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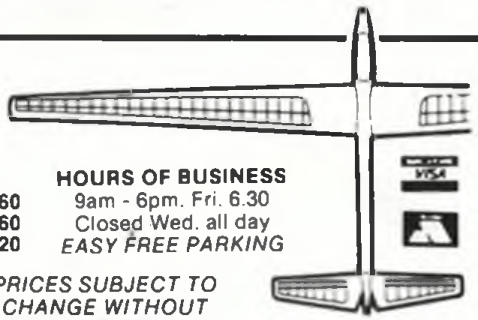

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MARCH 1990
Volume 55
Issue 650

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AERO MODELLER

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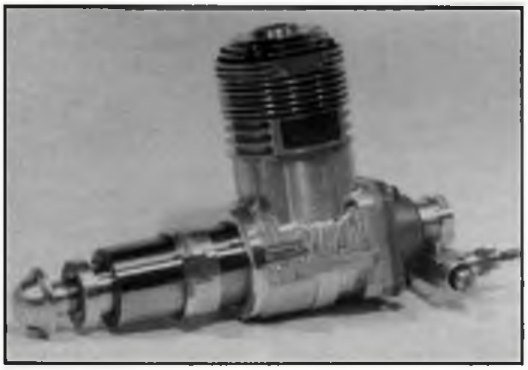

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Cover: Charlie Newman's fine Handley Page Hampden, featured in depth last month, was a worthy contender at the 1990 Model Engineer Exhibition where it was awarded a Highly Commended. More M.E. highlights on pages 128 to 130.

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HANGAR DOORS

Jets everywhere - just one display from last year's Dortmund Model Show. Fancy going to the '90 show? We can help you...

Special trip!

Fancy seeing the latest and best that continental modelling can offer? Here's your chance to visit the Dortmund Model Show for just £159.00. This includes three nights' accommodation at the Novotel at Dortmund West, just ten minutes drive - by coach - from the Westfalhallen building which will host not just model aircraft but trains, boats, cars and more besides. Two all-day visits will be made; other attractions include a half-day excursion to the famous overhead railway at Wuppertal, a local shopping trip - and a full, buffet-style breakfast each morning. The dates? depart on 29 March; return 1 April. Full details and booking form on page 252.

Thanks again, and please keep up the good work'.

It's good to know that contributors' hard work at research is appreciated...

Cardinal capers

Remember the Veron Cardinal - surely an all-time favourite introduction to sports free-flight? In the days of the 'real' Mills

engine a .75 Cardinal could be recommended as an ideal combination for the beginner. Well, the Raynes Park lads have decided on a series of competitions entirely for the Cardinal, to be held on 6th May, 20th May, 24th June and 1st July. Rules are simple. Any motor up to 1.5cc is allowed! This one we just have to try. Call Alan Jupp on 01-699 9497...

Indoor Scale Nationals

Doug Sheppard reminds us that the much-enjoyed Indoor Scale Nats are again to be held at the Alumwell Centre, Walsall. Date: Sunday, 22 April. Competitions will be held for CO_2/electric, Open Rubber and Air Racing, with the Aeroplane Monthly trophy for best ultra-light. Talks and model demonstrations are again planned this time under the auspices of Mike Hetherington. More news next time - meanwhile call organiser Doug Sheppard for details on 0272 697595.

Tribute tribute

We were pleased to receive the following letter from J W F Roest, who hails from Nieuwkoop, The Netherlands.

'Together with friends I have been photographing and studying a collection of old drawings and blueprints belonging to the Aero club.

This collection consists of van Hattum designs for a great deal, as well as contemporary modellers like Dijkman, Napjus and De Kat's work. The condition of many of these drawings is poor, and makes my appreciation of the quality of your articles all the greater.

Subjective stuff

Mark Croome was quick to respond to recent thoughts on the desirability - or otherwise - of a combined Nationals, as follows...

Just a thought on the subject of F/F, C/L and R/C Nationals. It occurs to me that aeromodelling is actually split into two groups already; there's the objective group where the stopwatch decides the outcome and the subjective group in which someone else judges the quality of the performance.

I suspect that these two groups are more natural companions than the present split and I look forward to the first objective Nationals with Open Free Flight, Open Speed and so on. Others can look forward to the Subjective Nats with R/C Stunt, F/F Scale and so on.

Isis ambitions

Here's a neat one. John White reminds us of an achievement worthy of commemoration. Over to John:

'In 1940 and 1941 AA Courtney of the Oxford MAC won the Gamage Cup flying the Isis Wakefield designed by AF Houlberg, for many years Chairman of the SMAE. To commemorate the Golden Jubilee of this (I believe) unique double win I propose to donate a small trophy to whoever obtains the best score in this year's Gamage Cup competition (on 1st April 1990) flying an Isis. This will of course, depend on there being more than one entrant flying an Isis!

'Anyone wishing to enter an Isis in this year's Gamage Cup should write to me enclosing an SAE for a reply. My address is: John H White, Seafield, Madeira Road, Totland, Isle of Wight, PO39 0BJ; telephone number 0983 755186'.

Isis plans are quite well-known on the Vintage circuit; certainly, John will be able to provide contracts. Isises (Ises?) are fine performers, even in a breeze, and were quite fashionable when Vintage Wakefield contests first got under way. What better motive for building your own?

Dutch treat

Frank Smart tells us that Ron Kaptijn, arch-combat enthusiast from the Netherlands, has organised a combat International on 4-5th August. Exact location not known at time of writing, but 'somewhere in north-west Holland' covers the area! In addition to FAI, Diesel A and 1/2A classes, it is hoped to run a Stunt event. Send an SAE for more details to Frank, who is acting as UK link man, at 1 High Street, Tredworth, Glos, GL1 4SP.

Brumfly 90

We have confirmation that this much-enjoyed annual event is definitely on. Date is 22 July; venue RAF North Luffenham. Details in What's On - but we stress the advance arrangements. Intending competitors must submit, in writing with an SAE, to organiser Stafford

Above: The Veron Cardinal - an ideal intro to F/F Power. Build one for the Raynes Park competitions! Below: Terry Rose's view...

'Is it you who's selling a Brown Junior modified for a tuned pipe?'

WHAT'S ON

Screen at 66 Stevens Road, Wollescote, Stowbridge, West Midlands with the following information: name, telephone number, BMFA number and car registration - before 15 July. Identification will be needed on the day. Usual RAF security requirements, of course. Always a good one, this. Don't miss it!

Send 'em in!

News of your club's events would be most welcome for inclusion in our What's On panel. Let's have them - but don't forget to include date, location, a contact name and telephone number, with any special requirements, and brief details. A look at this month's entries will give you the idea, anyway.

Plumpton again

Dave Bishop sends news of this 1990 Model Show, to be held on 18-19th August at Plumpton Racecourse. It's the merry mixture as before, with pulse jets, rockets, radio control craft large and small, the DPR Chuckie contest and much, much more besides - with cars and boats too. Top camping facilities and plenty of leisure attractions make this one for the diary. Watch for more news!

Congratulations!

We learn from the Impington Village MAC newsletter that funflier extraordinary, Ray Malmstrom and his wife Sheila celebrated their Silver wedding anniversary in September. We'd like to add our own congratulations - and equal sentiments to newly-married Ian and Angela Davitt. Future happiness on and off the flying field!

Woodbury Weekend

The annual Bristol and West Woodbury Weekend is scheduled for 5-7 May at the now-famous (shouldn't that be infamous?) site at Woodbury Common, down in cream-teas country near Exmouth, Devon. Check with What's On for the gen. Must say, though, that 'Woodbury' is always an eagerly-anticipated calendar date with a healthy mix of events. Organisation is usually tops, too. Elton Drew advises that, in addition to the usual competition prizes perpetual trophies will be awarded for the first time this year in Open Rubber, Combined Open Power/Slow Open Power, and Open Glider. Caravan accommodation is available at special rates - and don't forget the Sunday evening supper! For more details contact Elton Drew at 2 Downfield Close, Alveston, Bristol, BS12 2NJ.

Roy Ashby

It is with sadness that we learn of the death of Roy Ashby on 20 December after a long and gallant fight against cancer. In recent years Roy's speciality was electric flight, both Indoor and outdoor, which he approached with characteristic individuality, creating a series of instantly-recognisable aeroplanes flown with cheerfulness and vigour. Publication of his 'electric' experiences in this magazine during 1987 gave him immense pleasure - and he was rewarded with the knowledge that his writings provided inspiration to many other enthusiasts. Roy's energy, good humour and willignenss to help others will be missed by all, and particularly his Maidstone MFC colleagues; we extend our sympathies to his family.

John Colyer

It is with great regret that we report the passing of John Edward Snelling Colyer, known as 'Jack', aged 80 on 18 December, just a few days before his 81st birthday.

Jack Colyer was the designer and manufacturer of Majesco engines in the immediate post-war years, now sought after as collectors' items. He was also blessed with many other talents, in music, as an artist and model engineer; besides being, for many years, a keen aeromodeller, particularly in the building and operation of early pre-war Power free-flight models. He was, eventually, a great of Col. Bowden and began this hobby with the construction of Col. Bowden's Blue Dragon fitted with an early Brown Junior with which he narrowly missed winning at the Sir John Shelley Cup in 1936/7.

We offer our sincere condolences to his wife Mirian and family in their sad loss.

22 April
INDOOR SCALE NATIONALS
Venue: Alumwell Centre Walsall. CO/Electric, Open Rubber, Air Racing, Aeroplane Monthly Trophy for Best Ultralight. Talks and demos. Contact: Doug Sheppard. Tel: 0272 697597
Venue: Dewsbury. Contact: Jeff Smith.

29 April
WHARFEDALE & DMAC OPEN MINI GOODYEAR EVENT
Venue: Dewsbury. Contact: Jeff Smith. Tel: 0532 663432.

5-7 May
BRISTOL AND WEST WOODBURY WEEKEND
Venue: Woodbury Common, Nr. Exmouth, Devon

5 May
Champagne fly-offs for OR, OG, combined OP/SOP, Vintage Rubber. 5-8pm

6 May
Open Rubber, Combined Open Power/Slow Open Power, Open Glider, Vintage to SMAE rules

7 May
Combined FAI 5 rounds. Ray Inker Memorial Trophy plus prizes for to flyer in each class. Vintage to SE rules. 8am-3.30pm. Caravan accommodation at special rates. Sunday evening supper. Contest details and accommodation booking forms from: Elton Drew, 2 Downfield Close, Alveston, Bristol, BS12 2NJ on receipt of an SAE

6 May
CONTROL LINE SCALE MEETING
Venue: RAF Hullavington. Contact: Martin Fardell. Tel: 0454 412486

20 May
WHARFEDALE & DMAC OPEN AEROBATICS EVENT
Venue: Dewsbury. F2B and Class 2. Contact: Jeff Smith
Tel: 0532 664432

3 June
BLACKPOOL & FYLDE RCMS SCALE DAY
All welcome
Venue: Not supplied, but contact: A. Dawson. Tel: 0253 506513.

10 June
WHARFEDALE & DMAC 1/2A COMBAT EVENT
Venue: Dewsbury. Contact: Jeff Smith.

1 July
WHARFDALE & DMAC CLASS A DIESEL COMBAT EVENT
Venue: Dewsbury. Contact: Jeff Smith.

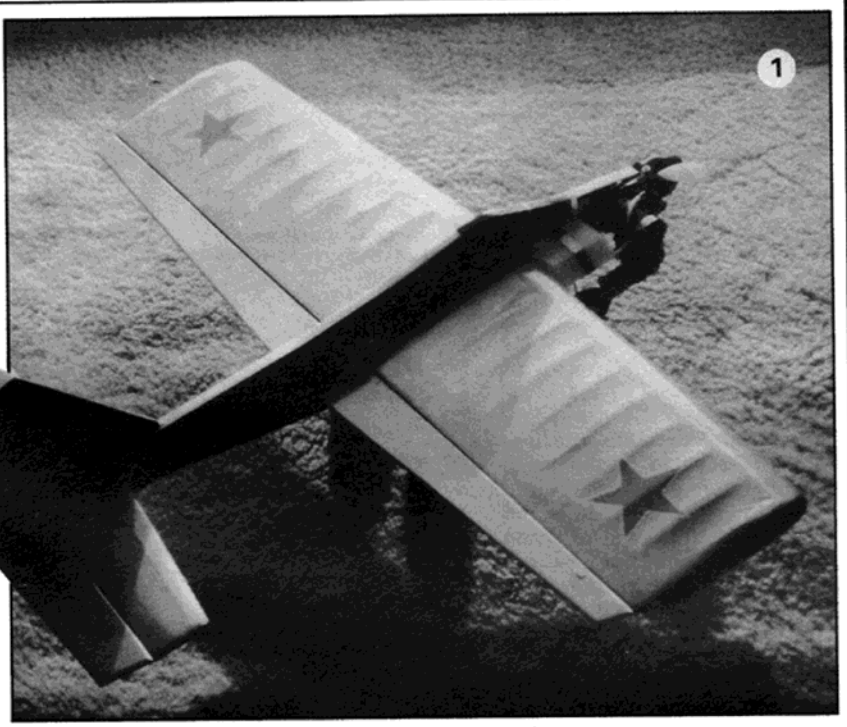
1 July
CONTROL LINE SCALE MEETING
Venue: RAF Abingdon. Contact: Martin Fardell. Tel: 0454 412486

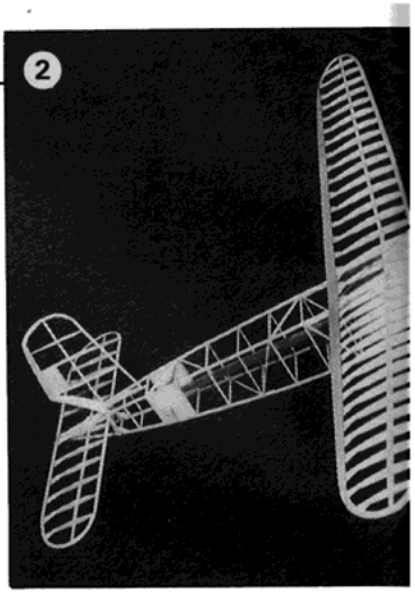
15 July
ROLLS ROYCE MAC VINTAGE C/L MEETING
Venue: RR Airfield, Hucknall: vintage T/R A and B. Old Tyme stunt. Vintage Speed. Fun Flying over grass and tarmac.
Contact: Terry McDonald. Tel: 0332 511273

22 July
BRUMFLY 90
Venue: RAF North Luffenham. 10am start. Competitions will be flown in rounds from a line. Classes: Open Power, Open Glider, Open Rubbewr, 1/2A, CDH, A/1. Send SAE, and submit name, telephone number, BMFA number and car registration before 15 July to Stafford Screen, 66 Stevens Close, Wollescote, Stourbridge, West Midlands. Tel: 0304 396535. Identification will be needed on the day.

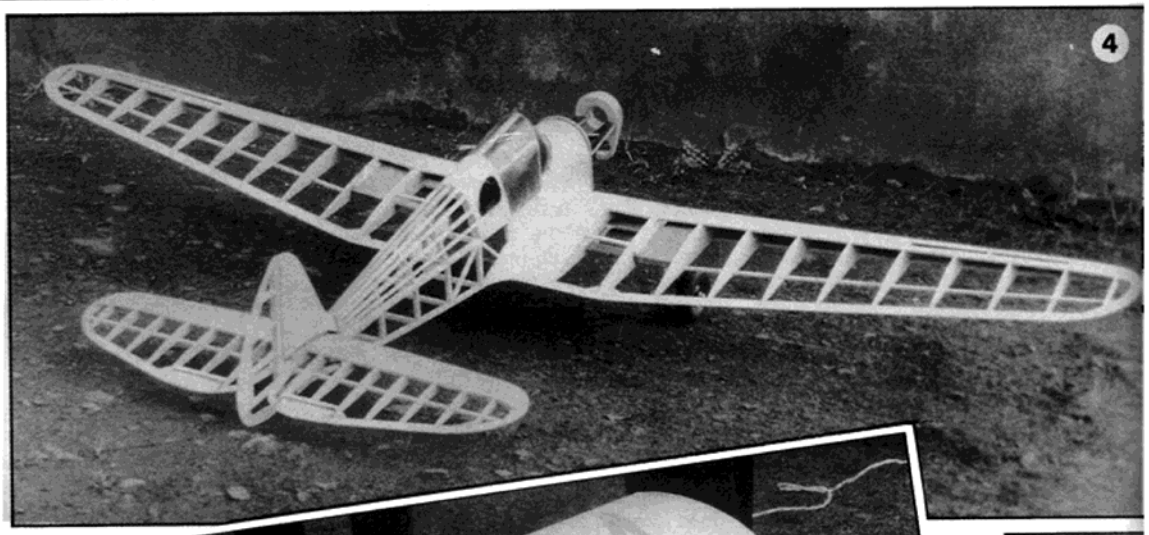
27 July
NEWBURY & DMAS ANNUAL VINTAGE DAY
Venue: Newbury Racecourse, Newbury, Berks.
Control line and R/C Vintage ONLY. A full day's flying in a relaxed atmosphere. All welcome! Proof of insurance essential.
Contact: Mark Dees. Tel: 0625 46426

16 September
CONTROL LINE SCALE MEETING
Venue: RAF Hullevington. Contact: Martin Fardell. Tel: 0454 412486

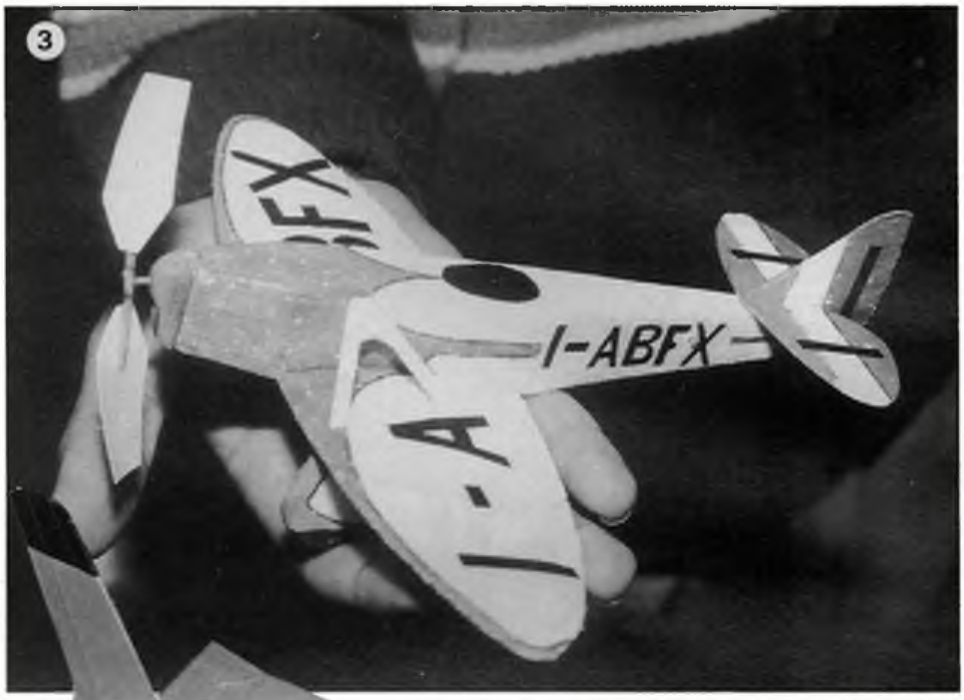


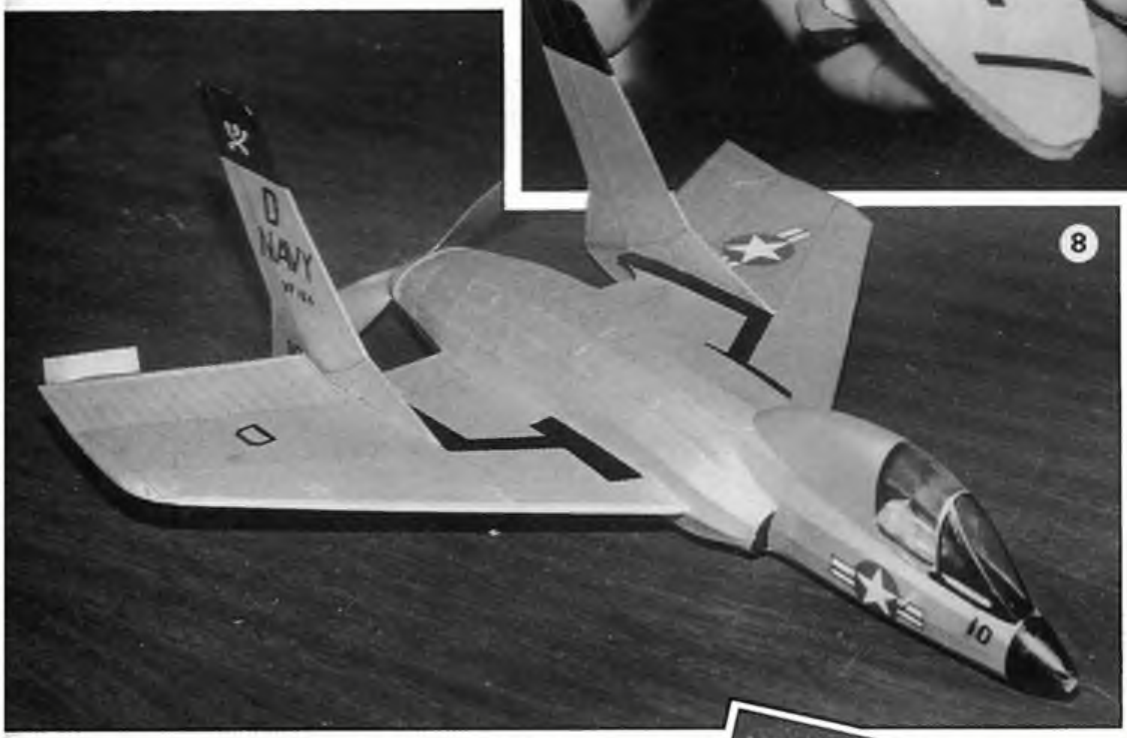


4: Back to 1949 for this structure photo of Gordon J Rae's 54in MonoRae G-JR35 free-flighter for Mills 1.3. He still has the plans... 5: Bigger stuff at our ASP Four-Stroke Rally – blue-and-white Tiger Moth was a great performer. Tiggies always go well!

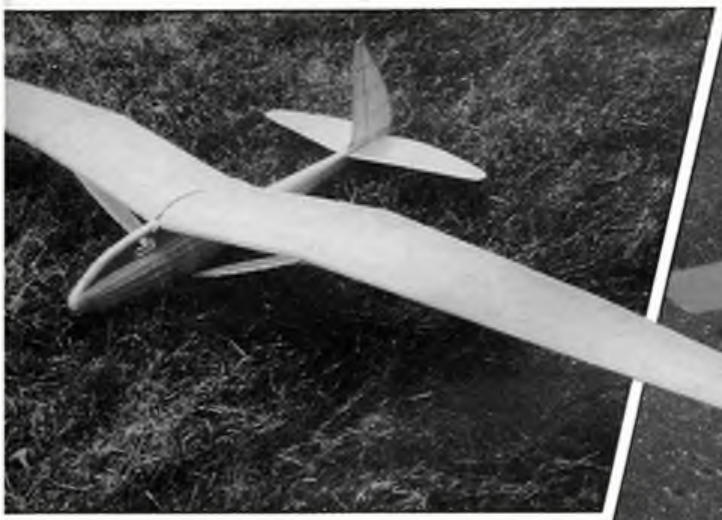


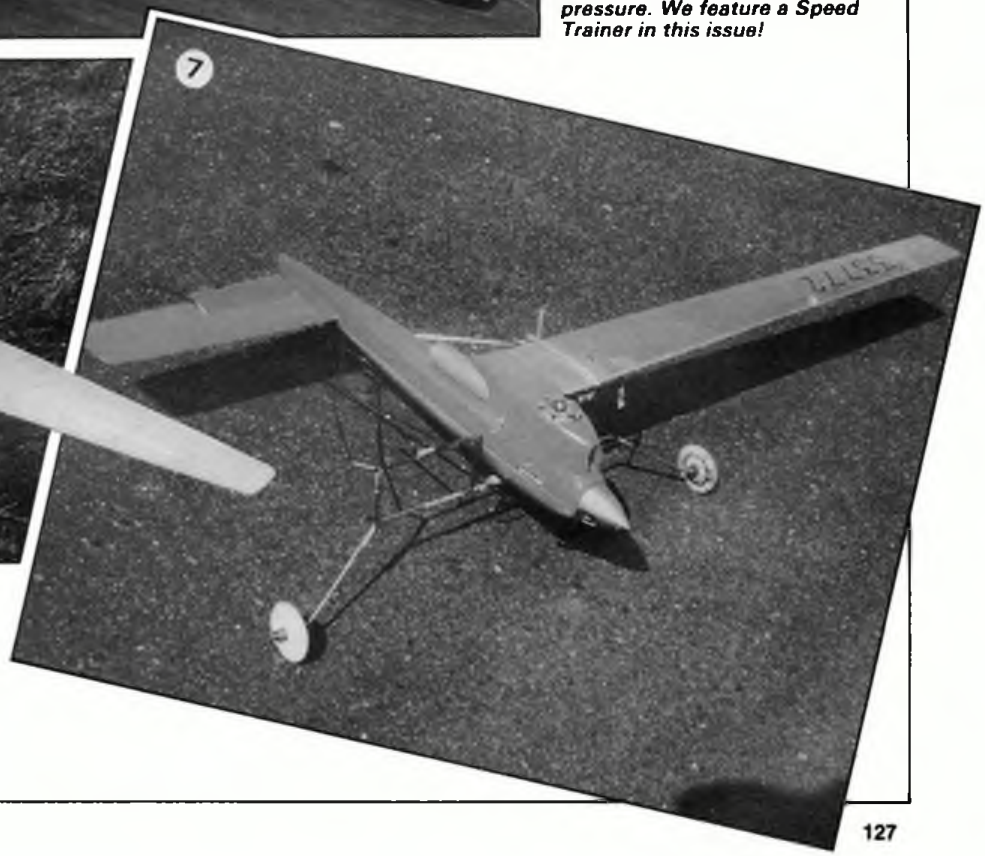
1: Attractive C/L Sukhoi Su-25 built by Steven Branford was used as a trainer during a school course. More details later! 31in span, OS Max .20 power. 2: From Italy comes this shot of Hugo Bendini's KL 69, a Wakefield from around 1950. Model - since finished! - flies well on 40gm of rubber. 3: Seen at the last Watford, meeting this baby Breda was a delicate performer.





8: Sleek Chance Vought Cutlass for pusher rubber power is the work of Peter Smart - snapped at Watford and shortly to appear in Aeromodeller. 7: Neat Novice 21 speed craft by Maurice Roberts is powered by an Irvine 21 running on pen bladder pressure. We feature a Speed Trainer in this issue!





6: The Ontario Model Aircraft Co kitted this 60in semi-scale model of the Bowlus-Dupont Albatross II (if you please) from 1937 to 1941. Tail section is inverted. Builder Peter Mann has yet to try it out...

AEROMODEL

Left: Gold Medal and RCM&E Cup winner Mick Reeves' superb R/C Sopwith Camel would be at home in any museum. Below left: Ron Moulton's R/C balloon caused crowds to gather. Below: Beautifully Screen was awarded a Gold Medal and Aeromodeller Cup.

Above: Don't see many C/L autogiros! Peter Burrows' Avro Rota actually first appeared at the 1968 Woodford Rally... Below: Nifty R/C Tigershark by Donald Smalley is built from a Thorpe Bros plan.

AMOST enjoyable display. Thank you!' Rewarding words, indeed, at the close of the 1990 Model Engineer Exhibition at Ally-Pally – our second at this most spacious and airy Peoples' Palace, where aeromodelling interest was represented as fully as ever. All the details next month, after this brief whizz round the exhibits and entries.

Very varied

What was the message from the aeromodelling on show? Simply that variety of subject is as unpredictably fascinating as one could wish. From John Walden's half-size Pinocchio for CO_2 (plans soon!) to Ron Bye's hefty C/L Hercules; Stafford Screen's latest FAI Power craft (a masterpiece of state-of-the-art technique – and skill) to David Ward's amazing Albatros DVa – one-fifth scale for R/C and looking as characterful as only this curvy WWI fighter can; what more could you wish? Strong support came from other battling biplanes. John Siddall's Fokker DVII in allegedly-Udet colours is a fine performer too, as many an Old Warden devotee could testify. But top honours in the field just had to go to Mick Reeves for his museum-quality Sopwith Camel, a worthy Gold Medal winner which took the RCME Cup too.

Fans and fancies

Jet craft made a notable presence. Donald Smalley's F20 Tigershark and Jaguar were captivating; Philip Noel's SAAB Viggen too (and it's from the RCM&E plan!). More ASP influence was seen; the colourful Sabre entered by Brian West is a Radio Modeller plan. So was Kenneth Hobson's HK 1. Also familiar from our Scale Weekend and Golden Era Day in '89 was David Smith's fine Curtiss Jenny, just across the table from Joseph Barry's Hanriot which boasted metalwork to astound. Not to be outdone by Dad, Mick Reeves' son Jim entered another splendid Sopwith – a Pup this time, based on Shuttleworth's own example. Down a size or two to Charlie Newman's Hampden, which has been the subject of attention in these pages recently, and Doug Sheppard's delightful Redwing, all proving that CO_2 Scale is alive and well. And how good to see, finished at last, Paul Briggs' electric Hansa-Brandenburg W29...

Malvern mixture

ME stalwart Gordon J Rae provided a merry mixture. His Demon was a sharp replica of his original 1951 design – but his Skyleda Skymaster was a nifty up-to-date stablemate. Another of Gordon's designs, the nine-foot Phoenix Gull, was submitted by clubmate Lewis May. And it just wouldn't be the same at the ME without the presence of Charlie Crawley, who forsook C/L interest this time to enter a charming Veron SkySkooter, complete with ancient valve R/C gear, as his first radio model since 1951... Robin Woodhead's neatly-finished Nobler (first seen at the Nats) and similarly-styled Astro-Hog were, as the saying goes, a nice pair, contrasting the disciplines with Dave Hipperson's SST 1 Open Rubber Flyoff model, which earned its builder a Silver Medal. Splendid variety; more of the rest next time – but what of the flying?

DPR Day

Traditionally, now, New Year's Day is for the DPR Model Flying Championships. Organiser and mainspring Dave Rawlins was delighted with the response which had the audience applauding, laughing and sympathising in turn at the competitors' efforts. Full report next month – but we have to say, especially, well done to winners Darron Bellworthy as Junior Champion and Phil Ball as top Senior. Participation was so enthusiastic, and strong, that this Chuckie comp took over three hours to run... Well done, too, twelve-year-

ING AT THE M.E!

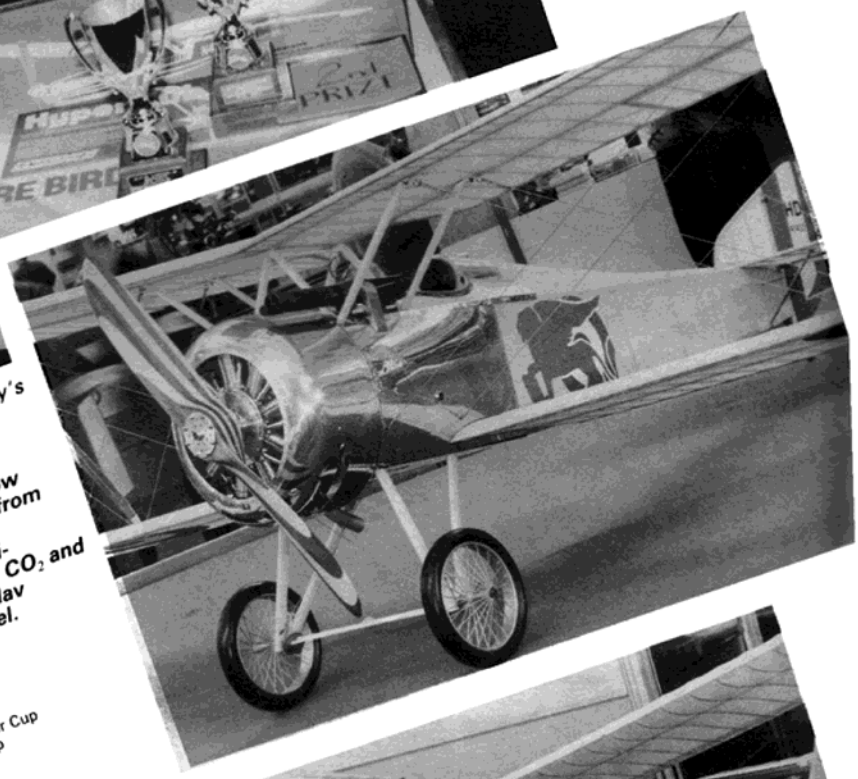
Left: Bernard Seale's Thulin NA is a familiar sight on the scale C/L circuit. Took a Bronze medal at the M.E. Below: Remarkable Hercules by Ron Bye needs four OS .25 FSRs to carry aloft 15lb a.u.w. Below that: Hansa-Brandenbergs were popular. This Raymond Ferguson's 1/8 scale version for R/C and OS48 four-stroke. Foot of page: Robin James gets his well-known R/C lightweight away during the mid-week flying day.

Left: Some of the spoils at the DPR Model Flying Championships. Full report next month!

old Jay Rebbeck, Superfighter Champ this time round!

Then there was our own Fun Fly and Fly by Nite on 4th January – a hectic day which really set the spectators going; but space runs short for now. But what fun it was...

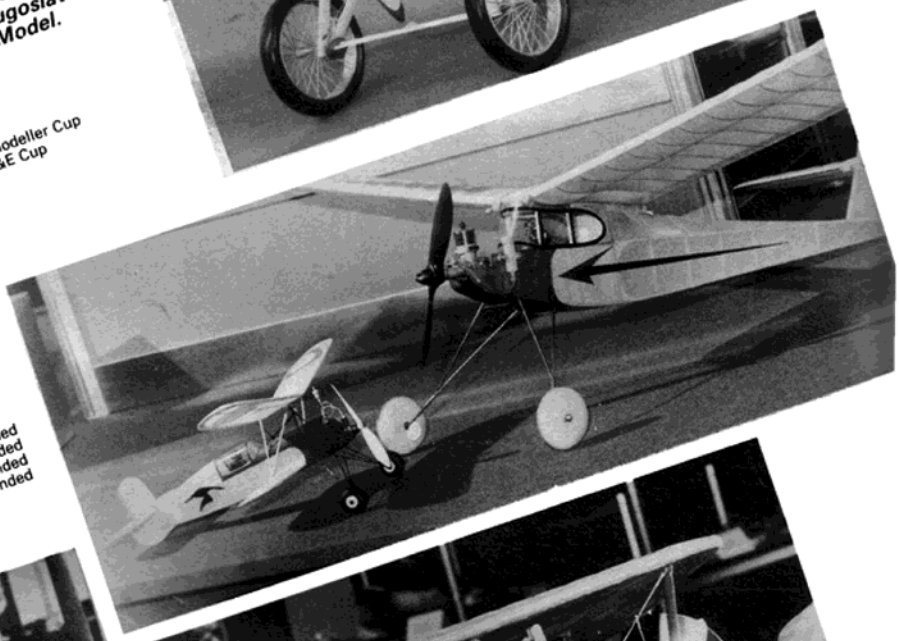
Join us in the April issue for more news of the exhibits, the flying – and ME support from SAM, BMFA, BSMA and others...



Right: Joseph Barry's fine Hanriot from Pete Neate's plan featured superb metalwork. Below that: Neat duo from John Walden – charming mini-Pinocchio for CO_2 and 1949 Yugoslav Power Model.

The winners!

Stafford Screen	F1C Power Model	Gold Medal and Aeromodeller Cup
Mick Reeves	Sopwith Camel	Gold Medal and RCM&E Cup
Dave Hipperson	SST1	Silver Medal
Paul Briggs	Hansa-Brandenberg W2G	Silver Medal
David Ward	Albatros DVa	Silver Medal
John Siddall	Fokker DVII	Bronze Medal
Gordon J. Rae	Demon	Bronze Medal
Doug Sheppard	Robinson Redwing	Bronze Medal
Bernard Seale	Thulin NA	Bronze Medal
Philip Noel	Saab Viggen	Bronze Medal
Joseph Barry	Hanriot HD1	HC
Brian Manby	DH60	HC
Kenneth Hobson	HK1	HC
John Walden	Half-size Pinocchio	HC
Gordon J. Rae	Skymaster	Commended
Charlie Newman	HP Hampden	Commended
Ron Bye	C-130 Hercules	Commended
George Bushell	Joey	Commended
Lewis May	Phoenix Gull	
Joseph Michie	Electra	
Donald Smalley	F20 Tigershark	

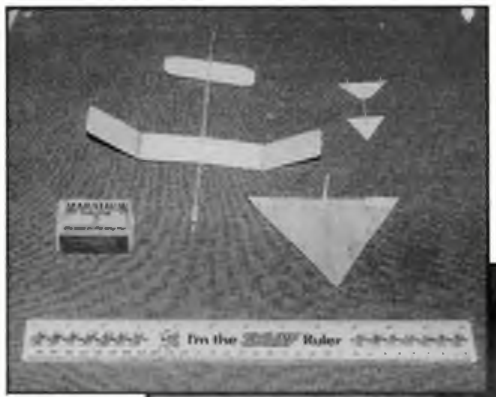


R/C Albatros DVa by David Ward.

The Marvellous Matchbox Amusement

Winter clubroom fun for miniature modelling enthusiasts recounted by Dave Skertchly

Above: Derek Mason assembling. Parts are small! Below; The author's tandem-wing craft. Below that: A selection of entrants. Variety here...



EVERY autumn the Lee Bees committee rack their brains for fresh, original ways to amuse the membership during the winter closed season. Of course, various senior members give interesting slide shows, we enjoy some excellent visiting speakers, and there are always the raucous quiz games, accompanied by much leg pulling. However, we always like to include a practical evening. These have included proper Indoor events, paper gliders, and rubber-powered round-the-pole speed, the last event becoming quite hazardous when an FAI job was given full turns and attached to the pole with button thread. All pale into insignificance, though, when compared with the famous Lee Bees 'Model in a Matchbox' competition. Rumour has it that the idea was dreamed up by pylon race ace Tony Butterworth, with visions of minute scale jobs, possibly even racing, but the real origin of the class is now burried in club legend.

The rules are very simple.

(a) The Model must be brought to the meeting in a standard matchbox.

(b) The longest duration flight in the clubroom is the winner, providing that it passes rule (c)

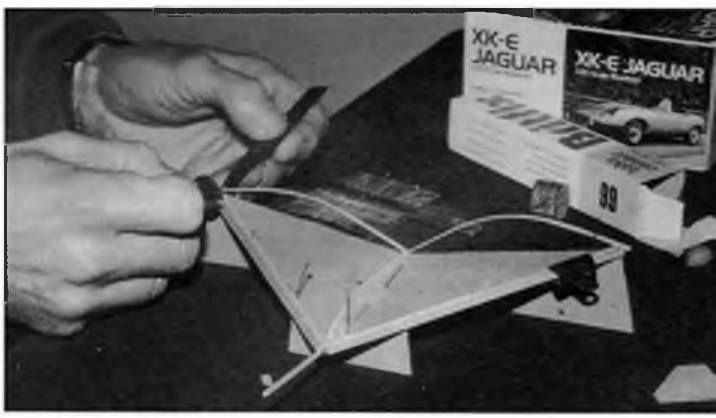
(c) All models shall be returned to a different competitor's matchbox.

On the day all entrants arrived early, so keen were they to get started, many being well 'tooled up'. Soon followed the mocking audience, keen not to miss any of the fun. In half an hour an amazing diversity of machines had been assembled. Admidst much bustling and jeering the centre of the room was cleared, the standard Lee Bees chair was ceremoniously positioned for launching, and the first contestant solemly ascended. At this point the caretaker entered the room and at his first glance at this peculiar spectacle, turned on his heels and nearly fell down the stairs in his haste to escape.

Approaches

The models were, broadly, of three types. The first were mini-copies of known chuck gliders, and even the appropriately-named Easy Bees. Tony Butterworth's excellent example was the most advanced, but was tricky to trim, the problem seeming to be one of warps. It was really sad to see him squash that beautiful model back into a slightly smaller matchbox...The second class was the 'cram as much 1/32in balsa into the box as possible and stick it together on the night with zap' classs. Mick Harvey excelled at this approach, no doubt due to his background in the rough-and-ready control line field. His model was about 18in span with swept-back wings for stability. It turned superbly on a wingtip and thus circled the club room. Brian Moore also chose this approach but with beautifully dovetailed pieces of balsa. The last class were the 'oddies'. These included Norman Hudson's superbly executed sail-wing, and the author's rotor wing and tandem wing models. Brian Cracknell tried for auto stability with tail-first designs.

Such a good evening was had that the result was all but forgotten during the technical discussions which continued in the bar, long into the evening. Almost out of sight could be glimpsed the quizzical stare of the caretaker...



Left: Tony Butterworth with his EZB glider. Above: Norman Hudson assembles his sailwing. Somehow the performance did not reflect the care in construction.

Beat the rest!

Go for .21 engined Team Racers, says Dave Clarkson!

WHEN Team Racing first emerged in the immediate post-war years in the USA, it was for models with .29 (5cc) motors and one fluid-ounce (29cc) tanks. Today our B Team Race rules remain very similar, permitting motors up to 5cc and 30cc tanks. Up to the present time there have been few major rule changes. The first of these was a short-lived requirement for silencers in the early 1960s, a requirement that became permanent in 1980. The second was the metrication of our rules in the mid-1970s which increased the required wing area from 125sq in to 9dm² and extended the race distances from five mile heats and ten mile finals to 10km heats and 20km finals.

Great history...

Class B Team Race has been flown at the Nationals for almost forty years, making it one of the oldest competition classes still actively flown in control-line anywhere in the world. A long history; and maybe someone should write it down before the early days fade from memory. Sadly, in recent years it has seemed that this history was coming to its end, for the number of events has declined to three or four per year, and new models and new teams have become rare. The reasons for this decline are well known. 5cc racing glow motors have become very powerful, very heavy, very expensive - and are very hard to obtain. The silencer rule has effectively forced the use of tuned pipe exhaust systems which have brought with them operating difficulty, very high airspeeds and excessive weights. A top class 5cc team racer today weighs nearly one kilogram, and it can exceed 225km/hr (140mph). Combined, these factors mean line tensions in excess of 20kg, a pull so high that only the strongest and bravest of pilots can tolerate it.

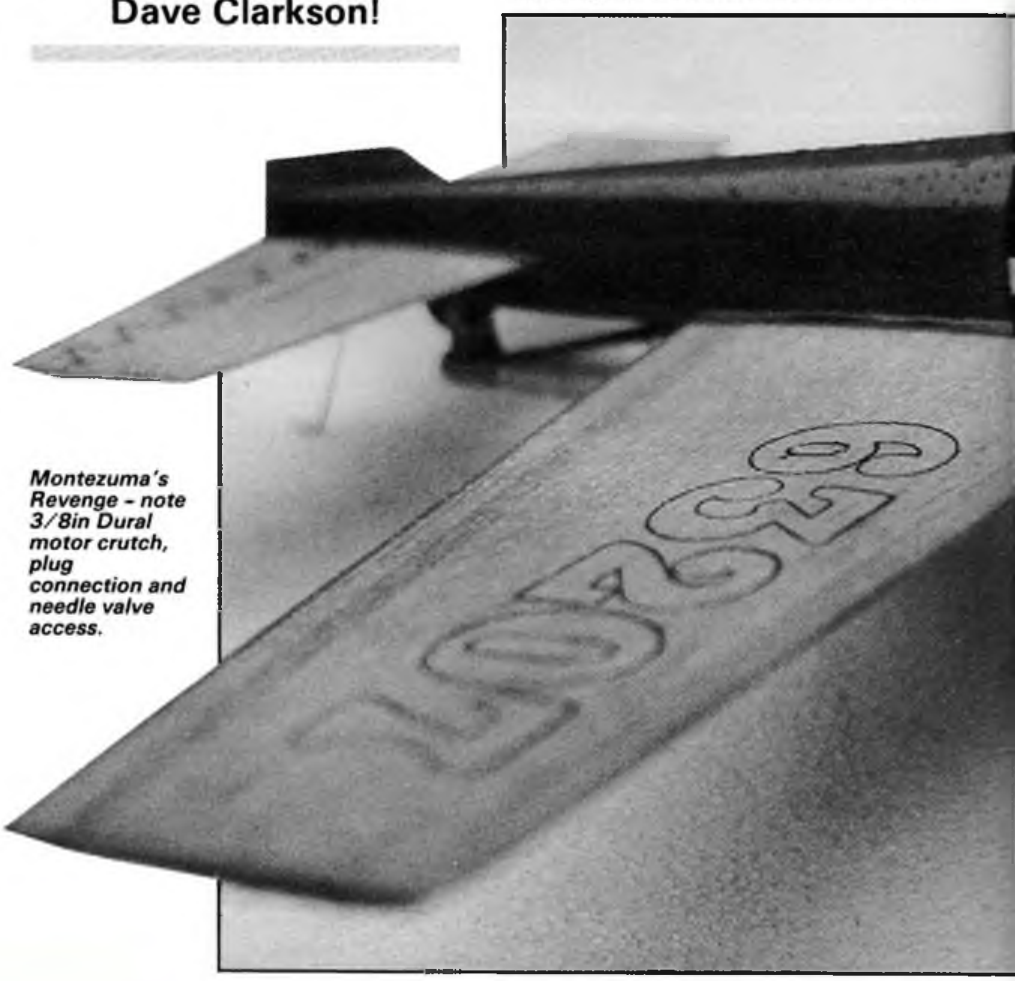
It seems that no-one today is prepared to spend £175 on a motor (the last price I have seen advertised for an OPS 29 VAA plus pipe) and put it in a model no pilot can enjoy. Basically, competitive 5cc B team racers have become too much. The obvious way to have overcome this problem would have been to eliminate the silencer rule. This would have reduced both weight and airspeed by around 10 per cent leading to a 25 per cent reduction in line tensions. Such a proposal was made to the SMAE after the 1987 Nationals where, in the final, we saw a model lose its pipe leading to real fears about safety. Understandably, environmental pressures are such that this proposal could not be accepted despite its improved safety implications. Following this failed attempt to improve things, the B Team Race competitors met at the 1988 Nationals and proposed to the SMAE that models fitted with motors up to 3.5cc in size be encouraged, by allowing them to fly on 0.35mm lines whilst retaining 0.4mm line for the 5cc models. The hope being that on these thinner lines 3.5cc models would be competitive giving a viable alternative approach for we more wimpish pilots. This proposal was accepted by the SMAE.

Reasonable

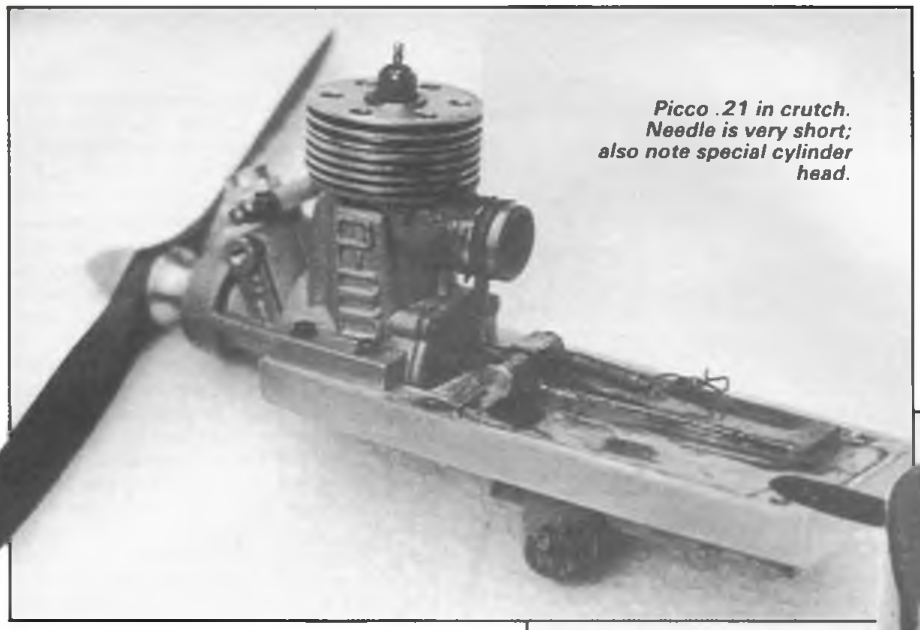
The nice thing about 3.5cc (.21) size motors is that they are reasonably priced and very available, for this is the motor size for club 20 RC Pylon Race and RC ic Cars; and it is one of the most popular RC Boat racing sizes. I know of eight different makes of rear exhaust, tuned pipe compatible 3.5cc motors; namely (in alphabetical order) Irvine, K&B, Novo Rossi, OPS, OS, Picco, Rossi and Super Tigre. They are all state-of-the-art motors and are (to varying degrees) much lighter and much cheaper than the only suitable 5cc motor currently available. So - has the 1989 contest season shown that the SMAE's revised rule line has made 3.5cc B team racers competitive? The answer is yes! - for three out of the four contests last year (the ETA Trophy, the Wharfedale 1000 and the SMAE Centralised) were won by such. That victory in the 1000-lap marathon was notable because it was the first ever victory by a tuned-pipe model, and it was the tenth-quickest time in the event's thirty-year history. Great news for those who want to try B Team Race; truly a new beginning for this historic event. To encourage the construction of more 3.5cc B team racers, I give in this article all the relevant details concerning my Montezuma's Revenge, the model that won those three events. Other enthusiasts also had success in 1989 with 3.5cc models, for Gough/Ward placed third at the Nationals, and Ross/Lorimer finished third in the Wharfedale 1000. In fact there were as many 3.5cc Bs competing last year as there were 5cc models.

Montezuma's Revenge

The sketch gives the important dimensions and construction details. Those familiar with my Nelson Sprint FAI-TR design (Aeromodeller plan CL 1351) will recognise it; and the construction description given in the September 1978 issue of Aeromodeller is very relevant. Compared with the Nelson Sprint, Montezuma has a bulkier nose to accommodate its bigger motor and lower aspect ratio flying surfaces for greater rigidity. It employs a motor crutch cut from 3/8in thick Dural sheet since no cast item is available to my knowledge for these 3.5cc motors. At its rear

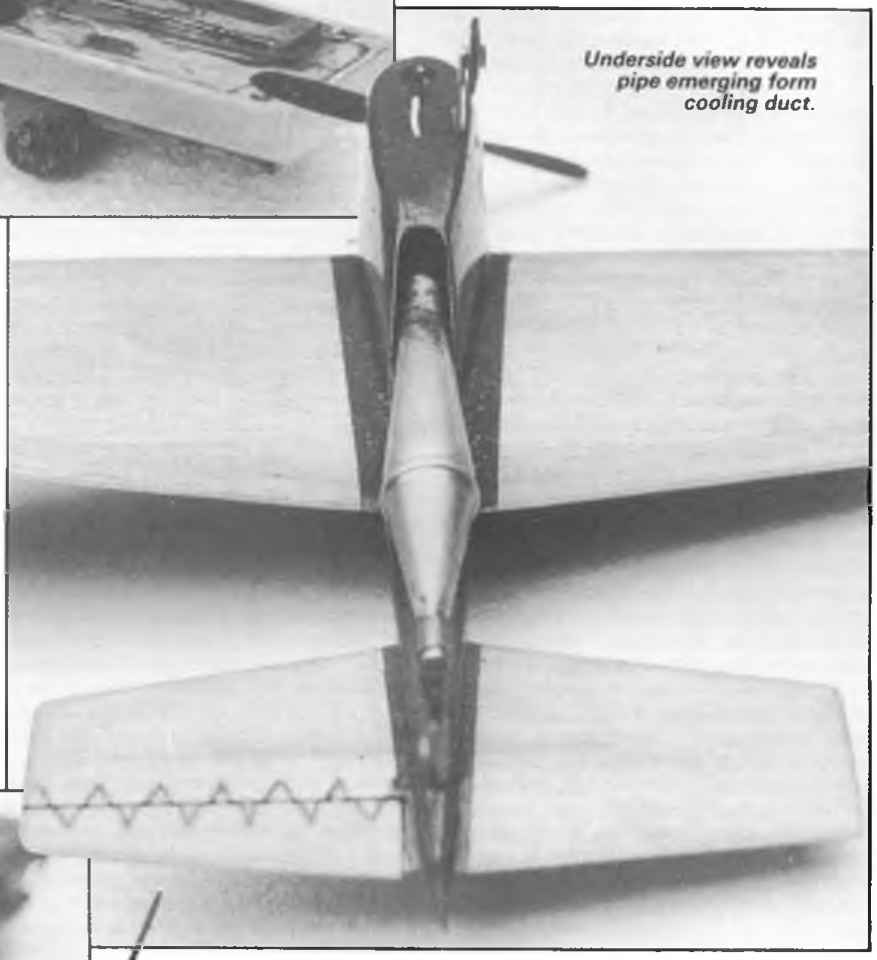


Montezuma's Revenge - note 3/8in Dural motor crutch, plug connection and needle valve access.



Picco .21 in crutch. Needle is very short; also note special cylinder head.

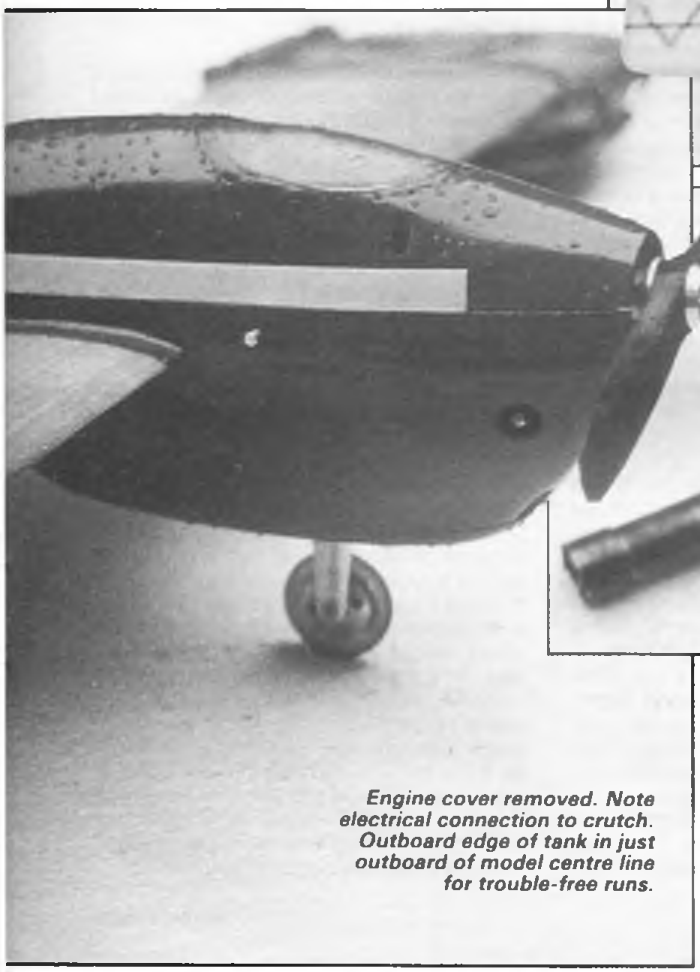
the head would have been in contact with the tuned pipe – a very hot place to use epoxy glue for such an important job. Larsson/Rylin cooling has been retained, for my experience years ago with front induction, rear exhaust motors in FAI-TR had shown that this cooling system works well, and it permits very easy motor installation. One thing that has been learned is that B fuels place high demands on model finishes. My normal car spray paint followed by Tufkote finish was quickly eaten, so it had to be removed and replaced with



Underside view reveals pipe emerging form cooling duct.

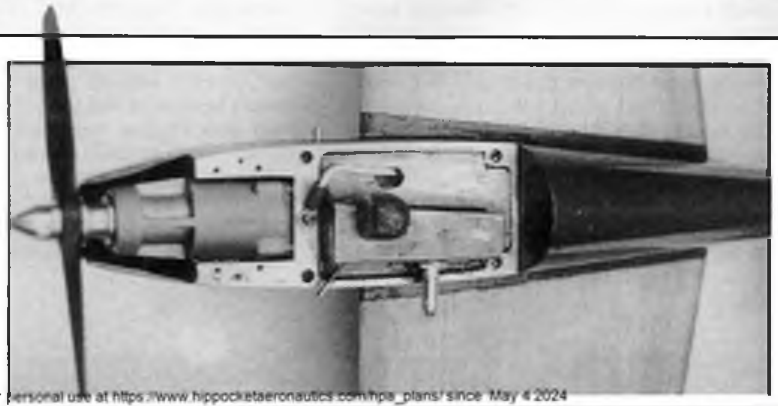
end a flat tail and fin is used together with a long tailskid.

The fin is cut from copper-surfaced printed circuit board with one side internally connected to the motor crutch and the other to the motor plug terminal. The two-volt electrical supply necessary for starting the motor is provided simply by the 'battery person' contacting the fin. The long tailskid gives adequate clearance between the tuned pipe exhaust and the ground. A side benefit is the resultant low ground angle, which considerably aids take-off characteristics. One big change is the use of a turned aluminium circular bellcrank running in a housing of identical material, incorporating an integral bellcrank bush. This housing is glued into a close-fitting hole through the wing with cyano, for fuel and temperature resistance. This complex form of bellcrank mounting was chosen to avoid the use of an epoxy-glue-secured bellcrank pivot bolt, for



Engine cover removed. Note electrical connection to crutch. Outboard edge of tank in just outboard of model centre line for trouble-free runs.

Tuned pipe with integral header. Grime at left is baked-on fuel; at right, silicone rubber absorbs pipe expansion at bracket while it heats up.



K&B Super Poxy paint. This has not suffered in the slightest and is thus strongly recommended.

The motor

Montezuma is fitted with an eight-year-old Picco 21RE, a relatively low-tech motor compared with many of the 21s available today. It is on its second piston/liner assembly, for at the 1989 Nationals its con-rod broke, wrecking the original assembly. Just where we get hold of another piston/liner for this much superceded motor I do not know - is there anyone out there who can help me? To adapt the Picco to its function my team-mate Ed Needham machined a new prop-driver and SMAE safety nut, as well as a new head. He also machined the outside diameter of its exhaust stack to accept a standard elastomeric D-ring to seal the pipe header onto the motor. After much experimentation with heads, we have found that the angled squish plus hemispherical bowl shape shown in the diagram gives the best combination of motor performance and plug life. The bowl is formed by driving a 1/2in dia Bullnose milling cutter 140thou into the head. The plug hole depth is such that the plug projects approx 5thou. The checked total head volume at TDC is 0.38ml, giving a 10.1: 1 geometric compression ratio.

Our Picco is fitted with a ten-year-old 3.5cc OPS tuned pipe. During bench tests with 150 dia x 145mm pitch Goodyear prop we found maximum rpm increase given by this pipe when its length from plug terminal to tailpipe outlet was 310mm. The tests were achieved by an adjustable-length pipe header, machined from aluminium, sealed to the inside of the pipe with O-rings. No doubt we could have used a piece of silicone rubber tubing and plastic ties, *à la* RC practice, for these bench tests. Use of this adjustable header in the model showed the O-rings to have an extremely short life but, since these air tests had confirmed the pipe length to be correct, a new header was machined and permanently pressed into the pipe to give an integral unit. Initially we experienced a lot of trouble getting our motor to come-on-the-pipe in the air. Ken Morrisey suggested that we try sleeving the tail pipe to reduce its effective diameter. A reduction from 7mm to 5.5mm ID made the piping characteristic utterly reliable, but reduced airspeed. Opening up the sleeve to 6.4mm ID has proved (for us) an excellent compromise between pipe reliability and pipe performance. The tuned pipes currently available for 3.5cc motors are much more developed than our old scrap item, so they may work best with slightly different lengths and tailpipe diameters. Experimentation with these parameters is, in our experience, well worth while. The final motor adaption used is the fitment of an insulated, peripheral jetted 4.8mm ID venturi following normal FAI-TR practice. We use a Moki needle valve assembly with the needle much shortened and fitted with an 8BA nut at its end. The idea here was to get around the usual problem (with a front induction motor in a team race model) of having to remove the needle from the motor before the motor can be removed from the model. Our needle is so short that it is flush with the side of the model, allowing motor removal without disturbing the needle. A key made from a suitable socket-headed screw is used to adjust the needle. One benefit of our very short needle is that it cannot be broken or moved by Ed as he catches the model for a pitstop.

Underside of nose. Visible are the 'puffer' head air inlets, and bent wire plug chip.

The fuel tank

If any event has specialised in complex fuel tank design, it is B Team Race. Tanks such as the Chicken Hopper and the Regufol first saw light of day in this event, all more-or-less successful attempts to ensure a totally consistent supply of 30cc of fuel to the motor. Being strong believers in the KISS principle (Keep It Simple, Sam) we use a scaled up FAI-TR style forward feeding Uniflow tank fitted with a Needham tank valve and a Needham shut-off, both originally produced for use in British Goodyear. This very simple arrangement allows Ed to open the shut-off as he commences tank re-fuelling, thereby giving a venturi prime to the motor as the tank is filled. As a result, our motor starts are some of the fastest and most reliable in B racing at the moment. After initially positioning the tank as far inboard as possible so that its fuel feed point was in the same vertical plane as the axis of the venturi, we have moved it 5mm outboard, for with the 'inboard' tank the motor ran lean on the ground and sometimes quit, lean, on take-off. With our present just-outboard feed point position, the motor runs rich on the ground ensuring trouble-free take-offs. In fact, it runs just rich-off-the-pipe on the ground giving a good basis for ground-setting the motor. When correctly set our motor comes on the pipe half-a-lap after launch. If it takes more than one lap to come on the pipe it is rich; and if it is on the pipe on the ground it is too lean. These have proved to be very useful indicators for setting the motor quickly and correctly. I feel that positioning the tank feed point any further outboard may prove to be a mistake, for this may result in the motor having to be set too rich to run reliably on the ground and come quickly onto the pipe in the air.

Props, plugs and fuels

Present day 3.5cc racing glow motors are high-revving beasties with the power coming in at 25,000 or more rpm. Even our early model Picco is very unimpressive at lower revs as tests using an FAI-TR prop have shown. We therefore use a Goodyear prop at maximum diameter and pitch of 160 x 160mm, which gives good revs and airspeed. It may well be that current .21s will work best on even smaller props so some experiments here could well pay off. Naturally such high revs require well-made Carbon Fibre reinforced epoxy resin props for safety.

Charlie Taylor (a famous old B Team Race man) makes good plugs, and we have always used his 1.1/2v Competition plugs. If this plug has one weakness it is in the seal used. We consistently have trouble with blown seals. I understand from Charlie that he is introducing a Super-seal plug, using the technique he has developed with Peter Halman in FAI Speed to successfully overcome this problem. I do hope that this competition plug appears - and that it proves to have an unblowable seal. If not, then with some reluctance we will have to change to one of the known sturdy plugs from the OPS, OS or Rossi ranges of plugs.

More has been written about B fuels than any other. Many exotic formulae have been used, all developed to produce improved range. Because the 10km heat distance is too far for anything but an over-sized FAI-TR diesel to manage non-stop, we have settled for a one-stop heat and three-stop final technique, thus requiring a medium-range brew. The easiest glow fuel range ingredient to obtain is super grade unleaded petrol but, since we have found petrol containing brews to be hard on plugs, we have settled on the use of IPA (iso-propyl alcohol). I guess that the majority of present B-TR competitors use IPA-containing brews, all inspired by Sven Pontan from Sweden who was the first to get a tuned pipe equipped OPS.29 powered B team racer to work. The fomulae we use are as follows:

	SMAE Rules	1000 Lap
Nitromethane	25 per cent	20 per cent
Castor Oil	15 per cent	18 per cent
Methanol	28 per cent	32 per cent
IPA	27 per cent	30 per cent

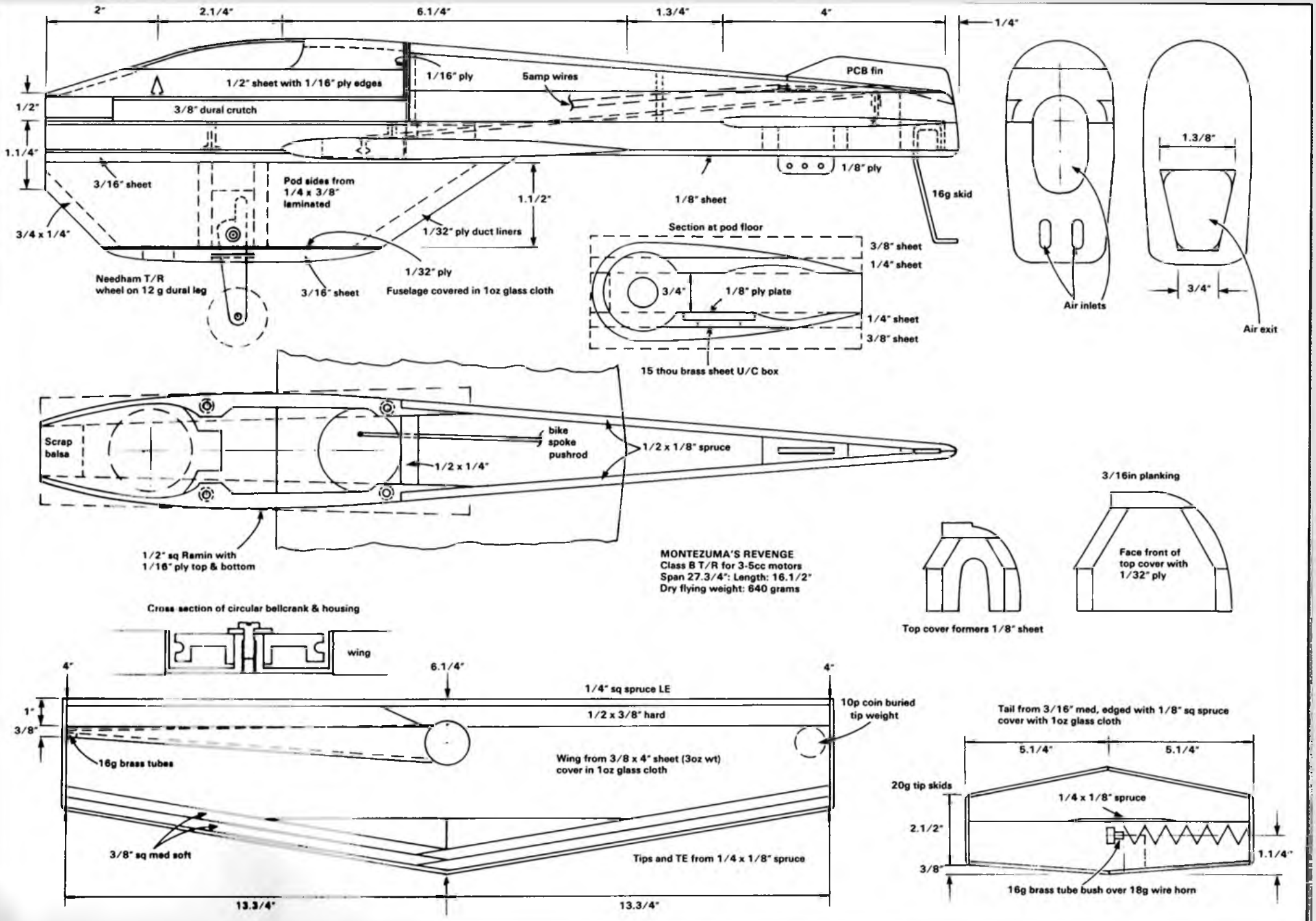
For us, the 'SMAE rules' brew gives 18.5sec/nine laps airspeed for 45 laps range, and the 'marathon' brew 19.0sec/nine laps for 50 laps. The 'marathon' brew is a softer formulae adopted for greater reliability and reduced motor stress. For those who cannot obtain IPA (that is, you have no friendly chemist nor convenient laboratory supplier) then the following petrol-based brew should be OK for just 45 laps...

Nitromethane	25 per cent
Castor Oil	15 per cent
Methanol	45 per cent
Unleaded Super	15 per cent

If you fear the effects of the low oil contents we use, then 20 or even 25 per cent castor oil can be used at the expense of methanol content. We would expect that such higher oil contents would reduce both range and airspeed.

Challenging

In reading this article you will have gathered that Class B Team Race is the most challenging of the control-line racing classes. The addition of pipes, plugs and fuel formulae gives a number of extra variables that require optimisation. Believe me when I say that getting it right gives immense satisfaction. Fortunately the SMAE's action in enabling 3.5cc motors to be used competively has made the event bearable for pilots for instead of the 20+kg line tension given by 5cc Bs , for the 3.5cc Bs pull much less at around 12kg. Actually much the same pull and rotation an Open Goodyear pilot experiences. Class B Team Race is the only control-line racing event dominated by glow motors. If you love glows, love racing and love a challenge then this is a practical and realistic way to compete. To me it is astonishing that the oldest racing class in the world is today in many ways the most challenging. It would be truly sad if it declined into the mists of time. I hope that this article has inspired some interest and will encourage some more activity for I would love to fly against more people and in more contests this year...



VINTAGE CORNER

Alex Imrie examines some successful scale fliers and renews a new book

DOUG MCHARD has kindly sent in an account of his sixty-inch rubber-powered Rearwin Speedster, a design kitted by the Burd Model Airplane Company of Baltimore, Maryland, USA in the 1930s. Since he concurs opinions expressed in previous Vintage Corners about the accuracy of early flying scale models and the minor modifications needed to make them practical propositions, his comments are especially interesting and greatly appreciated. During last year's Vintage Weekend meeting at old Warden Doug flew his three-year-old 60in Megow Stinson Reliant rubber-powered model which has featured previously in these pages and which appeared on the cover of the November 1987 Aeromodeller. Regular US visitor Danny Sheelds was particularly taken with the performance, and fondly recalled his own, identically-finished model. It transpired that both Doug and Danny had each first built the original kit (costing $1.50) almost fifty years earlier! Their conversation revolved around the monster, rubber-powered scale models which were at that time so popular and which flew so majestically. Danny, who has lived all his life in Baltimore, naturally harboured a special affection for Burd products, for this company had produced three kits for 60in rubber designs in the mid-1930s (the Fairchild 24, Curtiss Robin and Rearwin Speedster) but he bemoaned the fact that in spite of the ever-increasing numbers of Vintage plans available from various sources, many of the most popular Burd designs, including the three mentioned, are still not available to collectors. Doug had not realised the rarity of these designs, having built some of them from the kits, including the big Rearwin which he, as an 11-year-old, had purchased from Élite Model Airplane Supplies of Manchester in 1940 for 9/6d (about 47p) post free.

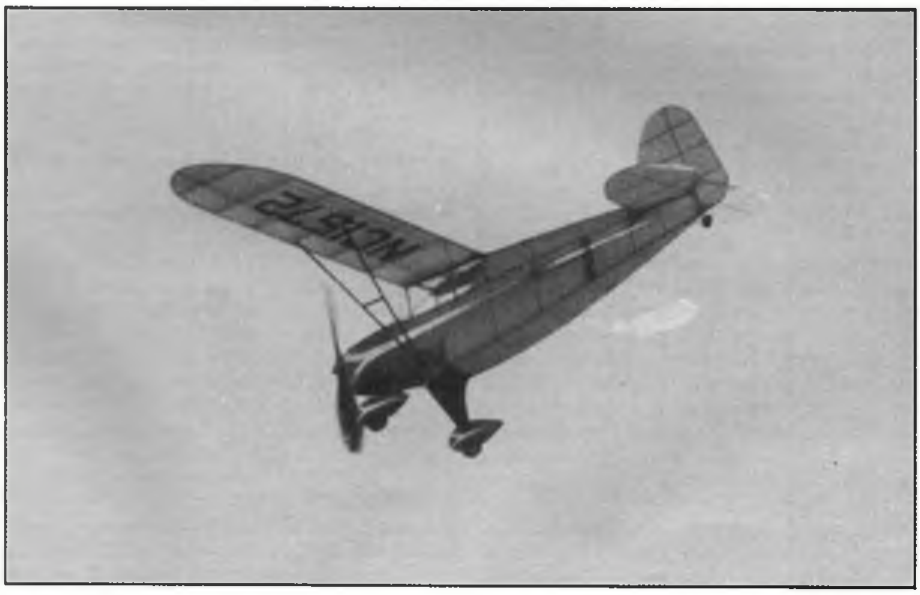
Burd Rearwin Speedster

Doug relates... 'Danny got me so enthused about the model (he has that effect on people) that at the first opportunity I looked out my old plan and set about building it again. The results are now flying, and I must say that the Rearwin is one of the best-flying rubber-powered scale models that I have ever built. It is perfectly stable; and its stately progress around our village playing field stops the football matches dead! The flying speed of this model is so unhurried, and the glide so flat, that every landing so far made, perhaps fifty to date, has been a gentle rolling "wheelie", the tail gradually settling as residual speed is lost and the machine comes to rest in the most realistic manner which is just not achieveable by smaller, faster models.

'No one would pretend that the Burd Rearwin Speedster would score high accuracy points in a scale contest. It would be very easy to improve its fidelity with the aid of the vast amount of good data now available to scale modellers. To do so, however, would, in my opinion, destroy the appeal of the design and its importance as a piece of modelling history. Nevertheless, I am not against incorporating design alterations which have the aim of improving the durability of the model provided the overall structural appearance of the design is not significantly altered. I have included a few "standard" amendments such as wire-reinforced sprung landing gear, detachable knock-off wings, removable tail surfaces, sheeted nose and re-positioned rear rubber anchorages. The main visible structural characteristics are retained – no extra wing ribs have been added, nor structural beefing-up of the fuselage.

'Only one major alteration has been made. I considered the wing incidence angle shown on the plan to be far too great, and I reduced it by fifty per cent. The visible effect of this is to lower the height of the windscreen (incidentally bringing it closer to scale) but the reason for the change was purely aerodynamic. The eventual flying performance has confirmed the wisdom of the modification. Because of the generally small cross-sections of many of the structural members – 1/8in sq fuselage frame for example – some rock-hard timber was used. The resultant weight increase is relatively insignificant on something of this size with such a spidery structure. The all-up-weight, ballasted with two ounces in the nose, is eighteen ounces and this produces a wing loading of less than five ounces per square foot. The motor comprises eight strands of 1/4in flat and four strands of 1/8in flat FAI 'tan' rubber, made up into a four-foot skein with 150 tensioning turns then applied to reduce the length sufficiently to just retain

Heading photo: 'A Burd Always Flies' could well be the title of this fine action shot of Doug McHard's sixty-inch span Rearwin Speedster as its sails effortless around. Below: Another view of the Burd Rearwin on one of its early flights.



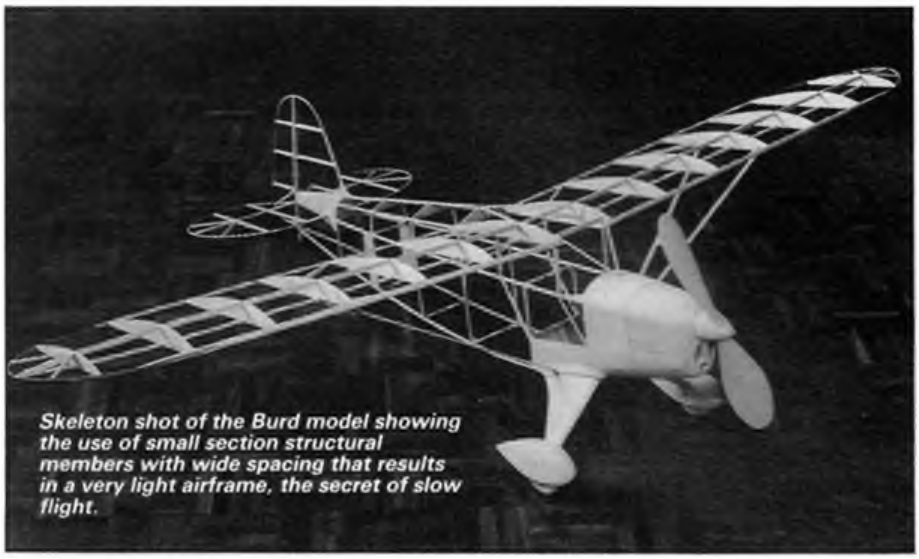
the nose plug. Motor weight is 3.1/2 ounces. A flight of thirty seconds results from using 300 turns, the pattern safely containable within the confines of my little flying field. Maximum safe turns are estimated to be around 1200 which would produce about two minutes if you have the space to fly in and the desire to chase it that far!

'In pre-war days one would have covered the fuselage with bamboo paper. This was a really tough covering material, made in a wide range of colours but now, sadly unobtainable. The fuselage covering contributes very significantly to its strength - particularly its torsional strength. Today, I find a very effective covering is white single-weight Modelspan overlaid with coloured Esaki Japanese tissue. The fibrous nature of the Modelspan combined with the directional grain and smoothness of the Jap make a very tough durable covering. Low-shrink clear dope is used to bond the laminations. The wings and tail-unit are covered in lightweight red and white Japanese tissue with black numerals as specified on the Burd plan. Now! Who has copies of those two missing 60in designs, the Fairchild 24 and the Curtiss Robin?'

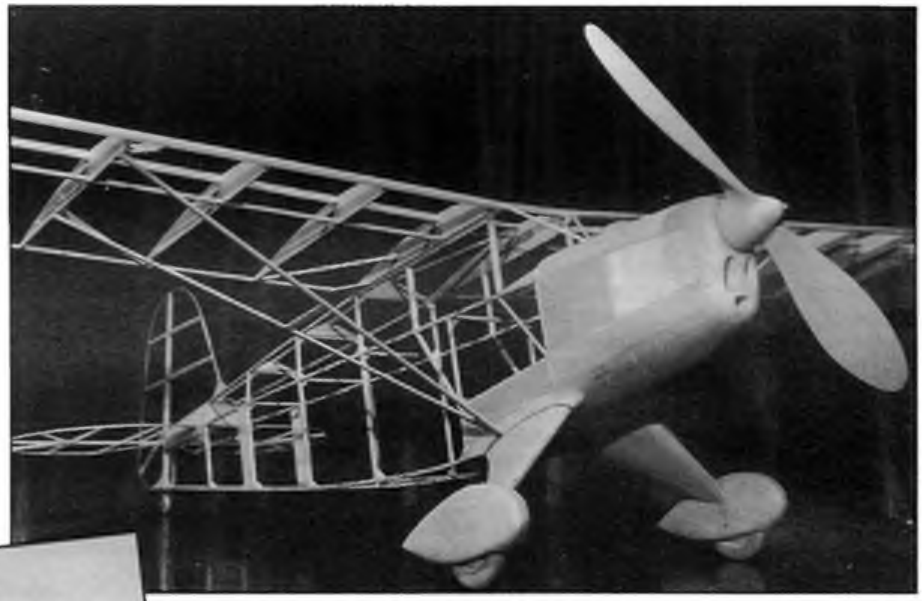
Burd and Élite

By the mid-1930s many UK hobby supply houses were importing American kits, and, in order to lessen competition, sole UK agents for the better-known makes were appointed: for example, Sweeten of Blackpool sold Comet, Ideal and Peerless; Premier of Hornsey Rise dealt with Cleveland; Northern Model Aircraft Co in Manchester was the UK distributor for Lindberg and the Model Supply Stores (also of Manchester) had the Scientific and Bunch agencies.

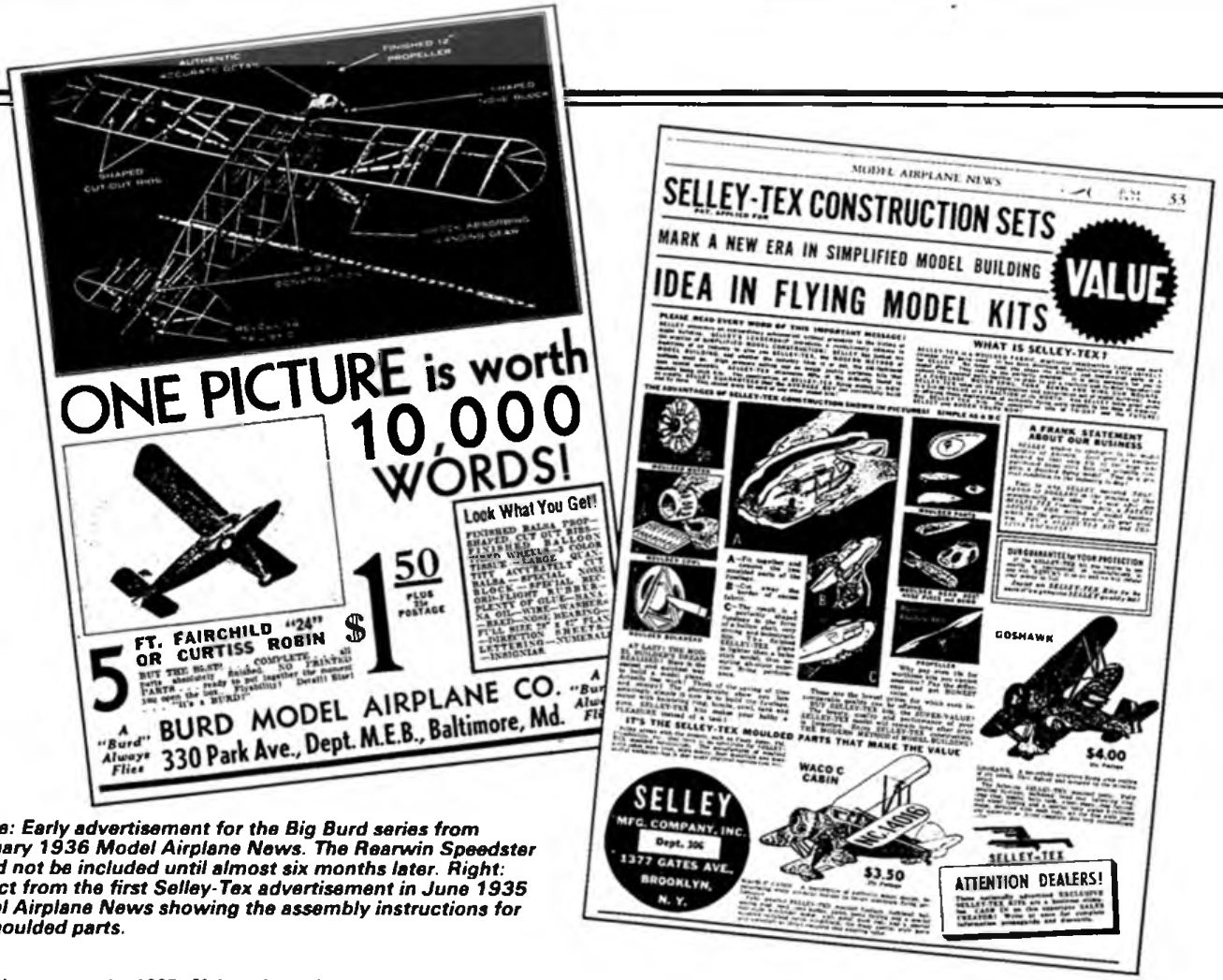
In the USA, Kramer Brothers, a large hobby distributor (doubtless seeing a future in the manufacture of kits at the lower end of the market) formed a subsidiary company



Skeleton shot of the Burd model showing the use of small section structural members with wide spacing that results in a very light airframe, the secret of slow flight.



Above: This close-up shows the fine workmanship of the business end of Doug's model. Left: The Curtiss Robin and the Fairchild 24, both giant rubber-powered models produced by Burd, were joined by the Hearwin Speedster in mid 1935. The builder is seen here with his model, the second one he has built from the same plan: the first one almost fifty years ago. Below: The big Burd Rearwin was designed by Leo Dragonuk, an aeronautical draughtsman, who died only recently in Philadelphia. Danny Sheelds, a Burd enthusiast, attended the funeral. Complete model seen somewhere.



Above: Early advertisement for the Big Burd series from February 1936 Model Airplane News. The Rearwin Speedster would not be included until almost six months later. Right: Extract from the first Selley-Tex advertisement in June 1935 Model Airplane News showing the assembly instructions for the moulded parts.

for this purpose in 1935. Using the axiom that birds fly they adopted the name of Burd Model Airplane Co, plugging the slogan that 'a "Burd" always flies'. They knew what the modelling masses wanted; large size, low price and varied choice: and they gave it to them. Rapidly they produced a series of attractive scale models, sixteen-inch span at ten cents each; another series, of 25in designs at 25 cents, yet another series (30in) costing 50 cents – and to crown it all, a choice of the three 60in models mentioned earlier at $1.50. They were not the first to offer the giant rubber-powered model, since Megow's Stinson Reliant (as made by Doug McHard) of the same size and price, and three similarly-sized models costing only $1 each were already available from GHQ Model Airplane Co, but the ready-cut ribs and finished twelve-inch propellers of the Burd kits probably gave them an edge on the others.

Kramer Brothers, being experienced distributors, ensured that the overseas markets did not remain the prerogative of the longer-established companies by appointing Burd agents in the UK, Sweden, South Africa and Australia. In this country, Model Supply Stores of Manchester had the pick of the American markets, as their advertisements stated and this may have been the reason that they were approached by Burd (or vice versa). In any event, at this time MSS was run by Sammy Norman, his wife and his brother-in-law R W Wood. Whether MSS did not want to handle the Burd kits, or if a condition of the contract stated that a fresh agency should be used for this is not known, but R W Wood formed Élite Model Airplane Supplies to distribute the Burd products, initially running it from the front room of his house at 45 Tamworth Avenue in Prestwich, until obtaining premises in 1937 at 14 Bury New Road above the offices of the Royal Liver Assurance Company. The bulk of the business must have been mail order. The kits already mentioned were sent post free for 1/6d (16 inch), 2/3d (25 inch), 3/3d (30 inch) and 9/6d (60 inch). These kits were soon joined by others. Particularly remembered are the 30in Thermalider for 3/3d and the 60in power model King Burd

Elite Models Airplane Supplies catalogue listed 53 Burd kits, eight Selley-Tex, six Douglas and masses of mouth-watering items like celluloid motors and M&M wheels.

Below: The Elite catalogue devoted a whole page to that King Burd Kit which must have been the cheapest power model available in this country until the late 1940s.

a "BURD" always flies!

Emblem and motto used by the Burd company.

at 21/-. We have seen examples of the last two models at our vintage meetings in recent years, but the flying scale Burds have been conspicious by their absence. A point about the King Burd worth mentioning is that because engines were expensive, it was suggested that while saving-up for one of these, you could fly your King Burd with rubber – not as ridiculous as it appears, since the structure was extremely light. Although I had drooled over the pictures and the description of the King Burd in the Élite catalogue forty years before, it was the very light structure of this model that caused me to build one some twelve years ago, since I reckoned that it was the only model light enough to fly on the marginal power of my GHQ. The Élite story conjures up thoughts of Mr Wood receiving many letters in laborious schoolboy handwriting containing postal orders. Many of us must have done this – I too was one of his customers, and after saving-up and dispatching the 1/3d, eagerly awaited the 16in Burd Curtiss Robin, which was my first ever model. Élite, of course, went on to be a successful model company, its business being conducted from the 14 Bury New Road address well into the post-war years.

Selley-Tex

Élite also imported the Selley-Tex kits whose fuselages (and some other components) were moulded in the form of light, hollow shells from a special, closely-woven processed fabric which was said to be indestructable and could be 'beautifully finished in any colour with dope or lacquer'. There were eight models in the imported range, and while wings and tails were generally built-up balsa and tissue construction, the largest model in the imported series, the 22in semi-scale high wing Moth, had these parts also moulded and coloured, thus needing no further finishing, being merely an assembly job that took an hour. The manufacturers claimed such success for these models that used the moulded shells of 'executive fabric... processed by secret formula...' that they decided to discontinue all balsa stick types of kits, stating that their analysis showed that less than two per cent of modellers could actually complete a balsa stick type kit! It is thought that Élite was the only UK importer, and since these kits were available here from late 1936 until the early war years, a goodly number must have been sold, yet we have never seen an authentic example! Knowing the reluctance with which modellers part with hobby items they no longer need, it is felt that there must be remnants of the Selly-Tex models around somewhere in somebody's scrapbox...

Recently I sent Doug McHard the plan for the Shelley-Tex Lockheed Orion, the origin of which I cannot remember; but I have had it for a number of years, and the immediate thought was – how to reproduce the fuselage of this model in a way that approaches the original moulding? Buckram or closely woven butter muslin impregnated with a stiffening agent has been suggested, or might someone still have an old Selley-Tex model, the examination of which would reveal the composition of the original material? We would be grateful for any assistance in this regard. (Note that when first introduced in mid-1935 on the American market, the Selley Mfg. Company Inc. offered six models of 24in span that were probably never exported to the UK).

Your columnist with his GHQ-powered King Burd at Old Warden on Vintage Day 1978; despite tissue covering the model is still in flying trim today and has logged about 300 flights (all with the GHQ).

Vintage Book Review

Vintage Model Aeroplanes

by Peter Russell (Published by Argus Books, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST: price £4.95).

One of the Radio Control Handbooks, of which there are a number of titles, this one is focussed on our kind of model. I found it an excellent publication, not only suitable for R/C modellers but also for anyone having a 'bent' towards vintage power models. The look at nostalgia ('a phenomenon of the second half of the twentieth century'), and a short historical background to the flying model aeroplane sets the scene for the author critically to define what 'vintage' really is. There follows practical advice on how an enthusiast should tackle the subject, select the right sort of model, what to look for during building, how to choose a suitable engine (including spark ignition) and finally a treatise on actually flying the model.

A very readable book, full of useful information that is well imparted thanks to the author's personal experience with most of the models discussed. He provides many capsulated descriptions and explanations of items that would be hard to find anywhere else. This volume is well illustrated with photographs and contemporary, reduced-size constructional drawings, some of which have dimensions. The Appendix contains design and constructional data of some main R/C vintage types. In this age of restricted free flight flying areas, many of us are turning to R/C to keep our old time models within reasonable confines. As we are not all aware of the characteristics of radio control as applied to vintage models this book becomes a must. Followers of its advice cannot fail to be successful. To go a stage further, experienced R/C flyers should digest this book too, then perhaps when they build a vintage design, they will remember Peter Russell's words and fly their creation in a manner appropriate to its kind. I recommend the book to all vintage enthusiasts.

BUILD FROM OUR FULL SIZE PLANS!

SST

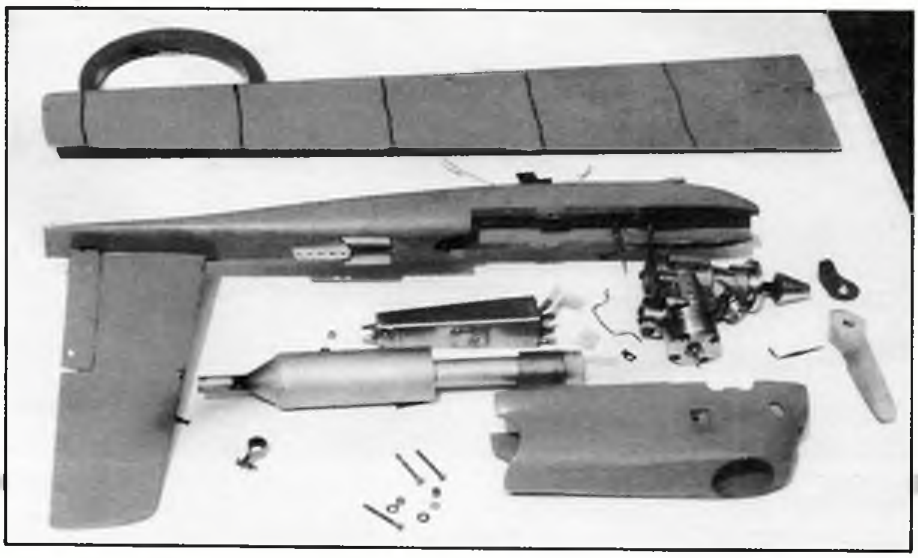
Make a start on C/L Speed with Dick McGladdery's Simple Speed Trainer. Part One...

WHETHER you want only to sample C/L Speed or intend to take it up seriously, this design should be attractive for several reasons. It is a sensible size (ideal for the UK 21N class) and all the necessary materials and tools are available either from model or DIY shops; or (see later) mail order firms.

In considering the basic formula for this model, avoiding use of an alloy speedpan was the number one design requirement, principally because there is no particular example which is even remotely reliable in availability, but also to investigate if the problem could be solved by other means. The use of a Deal crutch has proved gratifyingly effective, and although this resulted in a slightly more bulky and less slinky model than might have been achieved with an alloy pan, there is room for improvement on this first try – and, anyway, it is doubtful whether it significantly affects performance. About two-thirds of all the drag of any C/L model comes from the wires; reduction of model cross-sectional area and streamlining improvements would have to be very radical indeed to make much difference to the remaining one-third of the drag attributed to the model, and thus to the speed attained.

How did it happen?

Although completed originally as an FAI craft, the prototype was converted to conform to the new 21N class rules, to test their general workability. The old rules were too lax and allowed in people who were N's in theory only, and who got far too much skilled help, with the result that the 21N handicap record rose to an absurdly high level (174mph this year), far beyond the realistic aspirations of genuine newcomers. The new rules, therefore, are designed to limit performance to lower levels by effectively excluding use of full-wave tuned pipes, noisy systems (including open exhaust and minipipes) and permitting only expansion box silencers and super silencers with final orifices of 6mm diameter. Also, fuel is limited to a 10 per cent nitromethane mixture. To test the effect of these regulations, SST was fitted with a borrowed 'bitsa' OPS 21 which had been fitted with an HP.21 liner/piston set (which just happens to fit) due to the original parts being worn out. Preparation comprised easing the rear bearing fit which was rather tight, cleaning out, fitting a 6.8mm choke and setting head clearance to 0.15mm (0.006in). Peter Halman donated an example of the special, straight-through 'super silencer', of which he has made a small batch especially for the new regulations. (For supply, contact Peter at Irvine Engines; the price is round £15, plus postage and packing). The 'super silencer' is basically a minipipe inside an expansion chamber and is similar in effect to a minipipe, but amazingly quiet, a very useful feature for testing your handiwork at noise-restricted sites. A variety of commercial props was tried but the best result was obtained with the makeshift single-blader seen in the photos. No bench testing of the engine had been carried out, but it seemed that with the pipe length set as it was (240mm measured from plug terminal to extreme end of tailpipe) the power was developed at lavish rpm. The single blader was hurriedly butchered from a Top Flite 9.1/2 x 9 pylon prop, and although it needed a bit of a pull to help the model up to top speed, once there, it held convincingly. The best speed obtained was a little under 130mph (about 205kph) and this with further tinkering could probably have been pushed up to 135/140. In case this sounds a little unexciting to prospective newcomers, be warned – if you have never flown in a pylon, you will find even this superficially pedestrian speed quite exciting enough; probably more than you can manage. In fact there's a lot more to flying in the pylon



Heading: SST in foreground; compare with Ian Mander's Irvine-powered F21 at rear. Right: All the bits!

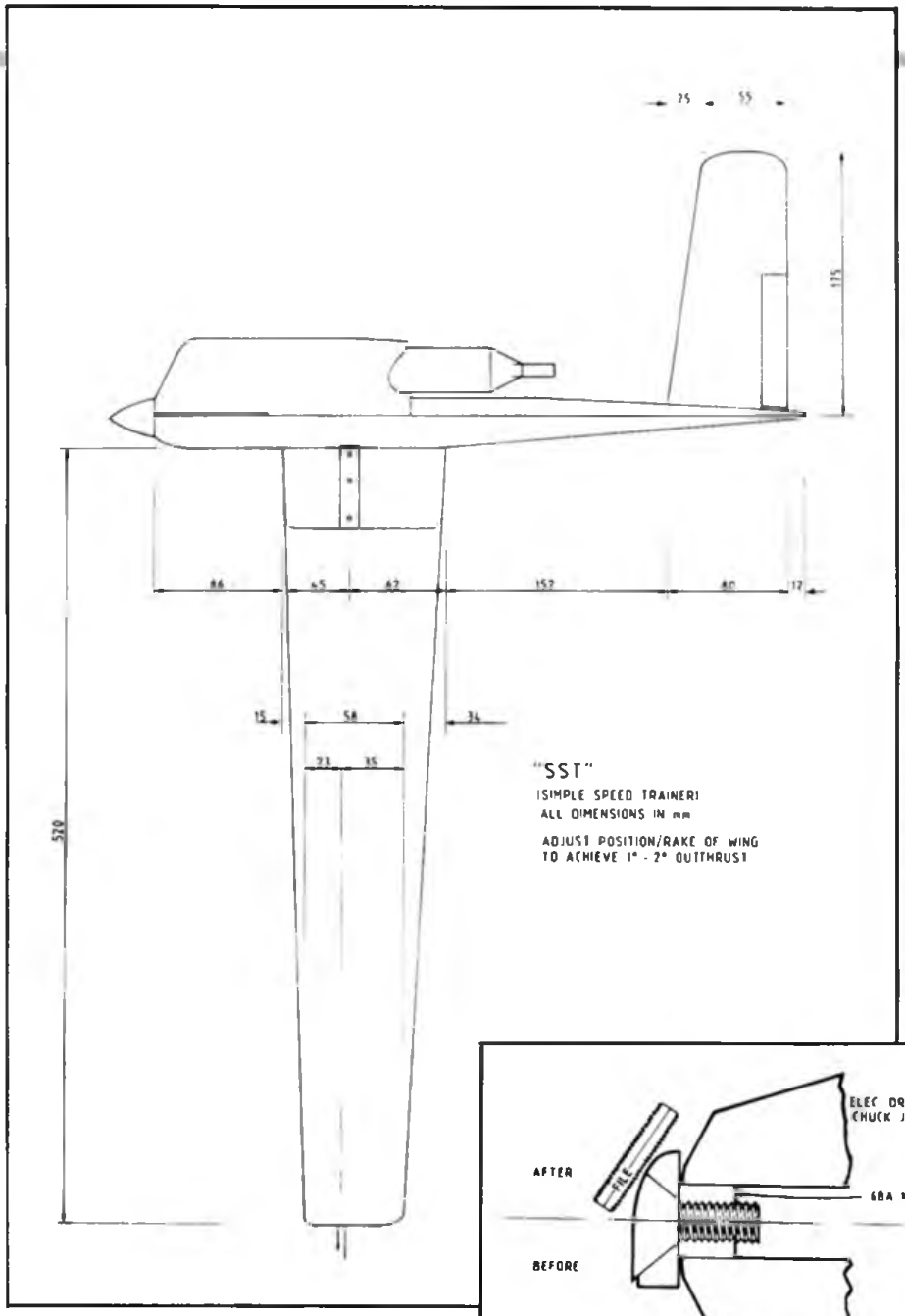
than meets the eye, and it will take a fair amount of practice before you can expect to make a successful timed run.

And what next?

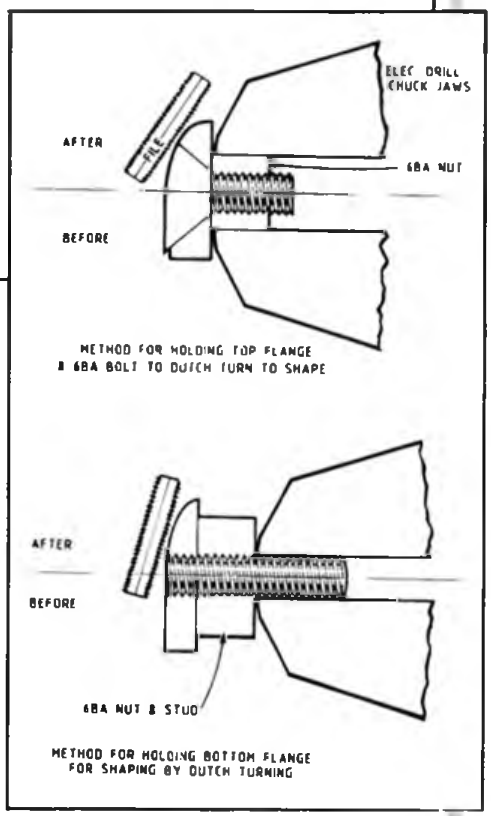
To get a better appreciation of how good or bad the model is, it was subsequently re-engined with an Irvine 15R and tuned pipe. Initially, the increased power and vibrations exposed the unsuitability of the countersunk-head 8BA bolts used for the wing/bracket joint. These were replaced with cheese-head bolts and big washers (to bridge the countersinking in the wing brackets) and almost immediately 167mph (about 269kph) was obtained, despite the fact that the vibration was not entirely cured. To fix this, the secondary steady bracket near the wing trailing edge was added, but weather and circumstances have so far prevented any further trials. The particular engine used, when installed in my No.1 FAI model, returned speeds between 174-177mph (280-285kph) but this was with the benefit of a 910mm wing and complete absence of vibration. The value of the longer wing (the SST wing is only 525mm) is difficult to assess, but vibration is a real killer of speed, so I'm hoping to reduce this already small performance gap when I can get to fly again.

Fuselage details

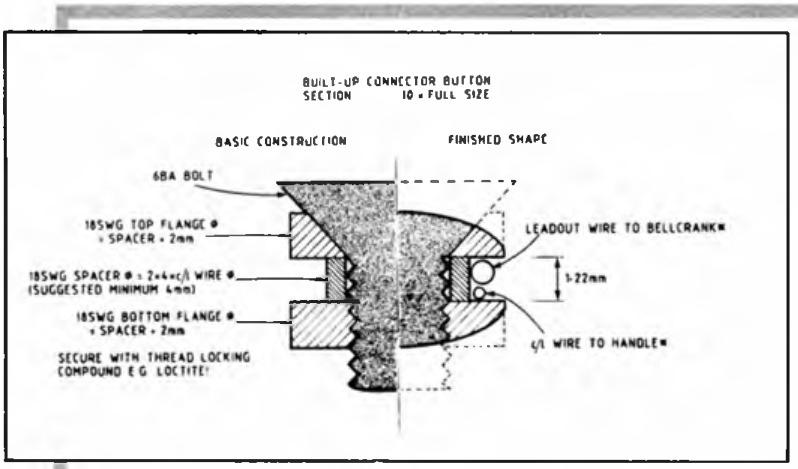
Deal carves fairly easily, but try to choose a well-seasoned bit if you can find it, preferably straight-grained and free of knots. Accurate drilling of the holes for the engine bolt sleeves is crucially important, and virtually impossible without a jig. I used the engine for this purpose; the bolt holes in the lugs were drilled out with a 1/8in drill, then, holding the engine in position by hand, the first hole was drilled in the deal 'pan' (with the same 1/8in drill, in a wheelbrace, not a power drill) to a depth of about 10mm, which was as deep as possible before the drill chuck came into conflict with the engine cylinder. A close-fitting dowel (another 1/8in drill) was inserted in this hole while the next hole was similarly started; another dowel was put in that and the other two holes were similarly created. Next, the engine and dowels were removed and the holes were drilled the rest of the way, right through. These holes were still undersized, so, using a drill of a diameter similar to the brass spacer tubes, they were enlarged by drilling from the opposite direction in the pious hope that the pilot holes would steer the larger drill with sufficient accuracy. The brass sleeves were made next, about 6mm overlength with one end of each filed square for eventual butting against the nut plate. The holes in the wood were eased out with a needle file so that the tube sleeves slid in easily (but not loose) and a trial fit of the engine and bolts was carried out. I think at least one hole had wandered a bit, and had to be slotted a little so that the engine bolt could enter without binding. The slotting was done with one of those round fretsaw blades that are marketed under various names at DIY shops, Abrafile or some such; the tool for this job has to be coarser than a needle file, which barely makes any impression on the wood. Trial fits were repeated until it was apparent the tubes could be correctly positioned, then the nut plates were cut to shape and slots were cut in the fuselage where shown on the drawing: however, they are not drilled or tapped at this stage; that comes later. The next step is to glue in the tubes and nut plates with

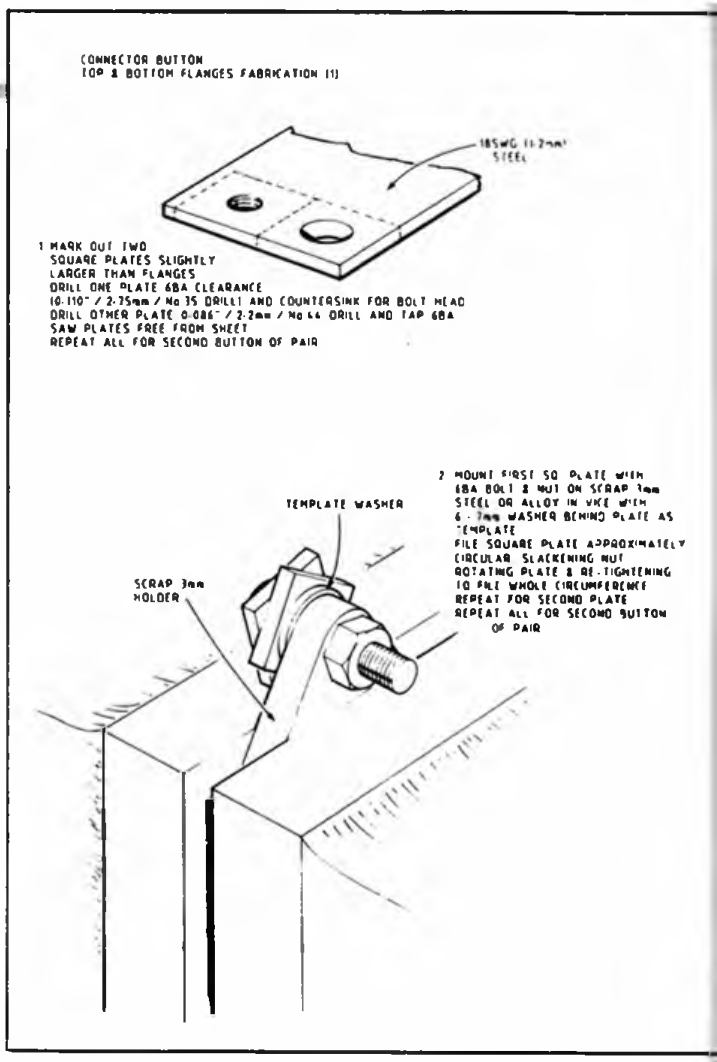


24-hour Araldite, and to make sure that the tubes in the slotted holes are correctly positioned. The engine can again be used as a jig, this time with four bolts installed in the lug holes and secured with nuts. Roughen the surfaces of the tubes and nut plates, clean them in solvent (cellulose thinners is fine), smear Araldite in the holes and slots and on the plates and tubes, assemble with the squared ends of the sleeves butted firmly against the nut plate and scrape off the surplus adhesive that oozes out in various places. Also, clean out any adhesive that has found its way inside the sleeves, using a piece of piano wire or, ideally, a drill that fits the tube fairly closely but not tightly. The engine/bolts jig can now be offered up and the position of the wayward tube or tubes adjusted if necessary while the glue is inset. The jig can be left in position until the glue has started to 'go off', then check that it has not got stuck in anywhere. If it has, slacken the nuts securing the bolts to the engine lugs and gently force the offending bolt or bolts, taking care not to disturb the brass tubes. If any bolt seems unduly obstinate, heat it gently with a soldering iron then try again, twisting it with a screwdriver. If this does not work straight away, keep repeating, using



a little more heat each time until the bolt comes free. The problem would be eased by coating the bolts beforehand with a release agent such as cellulose acetate, but often the grime acquired by storing then in a tin in company with spare new and used bolts is quite effective.





Having got the jig free, it can be re-inserted if the glue is still soft, but clean the bolts and (carefully) the insides of the tubes and oil the bolts lightly before re-inserting. However, if the glue appears reasonably firm, the jig can be dispensed with. When the glue has fully hardened, cut off the excess length of the tube sleeves and file flush with the face of the wood. Next, make the facing plates a little oversize on their outer edges and drill the holes for the engine bolts; 'spot' the position of the first hole by holding the plate to the lug by hand or with a miniature G-clamp, using the 1/8in drill as before to make just a small dimple in the face of the metal. Disassemble and drill the hole 6BA clearance with a No.35/0.110in/2.8mm drill, then bolt the plate onto the motor, spot the second hole, dismantle and drill 6BA clearance also; repeat the whole process for the other plate. Now select good positions for the three 8BA securing bolts and drill '8BA tapping' size.

Before installing the plates the nut plates already in place should be tapped and drilled. Using a drill which is a close fit in the spacer tubes, spot the nut plate, then drill with a No.43/0.089in/2.25mm drill and tap 6BA. Roughen the underside of the facing plates by scratching with an old balsa knife blade or a small file, degrease and glue in position with 24-hour Araldite. Scrape away the excess glue that oozes out of the joints and then bolt the engine in firmly, and at the same time, drill the holes in the wood for the 8BA securing bolts, inserting the 8BA tapping size drill in holes already drilled in the facing plates. Drill these holes to a depth of about 5/8in (almost 16mm), countersink the steel for the bolt heads and then tap the wood with a clean, dry 8BA tap; smear epoxy inside the hole and screw in degreased 8BA x 1/2in long bolts similarly treated. These bolts can be tightened quite firmly - but don't go too mad! If the countersink is not deep enough, take the bolt out again, enlarge the countersink, then screw the bolt in again. The front bolt of each plate will poke through the wood on the inboard side, but can be filed smooth when the glue has set.

This all makes a very robust mounting for the engine, and the brass spacer tubes enable the engine bolts to be fully tightened so that they will not work loose (as they would if the sleeves were omitted). The 1/16in nut plates may seem a bit thin, but if the threads are properly made in the first place - right size tapping drill, reversing the tap every half-turn to clear the swarf and lubricating the tap beforehand - they are adequate. It helps to use undamaged bolts, no burrs or such; but if the thread does strip, simply insert a nut under the plate and epoxy it in.

Since building the prototype, I have been trying to dream up a simpler method of mounting the engine, and the system shown in the accompanying sketch should be an effective answer. In this system, the engine is bolted to a pair of 2.5mm steel or 4mm dural plates which are then each fixed with four 8BA bolts tapped into the wood, and Araldited in the same way as the facing plates and bolts in the original system. This is closely similar to old Class B T/R practice in the 50/60s, except that woodscrews were then used, which had an unhappy habit of splitting the woodwork; using machine bolts instead will avoid this problem, and allied with Araldite, should give a very secure mounting.

When gluing anything to deal, balsa cement is useless, so always use epoxy or some other adhesive.

Connector button details above.

Wire sizes as follows:

0.25mm (0.010in/32swg): use leadout wire 0.9mm (0.036/20swg).
0.30mm (0.012in/30swg): 0.8mm (0.032in/21swg).
0.35mm (0.024in/28swg): 0.8mm (0.032in/21swg).
0.40mm (0.016in/27swg): 0.7mm (0.028in/22swg).
0.45mm (0.018in/26swg): 0.7mm (0.028in/22swg).

Note: For class 21N, F21 and F2A, 0.4mm wires are required.

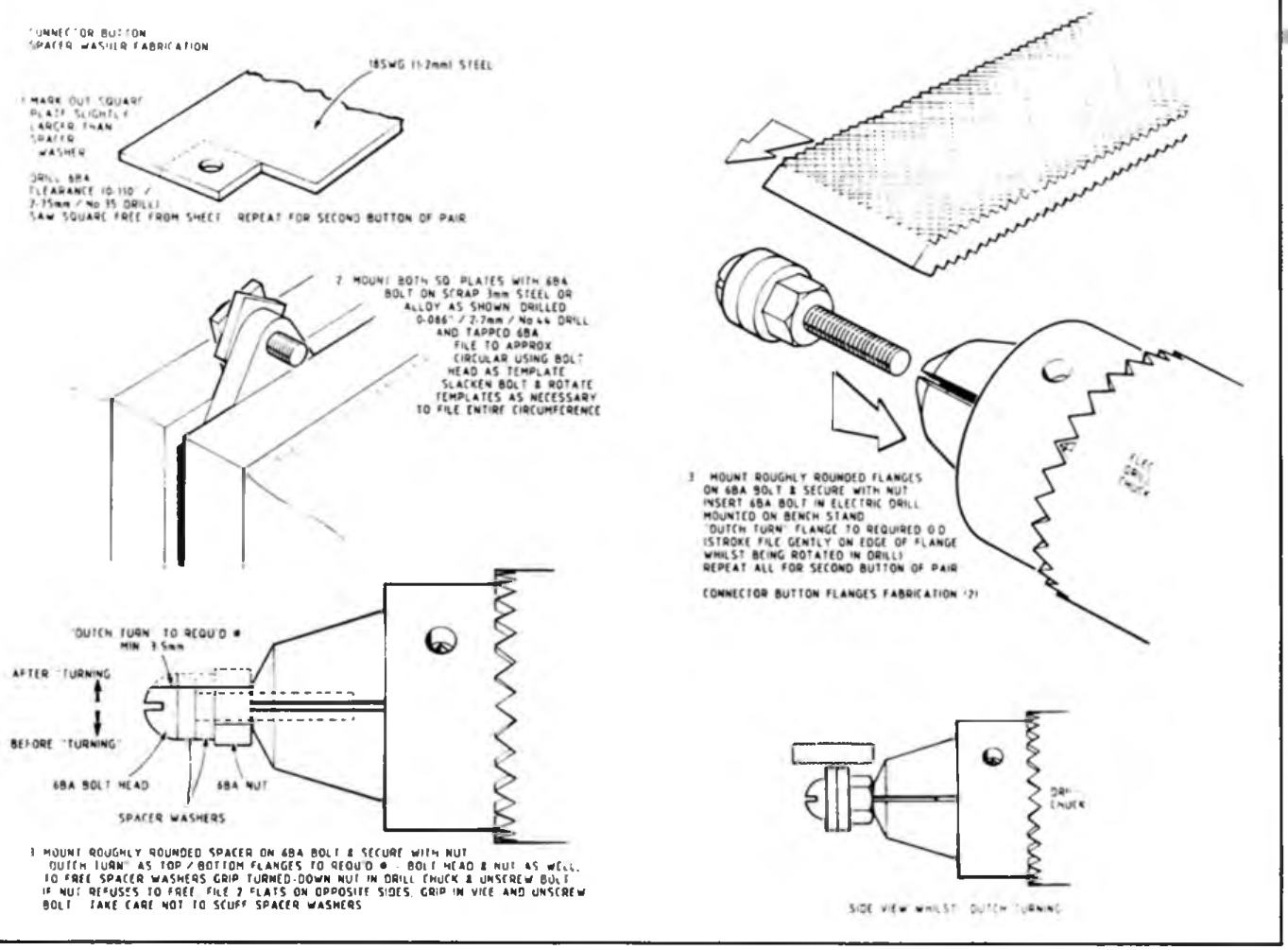
Wing and tailplane!

My experience with asymmetric wings suggest that they should wash-out progressively from root to tip by about two to six degrees for good handling characteristics. This needs to be arranged during the building process, so when marking the leading and trailing edge lines on the balsa blank, use a parallel strip of wood to guide the marker pen on one edge, but on the other, use a strip tapered about 2·3mm over its length so that at the appropriate end, the line marked on the blank is 2·3mm higher above the mounting board than the other end. With the blank rightway up, and using the leading edge as reference, the root should be higher than the tip, but if done on the trailing edge, the tip should be higher than the root. Don't get this muddled, otherwise you'll get wash-in, the opposite of what is needed.

The original was built using the balsa pads and inverted ribs as shown, which involved a lot of careful fitting to avoid distortion; however, the process should be greatly simplified by using Plastic Padding. This is a filled polyester glue which has several useful properties. It has very soft, paste-like consistency and a fast setting time (it gels in about ten minutes) so it is a good gap filler, and ideal for several jobs in the wing construction sequence. The wing blank could be mounted on the board by PP 'dabs' arranged in a regular grid so that the blank would be supported evenly over its whole area, rather than at the root and tip, as per the original arrangement. The PP is soft enough unset to be gently pressed onto the board and levelled without fear of distortion, and detached after veneering the first side by sawing through the dabs with a hacksaw blade. Similarly, the inverted ribs would only need approximate shaping for gluing to the veneered wing surface, and when gluing the ribs to the board to work on the reverse side of the wing, PP would fill up all misalignments on the back edges of the inverted ribs.

The inverted ribs are needed to stop the Mirraply from flattening out when the C/L wire tunnels are cut, so do fit them. It's useful to have the facility to install or remove the C/L wires with the attachment loop formed, so when making the tunnels, it would be helpful to have a dummy loop to check the grooves are large enough to allow the loop to pass through without hinderance. Sand the grooves smooth before veneering the surface.

Evo-Stik contact adhesive was used for veneering; and after trying other types of glue - epoxy and Ponal Express, I still think Evo stick is best mainly because it is easier to achieve a tight joint at the leading and trailing edges. If you have never used contact adhesive before, read the instructions care-



fully. Both surfaces must be coated evenly, so use fresh glue (not some old remnant that has gone thick and lumpy) and allow both surfaces to dry completely before assembling. It might seem unlikely that the dried surfaces woud stick to anything, but when they touch each other, they bond instantly and unadjustably. It is therefore advisable to make the veneer panel oversize by a half-inch (12mm) or so all round, and line up very carefully when presenting it to the core.

The tailplane was built in the same way as the wing, but could probably be made more easily out of obechi, bass or hard balsa suitably edged and sparred with hardwood. Use 3/16in (5mm) sheet and don't thin it any more than necessary. 1/16in less thickness is not worth the risk of flutter and total destruction. It is decided to make the tailplane out of plain sheet. I recommend that the elevator, when cut out, is binned and replaced with a balsa core/Mirraply (faced both sides) replica, which will be much tougher.

For tailplane hinges, I used commercial R/C hinges with proper wire axle pins. The flap on the elevator was too wide, so was cut back and a few holes drilled in the remainder to ensure it was well keyed when epoxied in.

When fitting the tinplate elevator horn sleeve the bolt holes with brass tube in the same way as all other bolted connections so that the bolts can be tightened without crushing the woodwork, but failing that make sure the bolts are secured with epoxy or Loctite thread locking compound, or engine vibration will unscrew them.

Rigging time

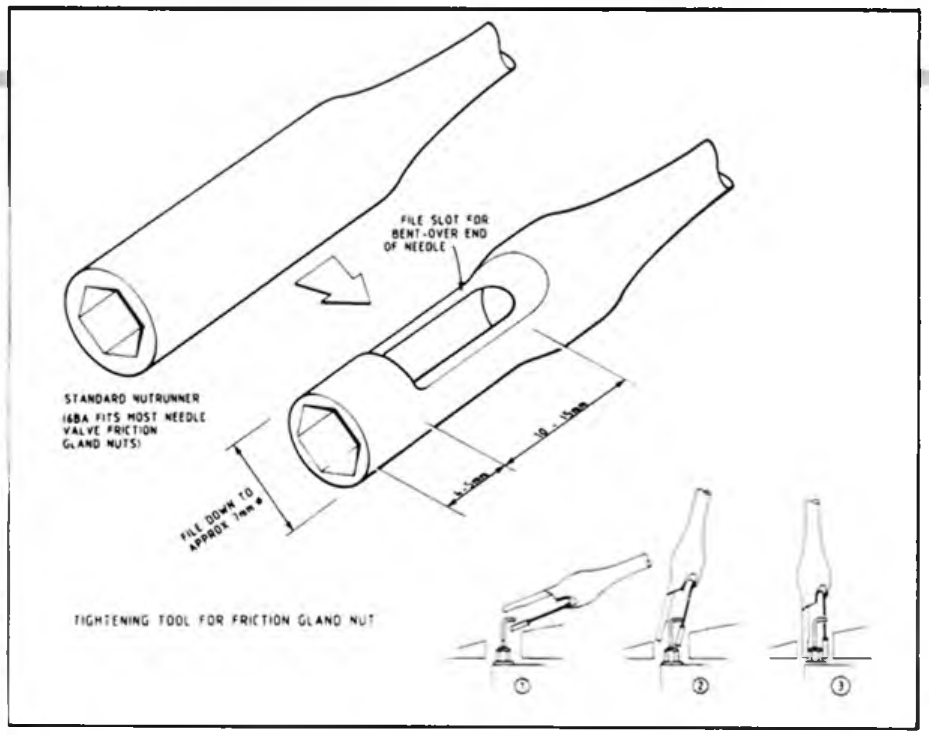
For initial flight tests, set the model up zero-zero; that is, with the thrustline, wing root and tailplane at zero degrees incidence. Rather than relying on simple pencil lines marked on during construction, it is better to take a bit of trouble over this. When the engine installation in the fuselage is complete, set the assembly up on a flat surface and adjust the thrustline to zero in relation to the surface. I do this by installing a piece of straight strip on the propshaft – a piece of 1/8 x 1in alloy strip about 7in long holed in the middle for the shaft is ideal, but any straight piece of wood strip would serve just as well.

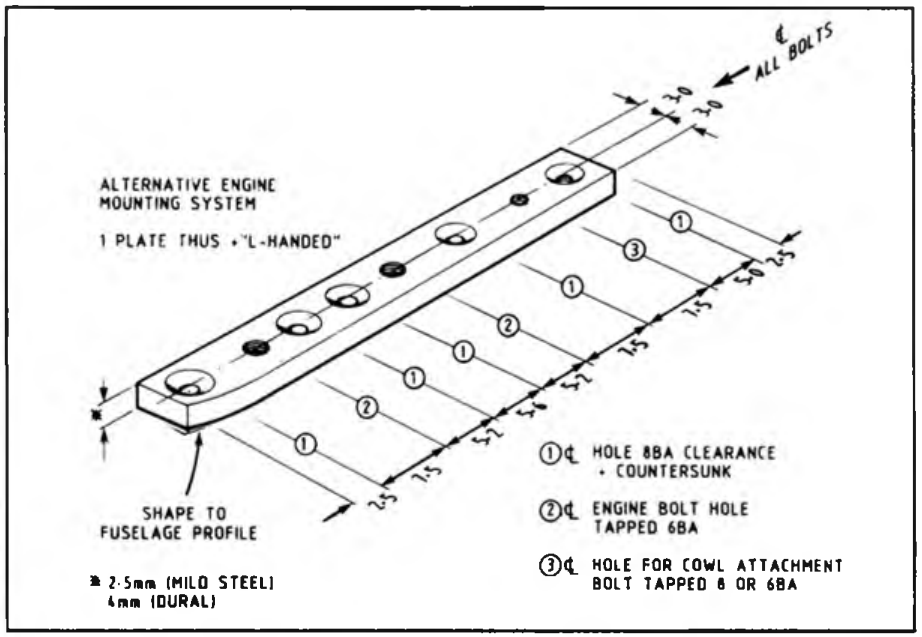
The thrustline is then adjusted to zero by checking the vertical alignment of the strip on the engine shaft with a set-square, adjusting by packing under the fuselage as required. Now the centrelines of the wing and tail can be marked on and their installation carried out, but especially with the tail, check the set up again before gluing it into its slot. The wing is less of a problem, since it can if necessary be adjusted by slotting the holes for the bolts that attach the whole assembly to the fuselage; however, it is better to install the wing brackets assembly by installing only one of the sleeved holes in the fuselage to begin with, set it all up on the board, and mark the position of the second hole and/or the trailing edge position before drilling and sleeving the second hole. If in any doubt, try to err on the side of positive incidence for the wing and negative incidence for the tailplane – the model may tend to a little climb-happy, but this can be overcome by the elevator. If you err in the opposite direction – negative wing, positive tail – you could end up with a model with a built-in kamikaze instinct; and I have seen cases where models simply powered themselves into the ground due to this negative couple between wing and tailplane, full 'up' elevator notwithstanding.

If initial flight tests reveal that the model tends to groove higher or lower than an comfortable three metres of altitude, this can be trimmed out by adjusting the wing incidence, reducing it if the model flies high or increasing it if it flies low or shows a tendency to dive when engine power comes in. The adjustment needed may be very small, perhaps less than a degree, and should be carried out a little at a time, testing between each increment. To enable the adjustment, mark the TE position on the fuselage, then slightly elongate the hole in one of the wing brackets for the main fuselage attachment bolts so that the wing can be rotated very slightly – the TE of the wing should move no more than 1mm from the mark on the fuselage. Test fly the model, and if still not satisfied, slot the bolt hole some more and keep repeating the process until the model trims out at the height wanted.

Cowling

It is essential to have access to the engine, tank and systems. the cowling must be no less securely attached than shown. When building the prototype, I used 8BA x 1in bolts for attachment, but these are unlikely to be obtainable and you may have to use 6BA. The best way to build the cowl is in situ, that is, on the model! Start by installing the 1/2 x 3/4in bottom strips, fitting around the engine and tank and install the sleeves and plates for the attachment bolts. To spot the position of the bolt hole in the main fuselage, screw in a short round-head bolt and press the strip down on top of it, indenting the wood, then drill where the indentators occurs. Do not omit the spacer tube between the plate washer and the main fuselage; its essential to allow the attachment bolt tube adequately tightened to resist vibrations – install in the same general way as the engine





bolt sleeves. Also install the location pegs near the aft end of the cowl and the corresponding tubes to receive them in the main fuselage.

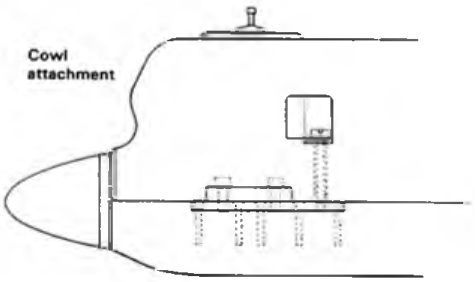
Next, add the sides, top and spinner ring, carving the inside to fit snugly around the engine cylinder and the exhaust pipe.When the glue is set, remove the cowl by unscrewing the attachment bolts (you will probably find it necessary to remove the exhaust to do this) then install the infill section to the front of the cowl. When the glue is set, start hollowing the front infill to clear the carburettor and any other obstructions by frequent trial fits/hollowing. By pressing firmly against obstructions, indentation will be made which will indicate where material needs to be removed. When the cowl can be fully pressed into position, tidy up the inside by carving and sanding to produce as smooth a surface as possible then turn attention to the outside, taking care not to carve and sand though anywhere. A fairly bluff outer shape will be easier to glass and paint and no less efficient aerodynamically, so avoid 'razor edges' when shaping, the structure is not suitable for it. To finish cover inside and out with lightweight glass cloth fixed with K&B Poxy epoxy paint or similar - one flood coat to fix the cloth, another when the first has set to fill the grain, sand lightly and then follow with this finishing coats or spraying.

Regarding glue for cowling: five-minute epoxy is generally not good enough - it can't stand the heat. 24-hour Araldite is OK; so is cyano, but again I favour Plastic Padding, which is adequately heat-resistant, a good gap filler - and it sets fast. The threaded hole in the main fuselage should be centred 3mm in from the fuselage edge, drilled and tapped with a dry, clean tap, then hardened by smearing epoxy inside, spread by screwing in the appropriate thread bolt which is then immediately removed and cleaned for re-use.

One last detail concerns the friction gland nut on the spray bar. Don't be deceived into thinking that the tightness can be present and the needle screwed in after the cowl has been installed - this does not work. It is essential to be able to tighten the gland nut after the cowl has been attached, and the tool for doing this, based on a 6BA nut runner is shown in the accompanying sketches. There are other solutions to this problem, but that shown is most widely used in speed, simply because it is so dependable, and has fewer negative aspects than the other systems. The nut runner may be difficult to find - try local engineers' tool shops if all else fails.

Landing gear

This was a detail which caused a lot of head-scratching. the arrangement finally selected has worked well, but nothing is completely crashproof, so don't expect too much from it. If in any doubt about your ability to arrive at ground level in a fairly organised fashion, at a lowish rate of sink, it might be prudent to glue on some temporary, sacrificial, hard balsa blisters at the front end; these will absorb some of the impact and may save excessive carnage. The main skid is positioned just being the engine, and might look liable to trip the model on its nose; however, if the skid length is restricted as



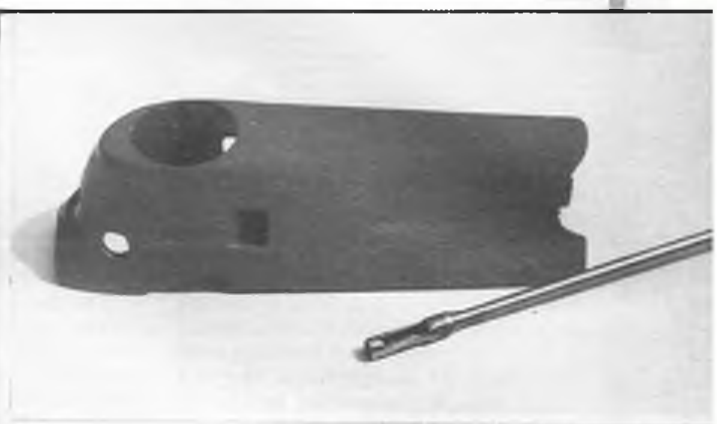
shown, this doesn't occur, and there is less tendency for the model to porpoise than with a forward mounting position. It also helps if the tailskid is long enough to hold the model very slightly nose-down while landing - this stops any 'floating' tendency as well as helping to cure porpoising. The main skid is secured by an 8BA bolt positioned just under the U-bend in the mounting tube, drilled through the woodwork and brass and tapped as metal. The tailskid can be secured by a small daub of epoxy - if a breakage occurs, heating with a soldering iron will soften the epoxy sufficiently for the remnants of the skid to be pulled out with pliers via the tang end of the loop.

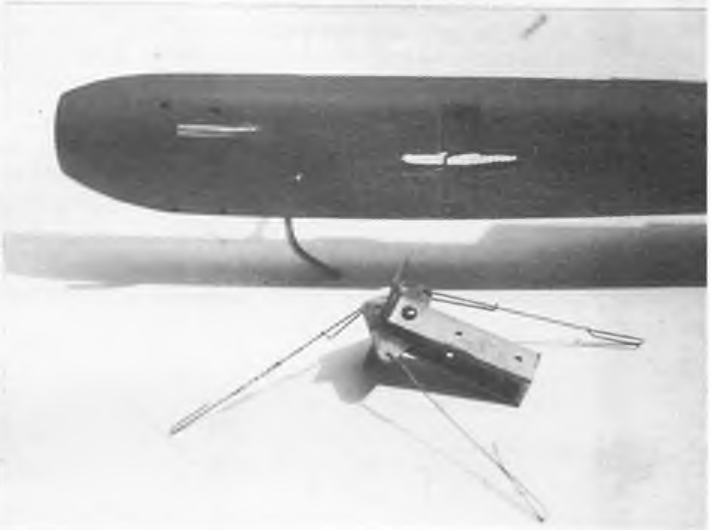
Tank

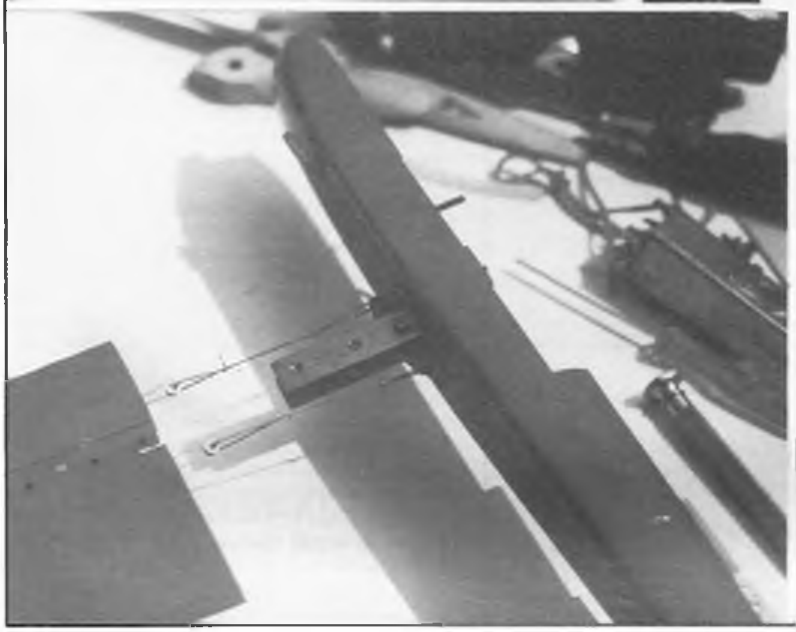
This is exactly as I use in my F2As, a front feed "uniflow" tank which maintains an even pressure in flight regardless of fuel level. Front feed tanks are accused by some of suffering from surge, but my observation is that the more popular middle - and back-end feed tanks also encounter the problem, which is more likely caused by vibration and the way some engines react to 'unloading' when released for take-off. In most cases, changing to a larger (lower rpm) prop will cure the problem.

For material, I use 0.15mm (0.006in) shim brass which is much easier to bend than the more commonly used 0.25mm (0.010in) gauge as well as being lighter. I also use ordinary soft solder, uncored, and Fluxite paste. I would advise against using tinplate, having seen too many which corroded on the inside and started losing flakes which found their way to the needle valve with infuriating frequency. It's all something to do with the tinplate quality - they don't make it like they used to, you know.

It is important to mount the tank in the position and altitude shown, that is, the vent exit in the tank should be the same distance from the thrustline as the spray bar. A tolerance of a millimetre or so is permissible,







Top left: General view inside fuselage showing anti-vibration tank mounting and vent tube connection, cutout trigger and pull wire. Above centre: General view inside fuselage. Cutout trigger and pullrod, front tank mounting stud, bellcrank and pushrod. Vent tube peeping out just behind front skid mounting sleeve. Above: Detail of wing root and leadouts – we advise against this leadout formation! Top right: Cowling and gland nut tightening tool. Below that: Fuselage and bellcrank/wing mounting brackets. Above right: Engine and cutout installation detail. A bit crowded in there. Right: Close-up of improvised single blade prop and counterweight – model did nearly 130mph on this.

and for practical purposes, the measurement can be taken to the outboard side of the tank near the vent exit. The tank must not contact any part of the body or touch anything metal – for example, the exhaust pipe – otherwise vibration will be transmitted which will completely disrupt fuel flow.

To fill the tank, hold the model vertical, turn the engine back against compression (to close the shaft intake valve) and pump fuel in gently when the tank is full, fuel will flow up to the spray bar and issue into the choke; stop pumping, tip out the fuel in the carb and start cranking.

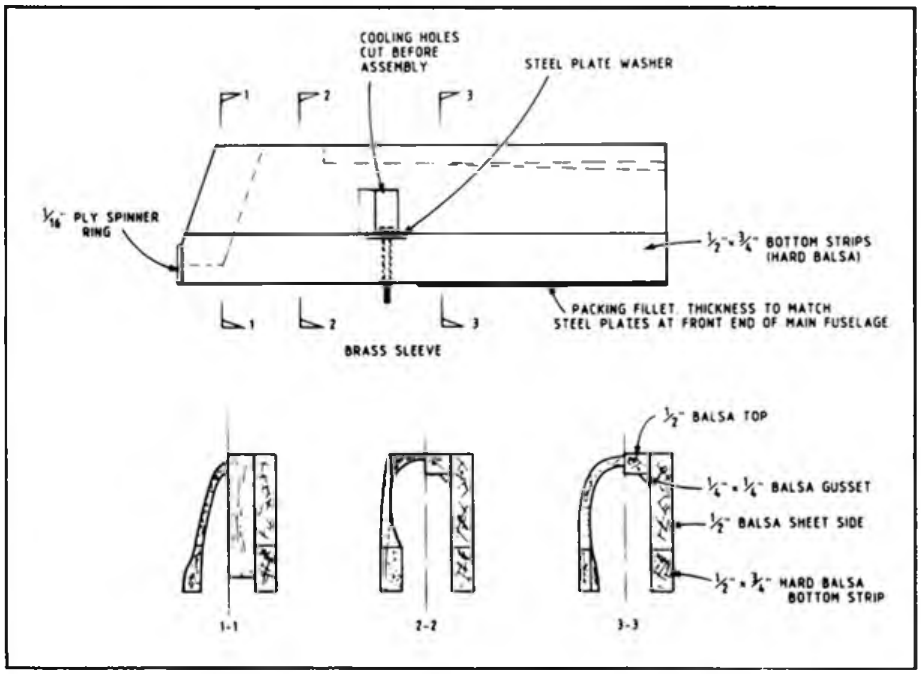
On to the systems...

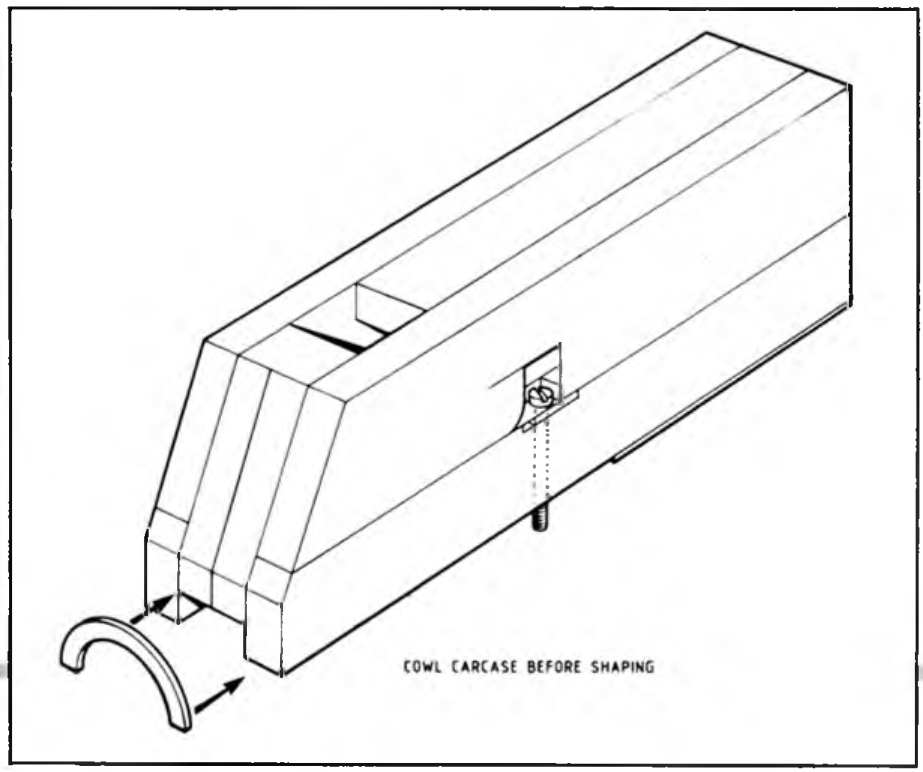
Controls

The gearing of the controls suits a C/L handle which has wire attachments only 50mm apart. If the attachment spacing on the handle is much greater, the model will react to much smaller movements of the handle and will become difficult to control – oversensitive. If you can't change your handle, the controls in the model will have to be geared down by increasing the spacing of the bellcrank leadout pivot and the pushrod pickup hole.

The button line connectors are necessary to comply with SMAE speed rules. If a wire is bent too tightly, that is to any radius smaller than four times the wire's diameter, the wire will be severely weakened, resulting in early failure. *Ergo*, the buttons for the 0.4mm C/L wires should have a shank diameter of not less than 3.2mm (0.125in). Buttons are just about the most compact method of attaching the wires within the wing structure, and although the most obvious way to make them is by turning, there are other ways, using bolts as a basis. The accompanying sketches show how. The control-line loops should be of fairly generous length about 25-30mm to allow them to be sprung off the button without bending the loop, otherwise fatigue may be promoted.

The leadouts from the bellcrank should be fabricated very carefully – the 'twisted' method of securing the ends (lower leadout on the bellcrank detail on the drawing) are not recommended, although as can be seen from the photographs they were used on the prototype. The method shown on the upper leadout in the same detail, also on the cutout perspective sketch, is much better and more reliable. The control pushrod is not shown on the drawing. That in the prototype is 16swg, but 18 or even 20swg would be sufficient, and much easier to bend.





Cutout

The cutout is the same as I use on my FAIs, and when correctly adjusted, is fired by a sharp flick of the wrist which barely disturbs the flight path. It is essential to have a cutout on an FAI, and it is so useful that I urge that one should be fitted to every speed model. It is important that the crusher bar does not rub or bear on any part of the crankcase at any point in its travel, as this will hamper its efficient action. To check that the crusher is adequately sprung, fire the shutoff by pulling the 'down' leadout, slip the fuel tubing off its connection to the tank or motor and blow hard down the tube. If there's any leakage, increase the spring pressure. When set 'open', the fuel tube can be partly (about half) squashed without restricting flow, and the total travel of the crusher can be as little as a few millimetres. Note that when 'up' elevator is applied, the hooked end of the pull-off wire extends into the recess in the engine backplate, and the guides are needed on the trigger bar to ensure it does not collide with anything. The front tank mounting stud is unconveniently close to the pull-off wire and it is probably best to delay installation of this component until the cutout is complete. If it proves too much of a problem, the stud could be replaced with a cross-plate similar to the rear tank mount. When the model is complete, make sure that the cutout actually stops the engine when the 'down' line is pulled sharply – a 'half cut' engine is worse than anything. I set mine to fire with just perceptible 'down' – about 5-10 degrees, and to make the whole mechanism as positive as possible, the throw of the hole in the bellcrank of the cutout pullrod should be as possible – within reason, of course. The bending is not as tricky as it might look, and a few cms of piano wire is cheap, so if the first one goes wrong, try again using the first as a guide, so far as appropriate. The cutout should not be too easy to fire, and I estimate a pull of about 2kg (4lbs) is about right firing pressure level. If it does fire too easily, file a very shallow groove in the cocking plate where the cocking lever rests, or bend the plate upwards slightly. Very often, the burr left when cutting out the plate is sufficient, and surprisingly durable.

To be continued

BALSA CUTTINGS

Cyano de Bergerac and more aeromodelling matters

Now that is tough

It is reported that the very successful Vacheslav Beliav 'has confessed to building forty of his immensely tough models each year.' You can just imagine some kid's effort in a Geography paper – 'The USSR comprises an enormous area covered with snow, trees and bits of F2D Combat models...'

Eastwood Ho!

If someone said 'Think of a Great Shape,' you might fix on M.West, J.Russell or S.Fox, depending on how old you are. (Yeah, yeah, okay, some columnist might think of Q.Victoria; you've had your joke.) Unfortunately, whatever their respective merits, none of them is much cop when it comes to doing trailing, and more especially, leading edges. For those, you want Grate-Shapes, which are 10in blocks around 1.1/4in square coated with abrasive. The faces are cut with lengthwise flats and triangles, plus female half-rounds, right-angle and leading-edge rabbetts good for about everything from 1/8in sq upwards. Used only on balsa – that's what the grit is chosen for – they last a long time. The No.1 set, radiused shapes 101-103, costs £8.25 plus £1 p&p; so does No.2 set, radii and angles shapes 104-106, or the lot for £15.50, £2 p&p. Reserve judgement on the price until you've (a) tried them, and (b) tried to do without them. Why bring them up in this column? Well, you want to know about a good specialist thing, don't you? Or you can take no notice and carry on doing lousy leading edges.

They come from Eastwood Model Aircraft, and the bloke himself, Eric Rawlings, a gen kiddie whose name has been on the Weston Cup since 1945, also knows about the need of youngsters starting in aeromodelling for an easily-handled motor at a figure they can afford, which is why he sells the Silver Swallow diesels. At £17.95 for the 2.47cc even poor old father can afford one too – one club bought seventeen. They take two days to get from China to Heathrow, and only eight days more to get from Heathrow to Cornwall, though that, as Eric says, is another story. And don't write in with humorous lines about Confucious he say man who start diesel in churchyard flicking near dead, until *you* can churn out a full-length-bushed crankshaft you can see your face in. They fire up right away, and do they go! The 1.47cc costs £14.80, and they whang along, too. Each engine is run briefly and the optimum settings established for *that particular one*, then all the griff is written out on your receipt together with a note of what choke and prime it likes, and a modicum of guidance. Postage & Packing? Neat little parcel by return, eighty-pence worth of stamps and recorded delivery, for a quid. Drive to your model shop and back for that if you can.

And don't think this is a slimy thank-you for a free motor; it was ordered and paid for in the usual way. This kind of finger-on-the-pulse stuff you can't get too much of. Eastwood Model Aircraft – go forth, and multiply.

Sounds like a good buy

Booklet for beginners: 'It is impossible to describe the installation of all the different types. Radio Control Handbook *Installing Radio Control Equipment* does this...'

Notta lotta choice

Same booklet: 'Metal rods are secured to the wooden pushrods by binding and gluing, heat shrink tubing or binding and gluing.' *(All right, all right. GC).*

And what's going on here, then? Paul Eisner and Dick McGladdery's Speed preparation surely deserve a witty caption – let's hear yours...

Cylencer de Bergerac

From all over the land come reports by Environmental Health wallahs on complaints they have investigated concerning noise. Well, screeching peacocks do kick up a racket, harvesters roaring dustily all day are a bit of a *bind*, and bird-scarers going through the night can be rather much. Then there are shooting clubs, stinkwheel scrambles, even strimmers whining by the hour, not to mention unsociable mowers. Indeed, not a thousand miles from here is a gent with a lawn you could do in ten minutes with a pair of nail scissors, yet the thing he cuts it with looks as though it must have left its forty-foot trailer blocking the lane outside; if you tumbled out of the cab the fall alone would kill you, and you can hear the row it makes right up as far as the church. That's a hoot, too – the chap who bought The Old Rectory goes on to the Council about the bells something alarming, although you'd have thought that was a matter for a Higher, rather than a local, authority. But amazingly, in all this *we* don't get a mention!

Lost love

Quite a few of our bodies can tell the same old tale – they were keen aeromodellers as lads, in their mid-to-late teens they were really getting the hang of it; then bingo – they met some dame. That was that. Because, as the girl said to the soldier, one thing leads to another. Or, a Saturday night in the two-and-threes at the Gaumont (Oh, *come on* – the back row of the pitchers) somehow leads to a wilderness of weddings, families and mortgages which stretches for a long way. They have all emerged safely enough, and are now back doing what Arnold has been doing all along, but were curious to know how he had managed to stay single, build hundreds of models, amass skills and gen whilst the rest of us became respectable. 'Well', he said in the vernacular of a past age, 'I used to snog with this smashing bird in her old lady's front parlour in the days when the wireless was always playing that number about a penny a kiss, a penny a hug, we're going to save our pennies in the big brown jug. You know, we used to do just that, so you can see what I was in for. Anyway, one evening, instead of a penny, I put in a quid. This, I thought, should be interesting! But when she just gave me 19/11d change...

Better take a seat, though

Regarding the procurement of flying sites, a leading writer has suggested one course would be to wait for recognition from the Sports Council. Yes! Why not do that?

Fun for future fetchermites

Little Bo-Peep, your model's a heap!
Everyone reckons you bild on the cheap.
Sweetly she fluttered provocative lashes –
'Darling – I do have expensive crashes!'

Pure Fantasy

Dave Hipperson's state-of-the art Coupe – development of a winner. The full story!

Normally I would hope to bring you details of at least one of the winning models from the Aeromodeller Coupe d'Hiver contest in December. Although Gerry Ferer is being rather cagey about his designs he will let us have them eventually. However, the 80 gram winner is easy – because it's mine. It would be reasonable to presume that this is an evolutionary model since the writer is well known for his resistance to change! Such is not the case. It is a revolutionary model with ideas taken from many sources. How all these ideas came together forms the interesting part of the story.

This aeroplane could almost be said to have been built especially for the Aeromodeller Coupe contest – certainly for the weather we had. If I got lucky with anything it was the way the weather played along. I don't expect to be able to get away with this sort of a win again. I shall expect many of you to have caught up next year. In fact there was a moment when I thought of witholding some of this but I don't think that I of all people, should stoop to keeping secrets, particularly as the model will always be available for all to see. However, this might be the moment to express my surprise as to how it was necessary for me to discover (the hard way) what I have regarding the relationship between model performance, weight and head-on resistance through years of trial and error. There are, after all, numerous, experienced, full-sized-aeronautical engineers amongst my competition. They have been very quiet on this subject!

I have long believed that flying as many classes as possible within a given discipline (Power, Rubber or Glider) helps development in all classes, as-more often than not – improvements discovered in one fit another. In the case of this model the route has been via all the rubber categories, everything coming together for the first time only in October '89 when the idea for this model was laid down.

The Open connection

It was as long ago as 1979 that I made my suggestions in this magazine as to the path to improved Open Rubber model performance – bigger wings. Much bigger wings.

At that time I referred to how well CDH models were performing considering their large wing areas and low power, and I suggested that extrapolation of that idea into the Open Rubber flyoff model might well benefit performance. When, ten years later, I glanced around in the Nationals Open Rubber flyoff and saw the field bristling with 400sq in-plus models I knew the penny had fully dropped. My SST was built ages after I had floated the idea first but it gave me time to observe how the opposition took to it. I reckon it's now a match for anything but it was built back in '83 and I have only just begun to realise why it is so good. In the Farrow flyoff last year I used a scaled-down version – still large at 400sq in and just slightly more manageable. It did far more time than I would have thought possible just then – nine-minutes-odd and from a high climb. Both this and the 555sq in SST glide superbly (as would be expected) but the surprise characteristic has proved to be the climb. Close observation over a few dozen fully-wound flights (all flyoffs) has shown that the big models are climbing as well as the 300sq in originals but for longer, thus adding quite a bit of stop-watch time before the glide even starts. I think I know why now.

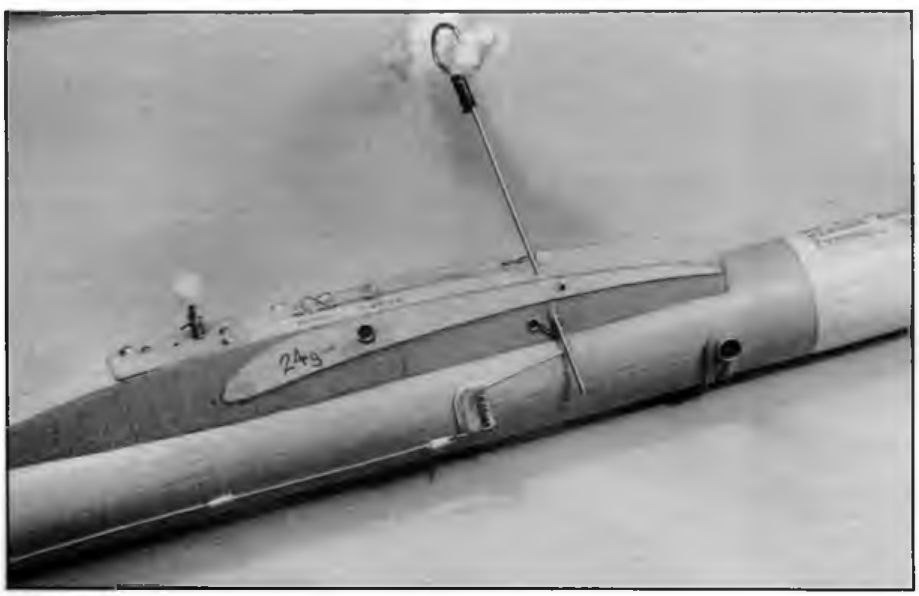
Propellor progress

While all this was occurring, propellor development was going on apace – and without me! SST1 was built with a standard helical pitch prop (even if it had high aspect ratio blades). It was the last such, as eventually I discovered that the Doring/Theorsden pitch distribution arrangement of 80-100-92.5 per cent (March '82 Aeromodeller) improved F1B performance no end. Since '86 all my rubber models have had such pitch patterns. Man-powered flight gave us another avenue down which to examine prop efficiency and Larabee came up with an interesting theory regarding distribution of area. He argued that with more of the area towards the root and slim tapering tips induced drag was reduced, thus allowing bigger props to revolve fast enough to be useful. Careful examination of the photos I took during my tour of Europe last year showed that the majority of the best Wakefields abroad had such blade shapes with wide chords at the hub and pointed tips. John O'Donnell had been impressed enough to adopt such a shape on his latest rubber models – and John is not a man to change simply for the sake of it. His shapes are based on Reg Boor's slightly simplified reading of the original Larabee theory. The Free Flight Forum paper from '86 has details of this. This must be the way to go in propellor design.

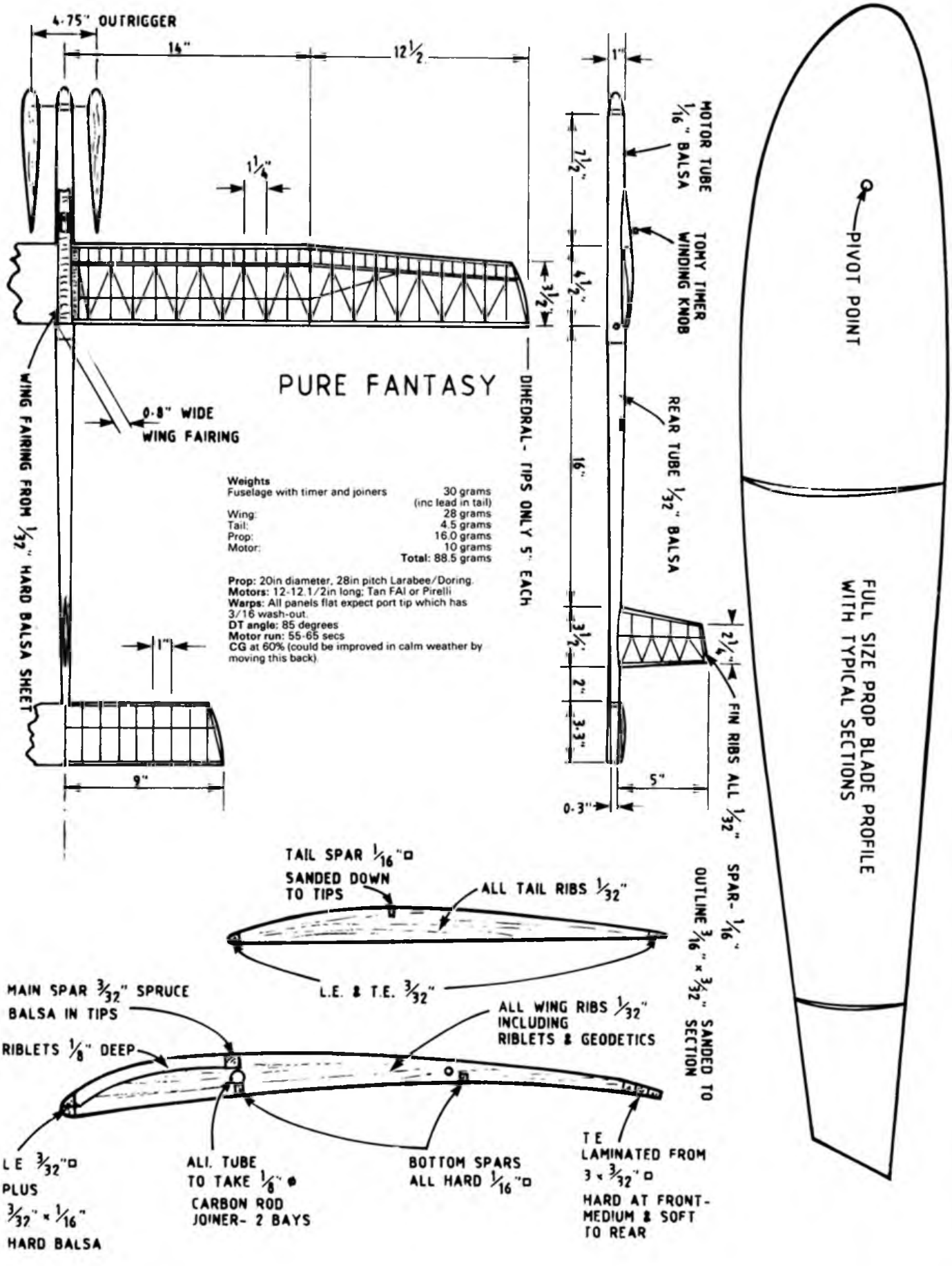
The rule change

Then, almost out of the blue, came the CDH rule change of which far too few of you have taken enough notice. The 3.1sq inch cross-section fuselage requirement was lifted for 80 gram models. Overnight the class became 10 gram Open Rubber. The 80 gram overall weight limit being now merely a bench mark rather than a restriction. A way of keeping out the Peanuts, EZBs and microfilm models! I had models re-built for last year's Aeromodeller event at North Luffenham (which were to be allowed) even though that was actually pre-empting the FAI rule change by a month. They were not flown because of the unfriendly conditions. However, re-trimming the slimmed-down Artoos had caused somewhat of a problem. I had new fuselages with very low pylons – probably now 1.5sq in cross-section rather than the previous three-inches plus. The models appeared to be over-elevated on power. I thought little about this; re-trimmed accordingly and noted that the glides had improved a bit with the reduction in cross-section. I had missed the important point!

Those slimmed-down models got their first contest airing at last year's Nats and managed a full score despite the fact that the one I had opted to fly started to twist in the heat – the fuselage that is, not the



Fuselage in 'ready' mode. Wire pin slides through wing mount in ali tube to foul timer start and prop release levers.



Weights

Fuselage with timer and joiners	30 grams (inc lead in tail)
Wing:	28 grams
Tail:	4.5 grams
Prop:	16.0 grams
Motor:	10 grams
Total:	88.5 grams

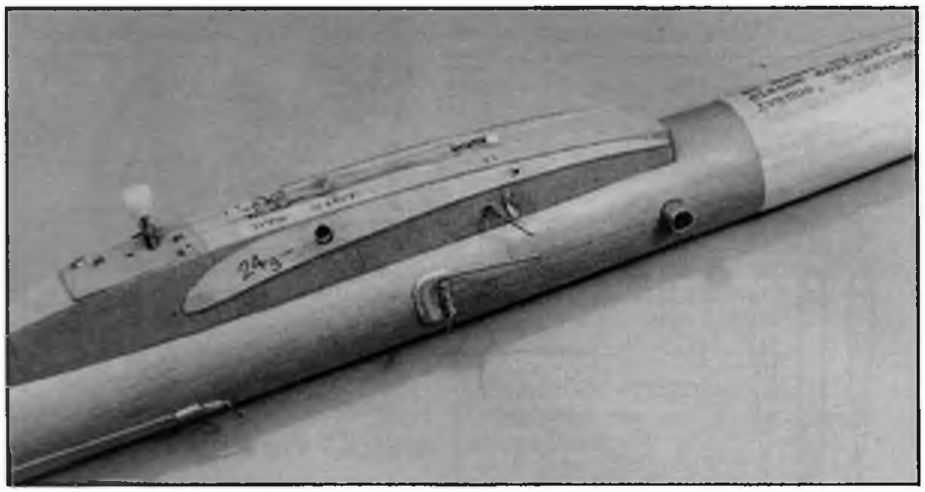
Prop: 20in diameter, 28in pitch Larabee/Doring.
Motors: 12-12.1/2in long; Tan FAI or Pirelli
Warps: All panels flat expect port tip which has 3/16 wash-out.
DT angle: 85 degrees
Motor run: 55-65 secs
CG at 60% (could be improved in calm weather by moving this back).

wing! The trim was all over the place by the last flight on which the model was temporarily lost. The flyoff was taken with the DPR model still sporting its full, three-inch-plus cross-section housing all the necessary gubbins. Nice little thermal; and George Sharp's long-running, slim model couldn't quite reach it. Later George mentioned how he too had to re-trim his models when he removed the excess cross-section and said something about being able to use even less power but climb as quick. I still hadn't twigged; and that was May last year.

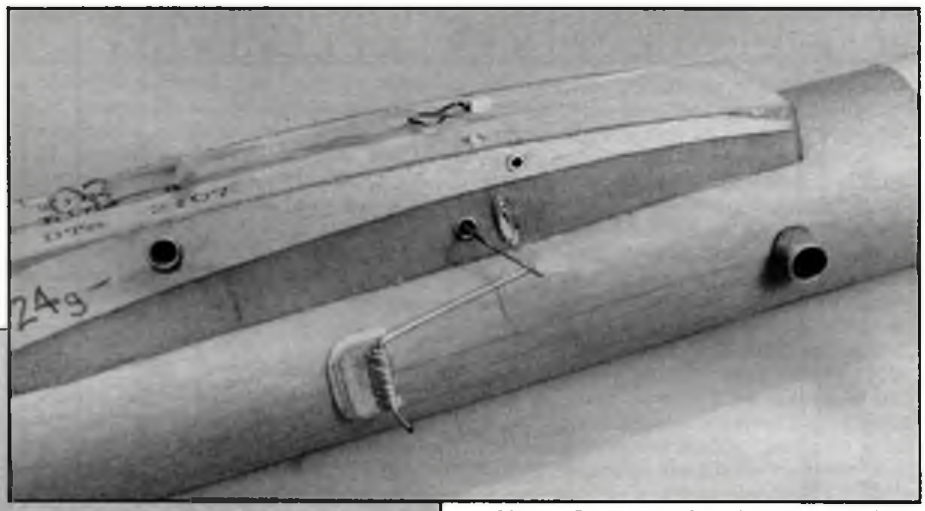
Input from Europe

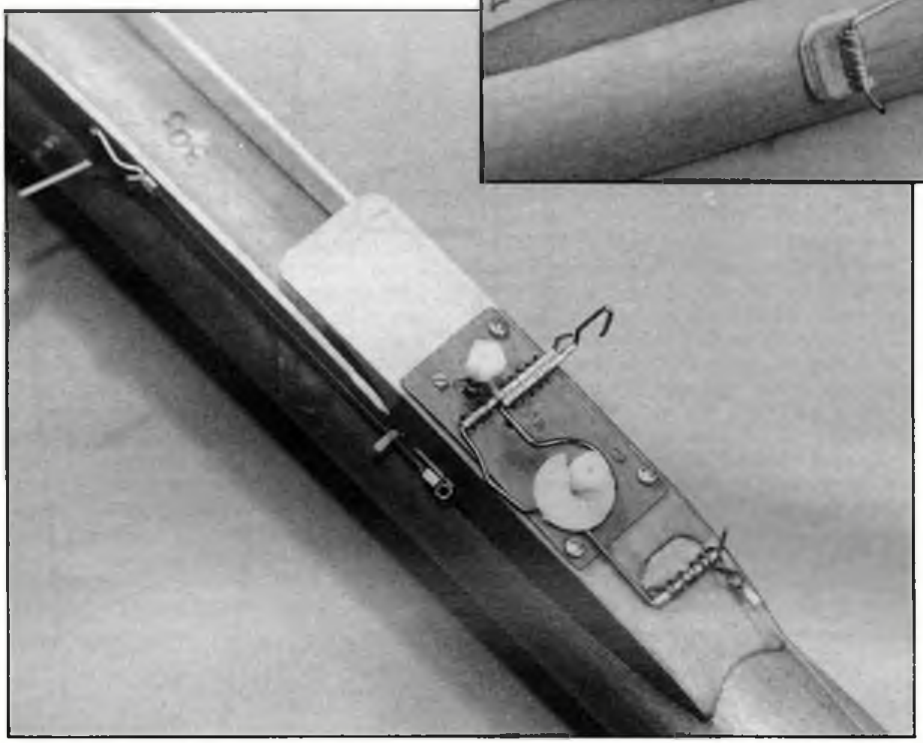
In June I watched Anselmo Zeri's large CDH with its near-minute prop run win handsomely at Arnhem, including two three-minute-max flights (evening and morning). Long run like George Sharp, I thought. Probably the best compromise for all-weather flying. DPR is spectacular but probably gains very little in CDH. I made a mental note to lengthen my CDH prop runs.

Returning now from Europe, keen (I wouldn't say quite desperate) to further improve the climb performance of my Wakefields I talked to John O'Donnell about the Larabee/Boor prop geometry. Up until this moment I must admit to having regarded the importance attached to blade profile as being a lot of old mumbo-jumbo but I had thought that for too long about Doring pitch



Above: With pin removed, timer and prop are now running. Wing and carbon joiner omitted here for clarity.





Above: Centre-section close-up reveals ply reinforcement for release lever, substantial joiner tube and D/T reminder! Left: This is the Nats-winning model with hacked-down pylon. Note on/off linkage to start both motors at once.

– I wasn't going to make that mistake again. I set about building a test unit for the CDH model No.12 that I had used for the comp. flights at the Nats, which still had too short a run. It was 18in diameter by 25in pitch – the same dimensions that had tamed the run on my other conventional CDH (No 10). The Larabee/Boor shape could best be described as a teardrop. Widest at about one-third-span, then tapering to a very narrow chord, even a point, at the tip. The precise distribution of area depended entirely on the pitch/diameter ratio of the prop. Having previously used Doring varied distribution I had no single pitch value to take as a datum so averaged it out over the whole blade. I must also admit to doing the minimum of calculation to find the final shape. It fitted the formula and looked very different – but right, somehow.

Testing the prop

The test sessions proved interesting – and not for the expected reason. The model looped! Well, very nearly. Less incidence and nose ballast removed tamed the power burst and re-established the glide. The run was still shorter than I had expected at 40 secs, but sensible. The model whistled up. It was a very calm overcast September evening so I took the opportunity to check fly the Nats winning DPR model as well. Much better pattern with the VIT and all, but it was flying *slower on the climb*. Repeated tests, alternating the two models and using the same rubber showed the slim Larabee prop model to be flying a few seconds either side of 2:20 to the ground every time and the DPR model clocking only 2:10-ish. The later was losing out on the climb in particular. I was getting somewhere.

The effects of cross section

My previous tentative steps into the field of large CDH models – that is, 210sq ins plus – had been disappointing. The model in question, Noll had to be relegated to 100 gram flying because, no matter what I did with the trim set-ups or turbulation, I could never get a consistent glide. It came like magic when the model was ballasted up to 100 grams, actually increasing performance over the unballasted condition. This model was (and still is, of course) to the old formula of 3.1sq in cross-section. Since this I had been loath to try another big model; but Zeri's flew so well. Of course, Zeri's had a super-slim fuselage and no pylon at all, as it had been built since the rule change!

Thinking back over the previous experience in Open Rubber. What else did the big models have apart from big wings? Slim fuselages! Relative to wing area, *very* slim fuselages. Was it this that allowed them to climb as well as the smaller models with wide fuselages? The best F1Bs in Europe have one other common feature as well – as the Larabee prop style – a lot of them don't have pylons! Surely a reduction in head-on resistance will

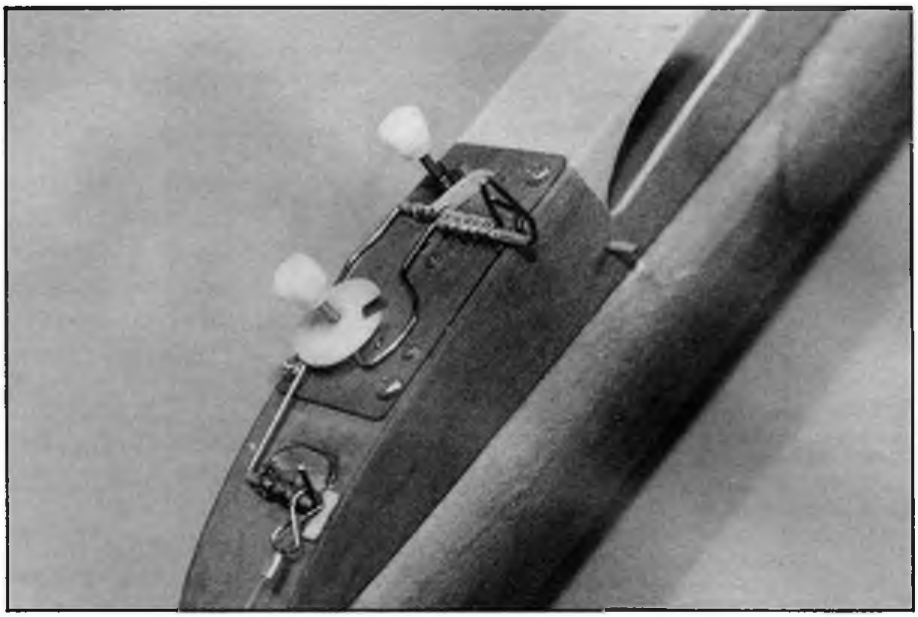
benefit any model (even a Vintage Wake) but light models in particular. Remember the light, large CDH that wouldn't fly at 80 grams but would when ballasted! Light models mush when they don't glide well. They glide slowly enough, for sure, but they mush and lose height fast. If they can be made to fly faster by adding ballast, allowing the wing to work properly and turbulate itself or whatever it does, perhaps the link to light model performance is a reduction to an absolute minimum of the head on profile to help it fly faster?

The design

So it all came together in a rush while all the evidence had been staring me in the face for years. It also goes some way to tidying up the loose end that surrounded just why Phil Ball's original big (360sq inch) Open model of '79 would regularly outfly my only slightly-smaller-winged model by a minute or so. The added drag of the bigger wing was more than compensated for by the reduced drag from the comparatively slim fuselage!

So this model – the airframe I used in 80 gram at Old Warden in December last year – is in essence a cleaned up, miniature Open Rubber flyoff model. It was commenced in October. A Larabee/Doring prop of 20in diameter by 28in max pitch, outrigged and arranged on an instant start hub for launching convenience. The blades themselves are very thin with considerable undercamber, covered with 25 gram-per-metre glass cloth – but not smooth. The surface finish is 'as laid' cloth over resin-coated balsa. This slight texture is what I prefer on all but the very fast turning F1B blades, for turbulation effect. (I have noticed that quite a few good Wakefields use rough surfaced blades now.)

The model itself was designed for long run efficiency and (of course) the very minimum of head-on resistance. The wing halves plugged into a sectioned fairing on top of the slimmest practical motor tube. This actually allows them to sit slightly lower than they would if they were on top of the fuselage. The timer is accommodated in front of the wing so that it disappears as far as head-on profile is concerned. No moving surfaces and a wing structure using no hi-tech materials. The spar, after experiments with carbon capping on other models with no appreciable weight saving (nor strength gain), is good old fashioned tree wood, in this case high quality spruce. Balsa in the tips. No webbing is used – the alloy tube that accepts the very light but stiff pultruded carbon wing joiner is sufficient to bond the top and bottom spars for the crucial first few bays. This tube is cyanoed in place and then firmly stuck with the smallest possible quantities of Araldite squeezed in. It is also angled as much as the spars will allow to give a trace of centre dihedral to counteract the natural, anhedral effect that might set in when the model is not in the air. Anhedral looks so ugly. Only the Artoo sections and wing and tail structure remain from the old models. The planform has been prettied up and the wing – now nominally flat in the centre – has been stretched to 50in and hence the largest area yet at just under 225sq inches of lifting surface if you count the fuselage section. The tail area has been increased in slightly less than true proportion. Fuselage is the same length as the large 100 gram Artoo although the motor section has been extended slightly (by half-an-inch) to accommodate the longer motors. For the first time the boom and tube are covered *inside* with lightweight



Another view of the modified Nats winner. Two timers, VIT, AR and DPR all fit in!

Model span and only the motor tube is covered outside (with light Jap). The boom is just doped and sanded. Both are very strong. The assembled airframe is very stiff and ready to fly at a few grams over the 80. Ridiculous wing loading!

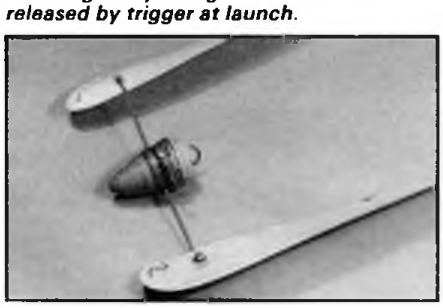
The wing-mount-cum-timer-bay took ages to perfect, enclosing (as it does) a thin wire on/off switch to start the forward mounted timer on release of the model. The timer is of course a Tomy Minimal (three grams). The instant-start propellor release lever is adjacent to the timer start trigger so both can be held off by a single pin running through a hole in the wing mount from above so as no to foul the winding jig. The model is always wound with the wings off – the IPR holding the blades until the wings are plugged on. That way the fuselage assembly is much easier to handle in the event of a broken motor having to be changed (as well as eliminating the need to worry about gusts).

The surfaces are covered in light Jap, watershrunk – and so far, have received only one coat of 50/50 dope/thinners. The surfaces go a little slack in damp, but not cold or wet. They should be ready for their final coat about the time you read this...

Model tests

The first test hops showed the glide to be excellent. First power flights proved the model nipped away very quickly, even on low turns, but the motor still had to be stranded down to 12in to achieve the run of around 60 secs that I required. Even with this length run the initial burst was still slightly 'loopy'. The CG was well forward so it had to be lead in the tail. Even 1.1/2 grams hurt after getting the model virtually down to weight! With the CG thus shifted and the incidence reduced accordingly power was tamed and

Doring/Larabee prop. Outriggers nearly 5in. long. Very thin glass-covered blades released by trigger at launch.



the glide became sensational. Final flights showed the model climbing well on a 12in Tan FA1 motor wound to about 400. Run around 55 secs; overall duration well over 2.30 minutes in 45 degree temperature. Final checks, a week before Old Warden, were made in a light breeze and on Pirelli. This smoothed out the climb still further and put more height on, after a slightly longer run. The glide was ridiculous, possibly sinking at less than that magic figure 1ft/sec but always moving fast enough to maintain lift and stability. I didn't dare clock the durations – it seemed to be holding up forever. For the first time I had a CDH with a clean wing – no turbulators or invigorators. It was everything that it had been planned to be.

The flyoff at Old Warden was remarkable (12.5in Orange Pirelli, 1/8in strip; 456 turns, 65 sec run) but both Gerry and I were in better air than anyone dared to expect at such an hour on a damp 40 degrees December day. A man-made thermal undoubtedly. For me it was the comp flights themselves that impressed most. The model climbed to about the same height as most of the other good models (Pete King's excluded) but took almost twice as long to get there. Thereby giving it a head start of nearly thirty seconds before the better-than-average glide took over. The resultant overall duration becomes fairly obvious – the *worst* one might have scraped 2.30in had it not DT'd.

To condense the design thinking. The head-on profile is a crucial factor (if not *the* crucial factor). Reduction of this will help any lightly-loaded model – there are some obvious applications in other classes. The model is down to weight and it's big (but not silly) with a proven gliding section Benedek 7406f modified. (I have now been using this section for 25 years). Very important – it has the right propeller utilising all the design experience currently available. The instant start is convenient but not essential. To duplicate the performance you probably won't have to build this model exactly; just bear in mind what I have found to be effective.

Finally, remember in all but the occasional contests the most important factor is the air you fly in, not the model. If all the hot air talked about still air duration (particularly of foreign Wakefields) was bottled up for us to use as lift I expect we could all max out for an entire season. Like the mythical four minute Wakefield, the three minute Coupe d'Hiver is, of course, fantasy. Pure Fantasy...

Polish Premi

IN order to qualify for World Championship status, an International event must involve the nominated teams from at least five Nations. For several years, the F1E class has peaked at a yearly Euro-Championship, usually with six or seven participating Nations. Poland, the latest recruit to the Class offered to host the crucial inaugural event through the good offices of the Aero Club of the Polish People's Republic, centered upon its site at Nowy Targ in Southern Poland.

Nowy Targ Airfield was used for the spectacular opening ceremony, the requirement of slope sites for various wind directions

Trevor Faulkner and Steve Philpott attended the first F1E World Championships

being fulfilled by no less than five separate slopes, all but one of which offered two or three usable faces according to wind direction. This area is predominantly agricultural, and because of its beautiful scenery and the proximity of the Tatra Mountains is a popular tourist venue.

The British Team – Jeff Palmer, Steve Philpott and Trevor Faulkner – had been in doubt until the last minute. Illness and business pressures had affected final selection, and, unusually, one member (Jeff Palmer) was chosen both as a flier and Team Manager. The lack of numbers meant that Team Members were faced with their own retrieving problems, unlike Classes F1A, B and C where extra help is available on Contest days. Knowing this to be the case, considerable time had been spent in getting into suitable physical condition, particularly in view of the fact that the average age of team members was 56, arguably the oldest team ever to represent Great Britian! Initial information regarding the area suggested that brisk winds could be expected in September, and that there was a 1:3 chance of rain. (September snow is not unknown in the region).

As a result, the model boxes were packed with models covering a wide range of flying speeds, from the heavyweights used in the Trials to very light 'floaters'. (The F1E Class has no minimum weight limits, and its maxima of 5Kg and 150 sq.dm area are quite remote in terms of current practice. Processing is, therefore, a simple labelling activity.)

The victorious German Team. Noted A/2 flier Herbert Schmidt is at far left; Anton Frieser, of steering unit fame, is far right with Hans Gremmer to his left.

Nightmare

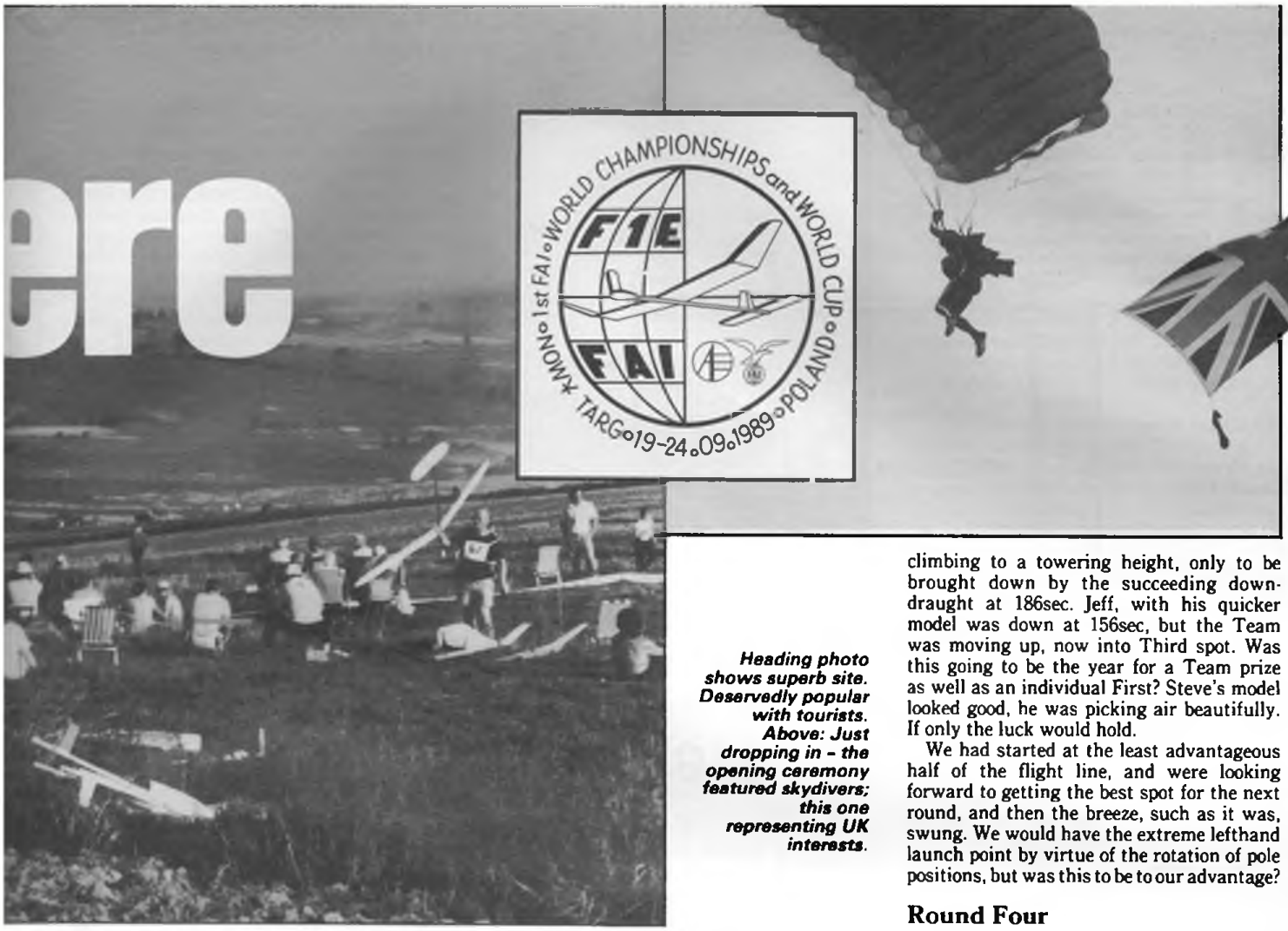
Travelling by road was inhibited by lengthy Border procedures once West Germany was behind us. Camping in the DDR is a Bureaucratic nightmare, not helped by the mono-lingual ability of one female official whose idea of communication was to shout as loudly as possible at uncomprehending 'guests' wishing to stay overnight. In Poland, the Camp sites had been closed the day before we arrived but a tolerant site organiser allowed us to pull off the road and at least stay overnight despite the closed ablutions block.

We arrived at the hotel some three minutes before the official reporting-time deadline to find that we were last in; all the others were out practising on one of the designated slopes.

Throughout the journey we had been looking for signs of the anticipated winds, but a large high-pressure area with clear blue skies and vertical smoke plumes presaged the conditions destined to hold throughout the event. Would it be a floaters' event? It certainly appeared likely.

Practice Day – Wednesday 20th September

A 'voluntary' competition had been arranged with modest (2 min) maxes to give



Heading photo shows superb site. Deservedly popular with tourists. Above: Just dropping in - the opening ceremony featured skydivers; this one representing UK interests.

practice to both timekeepers and fliers in the World Champs and subsequent Open International (World Cup) event. Steve Philpott's very light model had suffered a warp which was removed to reinstate its claims to be one of the most effective lightweights around. Jeff Palmer's model looked rather too heavy for the virtually zero-wind conditions and the Faulkner nine-footer looked to be going like a train, dropping just one sec on Flight 3 to spoil a run of max-times.

In the effort to gain extra height at the launch point, several fliers were attempting a version of a javelin launch. Ivan Crha (CSSR) had the right technique and model, but several would-be emulators found the procedure far from simple, with 15ft pull-outs from 12ft altitude and the resulting penalties.

Contest Day — Thursday 21st September

Because of possible wind shifts, the convoy of official fliers and supporters made their way to the DZIAL site, some 30km from the hotel. Thick morning mist persisted, delaying the start by two hours. the ten-minute break between Rounds was cancelled, as was the forty-minute lunch period. It was going to be a hard day with no intermissions. The sun broke through, burning off the mist, and a wind so slight as to hardly stir the anomometers indicated that emphasis would be placed on both low sinking speed and low glide angles, the flat area at the slope's foot necessitating maximum altitude as models left what little lift was afforded by the hill.

With eighteen fliers maxing at 180 secs in Round One the Contest Director specified that 240 secs was to be the target in Round Two. The British Team were in sixth place after the opening Round. Only Philpott made the required four minutes in Round Two, yet reasonable back-up by his Team-mates moved Britain ahead of two more Teams to take fourth place.

Round Three

Only seven maxes having resulted from the change to four minutes, the C.D. wisely decided to stay with the same target. Again, Steve used his thermal-picking skills effectively, putting in another superb maximum, and even arranging for the model to circle back towards the slope to ease retrieval. Trevor's large job hit an enormous thermal, climbing to a towering height, only to be brought down by the succeeding downdraught at 186sec. Jeff, with his quicker model was down at 156sec, but the Team was moving up, now into Third spot. Was this going to be the year for a Team prize as well as an individual First? Steve's model looked good, he was picking air beautifully. If only the luck would hold.

We had started at the least advantageous half of the flight line, and were looking forward to getting the best spot for the next round, and then the breeze, such as it was, swung. We would have the extreme lefthand launch point by virtue of the rotation of pole positions, but was this to be to our advantage?

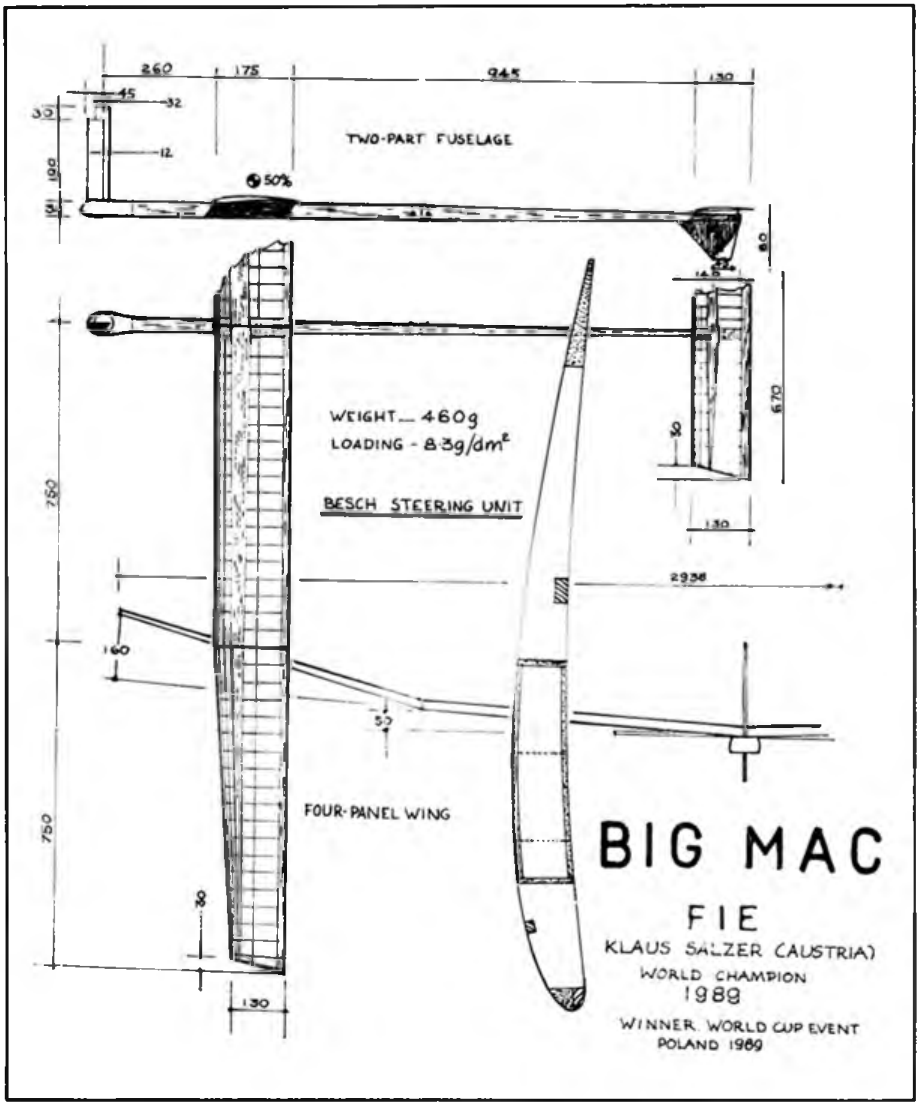
Round Four

The answer to the last question was soon revealed. No. 1. launch point was the least favourable, but with careful adjustment of the flight path, the slope was such as to make a four minute maximum something of a formality, only seven fliers failing to score 100 per cent. For the first time, all the Brits maxed, Steve was equal first place with one Round to go, the Team was third, and things were still promising.

Round Five

For the first time, a light breeze appeared. Another change of launch-point was decreed.

Peaceful preparations in the Polish sunshine. 21 entries in the Championships; 54 in the World Cup. Impressive!



and timers, fliers had five minutes during which to launch. Using the same slope as for the World Champs, the opening three-minute Round saw 45 maxes, including a perfect score for Great Britiain. The next Round saw all the Team dropping scores short of the required four minutes and only 7 maxes were recorded. Salzer had dropped nine seconds, but Musil was still 100 per cent there.

Round Three saw more evidence of fliers getting the measure of the slope. Steve

By contrast with the previous warm, slow airstream, the wind felt strong enough to merit the use of a medium weight model. And then Steve, flying first with a heavier model, found it penetrating far too quickly ..... down for two minutes three seconds. Trevor put in a rapid test-flight with a medium-weight model, found it too quick, and reverted to the nine-foot floater for a 4:02 flight against the target time of five minutes with Jeff just falling short of three minutes.

From the top four in Round Four only two remained; with both Seve and Ivan Crha (3:49) out of the running, Musil, (CSSR) and Salzer (Austria, the 1988 Eurochamp) were in the six minute fly-off Round.

Fly-off

From a position half-way down the slope, Musil's model seemed to be travelling quickly (the wind having dropped again) whilst Salzer, taking a slightly different heading to use any possible slope-lift from undulations in the terrain, was edging forward gently.

The Czech technique of flying for the lowest possible part of the landscape with a clean, low glide-angle model was pitched against a large, light model with a supremely low sinking speed flown to maximise its soaring abilities.

The impression was that the result was a formality, 'Big Mac' seemed to be hanging around and maintaining height, while the Czech model was steaming away. The scores were a surprise because of the small variation ..... an 8 second gap in favour of Klaus. After his Team's place in Austria's World Champs success in Argentina, Klaus looked to be the man in form. The British Team had slipped back (but only just) to fourth place, but with the consolation that, with the exception of the winning German Team, we were the only ones to score more than 400 points per man out of a possible 500. (F1E scoring is worked on a percentage system, five rounds giving a total of 500 possible points).

Given the retrieving, each flight covering at least half mile, with no back-up, and the fact that two Team Members were suffering quite dramatically from food-poisoning, it didn't look too bad but we weren't in the money, and that's what mattered. There are no medals for coming fourth, no Union Jack on the flat-pole, no National Anthem. Would the following day's World Cup event prove any better?

World Cup (Open International): Friday 22nd September

With 54 entries, a queueing system was adopted. After the allocation to a start-point dropped a mere four seconds, Jeff fifteen; whilst Trevor, changing to an even lighter but less flight-proven 9-footer put in a safe max. As for the previous day, a wind shift necessitated a change in launch point, the five-minute rule forcing some fliers to launch when the air was far from helpful. Once again, semi-javelin type launches were being used, on occasion with disastrous results. Even Crha was down in two seconds, the cancelled 'under 20 seconds = an attempt' rule was exacting penalties.

Salzer had dropped five and then four seconds in Rounds Three and Four; Musil twelve and 53. Horst Nitsche (FRG, not a member of the National Team) was in a strong second place with two maxes from four rounds. Vajda, (CSSR) had racked up three maxes, only to drop 1:12 in Round Four. Steve was holding steady after his poor second Round score, but Jeff put in his worst score of the week ..... a disappointing 32 seconds.

Conditions in Round Five improved with seventeen maxes recorded. The leaders either

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F1E World Championships Individual results (21 entries)

1	K Salzer	Austria	180	240	240	240	300	1200+ 219
2	R Musil	Czech	180	240	240	240	300	1200 + 211
3	I Crha	Czech	180	240	240	240	229	1129
4	F Brumat	Italy	180	230	340	240	224	1114
5	H Schmidt	FRG	180	220	189	240	300	1129
8	S Philpott	GB	1023					
9	T Faulkner	GB	1043					
12	J Palmer	GB	945					

F1E World Championships Team Results (7 entries)

1	FRG	1386 8
2	Czechoslovakia	1325 9
3	Austria	1293 9
4	GB	1283 5
5	Italy	1180 4
6	Switzerland	1149 3
7	Poland	1002 1

World Cup Individual Results (54 entries)

1	K Salzer	Austria	1122
2	H Nitsche	FRG	1055
3	J Mach	Czech	1067
4	R Musil	Czech	1062
5	M Mravec	Czech	1057
6	F Kanczok	Poland	1055
10	T Faulkner	GB	1027
21	S Philpott	GB	920
48	J Palmer	GB	608

Klaus Salzer launches ing Big Mac, drawn on site page. Centre: Our ter, Trevor Faulkner, gets nicely. Right: Light, open ework is a notable feature eve Philpott's latest net soarer.

maxed or fell short by a very few seconds, so keeping up their percentage scores. Steve and Trevor both maxed to give some boost to the hope that the top two scores in each Team (the lowest Team Member's score being discarded in this contest) would show quite well. From the eighteen Teams entered, Great Britain finished in sixth spot, again, a fair solo effort, but with no rewards.

Once again, Klaus Salzer took the Gold, with Nitsche second. A good contest, with, unusually, no need for a fly-off.

Prior to the Closing Ceremony and Banquet, all the fliers were taken by coach to an embarkation point on the Dunajec River to enjoy a raft journey through magnificent sunlit scenery. A brief chance to pick up some examples of local craftware before returning for lunch, a quick scramble for petrol (fortunately with a queue-jumping concession arranged by the Aero Club) and the award of medals and prizes.

The banquet was an excellent open air sheep-roast with a lively disco to conclude a memorable four days.

The Poles had done us proud; helpful and cheerful farmers who seemed happy to h ave hoards of fliers tramping across pasture and plough, children who were courteous and competent in handling models (20,000 children in 700 state-supported 'modelling workshops'), good sites on which to fly, and a Contest Director who used the percentage/variable-max system to advantage so avoiding hidebound adherence to the five minute maximum which has spoiled so many contests in the past.

The models and the fliers

These Contests called for an extreme type of model as already mentioned. The best British models compared well with those of the opposition, but the lack of Contests in the BMFA Calendar deprives fliers of the essential practise which leads to International success, and, of course, makes it worthwhile for newcomers to the Class to build a stable of suitable models.

Having said that, our Italian counterparts tell us that there are now more F1E fliers in their country than those flying F1A ..... and we were able to finish ahead of their National Team.

As can be seen from the drawing, Salzer's winning model is of conventional open frame construction, light, and with a smallish stab. To help D/T action, a small parachute is used (a feature copied by at least one other flier). With two-piece fuselages and 4-piece wings, Klaus manages to fit five large models into a very compact box, probably the smallest in the contest.

Rudolf Musil's models are, like all the Czech Team's aircraft, beautifully made. One all-sheet highly polished glass-on-balsa wing had a series of invigorators in what appeared to be a 'bead' of rubber solution, drawn into the upper surface. Considerable use was made by many modellers of Mylar covering for stablizers, although only the Faulkner 9ft span job used this material for wings. (It was noticeable that its performance was improved as dust from the ploughed fields left a thin coating on the upper surface).

Finally, and as a fitting conclusion to the report, the contribution of the Father of F1E, Hans Gremmer, now in his seventieth year, was recognised by the presentation of a Tatra style ice-axe from the Polich organisers. Thirty-five years ago Hans demonstrated the principles of forward fin steering in its present form at the Wasserkuppe; he is still actively experimenting with new aerodynamic forms (pinion feather tips, aerolastic stabilizers and canards) with the energy of a younger man.

With the first World Championships for 'his' Class of model, Hans' dream has come true. It is a privilege to know one of the truly great innovators on the modelling scene, and to share his sense of achievement on the occasion of such a fine contest.

RED OCTOBER

State-of-the-art Team Race topics all distilled into this winner from Italy.

Description by Aldo Zana

OUR STORY begins during the long way back to Italy, after the 1987 European Championships in Sweden: we managed to finish among the semi-finalists and we won second prize as a team, but we definitely realized that it would be impossible to catch the Russians with our existing materials. So, we decided to scrap everything we had flown before and to start again from scratch...

First of all, the decision to share all costs, materials, construction and tests was made: we put together the know-how and the scarce time of six persons, all enjoying a long career in the F2C circles: Giancarlo Martini, Marco Menozzi, Roberto Pennisi, Andrea Rossi, Gino Voghera, and Aldo Zana. Unfortunately, Marco soon decided to quit the group, due to technical contrasts on the route to be followed, so we decided to carry on with two teams, Voghera-Rossi and Pennisi-Zana with Martini encouraging progress.

We think that our group approach has been the key to success, as we managed to share all the efforts, speeding up all the actual phases of 'doing', while we always have to devote some time to discussions (sometimes very hot) in order to agree on the decisions. We set the objective of the presence of one team in the final of the 1988 World Champs in Kiev (USSR): so it was natural to name the new model Red October, as we started to design it early in October 1987.

Save time and weight

We targetted basic requirements on the new model:

(a) weight lower than 320 grams, ready to fly,

(b) assembly time shorter than ten hours,

(c) full compatibility among all models,

(d) 'expendability', i.e. to have a new model ready to fly as soon as the old one is worn out,

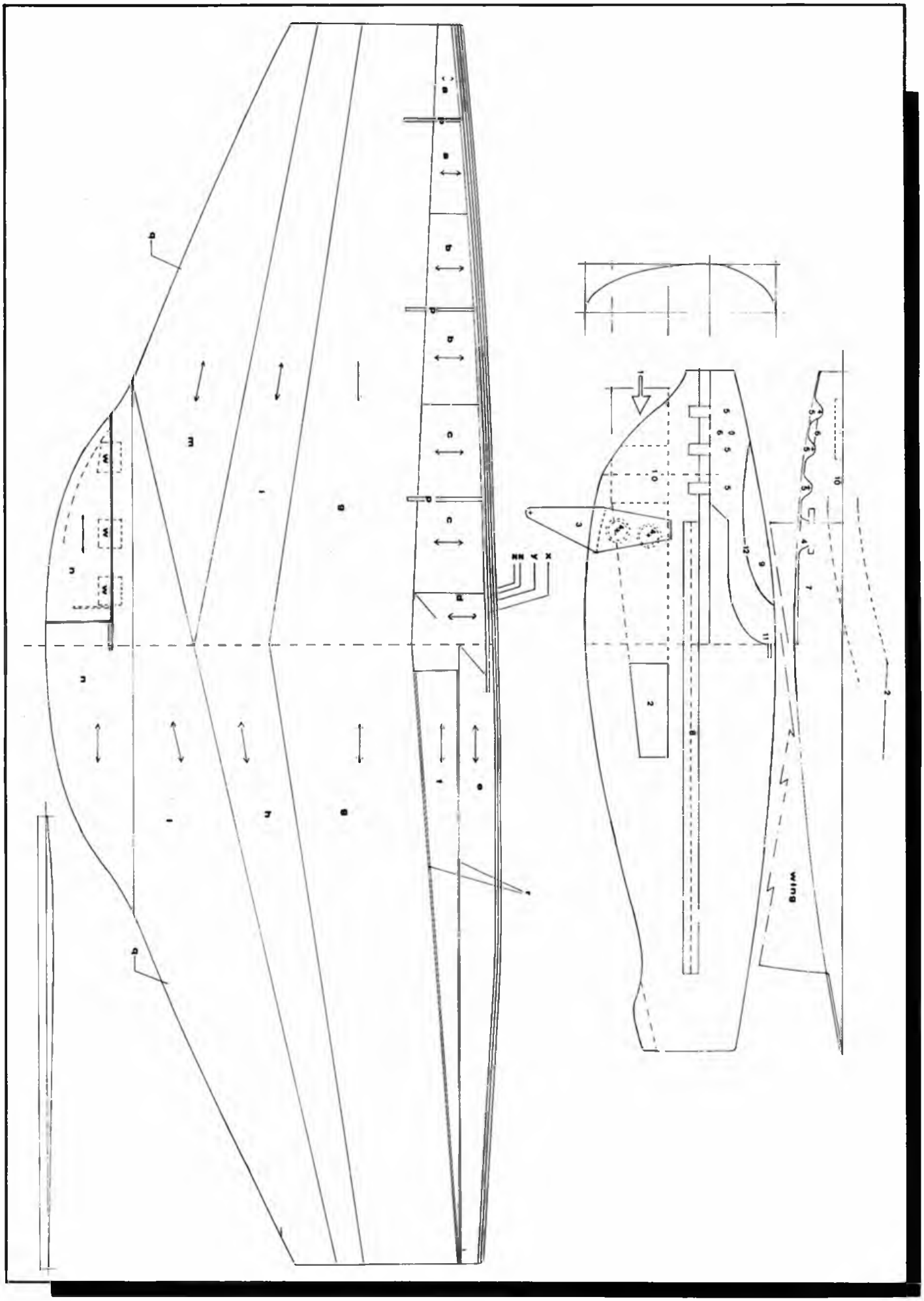
(e) single-blade prop,

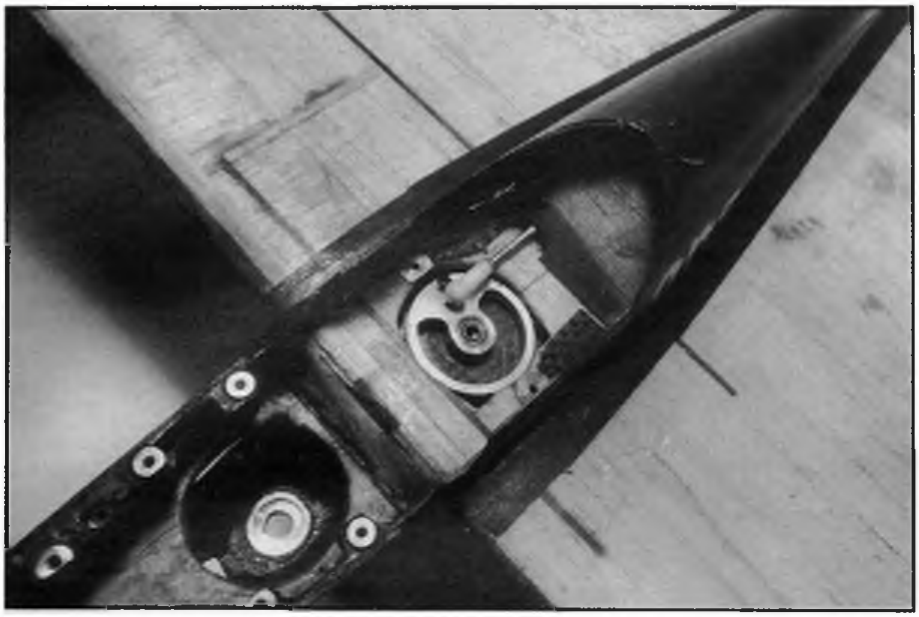
(f) engine with a sturdy crankcase, even though rather heavy.

The concept of compatibility has been stretched to the point that, before each contest, we choose between us the model and the engine to fly.

We do not think that our model is particularly revolutionary, but it is quite unique for the methodology of planning, construction and management: it has been designed to be 'engineered' in order to obtain always the same quality and the same performances, without wasting precious time in trouble-shooting and setting up. Up to now, we have flown fourteen 'clones' of Red October and all performed quite alike. After the first tests, in a chilly January 1988 afternoon, we set an airspeed corresponding to 17.5 sec. for ten laps as the threshold to be reached in the first set of tests with the racing propeller, in order to determine the model as good for contest flying. All models achieved this standard.

We went through painful experiences trying to understand the behaviour of the model, which is very stable and 'sensitive' while flying and landing, but needs an enormous concentration at take-off, to counterbalance the violence of the torque induced by our prop. At the end of '88 we were left without models in flying order. We had to use cans of cyanoacrylate bond in order to fix the wings, cut away at the root during take-offs steered toward the inner circle





Top: Circular bellcrank detail. Note use of R/C ball-joint at pushrod. Above: Snug engine and cut-out installation. The pilot could be neater!

instead of aimed at the sky. In 1989, we assembled five models and we still have four of them, flown only at the Three Sisters Champs and in two Italian events.

A lesson can be learned from our experience: if you wish to fly fast, you need a light model and you have to change it very often, as a patched one is unlikely to perform as before.

We missed the 1988 objective and also the 1989 one, which was, to put it simply, to win the European Champs, but Gino and Andrea finished fourth in Kiev and second in Three Sisters. Now we know by sure that we are no longer ages behind our friends from the Soviet Union. In the UK we managed to beat them as a team, we won Breitenbach and Vidreres (Spain) and all but two Italian 1988 and 1989 contests. Of course, 'we' means the total results of both teams.

The best recorded performances are 3:20 for 100 laps (Three Sisters, 1989) and 6:49 for 200 laps (Lugo, 1988).

Construction hints

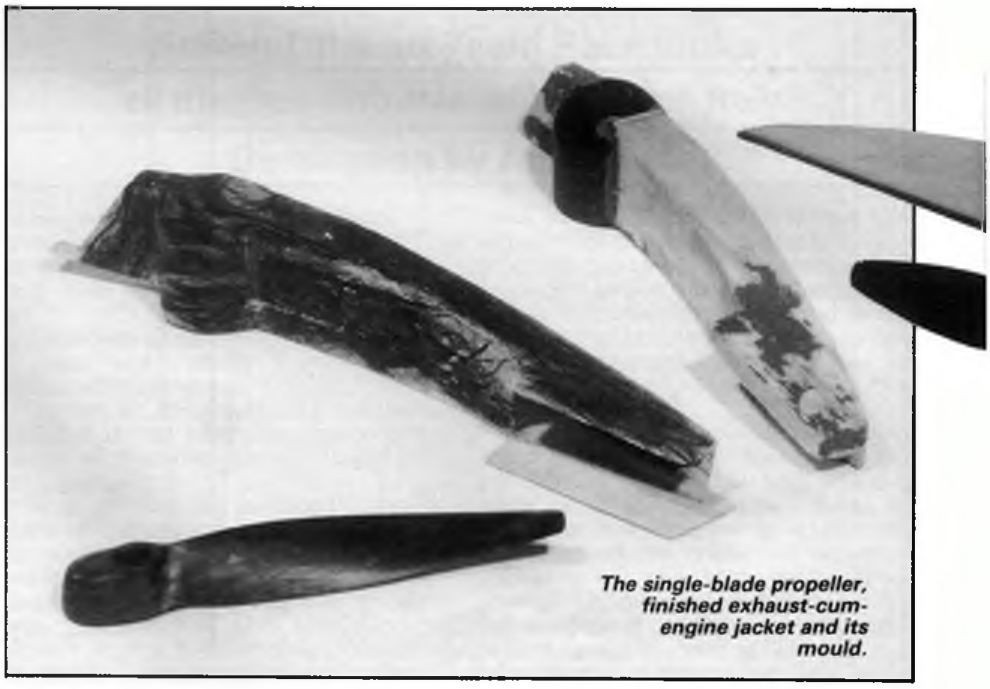
We chose the flying wing layout, beginning with six millimetres thickness and a full symmetrical profile, to be shaped into an airfoil that we designed, as no 'official' one exists with such a thickness over a maximum chord of 240mm. Balsa was chosen, putting together fourteen sections of different density, bonded with cyanoacrylate: later (i.e. after dozens of wings had broken at the root) we decided on 8mm thickness and twelve sections. Hardwood is used on the leading edge and a .4mm plywood is inserted along the trailing edge.

After shaping the airfoil, we cover the wing with .06mm fibreglass cloth, using about ten grams of Ciba 3052 resin. Drying is overnight inside a frame with plastic cover to press the cloth on the wood and to squeeze out the excess resin: we built a simple vacuum machine, using an old fridge compressor, set at 0.6 atmospheres. The finished wing weighs about 70 grams. Mass production was used for the wings, in order to have the same quality and to shorten construction time: we chose the fourteen wings that actually went on the models out from 26 assembled: we still have a good stock for the next flying season!

Lines reach the wheel through two stainless steel tubes (0.6mm internal diameter and 0.8 externally) normally used for surgical needles. We use a wheel, instead of the traditional bellcrank, in order to have a smooth movement. The wheel is mounted on a 3x8x3mm micro-ball bearing and can be removed when we have to change the lines. The pin of the wheel runs through two .5mm plates of carbon fibre: the upper one acts also as mounting of the tank and is screwed to the wing.

The control rod is made of an aluminium knitting needle, threaded at the front to accommodate a RC ball joint, to be inserted in the pin on the wheel. The diameter of the rod is 1.8mm and we drilled two .8mm holes through it to firmly locate the wire connected to the refuelling valve and the hinges to the elevator. The rod weighs less than one gram and doesn't deflect under stress.

The fully finished wing is inserted in a slot cut into the fuselage and, from that moment, the time left to the maiden flight is less than three hours, spraying included.



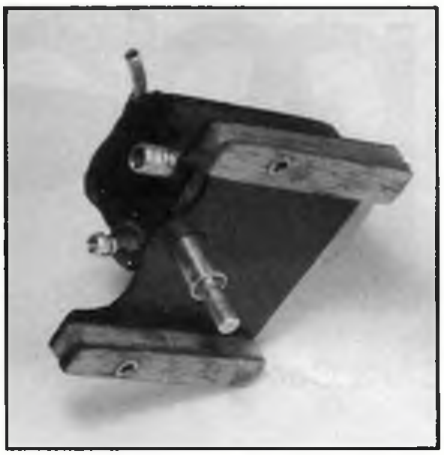
The single-blade propeller, finished exhaust-cum-engine jacket and its mould.

Carbon fuselage

In order to achieve weight savings coupled with strength, carbon fibre is the only answer. The carbon-only fuselage is cut in two halves along the vertical, longitudinal axis and is moulded through male and female hard resin moulds. The construction of these four moulds was quite long and expensive, but now, after two years of experience, we need less than half-an-hour to finish one fuselage. Up to now, we have moulded 24 fuselages; and the resin in the four moulds (male and female, left and right) is still good.

The two halves include engine and undercarriage mountings. Thickness at the front is 0.8mm, while after the leading edge it is down to 0.2mm: We use Ciba 3052 resin, dried for twelve hours in an oven (we bought for the purpose) at 75 degrees Celsius. Total weight of the two finished halves is about 32 grams.

When the fuselage has dried up, we glue the engine jacket-cum-air exhaust to one half, exactly positioning it by means of a template and the holes of the screws used to mount the engine. In the meantime, we check if the engine mounting bosses are levelled, as we will set and check the proper angle of attack of the wing according to this plane: according to our experience the best setting is to set wing and engine at zero degrees, but we have also tried a one degree wing and a zero degree engine, without any significant change in take-off or flying. Prior to bonding together the two halves, using the excess carbon as the plane of reference, we cut with a Dremel mototool the upper, front section, to be glued together and to become the canopy.



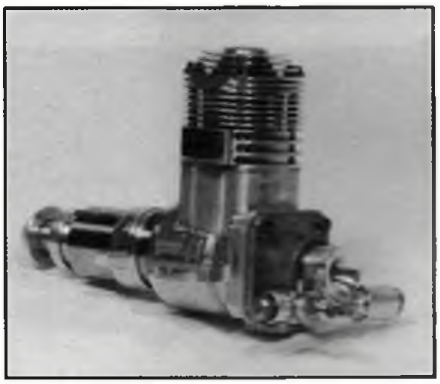
Below: 'Bridge' structure carries the tank (all carbon fibre with ali tubes) and bellcrank pivot. Tube bearer inserts prevent crunching.

Top to bottom: Wooden mould; two fuselage halves as they come from the mould; mould and finished exhaust/jacket.

The undercarriage is made of 3mm carbon fibre and is screwed to the fuselage, so we can change it as soon as we see some fatigue. Total weight, wheel included, is six grams.

The fuselage is longer than the actual wing chord, but we think that it works quite well from the aerodynamic viewpoint. As a check, we also designed and flew a model with a shorter and lighter fuselage: performances, with the same engine and propeller, were inferior. Another proof of the good design of the fuselage is the cleanliness of the lower right wing, totally unaffected by engine exhausts, and the straight flow of the oily exhaust from the side air exhaust.

Below: The prototype OPS TR engine is machined from solid. Note short venturi.



Engine and propeller

The engines are one-off specials built by Gino Voghera on the basic frame of the Cipolla engine. Changes have been so extensive that the actual engines bear no longer any similarity to their ancestors: they may be the prototypes of the future OPS team racing engines, if Gino should eventually decide to produce them in a small series.

The crankshaft mount is turned from titanium and screwed to the crankcase from the rear. The crankshaft has a diameter of 8mm and rolls on two rear 8x13 ball bearings and one 8x13 front bearings. All these bearings are especially made, to our specs, by a Swiss firm. Piston and liner are hardened aluminium, with chromium coating on the liner: we faced many troubles, in 1988, with the material of the pistons and we still have to cope with a very short life of them. This is another item we have to fix.

The rear intake valve is mounted on a ball bearing, even if we noticed no significant difference from the standard model, running on brass. The refuelling valve is a shortened, old type Cipolla and we choose a Venturi of 5mm diameter. It protrudes only 2mm behind the valve.

From the very beginning, we opted for a single-blade propeller, as we already had some experience with it. We are the only two teams still using it, but the trade-off between the added stress on the engine and model and the better torque profile is positive: that means higher acceleration. We selected a 202mm diameter with a maximum pitch of 6in, marginally changing the pitch according to weather conditions and air density.

Revs at take-off are about 14,000, which is the point of maximum torque of the engine, while at the top speed (usually around 17.2 secs for ten laps) the revs are about 25,000. We tested some Russian two-blade props as well, but no significant change in maximum airspeed was noticed, while the acceleration is definitely lower, sometimes more than one second for ten laps. With our prop and an airspeed corresponding to 17.5 sec., the model flies the first ten laps, since the mechanic has released it, inless than 19 sec.

We still have to fully understand how to achieve a range of 35 laps per tank: only one engine is running with such performances. It gave Gino and Andrea the thrust to record twice a 3:20 time in Three Sisters. Even though our machines are quite fast and fully reliable, we understand that extended range is a must in order to compete with the Russians next year. After their defeat, as a team, in the 1989 European Championships, they will surely be at their best to give us a hard time at the 1990 World Champs, in despite the goodwill radiating from the Red October name of our model!

Red October ready to fly! The team is quite happy with the clean lines of their brainchild. Longer range now the target...

High potential

Flexidrive facts for electric free flight – Chris Coote comments

FIRST things first. Thanks to those who have written in with queries, and even better, feedback on your own electrifying experiences. Unfortunately my house number was incorrectly printed in an earlier article. Despite a reminder, some of you are still sending letters to a stranger at number 44! So for future reference please note the correct address for all High Potential correspondence should be:-

Chris Coote
55 Edward Road
Clevedon
Avon BS21 7DX

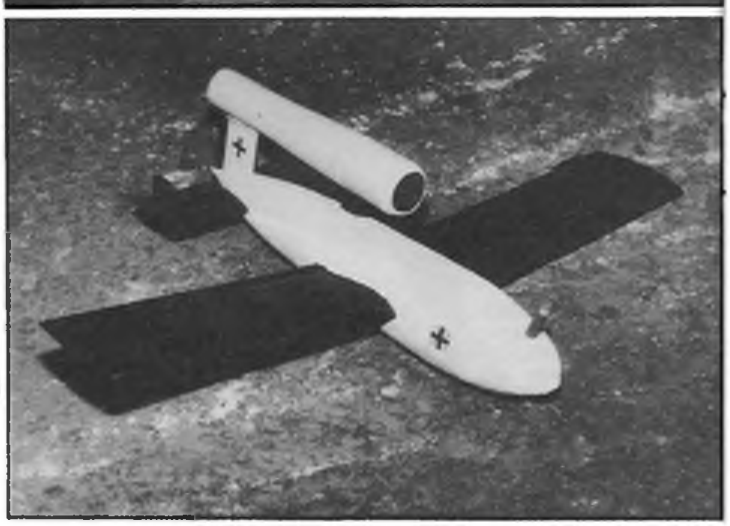
Flexidrive facts

Right. Now we can get on with the main part of this month's electrical comments. One of the attractions of electrics is that the power delivery is smooth and vibration free. This can be of considerable advantage when considering unusual type installations, such as pushers. In addition the use of various forms of flexible drive which are not normally possible with conventional IC power can be considered. The photograph and sketch come courtesy of Phil Stanson in the USA and show a small experimental motor unit with an ultra simple right angle flexi drive using a single piece of thin (1/32in or 24swg piano wire) wire to transmit the prop drive to a remote, higher, pusher-type location. Measurement of current consumed with a standard prop showed that there was surprisingly little difference between the flex drive 'bent' through a right angle, and the simple direct drive situation. This shows the high efficiency of such an arrangement. This should not come as too much of a surprise to those who read other modelling publications since the model boat fraternity, and in particular the high speed electric enthusiasts, discovered this technique some ten or more years ago and have been using it ever since. The advantage from our point of view is that it can enable us to locate the relatively heavy motor low in the model to give increased amounts of pendulum stability whilst enabling the prop to be set in a scale position high up in a nacelle. Another advantage of this method is that all those hard-to-build narrow scale fuselage or nacelle noses are now possible using a simple wire extension shaft. In all these applications the actual nose bearings can be very simple, again due to the low levels of vibration and stress involved. My own favourite is what I call the bent tin type which consists of a diamond shaped piece of tin or thin brass with a central hole for the wire prop shaft. The ends of the diamond are bent over at right angles to form sharp points which can be pressed into the nose block for positive location before gluing on with a dab of epoxy. The sketch should make it all clear. The American Highline company show just a crude hole drilled in a 1/16in ply nose former as a nose bearing for an extension shaft, for use with their Imp motor, and this larger unit is rated at 30 watts! If the flex drive is bent through an angle then a more rigid bearing will be required. This can be a simple piece of tube or a double diamond arrangement, again, I hope that the sketch makes it all clear. Eyelets, or pop rivets with the central mandrel removed also make good nose bearings, as do the ball and oilite type sold for electric R/C cars.

Pushers

Just before we leave the subject of pushers remember that the other main advantage is that the normal high mounting means that the chances of stalling the motor in a crash are much reduced due to the protected position of the prop. This seems to me to be quite an advantage, especially for a first foray into the world of electrics where a crash followed by a stalled and possibly burnt-out motor is not too encouraging. Perhaps you remember Phil Stanson's neat all-sheet pusher, featured in this column last year. This was a classic of its type, following the basic layout sketched in our diagram. Pushers are ideal subjects for flexi-drive

Below: Doug Sheppard's 28in American Sport scale model. KP01 powered: weighs 95 grams. Right: Doug's simple field charger. Below right: Experimental V1-type model by Dave Hanks. Fan only about one inch diameter, but lots of draught!



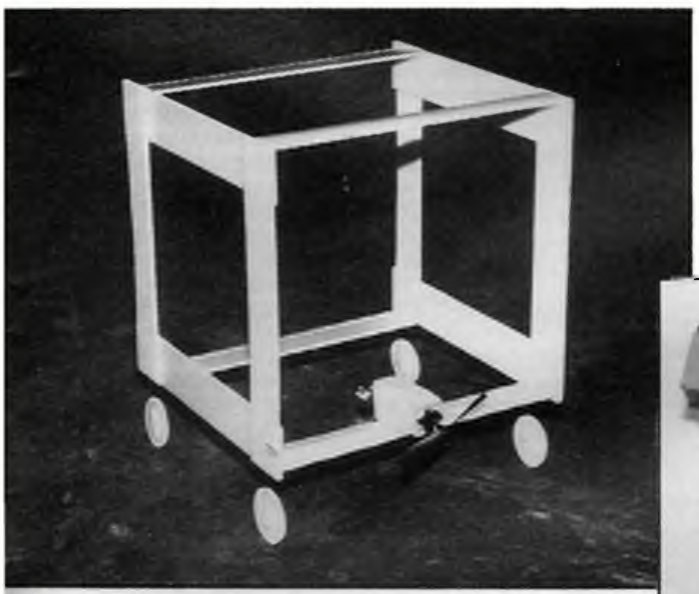
experiments, and provide much scope for playing with thrustline adjustments. Try one for yourself!

Egg it on

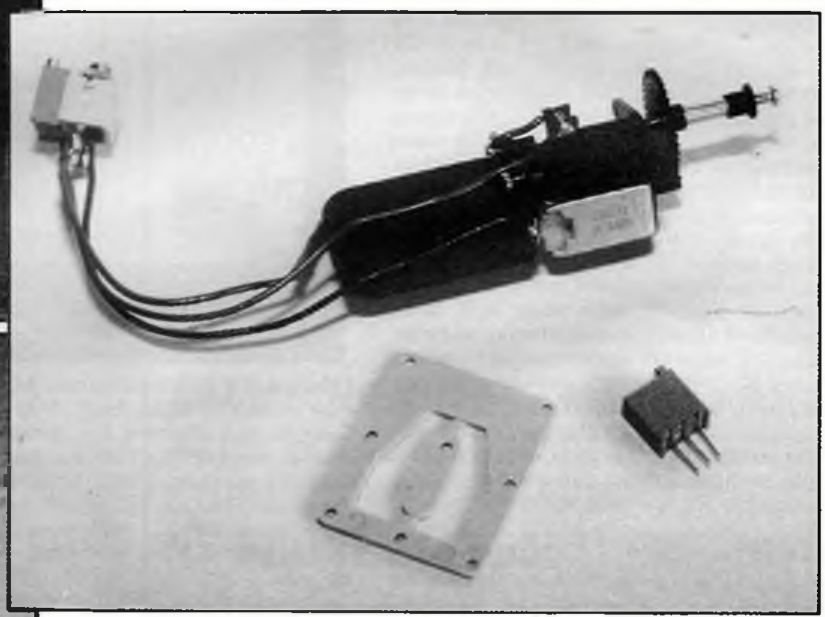
From the same fruitful source of information comes a tip for using foam egg carton material as a lightweight structural medium. Sufficient flat sheet can be cut from such egg and meat packaging cartons to provide quite decent sized wing and tail sections. An additional advantage is that this stuff comes in a variety of colours so that you do not even need any paint, which is beneficial in trying to produce lightweight electric type

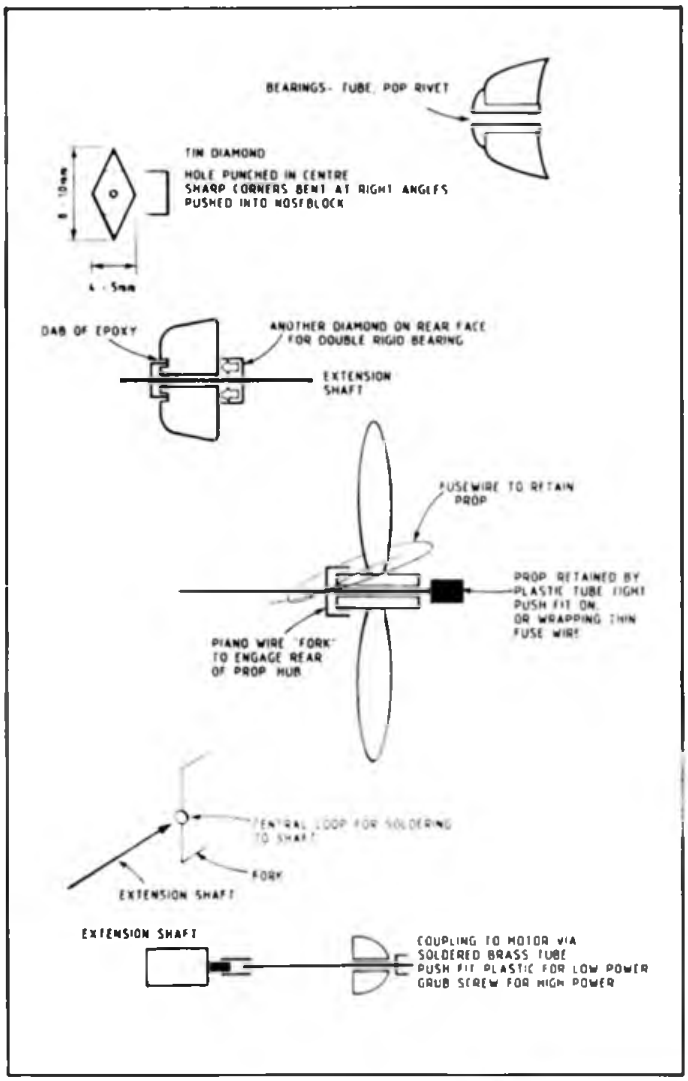
Above and left: Stateside activity. Lightweight Northrop flying wing bomber, actually rubber powered, at the Thermal Thumbers meet at Mile Square, who'll try a Stealth bomber for electrics?

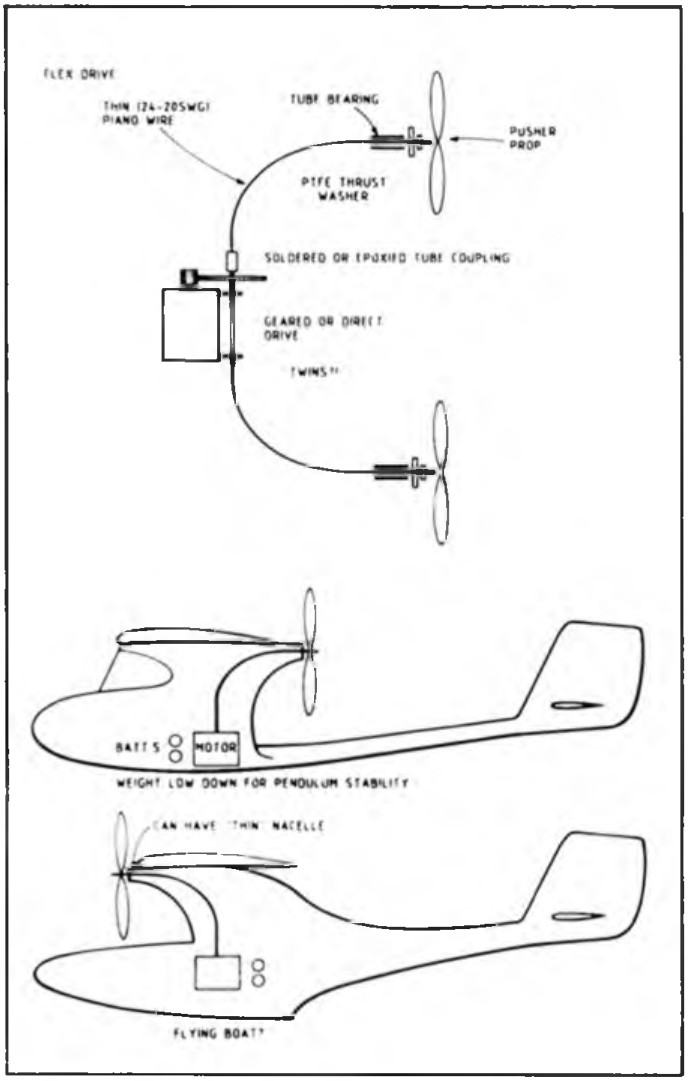
airframes. One trick that has been discovered is that you can mould the stuff to shape by dipping in hot water and then tweaking it suitably. It will hold the sort of curves necessary for airfoil sections on wings, for instance, extremely well. The production of curved turtle decks for fuselages is equally possible. My own experiments have been very encouraging. Just to see what was possible a tubular fuselage section was made up for a pod and boom type model. This tube was only 1in outside diameter from moulded foam about 3/32in thick. The seam was glued with a fast setting PVA type glue. (Lighter than epoxy!) The result is a pre-finished and coloured tube at about the same weight as one of 1/16in balsa sheet. The rigidity is excellent and would, I am sure, be equally suitable for a rubber model fuselage carrying the torque of the motor. Because of the moulded nature of the foam, the surface finish is quite smooth. This is quite unlike that of normal 'white' foam and can easily be coloured if desired with one coat of Tamiya acrylic paint. (This stuff is both water soluble and lightweight; also, it does not attack foam of any type. If you have not yet tried it I suggest you do, especially for indoor jobs! You will discover that the foam swells in thickness to about double its original size, so it pays to start with the thinnest stuff you can



Left: Robin James' now famous flying box for KP power (again!) makes beautiful 'wheelie' landings. Below left: Fine DH60 Moth by ex R/C scale champ David Vaughan. Below: New version of KP01 features improved, welded battery pack.







Above: Simple tips for friction-free flexi-drives. Two typical applications above right. Right: Test rig allows experiment with drive angles.

find. Those of you who spotted Robin James' unorthodox flying 'box' (or foot stool) at Watford may be interested to know that it is entirely constructed of this type of foam. The material is about 3/16in thick and is to be made available to modellers in large flat sheets by Dave Rawlins of DPR Models. Robin's model consisted of 2in wide strips of the material, about 15in long, overlapped at the corners to make the square flat sides, and used similar size strips cambered slightly for the four wings. The KP01 motor unit attaches to a simple foam nacelle glued to the upper centre of the lower front wing. Turn seems to be natural to the left under the torque effect from the motor. Wheels are also cut from the foam sheet with small lengths of alloy tube epoxied in as bearings. The U/C wires are simply epoxied to the box sides! No doubt the editor will be able to get Robin to supply a plan if he gets enough demand from you, the readers. Just to show the versatility of this foam material, Robin also produced a flying rain cloud at our last indoor fun flying session at Colerne!

Tamiya topics

Talking of Tamiya products reminds me to report on some very useful car components

produced by this organisation which are of use in electric flight. Apart from the fairly obvious fast chargers and meters, a very useful range of bits and pieces is available as part of their 1/24th scale racing car package. The type FK 180-SH motor (Part number 40003) is a high powered carbon brush type complete with brass pinion for gearing. It is a little larger than the smallest standard Mabuchi RE140 but gives out about three times the power. It is designed to run off a pack of six 270mAh cells for several minutes. For flight purposes a lightweight pack of six 50mAh cells is fine. Or for a ready made pack just use a rechargeable PP9 type as shown cut open in the December issue! The Tamiya pack itself (part number 55030) makes a very useful source for 380 size motors. So once again a standard setup could be bought off the model shop shelf comprising, say, an MFA 02 motor and prop adaptor and the Tamiya 270mAh battery pack together with its fast charger (part number 55032). This would make a very good combination for powering outdoor F/F models of the APS Tomboy type, and similar sport models designed for .049 (0.8cc) glow/diesel power.

A hard one

I seem to get lots of letters asking questions on the relative power of electric setups. This is a hard one to answer absolutely because of the different type of power delivery offered by electric systems. For those of you who have followed this column faithfully since the start, some of what follows will be familiar. What I have done is to categorise various 'standard' type layouts in ascending order of power, size, and weight. The size of battery pack shown in the table is that recommended for normal free-flight type applications with motor runs up to 45 seconds or so. The sizes of model shown can vary quite a bit, being more dependant on wing loading than absolute size. As a general rule try to keep

the wing loading below 6oz/sq ft. The equivalent motor sizes are shown to give a guide to the sort of power available. In fact the two smallest motors are better than the CO_2 equivalents, and the remainder are slightly worse than the equivalent i.c. motors, but are often better in practice due to the ability to swing larger and more efficient props (especially on geared units!).

Motor	Battery	Model Size/Weight	Equiv. Motor
KP01, HY70, Union	2 or 3 x 50mAh	80-100sq in/4oz	Good Telco Co.
HY42, RE260 (geared)	3 or 4 x 100mAh	100-150sq in/8oz	Modela CO_2
Astro 02, RE360	4 or 5 x 270mAh	180-250sq in/15oz	Cox 020 Glow
MFA 02, Acoms 380	5 or 6 x 270mAh	200-400sq in/24oz	049 Glow
RE540, MFA 05	6 to 8 x 500mAh	400-600sq in/36oz	1·1.5cc Diesel
Graupner 600 (geared)	6 to 8 x 600mAh	500-800sq in/48oz	15 Glow

Colerne!

We include some pictures from our recent Colerne indoor session, the DH Moth biplane was originally built for CO_2 by David Vaughan (Yes – it is the same chap who has produced those superb large R/C scale winners. He says that since discovering Indoor he cannot stop building them instead!) It was a bit marginal on flying performance due to excess size really for a Telco, but flies well, if a little fast with its KP01. Span is about 21in, smaller than Derek Knight's well-known Tiger Moth bipe with similar power. The other scale job is Doug Sheppard's American Eagle home-built parasol, also KP01 powered. This model is larger at 28in span, and 95gm ready to fly. The motor speed trimming resistor has to be wound in a bit to restrict power to give a scale like performance, and although the model has been around for some time now, it has not really flown well. However, a change in the thrust line to give some right thrust has transformed the performance, and some really excellent flights climbing to the roof of the hangar were obtained. We also liked Dave Hanks, latest experiment. That V1 buzz bomb really does hum since the jet pipe contains one of the small flat motors rewound, direct-driving a tiny ducted fan. Not quite enough thrust to fly the model yet, but the development possibility is there with an extra cell and a bit bigger model to reduce the wing loading, I am sure it will succeed! My own experiments on ducted fan electrics centre on the old Harry butler two-bladed fan produced for electric RTP, driven by a rewound 360 or Astro 02 motor. Results so far are encouraging; it's getting the time to build an airframe that is the problem. Too much time spent in fascinating tinkering in the workshop! Hopefully more news on this in a later article; are any of you out there are experimenting and care to tell us all about it.

Stop press

Just received in the Christmas post – the latest version of the KP01 with new, improved, welded-battery pack. Sometimes you could get minute amounts of corrosion on the surface of the cell contacts of the previous unit. Since they were only sprung together this could lead to extra internal resistance and a mysterious drop in performance. All that was required was to slip the cells from the tubular carrier and wipe over their ends with a dry cloth and all would be well again. However, in order to make this versatile little unit even more foolproof, the all-welded connection battery pack has been introduced. This also has the advantage of reducing the rear overhang since the cells are now arranged side by side rather than lengthways. The cutout in the nose mounting former has to be slightly bigger, I found; and the very handy template supplied with the motor for marking out this hole is now a bit inaccurate – be warned! Good news is that the welded pack seems to have a lower internal resistance than the old separate cells, which gives a bit more power in the first stages of the motor run. My tests showed over 4,500rpm for a few seconds after startup compared to a best of 4,400 on the older unit. Mine has just gone into a semiscale micro-light type model of 20.5in span which climbs like a contest job. Speed controller definitely needed; more next month!

READERS' LETTERS

CO_2 support

Dear Sir,
On behalf of CO_2 fliers everywhere may I ask you to give all your support to CO_2 duration flying which at present seems very much in the balance. What a shame it would be to lose this side of the hobby.

I would like to thank you for all the CO_2 designs published in Aeromodeller recently, especially Dave Causer's 1/16 scale model of the Nieuport II – a delightful model to build, and full of detail. I have fitted a standard Telco motor to mine, and it performs really well.

Vulcans F/F Club,
Sheffield ***J.K. Gilbert***

(Of course we will continue to feature all types of CO_2 activity, including Duration – which attracted a healthy entry at the Nationals despite inconsistent publicity. GC).

Foreign favourites

Dear Sir,
I recently bought Vic Smeed's book of Favourites of the Fifties and have enjoyed it immensely. I keep picking it up and browsing though it again and again. What really prompted me to write was the comments about flying in the Argentine in the '50s, because I lived there from 1946 to 1953 and began my aeromodelling career in that country.

The local village school up in the mountains taught me to handle decimals and to speak Spanish fluently – including swearing – but not much else. The government often sent items for free distribution, including, on one occasion, a batch of glider kits for the pupils in the fifth and sixth grades to build. Although I was only in the fourth grade I managed to get one which I built with carpenters' glue and dope. I never got it to fly...

In 1951 I moved to a British school in Buenos Aires, where modelling was much more widespread. The two model shops provided a variety of goods including imported engines at truly incredible prices and a very good range of locally-produced kits, mainly rubber scale. I also recall a motor of Argentinian manufacture which, I believe, was based on the McCoy .049. My efforts included a large model of the Aero Boero lightplane for rubber power (it really needed an engine) and a Wakefield called Cardinal which flew like a dream – it was my most successful rubber model ever and I would dearly love to get the plans now...

Sudbury, Suffolk ***Peter Miller***

BMFA affairs

Dear Sir,
The item in a recent Balsa Cuttings column concerning the new working title for model flying's national body raises some interesting points. I believe it was almost two years ago that the SMAE Annual General meeting voted that a working title be adopted that more accurately reflected the activity in which its members took part, model flying. Some time later a meeting of its Council considered a number of alternative titles and agreed by a considerable margin that The British Model Flying Association did the job best.

As in any organisation with the length of experience that ours has, there are some die-hards who see little reason for change; I have been a member since 1947 myself, but it is quite clear that it is many years since any sort of aeronautical engineering was the predominant interest of our members. Sure, some of us design the aircraft we fly, some of us build other people's designs, and some of us, whether Cyano de Bergerac, other Aeromodeller *columnists and I like it or not, buy them. The one thing we all have in common is an enthusiasm for model flying, and for our working title not to show this is dishonest. I am afraid that much of the confusion has been due to some of those die-hards gainsaying the decision of that AGM and persisting to use the old title to work with, or at best implying that we can use either.*

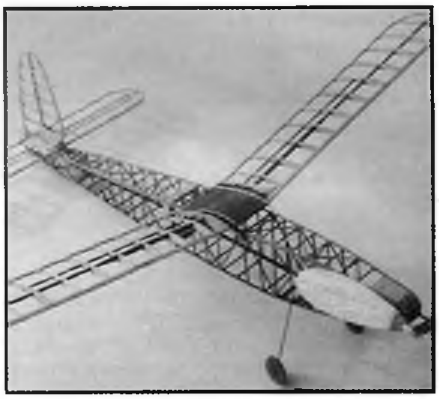
Many organisations have working titles different in some respect from their company name: most of our fellow Royal Aero Club associations, for instance, work with titles that omit the word "Limited". The only occasions on which the company name (SMAE Ltd., in the case of the BMFA) must appear are on such documents as receipts and bills, at the bottom of our letterheading, and on minutes of business meetings, like AGMs and Council meetings. On all other occasions we should be using our working title for its intended purpose, which is to work with. We are an engineering society, and indeed the inference that we would like to be could well deter some of today's Now Generation of model flyers. We have not, as C de B. suggests, adopted 'an additional *working title', by the way, although to read some of the BMFA's literature lately you'd never know it.*

Having been involved with public relations for our national body for a number of years, I know the new working title would be wise for one reason alone, let alone the rest; when the PRO phones the national press with a story on our sport, he inevitably starts by identifying himself or his organisation. Ignoring the fact that 'Society of Model Aeronautical Engineers' didn't exactly roll off the tongue, even when you'd got it out the chap at the other end still had no idea what the activity was to which the story was going to refer; when the poor PRO started to explain, the words 'model flying' inevitably came into the explanation, so why use the earlier confusing, even pretentious, title?

By the way, Cyano, the SMAE is/was not the body 'appointed by the FAI to govern aeromodelling in this country'. The Royal Aero Club is recognised by the FAI as responsible for British air sports, and the RAeC delegates that responsibility to our national body, now known as the BMFA. And incidentally, our new working title, read alongside other sports governing bodies', will certainly not stick out like a thorn among the roses in the way that the old one did. If that helps in any way to improve the image of model flying, then I'm all for it, even if a few of those in the hierarchy of Britain's most popular air sport are still fighting a rearguard action.

By the way, have you seen the new BMFA sweatshirts yet? They go like hot cakes at the model shows and have space on the back for your own club logo. A call to the BMFA on 0533 440028 will get you details.

West Wickham,
Kent ***Martin Dilly***



Italian offerings

Dear Sir,
Here are some pictures of two Italian models built by SAM-Italia enthusiasts. The compressed-air model is the work of Arve Mozzarini, and is a replica of his 1935 design (the engine too).

Luigi Micheli built the Wakefield in 1945 and has recently reconditioned it. He originally flew it in many contests, including the Coppa Arno in 1946, where it placed tenth. Spars and longerons are from Lebanon cedar (as used for racing rowing boats) and are L or T-section for strength. This required much work! The model is easily dissembled into a suitcase for travelling by train, as Luigi frequently does in order to attend Old Timer meetings.

Full-size plans are not available, but the designer can supply further details. (Letters will be forwarded. GC).

Arcore, Milan ***Roberto Marzoli***

Note that the Micheli Wakefield is a restoration (above); also, you may admire Mozzarini's workmanship – compressed-air model spans 70 elegant inches.

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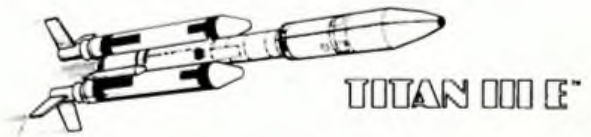

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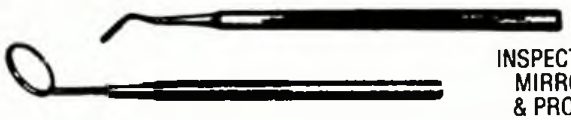

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