| 2 | D. Davitt | Yankee-Four | 9:00 plus 2:45 in flyoff |
| 3 | M. Kemp | Hereward | 9:00 plus 2:02 in flyoff |
| 4 | M. Kemp | Yankee-Four | 8:38 |
| 5 | K. Redfern | Korda | 7:40 |
| 6 | R. Alban | Zombie | 7:37 |
| 7 | S. Fieldings | Korda | 7:19 |
| 8 | D. Tennant | Isis | 7:00 |
| 9 | P. Michel | Copland | 6:34 |
| 10 | I. Rushby | Gipsy | 6:28 |

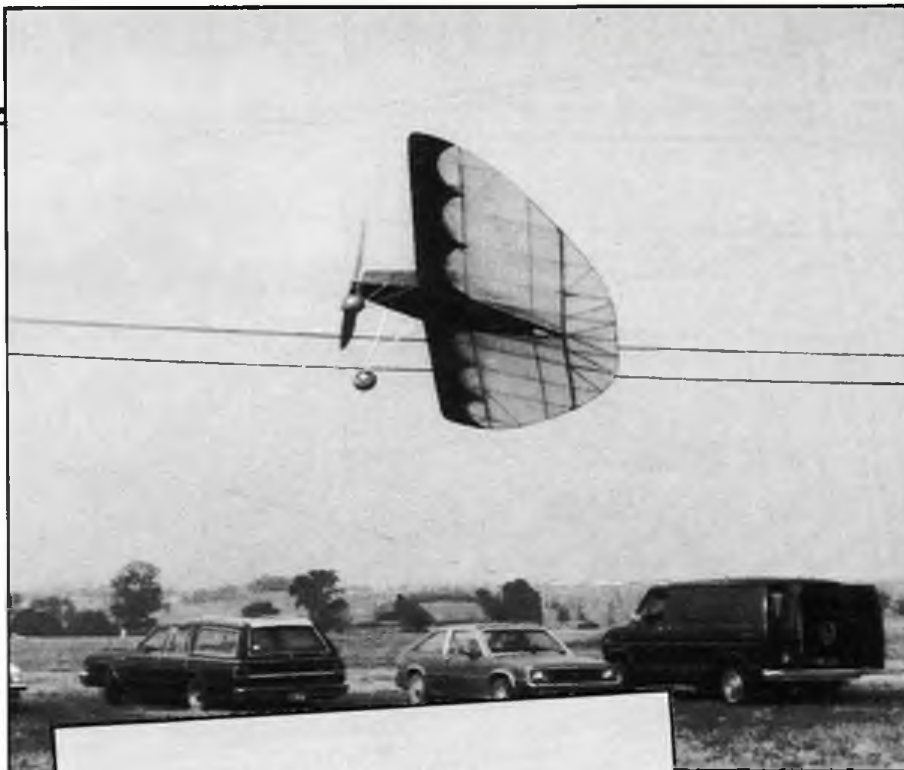
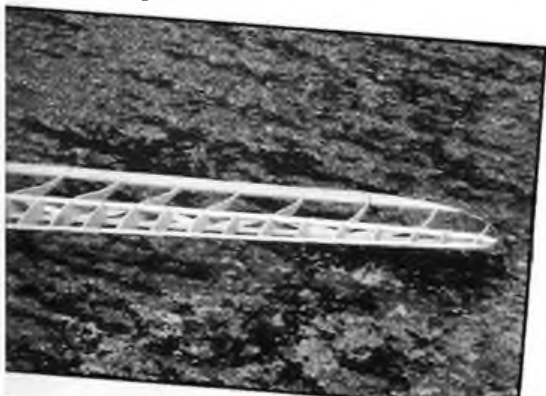
All three-flight totals

Total number of Wakefield entrants: 27.

U for Unorthodox

Al Backstrom from Little Elm, Texas is a keen follower of these notes and is especially interested in vintage tailless rubber models. He writes "There were several such designs in Britain in the 1930s and early 1940s, but the only two that I have seen... are in Vic Smeed's two books. One is the Brixton Terror shown in *Fifty Years of Aeromodeller*; the other is the Frog Pterodactyl in *Model Flying: The First Fifty Years*. I would appreciate any help you might be able to provide in locating drawings of either of these two models or any other similar designs." Can any reader help? Please send via Vintage Corner; all material loaned will be handled carefully and returned as soon as possible.

Far left: Peter Dickson of Bridlington with his orange and white Sunnanvind at the SAM 35 Champs at Barkston Heath. Centre left: Ernie Wisbey with his Herbert Fish Elimination Wakefield Winner made from plans in the January 1938 *Air Trails*. Below: The unfinished tailless glider made from details in the Frank Zaic 1938 *Yearbook* and referred to in the text. This German glider designed by Klaus Schmidtberg held its class record for ten years following a flight of 37 minutes 41 seconds from a ground-level hand launch in 1935.

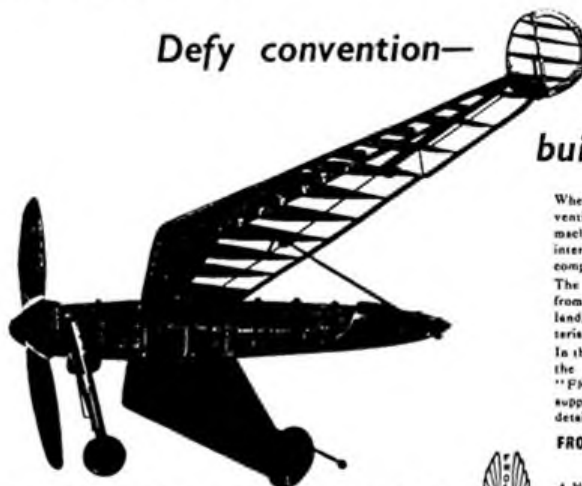


Above: Al Backstrom's 27in. rubber powered Arup. Designed by Gordon Englehart, this model was originally described in the September 1936 issue of *Model Airplane News*. Left: This pusher canard made by Mr. Hill of the Croydon and District MAC in 1937 is caught by the camera as it leaves on a 95.3 seconds flight. W. P H Goodsir, designer of the Frog Pterodactyl, belonged to the same club.

July, 1939 THE AERO-MODELLER

455

Defy convention—



build a Pterodactyl

When considering your new model, defy convention and progress by building this unusual machine. Not only will you find it particularly interesting to construct the Pterodactyl, but the completed model has a charm of its own.

The "Frog" Pterodactyl has been developed from the only English tailless plane, the "Waxland," and exhibits exactly the same characteristics in the air as does the real machine.

In the kit every part is correctly cut to shape, the airscrew is carved and the well-known "FROG" free-wheel and tensioner device is supplied complete. Full size drawings and detailed instructions make the model easy to build.

FROG PTERODACTYL MODEL 21/-
Kit of Parts

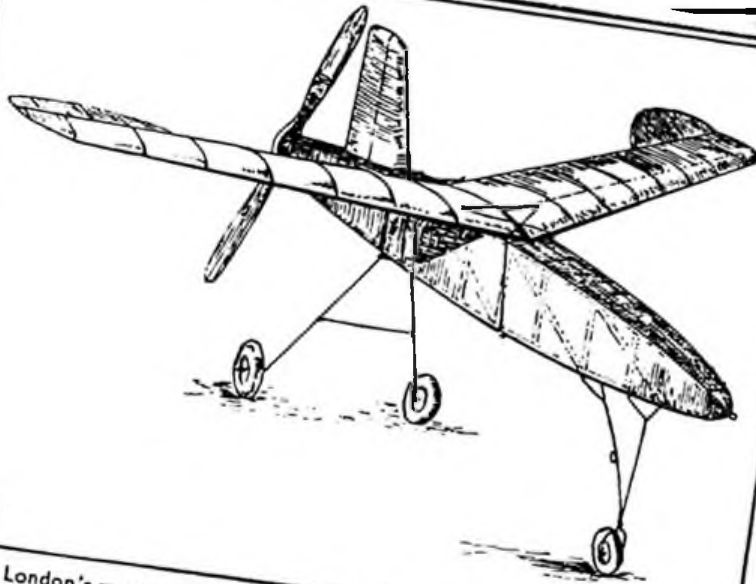
A New branch of the famous FROG Service is the introduction of comprehensive kits of material, including balsa wood, fully shaped airscrews, etc. Details from your local aeroplane stockist.

SOLE CONCESSIONAIRES:
LINES BROS. LTD., MORDEN RD., S.W.19

FROG MODEL AIRCRAFT
Covered by World Patents granted and pending
Made in England by International Model Aircraft Ltd.



The Frog Pterodactyl kit was first advertised in June 1938 but it was over one year later before an illustration of this unusual model was included in the Frog advertisements. See text.

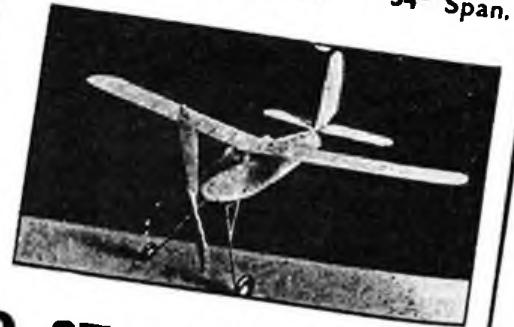


"THE TERROR" 36" Wing Span

A tail-less pusher 'plane of unique appearance and whose performance in the air is amazing. The only kit obtainable of this type of plane. Build one and marvel at the steep climb, its ceiling, and watch it glide to rest.

Complete Kit includes full-size plan, finished prop., and selected materials 8/6.
Blue Print only 2/6.
POST FREE.

THE "DON" 34" Span.

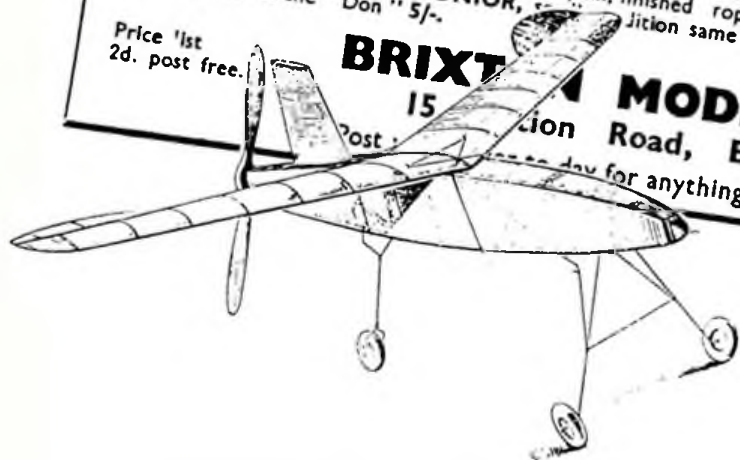


Trade considered.

South London's most popular 'plane. The construction of this kit is very rigid when built, the 'plane takes all the knocks and gives endless pleasure. If you want exercise send for this kit. Kit complete, full-size plan, finished prop., etc., 9/6 post free. Blue Print only 2/-. **DON JUNIOR**, addition same efficiency, 24" span. Kit complete as the "Don" 5/-.
Price 1st 2d. post free.

BRIXTON MODEL AERO STORES
15 Road, Brixton, London, S.W.9

for anything you require. Return of post service.



Above: Terror tactics! The Aeromodeller advertisement (July 1938) showing updated landing gear, presumably to help ground stability. Left: The Terror in original form before undercarriage modifications.

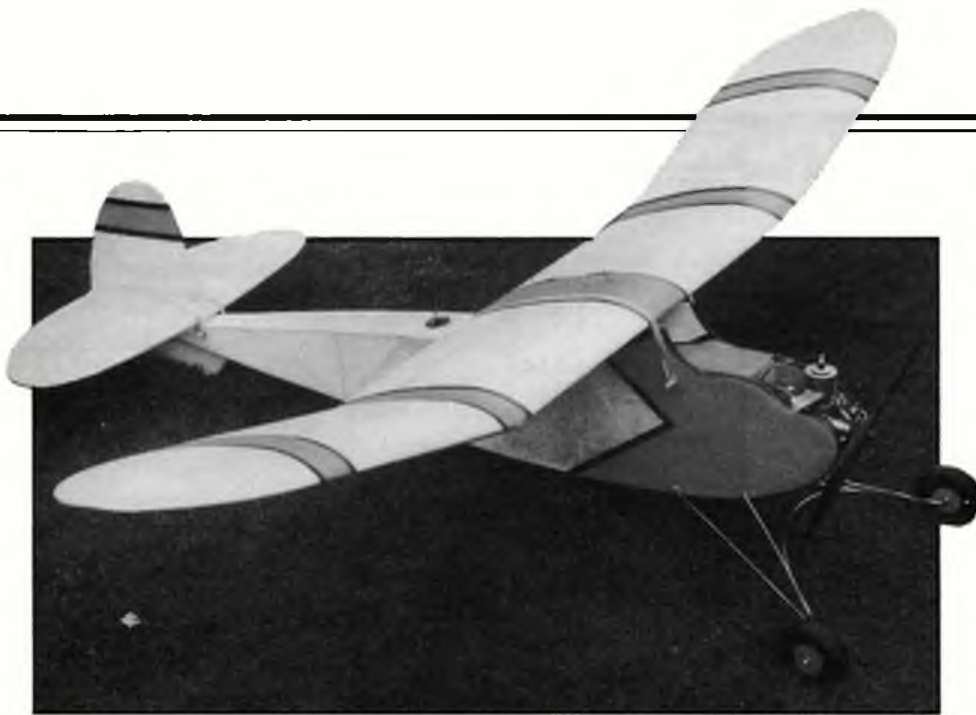
The Terror, designed by G Shanly and kitted by Brixton Model Aero Stores, was a slab-sided 36in pusher with a central fin, slight dihedral and 25 degrees of leading-edge sweepback. A Clark Y aerofoil was used with 1/8in washout at the tips. Six strands of 1/4in rubber drove the 12 x 12in propeller. A freewheel and rubber tensioner was fitted, and the model was reportedly quite stable, with good climb, glide and duration. At the time it was claimed that this was the only kit available for such a model, which I suppose is true for a pusher tailless, but there was obviously a rush to get the model on the market since Frog (International Model Aircraft Ltd) were kitting a tailless model at the same time. In the event, adverts in June 1938 mentioned the Frog Pterodactyl kit, while the Terror was not advertised until one month later when it was illustrated in the advertisement reproduced in Vic Smeed's book, as mentioned by Al Backstrom. For some reason the Frog model was not illustrated in that company's adverts (as far as I can determine) until thirteen months after the kit had been announced. The Pterodactyl was a 38 1/2in. span tractor with monocoque fuselage and mid-wing, designed by WPH Goodsir, a member of the Croydon and District MAC. It was based on the full-size Westland-Hill Mark V sesquiplane. The wing planform was similar, as were the wingtip rudders, and it had the same type of landing gear with outrigger wheels as well as a main central undercarriage. The sweepback from

a point some six inches from the fuselage was 47 degrees and one degree of anhedral was used on the RAF 34 section wing. A 14in. propeller of 20. 1/4in. pitch was driven by 14 strands of 3/16in. rubber. The kit was expensive at one guinea (£1.05 in present day money) but then one always had to pay for the high amount of prefabrication in Frog kits.

Mike Farrell, a regular and enthusiastic visitor to all Old Warden events, admires his Frog 100 powered Wigdor Wasp.

The challenge 'Defy convention...' appears not to have been accepted by many modellers. Bert Judge (who was employed in the Experimental Department of IMA at the time, as was W P H Goodsir) estimates that only some 500 kits were produced. Sales indicated that this model was not popular. Perhaps it was too expensive, and the concept too radical for the modellers of the day. Thus the





Kayo, a six foot design by Claude McCullough that was described in January 1939 Flying Aces magazine. This example, flown by Mike Beach, uses a 7.2cc Rocket petrol engine.

drawing for the Frog Pterodactyl must be one of the most rare plans in our aeromodelling heritage. Yet one feels that somewhere a copy must be waiting to be brought to present day vintage modellers' attention. If a drawing surfaces we might yet see a whole flock of these models darkening the Old Warden sky at next year's Vintage Weekend! It would certainly be a natural for the Howard Boys Memorial Competition.

Trimming thoughts

Mike Beach writes '...you may be interested to know I will be holding a meeting of the "I've flown a Hallum" club in a phone box in Acton later this year...' Mike reports that his Kayo '...flies fairly well although a tree at Chobham managed to re-arrange the model and the Rocket. Incidentally, you may like to point out to your readers that although many pre-war plans give precise angular settings for the wing, tailplane and engine, they are often miles out. Both the Baby Barnstormer and Kayo needed drastic alterations to the incidence angles.'

The Kayo, a Claude McCullough design, uses two degrees of positive wing incidence and one degree 'negative' on the tailplane, giving a three degree difference which I would

have thought would have been OK. The Baby Barnstormer, a 50in. Fred Tuxworth design described in the February 1939 issue of Flying Aces has the same angular difference. The wing is at +3 degrees; the tailplane is set at zero. In mentioning incidence angle changes in these old models, it is worth remembering that the SAM Official Rule Book states that minor changes may be made to thrust lines, but there is no specific mention of incidence; thus one would assume that the incidence should not be altered. Rule 2 of the Haggart Rules states that 'Models must conform to the original drawings... thrust lines, rigging angles... may not be changed.'

These rules are mentioned here merely to indicate the procedure that is adopted in serious vintage free flight power competition. In this country we have never, to my knowledge, processed models entered for a vintage competition with the scrutiny that would reveal such departures from the original design. But it has been done in the USA, although I do not know to what extent entrants who have changed their models in this way were debarred from competing. I know what Mike means; I have had to resort to such rigging changes too. It was either do that - or no flying!

No centre of gravity position is given for the Baby Barnstormer. It was not meant to be test glided before flight, but ROGs took place from the start, with the flight batteries purposely too far forward. These were progressively moved aft until the model took off....easy, eh? Try it! Remember, this is a small 50in. model powered by a Brown Junior! Such terms as '...zooms nearly vertically from take-off....spectacular climbing angle' appear in Tuxworth's narrative!

The recognised procedure, and certainly the one that I have always used, is to balance a power model at 30% of the wing chord at the root, slightly nose-down if the model has a lifting tailplane; or at 40% if a zero incidence, symmetrical section tail is used. This is not my idea, but is laid-down, accepted advice from the 'greats' of years gone by. The Kayo is a particularly odd example, since Claude McCullough stated that it should balance slightly tail-heavy at one-third of the way back from the leading edge - he is quite definite that the specified thrustline two degrees 'down' and two degrees 'right' must be adhered to, as must the previously - quoted incidence settings, if the steep climb of his model was to be duplicated.

Here we are entering into a realm of individual trimming techniques. Of course, some of the experts could make anything fly and fly well - imagine bolting a really hot engine in without any thrust offset or downthrust and leaving it there, adjusting trim by flying surfaces only! And don't forget - the modellers of the time were trimming for absolute maximum performance (they were out after the hardware!) whereas today we fly the same models for fun, obviously with less risks and putting reliability first. But to return to the SAM rules. Surely incidence should be allowed. All models are built differently and removing or adding incidence is all part of the trimming procedure. Early models sometimes had fixed incidence; many power models of the mid 1930s had no longitudinal dihedral - that is, the wing and tail were both installed at zero degrees, the engine often set at zero degrees too - so the only adjustment was to change the centre of gravity position by moving the flight battery or by warping the flying surfaces. Try it if you like, and if your system can stomach the crashes, when the model does fly well you will have tasted something that was the staple diet of the power pioneers. I have recently built Joe Weathers' first power model, the 1935 Miss San Diego, so I have also sampled the zero-zero set-up. There is no mention of any engine off-set in his flying instructions either, but there was a clue. He was using (as am I) the Elf engine of only 2.3cc driving a 12 x 6 1/2 propeller at 3500 rpm. This is not a lot of power, so an accurately-built model should be safe enough - but put the revs up by using a small propeller and the stately old lady becomes a ground-strafing fighter! More on the adventures of building and flying this model soon...

Also at Old Warden, Sebastian Robinson casts an eye over his Shereshaw Air Trails Sportster before another fine flight. Mills 1.3 power.



READERS' LETTERS

Bring 'em back

Dear Sir,
Having returned to the C/L scene after some 18 years I'm pleased to see it is still going strong.

In my youth C/L was considered either as proof you couldn't afford R/C or that one had an affection for rotating about on axis, displaying one's sanity to those who looked on!

Many a Saturday was spent down at the local park, which had an area set aside for C/L, flying my KK Gazelle to the melodic tone of a Frog 150. This was followed by an AM25 powered Firebird and a Rivers Silver Arrow in a Red Dragon. Sigh! Those were the days - and no silencers!

May I make a plea to manufacturers out there to bring back the good oldies, such as the Gazelle, Firebird, Firefly, Spectre, Marquis, 1/2A Team Racer and Bom Bat - or even some new designs, as there is a lack of C/L kits in the 1.5-3.5cc range. If the Spanish can produce them, why can't we?

Worcester

G.S. Crump

Tighten up

Dear Sir,
Anyone with even a casual interest in the contest scene cannot have failed to notice the extraordinary success of the Russian aeromodellers. They made a wonderful showing the World F/F Championships in France last year and the Eurochamps in Yugoslavia, and appear to have swept all before them in the World C/L event on their own ground.

The inevitable question raises itself. Why don't we as a nation do better? I can't speak for control line, but have some thoughts on free flight. Our models are adequate. We operate them well and work hard to develop them. It is no good bleating about Eastern Bloc training camps, facilities for 'mass produced' specialist model parts, and so on. That is not a major factor. It is still down to the individual. In Britain where, apart from very rare occasions, we do not have ideal weather for free flight (or much else in a summer like that of '88!) we do have a wonderfully active and diverse contest programme. I am not suggesting that cutting out Vintage, Open Rubber or anything else would improve our national standing. In fact, skills can be transferred between disciplines with advantage. What I am suggesting is that contest organisation should be tightened up to approach conditions experienced in major International events. It is amazing to think that the majority of competitions in this country are flown neither from a line nor in rounds. There is a vast difference in having all day to do your three maxes in Open Glider to delivering the goods from a pole position, on a line and in possibly fifteen minutes.

The argument that 'relaxed' contest organisation encourages the beginner does not wash. The experts are lurking downwind to pinch his lucky thermal!

In short - if we want to improve our standard of flying we should advance our standard of competition procedure; and that takes only a line, a clock and a hooter.

Summertown, Oxford Andrew Crisp

Another Crisp packet

Dear Sir,
Dave Hipperson's comments on right/left trim for rubber motors makes interesting reading.

Bob White flies right/left (and he uses a woodscrew stop and he uses a fuse D/T) and he happens to be the current World Wakefield champion. So he does not fly out of too many thermals by using this trim!

Summertown, Oxford Andrew Crisp

Oh no, it's him again

Dear Sir,
Russell Peers is a wonderful flier and a very handsome chap but must we have a photograph of him in practically every Free Flight Scene? I am sure there are others who are equally good looking.

Summertown, Oxford Andrew Crisp



(Indeed there are. Look at this photo of Andy Crisp. GC)

Flying sparks

Dear Sir,
More on my 'electric' activities!
Elira has now been tried outdoors very satisfactorily; tests took place on a calm evening recently when flights of about 5 mins were recorded. The usable motor run is now between 2 and 2.1/2 mins on 4 x 150m AH cells, driving a Mabuchi 260 with reduction gearing of 5:1, the prop being a standard P.30 rubber type cut to 9in. The flight is very smooth and controllable, with the extra power from the motor and cells being noticeable, although the weight has risen by about an ounce. Wing loading is now 3.75 ozs per sq.ft.

Roy Ashby Rochester, Kent

Great effort

Dear Sir,
May I refer to Laurie Barr's remarks in his report of the Johnson City Championships (Aeromodeller, October).

It is disappointing to see that he would wish to bring his disagreements with the Indoor Technical Committee into the public domain.

The facts of the matter are that the committee

made very great efforts to obtain a full team. All of those approached were either unable or unwilling to attend.

Wootton Bassett, Bernard Aslett,
Chairman, Indoor Tech.
Committee

Magic maths

Dear Sir,
Nostalgia, they say, isn't what it used to be; but looking back is something a good many aeromodellers are prone to, if the craze for vintage models is anything to go by. I bet there are a few of the older generation, like myself, who still thumb through their old back numbers of Aeromodeller, dreaming of models long gone: and I thought it might be interesting to recall some of the material from forty years ago, and even perhaps coax one or two of your old contributors out of the woodwork, if they're still with us, to pick up the threads from those days.

My acquaintance with Aeromodeller began in the heady days just after the war, when Eaton Bray was the new modellers' Mecca, about six new diesels came onto the market every month, and model design was about to be revolutionised by the LSARA (Low Speed Aerodynamics Research Association, to you youngsters). The amount of mathematics, at that time, was awe-inspiring, compared with today. Who would now plough through an article - no, a series of articles, stuffed with equations, on 'Counteracting the Effects of Engine Failure in Twin-engined Model Aircraft'? Come to think of it, did anyone plough through it then?

Coming a step or two nearer to reality, we had the articles on Aerodynamic Design, by P.R. Payne, alias J. Halifax. I remember, at the age of about fifteen, filling sheets of paper with columns of figures in the search for the magic angle of incidence for maximum Power Factor, in the fond hope that this would produce the all-time super sailplane. I had in mind something rather like the Evander, or L.G. Temple's Tribute, only better of course: and my hopes of such elegance were slightly dashed when a letter to Mr. Payne, asking for help with some problem, received the rather crushing reply, 'Have you any low-speed data on Gottingen 426? If not, I would advise you to use N.60 and an Aspect Ratio of about six.'

Well, never mind; at least these articles taught me something about rigging angles and stability, even if the source data did not always justify the degree of precision being aimed at in the mathematics. In any case, we were told, these difficulties were about to be swept away by the Optimum Angle of Attack theory, and the marvellous new laminar-flow wing sections from the LSARA. Super, but we now had the opposite problem: the theory was OK, but nobody could actually build the wings with the precision necessary to get results. How many models with an LDC 2 wing section do you see today?

Seriously though, I think Messrs. Payne, Walker, Annenberg, and others, deserved a lot of credit for trying to put model design on a sound theoretical basis. It would be interesting to know what they think of the present state of the art. Do we really know any more about the behaviour of airfoils at low Reynold's Numbers now than we did forty years ago?

Milford, Surrey John Bunting

Aeromodeller

MIND THE LINES



DURING the past four or five years I have encouraged the revival of team racing as it was practised in the so-called 'Golden Age' of flying in the early 1950s.

I was thrilled to see the impromptu vintage team racing competitions at the 1987 Nationals and it was obvious that this aspect of Vintage control line was about to take off in a big way. It was with enjoyment, therefore, that I read Terry McDonald's article in the June *Aeromodeller*. Particularly interesting was the list of suitable models, together with the source of plans.

A few weeks later, when preparing the score sheets for this year's Old Time Stunt event at the Nats, I realised that recent alteration to the SAM 35 OTS Rules by John Perry, the C/L Competition Secretary, in which he deleted the rule giving bonus points for the use of an authentic engine of the period and inserted a bonus of 20 points for the use of an engine of up to 2.5 cc, provided the bones for a similar article and list.

You lucky people

It has been said that the new rule would transform any SAM event into a one-model competition, because of the invincibility of the Alan Hewitt designed Ambassador, winner of the Gold Trophy in 1951 and '52, but on delving through period magazines, and with the help of a marvellous list compiled by Mike Rolls, I am convinced that there are a number of models which, if built light and strong, could be equally competitive.

Looking through the list of designs for up to 2 cc, which, of course, are equally eligible, I feel those powered by Mills 1.3, ED Competition Special and similar long-stroke motors would not be competitive. This leaves such motors as the Elfin 1.49 and 1.8, Allbon Javelin and PAW 1.49. Those lucky people with an Elfin 1.8 would give very healthy opposition if they put the motor in a Thunderbug, Mills Bomb Mk II or a Happy Harold. I remember a modified version of my Small Fry which was Elfin 1.8 powered. It would do the book to perfection, if your reflexes were fast enough! But I must say that the original Mills 1.3 version leaves a lot to be desired...

Bigger — and better?

Going on to the 2.5 cc designs, it is quite obvious that an Ambassador with an Elfin 2.49 is a strong contender for honours, but there are many others quite capable of winning — for instance, Ken Marsh's 39 in Hotshot, originally built for an Amco 3.5. I have flown one with an Elfin 2.49 and an AM 25, with first class results each time. I have also tried the standard kit Mercury Monitor with an AM 25. By reducing some

Ron Prentice checks out Vintage Stunters — and advises on motor matters

weight, it could easily be a winner. Another model which consistently scores well in comps is Maurice Doyle's Oliver Tiger powered Tycoon, while Mick Taylor has had early success with a Magician. Others are the Veco Papoose and Brave (original kit versions only). Both were originally designed

for the Veco 19, but I feel sure would fly well with a PAW 2.49.

Choose for yourself

My own first choice is the smallest of the famous Zilch series, designed in the early 50s by the late Jim Saftig. As my Elfin 2.49 is being used in a Mercury Marlin, I decided to use a recently obtained pre-production AM 25. Yes, Forest Engineering Services Ltd, the makers of Merco Motors are to produce a 'one-off' batch of 250 AM 25s. Having scaled up the plans from the April 1951 Model Airplane News I started building, but soon became convinced that because of the relatively long nose there would be balance problems. The original model was powered by OK Cub .09, an extremely light motor, so I had to substitute something more suitable. After discarding an OS 10 Schnuerle and a Cox TD .09 because of the extra weight of silencers, I finally decided to drop down on motor size, and fitted a PAW 1.49 Contest. The finished model balances correctly but at the time of writing the weather has not been good enough to check its flying capabilities.

I hope that the list of suitable models will assist your search for a winning model.

Tanks a lot

What a difference a good motor run makes to your morale. If you are happy with your start and can concentrate entirely on flying a good schedule, your results will only improve.



Heading: A youthful Ron Prentice in 1949 with his Elfin 1.8 powered Small Fry derivative. **Above:** Peter Michel's Hot Rock — an able performer with OS40FP. **Below:** Couldn't resist this one. Who remembers the plastic ED Bee powered Challenger? This is Steven Glead's preserved 'kit'.



Designs for motors up to 2 cc

| Name | Designer | Date | Comments | Source |
|------------------|-------------|--------|-------------------------------------|-------------|
| Twister | C.A. Bates | Jan 51 | Similar to Small Fry; Eflin 1.8 | MA77 |
| Ariel | R.J. North | 1949 | AM Annual '49; Eflin 1.8 | unknown |
| Kandoo | P. Cock | 1949 | 1st Gold Trophy winner; ED Comp Spl | SAM 35 |
| Thunderbug | L. Glover | 1948 | Similar to Small Fry; Eflin 1.8 | Glover |
| Small Fry | R. Prentice | 1948 | Flies well with good Mills 1.3 | Prentice |
| Happy Harold | N. Butcher | Dec 49 | Eflin 1.8 | APS CL/342X |
| Bumble bug | Howell | 1951 | Eflin 1.49 | APS CL/437X |
| Dervish | C. Shaw | 1949 | Mills 1.3; Model Aviation plan | SAM 35 |
| Mills Bomb Mk.11 | M. Booth | 1949 | Good flyer with Eflin 1.8 | SAM 35 |
| Shufti | - | 1948 | Astral Kit for ED Comp. Spl. | SAM 35 |
| Virago | V. Smeed | 1950 | Eflin 1.8 | APS CL350X |
| Wee Duper Zilch | J. Sefrig | 4/1951 | MAN plan Flies well with PAW 149 | SAM 35 |

Designs for motors up to 2.5 c.c.

| | | | | |
|-------------------|--------------|--------|--|-------------|
| Hotshot | K. Marsh | 1950 | Model Aviation. Build light | SAM 32 |
| Demon King | A.E. Burch | 3/1960 | Original used Amco. Build light | APS CL347X |
| Lil Abner | A.E. Burch | 7/1962 | Original Amco 3.6. Build light | APS CL478X |
| Papoose | Bob Palmer | - | Original Vaco kit version | unknown |
| Ambassador | A. Hewitt | 12/51 | Winner Gold Trophy '51 & '52 | APS CL467X |
| Junior Monitor | Nicholls | 1949 | Original planked fuselage only | SAM 35 |
| Junior Musketeer | Nicholls | 1950 | Mercury kit | SAM 35 |
| Monitor | Nicholls | 1949 | Kit made under licence by Ron Prentice. Build light. | MA 69 |
| Tycoon | Cyril Mayes | 1950 | Model Aircraft plan | |
| Magician | Babcock | 1948 | Mike Rolls & Mick Taylor have versions | |
| Stunt King | Brian Hewitt | 1950 | Build light. I have used AM26. | SAM 35 |
| All American | H. deBolt | 1952 | Plan from Fran Ptaszkiewicz USA | |
| Super Screw Babet | Windebank | 1949 | Original kit used Amco 3.6. Build light | SAM 35 |
| Barnstormer | Ted Buxton | 1948 | Built light. Original used old S.T. diesel | SAM 35 |
| Blunder Bus | Williamson | 1951 | MAN plan. Original used O&R 23 | SAM 35 |
| Bobcat | Hi Johnson | 1952 | Kenhi kit. Originally Fox 19 | SAM 35 |
| Crackerjack | Hundleby | 1948 | Originally used front ind. ED Mk.111 | APS CL303X |
| Destroyer | Green | 6/52 | Originally used Amco 3.6. Build light | APS CL471X |
| Easy | Frank Ehling | 1951 | Mag. reprint for versions of all sizes | SAM 35 |
| Ginger Snap | Bahya | 1949 | MAN 32in. span | |
| Hot Rock | Bob Tucker | 1948 | MAN Mick Taylor has OS 25 version. | SAM 35 |
| Juggler | C.A. Bates | 1950 | Originally Frog 500. Build light | APS CL389X |
| Merlin | D. Allen | 1948 | Kit under licence from Ron Prentice | |
| Playboy | R. Warring | 1949 | Details in 1949 AM Annual. 30in. span | unknown |
| Stunt Queen | B. Hewitt | 1950 | Keil Kraft kit. Build very light. | SAM 35 |
| Big Fry | R. Prentice | 1949 | Original used Mills 2.4. Kit available. | R. Prentice |

This is the moment for a few basic hints. Modellers, old and new, may not be totally familiar with the best way of starting a motor. I remember only too well when I came back into aero-modelling that I bought a glow motor for an R/C powered glider. There was no way that I could make that motor start! In sheer desperation, I asked for help from Fred Deudney. He got it going within two or three flicks of the prop! I had just lost the knack; and soon I had no further trouble.

I have developed starting procedures for diesels and glows. They work almost every time.

With diesels: Turn the engine backwards onto compression and fill the tank; this avoids flooding, the usual cause of a non-start. Open the needle valve a half-turn from the running position and choke the engine two or three times. Increase the compression by a quarter of a turn. I usually prime the motor through the exhaust with one drop of fuel. A good flick and it's running! If it doesn't, choke the motor once more and try again. As the engine warms up, return needle valve and compression to their original setting. Should the propeller oscillate as the engine fires, the compression is too high. To remedy this, gradually decrease compression, flicking at the same time. It may be necessary to reduce compression below the normal running position, so that when the engine does start, it will tend to misfire. Immediately return the compression to its normal running position.

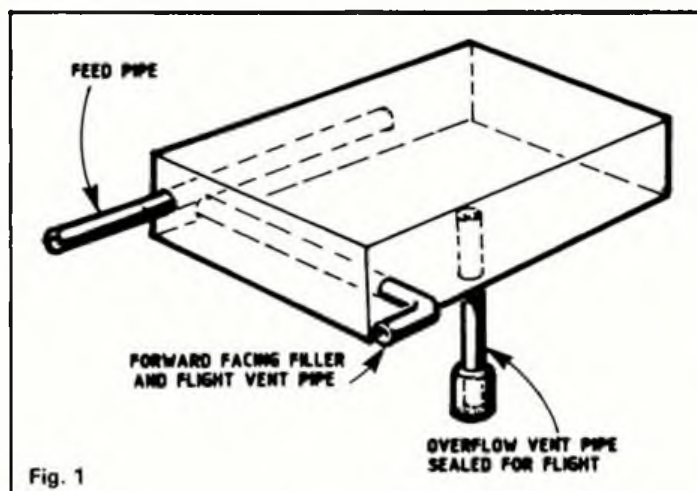


Fig. 1

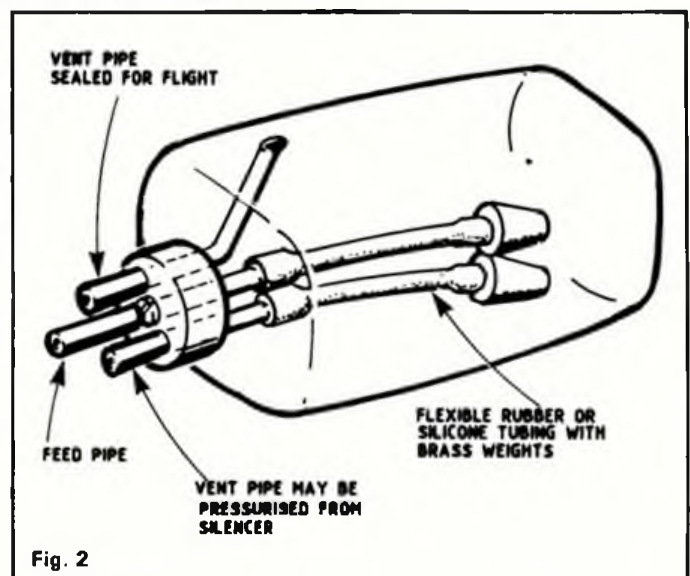


Fig. 2

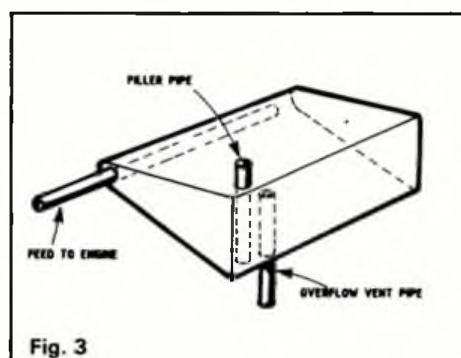


Fig. 3

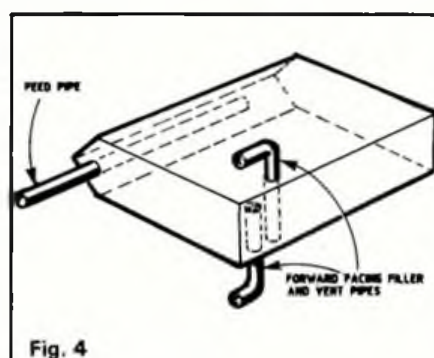


Fig. 4

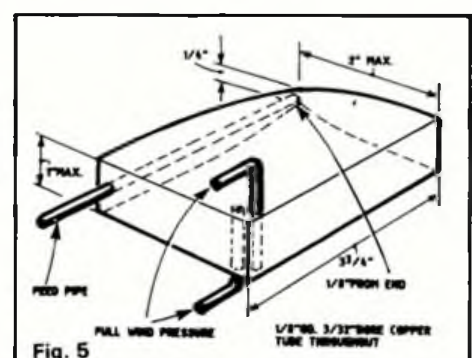
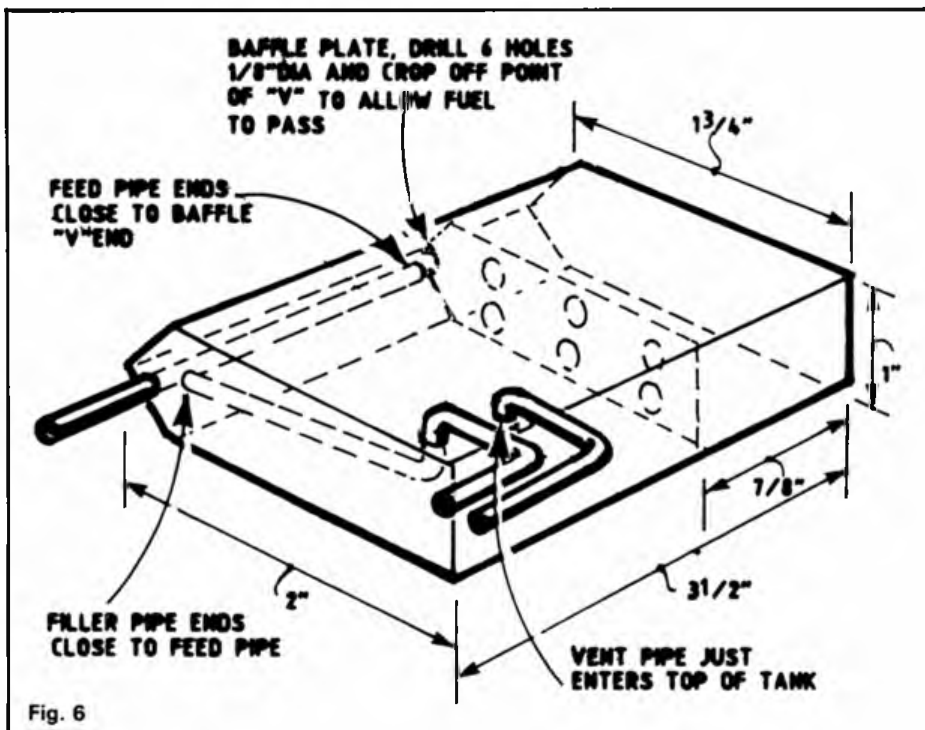


Fig. 5

Stunt tank types. Basic rectangle at 1 has low volume for width; must be shallow. 2: Modern R/C tank system works well. 3: Early wedge has drawbacks. 4: Compound wedge is good all-rounder. 5: Aldrich tank is recommended, but more difficult to make.



constituents is most useful. Firstly, oil is common to all fuels. Mineral oil is typically used as a motor car oil. Nowadays these are usually multi-grade types, which are definitely bad for two-stroke motors. The only type of mineral oil I use is Comma SAE 40 motor oil, which is specially made for older cars where detergent oil is not required. Much more commonly used is vegetable oil; in particular, castor oil, the traditional model aero engine oil which can be relied upon completely. It is quite expensive. Lastly we have the synthetic oils, which can be quite adequate; but I prefer to stick to the types which I have found satisfactory over many years.

The other ingredients of diesel fuel are 'technical grade di-ethyl ether' and paraffin. Although paraffin is obtainable in various colours - blue, red and green - they are all much the same. All are suitable. The final constituent is an 'ignition improver' which is only necessary if you are running the motor above 10,000 rpm. Once we used Amyl Nitrite or Amyl Nitrate, but it is more usual these days to use IPN (Iso-Propyl Nitrate) which can be bought in half-litre cans from model shops.

My favourite diesel fuel, which I have used for many years, is as follows:

| | |
|----------------------------|---------|
| Mineral oil or castor oil: | 3 parts |
| Paraffin: | 5 parts |
| Di-ethyl ether: | 4 parts |
| IPN: | + 2% |

This fuel gives easy starting and good running with most engines. If using a vintage motor such as a Mills 1.3, it may not be necessary to add the IPN. Glow fuel consists of 20% Castor oil, 75% Methanol and 5% Nitromethane. However, because of the easy availability of good quality commercially made fuel by such firms as Model Technics, I do not bother to mix it myself. Propellers for stunt work are invariably of smaller diameter than for free flight, and usually of greater pitch. Most engine manufacturers specify suitable propellers. In most cases some experimentation will determine the best pitch for any model. A slight change may make a considerable difference in performance. The tendency is to use too fine a pitch, with the result that the motor races at high speed with the model flying relatively slowly. A change in diameter has less effect although alteration to blade area may make a considerable difference to the thrust. I personally prefer to use props with plenty of blade area. A number of top flyers get results with plastic props such as Tornado and Kavan but I prefer wooden ones, such as Top Flight and Airflow, with the Graupner grey nylon ones as a second choice.

Since writing this article, I have heard from John Perry that he has decided to attempt to iron out the hump of 2.5 cc Vintage Stunt models (or the 'Ambassador benefit', as he calls it!) next season by spreading the bonus points over a larger area. i.e. 20 points for 1.5 cc or less; 10 for 2.5 cc or less and 5 for 3.5 cc or below.

This should not affect the choices of discussed earlier, with the exception of those I suggested should be built very lightly. With a 3.5 motor these could, of course, be made with the more usual medium or hard grades of balsa.

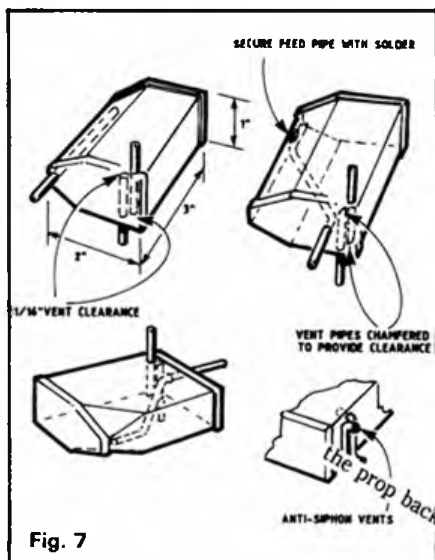


Fig 6: Baffled uniflow tank, as favoured by Bob Palmer, is a classic of its type. Copper tubes bend more easily than brass - use for complicated vents. 7: Variations on the wedge theme all work satisfactorily but test metalwork techniques. Tanks best made by banding around hardwood former. Remedy leaks before installation in model!

Most flyers run their diesels at maximum revs throughout the flight, although in order to get the best performance it is sometimes necessary to slightly reduce compression before launching to avoid the motor becoming 'hard' and overcompressed later in flight. With glow motors, it is best to get a four-stroke/two-stroke engine run. Open the needle valve one notch at a time from peak revs, until the motor breaks into an intermittent 2/4 stroke. With the motor running at this setting the model will fly on a four-stroke but as soon as the model climbs the engine will break into a two-stroke, thus giving extra power when it's needed. It is necessary to instal a fuel tank which will provide the same head of fuel no matter what the elevation of the plan. The basic 'wedge' tank, first used in the late 40s, was the first attempt to produce something which would permit inverted flying, but the shape contained a low volume of fuel for the size involved. It also posed the problem of fuel syphoning (this is when slipstream sucks the fuel out of the vents). Both faults could be overcome by making the tank rectangular with a small wedge at the side. Bending the pipes forward also caused an improvement. But soon the uniflow type of tank made its appearance, both with and without internal baffles.

This is still the basis for all modern designs, and is used by virtually all present-day flyers. For small aircraft I make it from tin sheet, tailored to the model concerned. On larger models I have been trying the double-clunk uniflow tank, adapted from a plastic R/C tank, which has proved completely successful.

Prop it up

Of course, the best aircraft and tank are still useless without correct fuel and propeller.

Whether you brew your own or buy commercial varieties, a little knowledge of the

Glow motors generally require a different technique. Position the model so that the motor is upright. Turn the prop back on compression, fill the venturi to the brim once and turn the prop to suck in the fuel. Flick the prop until the motor spins easily (you can gradually feel it get wetter). Connect the battery and feel for a 'kick' while turning the prop clockwise (this avoids the kick loosening it). Without it the motor may start, but the chances are that it won't!

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Duetto Biplane by Claus Maikis

CL Stunt

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