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Cover:
Control-line scale maintains its popularity. Notable amongst the devoted band of followers is Patrick Roberts, seen at our Scale Weekend with his latest project, a fine Miles Sparrowhawk. Merco 61 powered craft, converted from an R/C plan, flies as if on rails. We begin a close look at C/L scale on p.536.

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HANGAR DOORS

Russian around

Dave Clarkson, just back from the C/L World Championships at Kiev, has telephoned an advance summary. Most notable British achievement in almost ideal flying conditions was Neil Gill's magnificent second place in combat, splitting the Russian duo of Faisov and ex-World Champ Necheukhin. Other worthy efforts at a meeting where the accent was on refinement of existing techniques rather than innovation were Pete Halman's seventh place in Speed, setting a new British record in the process; Smith/Brown, fifth in Team Race with a best heat time of 3:29.3; John Hammersley equal ninth in Combat (helping Great Britain to a splendid third team place) and Ron Truelove, sixth in Scale with his new Heinkel 51b. Otherwise it was the familiar message of Russian domination despite Jhang Xiand's victory for China in Aerobatics.

Full report next month; meanwhile, here are the major results.

Speed F2A 35 flew, 15 countries. GB 6th

1	A. Kalmykov	USSR	301.76 kph
2	S. Schelkalin	USSR	299.50
3	S. Pitskalev	USSR	298.26
7	P. Halman	GB	285.49
24	D. Isles	GB	267.45
25	R. McGladdery	GB	267.45

F2B 54 fliers, 22 countries. GB 8th

1	Jhang Xiand	China
2	A. Kolesnikov	USSR
3	Wang Jianzh	China
17	C. Draper	GB
20	B. Robinson	GB
26	N. Dickinson	GB

F2C 45 flew, 18 countries. GB 6th

1	Barkov/Suraev	USSR	6.42.0
2	Shabashov/ Ivanov	USSR	8.42.9
3	Naxin/Vorobiev	USSR	6.56.7
5	Smith/Brown	GB	
33	Fry/Thorpe	GB	

F2D Combat 43 flew, 17 countries. GB 3rd

1	S Faisov	USSR
2	N. Gill	GB
3	N. Necheukin	USSR
=9	J. Hammersley	GB
=34	E. Burles	GB

F4B 22 flew, 8 countries. GB 4th

1	V. Fedosov	AN 28
2	A. Pavlenko	Li-2T
3	V. Bulatnikov	An-1
6	R. Truelove	He 51b
9	C. Bradford	Nieuport 17
16	J. Robarts	DHC-1

Unorthodox, particularly rocket-powered craft, have always compelled the obsessive. Here's Terry Rose's view, below...

British success in Kiev! Neil Gill stands on the second place step for combat at the control-line World Championships. Fighting in the final was a splendid achievement – well done, Neil!

BMFA AGM

The Crest Hotel, Coventry is once again the location of the Annual General Meeting of the BMFA (ex SMAE). Date is 26th November. As in the past two years there will be a static model exhibition of particularly notable aircraft, and at 10.55am a short seminar session will follow an introduction by Chairman Kath Watson. Des Farthing and Tom Whittle – both hard workers on the BMFA Accident Investigation sub-committee – will deliver a talk and briefing on 'Safe Flying is No Accident'. After this, Ian Peacock's talk on 'The Finishing Touch' will examine the subject of covering and painting model aircraft.

A cash bar and buffet will be available at lunch. All members are welcome to attend the formal afternoon session, although priority seating will be given to Club delegates.

More details from Mike O'Neill on 02816 2727 (daytime); 0932 565323 (evenings).

See you there!

Just for the record...

By the time this is read we expect at least one National Speed Record to have been broken at the C/L Nats. But to keep the record straight, here are a trio of new records established a short time earlier. In brief, then:

Paul Eisner has set a new Open .15 record of 192.52 mph with his Rossi-powered model, beating his own previous record of 189.2 mph. Ian Mander's success in Novice .21 has netted a record speed of 164.01 mph, an Irvine .21R providing the urge; thus simultaneously setting his personal best time in FAI. Pete Halman's new FA1 record of 177.12 is courtesy of an Irvine 15R (surprise, surprise); and, lastly, we hear that Ken Morrisey has unofficially set a World's fastest time of 215.93 mph with his well known OS 61 powered model. To be repeated at the Nationals?

Flying Models – Favourites of the Fifties

When Vic Smeed was asked to paste up a scrap album of outstanding illustrations, features and designs which appeared in over 50 years of publication in *Aeromodeller*, no one, not least ourselves, could possibly have anticipated the response. That first of our '50' books (Fifty years of Aeromodeller) has gone around the world to be read and by modellers everywhere whatever their mother tongue might be.

We followed with Model Flying – the First Fifty Years twelve months later and enjoyed the same response, with a slightly different approach; namely the content was international and not restricted to material that had appeared in *Aeromodeller*.

Now we have the greatest

Just off the production line; Vic Smeed's latest book Favourites Of the Fifties complements 50 Years of Aeromodeller and Model Flying – the First Fifty Years. Buy and enjoy!

pleasure in announcing the third in the series – Flying Models, Favourites of the Fifties, with the accent on favourites, againg selected by Vic Smeed.

In 96 tightly packed pages one can span that exciting period, approaching 40 years back when the pace of development – and certainly the volume of activity – was at an all-time peak. Scale reproductions of designs gleaned from all over the world. Clear reproductions of original drawings cover, free flight, control line and yes, radio control. One can scale up (because a standard scale has been added to many of the drawings), and reproduce any of 166 plans which appear in full detail while many more are shown in part to inspire. The outstanding designers, Frank Zaic, Louis Garami, Laurie Barr, Don Foote, Paul Gilliam, Bob Palmer, Norman Marcus, Jim Saftig, J – P. Templier, Ken Willard, Roy Clough, and Calhoun Smith are among so many others; not forgetting, of course, Vic Smeed himself and all the prominent Aeromodeller Plans Service designers of that era. Truly this is an absolute gem to acquire. Look out for it on the bookshelves! Price is £6.95.

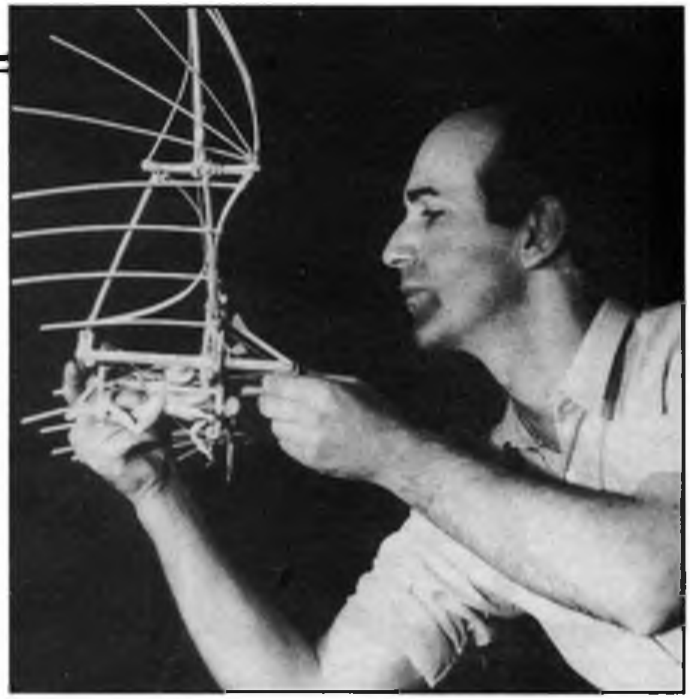
You've had the Blue 'un and the Green 'un; now this one is bright Red with a distinctive Les Hoy designed cover guaranteed to catch the eye.

More What's On

Norman Couling has seen details of two October meetings. They'll appear in What's On next time; here's advance warning.

On 2nd October the Eastbourne MFC R/C Fly-In takes place at Golden Cross, East Sussex; 10.30 am start. Details from Mr. S. Coombe, 7 Petworth Place, Hampden Park, Eastbourne, Sussex. The following Sunday, 9th October, is the occasion of the SMAE (BMFAI) South East Area Fly-In at the Sports Hangar, RAF Biggin Hill, Westerham, Kent. BMFA members only; bookings accepted by Mr. M. Richardson, 64 Grange Close, Horam, Heathfield, East Sussex.

Note also two date changes which do appear in What's On – the Peterborough MFC Diesel A Combat meeting is now on 9th October (not 16th), and Andy Sephton's RAFMAA Indoor event at RAF Upavon has been rearranged for 12-13th November (not 29-30th October). Check those diaries!



Not a bowman at his craft but James Wink of Tetra Design Services with static da Vinci ornithopter, displayed at recent Hayward Gallery da vinci preview. Full-size version in the making – 36 ft span!

Brumfly to come

A call from Stafford Screen confirms that the annual Brumfly F/F event will take place this year, but later than usual at a date to be arranged. F/F enthusiasts are advised to watch Hangar Doors for more details.

WHAT'S ON

18th September
WALSALL MAC VINTAGE MEETING
Venue: Newtown, on A34 between Bloxwich and Cannock. Take J11 off M6. Clases 1.2, Texaco, Flying Fifteen.
Contact: Tony Proggatt, SAE to 12 Tower View Road, Landywood, Gt. Wyrley, Walsall WS6 6HE.
Tel: 0922 415883.

18th September
INDOOR FLYING AT CARDINGTON
All-in Index and fun-flying.
Contact: Bob Bailey. Tel: 0438 723642.

18th September
THREE KINGS C/L SCALE DAY
Venue: Old Croydon Aerodrome, Purley Wy, Croydon, Surrey. FAI Scale and Profile Classes. Best WW2. Silencers and proof of insurance essential.
Contact: Wal Cordwell. Tel: 01-764 1661.

18th September
NORTHERN GALA
Venue: Driffield. Contact: Dennis Davitt. Tel 0532 675433.

25th September
SAM 35 FREE FLIGHT EVENT
Venue: Tatton Park, nr. Knutsford, Cheshire. Events: Mini-Vintage Rubber (34in max span); Flight Cup. Park open 10am; comps start at 11am. First flights to be made by 1.30 pm. Prize for top junior. Contact: Douglas Tennant. Tel: 0625 874440.

2nd October
FAI RALLY
Venue: Driffield. Contact: Dennis Davitt. Tel: 0532 675433.

9th October
PETERBOROUGH MFC DIESEL 'A' COMBAT
Venue: The Embankment, Peterborough.
Contact: Mick Taylor. Tel: 0733 204484
This is a date change from 16th October.

16th October
SMAE INDOOR SCALE MEETING
Venue: Alumwell Centre, Walsall. Two minutes from M6, J10. Peanut, Open Rubber, CO_2/Electric, Kit Scale and Air Racing. Lots of trimming time. Come and join the growing numbers!
SAE for full details to: Doug Sheppard, 13 Luckington Road, Monks Park, Bristol BS7 0UT.

23rd October
SOUTH BIRMINGHAM MFC VINTAGE C/L Rally
Venue: Rubery Hill Hospital, Rubery, Nr. Birmingham.
General flying for SAM 35 and SMAE members. Fun competitions too.
Contact: Peter Martin. Tel: 021 459 5520.

30th October
SAMS INDOOR FUN FLY
Venue: Watford Leisure Centre, 11am – 6pm. Every form of Indoor model! Lympne Scale event. All welcome! Contact: George Wallbridge. Tel: 076 388 384.

30th October
CROYDON WAKEFIELD TROPHY
Venue: RAF Barkston Heath. Classes: F1B, Vintage Wakefield (8oz and 4oz); own-designs to pre-1951 rules. Croydon Club trophies and Ted Evans Memorial Trophy.
Contact: David Beales. Tel: 01-858 2714.

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: Flt 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.

Pretty and perky – Vic Smeed's 38in. charmer from the early 1950s...

A BEAUTY FROM THE PAST...

COURTESAN

THIS LITTLE model was designed at the request of the late Charlie Ashby, a fellow-member of the Canterbury Pilgrims MFC, who asked for 'something like a Tomboy but with a few more curves'. One of the photographs shows Charlie's model on its first outing in, from memory, late 1953. This was the only model built to the design, as far as is known; the original drawing remained in a drawer with several others until five or six years ago, when they were all dumped, due to a misunderstanding by a colleague.

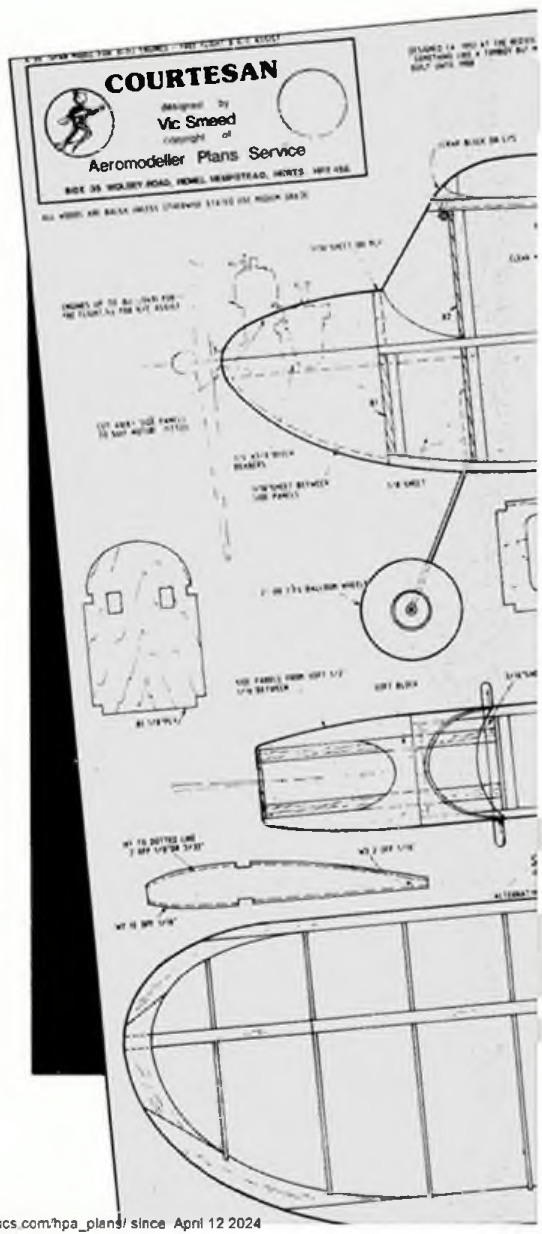
The photograph surfaced during a discussion on the Irvine Mills .75 when, as a consequence, the plan was redrawn. At least four further models have since been constructed. Some of these will probably have caused confusion at the Old Warden Vintage Weekend (yet to come as these notes are written) but judging from interest already shown in the model it is probable that a number of people will be keen to obtain plans.

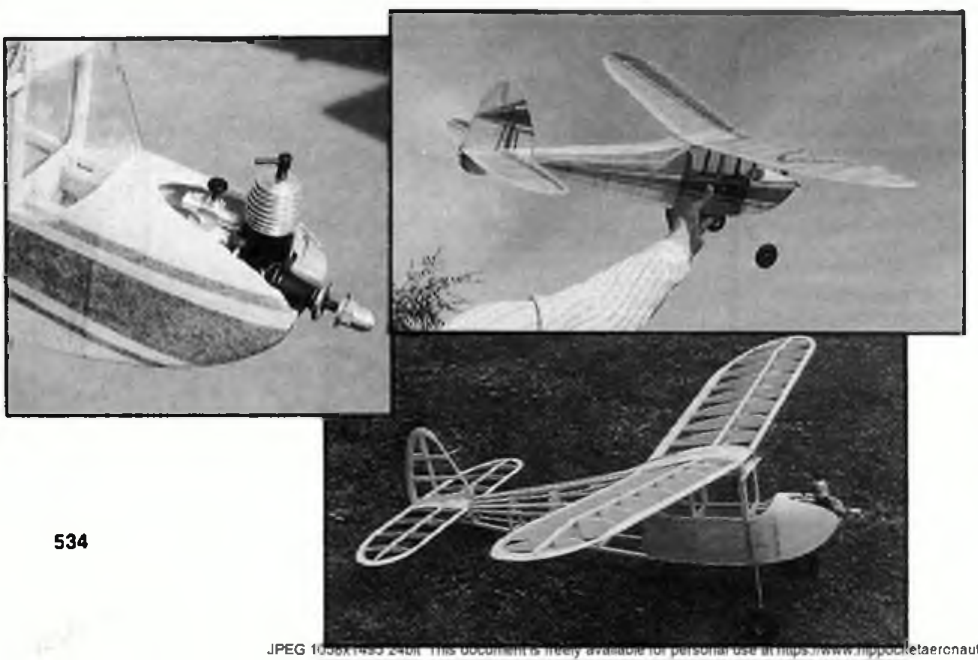
Rudder — only radio days

At the time of the original design, single-channel (usually rudder-only) radio was the normal form of radio control and it was thought that the ideal rudder-only model should be able to make one to one-and-a-half complete turns and then drop its nose into a spiral dive. When sufficient speed had been built up, a touch of opposite rudder would straighten the dive and the excess speed would produce a loop. If the speed was judged right, a touch of rudder at the top of the loop would produce a half-roll – a 'roll of the top' to the RAF or an 'Immelman' to US fliers. If a full loop was carried out, excess speed would start a second loop and a touch of rudder at the correct moment was needed to turn the model out of a potential stall.

The original Courtesan was not flown under radio as equipment was, on the whole, rather bulky and heavy for this size of model, but it did have the characteristic of making one-and-a-half turns before dropping into a fast-accelerating spiral. The model lends itself to rudder assist with average modern gear; there is plenty of room for two or even three functions with micro servos. Observant free-flight readers will already have concluded that very tight turns are best avoided; under power, circles of not much less than 100ft. (30m) diameter are recommended. This is one of the rare occasions when the designer has not himself built the model, but our trim intention would be wide right-hand climbing circles achieved with just enough sidethrust to offset torque-induced left turn and produce a hint of right turn, plus about 20 deg. of right rudder trim tab. This would produce similar-size circles to the right on both power and glide, remembering that the tab is slightly less effective without the slipstream; hence the faintly right sidethrust. Power circles to the

Above: Original Courtesan was fitted with a Mills 1.3. We recommend up to 1cc for F/F. Trio of photos below shows Alec Gee's fresh replica for Irvine Mills .75 power. Classic Smeed design characteristics mean viceless performance. Plans from ASP Plans Service, 9 Hall Road, Maylands Wood Industrial Estate, Hemel Hempstead, Herts HP2 7BH. Price £2.75 plus 60p postage. Quote plan no. AM 1582.





left with the average sport model are likely to result in a much slower climb, though perhaps such a generalisation is slightly dangerous!

Constructionally the model is straightforward. There is a little extra work in the laminated wing and tail tips but the increase in strength of warp resistance is well worth having. For further comment perhaps it is as well to hand over to one of the builders who has constructed the model recently...

Alec Gee reports....

Everything about Courtesan is traditional, including the construction about which little need be said, so easily and enjoyably does it all go together. There are one or two points worth noting, however, and one of these concerns the wing leading edge. Optional flat faced or notched ribs are shown on the drawing for use with 1/4 x 3/8in. shaped LE stock or 1/4in. square LE (is probably the better choice). Make sure you decide which before cutting the ribs.

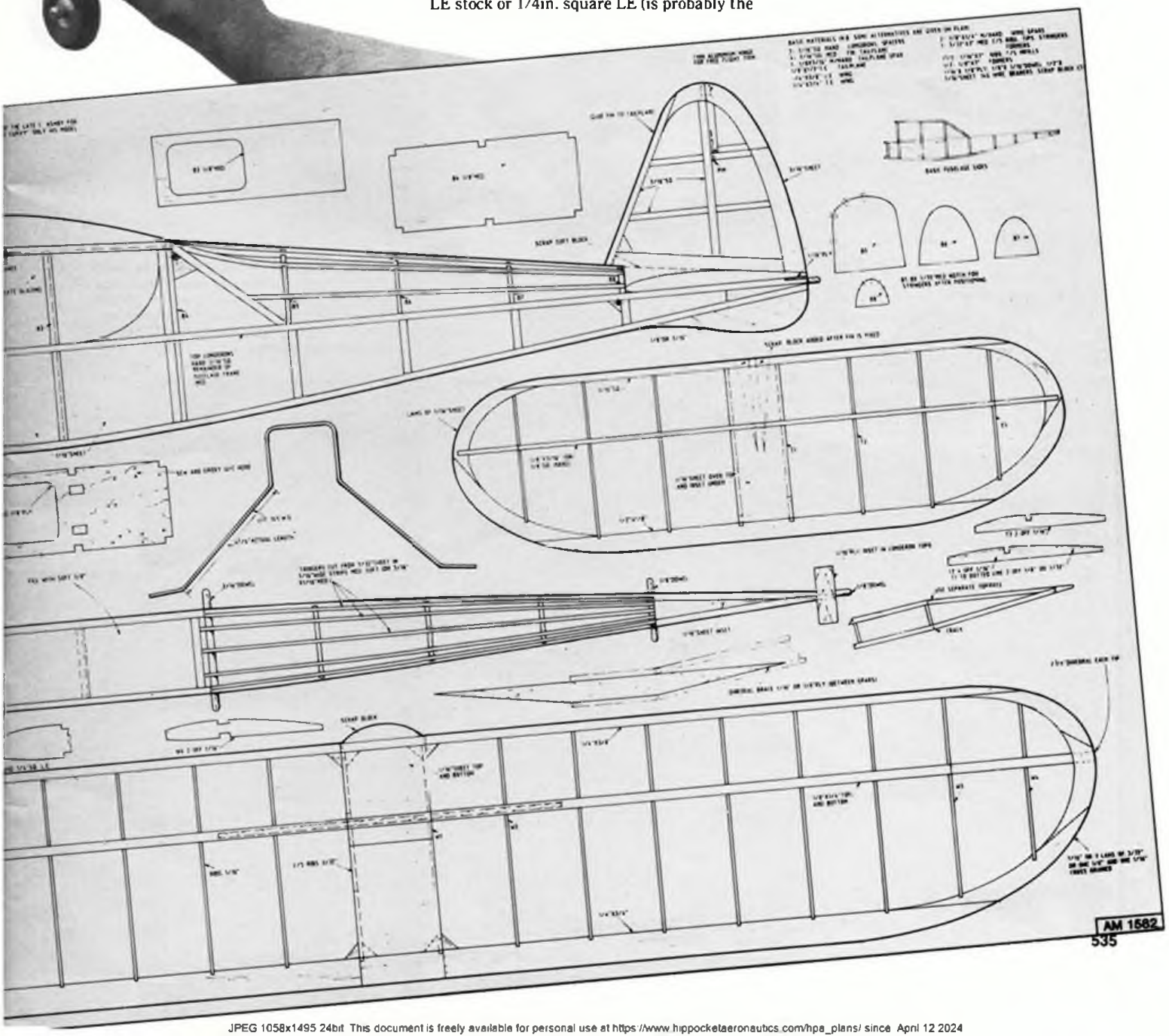
Top and bottom spars require cracking carefully at ribs W3 to meet the wing tips; you'll need to eyeball these, packing up the tip components to obtain a smooth sweep from trailing edge to leading edge while the wing panel is pinned to the board.

The fuselage is a basic 3/16in. square box frame; the two sides constructed one on top of the other, for accuracy, over the plan.

Choose hard balsa for the top and bottom longerons (the latter will require steaming to take up the curve) and select medium wood for all the rest. Pretty stringered rear turtledeck uses 3/32 x 3/16in. strips and, as is always the case with design features of this sort, it's wise to leave former notching until you actually come to this stage and plot the notch positions by letting the strip balsa find its own natural curve from the cabin area to the rear of the fuselage.

...and fly it!

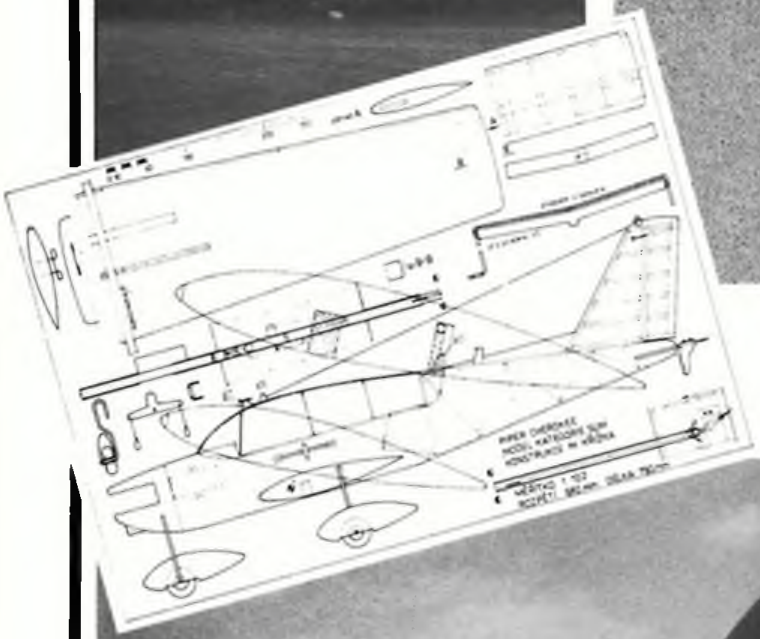
What can we say? Medium power gives stately performance on calm days; rev up a bit for livelier cirucits, perhaps with a touch of downthrust to keep things safe. Courtesan is every inch a lady – now, aren't you tempted, just a bit?



IN THE SCALE

We begin our series on control-line Scale with a look at projects to inspire

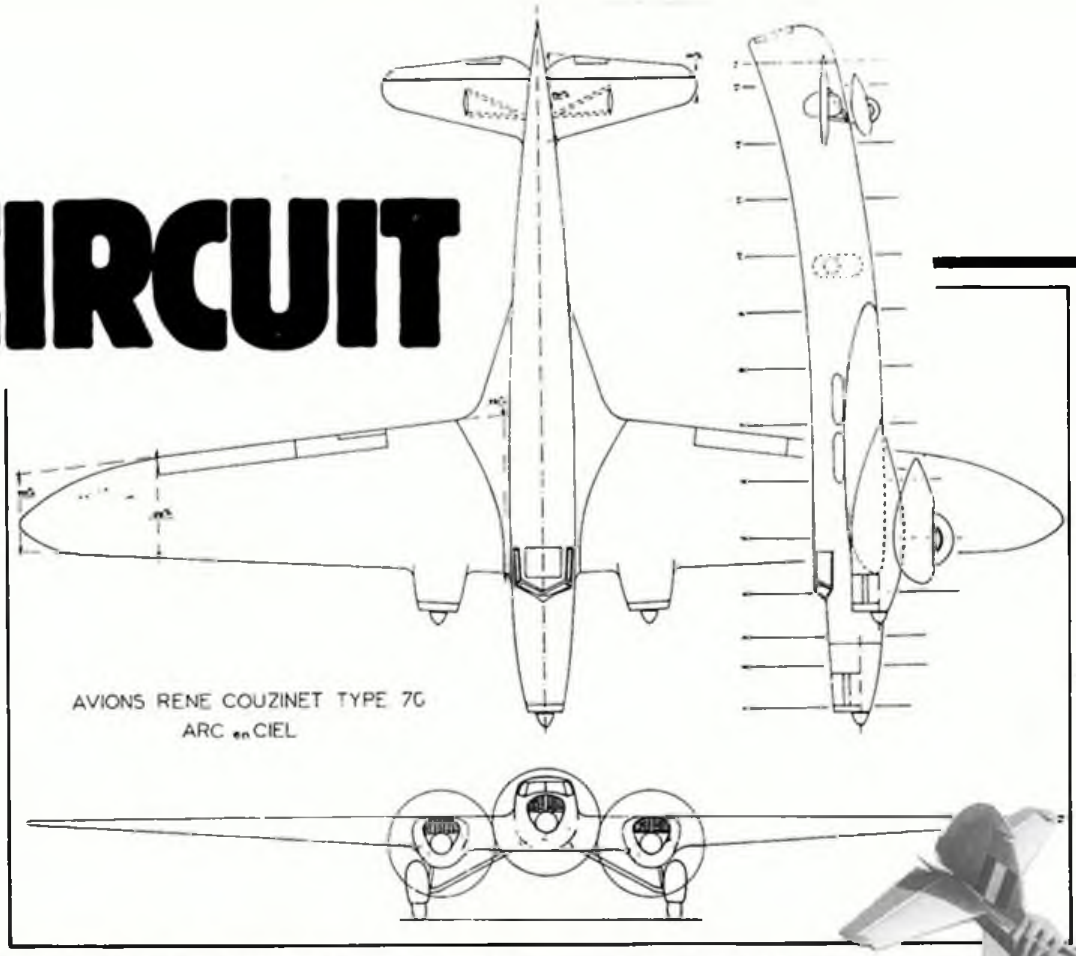
Atmospheric stuff! Ron Truelove's Typhoon cruises by on low power.



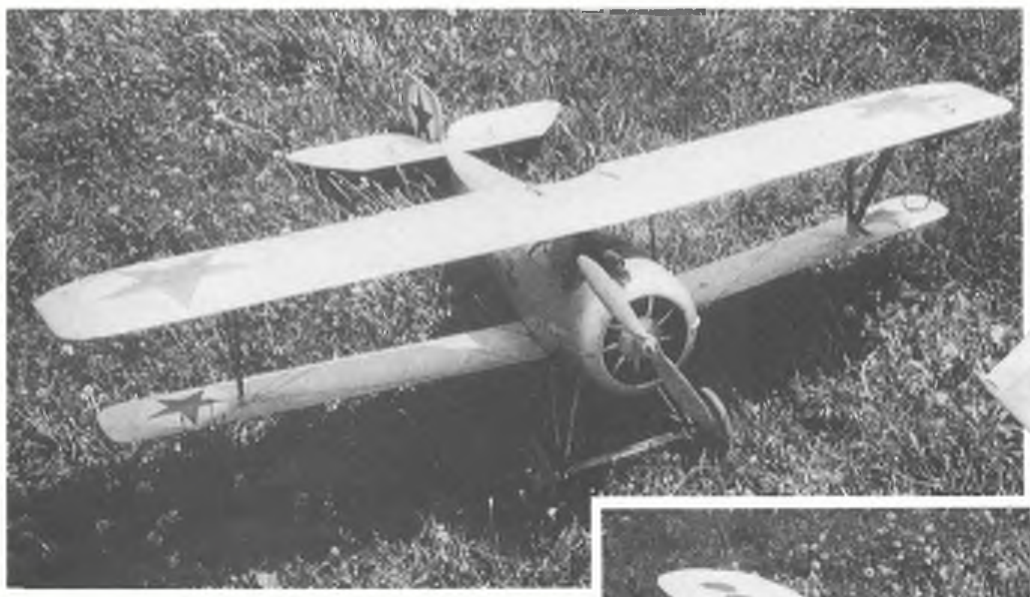
Above: Seen at World Champs in Kiev, this smart Pitts Special was the choice of Man (Romania). Drawing at left shows typical Eastern European approach to Profile Scale. Piper Cherokee is from Modelar magazine.

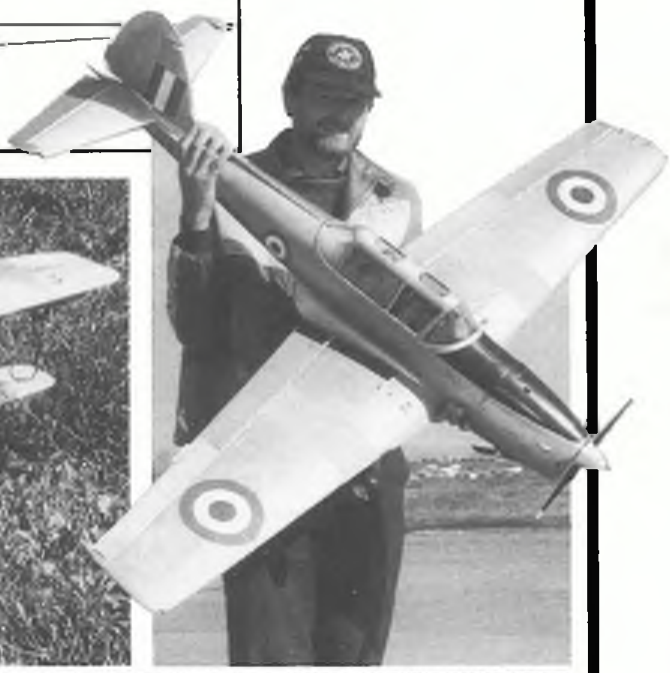
Also at the Champs - Pavlenko chose a subject from his own country. Li-2T is a Russian Dakota copy. Model placed second. Note variety of line guide holes.

CIRCUIT



Left: Classic Thirties shape of the Couzinet Arc-en-Ciel (Rainbow) would look – and sound – good on the end of C/L wires... Below left: More from the World Champs. Nieuport 24 bis by Zachoszcz (Poland). Search for the unusual! Below that: A real Nieuport 17, Chris Bradford's World Champs entry. Below right: Latest from the Truelove stable is this attractive Heinkel He 51B, highest Brit placed at Kiev (sixth overall). More details of this one next month! Below: John Robarts is a Chipmunk enthusiast. 'Shuttleworth' version here is being followed by a civil variant. More next time!





1988 Free

Hot competition at Zrenjanin, Yugoslavia from 5-7th July. GB 4th in individual F1C — Mike Warren reports...

ONE HUNDRED and fifty competitors from eighteen countries, sensational performances from the Russians, and weather so hot it was almost unbearable – this was a memorable competition. Zrenjanin is a small, comfortable industrial town about eighty kilometres north of Belgrade, surrounded by miles of flat farming and grazing land. A party of more than fifteen from Britain assembled in Zrenjanin, some having flown to Belgrade and hired cars, others having chosen to spend two or three days on the road from England. The welcome in Yugoslavia was friendly, the hotel was fine, the flying site was large and almost completely flat, and the training days went well. Indeed, the only real problem was with the camp site, which was being used by the Danish and Bulgarian teams and by some of the British supporters, and which, it it was generally agreed, was appalling; but apart from this things were looking good as the contest days approached...

5th July: F1A

Even at 5am it was warm, with a clear blue sky and the faintest of breezes. Unfortunately, the flight line, which had been set up the previous day, proved to be in the wrong position and there was some delay whilst it was moved further upwind. This in turn resulted in a slightly late start to the A/2 competition, and the problem was compounded by the late arrival of the Very light pistol which was to mark the beginning and end of the rounds. As a result the first sound was started simply by an announcement through a loudhailer, and several teams - including the British - simply could not hear it.

First to fly of the British, once this had all been sorted out, was Andy Crisp. He towed for a while upwind and to the left of the line, and eventually launched into air that looked promising rather than impressive. The flight seemed to be on a par with many around it, not bad but, equally, not obviously good. In fact, it wasn't quite good enough and the model landed just four seconds short of the max. John Cuthbert was next to fly and maxed well though his launch was not up to his standard of earlier in the year, the model gaining little or no height.

The 1986 Champion, Didier Barberis of France, put himself out of the running immediately by dropping fifteen seconds in this first, fairly difficult round. Other 'names' to lose time included Per Grunnet of Denmark, Klaus Salzer of Austria and Ivan Crha of Czechoslovakia.

Third British team member was Mike Fantham. With only a few minutes to go to the end of the round he launched splendidly and seemed well on his way to a first max when he suffered a mid-air collision and the model went into a flat spin – literally – from which it did not recover. Mike did not have another model assembled and, perhaps surprisingly, opted to wait for the return of his 'number one' model rather than fly the first reserve. Whatever the qualities of the two models, this decision left Mike with little towing time. When he eventually launched it was into only moderate air and despite some flapping from the retrieving team the model was down in just under two-and-a-half minutes.

In the second round Crisp and Cuthbert dropped time after launching into air that both they and Alan Jack - acting as runner and spotter, and doing a splendid job - thought would be sufficient. Fantham left his flight until late in the round but found a good patch of air and maxed easily. Proof that it wasn't going to be Mike's day came when the retrieval team radioed back that after landing the model had been, of all things, trampled on by sheep.

Warming up...

By the third round, at barely nine o'clock in the morning, it was starting to get hot and the local storks were circling lazily in thermals above the field. I watched Victor Tchop, current World Champion and whom I had not seen for five or six years, make his third flight. He has a few grey hairs these days, and still smokes quite a lot, but he remains extremely impressive. Even his best friends would not call him an elegant flyer, but like Viv Richards, Ruud Gullit and - at his best - John McEnroe, Tchop always seems to have more time than those around him. It is an enviable talent. He maxed again in this round, as did his young colleague Kochkarev, but Victor Isaenko dropped time despite a massive flapping exercise by the rest of the team. This flight of just under two minutes not only cost Isaenko a place in the fly-off but cost the Russians a team medal. All three of the British maxed, though Crisp had a line across with one of the Israeli team and had to take a reflight.

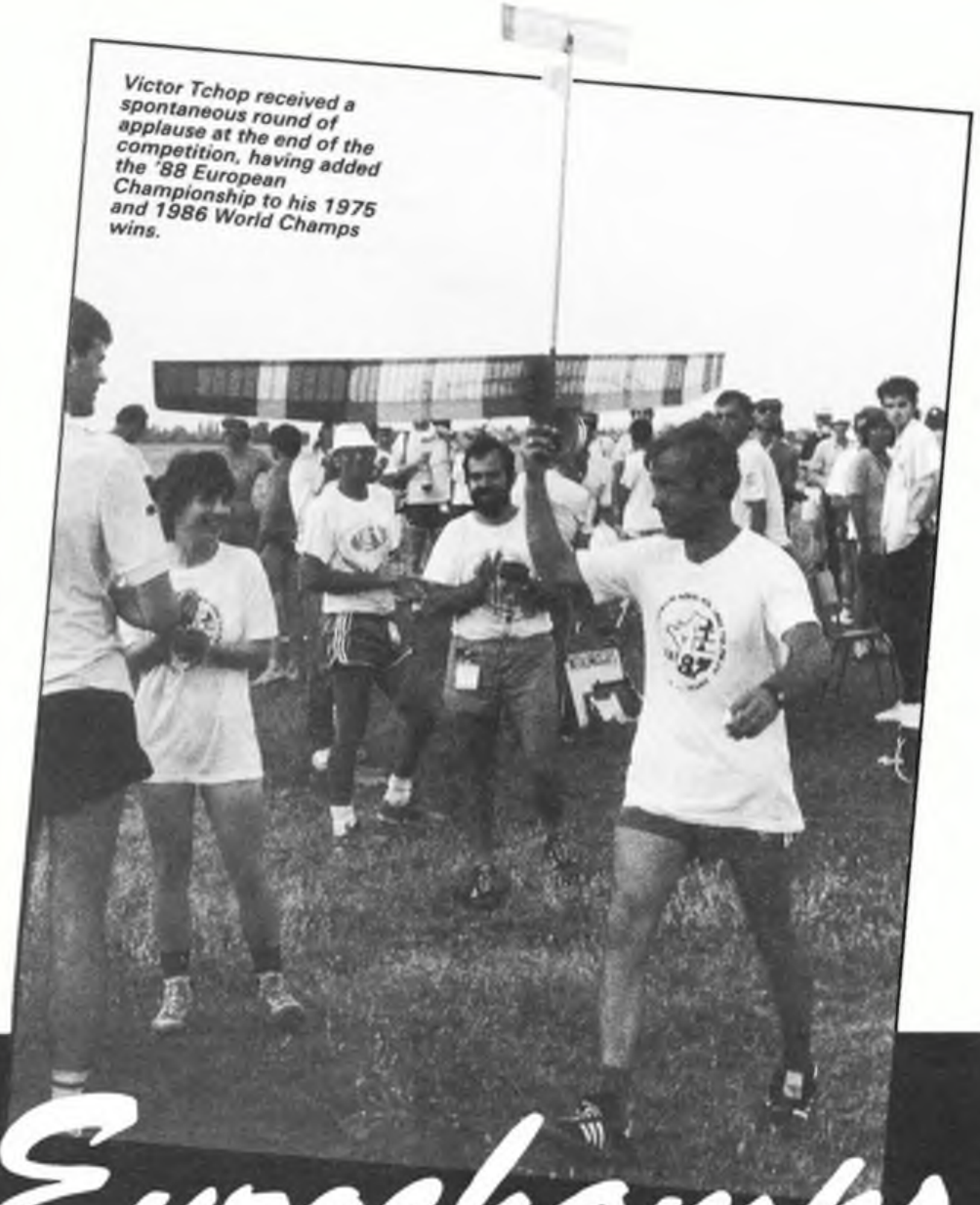
The fourth round started with another minor panic for the British team when their winches were delivered to the wrong point

Left: The Russian Team manager holds F1A winner Tchop's model and checks the time... Right: Czech supporter awaits with Horejsi's third-place F1A. Far right: Henning Nyhegn holds Allan Ternholm's A/2. Ternholm placed a splendid sixth in his first major international.

on the flight line. Nevertheless, once this problem was solved, three more maxes were recorded; by now Fantham was spending much of his time repairing the sheep-damaged model, returning to the line only to fly.

Though there was not much of a breeze there was a distinct drift, and by the fifth and sixth rounds it was taking models away to one side of the field, towards a village. There is little doubt that it would have been sensible to move the flight line (indeed, British team manager Martin Dilly made efforts to get it moved) but the organisers declined, on the grounds that it would take an hour to do it and anyway the villagers are very friendly. Dilly's worries were more for the retrievers and the models, but as it turned out no models were either lost nor, I think, damaged in the village.

As so often happens, the seventh and last round was eventful. Tchop, flying first of the three Russians, found a powerful thermal, and in the rush to join him Andy Crisp towed in. His model was damaged and he changed to a variant of his Flashback design for the reflight, which was a safe max. By this time it was distinctly hot - in the low 90s I would guess - and a slight breeze had developed. John Cuthbert had trouble on tow and unlatched on the downwind leg of the circle; rather than launch at the wrong moment he chose to tow in and take the reflight. This was a problem too since the reserve model seemed to lurch to the left as it reached the top of the tow, but Cuthbert worked hard and maxed well. Fantham maxed again - a superb flight, high in the clear blue sky - making that first round problem all the



Victor Tchop received a spontaneous round of applause at the end of the competition, having added the '88 European Championship to his 1975 and 1986 World Champs wins.

Flight Eurochamps

harder to bear.

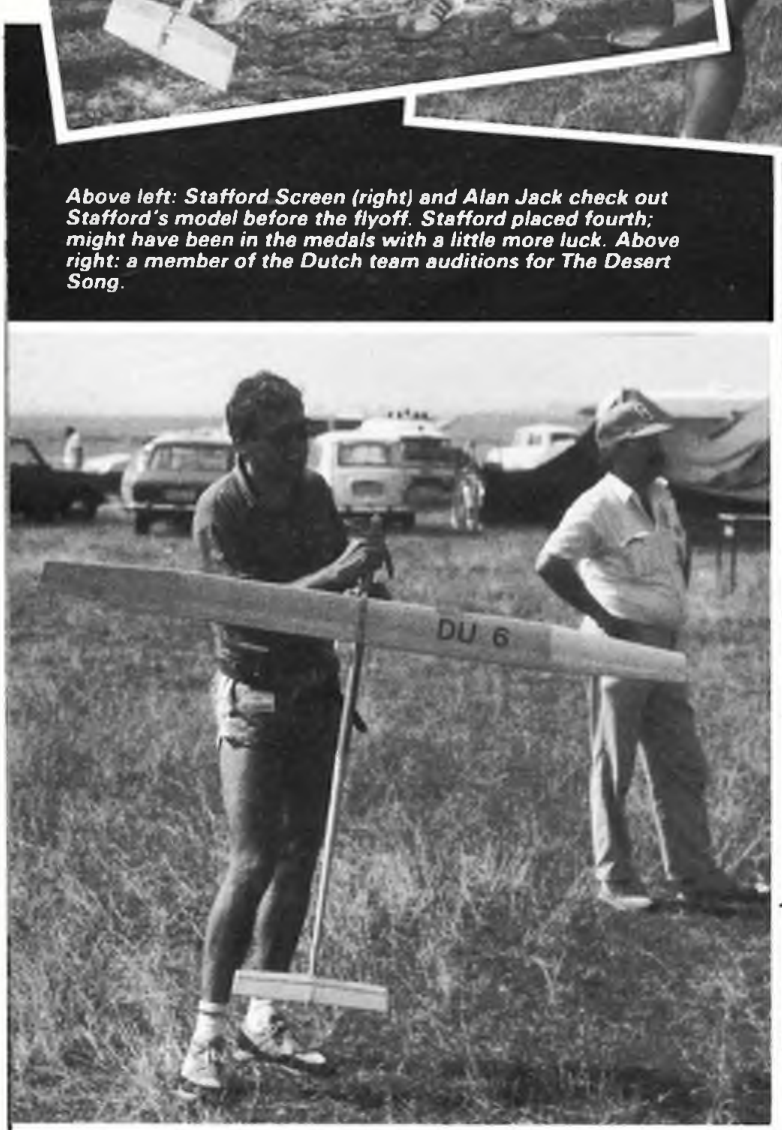
By 1pm the seven rounds were finished and fifteen flyers had made seven maxes. No country had all three of its flyers through to the flyoff but four countries had two that had maxed out - Italy, West Germany, Czechoslovakia and the USSR. Incidentally, West Germany's unsuccessful flyer was, surprisingly, '87 World Cup winner Stefan Rumpp, who has seemed near-unbeatable for the last few months but who dropped almost twenty seconds in the sixth round.

Flyoffs

With the flyoffs scheduled for 5pm the majority of competitors and supporters, after a brief lunch on the field, returned to the hotel for a shower and, with luck, a little sleep. The time passed quickly and it seemed only a few minutes later that we were getting back into the cars (which were very hot after sitting in the afternoon sun) for the fifteen minute drive to the field. The first two flyoff rounds - aiming for a four-minute and then a five-minute flight - were flown in a light breeze against a sky no longer completely blue since some cloud, perhaps even with a threat of rain, seemed to be building up from the west.

Both Italians and the two West Germans dropped out after the first fly-off round. In the second round, flown after a gap of some 40 minutes, Chop towed upwind and eventually launched into good but not sensational air. The model held at just over line height where it was joined, in what was clearly a wide patch of lift, by Kochkarev, and by Findahl of Sweden and Ternholm of Denmark. Ternholm, incidentally, flying in his first major international looked very promising. Six or seven models all seemed set to max so it was a surprise to find that only four had flown for five minutes and were therefore through to the next round. It was less surprising to find that the four included both the Russians and Ivan Horejsi from Czechoslovakia. While the models were being retrieved, both Kochkarev and Horejsi made a number of test flight with reserve models.

Going for six minutes, Tchop and Kochkarev both towed upwind as soon as the



Above left: Stafford Screen (right) and Alan Jack check out Stafford's model before the flyoff. Stafford placed fourth; might have been in the medals with a little more luck. Above right: a member of the Dutch team auditions for The Desert Song.

round started and circled away towards the right-hand end of the line. Horejsi moved in the opposite direction and was circling downwind of the left-hand end, with the Bulgarian Rusen poised between the two. The wind had dropped by this time and the threat of rain had vanished. Tchop launched first, after several minutes towing; and it was one of the best launches of the day, high and fast and gaining twenty or more feet. Kochkarev, who had been towing slightly downwind, zoomed into the same patch of air. As the models floated past us, holding height rather than gaining, Horejsi worked his way across the field and joined them, though his launch was a good deal less impressive. The Bulgarian launched soon after and the four models sailed away towards the horizon, all at more or less the same height. It was clear that the Russians' advantage in launching first was decisive. Tchop won with the same glider with which he took the World Championships in France last year, and Kochkarev was second using a double-tapered, high aspect ratio model.

6th July: F1C

The power contest started with a problem for virtually all the fliers when the official fuel was produced on the night before the contest. For some reason engines were over-revving using the new fuel, which, aside from its impact on the engines themselves, could play havoc with model trim. The pre-contest flights were particularly crucial and not all the competitors were happy when the contest started, again slightly late.

Pete Watson was the first of the British to fly. A distinctive climb, with the aircraft rotating slowly on its axis as it powered vertically upward, made his model immediately recognisable. He maxed easily. Stafford Screen had a difficult few minutes as his model overshot on the climb and was already flattening out when it bunted: it was at no great height by modern standards but was in good air and, eventually, maxed well.

Alan Jack flew third for Britain. Unbelievably, like Mike Fantham's glider on the previous day, Jack's model had a mid-air collision; this was clearly not going to be Britain's week. The model was a write-off and though Jack's reflight was successful, he needed to test fly one of his reserves between rounds.

Alan Jack was not the only one with problems. Thomas Koster, in the third round, had his engine cut and the model D/T two seconds into the climb. Again, the reflight was successful despite an initial stall on the glide. Somehow it was no surprise to hear that Koster had experienced an identical timer and system problem on the previous day.

The fourth round saw the real start of Britain's difficulties. First Pete Watson hit one of the day's big downdraughts, his model being sucked out of the sky after a perfectly respectable climb and transition, and then Alan Jack also dropped time. Worse was to come however, for Jack then changed models, not realising until later that one wing tip had not been in the shade and had consequently warped in the fierce heat. His fifth round flight was little over a minute, and it was about this time that he was heard to say '...it was a poor launch, a poor climb and the glide was only OK after the stalls had flattened out. I think I'll go back to golf.'

Hot stuff

No account of this day would be complete without mentioning the heat. Shortly after 10.30 in the morning it hit 100 degrees, rising to about 104 or 105 at the launch area by the time the seven rounds ended at lunchtime. Even higher temperatures were recorded out in the fields where the models were landing. Retrieving was tough work. A fire-tender from the local town, containing hundreds of gallons of water, was on the field throughout the day and though the water was not drinkable it could be – and was – poured over hats, shirts and the towels that many of us wrapped round our heads and necks in an attempt to keep cool. Despite all this at least one person had to receive medical attention because of heatstroke.

Fourteen flyers maxed out, including the entire Russian team and Verbitski, who was competing separately as the current European champion. Doring of West Germany (twice World Wakefield Champion) was this year in his country's power team and had reached the fly-off, though he had lost one model earlier in the day after a fly-away. Koster also reached the fly-off, though he was to drop out after the four-minute round when a loss of power ruined his climb.

Fly offs

After two fly-off rounds the field had been reduced to seven, including Stafford Screen (who had been flying splendidly after his first

Far left: Dieter Siebenmann of Switzerland flew in the F1D World Champs in May but was out of luck again here in F1B. Left: Lothar Doring, twice World Wakefield Champion, was in the German F1C team. Placed sixth but lost a model. Above: Eriksson of Sweden reached the Wakefield flyoff; placed second. Right: Eugene Verbitski of the Soviet Union came within a few seconds of retaining the F1C European Championship. He is also the reigning World Champion.

round nail-biter) and, amazingly, all four of the Russians. Going for six minutes, Screen's model stalled off the top of the climb and he dropped ten seconds. Indeed, only three flyers maxed in this round and – of course – they were all Russian. It was now simply a matter of deciding which Russian got which medal. The final fly-off was, I am afraid, a bit of a mess. First, Muhin, who was flying a reserve model since his number one aircraft had not yet been returned, spiralled in from the top of the climb. A rueful look crossed Screen's face at this point. But then, in a near-repeat of the last year's events in France, the time-keepers got themselves in some confusion with both Verbitski's and Strukov's times. In this case there was no reflight and Strukov was declared the winner. From what I saw this was probably fair, though the precise times that were awarded seemed fairly arbitrary. The Russian models were the standard, metal-covered beauties that we have come to know so well.

7th July: F1B

This last day of competition was somewhat cooler. By this I mean the temperature barely reached the mid-90s. It was however a difficult day for flying Wakefields as many, including the British, were to discover.

Wakefield day is, of course, the day of the great trek, with competitors, team managers and supporters spending the between-rounds time humping models, boxes, winding stooges and a variety of thermal-sensing devices from launch point to launch point. Somehow, Wakefield day always seems even messier than power day. And on this occasion, of course, gallons of water were added to the burden.

All three of the British team maxed in the first round. Derl Morley's initial climb was not as impressive as some, but the cruise was good and his model seemed as high as most by the time the prop folded. In the second round things got tricky, and half a dozen, including Jens Kristensen of Denmark, and Morley, dropped time. Incidentally, Morley's model was a centre of some interest. The fuselage is in two parts, hinged just behind the rear motor peg, and when it DTs the entire rear section of the body pivots upwards, leaving the tailplane at the right angle for the DT but also leaving it clear of ground damage. To those not used to the sight however, the model appears to have sustained terminal damage. Verbitski came over to look at it (it seemed new to him) and after some discussion he described the system, with a broad grin, as a good idea.

Almost all the teams were using thermistors of some sort. An exception was the Russians, whom I watched in the fourth round. Alexander Andrjukov is still apparently flying the model with which he first won in '82, though comparison of the photographs suggests that it now has a new fuselage. Certainly he is still using the system of launching the model with the blades extended, fixed and feathered. The model is thrown directly upwards and at about 20 feet the propellor comes into operation, pulling the aircraft, fast, into a vertical climb. Equally interesting, I found, was Andrjukov's preparation of himself for the launch. Once the model is ready and the decision has been taken to fly, the Russian takes a step or two backwards, settles himself, takes a deep breath in and out, drops his shoulders, relaxes, holds the model as if it was a javelin, with the fuselage above, behind and slightly to the right of his head, and then explodes into life, flinging the model high and straight. The comparison with athletics is unavoidable.

The British team were having a hard day, both Mick Chilton and Ron Pollard dropping time in the third and fourth rounds. The third round in particular was a problem, with over a third of the field (including Gorban and

Far left: The F1C flyoff. Soon-to-be European Champion Strukov prepares. Left: The British team received major support from Zap, or Pacer Technology (see John Cuthbert's tee-shirt) and Gatorade (Martin Dilly can be seen replenishing fluid). Gallons of liquid were consumed in the crippling heat. Above: European Wakefield Champion once again is Andrjukov of the USSR. That launch absolutely vertical and fast (see text).

Stefanchuk of the USSR) failing to max. This third day of competition was perhaps the calmest of the days, and the models were not travelling far. This was probably just as well since it allowed the retrievers to assist, or try to assist, vulnerable flights with some hard flapping. As Mike Fantham noted as we tried to shelter from the sun in the shadow of a van (not easy when the sun is almost overhead) it was difficult to remember a day when there was quite so much flapping, much of it clearly successful. Perhaps I am old-fashioned, but flapping – that is, running around underneath a model, waving a shirt or jumper, to try to break a thermal away from the ground and thus increase the flight time – seems to me against the spirit of free flight. I know a rule to ban it would be difficult to word and even harder to enforce, but trying to change the nature of the air in which a model is flying seems to me, quite simply, wrong.

Fly offs

Nine competitors maxed out, no team having more than one representative in the fly-off. In the first round, going for a four-minute flight, all but two of the competitors flew in the last minute, which ensured a splendid end to the day. Only four maxed, though Yordanov of Bulgaria would probably have joined them if he had not DTd early. In the final round Andrjukov's model was clearly highest and he duly became European Champion for the third time, having won both in 1982 and 1984.

And so – with the temperature still in the low 90s and this was 7 o'clock in the evening! – a memorable European Championships came to an end. It was, on the whole, well organised, with a good site, adequate accommodation and food, and splendidly helpful support staff. As you may have realised, I enjoyed myself....

1988 Free Flight European Championships

F1A: Individual results (55 flew; 15 in flyoff)

				Total
1	V. Tchop	USSR	180 180 180 180 180 180 180	1260 + 240 + 300 + 310
2	M. Kochkarev	USSR	180 180 180 180 180 180 180	1260 + 240 + 300 + 259
3	I. Horejsi	Czechoslovakia	180 180 180 180 180 180 180	1260 + 240 + 300 + 228
4	N. Rusen	Bulgaria	180 180 180 180 180 180 180	1260 + 240 + 300 + 219
5	P. Findahl	Sweden	180 180 180 180 180 180 180	1260 + 240 + 288
6	A. Ternholm	Denmark	180 180 180 180 180 180 180	1260 + 240 + 225
7	J. Vosejpka	Czechoslovakia	180 180 180 180 180 180 180	1260 + 240 + 211
8	N. Rastislav	Yugoslavia	180 180 180 180 180 180 180	1260 + 240 + 168
9	R. Gokubowski	Poland	180 180 180 180 180 180 180	1260 + 240 + 144
10	G. Massimiliano	Italy	180 180 180 180 180 180 180	1260 + 217
11	S. Puttner	E. Germany	180 180 180 180 180 180 180	1260 + 196
12	U. Schmelter	E. Germany	180 180 180 180 180 180 180	1260 + 177
13	A. Plangger	Austria	180 180 180 180 180 180 180	1260 + 166
14	J-L. Drapeau	France	180 180 180 180 180 180 180	1260 + 107
15	V. Brussold	Italy	180 180 180 180 180 180 180	1260 + 32
16	G. Stranieri	Italy	180 177 180 180 180 180 180	1257
17	B. Hagag	Israel	176 180 180 180 180 180 180	1256
18	R. Katajahaki	Finland	173 180 180 180 180 180 180	1253
19	F. Szvacsek	Hungary	172 180 180 180 180 180 180	1252
20	K. Salzer	Austria	167 180 180 180 180 180 180	1247
30	**M. Fantham**	**G. Britain**	**147 180 180 180 180 180 180**	**1227**
31	**J. Cuthbert**	**G. Britain**	**180 132 180 180 180 180 180**	**1212**
33	**A. Crisp**	**G. Britain**	**176 122 180 180 180 180 180**	**1198**

F1A Team results

1	Italy	3777
2	E. Germany	3761
3	Poland	3743
4	Czechoslovakia	3730
5	Denmark	3727
6	USSR	3717
8	Great Britain	3637
9	Yugoslavia	3587
10	Finland	3584
11	Netherlands	3519
12	Austria	3508
13	Israel	3494
14	Bulgaria	3486
15	Sweden	3364
16	France	3306
17	Spain	2859
18	Switzerland	2089
19	W. Germany	0

F1B: Individual results (50 flew; 9 in flyoff)

				Total
1	A. Andrjukov	USSR	180 180 180 180 180 180 180	1260 + 240 + 290
2	L. Eriksson	Sweden	180 180 180 180 180 180 180	1260 + 240 + 246
3	K. Rozycki	Poland	180 180 180 180 180 180 180	1260 + 240 + 230
4	D. Paff	FR Germany	180 180 180 180 180 180 180	1260 + 240 + 209
5	M. Varadi	Hungary	180 180 180 180 180 180 180	1260 + 240 + 177
6	S. Yordanov	Bulgaria	180 180 180 180 180 180 180	1260 + 218
7	M. Kapetanovic	Yugoslavia	180 180 180 180 180 180 180	1260 + 213
8	L. Luigi	Italy	180 180 180 180 180 180 180	1260 + 183
9	V. Sanda	Czechoslov.	180 180 180 180 180 180 180	1260 + 135
10	O. Kilpelainen	Finland	180 180 180 180 175 180 180	1255
11	B. Eimar	Sweden	180 180 180 174 180 180 180	1254
12	G. Rudiger	FR Germany	180 180 171 180 180 180 180	1251
13	A. Mantere	Finland	180 180 180 169 180 180 180	1249
14	J. Krasznai	Hungary	168 180 180 180 180 180 180	1248
15	G. Nocque	France	180 165 180 180 180 180 180	1245
16	J.C. Cheneau	France	180 180 180 164 180 180 180	1244
17	E. Gorban	USSR	180 180 160 180 180 180 180	1240
18	A. Zdravko	Bulgaria	180 157 180 180 180 180 180	1237
19	A. Koppitz	France	180 180 162 173 180 180 180	1235
	A. Zeri	Netherlands	180 180 155 180 180 180 180	1235
29	**M. Chilton**	**G. Britain**	**180 180 142 170 165 180 160**	**1197**
33	**D. Morley**	**G. Britain**	**180 120 190 180 180 180 159**	**1179**
39	**R. Pollard**	**G. Britain**	**180 180 117 129 180 180 180**	**1146**

F1B Team results

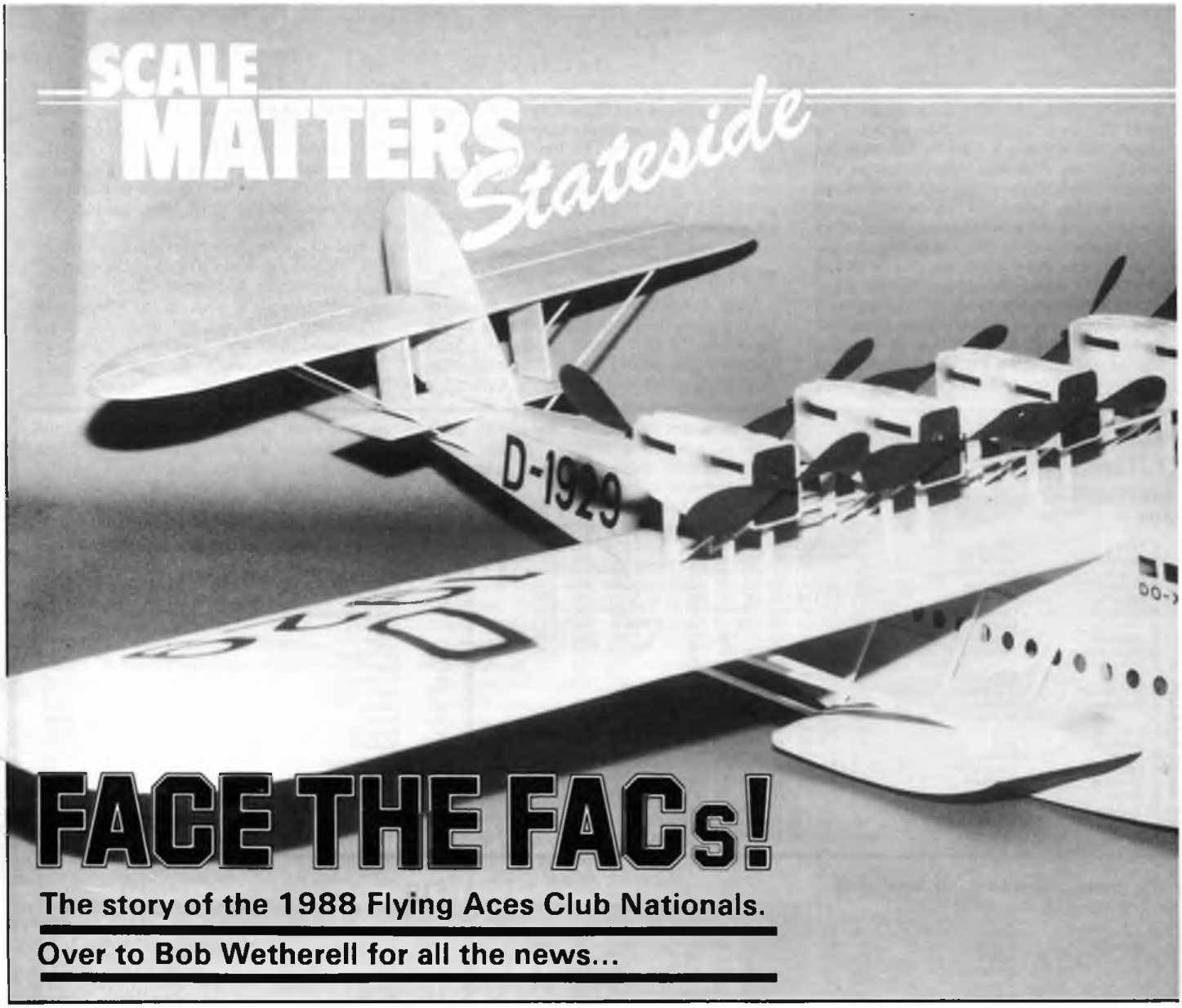
1	France	3724
2	USSR	3716
3	Hungary	3682
4	Bulgaria	3669
5	Italy	3649
6	Finland	3644
7	Denmark	3640
8	Czechoslovakia	3603
9	E. Germany	3598
10	Sweden	3593
11	Yugoslavia	3563
12	Great Britain	3522
13	Netherlands	3390
14	Austria	3389
15	Israel	3355
16	Poland	3220
17	Switzerland	2075

F1C: Individual results (36 flew; 14 in flyoff)

				Total
1	V. Strukov	USSR	180 180 180 180 180 180 180	1260 + 240 + 300 + 360 + 412
2	E. Verbitski	USSR	180 180 180 180 180 180 180	1260 + 240 + 300 + 360 + 408
3	A. Muhin	USSR	180 180 180 180 180 180 180	1260 + 240 + 300 + 360 + 39
4	**S. Screen**	**G. Britain**	**180 180 180 180 180 180 180**	**1260 + 240 + 300 + 350**
5	S. Korban	USSR	180 180 180 180 180 180 180	1260 + 240 + 300 + 346
6	L. Doring	FR Germany	180 180 180 180 180 180 180	1260 + 240 + 300 + 285
7	R. Czerwinski	Poland	180 180 180 180 180 180 180	1260 + 240 + 300 + 281
8	G. Napkori	Hungary	180 180 180 180 180 180 180	1260 + 240 + 280
9	R. Truppe	Austria	180 180 180 180 180 180 180	1260 + 240 + 260
10	J. Dolezel	Czechoslov.	180 180 180 180 180 180 180	1260 + 240 + 222
	J. Zelinski	Poland	180 180 180 180 180 180 180	1260 + 240 + 222
12	T. Koster	Denmark	180 180 180 180 180 180 180	1260 + 233
13	H. Hubler	FR Germany	180 180 180 180 180 180 180	1260 + 222
14	D. Varda	Yugoslavia	180 180 180 180 180 180 180	1260 + 209
15	K. Houcek	Czechoslov.	180 180 180 180 180 180 177	1257
16	P. Maurer	Switzerland	174 180 180 180 180 180 180	1254
17	A. Roux	France	180 180 180 168 180 180 180	1248
18	G. Venuti	Italy	180 180 180 180 153 180 180	1233
19	O. Maczko	Hungary	180 180 180 142 180 180 180	1222
20	B. Bautiller	France	180 180 180 180 180 180 139	1219
23	**P. Watson**	**G. Britain**	**180 180 180 136 180 159 180**	**1195**
28	**A. Jack**	**G. Britain**	**180 180 180 161 69 180 158**	**1108**

F1C Team results

1	USSR	3780
2	E. Germany	3734
3	Czechoslovakia	3670
4	Poland	3620
5	Great Britain	3563
6	Switzerland	3550
7	Italy	3476
8	Yugoslavia	3475
9	Hungary	3473
10	Sweden	2812
11	France	2467
12	Austria	1260
	Denmark	1260
14	Finland	1121
15	Bulgaria	0
	W. Germany	0



FACE THE FACs!

The story of the 1988 Flying Aces Club Nationals.

Over to Bob Wetherell for all the news...

AMERICA's best free-flight Scale builders and fliers converged from all over the country to compete in the sixth Flying Aces Club Nationals. The meet was held on the picturesque grass airfield of the National Warplace Museum in upstate New York. In a continuing history of successes, 1988 was perhaps the best yet.

Statistically the success could be measured by the number of contestants, 122 in all, taking part in eleven events with almost 500 models. But the less tangible measures, enthusiasm and fun, quality and innovation, are even more important. It was a great contest. Since you Brits may not be too familiar with Flying Aces, here's a little background on this event.

FAC history

Dave Stott and Bob Thompson originated the modern Flying Aces Club movement in the mid-1960s. They reasoned that restrictive rules, focused on technical realism, had taken the fun out of flying F/F Scale. As Stott puts it, 'I already have a job'. They wanted to bring back an approach that encouraged maximum participation, featured lots of flying, and resulted in the building of a large variety of types of subjects. They succeeded, probably far beyond their expectations.

The first step was to develop a set of rules that would support the objectives. The scale judging focuses on generating a sense of realism in the models. Such factors as scale structure and areas are minimized, but craftsmanship, general scale details, and markings are emphasized. The goal is an artistic impression of realism rather than a mechanical reproduction.

Flying Aces Rules Summarized

Scale Points

Construction and details
Not much, 0 to 10; some of it, 11 to 20; Most of it, 21 to 25; All there, 30

Colourings and markings
Consider appropriate finish, insignia and numbering, up to 20 points max

Workmanship
12.1/2 points max

Maximum Scale Points 62.1/2

Flight Points

0 -60 seconds	One point per second	60 points max
61-90 seconds	1/2 point per second	15 points max
90-120 seconds	1/4 point per second	7.1/2 points max
Maximum Flight Points		**82.1/2 points max**

Bonus Points

Points	Aircraft Characteristics
0	High Wing cabin monoplane
3	Parasol wing
5	Shoulder and mid-wing
5	Canards and tandem wings
10	Low wingers
15	Biplanes
20	More than two wings
15	Seaplanes, flying boats, and amphibians
15	Unorthodox (flying wings, autogyros, etc.)
1	Each jet engine pod
2	Each dummy nacelle with scale diameter freewheeling prop
5	Single engine pushers
	Multi-engine aircraft
5	For off-centre motors as pushers or in tandem
10	Centreline tandem if both props provide thrust
20	Off-centreline twins
10	Additional pairs of off-centreline motors
5	If off-centreline motors are pushers or in tandem
25	Trimotors

Add total scale points, flying points, and bonus points for final score

A point is given for each second of flight up to one minute. One-half point is given for each second for the next 30 seconds, and one-quarter point for each additional second up to a two-minute max. Thus max flight points are 82.1/2. This gives credit for good solid flying, but keeps the reward from being disproportionate for a lucky thermal flight. A balance between scale quality and flying ability results.

'We wanted to allow builders to build any airplane they liked and have a chance to win,' says Stott. So the third, and perhaps most significant component of the scoring, employs bonus points for non-standard configurations. The system awards points for low-wingers and biplanes, flying wings and canards, seaplanes, pushers, and multi-engine models. Subjects that feature more

Heading: Don Srull's 42in Dornier DO-X, powered by six electric motors driving all twelve props in tandem, won the Special Achievement award. About twenty flights so far — best time 80 sec! Left: 36in Jumbo rubber Folkerts SK-2 by Emerson Elwell flew smoothly. Below: Third in Power Scale — Joe Barish's fine electric Fairchild 91 Amphibian. Full size machine was built for Pan American Airways in 1935.

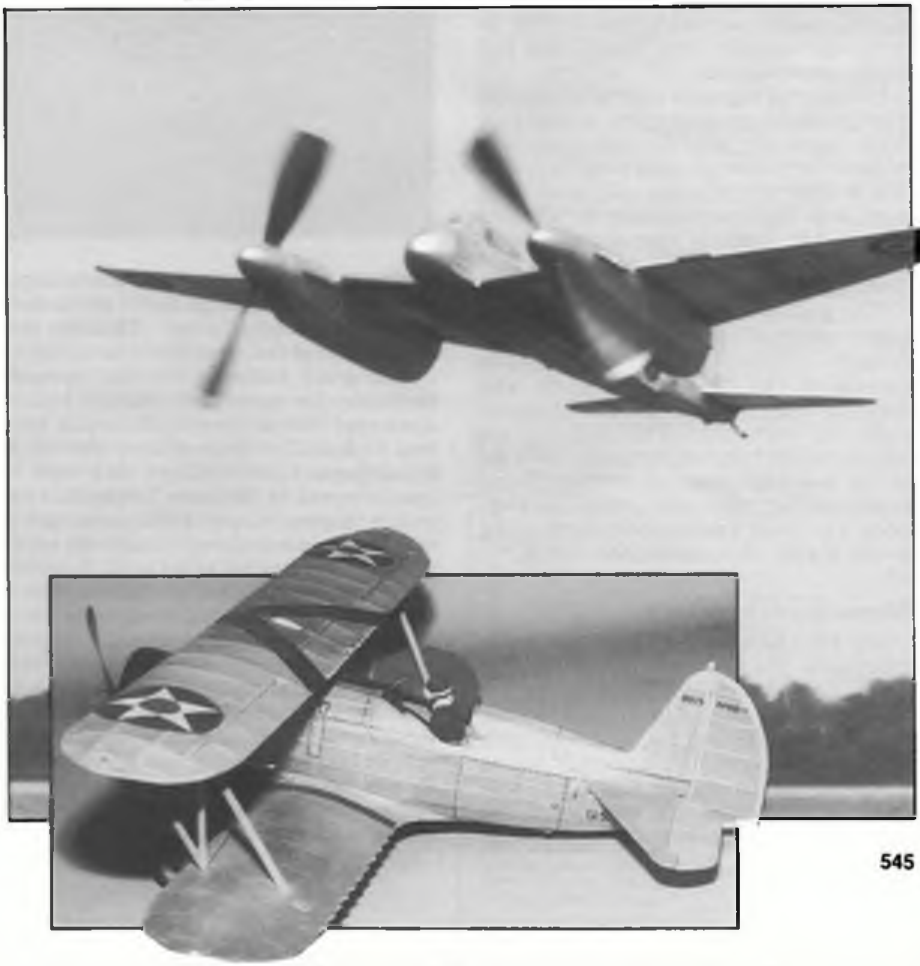
Below: Jack McGillivray's very light Jumbo DH Sea Hornet cruises by on its way to a 71 sec flight. Bottom: Pilot in Jim Kamin's Boeing XF 6B-1 looks ready for anything!

than one of these factors have points added up to credit each characteristic. The box shows specifically how this works.

Mass-launch events are handled differently. So long as a model is judged to have a minimum of forty scale points, it is eligible to compete. Models are all launched simultaneously, and the first ones down are eliminated. Local contest directors have the option of deciding the number of heats to be flown and eliminations for each heat, depending on conditions. More heats are flown, and more are eliminated. This process continues until the winner is the last one left flying. There are a number of categories that compete only against each other. These include World War I and II combat aircraft, Golden Age aircraft, and inline and radial engine racers. These events are wonderful to watch, exciting, colorful, and historically interesting.

The competition itself is kept informal. Official timers are not required for most flights. Anyone who can operate a watch can time. Honesty is assumed.

Competition rules for model airplanes have always generated controversy. There are dozens of ways to approach building and flying, and each person wants rules that favour his approach. Within this environment, the FAC rules have been remarkably successful. A look at the list of winners through the years reveals an excellent balance between normal and atypical con-



figurations. Sometimes the balanced approach is most successful. Another time a radical model wins. One thing is certain. Such a variety of types would never have been competitive without these rules. The good builders and flyers still win, but an average builder who gives it his best shot has a chance without investing half of his life in building his model.

So results achieve the goals - increased and enthusiastic participation, lots of flying, and an infinite variety of model types.

But back to the Nats

Today there are over 500 members of the national Flying Aces Club. Local clubs engage in activities - both indoor and outdoor - all year round. The national contest is held every other year.

This year contestants stayed in dormitories at the State University of New York at Geneseo, which is adjacent to the flying field. Having everything so close together unified activities and provided a sense of community. For the entire weekend one was immersed in scale models and the people who fly them.

Scale judging took place in a large hall on the Friday evening before flying. The hard-working judges worked past 1 am to complete their task. Bringing all of those models together in one room was a brilliant idea. The result was the largest and most interesting bull session imaginable.

This year's contest was administered by the Maxecuters, the Washington DC FAC club. Contest director Alan Schanzle organized the event down to the smallest detail, and ran it with zeal. Members of the club spent untold hours working to make the contest the best ever. Trophy art, a fine sketch of a Boeing F4B-4, was donated by artist and modeler Otto Kuhni, and the results were beautiful.

On Saturday night the traditional banquet highlighted the presence of the Master, Earl Stahl. Stahl was feted for his contribution to the art of rubber-powered scale modelling, first and best at combining scale appearance with great flight performance. As Schanzle expressed it, 'Probably none of us would be in this room tonight if it weren't for Earl Stahl. His contribution cannot be measured.'

'The gods always seem to smile on this event,' reflected Col. Hurst Bowers, former designer of Flyline kit models but presently curator of the AMA museum. He was speaking of the weather, and mostly he was right. It was hot. The temperature approached 100 degrees both days. Still air in the mornings produced excellent flying conditions, but those who waited for afternoon thermals encountered freshening winds. If a hot wind can freshen, that is.

Mass launch galore

The mass launch events were held in the afternoons, after morning qualifying. The winds made these duels even more exciting than usual. Because of their configuration, these models tend to fly with the same characteristics as the full-size aircraft. Seeing groups of them in the air together - WWI biplanes climbing slowly away, or WWII fighters streaking skyward in twisting, looping patterns, all with colorful markings, evokes a sense of nostalgia that is unmatched in all of aeromodelling. This is the embodiment of the pleasure of FAC flying.

Left: Mark Fineman's all-yellow (yes, scale finish) F-7F Tigercat is an excellent rubber performer. Below: Happy Vance Gilbert with his three-engined Caproni CA-5.

Mac McJunkin prepares his CO_2 - propelled Bell XS-1. Looks potent!

This group comprises not the youngest people in the world, and chasing models downwind over and over again in that heat was a chore. Don Srull enlisted the aid of a young man to help retrieve his models in several events. In the Greve Trophy Race for in-line engine racers Srull came down next to last in a heat and thought the event was over. He gave his model to the retriever as thanks, and then learned that he needed to fly one more time to determine first and second place. The young man lent the model back to Srull, who gave it a good wind, put it into a thermal, and watched it disappear into the clouds. First place, but he had lost someone else's airplane. The story ended happily, as Srull later presented his WWII Heinkel fighter to the young man.

Tom Arnold ran into a unique problem of his own. He set down his fine Westland Welkin twin jumbo rubber-powered model, with winder, and went off to watch another model fly. In his absence a lightplane from the airport taxied over both model and winder, with destructive results.

At any moment during the contest five to 20 models graced the air. Images of flying persist in the mind. Vance Gilbert's big XB-49 rubber-powered flying wing flashing silver downwind. Don DeLoach's big yellow and black Corben Super Ace floating above the grass. Jack McGillivray sensing air as few can, then launching his de Havilland Sea Hornet jumbo for a fine flight. Joe Barish's electric-powered Fairchild 91 amphibian flying realistically on and on until it's a tiny speck against the horizon. The slow pulse of twin CO_2 motors, sounding as close to a pair of Gipsies as one could imagine, as my own DH 84 Dragon circled slowly overhead.

Anything can fly...

On the ground, one could walk along the line of parked cars next to the field and spend

Left: Gorgeous Albatros DVa by Press Bruning from Golden Age Reproductions kit featured dyed camouflage wing covering and detailed Mercedes engine.

Below: Our reporter's DH Dragon runs on twin Brown CO_2 motors with three tanks plumbed together. 33in model won the Earl Stahl Trophy for best model. Bottom: Dennis Norman entered this Ju 88, successor to his well-known Lancaster (which still gained fifth place in Jumbo Scale).

hours just looking. Each builder interprets the hobby in his own way, pursuing the goals of flight, craftsmanship, and scale accuracy with different mixes of priorities. Creativity and ingenuity abound. Literal lifetimes of work lie open to inspection and discussion. Phil Cox shows the cabin frame and engine detail of his Cessna AW, a masterpiece of traditional stick and tissue craftsmanship. Airbrush shadings on the ailerons of Dave Rees's Colibri present the illusion of surface detail that is astounding. Bob Anderson's Douglas 0-38A takes us back to a dream era of old time building that exists only in our imagination. The state of the art continues to advance.

'There appears to be a complete departure from the traditional subjects of free flight scale,' noted Leon Bennett, an aerodynamicist known for his series of Glue Guru writings. 'Today people are building anything and making it fly.' The trend to multi-engine subjects is especially notable. Don Srull is adapting small electric motors to this application with impressive results. His Handley-Page W.8b stands to be a landmark model, one that will be looked back upon as the one that started it all. His Dornier DO-X used 6 motors to drive 12 propellors, and more than earned the Special Achievement Award. Srull and Tom Schmitt are marketing these motors through a company called Hi-Line Ltd, for the incredibly low cost of $12.95 for a set of two, complete with much inside information on how to optimize performance. Dave Rees used Bentom gear units in the outboard engines of rubber-powered Bellanca trimotor with fine results.

I've not devoted much space here to individual competitions. The fact is, competition is fierce. Srull, Rees, McGillivary, Allan Lawton, George Meyers, Ralph Kuenz, Mark Fineman, and scores more, yield no quarter when the models go up. They want those trophies. Still, the essence of the over-all meeting remains relaxed. People enjoy themselves, share ideas and resources freely, and maintain a perspective that says give it your best shot and then enjoy what happens.

So why don't you Brits give this approach a try? Come over in 1990, bring your best stuff, and show us how it's done. We all might learn from it. Write to the address below, and find out more about the Flying Aces. I've only skimmed the surface.

Flying Aces Club GHQ, 3301 Cindy Lane, Erie, PA 16506, USA.

1988 FAC Nationals

FAC Rubber Scale

1	Don Srull	1911 Voisin Hydroplane
2	Jim Miller	1911 Voisin Hydroplane
3	Dave Rees	Colibri M82
4	Ken Groves	Bristol Scout
5	Steve Bacom	Bebe Jodel

FAC Power Scale

1	Dave Rees	Colibri M82
2	Bob Wetherell	de Havilland DH84 Dragon
3	Joe Barish	Fairchild Baby Clipper
4	Alan Schanzle	Focke Wulf 190 A5
5	Walt Eggert Jr	Air Transport P-2

Jumbo Rubber Scale

1	Don Srull	1911 Voisin Hydroplane
2	Dave Rees	Dewoitine D-338
3	Jack McGillivray	de Havilland Sea Hornet
4	Mark Fineman	Savoia Marchetti 92
5	Dennis Norman	Lancaster Mk1

WWI Peanut Mass Launch

1	Jack McGillivray	SE5A
2	Allan Lawton	Fokker DV11
3	Ross Mayo	Bristol Scout
4	Vick Nippert	de Havilland DH6
5	Gordon Roberts	SE5A

WWII Mass Launch

1	Ralph Kuenz	North American A-36
2	Mark Fineman	Caudron C714
3	Dave Rees	Mitsubishi Raiden
4	Allan Lawton	Kawasaki KI-61
5	Kevin Sharbonda	Grumman Avenger

WWI Mass Launch

1	Don Srull	de Havilland DH 6
2	Jack McGillivray	SE5A
3	Walt Eggert	SE5A
4	Dave Rees	Martinsyde S1
5	Walt Eggert, Jr	SE5A

Golden Age Mass Launch

1	Jack McGillivray	Cessna C-38
2	Walt Eggert, Jr	Cessna C 54
3	Jerry Paisley	Cessna C-145
4	John Stott	Cessna C-34
5	Bill Anderson	Bellanca

Greve Trophy Race
(In-line Engine Racers)

1	Don Srull	Keith Rider
2	Gordon Roberts	Chambermaid
3	Dave Rees	Caudron 460
4	Mark Fineman	Mr. Smoothie
5	George Meyers	Suzy

Thompson Trophy Race
(Radial Engine Racers)

1	Don Srull	Cessna CR-3
2	Allan Lawton	Hughes H-1
3	Mark Fineman	Cessna CR-3
4	Dave Rees	Cessna CR-2
5	Ross Mayo	Cessna CR-3

GHQ Peanut Scale

1	Ken Groves	Fike
2	George Meyers	Chambermaid
3	Ed DeLoach	Lacy
4	Don DeLoach	Waterman Racer
5	Dave Smith	Nikitin IS-4

Embryo Endurance

1 Ken Groves
2 Bill Passarelli
3 Jerry Paisley
4 Jim Hyka
5 John Stott

Special Awards
Grand Champion: Don Srull
Earl Stahl Trophy: best overall model: Bob Wetherell, de Havilland DH84 Dragon
Special Achievement Award: Don Srull, Dornier DOX
Rees Industries Winder Award: (most scale points, any category): Bob Wetherell

High potential

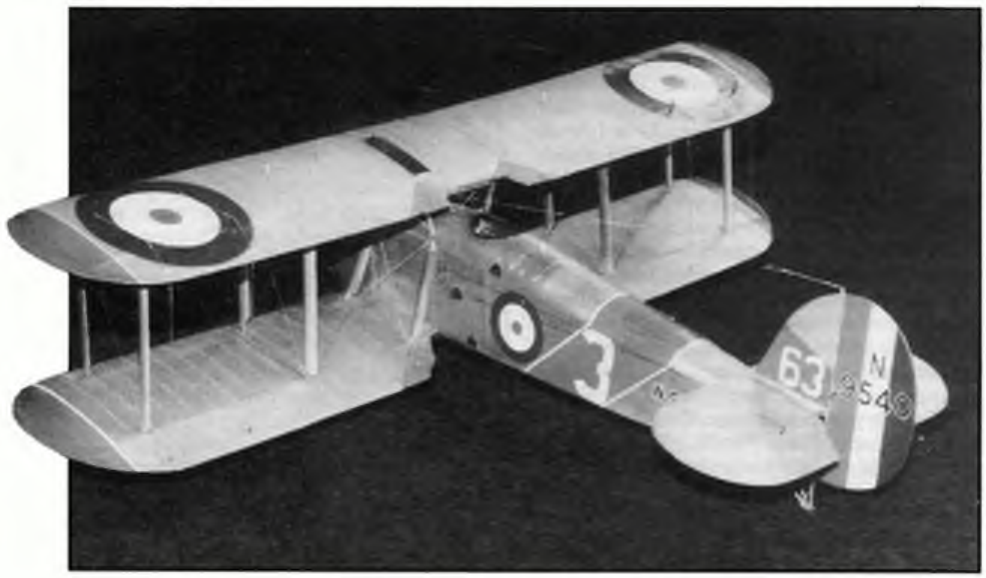
Back to basics as Chris Coote introduces his Electric Flight column. This month – Ohm's Law and all about it

I HAVE been interested in electric-powered models for more years than I care to remember, starting with naive experiments with pencells and Kako motors, prompted by my first modelling interests in model boats. In the late 60s electric RTP came of age with the availability of small, powerful slot car motors; and now, with the advent of high performance rechargeable batteries, electric power for all forms of model aircraft is an entirely practical proposition. I have been tinkering with electrics with various degrees of success, and was recently persuaded to assist some of my clubmates in their endeavours, particularly in the scale free-flight scene. Doug Sheppard, who does such a superb job of organising the Indoor Scale Nats, asked me to present some of the ideas and techniques, which I had developed and he had successfully used, to the wider audience of competitors and visitors at this excellent event. This was so well received that your esteemed Editor then asked me to undertake some more work for the benefit of *Aeromodeller* readers. I have drawn freely on the work and products of other pioneers to show a balanced view of what is currently available, and what the latest thinking is. Needless to say, if you have any more information, or reports, pictures of successful models, and so on, I should be delighted to hear from you. There will be future articles!

What and why

What is the attraction of this form of power, and why is it so shrouded in mystery? The sheer convenience of being able to switch on and fly, with no problems of motor starting or messy fuels, and no dependance on temperatures high enough to avoid gas freezing up, as on CO_2 motors, is irresistible. In addition, the potential for precise control of both motor RPM and power duration is very attractive for precision aspects of scale flying both indoors and out, and, especially, for small field flying – which most of us have to indulge in these days. The 'mystery' part is probably caused by the fact that the 'fuel' used is electricity, a commodity which is not easily seen or felt. A certain familiarity for the basics of electrical measurements and quantities is required to avoid wasting the small amounts of power available and to make the best of what is still a fairly marginal power source for flight. Those of you who are familiar with Ohms Law and watts, volts and amps can skip this next bit, but I have found that the numerical illustrations have surprised even experienced electrical engineers who have not appreciated the substantial energies dissipated in our systems.

Chris's techniques have helped Doug Sheppard to produce his reliable 25 in Blackburn Bluebird, above, and 34 in Blackburn Dart (below), which is powered by a geared 380 motor and four 150 maH cells. Bluebird has a geared Mabuchi A1 and four 100 maH cells.



Back to basics

The first concept to get clear is what the basic electrical measurements mean. A popular method is to equate the terms volts, amps and resistance to the image of water flowing in a pipe, the pipe being likened to the cable in which the electricity is flowing. Volts can be regarded as the electrical 'pressure' which forces a flow of electricity, measured in amps, down the cable which has a resistance to flow depending on how big it is. For a given resistance, if we increase the pressure applied (volts up), more electricity will flow (amps increase) and the amount of energy passed in a given time will go up (power increases). Thus, if we apply more volts to our motor by increasing the number of batteries, power output will increase because the rate of flow of electricity (amps) has been forced up.

Note that since we are now supplying the motor and therefore 'emptying' the battery at a greater rate, the duration of the power output may well be reduced despite the extra batteries! If we carry on increasing the voltage (pressure) there will come a point where the pipe is no longer strong enough to contain the flow and the friction induced by the increased flow will heat up and eventually melt it.

Electrical pipe bursts (insulation breakdown) are rare in our application, but heating and melting of wires due to trying to transmit too much power down them is not. Care needs to be taken to ensure that all the components in our systems are capable of actually passing the required electricity flow (amps) without excessive internal heating due to their own

resistance. This comment applies as much to switches and connectors as it does to the intervening cables; all such items possess some resistance. Most important of all is that the motor is not subjected to so much pressure (volts) that the current flowing within it becomes more than either the internal armature wires or commutator and brushes can stand without melting!

Ohm's Law, and other rules

There are simple mathematical formulae which relate all these items together. Some numerical examples are given to illustrate the point.
The first is known as Ohms Law:

Resistance = volt drop across component **x** Amps flowing in component

Thus you can see that if it takes a lot of volts to get a certain current to flow, then you have a high resistance in the circuit, and vice versa. Resistance is measured, surprisingly enough, in Ohms after the gent who discovered the law!

Still on the mathematical front, electrical power dissipated in a component with resistance is given by:

Power (watts) = Volts drop across component **x** Amps flowing in component

By looking at Ohms Law and substituting for voltage it can be seen that:

Power (watts) = Amps **x** Amps **x** resistance (Ohms)

Thus the power wasted in, for example, getting the available electricity to the motor via the switch and wiring harness is proportional to the square of the current. This means that we will lose four times as much power for each doubling of the current flow, compared to the normal power loss.

At the relatively high current levels in electric model flight used this can be significant, and an early lesson is to reduce to a minimum the resistance of the installation by making sure that cables of adequate size are used, and that switches do not get dirty. High resistance in the contacts will substantially reduce performance. I have found that this is a major failing with the otherwise excellent Union Japanese foam kits; the crude sliding contact switch in the battery pack soons get dirty enough to inhibit flight completely!

Work it out

It is instructive to look at a few examples using typical values of currents, voltages and powers. The Knight and Pridham unit is very similar to the motor used in the Union kits, although the KP uses three cells of 1.2 volts each, compared to the Union's two cells of 1.2 volts. Thus if we wish to control the speed of the KP to match that of the Union we shall have to lose one cell's worth of volts, or, as it is known, drop 1.2 volts. These motors consume about 1.5 amps when running flat out on two cells; thus we can use Ohms Law to calculate the resistance required to drop 1.2 volts at a current flow of 1.5 amps:

$$\text{Resistance} = \frac{\text{Volt drop}}{\text{Current}} = \frac{1.2}{1.5} = 0.8 \text{ ohm}$$

Thus if we set a variable resistor (often know as a potentiometer, or pot for short) in the circuit between motor and battery, and adjust it to give a value of 0.8 ohms, the three-cell battery pack will give out 3.6 volts of which 1.2 volts will be dropped in the resistor leaving 2.4 volts to be applied to the motor to reduce its speed.

Now it may not be immediately obvious, but anything you put in the circuit must be capable of actually passing the power flowing through it. In the case of this resistor the power dissipated within it is calculated as:

Resistance **x** Current **x** Current
= 0.8 **x** 1.5 **x** 1.5 = 1.8 watts

Note that this is also given by:
Volts drop **x** Current =
1.2 **x** 1.5 = 1.8 watts!

Resistors are made in different power ratings as well as different resistance values. In this case we really need a 2 watt resistor of value 0.8 ohm.
In practice electrical components can take quite a bit more 'stick' than their nominal rating suggests, and I have seen 0.5 watt resistors used successfully in the above application. However, they do tend to get very hot, and won't last too long unless they are of high quality.

Another example. Calculate the size and power rating of a suitable resistor for use in the charging circuit. Say we intend to use a 12 volt battery as the power source to charge our K.P or Union flight batteries at the typical rate of 1.5 amps. The three flight cells have a nominal voltage of 3.6 volts. Thus our resistor will have to drop or reduce the 12v source by 12 - 3.6 = 8.4v.
In practice we shall have to apply rather more than 3.6v to the flight batteries in order to get the charging current of 1.5 amps to flow, but using these figures will show us the maximum resistance we require and the correct power rating.

Thus resistance =
volt drop/current =
$\frac{8.4}{1.5}$ = 5.6 ohm.
Power dissipated = resistance **x** current **x** current = 5.6 **x** 1.5 **x** 1.5 = 12.6 watts.

Above: Chris's own 32in, 250 gm Pee Wee. Direct drive M3 motor turns 5.1/4 x 3 prop; close-up at left. Four 180 maH cells used. Below: Field charger, as per circuit in Fig. 1, uses 6 x 1.2 aH 'buggy pack' to charge at 1.5amp.

So if we were looking for a suitable variable resistor for the charging system we should try perhaps a 10 ohm, 15 watt type-if we can find one! Lower power rating types of perhaps 5 or 10 watts are more common and will work, but may not survive very long. Resistors of this size are not common nowadays, and a better solution is to make use of modern technology and use a simple transistor in conjunction with a much lower power rating control resistor, and let the transistor do all the hot work of reducing the volts.

Transistor topics

So how does this gem of silicone work? For our purposes we can go back to the water analogy and regard it as a kind of 'tap' for electricity flow. In the simplest types there are three connections which can be regarded as an inlet to the tap (emitter), an outlet from it (collector), and a control handle (base). Small changes in current flowing into the control connection (and out of the outlet) have significant effect on the much larger current flowing into the inlet and out of outlet. Thus it is possible to control a large current using a relatively small resistor which is used to vary the voltage applied to the 'base' and which itself will only have a small current flowing through it.

A suitable setup for charging is shown in **Fig. 1** together with the component sizes and reference numbers. Note that these magic bits of silicone can be easily damaged by

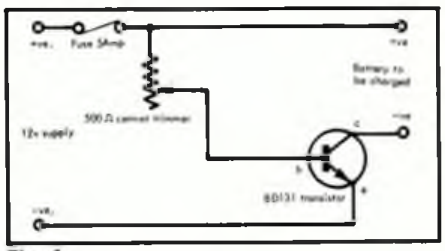
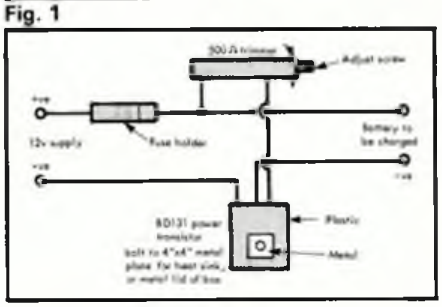


Fig. 1



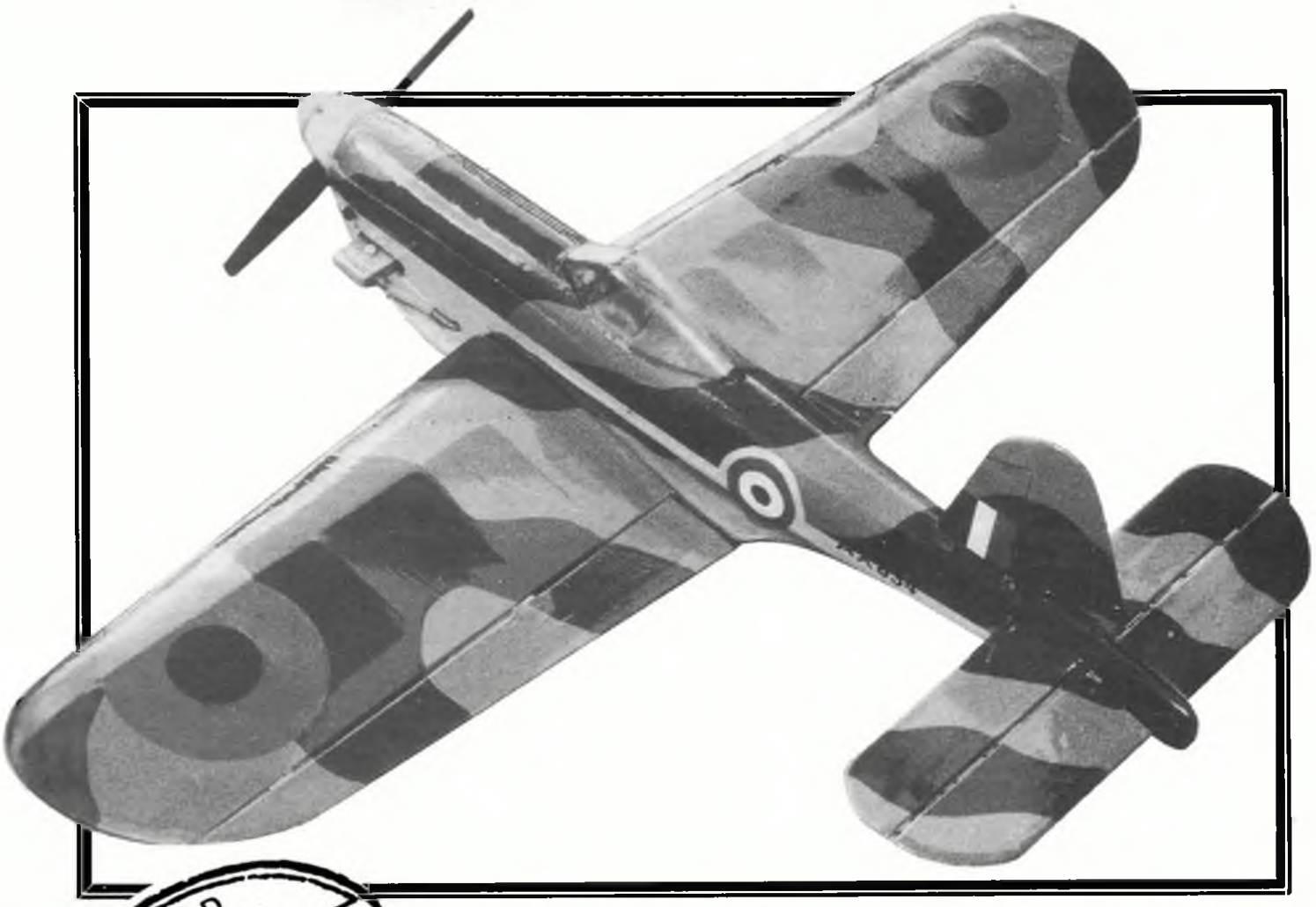
Theoretical circuit and practical charger layout. All components available from Maplins (see list of suppliers).

connecting up the wrong way around, so make sure that you identify the various leads before soldering up. In addition note that most of the power is now being dissipated in the transistor and it will get hot; very hot in some cases. To allow the transistor to survive this treatment it is common practice to try to conduct some of the heat away by mounting the device on a piece of metal known as a heat sink. This gets hot with the transistor, and radiates heat into the air from say a propellor or fan. Thus exactly the same technique of replacing a large power rating resistor by a resistor and transistor combination can be used for main motor speed control. We can take advantage of the ready made cooling air flow and use smaller, and thus lighter components with minimal size heat sinks to achieve our objectives.

There is one snag with using transistors for main motor speed control, and that is that even when turned fully on, there is still a significant volt drop across the device. This varies with the type of transistor, but for normal types is typically 0.5 to 0.8 volts. Thus even when adjusted for full speed, the maximum volts available to the motor will be reduced by this amount. Now with the low voltage systems we use this can have a significant effect on speed, and sometimes it is necessary to add an extra cell to make up the maximum volts available to the motor to be the same as before the addition of the speed controller. This extra weight penalty is OK usually on outdoor models which tend to be larger and thus more capable of carrying a bit of extra payload, but can be a real problem with indoor types. Hence the use on indoor models, with their lower power requirements, of simple lightweight miniature potentiometers (variable resistors).

Useful addresses...

Technicad 20, Poole Hill, Bournemouth, Dorset. 0202 294445/6/8	Nicad batteries
All Batteries Unit 11, Byfleet Ind. Estate, Olds Approach, Watford, Herts WD1 8Q7. 0923 770044	Nicads again
STC Edinburgh Way, Harlow, Essex CM20 2DF. 0279 26777	Electrical/electronic bits. Accept credit cards
Mole Technology The Sidings, Cammock Lane, Settle, N. Yorkshire BD24 9RP. 072 92 2092	R/C kits, motors, battery packs, flight manual
Knight and Pridham Castle Road, Rowlands Castle, Hampshire. 0705 412172	Geared motor, props batteries, charger sockets, resistors
Greenwich Maritime Models 7, Nelson Road, London SE10 9JB. 01-858 5661	Motors, gears
Electromail PO Box 33, Corby, Northants NN17 9EL. 0536 204555	Electronic components gear kits, fuses, switches Mail order specialists
Hobbies of Dereham Dereham, Norfolk.	Gear, motors
Whistons Union Mills, Stockport, Cheshire.	Gears, motors, steel rod bearings, engineering supplies, nuts, bolts, etc.
Proops Bros London (but look for packs in local shops)	Motors, gears, electrical items, surplus stocks of all sorts of useful bits
Maplins Maplin Electronic Supplies, PO Box 3, Rayleigh, Essex SS6 8LR.	Electrical, electronic bits, copper wire, tools Shops in major cities. (Bristol, Southampton, Manchester, Birmingham, London, Southend).



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THE NINE WEEK WONDER!

MILES M20

Noel Stephenson's semi-scale stunter is ideal for 1.5cc engines

SEARCHING AROUND for a successor to my Spitfire series (published in *Aeromodeller*, March '87) I chanced upon a small three-view drawing of the Miles M20. This aircraft, proposed as an economy fighter, was slightly slower than the Spitfire MkII, but faster than the Hurricane. It carried more armament and fuel than either of its famous contemporaries and was constructed largely from non-strategic materials. In the event, Spitfire and Hurricane production was sufficient for the RAF's needs and output of the M20 was confined to two prototypes.

The design is a natural for a model, with a huge chin radiator to hide the largest engine, a simple, thick, straight-tapered wing and generously large wheels on a wide-track fixed undercarriage. A quick session on the drawing board showed that stretching the design (*à la* Al Rabe) did not lose the essential 'flavour' of the prototype, so the design was completed along the same lines as the little Spitfires. I'm sure that I could have made the model more simple and probably lighter, but I do like to be able to get to all the 'works'. My experience is that if anything is made inaccessible then it will automatically go wrong and require surgery to rectify.

Like the Spitfires, this is not a model for the beginner to building (although it has proved a pussycat to fly) so anybody contemplating this one should get a few simple scratch-builts into the air first. Consequently, I'll not insult your intelligence with a detailed account of construction, but will confine myself to a general outline of the building sequence with a little more detail for the trickier bits. So, on to the building board!

Take up thy scalpel

Work is started by cutting out all the parts (I find this is most therapeutic). The engine bearers/ply joining plate and formers F1 and F2 are assembled using 24-hour epoxy (Araldite) and set aside to cure. The side assemblies of fuselage sides, Mirralyte doublers and former locating strips are then completed (remembering, of course, to make one left and one right!). The engine and 1/8in. packing pieces (I used brass) are fitted to the bearers, the mounting holes drilled and anchor nuts epoxied in position. The engine and packs are then removed and, following a dry fit to ensure everything is square and straight, the fuselage sides are epoxied to the bearer assembly. The locater strips fit into the slots in F1 and F2 and snugly against the engine bearers, thus ensuring a good register of the sides with the bearer assembly.

F8 is now positioned at the rear of the sides and cyanoed to the locator strips only. The other formers are positioned on the strips and cyanoed in position. After track-glueing a piece of scrap 1/8in. sheet in the tailplane position the upper and lower keels (lower keel with tailwheel assembly attached) may be fitted, the fuselage sides eased to the curve of the formers and cyanoed (if you've used the proper grade, damping should not be necessary). F1A and F2A are fitted, the fuselage upper decking completed and the top nose block glued in position. Assemble the lower cowl and tack-glue in position. Fit the tail block.

Now sand the whole thing to shape. Take great care around the front of the cowl, ensuring that the air intake is properly formed... get this wrong and you'll be plagued with an over-heating engine. Separate the cowl, fit the cowl hook and retainer. Install the engine and packing pieces and trim the

cowl inside to give ample room around the engine. Separate the rear decking over the tailplane and remove the scrap 1/8in. from the tailplane position. Assemble the tailplane, elevators and horn. Fit the idler arm and pushrod and assemble so that when the elevators are neutral the idler is vertical. When you are satisfied that all is friction-free, cyano the tailplane in position and re-fit the decking over the tailplane. The connecting rod is best left until final assembly. Fit the tail block, fin and rudder.

Strange but true

The wing may look a little strange with the large cut-out in the leading edge, but don't worry. This construction has been used in most of the Spitfire designs and the wings have survived when the fuselages were shredded. Fortunately the M20 wing has not been subjected to this ultimate test!

Cut out all the components. Assemble the mainspars over the plan. This sets the dihedral. Assemble the undercarriage legs to the ply U/C spar. The wings are built egg-box fashion over the plan, propping up the spar or other panel to maintain the dihedral. When the wing is removed from the board fit the U/C spar assembly using epoxy. The only really tricky bit is fitting the bellcrank in the wing centre-section. It *must* be angled as shown to clear the front dowel and also to align properly with the flap horns. Care taken to ensure full and free control movement will be repaid many times over. Do not be tempted to use a single flap horn; the relatively steep dihedral makes it imperative to use a separate horn for each flap. The horns should be 1/32in. apart when both are vertical. Fit the tip weight and complete the leading edge and centre-section sheeting, but do not fit the front dowel just yet.

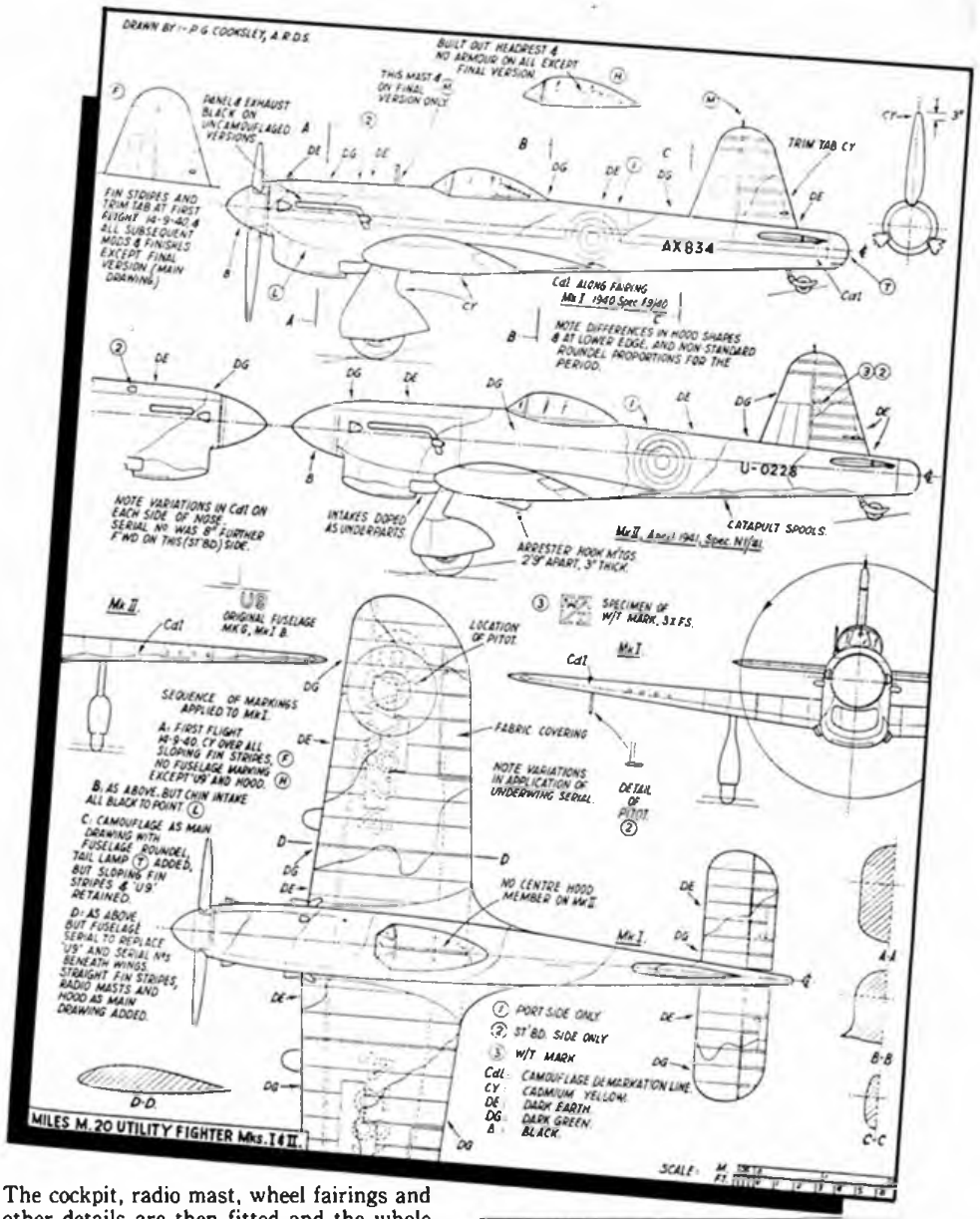
Fit the bits...

Tape a piece of bond paper to the top of the wing centre-section to simulate the thickness of the covering and check for correct alignment of thrustline, wing and tailplane incidences (all at zero degrees). Sand the wing-seat to ensure the wing sits square and straight. When all is to your satisfaction mark through F1 for the front dowel and spot through the rear wing fitting for the rear bolt. Fit the wing fairing block and sand to shape. Now remove the wing and fit the front dowel in place, cutting it away if required to clear the bellcrank. Drill through for the rear bolt. Re-fit the wing and make the wing root fairings from 1/32in. sheet. Do not make the gap between the fairings and the flaps too small; 3/32in. is about right.

Remove the wing from the fuselage. Make and fit the fuel tank, cutting away the fuselage side and cowls as required to clear the plumbing. Remove the engine and tank and give the whole of the inside of the engine and tank bays a coat of epoxy of polyester resin. Sand the lower cowl thoroughly and give it a coat of resin all over.

...then paint...

Cover the aircraft in your favourite materials. Mine are Solartex for the wings, plus one coat of clear dope for weather proofing. The fuselage is given the traditional treatment of sanding sealer and Jap tissue, followed by more sanding. Finally the whole aircraft is decorated with one thin coat of Humbrol enamels (that yellow underside is really flash!) and markings are hand-painted.



The cockpit, radio mast, wheel fairings and other details are then fitted and the whole thing is given one coat of Tufkote matted with Humbrol matting agent.

...and assemble

Make the best guess as to the length of a connecting rod, bend one from soft wire and fit to the idler arm. Connect the rod to the flap horns, swing the wing up into place and check that flap neutral coincides with elevator neutral. Adjust the length of the rod until this is achieved. Then make the 'proper' rod to this length from 16 swg wire and fit to the idler. Again bolt the wing in place and check for full and free control movement. Fit the wheels, engine, fuel tank, prop and spinner and check for CG location, which should be 1/2in. aft of F2 for reasonably aerobatic performance. If the CG is on, or forward of F2, it will fly like a team racer. As the aircraft is unlikely to be tail-heavy

Simple control linkage for detachable wing - all detailed on plan.

Above: Engine installation is compact! Top: Scale data from Model Aircraft, July 1963. Aircraft was designed and built in just nine weeks in those hectic days of 1940...

(this is the voice of experience!) some lead shot can be 'injected' over the top of the tailplane to achieve correct balance.

Performance

The prototype, with OS 10 FSR-S and Daniells silencer (plus half-an-ounce of tail-weight) weighs 15 oz, which I reckon is about two or three ounces too heavy for good performance. Nevertheless it will do loops, bunts, eights and fly inverted... vertical eights are just possible but are hard on the nerves! 40 ft. lines have proved best, and the ground handling is a dream, as might be expected from those big (scale!) wheels. I suspect the CG could afford to go still further aft, but I don't think manoeuvrability would be significantly improved, while the rock-steady level flight might well be sacrificed.

Build one! It looks great and flies beautifully... what more can one want?

AERO MODELLER

READERSHIP SURVEY

25 Free subscriptions must be won!

If you would like to receive a copy of your favourite magazine FREE for 6 months, simply complete this questionnaire and return by 21st October 1988 and you could be one of the lucky 25 people to win a 6 month subscription to AEROMODELLER.
Some of the questions are of a more personal nature and do not directly relate to the magazine.
Answers to these questions helps us present an overall profile of our readers and their lifestyles to advertisers who require such data for selecting suitable magazines for their products.
No names and addresses will be supplied to third parties and all details will be treated in the strictest confidence by the publisher.
We would like to thank you in advance for your time, and remind you that only fully completed questionnaires received by 21st October will be eligible for the FREE draw.

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1. How long do you keep your copies of AEROMODELLER for:

- Less than one month ☐
- One month ☐
- Three months ☐
- Six months ☐
- A year or more ☐

2. If kept, how often do you refer back to issues of AEROMODELLER?

- Once a week or more ☐
- About once a month ☐
- Once every three months ☐
- Less often ☐
- Never ☐

3. How long do you spend reading your copy of AEROMODELLER?

- Over 2 hours ☐
- 1½-2 hours ☐
- 1-1½ hours ☐
- ½-1 hour ☐
- Less than 1½ hour ☐

4. How long have you been an AEROMODELLER reader?

- Less than 3 months ☐
- 3-6 months ☐
- 7-12 months ☐
- 1-2 years ☐
- 2-5 years ☐
- Over 5 years ☐

5. How often do you buy AEROMODELLER?

- Occasional issues ☐
- Most issues ☐
- Every issue ☐

6. How much of AEROMODELLER do you read?

- Read only some articles ☐
- Read most articles ☐
- Read all articles ☐

7. With regard to the advertisements in AEROMODELLER, do you?

- Read or look through most or nearly all the ads. ☐
- Read or look through some of the ads. ☐
- Just read or look through the occasional ad. ☐
- Very rarely/never look at the ads. ☐

8. Which of the following would you most like to see featured with the magazine (please tick one box only)?

- Cover mounted gifts ☐
- Additional supplements ☐
- Competitions ☐
- Money saving offers ☐

9. Does anyone else read your copy of AEROMODELLER?

- No, only myself ☐
- One or two other people ☐
- Three or four other people ☐
- More than four other people ☐

10. If your copy of AEROMODELLER is read by other people, please give details of their age and sex:

	PERSON 1	PERSON 2	PERSON 3	PERSON 4
AGE: 9-14 YRS	☐	☐	☐	☐
15-24 YRS	☐	☐	☐	☐
25-34 YRS	☐	☐	☐	☐
35-44 YRS	☐	☐	☐	☐
45-54 YRS	☐	☐	☐	☐
55-64 YRS	☐	☐	☐	☐
OVER 64 YRS	☐	☐	☐	☐
SEX: Male	☐	☐	☐	☐
Female	☐	☐	☐	☐

11. Thinking specifically about the advertising content, would you please rate the two main types of advertisement:

	DISPLAY	CLASSIFIED
Very useful	☐	☐
Useful	☐	☐
Quite useful	☐	☐
Not very useful	☐	☐
Not at all useful	☐	☐

12. With respect to the articles in AEROMODELLER, how do you rate the following:

	POOR	AVERAGE	GOOD	EXCELLENT
Hangar Doors	☐	☐	☐	☐
Scale Matters	☐	☐	☐	☐
Free Flight Scene	☐	☐	☐	☐
Vintage Corner	☐	☐	☐	☐
From The Handle	☐	☐	☐	☐
Mind The Lines	☐	☐	☐	☐
Balsa Cuttings	☐	☐	☐	☐
Kit Reviews	☐	☐	☐	☐
Shop Talk	☐	☐	☐	☐
Aircraft Described	☐	☐	☐	☐
World News	☐	☐	☐	☐
Model News	☐	☐	☐	☐
Readers' Letters	☐	☐	☐	☐
Flyleaves (Book Reviews)	☐	☐	☐	☐
The Sky's The Limit	☐	☐	☐	☐
Motor Mart	☐	☐	☐	☐

13. Would you like to see more or less coverage given to the following:

	MORE	LESS	SAME
Scale	☐	☐	☐
Vintage	☐	☐	☐
Control Line	☐	☐	☐
Radio Control	☐	☐	☐
Free Flight	☐	☐	☐
Unorthodox	☐	☐	☐
Competition Models	☐	☐	☐
Sports Models	☐	☐	☐
Electric Flight	☐	☐	☐
New AM Plans Service Designs	☐	☐	☐
Full Size Model Plans	☐	☐	☐
Full Size Aviation news	☐	☐	☐
Scale References, including Drawings	☐	☐	☐
Contest Reports	☐	☐	☐
Constructional Advise	☐	☐	☐
Beginners' Features	☐	☐	☐
Competitions	☐	☐	☐

14. Which other aeromodelling magazines do you read and how often?

	NEVER READ	READ OCCASIONALLY	READ REGULARLY
RCM&E	☐	☐	☐
Radio Modeller	☐	☐	☐
RC Model World	☐	☐	☐
Scale Models	☐	☐	☐
Model Mart	☐	☐	☐
Model Aviation (US)	☐	☐	☐
Model Builder (US)	☐	☐	☐
Flying Models (US)	☐	☐	☐

15. If read, how do they compare with AEROMODELLER?

	NOT AS GOOD AS AEROMODELLER	AS GOOD AS AEROMODELLER	BETTER THAN AEROMODELLER
RCM&E	☐	☐	☐
Radio Modeller	☐	☐	☐
RC Model World	☐	☐	☐
Scale Models	☐	☐	☐
Model Mart	☐	☐	☐
Model Aviation (US)	☐	☐	☐
Model Builder (US)	☐	☐	☐
Flying Models (US)	☐	☐	☐

16. Please give any further comments or criticisms that you feel will help us improve AEROMODELLER.

.....

.....

.....

17. Have you ever built (or do you intend to build) a model from our full size plans?

YES ☐ NO ☐

18. How long have you been modelling?

Less than 1 year ☐
1-2 years ☐
3-5 years ☐
Over 5 years ☐

19. Have you ever competed, or do you intend to compete one day in a model flying competition?

YES ☐ NO ☐

20. Do you belong to:

BMFA ☐
SAM 35 ☐
CLAPA ☐
BARCS ☐
BMPRA ☐
BRCHA ☐
Local club ☐

21. Do any of your children follow your interest in free-flight and control-line aircraft?

YES ☐ NO ☐

22. How much do estimate having spent on your aeromodelling hobby during the last 12 months?

Nothing ☐
Up to £25 ☐
£25-£50 ☐
£51-£100 ☐
£101-£200 ☐
£201-£400 ☐
£401-£600 ☐
£601-£800 ☐
over £800 ☐

23. Have you ever bought products after reading an advertisement in AEROMODELLER?

Regularly ☐
Occasionally ☐
Never ☐

24. Do you own a personal computer?

YES ☐ NO ☐

25. If your answer to the previous question is YES, please state which model you own.

_____.

26. Are you aware of the scheduled publication day?

YES ☐ NO ☐

27. If the answer to the previous question is YES, do you attempt to purchase the magazine on that day?

YES ☐ NO ☐

28. How do you normally obtain your copy?

Chance purchase ☐
Newsagent shop collection ☐
Newsagent home delivery ☐
Subscription ☐
Passed on copy ☐

29. If you are a subscriber, on which date did you receive this issue?

☐☐ / ☐☐ / ☐☐

30. If you are a subscriber, how long have you subscribed to this magazine?

1-6 months ☐
7-12 months ☐
1-2 years ☐
3-5 years ☐
6-10 years ☐
Over 10 years ☐

31. If you do not obtain your copy by subscription, is it due to one of the following:

Subscription too expensive ☐
Not every issue required ☐
Not aware subscription service available ☐

32. Are you aware that to subscribe to this magazine in the U.K. is the same cost as purchasing it in a shop?

YES ☐ NO ☐

33. Would you like to receive further details on taking a subscription?

YES ☐ NO ☐

34. If you do not subscribe, from which type of newsagent do you most often obtain your copy?

High Street shop ☐
Estate shop ☐
Corner Shop ☐
Travel point ☐
Other (please specify) ☐

_____.

35. If you have subscribed to this magazine but now lapsed, is it due to:

Subscription too expensive ☐
Every issue no longer required ☐
Lateness in receiving subscription copy. ☐
Poor service from our subscription bureau ☐

36. What is your marital status?

Married ☐
Single ☐
Divorced ☐

37. Age (please tick)

Under 15 yrs ☐
15-18 yrs ☐
19-21 yrs ☐
22-24 yrs ☐
25-34 yrs ☐
35-44 yrs ☐
45-54 yrs ☐
55-64 yrs ☐
Over 64 yrs ☐

38. Sex:

Male ☐ Female ☐

39. Are you.....?

In full-time employment ☐
In part-time employment ☐
Not employed at present ☐
Retired ☐
Student - full-time ☐
Student - part-time ☐

40. If in full-time employment, please state your occupation:

_____

41. If student, what subjects studied?

_____

_____

_____

42. Please tick the box which represents the annual total of your gross income:

Under £6,500 ☐
£6,501-£8,000 ☐
£8,001-£10,000 ☐
£10,001-£12,500 ☐
£12,501-£15,000 ☐
£15,001-£19,000 ☐
£19,001-£25,000 ☐
Over £25,000 ☐

43. Which of the following do you have?

Bank current account ☐
Bank deposit or savings account ☐
Life assurance policy ☐
Any stocks or shares ☐
Access card ☐
Barclaycard (Visa) ☐
American Express ☐
Diners Club ☐
Unit Trusts ☐
Private medical ins. ☐
Personal Accountant ☐
Building Society account ☐
A mortgage ☐
Any H.P. agreements ☐
Telephone ☐

44 How many cars are there in your household?

None ☐
One ☐
Two ☐
Three or more ☐

45. What cars do you own?

_____

_____

_____

46. Is one or more of your cars a company vehicle?

YES ☐ NO ☐

47. Do you usually buy your cars new?

YES ☐ NO ☐

48. How often do you tend to change your car(s)?

Once a year or more often ☐
About every two years ☐
About every three years ☐
Less often ☐

49. Do you listen to commercial radio stations?

YES ☐ NO ☐

50. Do you smoke?

Cigarettes ☐
Cigars ☐
Pipe ☐
Don't smoke ☐

51. Do you own a:

Stereo/Hi-Fi system ☐
Tape player/recorder ☐
Video recorder ☐
T.V. ☐
None of the above ☐

52. Do you have any of the following cards either yourself or jointly with another person?

Cash dispenser card ☐
Retailer card/store card ☐

53. Do you own your own home, rent or live with your parents?

Own ☐
Rent ☐
Live with parents ☐
Other (please specify) ☐

_____

54. If you own your own home, what is the approximate value (your principal residence if you have more than one)?

Under £50,000 ☐
£50,000-£74,999 ☐
£75,000-£99,999 ☐
£100,000-£149,999 ☐
£150,000-£200,000 ☐
Over £200,000 ☐

55. How many rooms does your home (or principal residence) have?

	1	2	3	4	5	6
Bedrooms	☐	☐	☐	☐	☐	☐
Reception rooms	☐	☐	☐	☐	☐	☐

56. If you have children, please indicate their age and sex (give details of the four youngest if you have more than four.)

	FIRST	SECOND	THIRD	FOURTH
AGE: 1-3 yrs	☐	☐	☐	☐
4-8 yrs	☐	☐	☐	☐
9-12 yrs	☐	☐	☐	☐
13-16 yrs	☐	☐	☐	☐
Over 16 yrs	☐	☐	☐	☐
SEX: Male	☐	☐	☐	☐
Female	☐	☐	☐	☐

57. How many of the following items do you buy, on average, over a month?

	LESS THAN 1 PER MONTH	1 or 2	3 or 4	5 or 6	MORE	NEVER BUY
A book	☐	☐	☐	☐	☐	☐
A record	☐	☐	☐	☐	☐	☐
A tape	☐	☐	☐	☐	☐	☐

58. Please indicate below when you last did any of the following:

	IN LAST WEEK	IN LAST MONTH	LONGER AGO
Ate out at a Restaurant	☐	☐	☐
Entertained at home	☐	☐	☐
Went to the theatre/opera/ballet	☐	☐	☐
Went to a music concert	☐	☐	☐
Went to the cinema	☐	☐	☐
Attended at sporting event	☐	☐	☐
Visited an art gallery/museum	☐	☐	☐
Went to a pub	☐	☐	☐
Had a short break in a hotel.	☐	☐	☐
Overseas holiday (in last 12 months.)	YES ☐		NO ☐

59. Which of the following do you drink?

	MORE THAN ONCE A WEEK	ONCE A WEEK	LESS OFTEN
Beer	☐	☐	☐
Lager	☐	☐	☐
Wine	☐	☐	☐
Sherry	☐	☐	☐
Port	☐	☐	☐
Brandy	☐	☐	☐
Gin	☐	☐	☐
Rum	☐	☐	☐
Vodka	☐	☐	☐
Whisky	☐	☐	☐
Liqueurs	☐	☐	☐
DON'T DRINK	☐		

60. Where do you buy most of your drink from?

An Off-licence ☐
A supermarket ☐
A Public House ☐
Other (please specify) ☐

_____

61. Are you a member of a book club?

YES ☐ NO ☐

62. Are you a member of a record club?

YES ☐ NO ☐

63. Name the three television programmes you watch most regularly

_____

_____

_____

64. Other than items purchased for your aeromodelling, have you bought any other types of goods by mail-order during the past 12 months ?

YES ☐ NO ☐

65. If the answer to the previous question is YES, please state the type(s) of goods purchased.

_____

_____

_____

_____

66. Which, if any, of these sports and activities do you play or take part in nowadays?

Cricket	☐
Fishing	☐
Golf	☐
Rugby	☐
Soccer	☐
Sailing	☐
Skiing	☐
Shooting	☐
Swimming	☐
Squash	☐
Tennis	☐
Weight training	☐
Windsurfing	☐

67. Which of the stores listed below have you been shopping in during the last six months?

Boots	☐
W.H. Smith	☐
John Menzies	☐
Dixons	☐
Currys	☐
Laskys	☐
Rumbelows	☐
Burtons	☐
Austin Reed	☐
Hornes	☐
Next	☐
Fosters	☐

68. Which of the following newspapers do you read?

The Times	☐
The Daily Telegraph	☐
The Financial Times	☐
The Guardian	☐
The Independent	☐
The Daily Express	☐
The Daily Mail	☐
The Daily Mirror	☐
The Sun	☐
Today	☐
None of the above	☐

69. Which of the following Sunday newspapers do you read?

The Sunday Times	☐
The Observer	☐
The Sunday Telegraph	☐
The Sunday Express	☐
The Mail on Sunday	☐
The Sunday Mirror	☐
The People	☐
The News of the World	☐
News on Sunday	☐
None of the above	☐

To enter our FREE draw, fill in your name and address details and fold as shown below. Remember all entries must be returned by 21st October 1988

NAME.....

ADDRESS.....

.....

COUNTY.....

POSTCODE.....

To post, fold on the dotted line A. Fold again at B and C and tuck B into flap formed by C.

A

Postage will be paid by licensee

Do not affix postage stamps if posted in Gt Britain, Channel Islands, N. Ireland or the Isle of Man.

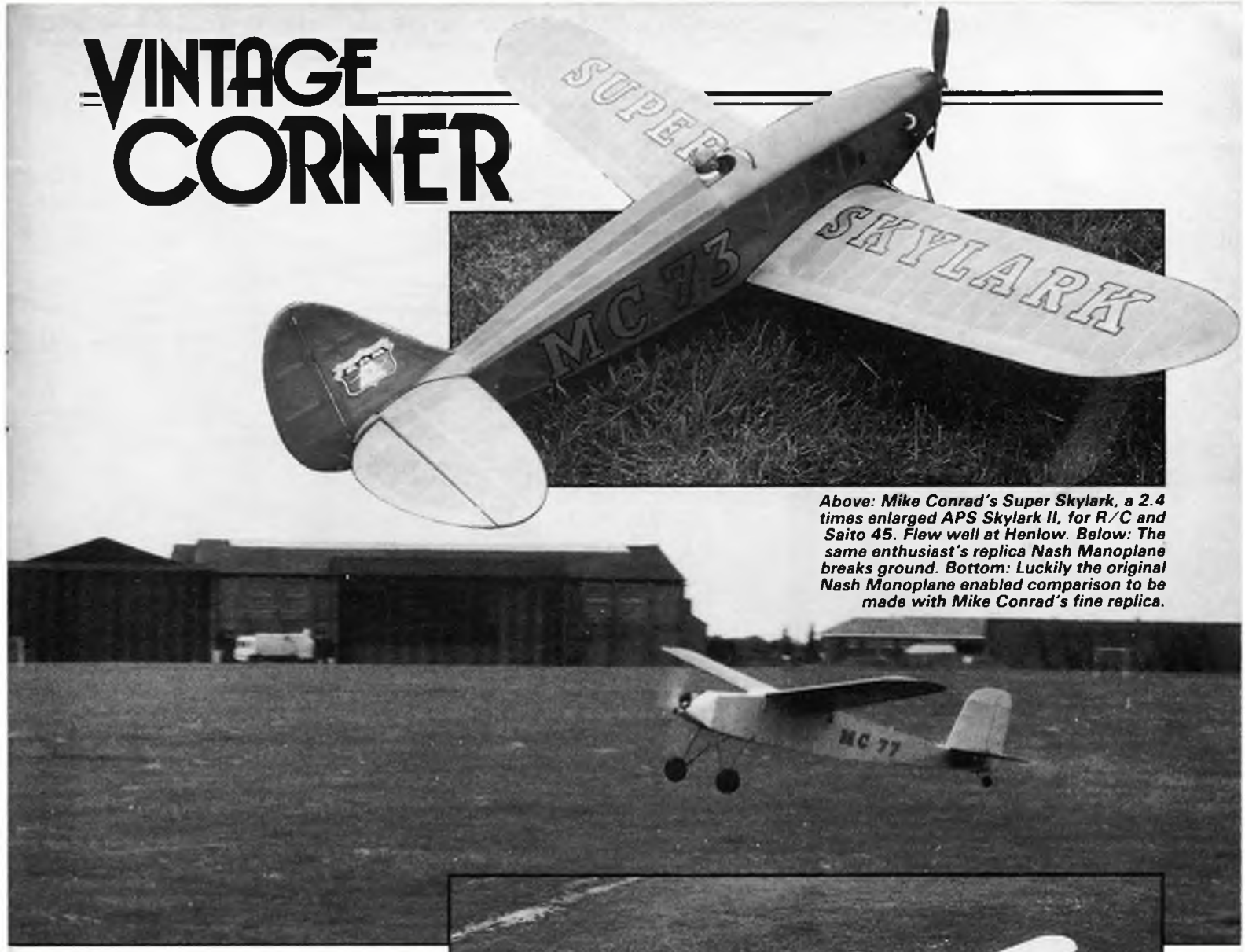
BUSINESS REPLY SERVICE
Licence No. WC3970

AEROMODELLER
ASP Ltd.
No 1. Golden Square,
LONDON
W1R 3AB

C

B

VINTAGE CORNER



Above: Mike Conrad's Super Skylark, a 2.4 times enlarged APS Skylark II, for R/C and Saito 45. Flew well at Henlow. Below: The same enthusiast's replica Nash Manoplane breaks ground. Bottom: Luckily the original Nash Monoplane enabled comparison to be made with Mike Conrad's fine replica.

Around the rallies – and other affairs – with Alex Imrie

IN successive Sundays in July, three meetings took place that always produce a goodly crop of Vintage models, so I was all keyed-up for a hectic bout of reporting (*Really? GC*). Alas! The weather did not co-operate. Wet and windy conditions, plus a conflict of other meetings, kept the attendances down at all three functions. The ASP Golden Era Day at Old Warden on 10th July was completely rained-out by a true Scotch Mist that soaked everything and everybody regardless of attire, although some stalwarts did brave the elements, and a number of R/C models made brief circuits. However, the sight and sound of two full-size Spitfires doubtless made it a memorable occasion for some. Shuttleworth's Mark V journeyed to and from Duxford, and Rolls Royce's Griffon powered example, also ex-Duxford, performed a slow roll over the aerodrome in the scud and driving rain as the pilot flew home to tea. So it was a dismal day from the aeromodelling point of view, but I enjoyed the chin-wags with enthusiasts that non-flying weather always brings; and that crackle of the Merlin never fails to act as a tonic after all these years. Afterwards, the rain didn't seem to be *quite* as wet as previously!

Midland Area Vintage Rally

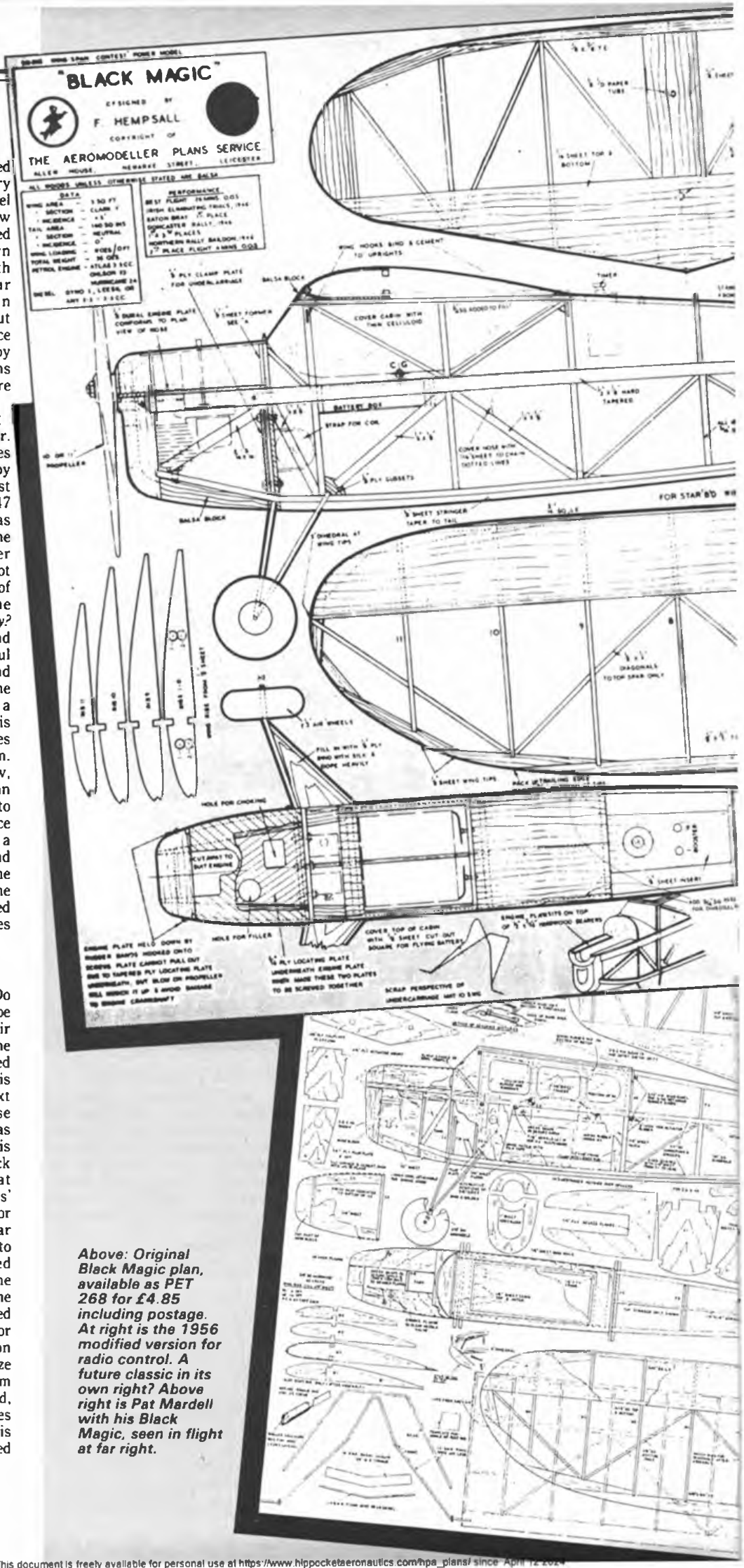
The SMAE South Midland Area held this meeting at RAF Henlow a week before the Golden Era meeting, and during a promising morning, which was windy but dry, the early birds got some flying in once the vintage R/C fliers had congregated near the control tower. Models seen included a splendid Rudderbug by Peter Harvey, but before it had a chance to fly, it was caught by a gust of wind and went over onto its back, breaking the wing dowels. This unfortunate happening reminded me of the advantage of using the C E Bowden system of wing joining whereby only short 1/4in. dowels are used as locators, the two wing halves being held together by hooked rubber bands at leading and trailing edges and both above and below the main spars. When such a model turns turtle, the bands stretch and the short dowels pop out of their respective holes in the other wing half with absolutely no damage whatsoever. Of course, Peter was using the correct Rudderbug method, but I'll bet that if the Colonel had built that model it would have had his well-proven, practical, wing joining set-up! (*Hmmm. Authenticity? GC*). Peter Foulsham brought a reduced size Albatros, designed by George Reich and described in the April 1941 Air Trails, powered by an Indian Mills .75; but conditions were too severe for flight. Brian Downham made one

To complete a Conrad quartet of photos – here he is with his Mills 1.3 powered Gordon Rae designed Newboy.

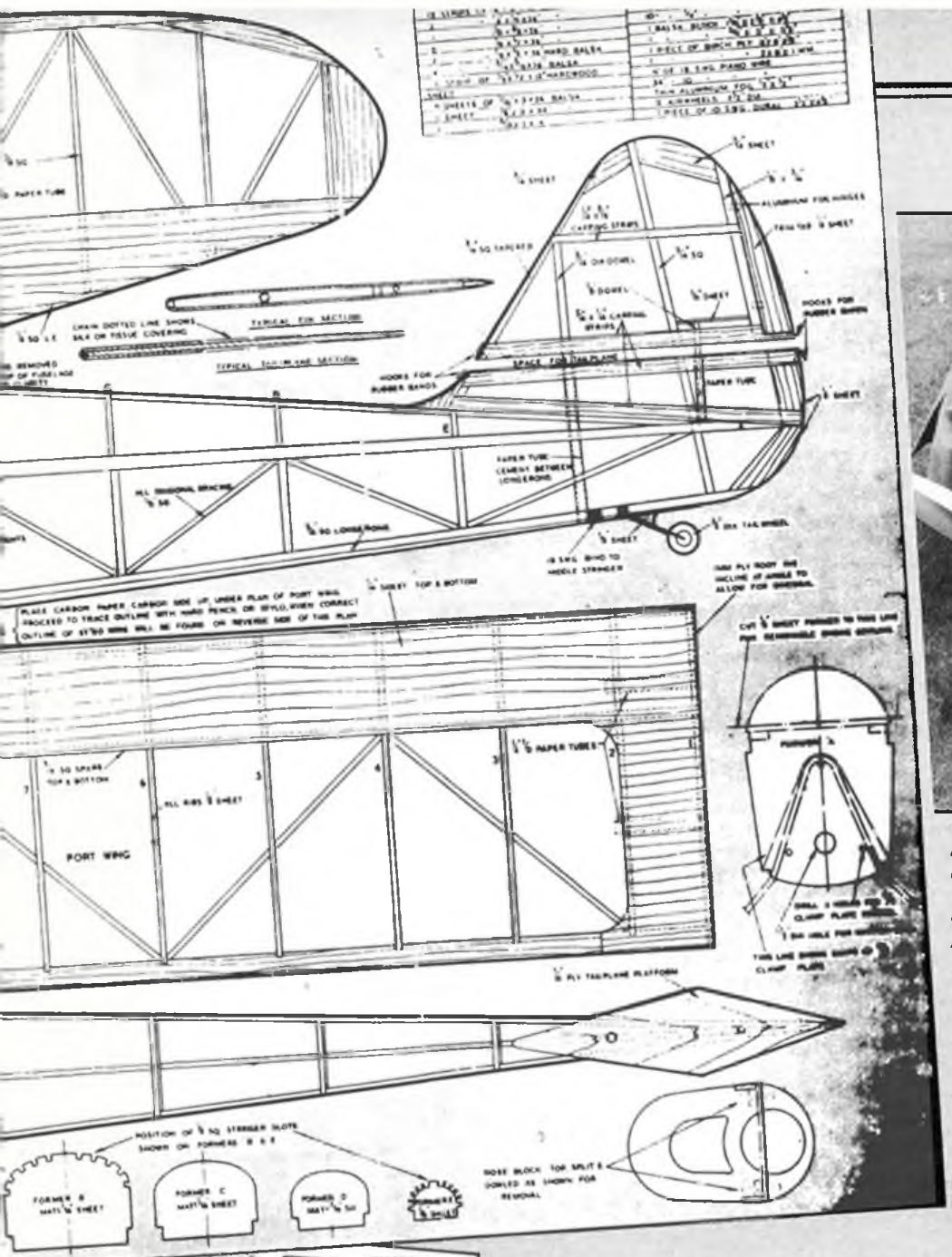
flight with his Keil Kraft Falcon, repaired after a recent accident; and managed a hairy wing-tip landing. As a diversion Michael Barton tried to run his diesel engine on glow fuel after getting the fuel containers mixed up! There was the usual field of better known models, but I spent most of my time with Mike Conrad, who, inspired by our description of the Nash Monoplane in February Vintage Corner, had quickly put Terry Rose's fine drawings to use to produce a splendid R/C Assist replica. Powered by an old twin-plug Merco 49 the model weighs five pounds, which is not so very much more than the original thanks to miniaturised R/C equipment. The model flies well, being completely stable; and looks fine in the air. Another of Mike's models was a 2.4 times enlarged Skylark II, originally designed by H J Pridmore as a rubber model and first described in the November 1947 Aeromodeller. No doubt Mike's attention was alerted to this attractive design by the June 1986 *Aeromodeller* description of Peter Michel's 'revival' prototype. Although I do not condone changes in size and purpose of Vintage designs, this one caused me 'furiously to think'! (*Hmmm. Authenticity? GC*) Powered by a Saito 45, it purred around just like a full-size aeroplane. A beautiful machine. Mike flew both the Nash and Skylark in true Vintage fashion, letting the models do the flying; only feeding them a correction or two from time to time. His manner of operation showed the advantages of having variable rates in the control system. At cruising speed with plenty of airflow, normal control movement would result in an overly sensitive model, so this is reduced to allow smooth flying akin to free flight, since manoeuvres are accomplished in such a gentle manner. However, during take-off and landing, especially in gusty conditions, the increased rate of servo throw allows the necessary coarse control movements required because of the slow airspeeds at these phases of flight.

Unnatural flight

Now for something completely different! Do we accept that Vintage models should be flown in the manner appropriate to their kind? Mike Conrad's fine handling of the Nash and the Skylark models, described above, proved that he is a past master at this business. At the Midland Rally he next demonstrated three models whose performance was, to me, as uninspiring as the previous two had been excellent. His Gordon Rae designed Newboy, with black undersurfaces to improve visibility at altitude; his example of Norman Marcus' Jaded Maid with its flat bottomed aerofoil for better wind penetration (the triangular section fuselage was apparently, a 'pig to build') and his John Stainer designed Sugarfoot, fitted with a Mills 1.3 (the background story of which was told in the May 1985 Vintage Corner) were all geared to the Flying Fifteen concept. But flying for endurance with high-performance pylon models like these, keeping the engine size down to a maximum of 1.5cc for maximum advantage of the measured fuel allowed, provides a disappointing spectacle. It shakes me even to try and fathom out how this approach to vintage power flying ever gained



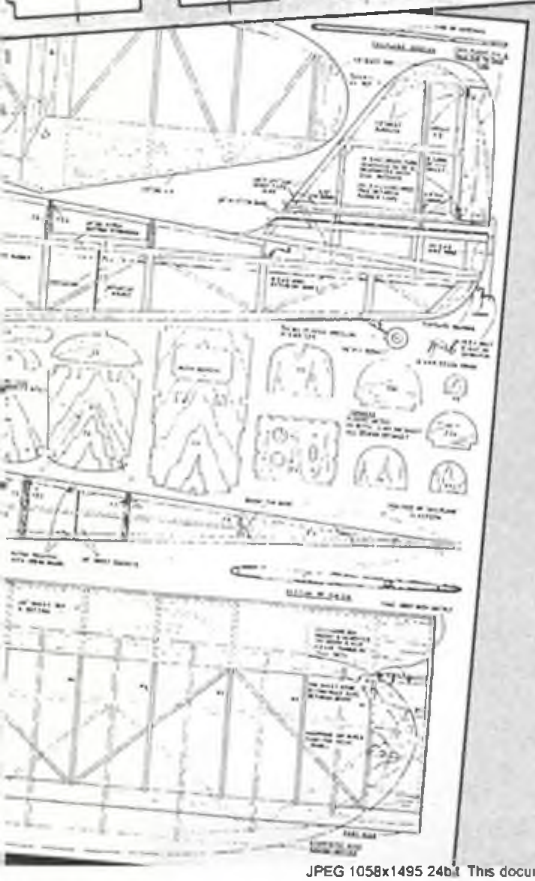
Above: Original Black Magic plan, available as PET 268 for £4.85 including postage. At right is the 1956 modified version for radio control. A future classic in its own right? Above right is Pat Mardell with his Black Magic, seen in flight at far right.



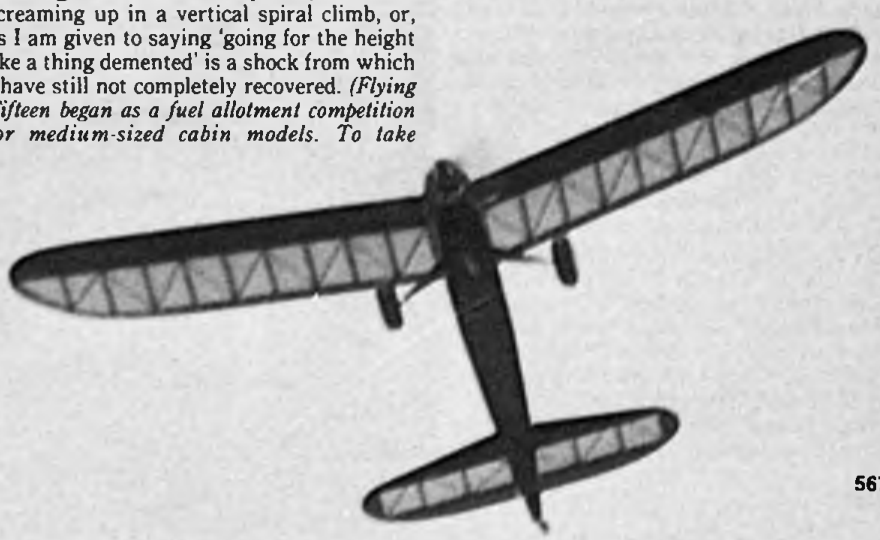
advantage of the rules larger models have been adopted; flying in the manner described will win competitions. Flying Fifteen is a modern class. Perhaps it is a mistake to expect Vintage performance. GC).

Rubber action at Henlow

The rain started lightly, but gradually increased in that way which heralds the approach of a warm front and means, in these latitudes, that we are in for a prolonged period of precipitation (*he means: it'll stay wet. GC*) and this terminated what activity there had been in Vintage R/C. But during the morning one had been aware of the veritable hive of activity over at the upwind aerodrome boundary where the free-flighters were doing their stuff. It takes more than wind and moisture to stop these fellows, who come equipped to take the worst kind of weather in their stride. Under beach umbrellas, motors were still being wound; timers were found and models launched into the murk, while competitors clad in wellington boots and oilskins hared-off across the aerodrome after their models borne on the strongeasterly wind. I have the greatest admiration for the



acceptance. These were the 'hot ships' of their day; if we wish to recapture the aura that surrounds their shapes, names and achievements they should surely be flown full-bore on a twenty-second engine run, and then flown by R/C guidance against the elements for endurance or ratio, which always used to be the name of the game. To see a pylon model meandering off in a near-level flight attitude on low power, instead of screaming up in a vertical spiral climb, or, as I am given to saying 'going for the height like a thing demented' is a shock from which I have still not completely recovered. *(Flying Fifteen began as a fuel allotment competition for medium-sized cabin models. To take*



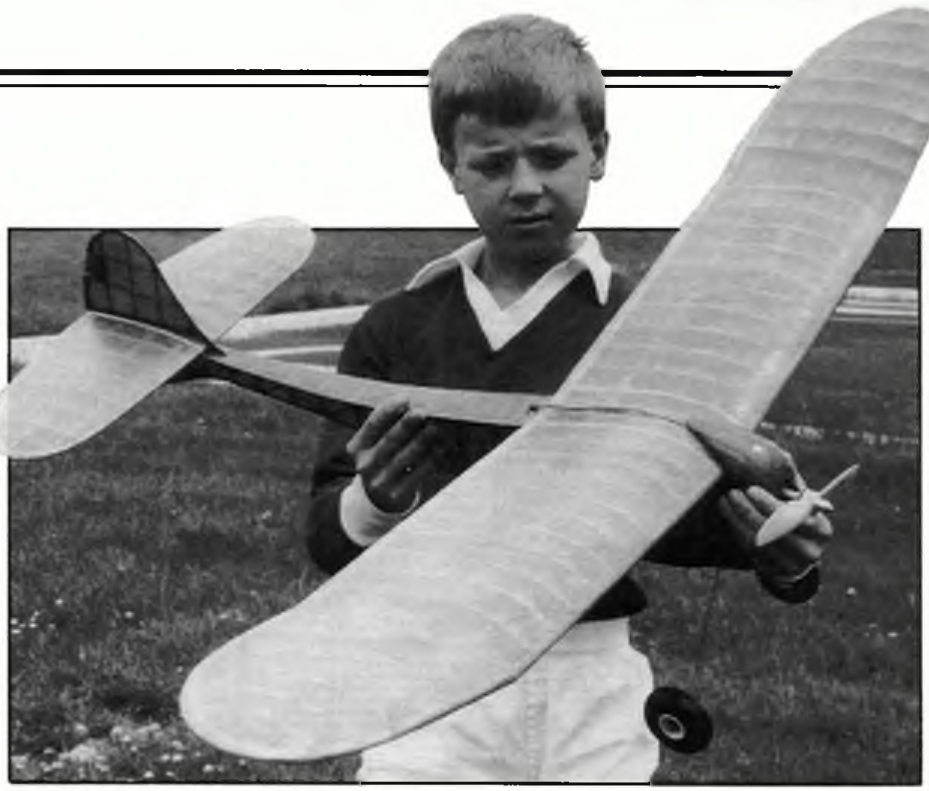
rubber enthusiasts, who kept at it all day and were obviously enjoying themselves. More active than the hopeful contestants for the Bowden Trophy who spent their time in cars, steaming up the windows meanwhile, reminiscing about drier days and fondling oily engines that they had brought along to trade or show. I know, because I was with them! Conditions being unsuitable, the Bowden Trophy was not flown. Instead, it will be held at Barkston Heath on a date to be announced.

Shuttleworth Model Group Day

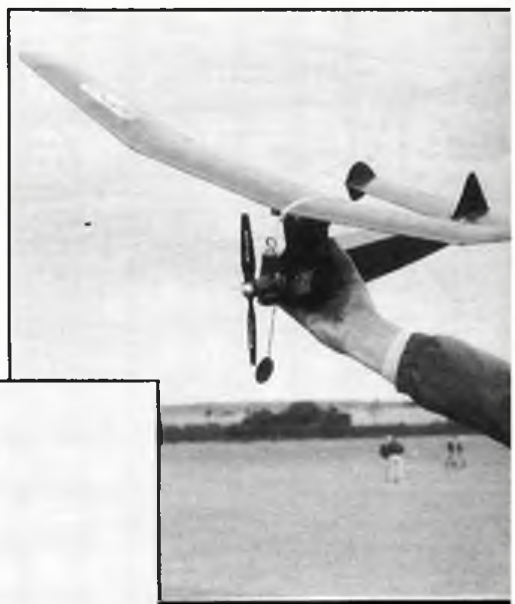
Vintage enthusiasts are gluttons for punishment. After the two previous meets had been rained-off, the moist conditions of the early morning of 17th July did not prevent keener types from attending at Old Warden. Soon the rain stopped, but the near calm gave way to a strong, blustery wind which, coming from the north-west, meant that there was no sheltered area on the aerodrome. Modellers had to hope that the wind might abate. Lo! and behold; in the afternoon it did just that so we were treated to some splendid flying.

One feature of this meeting was not only the surprising variety of the models but the selection of engines that powered them, A number of Black Magics were present. This fine thoroughbred from Fred Hempsall's drawing board claimed many competition successes in the late 1940s and was first described in the September 1947 *Aeromodeller*. Tony Penhall's, finished in orange and cream Solartex, was powered by a rare front rotary valve Reeves 6cc petrol engine from around 1946 (unfortunately installed upright). A steady performer. Ken Tansley, whose pale green and white example is powered by a PAW 15, confirms that this design is well worth modelling. Fred Hempsall's original had an Ohlsson 23 installed inverted in a nicely shaped nose on a uniquely easily-removeable duraluminium engine plate, and Ken used the same arrangement. This is a beautiful design that looks right. One can't have too many Black Magics; truly a classic British power model. Would-be builders are alerted to the fact that an R/C-modified plan from 1956 contains some modifications and a beefed-up structure. Free-flighters should ensure that they have the non-radio plan to work from (reference PET/268; price £4.25 plus 60p postage from ASP).

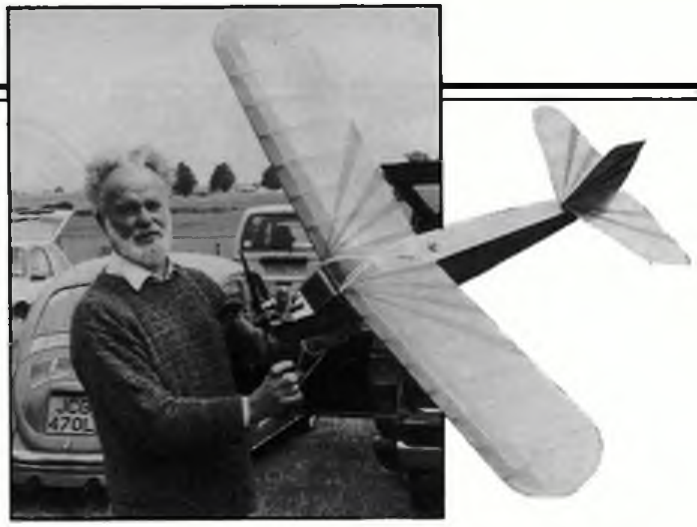
Colin Watts was spotted refining the glide of his Arden .09 ignition powered Hells Angel, a Ron Warring design kitted by Precision Aircraft for only 15/- (75p) in 1947, that owes much to Louis Garami's famous Strato Streak. Noel Barker, flying John Haggart's old Kanga Kub managed to put the model into the trees some thirty feet from the ground, but this machine knows the Old Warden woods well since it has roosted there on three previous occasions! Help was at hand, and Brian Welch got the model down in fairly quick time with his telescopic roach-pole, a piece of tackle that proves invaluable in such situations. Noel also brought his Southern Star, made from full-size drawings provided by the John Pond Old Time Plan Service, and extra information from the 1934 Zaic Yearbook reprint. This model, powered by a Mighty Midget engine, was designed by Bunny Ross and won the 1938 Bowden Trophy, thereafter being kitted exclusively by Hamleys of Regent Street at what was then the hefty price of £4.0s.0d. The kit contents would make one lick one's lips in anticipation today. Included were a hand-carved propeller, colour dope, pneumatic wheels, silk, and a German Autoknips camera timer. Noel's model is powered by a Brown Junior Model D fitted with a modified intake incorporating an air choke (not originally fitted to this variety of Brown Junior). He built the model some two years ago but had not previously flown it because of lack of suitable flying sites and a pre-occupation with radio control. During a lull in the wind Noel test glided the model and then decided to try further. Warps in fin and wing (covered with Solartex, which does not give as rigid a covering as doped silk or nylon) had not escaped attention and Noel set a large amount of offset on the trim tab to compensate, but the area of the tab is relatively small and the setting was insufficient. The model raced across the short Old Warden grass to the business-like roar of the Brown Junior. Once off the ground it immediately went into a steep right-hand turn from which there could only be one ending. There was a resounding crack as it hit the ground. The rubber bands broke, as did the propeller, but this machine is strong and it sustained no other damage. The temptation to fly again immediately was great, but Noel nevertheless deemed



Peter Foulsham's half-size George Reich Albatros at Henlow held by his son, Gregory, who is growing up in the Vintage tradition. Model powered by Indian Mills .75.



Left: Tom Andrews at the Shuttleworth Model Day with his red and yellow Sunnanvind, the well-known 39 inch span Sigurd Isaacson design. Above: Colin Watts with his Arden .099 Hells Angel at the same meeting.



Mike Beach and the GHQ Robotaire. The lightweight tissue covered structure is suited to low engine power. 10 inch chord provides plenty of wing area in this 60 inch design.

discretion the better part of valour, and decided to remove the warps first before any 'ditto repeato', so we look forward to seeing Bunny Ross's masterpiece of design in the air at some later date.

Home-made Hallams

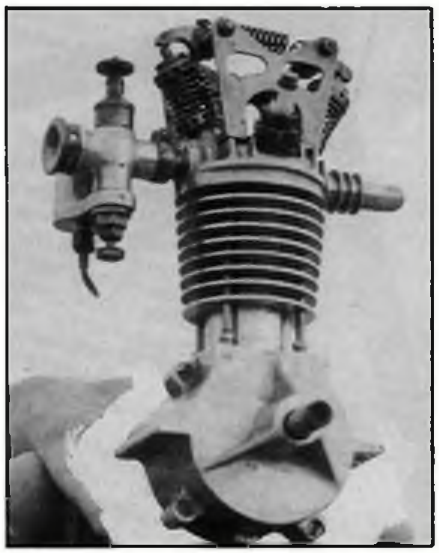
Attracted to a red-tissue-covered high wing cabin monoplane resting on the tailboard of Mike Beach's station wagon, I saw with surprise that it had a Hallam Nipper fitted. To my shame I could not identify the model although its shape seemed familiar. It was of King Burd size (sixty inches span) and very King Burd looking in appearance, although its wing was of greater chord; and the tapered tailplane I just could not place. Once I had given up, Mike reminded me that it was a Robotaire (months ago he had told me that he was building one!). If only I had been able to see the model from a low three-quarter front viewpoint, the sloping angle of its nose would have given all away; that particular image of this model had been staring at me from full page GHQ ads in Model Airplane News for more years than I care to remember!

The Robotaire appeared in June 1939 when it apparently replaced the GHQ Sportster originally designed for the Loutrel engine (see June's Vintage Corner), having first been flown in April 1935. Kitting rights of the design were obviously part of the deal when GHQ took over from the Loutrel Speciality Company early in 1936. Despite the claim that it was designed in 1939, the Robotaire has a 1935 look about it, and structurally is very similiar to both the King Burd and the GHQ Sportster of that vintage.

Not Vintage! Mike Callaghan's own design cabin job for the Urvine Mills, also at Old Warden.

The 6cc sideport Hallam Nipper, which appeared in mid-1936, was available both as a set of castings for home construction at 10/6 (53p) and as a finished engine complete with coil and condenser for £4.0s.0d. from the makers, J Hallam and Son of Poole in Dorset. A large number of sets of castings were sold over many years, model engineers doubtless being attracted to the advertisement which stated that the engine was 'easy to make'. But it was more difficult to make an engine that worked from these castings than the average enthusiast thought (some of these fellows did not even have a lathe, far less know how to use one!) and the amount of semi-machined Hallam Nipper bits, which have always been fairly easy to come by, bears witness to the many engines that remained unfinished. The engine was said to be capable of 3000rpm driving a fourteen-inch propeller, but it weighed six ounces (bare) and the maker's coil weighed eight ounces, so the modeller of the time was faced with a low powered engine, the complete installation of which weighed close to 1. 1/2 lbs. It is no wonder that there was no flood of models powered by home-constructed Nippers in the 1930s. Mike Beach runs his engine on diesel fuel with 20% castor oil added, maintaining that this keeps the engine cool and that as a result the Nipper's life has been prolonged approximately by a factor of three. The idea of a fuel that would mix with castor oil apparently started some ten years ago when Peter Russell was seen running his Ohlsson 60 on glow fuel and castor oil. Mike reinforced this 'castor oil thinking' when, having overheating trouble on his full-size Bleriot's three-cylinder Anzani he switched to Castrol R. For an engine with suspect clearances and finish, a good dose of castor oil seems to do the trick.

Mike flew his Robotaire a number of times during the afternoon. I had never before seen a model flying with this engine. The Nipper started easily and the model described consistent, circling flight without damage. The performance on marginal power was very like the flying that I obtain with my GHQ powered King Burd; slow and stately, where every foot of altitude gained is a battle against gravity. There is something about this that the zip and scream of the overpowered, skyrocket type model does not possess. Success is very satisfying indeed when one knows that the engine just might provide sufficient thrust to fly, if atmospheric conditions are right. It most certainly makes one appreciate what the power modellers were faced with in the mid-1930s; at least for those who could not afford to buy a Brown Junior or a Baby Cyclone. From every hundred enthusiasts who laboured away in home workshops (many of them with inadequate tools) making petrol engines just a few probably completed the engines and finally got them to run. Only one or two actually got them into a suitable model aeroplane and experienced the sort of flying that Mike Beach demonstrated to us at Old Warden; and remember, those pioneers did not have the experience or know-how that we possess today. Such flights for them at the time must, understandably, have made them feel ten feet tall!



This four-stroke 7.2 engine, now owned by Mike Beach, was made by H.L. Sharvell of Wembley in the mid-1930s. Tension spring across the rockers assists the valve operation. Enclosed contact breaker is fitted at rear of engine.

So this was a really enjoyable meeting, directly due to the enterprise of some of our keenest vintage enthusiasts. Well done, chaps.

the Bobt

Genesis of a Tailless glider. Ian Fairgrieve tells all...

AFTER EARLY attempts at flying wing models in the late 1940s with Floating Kidney and Flying Plank designs, my interest in the class lay dormant for many years.

In 1987 I built a model roughly based on the plan form of Sparrow (*Aeromodeller*, December 1961). It had a different aerofoil, structure and total area although I retained the same main wing-to-tip area ratio, and used twenty degrees twist on the tips. This model flew well; it towed straight with a meandering glide pattern, and encouraged me to try something bigger.

Bobtail is the result. It flew straight off the drawing board.

Design

I studied various designs. 20 to 30 degrees of sweepback seemed average, so I chose 20 degrees. The total area is slightly larger than that of an A/2; tip area is 25% of total. A low undercambered aerofoil section limited centre of pressure movement, and the main wing had no washout.

All the stabilization was placed at the tips using symmetrical sections which behave well at negative angles of attack. Detachable wing tips were incorporated so that tips of larger area or angle could be substituted if necessary. The end plates formed a suitable division between main wing and angled tip. The fuselage was added to form a keel and underfin, and to hold a timer and container for a folded-up parachute. It looked like a tail; hence the name Bobtail.

Building Bobtail

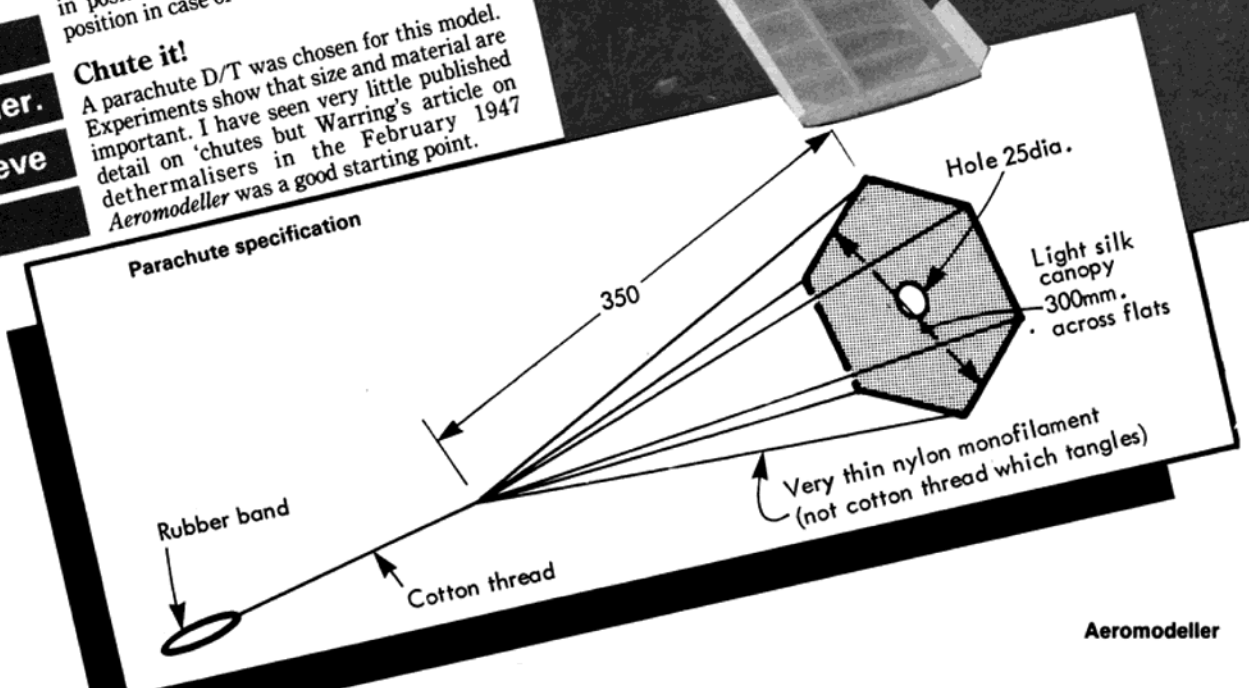
The drawings are almost self-explanatory. Choose grade and density of balsa to suit the component (light tips of course). Build both wing panels complete with spars but without the centre ply reinforced rib. Clamp together these ten ribs (in two sets of 5) in order of size and drill for wing dowel tubes. Complete the construction of the wing halves over a large building board, using the drilled ribs, tubes and straight wing dowels (later bent to give dihedral angle).

Tailless flying

Experiment with the best towhook position to give a slight weaving tow, and float model off top of line in a natural turn. This is important. If let straight off the towline, Bobtail may stall most of way down. Adjust one tip panel to achieve an open circle, by pivoting it about the leading edge, and lock in position by plastic screw (mark the TE position in case of a knock on landing).

Chute it!

A parachute D/T was chosen for this model. Experiments show that size and material are important. I have seen very little published detail on 'chutes but Warring's article on dethermalisers in the February 1947 *Aeromodeller* was a good starting point.



ail tale

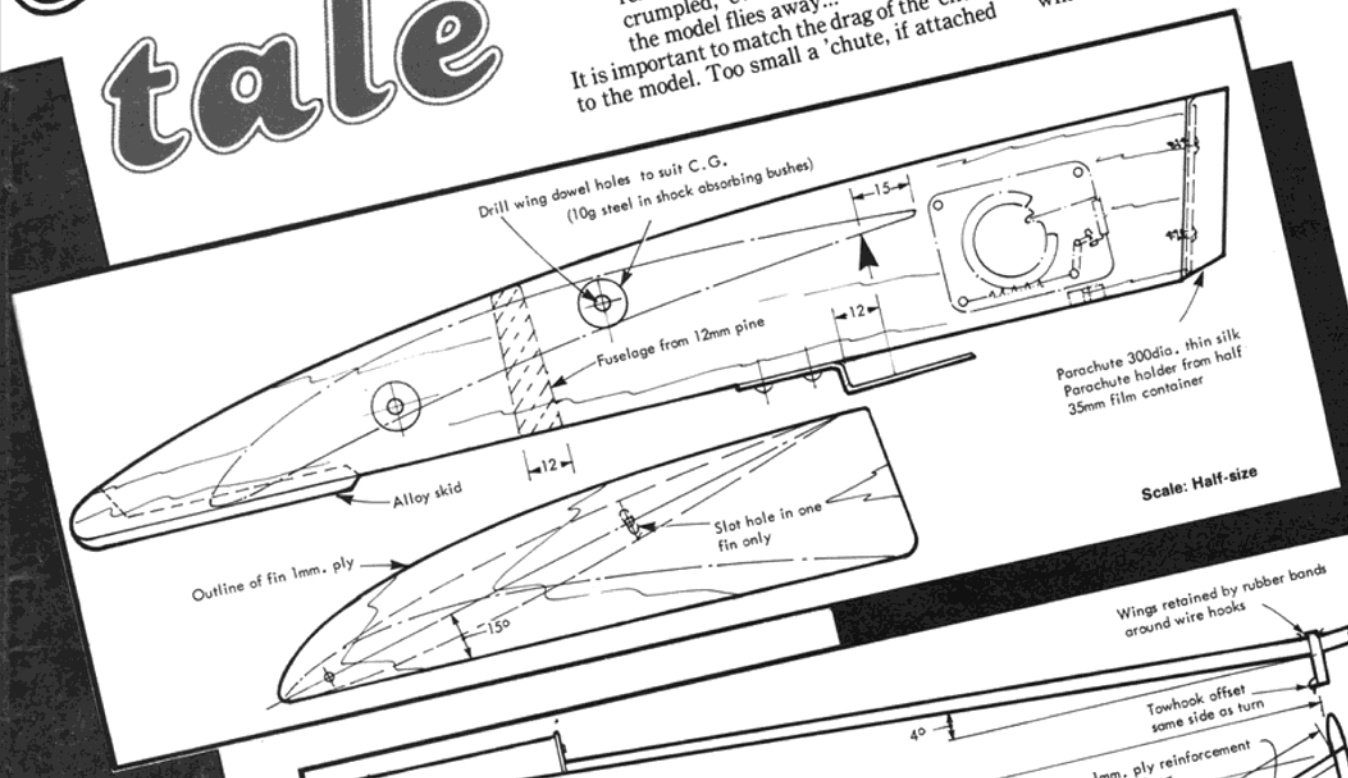
(i) Size: a simple hexagon 300 mm diameter is fine. 250 mm is too small. A classic shape 'chute of six panels sewn together is very good, but difficult to make.

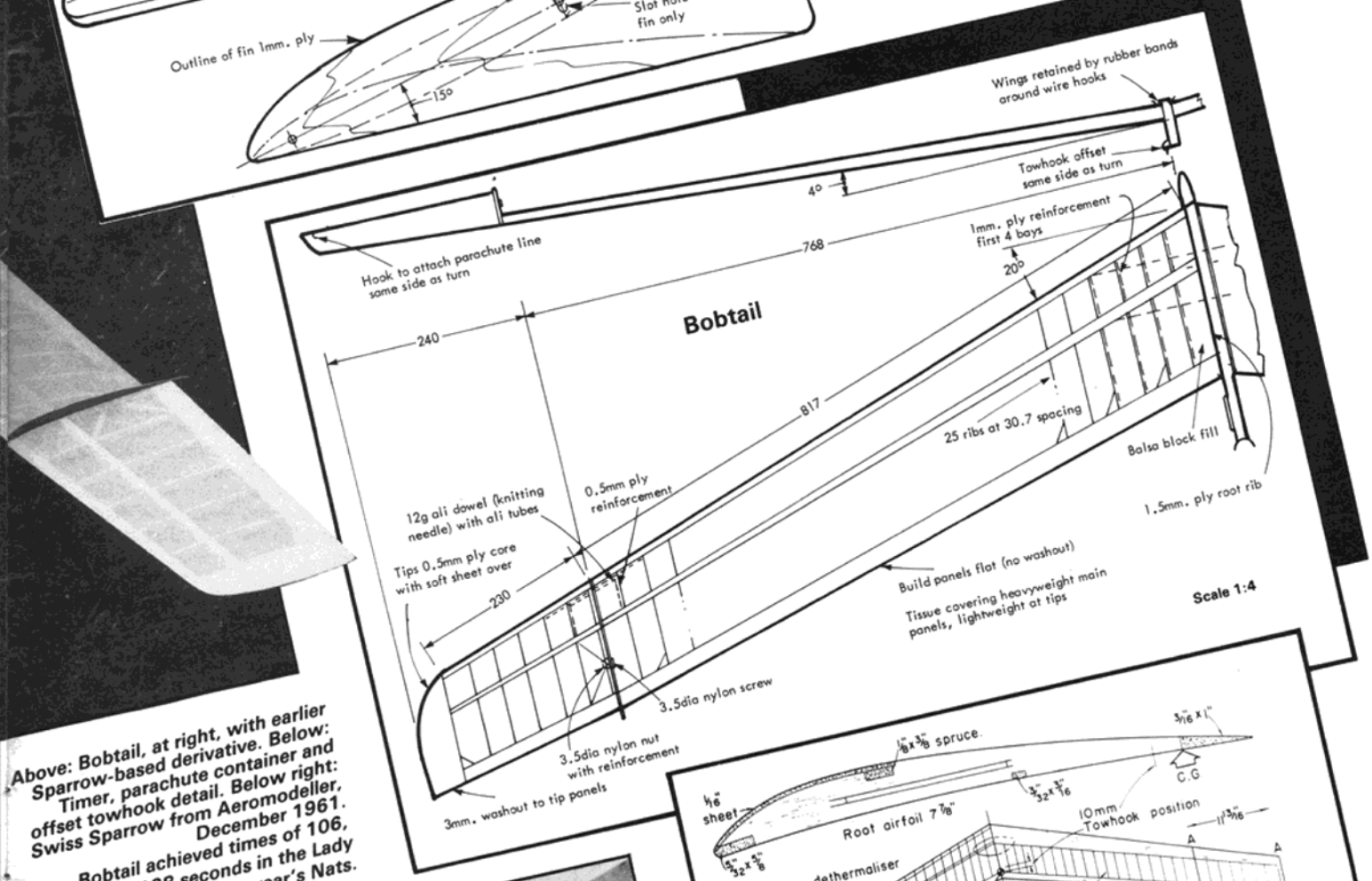
(ii) Material: Thin silk is best; chiffon and some nylons are not so effective. The 'chute must be carefully folded and placed in the container at rear of fuselage, but it must deploy when released by timer! Some materials stay crumpled, even when deployed, and the model flies away...

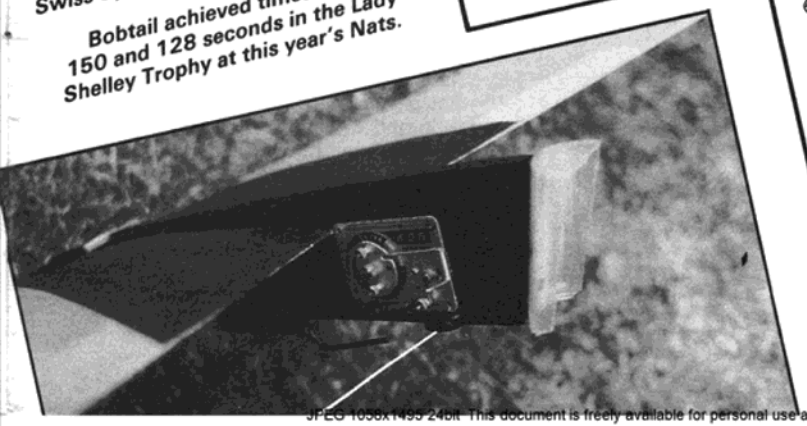
It is important to match the drag of the 'chute to the model. Too small a 'chute, if attached to the wing tip, will only tighten the turn with no loss of height in a thermal. Too large a 'chute spins the model down too fast with possible damage to tips.

I have made six 'chutes so far. The best is illustrated.

Simple layout of Bobtail has encouraged development and experimentation. Various combinations of wing tip area/angle and CG position, together with anti-warp structures, will keep me busy for some years...

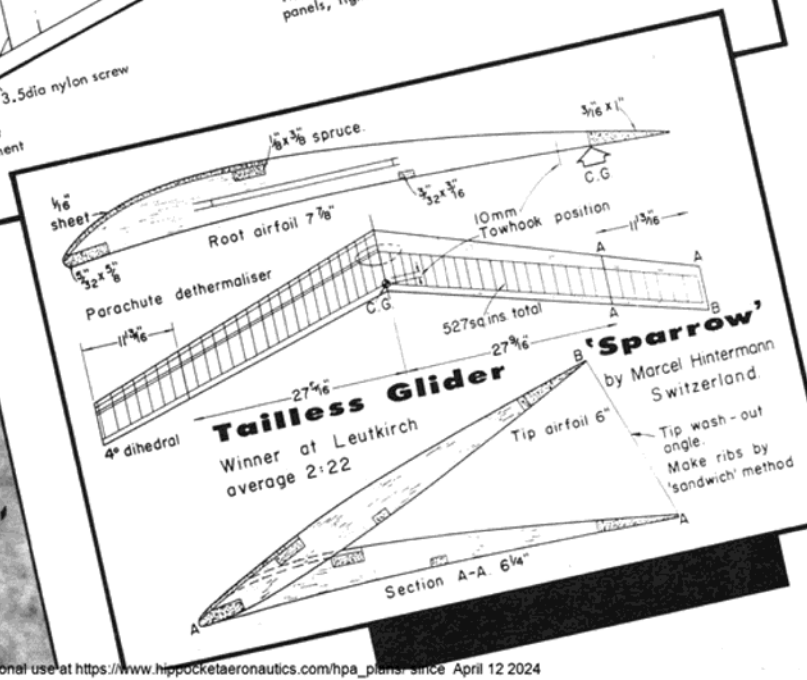






Above: Bobtail, at right, with earlier Sparrow-based derivative. Below: Timer, parachute container and offset towhook detail. Below right: Swiss Sparrow from Aeromodeller, December 1961.

Bobtail achieved times of 106, 150 and 128 seconds in the Lady Shelley Trophy at this year's Nats.



Jim Richmond wins again; USA take team award at Johnson City, Tennessee. Dateline 28th May – 1st June; report by Laurie Barr and Jim Henderson

1988 WORLD INDOOR CHAMPION

Amidst paraphernalia, Laurie Barr prepares for his second flight.

THIS YEAR'S World Indoor Champs were held at the Mini-dome in the campus of the East Tennessee State University, Johnson City. It houses a full-size American football pitch, together with very extensive training gymnasiums, as well as many offices and other facilities.

The dome is a huge structure, consisting of a large diameter arch that starts at ground level at 'goal post' ends and reaches a maximum height of 116ft. The roof runs straight across the site and compared to Cardington, where the maximum height of 150ft runs down the whole length of the shed, the best of the air space at Johnson City was confined to a central rectangle measuring approximately 80ft by 30ft in the centre. The weather was very hot and humid. Air conditioning was switched off to prevent turbulence so the air became very heavy.

The models Reg Parham and Laurie Barr took were far more suited to Cardington than Johnson City! All the winning models had thin wings, low-profile airfoils covered with tight film, and 'funny' props, either variable diameter (Jim Richmond), or variable pitch (Cezar Banks, Jack McGillivray, and others); they were rigged with minimal wing warps to allow them to fly very cleanly in this thick, hot air.

The winning approach

The three-day contest was organized to have practice flying in the mornings and two official flights in the afternoons, with no defined rounds. After the official opening ceremonies Canada's Mike Thomas had the very first model in the air to put a 37:17 flight on the scoreboard. Another five models had followed him and soon all were circling in the centre of the ceiling. Although there were two touches, miraculously there were no collisions; but it was obvious that air traffic control would have to be instituted even though each nation was only allowed one model in the air at one time. Since there were very few collisions for the rest of the contest it was obviously a good decision. Steering was strictly controlled – and was only permitted outside the 30 yard lines and the sidelines to bring the model back into the central area, or inside the central area only if a collision was imminent. Most flights on Day 1 were in the 34 to 35 minute range, but Jack McGillivray (Canada) put up two flights of 40:14 and 37:28 to take a commanding lead over Jiri Kalina (Czechoslovakia), 35:04 and 35:01, and Dezso Orsovai (Hungary), 34:44 and 35:17.

Because of late collisions Cezar Banks (USA) and Ron Higgs (Canada) were allowed to take their second flights at the beginning of Day 2 with Banks achieving a 38:50. This set the tone for the day and he produced the day's high time; 44:59 in flight 3. Other fliers produced similar high times so that at the end of the Day 2 the standings were as follows:

1	Cezar Banks	Flight 2,38:50. Flight 3,44:59
2	Jack McGillivray	Flight 1,40:15. Flight 4,41:57
3	Jim Richmond	Flight 1,35:20. Flight 4,41:57
4	Thedo Andre	Flight 2,37:22. Flight 3,38:20

Once again there were last minute collisions together with air traffic control delays that resulted in Jack McGillivray (Canada), Reg Parham (UK), and Andras Ree (Hungary) being permitted reflights at the beginning of Day 3. Tension was building and everybody pulled out the stops to reach the 40 minute standard set by the leaders. Cezar Banks, trying to beat the high time of the meet (set by himself) blew up several models and could not get any more successful flights. Several 36 and 37 minute flights appeared on the board, but Jim Richmond demonstrated his complete mastery of F1D by putting up two flights of 44:09 and 39:44. Sylvester Kujawa (Poland) produced 37:10 and 35:53 to hold onto 5th. place and Rene

Butty (Switzerland) put in two more very consistent 36 minute flights to stay 6th. place. Jiri Kalina (Czechoslovakia), Laslo Ree (Hungary), Peter Keller (Switzerland), Pentti Nore (Finland) and Dieter Siebermann (Switzerland) all put in over-36 minute flights to maintain or improve their standings.

Two dramatic position changes occurred when Mike Thomas (Canada) made flights of 35:22 and 37:43 to move from 16th to 7th place and Steve Brown (USA) got it all together with flights of 34:54 and 33:43 to move from 29th to 11th. Now it was obvious that there was a battle for the first four places in the team event. The USA had moved from 3rd to 1st. Steve Brown's flights dropped Canada to second place; and the consistent flying of the Swiss team pulled them up from 4th to 3rd, dropping the Polish team to 4th from 2nd. Canada was behind the USA on team total with Ron Higgs still to fly. He produced a very good 35:35, but Canada was still 1:45 short of the US team total in spite of the mid-field prayers to the duration gods.

Several countries flew with only two team members; notably, Holand, United Kingdom and Japan. Two countries, Czechoslovakia

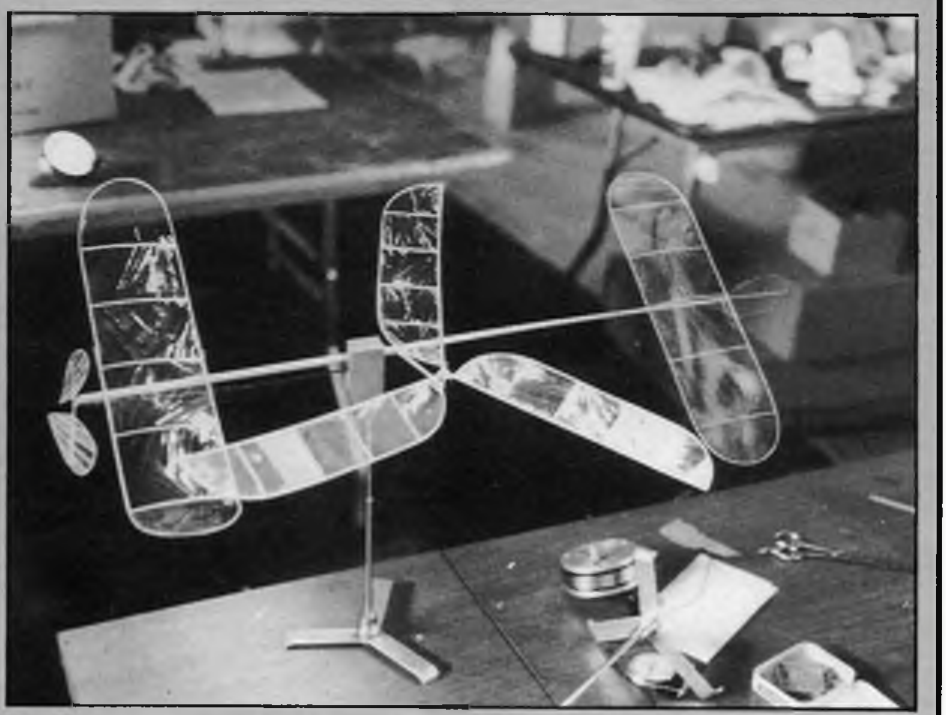
SHIPS

and Argentina only had one representative flying. For Eduardo Molfino of Argentina it was his first World Championships and he produced two personal best flights on Day 1. At the banquet and awards ceremony, besides the usual individual and team awards, a special award was given to Laszlo Ree, who at 19 was the youngest competitor in the championships.

Jim used the same Flim-Flam design with which he won in 1984 at Nagoya, Japan and again at Cardington in 1986. He did very little testing. Jim just sits there, well away from the centre of activity, watching everyone else flogging themselves to death, and making up his own mind how and when he will fly. He seems to use his first few flights as reference points, flying conservatively; and although his recorded flights were outstanding, he was always well short of the ceiling. He must have had something in hand - not once did he break a motor!

Richmond's model, equipped with variable-diameter prop, started the flight at maximum torque with the prop at approx 24in. diameter and with blade spars extended. As the energy drops off and the model loses height, the spars fold slightly, the small effective prop diameter giving a slight climb to a higher altitude, followed by a protracted cruise and slow descent, and a landing with very few turns remaining on the motor. It was a virtuoso performance. The model flew cleanly, without stalling or any hesitation.

Jack McGillivray's model seemed to be flown right at the airframe limit. With the variable prop at maximum pitch for launch the model developed a deep stall, and for the first half-minute the model was agonisingly close to touching the ground. Cezar Banks' model also had a V.P. prop (though a different system) and he too had stall problems at launch. This is not to detract from two magnificent performances, but merely highlights just how effortless Jim Richmond seemed to find it all!



Top: World Champ Jim Richmond gets ready for another flight of forty-minutes-plus. Centre left: Kujawa (Poland) failed the 40 min. barrier this time. Placed fifth. Centre right: That man Richmond again, this time during processing. Above: Events after the Champs included an Autogyro competition. This is Ganser's winner.

Brit blues; Laurie Barr's view

The British team selection trials had resulted in Bernard Hunt placing ahead of Derl Morley and Laurie Barr. Somewhat late in the day, Bernard Hunt felt unable to put in the effort required due to pressure of work, and as Derl Morley had also qualified to fly Wakefield at the European Free Flight Champs in Yugoslavia he chose to give up his Indoor team place.

I am not aware of any great pressure from the present incumbents on the indoor technical committee to avoid this situation, or to arrange for suitable alternative team members to be recruited...

In the event Reg Parham, the selected team manager, was gallant enough to build new models in the short time available in order to give some support to the British effort.

We could not help but feel let down, when during the opening ceremoney, particularly at the introduction and presentation of the teams, just the two lonely figures of Reg and myself were there to do our duty. Even countries less populated with World class fliers (who have no access to a good site like Cardington) managed to field full teams. A marked contrast from the glory days of yesteryear!

Reg's models flew remarkably well, considering how little time and practise he had, and his six-flight total was one of the most consistent. For myself, I built a selection of different designs, with 8in. and 9in. chords, as well as a tandem model, in the style of Hunt/Siebenmann. I have seen Bernard Hunt achieve 44 mins, at much less height than that available for the World Champs, and I have read reports of a good win by Dieter Siebenmann in Poland under a 120ft ceiling. Such a layout seemed to be a good solution to the problems in Johnson City.

In the event, the models I built had too deep a wing and tail section, were covered with slack film, and were rigged with too much wing washin. It was not possible to correct all this on site. But to conclude: it was a good meeting, in a difficult but good indoor site, very well run by the AMA and Tony Italiano from NFFS. Jim Richmond was a worthy winner, and must surely be the most dominant figure in any of the competitive disciplines.

Third-place Jack McGillivray (Canada) after his final flight.

What next?

The World Championships were followed immediately by a two-day open international F1D event based on three formal rounds each day, but with no air traffic control. Many of the competitors from the World Championships stayed on to compete and many entries from the USA took the opportunity to fly against the best in the world. In the end only one 40 minute flight was achieved (by Jim Richmond), but a very high level of flying was maintained. The final results reflect the International nature of the contest.

Rene Butty (Switzerland) awaits permission to fly. Finished in sixth place.

1988 Indoor World Championships

Individual Results

			Flt 1	Flt 2	Flt 3	Flt 4	Flt 5	Flt 6	Best	2nd Best	Final
1	J. Richmond	1986 World Champion	35:20	10:50	33:50	41:47	44:09	39:44	Flt 5	Flt 4	86:06
2	C. Banks	USA	16:52	38:50	44:59	31:35	06:34	00:00	Flt 3	Flt 2	83:49
3	J. McGillivray	Canada	40:14	37:28	38:45	29:04	28:44	34:28	Flt 1	Flt 3	78:59
4	T. Andre	Netherlands	17:18	37:22	38:20	09:20	33:02	10:54	Flt 3	Flt 2	75:42
5	S. Kujawa	Poland	11:57	34:01	35:09	37:58	37:10	35:53	Flt 4	Flt 5	75:08
6	R. Butty	Switzerland	02:07	36:04	35:50	36:41	36:51	36:13	Flt 5	Flt 4	73:32
7	M. Thomas	Canada	34:17	32:48	28:50	30:51	35:22	37:43	Flt 6	Flt 5	73:05
8	J. Kalina	Czechoslovakia	35:04	35:01	13:39	35:18	37:35	34:46	Flt 5	Flt 4	72:73
9	L. Ree	Hungary	33:23	32:18	36:32	34:39	35:18	36:09	Flt 3	Flt 6	72:41
10	P. Keller	Switzerland	34:04	34:17	35:41	33:36	36:44	35:54	Flt 5	Flt 6	72:38
11	S. Brown	USA	07:21	12:28	37:22	15:41	34:53	33:43	Flt 3	Flt 5	72:16
12	P. Nore	Finland	08:14	34:42	30:17	01:13	36:24	35:46	Flt 5	Flt 6	72:10
13	E. Ciapala	Poland	24:52	33:21	36:11	08:42	35:40	08:27	Flt 3	Flt 5	71:51
14	R. Higgs	Canada	36:10	32:10	33:18	30:33	32:56	35:35	Flt 1	Flt 6	71:45
15	L. Englund	Finland	34:50	02:21	05:09	10:42	35:38	35:16	Flt 5	Flt 6	70:64
16	O. Velunsek	Yugoslavia	32:36	34:36	32:50	32:02	35:55	09:58	Flt 5	Flt 2	70:31
17	D. Siebenmann	Switzerland	16:10	10:19	22:51	33:19	33:222	36:39	Flt 6	Flt 5	70:01
18	D.Orsoval	Hungary	34:44	35:17	34:07	32:11	15:44	33:43	Flt 2	Flt 1	70:01
19	B. Romak	USA	33:44	10:51	35:40	07:02	27:31	30:21	Flt 3	Flt 1	69:24
20	I. Zagar	Yugoslavia	33:49	35:15	01:48	227:52	33:25	11:11	Flt 2	Flt 1	69:04
21	L. Bar	UK	**30:08**	**34:27**	**29:53**	**29:20**	**33:17**	**34:13**	**Flt 2**	**Flt 6**	**68:40**
22	R. Parham	UK	**31:44**	**24:51**	**33:56**	26:25	33:59	**33:45**	**Flt 5**	**Flt 3**	**67:55**
23	A. Ree	Hungary	13:56	14:03	08:42	33:21	33:59	10:59	Flt 5	Flt 4	67:20
24	E. Lien	Netherlands	30:46	33:27	15:15	28:14	05:44	32:49	Flt 2	Flt 6	66:16
25	R. Czechowski	Poland	32:50	22:48	31:49	28:46	22:16	05:57	Flt 1	Flt 3	64:39
26	M. Mastnak	Yugoslavia	27:11	11:21	32:36	07:47	311:45	24:58	Flt 3	Flt 5	64:21
27	B. Trachez	France	31:25	31:30	32:18	06:15	30:10	14:27	Flt 3	Flt 2	63:48
28	S. Nonaka	Japan	20:47	26:39	31:16	28:52	32:26	29:47	Flt 5	Flt 3	63:42
29	R. Champion	France	32:53	06:48	29:18	09:53	20:09	05:27	Flt 1	Flt 3	62:11
30	H. Enomoto	Japan	09:00	25:19	30:10	31:14	28:36	20:05	Flt 4	Flt 3	64:24
31	G. Cognet	France	26:52	08:42	26:29	30:21	28:54	11:07	Flt 4	Flt 5	59:15
32	H.Erofejeff	Finland	05:07	18:26	21:06	29:36	28:48	07:05	Flt 4	Flt 5	58:24
33	E. Molfino	Argentina	23:31	25:56	19:56	05:58	09:27	00:00	Flt 2	Flt 1	49:27

Team Results

1	USA
2	Canada
3	Switzerland
4	Poland
5	Hungary
6	Yugoslavia
7	Finland
8	France
9	Netherlands
10	UK
11	Japan
12	Czechoslovakia
13	Argentina

F1D Open International

1	J. Richmond	USA	40:07 and 39:44
2	C. Banks	USA	39:51 and 39:10
3	S. Kujawa	Poland	37:38 and 38:35
4	A. Ree	Hungary	37:10 and 37:52
5	D. Orsoval	Hungary	34:55 and 39:19

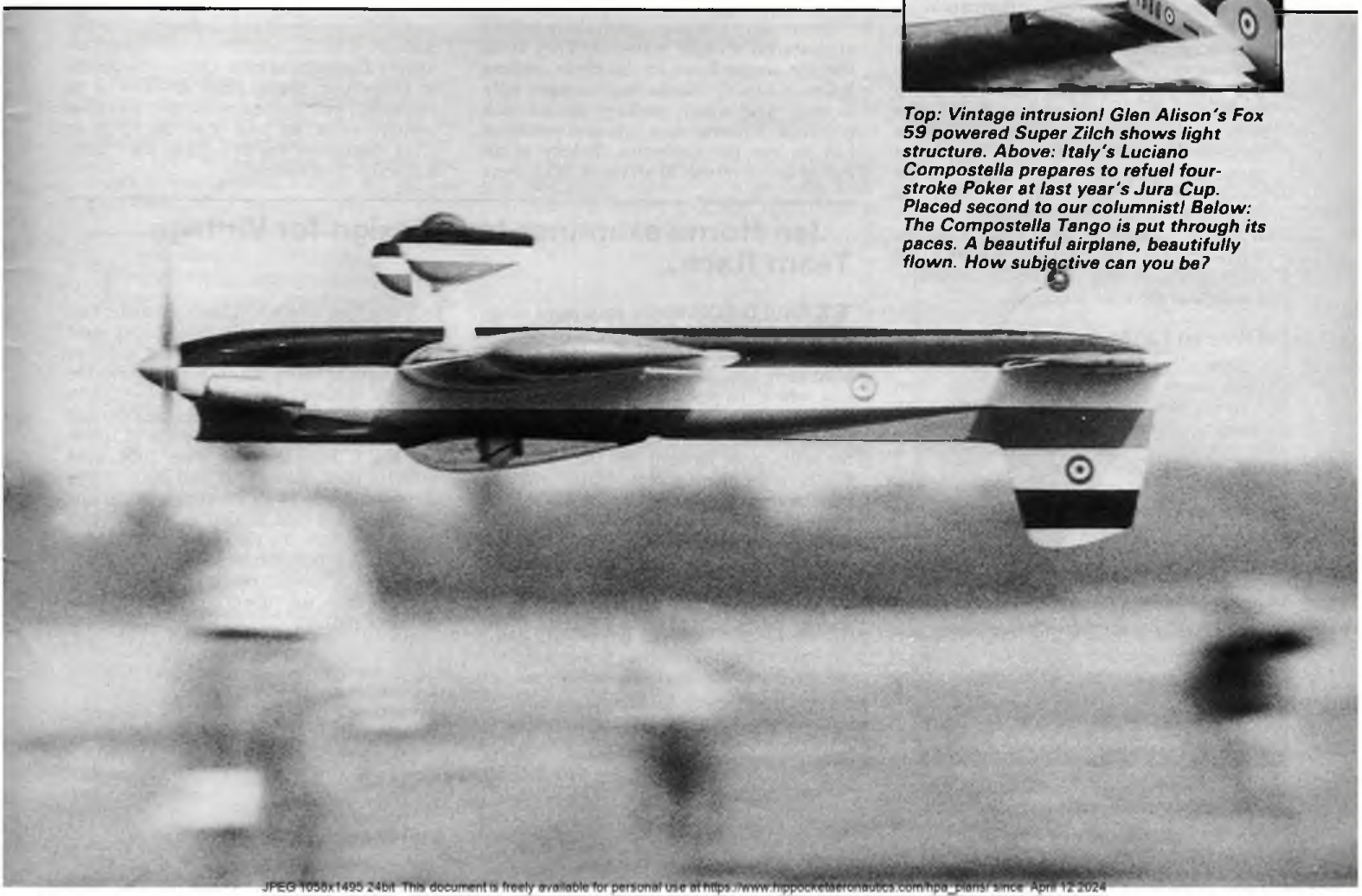
FROM THE HANDLE

Subjectivity and style in stunt: Claus Maikis comments...

THERE ISN'T a stunt flyer worth his weight in quarter grain balsa who hasn't complained about the subjective nature of our event. Again and again you hear argument about how stunt flying suffers from the subjective way in which our performance is judged. It seems to depend on whether or not the judge likes white pants, has an interest in team racing, or had eggs for breakfast. Our model flying colleagues whose placings are determined by the objective stopwatch are much envied. But is subjectivity really that bad? Frankly, I doubt it. If we take a careful look at other events we often discover lines of development which, I feel, wouldn't make stunt fliers happy. Performance which may be measured exactly has an awkward tendency to develop into one special direction, and into that alone. Only one measure is used, and this dictates development. There's only one goal. In the past I've explained the advantage of the wide room in stunt flying for every personality. If you don't have this there's no room for creative evolution. Speed and Team Race mainly concentrate on engines. The development of the airplane leaves little room for creativity. Still worse: competition forces participants to find extreme solutions. Extreme solutions never indicate a sound situation. Several times in the past attempts have been made to change the prevailing situation; for example, the promotion of scale-like team racers. As has been seen, such rules always produce perverse results which satisfy no-one. The resulting models are no scale beauties; neither are they functional airplanes. They are just plain ugly. Speed models have developed into shapes which the layman never can recognize as airplanes. Combat now produces the ugliest airplanes of all.

Function and beauty

Don't get me wrong. Functional craft *can* be beautiful. Beauty and technicality are not contradictory; they don't exclude each other. When the proportions are right they possess their own kind of technical beauty. No-one will deny the aesthetic appearance of, for example, the elegant Italian bicycles or the vigorous beauties from Milwaukee. (*Who they? GC*). Many racing cars and airplanes are a study in beauty. I think even combat models could be made to please the eye. But when stunt produces the most beautiful airplanes in modelling there must be something right with it. Imagine what would happen if we didn't want our judges to be influenced by a beautiful model. Would we force our flyers all to use the same model design (like team race, where everybody



Top: Vintage intrusion! Glen Alison's Fox 59 powered Super Zilch shows light structure. Above: Italy's Luciano Compostella prepares to refuel four-stroke Poker at last year's Jura Cup. Placed second to our columnist! Below: The Compostella Tango is put through its paces. A beautiful airplane, beautifully flown. How subjective can you be?

Walter Weineisen from Austria. Apparently conventional model has two-piece wing, carbon spar and engine cut-off.

seems to fly the same flying wing?). Preferably with the same paint scheme – uniform dull grey! Of course, then we would have avoided any influence, and thus any subjective judging. But imagine that situation.

When aerobatic airplanes stand in a line nobody passes without taking a close look. You can see different shapes, sizes, lines, colours. Actually, stunt models are often an expression of the builder's personality. They betray his opinions about technology, function, beauty; in general his whole approach to the event, however subjective it may be.

Our event is so colourful simple *because* subjectivity has a place. Watch our flight schedule. It's a perfect illustration of harmony and grace. Of course, views as to what is beautiful may differ. One judge may prefer a very 'soft' schedule. Another may like extremely tight corners and sharp transitions. A mixture of both decides the final score, which is a harmonic balance between opposite viewpoints. There's no particular influence which might cause competitors to follow one direction. So extreme developments are avoided. The last World Championships were a good example. While different flying styles were shown, the eventual winner used what was called clearly a 'middle-of-the-road' approach.

Over to Latin America

If you want to see an example of development into extreme directions then watch competition dancers when they perform a tango. The original, staccato motion of a tango has a special appeal, a typical expression of Latin mentality and character. Once the judges favoured this movement, dancers developed an exaggerated head-turning action which looks downright ridiculous (I always hope they won't break their neck). Maybe dancers know about this situation, but they cannot afford to offer another kind of presentation. Actually they are forced to overdo it. Ugly!

For many years stunt flyer Leif Eskildsen from Denmark performed extremely sharp corners and was admired by all competitors for his ability. Surprisingly he never got the score which everybody thought he deserved. It's quite obvious that the judges didn't buy his style. I think square manoeuvres are an extreme; they were included into the schedule to be able to distinguish the good from the bad boys. Once the general level of flying had markedly improved we just had to have some means to distinguish the flyers' performances. This was done by introducing manoeuvres no full size airplane could ever accomplish. That doesn't mean I'd like to abandon square manoeuvres. I just wouldn't like our schedule to develop into a blind alley. Still tighter cornering, or more of it, just wouldn't look nice. The different viewpoints of judges helps to prevent this. Nobody can exactly define beauty, especially since it's partly a very subjective perception. Beauty is a natural desire and need of mankind. In bad times (war, combat) it may disappear temporarily, but in good times (peace, aerobatics) it comes back quickly and strongly. When you don't fear a crash after each hourglass, you can afford to care about beauty.

Dress and finesse

And when you're sure your clothes will stay unblemished from fuel and your fingers from blood, you can afford to dress neatly. The majority of our pilots seem to like a clean wardrobe (maybe we can still convince those who don't). After all, what's wrong with white pants? Do you feel happy in torn, oil-soaked jeans? Do you think it's pleasant for spectators? I'd prefer to please the eyes of onlookers, judges and – last, but not least – myself. This point is sometimes overlooked. If you feel well, you perform better. Neat clothes certainly improve your well-being. If somebody denies this just look how he dresses for the theatre.

Stunt flyers try to give their whole presentation a touch of finesse. They avoid like the plague haste in the circle, endless hours of flicking, bloody fingers, noise, ugly models. The whole package should look beautiful. Whoever says this is superfluous has no eye for aesthetics. Beauty is an indication of culture. At all times, in all areas there was, and is, beauty. If it's subjective I'm ready to pay this price.

I think the apparent dissatisfaction with contest results comes not from subjective scoring and measures, but from incompetent judges. When my opponent has a more beautiful airplane than I have, if he flies a more pleasant style, if he wears white pants, and takes advantage from all this – okay. Except for flying, I can do everything as well as he does, maybe even better. I'll try to beat him at this own game. This philosophy has made control line aerobatics what it is today. I like it that way. I'd hate to see it develop into a one-sided, technical category.

Don't force it

At the same time I cannot acknowledge the American point system. We should strive for beauty voluntarily. If points are given, they cause a cold, acquisitive way of thinking – which shape, which colour gets the most points? How many stars on the wing? This is a negative development. Subjectivity will vanish – and with it, as we've seen, the versatility and colour of our event. A good example is what happened at the last World Championships. The Americans – who had developed their own style of presentation, because their judges at home preferred it, didn't earn the places they had hoped for. An aggressive flying style, modern model shapes, high speed, loud engines – little of this was acknowledged by the judges at Pecs. Maybe the flyers would have been better off if their home judges had scored more subjectively; that means, each judge with a different viewpoint.

Every coin has two sides. Subjectivity may certainly make exact judgement more difficult, if not impossible, and the reason for many a disappointed pilot. On the other hand, it keeps our event from developing to extremes, but concentrates the versatile, creative event we love. Possibly flyers in other disciplines are envious of us – quite subjectively, of course!

...Ian Horne examines tank design for Vintage Team Race...

WOULD YOU like to coax more range from your Vintage A or B racer? You could if you used all the fuel in the tank! Most early tank designs were of the two-vent type where the pipes just entered the top of the tank on the inboard side. This allowed fuel to syphon out during flight, even when the vents faced forward into the airstream. Furthermore, there was no control over the variable pressure caused by centrifugal force on the diminishing fuel left in the tank. Thus, the engine mixture would lean out as the tank emptied, forcing the pitman to set the engine rich at the beginning of the tank.

The Uniflow tank, as used in F2C Team Racing, solves both of these problems. It has only one vent which is submerged under fuel at the outboard side of the tank during most of its delivery. However, to fill it requires some form of valve, which is not within the spirit of vintage racing. Nevertheless, there *is* a way of providing a front feeding, constant head tank whilst retaining two vent tubes. See **Fig.1.** Note that the lower tube, used to fill the tank, should be at least 3mm outside diameter. There is an advantage in making the upper vent tube smaller in section, since it will force fuel into the engine venturi once all the air has been displaced during the filling operation. A similar result can be obtained by using 3mm. o.d. tube crimped smaller near the open end.

Table 1

	Required Volume cc.	Calculated volume cc.	H mm.	L mm.	W1 mm.	W2 mm.
Class A	15	14.5	20	50	18	11
Class B	30	29.7	30	60	20	13

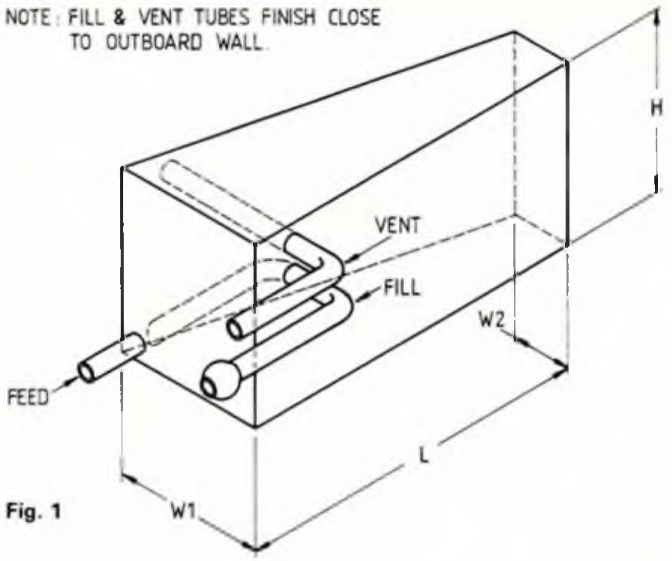


Fig. 1

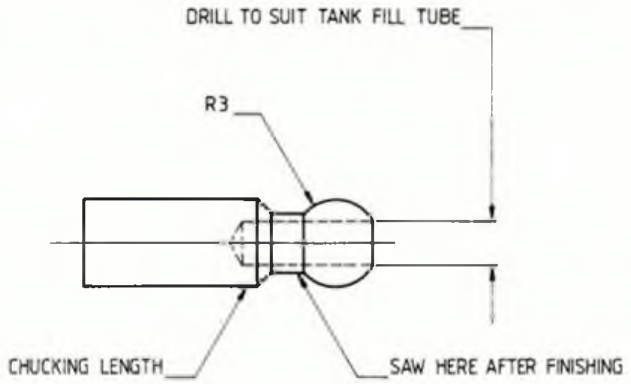


Fig. 3

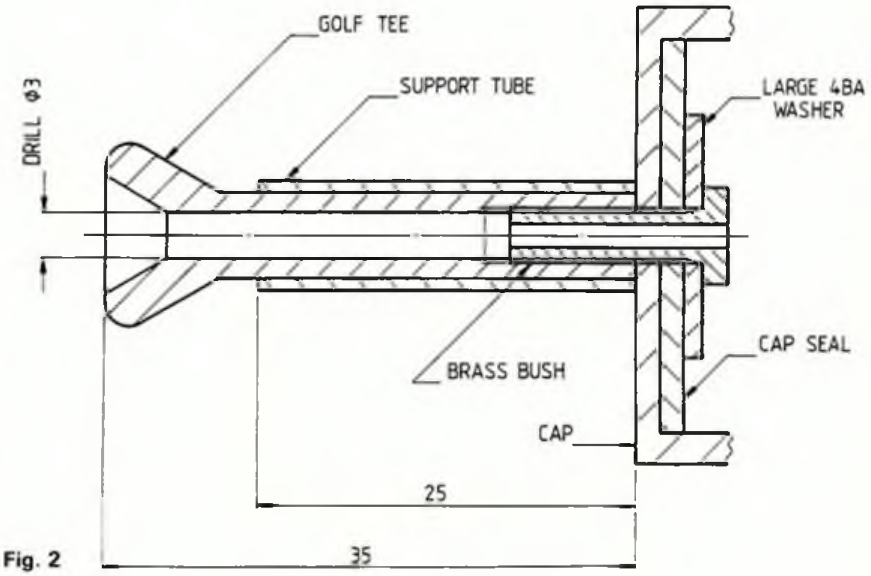


Fig. 2

Suggested sizes for A and B racers are shown in Table 1 but dimensions may be varied to suit your model, as long as the volumes do not exceed the limits of the rules. Try to keep W1 as narrow as possible and the difference between W1 and W2 not less than 6mm.

$$\text{Tank Volume} = \frac{(W1 + W2)}{2} \times \frac{L \times H}{1000} \text{ cc.}$$

To speed up refuelling, fit a spherical end to your filling tube and use a fuel bottle with a matching female end. You don't need a lathe, just an electric drill and a means of supporting it which will leave both hands free. Obtain a piece of 6mm. o.d. brass bar (old electrical parts make an excellent source of material for jobs like this.) If it doesn't have a hole in it to suit the tank filler tube, then drill one axially about 8mm. deep. Chuck the plain end in your power drill securely, switch on and roughly shape the sphere using a small coarse flat file. For your own safety make sure the file has a handle on it and you are not wearing clothing that will get caught in rotating parts. Leave the sphere attached to the parent material by a narrow neck and finish it with a fine file and abrasive paper. Saw off the sphere, fit it over the pre-tinned filler tube and solder into place. See **Fig. 2.**

The fuel bottle is simply a convenient sized discarded plastic container with flexible sides and screw top. Mine was formerly a shampoo container. Obtain a plastic golf tee, shorten it and drill it axially with a 3mm. drill. Thread the hole at the parallel end with a 4BA. tap. Drill a 3.7mm. hole in your bottle cap and fasten the modified tee to it using a 4BA. headed brass bush as sold for rubber model nose blocks. Don't forget the sealing washer and a large washer under the bush head to spread the load. To prevent the tee from splitting with enthusiastic use, press a length of suitable metal tube over the parallel shank. See **Fig. 3.**

Why not try it? It's much quicker than using a commercial bottle with a male end...

...and Ron Prentice tries state-of-the-art stunt for the first time!

THERE I was, sitting with my back to the wire netting fence, watching the vintage control line models gyrating at last year's Old Warden Vintage Weekend. Suddenly from behind came a loud PSST! Not wanting to be PSST at, I ignored it. Again it came – louder and longer this time. Then a voice thick with Scouse accent said, 'You wanna buy some control line plans?' Finally, plucking up courage to look around, I saw none other than Jim Woodside.

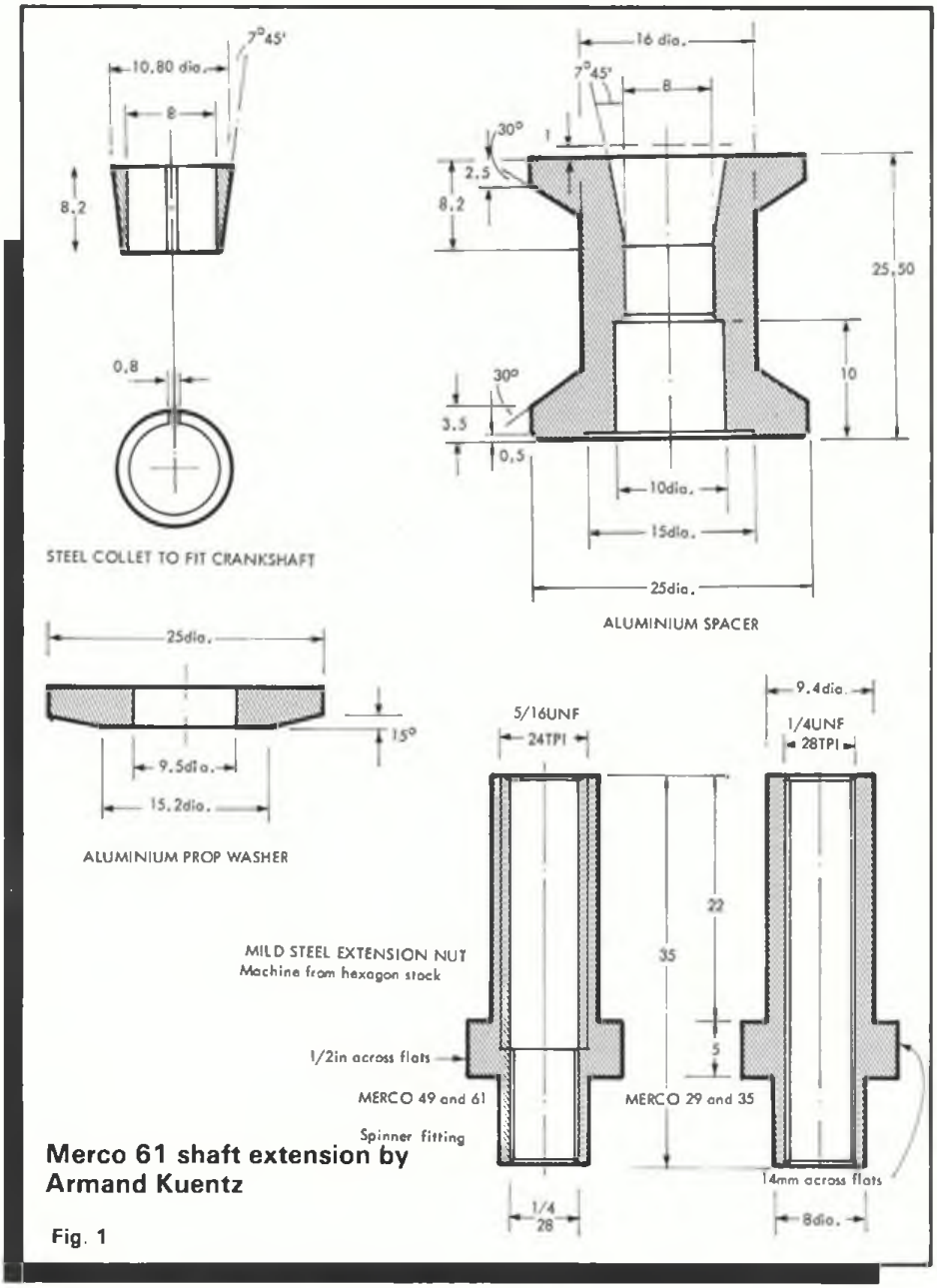
Jim had several 'state of the art' F2B plans for sale. Soon I had purchased the drawing of the beautiful Excitation, designed by American enthusiast Ted Fancher.

I had never built an up-to-date stunter, so for months I looked longingly at the drawings. Finally, when visiting Mike Curtis the decision was made for me. Mike picked up a large block of expanded polystyrene in his garage and asked if I would like it. My mind immediately pictured the Excitation with hollow foam wings; and I found myself loading the block into the car. I must say that I never before attempted to make a foam wing so it was a matter of looking through the old magazines for an article on how to do it.

Here we go...

Before starting the fuselage, I offered up to the plan my Merco 61. Having compared the weights of the ST 46 shown on the plan and the Merco, I decided to use a shaft extension and move the motor back one inch. I have some drawings for a Merco shaft

Old 'Mind the Lines' proudly displays his Excitation. Foam wing caused problems until aluminium templates were filed absolutely smooth.



Merco 61 shaft extension by Armand Kuentz

Fig. 1

extension, supplied by Armand Kuentz, so I was able to make one up in an hour. See **Fig. 1.** The remainder of the fuselage and tail were quite straightforward.

A 3in. Veco Bellcrank was salvaged from my ill-fated Bob Palmer Skyscraper of several years back. Pushrods were of aluminium arrow shaft, into the ends of which were epoxied one-inch lengths of aluminium rod, drilled and tapped 4 BA. Pushrod ends were bent from 16 swg mild steel sheet, the end drilled and tapped 4 BA, then a 4BA bolt with the head removed was screwed and soldered in place. Holes were drilled in the sides to take the clevis pin, which was made from a cycle spoke. One end was threaded 6 BA; a nut was screwed onto this and soldered. The pin was held in place by a 20 swg wire spring soldered and bound to the side of the clevis, which located in a grove filed round the pin. The elevator and flap horns were bent from 14 swg wire, with a 16 swg mild steel horn silver soldered on. **Fig. 2** explains.

I chose an R/C clunk tank equipped with two clunks, as advocated by Glen Alison. **Fig. 3.** It works perfectly; highly recommended.

To the airbrush!

The model was covered and prepared for finishing in the usual way, but here I thought I would make a break from traditional style.

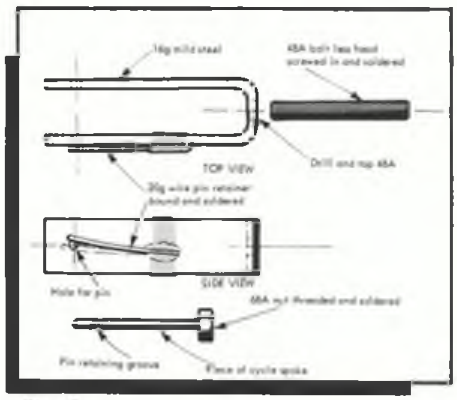


Fig. 2

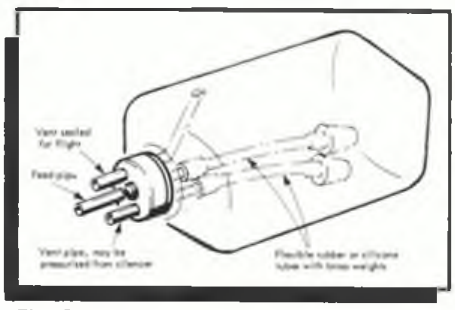
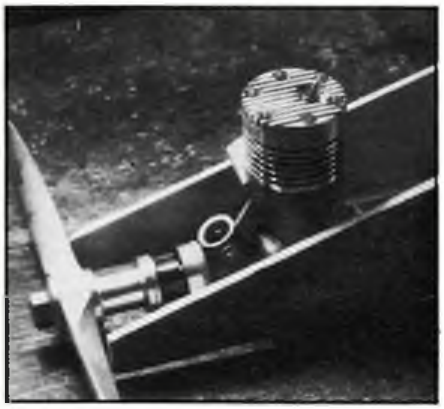


Fig. 3



Merco 61 fitted with Kuentz-designed shaft extension. See Fig. 1.

Being a muscial instrument maker by trade I have access to various colours of translucent aniline dyes used in violin varnish. Why not emphasise the balsa grain or Excitation? Some of yellow dye was added to Gipgloss clear cellulose car body lacquer. This was the sprayed base coat on wings and tail. Next I made up some more Gipgloss with red aniline and thinners. I laid a number of paper doilies over the yellow surfaces and sprayed the red through the patterns. I then removed the doilies and continued to spray the rest of the model, with the exception of the yellow-patterned areas. Final decoration was a light shading of the edges of the yellow to give the sunburst effect seen on many electric guitars. The whole model was then sprayed with clear to protect the colour layers, and finally covered with Tufkote fuel proofer. The Excitation name and my SMAE number decals were very tastefully made by Dabidec Decals of Williton, Somerset.

Success!

After waiting for some calm weather, the first flight took place at the Blackdown R/C site at Smeatharpe. My assistant was Harry Timms, no mean C/L flyer himself. The first attempt was a total failure. I couldn't even get the tank filled! Every time I tried to put fuel in, it came out of the overflow. Giving up in disgust, I took the model home and found my mistake - I had fitted the tank in the wrong way up!! It was the work only of a few minutes to remove the engine, slide the tank out and reverse it. The next evening Harry and I took it over to the airfield again; and this time everything worked according to plan.

I was amazed at the smoothness of Excitation's level flight, particularly when inverted; and I could hardly believe the way it turned when full elevator was applied. The model is still not completely trimmed out yet, but very little needs to be done.

It is a revelation to fly a modern stunter. There is no doubt that smooth manoeuvres are easier than with my similarly-sized de Bolt Stuntwagon, a vintage design which flies at a considerably greater speed. My main problem is that I was brought up on the 1950 schedule.

Perhaps this leopard is too old to change his spots!

READERS' LETTERS

Scale Weekend winner

Dear Sir,
Many thanks to you all for the splendid arrangements over scale weekend. Can it be better, I ask myself. The new layout and division between radio and free flight was great, and our own control headquarters was the final touch! Here are a few notes on my winning Spitfire. It's basically a 200% version of the Earl Stahl design, with a few mods I will describe, but rib and former spacing are all to the original drawing. Earl Stahl modelled the Mk1 Spitfire which has a short nose; not such a problem on a small model, but a real headache on a larger one like this. A quick calculation reveales that the nose/prop assembly needed to weigh 2oz to balance the model, even with the rear motor peg moved forward by two formers. I decided, therefore, to use gears and two motors geared together driving a scale diameter prop through a smaller gear, giving a step-up ratio of 1.5:1. See photo.

The total covered airframe weight is 7oz (including the gear-box) with 2oz of rubber, making 9oz in all. With a span of 54in. the wing area is 2.5 sq.ft. resulting in a wing loading of 3.6oz/sq.ft. While not capable of scale speeds, I hope you will agree the Spitfire looks most effective in the air, flying more like a duration model. Each motor consists of 16 strands of 1/8in. FAI, making 32 strands in all; roughly equivalent to a Vintage Wakefield motor in cross-section.

The model incorporates a retracting undercarriage, which I did not have the opportunity to demonstrate at Scale Weekend. It uses a Tomy timer in the fuselage to trip and close the U/C after eight seconds. The model then does 'non-scale' belly landings, as in the normal 'down' position the U/C would be too vulnerable on such a large model.

To cope with all this, each prop blade is hinged at the root and held in the normal 'open' position with rubber bands so the blades can fold on impact.

The final touch is the light blue finish to represent the prototype K5054, with Jeffrey Quill, in white flying suit, at the controls.

Many thanks again for a splendid weekend!

Old Tupton, Derbys. Mike Hetherington

Read all about it

Dear sir,

Photographs of the pre-war German model glider 'Der Grosse Winkler' which have appeared in some of the modelling magazines recently remind me of a type of glider which I and some of my friends flew when we were very young. I have not seen any references to this design in any of the magazines since then. Can any of your readers supply details and perhaps even some drawings? Where did these models come from? Who designed them? Would it be possible even now to resurrect them? I am going back more than 45 years, mind!

I think, though I am not all sure now, that this glider was called the GB (probably standing for Great Britain rather than Grunau Baby). The Daily Mail or one of the other national newspapers offered kits during the late nineteen thirties or possibly in the early forties. I think the kits were sold as a special offer. One had to send in some small amount of cash with a few coupons cut from the paper. My parents subscribed to the News Chronicle so I had to wait for my pals to get fed up with their models or break them and allow me to take possession. At one time I actually owned two. I cannot remember what happened to them in the end but I suppose they got written off or lost in trees. When completed the models certainly carried the newspaper's name in gothic letters on the fuselage.

Writing from memory, the glider was of about three feet span with a rectangular wing planform, straight dihedral and rounded wing tips. The fuselage was shaped rather like that of the Winkler with a deep up-curved keel at the front but it was only half an inch or so wide. The wing was held on with rubber bands. The fin was very rudimentary, merely a wire outline covered with paper. The covering of wing, fuselage and fin was a very tought, cream coloured kind of paper, perhaps bamboo paper, not tissue. It was tautened with dope as usual in those times. The tailplane was a simple plate of balsa wood, 1/16th inch thick. This was the only balsa in the entire model since all the rest was hardwood and plywood. The wing ribs were all supplied accurately die cut from thin ply, with pine or spruce spars. The fuselage had a fairly massive chunk of hardwood at the front, with lead weight for trimming. I don't recall the details of construction apart from this.

These models were very good value and flew remarkably well from hand launches. They would doubtless have been suitable for towline launching although I never tried. At that time I knew nothing about slope soaring (or anything else much) so although I enjoyed flying the models I never got as much out of them as I could have done with a bit more experience.

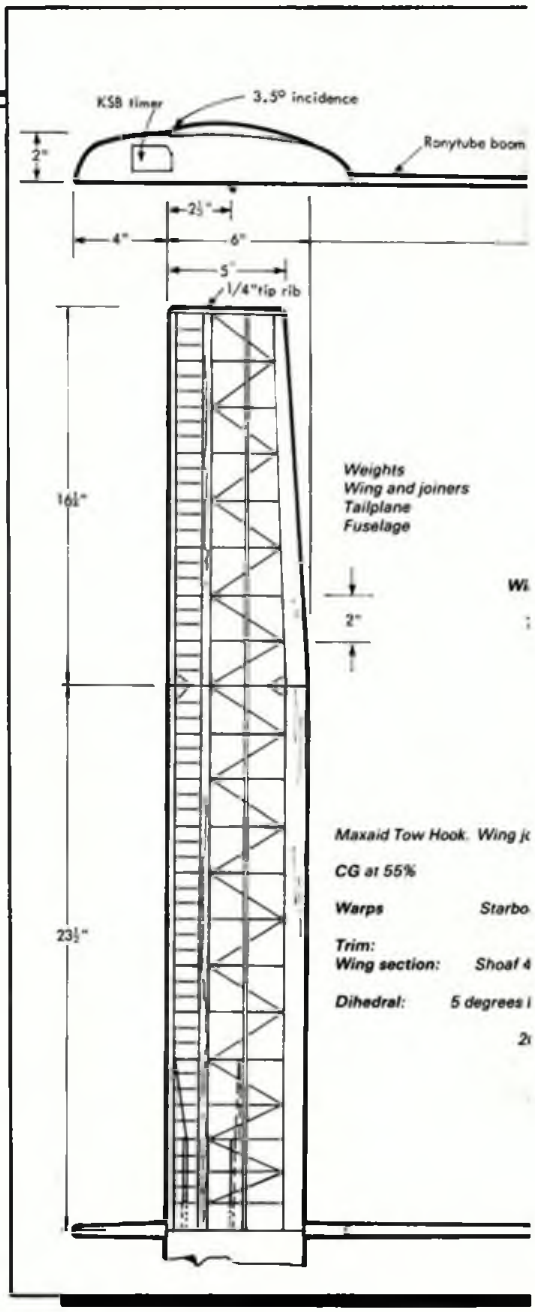
Does anyone else remember? Ther must have been thousands of these things in England at that time and perhaps there are still some hidden away in attics. I'd be most interested to hear from anyone who can supply more information.

Stepney,
South Australia ***Martin Simons***

(Sounds like the Daily Express glider to us. If anyone can help with information we'll sent it on. GC).

FREE FLIGHT SCENE

First up in Dave Hipperson's competition overview – a winning F1A from the west country



Heading: Rod Audley's windy-weather F1A; drawings above show his favourite general-purpose model.

ROD AUDLEY's performance must be regarded as one of the major contributory factors to Bristol & West's recent domination of the Plugge Cup, this season and last. His glider flying has been responsible for many Plugge points. At the start of this season he topped the list at the first Area centralised event on none too nice a day to gain for his club a further 100 points – and the KMAA Trophy for himself. This achievement was with the rough-weather model pictured here; but Rod chose not to give us details as it is rarely used. In his own words 'it required a lot of work for little reward'.

Instead, Rod has supplied full details of the model you are most likely to see him flying. He has three of these now. Interestingly, it once again uses the Shoaf section, thickened slightly, as favoured by Andy Crisp. Rod regards this model as reliable in all weathers and suitable for anyone who already has had a little glider experience.

The Free Flight leagues at mid-season

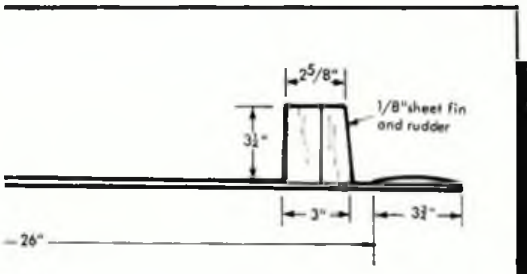
We now have mid-season positions for the World Cup series and the Falcons League. The latter shows a distinct pattern and comfortable margin for its leader.

Falcons League at mid-season

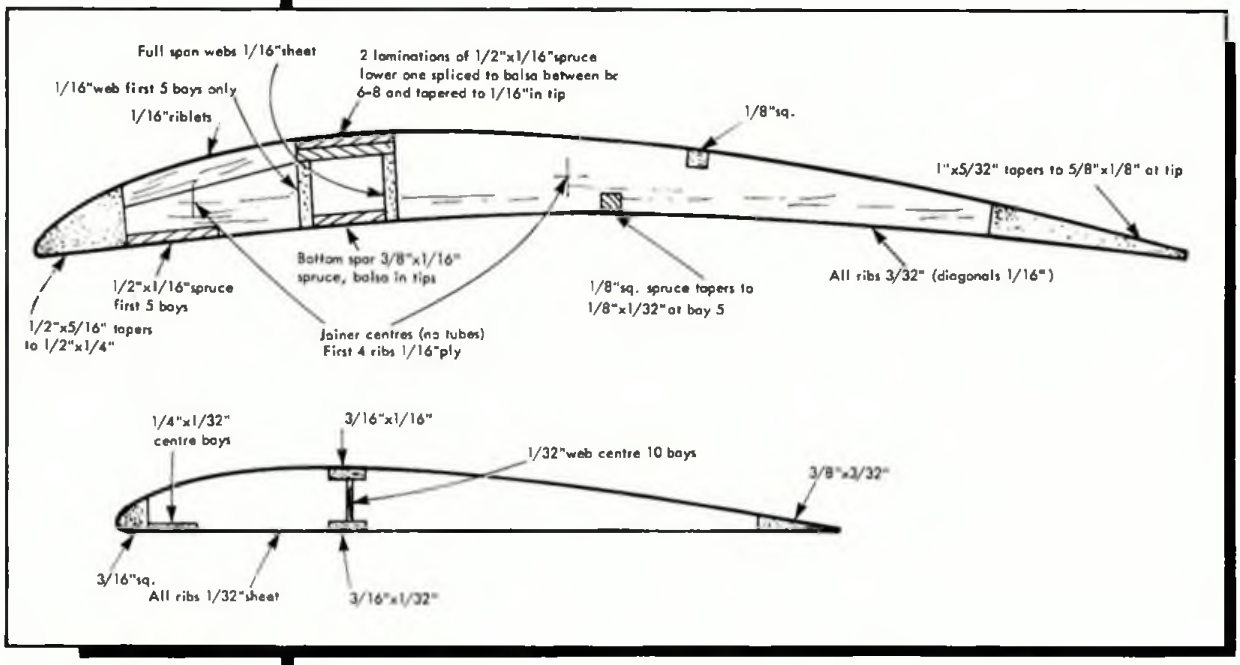
1	R. Peers	40 points
2	P. Ball	28 1/3
3	J. Carter	28
4	J. Cuthbert	20
5	C. Strachan	18

The Falcons table has been compiled from the first six major non-SMAE events of '88. The Pannett, Woodbury and Tynemouth meetings, the Oxford Rally and Grantham Grand Prix and the RAF Champs. It would appear that Peers is putting as much effort into the Galas as the SMAE events this year. It will be interesting to see if the gap between him and the pursuing duo closes later in the year when he has to concentrate on the SMAE events in defence of his last year's Senior Championship title, which he would dearly love to win again.

Internationally we are indebted to Ian Kaynes, co-ordinator of the CIAM's FAI World Cup event, for the latest positions after the first five events, namely the Max Men International (USA), Holiday on Ice (Norway), Pacific Champs (Australia), Fulop Sandor (Hungary), and the Midsummernight Trophy for F1A and F1B (Holland). It's certainly proving to be the Americans that can afford to move around the world to fly. I predicted this last year but at the moment the domination seems to be in Glider and Rubber rather than Power although Archer (last year's winner) and Simpson are in the top five. Ken Faux's trip to Hungary and resultant win puts him up there too and even Bob Bailey figures a little further down the list thanks to his efforts at the Pacific Champs. That's one heck of a way to go for



Androd IV F1A by Rod Audley

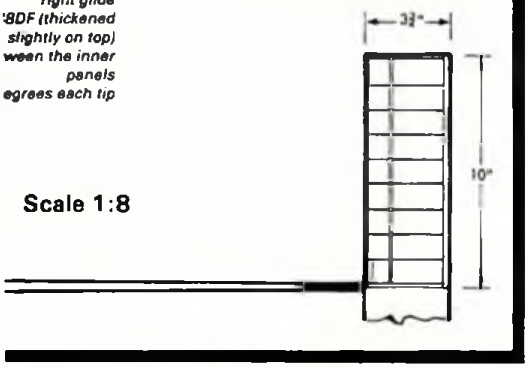


184 grams
9 grams
226 grams
otal 419 grams

area447 sq ins (projected)
l area 75 sq ins

ers 10 swg, 8in long (two off).

inner: 1/16in. wash in right glide
8DF (thickened slightly on top)
ween the inner panels
egrees each tip



Scale 1:8

nine points Bob! He managed to lose a model trimming and also hit a house during the contest. Walt Ghio has been travelling the World with his F1Bs and doing much better than he did at our wet and windy Nationals. He won his local Max Men event and then took a second in Hungary. A very promising start. I am sure that all the UK friends he has made thanks to his quiet and practiced techniques will wish him well for the remainder of the year. Former World Champion Hofsass also scored in Hungary. He beat Walt! British interests are kept alive only by Mike Woodhouse after his useful 5th place at the Norwegian event in the spring.

As mentioned earlier, the Glider list is topped by Americans. Matt Gewain, with two second places (one in the USA and the other in Australia) is in a commanding lead; and Jim Bradley, also of the USA ties at second thanks to his win at the Max Men meeting. Last year's Cup winner Stephen Rumpp is there as well after after winning in Hungary. Dave Oldfield is currently the top GB in F1A thanks to his sixth place at the Midsummer Night Trophy in June.

World Cup table at mid-season

F1A after 5 events			
1	M Gewain	USA	40 points
2	J Bradley	USA	25
3	L Larsson	S	26
4	V Morgan	AUS	26
5	S Rumpp	D	25
6	A Westermann	DK	26
F1B after 5 events			
1	W Ghio	USA	45 points
2	H Broberg	S	30
3	J. Christie	AUS	25
4	B Eimar	S	25
5	R Hofsass	D	25
6	A Koppitz	F	25
F1C after 4 events			
1	G Agren	S	25 points
2	K Faux	GB	25
3	R Simpson	USA	25
4	D Thomas	AUS	25
5	R Archer	USA	20

Dick Staines had a full Nationals, particularly enjoying himself with this geodetic-surfaced Open Power model. K&B .21 powered design is three years old. Placed seventh after 4:03 flyoff.

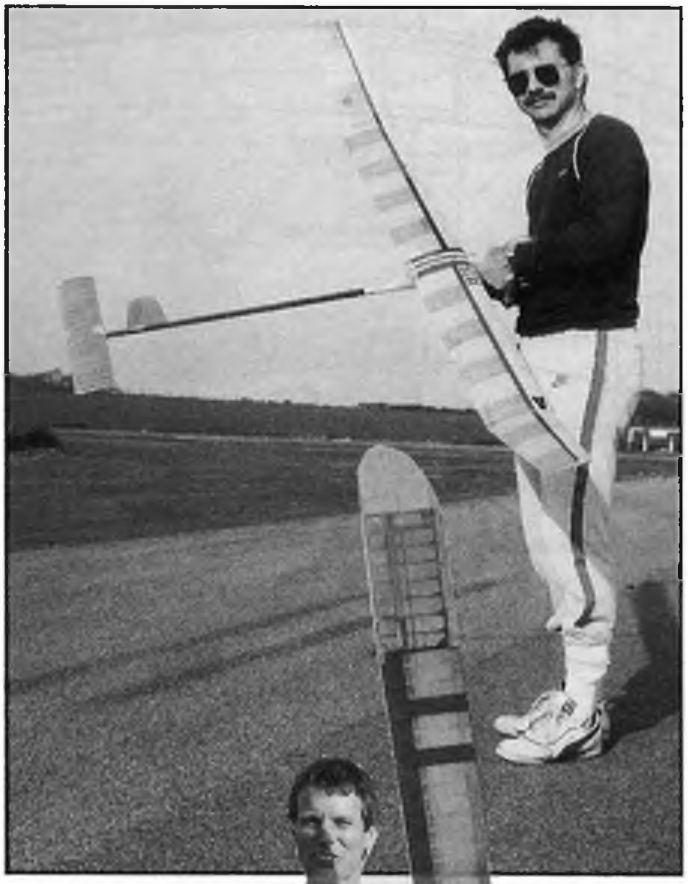
The case for 'right/left'

Realising the high regard in which Neil Cliff holds the 'right climb, left glide' trim for his Open Rubber models, and appreciating the convenience and safety inherent in the pattern, raises the issues once again as to whether or not it is actually a *better* set-up Neil's climbs are often impressive. I can't recall an occasion when one of his models even hinted that it might wind-in on power. Neil is also right when he points out that FAI Rubber has exacerbated the problems inherent in the more conventional 'right/right' trim. Huge initial torques tend to tighten the first burst of power; a few seconds

later the rapid reduction in torque can stall the model before it can make a second turn as the power dies and the port tip drops. With glide trim to the left, particularly if obtained by rudder deflection, it seems logical that the model, speeding up, will tend to turn left – in effect, opening up the initial burst of phase rather than turning in to the right. After all, airspeed affects rudder, wheras the thrust direction vector is constant. Of course, large amount of right thrust are then required to overcome the left rudder. Some may argue that this is an inefficient and wasteful equilibrium with large forces fighting one another. On the other hand it has the advantage of being able to dispense with wing warps – an inexact science at the best of times.

On my Skywalker 60s I have gone over to rudder and incidence deflections to control the first burst of FAI rubber, but you can't do that on a Vintage model. I noticed recently that Jim Baguley was using a 'right/left' trim on his Challenger. Although not fully sorted when I saw it, there were certainly no signs of spinning-in. When Jim overdid the turns the model straightened out and looped. Still safer than winding in! Actually, Jim uses 'right/left' on his F1Bs as well. Ivan Taylor has also been using it for years. Originally, when he flew the French PIG designs the 'right/left' pattern was needed for safety and Ivan actually included reverse warps – wash-in on the 'port inner' rather than 'starboard inner' panel. These designs were remarkably consistent, and despite their considerable aspect ratio flew on rails even in the wind. When his clubmate Peers adopted the same configuration one drawback was discovered. Indeed, this is the only real disadvantage of the 'right/left' trim – but for contest flying it's a big one.

The models can glide out of lift at the top of the climb. Not, as some believe, because northern hemisphere thermals rotate in a direction unsuited to a 'left' glide. Believe me, thermals rotate both ways. Sometimes they don't rotate at all! No; the fact is that a climbing model will automatically centre in rising air, just like a ping-pong ball will climb a jet of water and sit on the top. This is most convenient for us. To reverse the direction of the model at the top of the climb is inviting it to fly straight out the side or off the top of the rising air. To make matters worse, that transition period from



This page: Pics from the Grantham Grand Prix. Left: John Cuthbert is having a fine Glider season. Fourth at Grantham. Below: Bill Colledge with well-known model placed a disappointing fifth after low 1:26 flyoff. Below left: The Arthur Percival Trophy for Open Power – a silver Dream Weaver. Recipient was Stafford Screen. Nice to see trophies of this style. (J O'D photos).

F/F variety. Above: Jack Humphreys with Sunduster at the Nats. Left: Up and away at Port Meadow. Peter Michel releases his Buckeridge lightweight. Below: Dave Hipperson and Dennis Davitt, first and second in Coupe d'Hiver at the Nats. Event was for the HJN Trophy, not Sparklets as reported in August.

'right climb' to 'left glide' has, by definition, to include a portion of straight flight that puts even more distance between the centre of the climb helix and the centre of the eventual glide circle. When thermals are large and gentle this probably doesn't matter. In dead still air it certainly doesn't but when the lift is small in diameter and strong it can be the deciding factor. You fly out. The model might wander back - but is it worth the risk?

Incredibly, Peers was still so keen on the idea of the 'right/left' pattern, that for a time he partially overcame the problem by using an auto-rudder to snap the glide over to the right after climbing against 'left rudder'. Power still opened up the turn at the end of the tun. This was lethal if the auto-rudder came in too soon. Needless to say he flies 'right/right' now. However, I would say that the 'right/left' trim was still very much worth considering for those difficult Vintage designs...

Thrust races renaissance

Once again Tim Gray is producing his miniature thrust bearings for Rubber propellor assemblies. They are of usual high standard and good value - and the range is now extended. As well as the popular sizes to fit 16 and 14 swg shafts there is now a larger unit of 1/8in. bore with an eight - ball race and two smaller models fitting 18 and 20 swg wire. The latter measures a mere 0.15in. total diameter and weighs a quarter of a gram!

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All are £1.50 each, apart from the large one which is £2.00. Contact Tim direct at 29 Stockinstore Road, Luton, Beds.

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Venue: Areas
Contact: Area Comp Secs or SMAE Comp Sec Richard King Tel: 01 890 4504

18th Sept: Northern Gala
O/G for CMA Trophy. O/R for Caton Trophy and O/P for Hamley Trophy
Venue: Driffield
Contact: Dennis Davitt Tel: 0532 675433

25th Sept: 6th Area Centralised Event
O/R for Plugge points and the Farrow Shield for Teams. F1A for the SMAE Cup and 1/2A Power
Venue: Areas
Contact: Area Comp Secs or SMAE Comp Sec Richard King Tel: 01 890 4504

2nd Oct: Slope Soaring Meeting
F1E for the SMC Trophy
Venue: Sheffield
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Further information available from Argus Specialist Exhibitions, Wolsey House, Wolsey Road, Hemel Hempstead, Herts HP2 4SS. Tel: 0442 41221

Appendix - Links to the plans

The original issue comes with a free plan (Miles M20) printed front/back on a pull out banner of four sheets. The banner is not included in this document.

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Miles M20 by Noel Stephenson
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