MODEL MAGAZINE

JANUARY 1990 £1.95

AERO MODELLER

COMBAT CHALLENGERS

Russian winners analysed

RED STAR SPECIAL

Yak-55 drawings and data

THE GRAND NATIONALS

Thoughts on the Championships

I'D RATHER BE HEINKELING

He51 full-size plans

ISSN 0001-9232

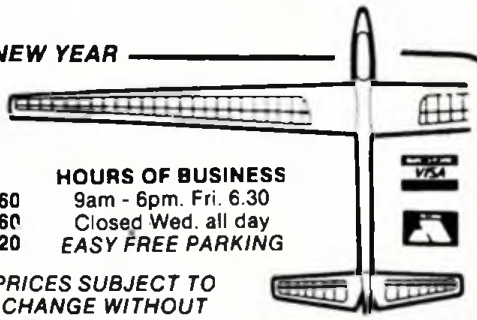
01

9 770001 923004

WE WISH ALL OUR CUSTOMERS A VERY HAPPY NEW YEAR

MAIL ORDER NOW 25 YRS. AROUND THE WORLD

ADDLESTONE MODELS LTD



63 STATION ROAD
ADDLESTONE, SURREY
KT15 2AR
TEL: 0932 845440

MAIL ORDER: POSTAGE UK ONLY

Engines & Kits under £15	£1.60
Kits over £15	£2.60
Other Items	£1.20

Credit Card Holders Phone For Immediate Despatch
EXPORT SENT V.A.T. FREE
S.A.E. with all enquiries

HOURS OF BUSINESS
9am - 6pm. Fri. 6.30
Closed Wed. all day
EASY FREE PARKING

PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

ESTES MODEL ROCKETS
STARTER SETS
Ideal Starter Set...Vagabond now in at 27.35
Space Shuttle 2 ..... 31.95
Sizzler 1 ..... 29.50
New Ninja Starter Set 18.10
X15 Set 32.95

ROCKET KITS
Number denotes skill level
Yankee 1 ..... 3.50
Wizard 1 ..... 3.50
Alpha III 1 ..... 6.85
Longshot 1 ..... 6.35
Big Bertha 1 ..... 8.05
Mini Mean Machine 1 ..... 7.05
Bullpup 12D 2 ..... 6.35
Space Shuttle Columbia 2 ..... 11.55
Heliocopter 2 ..... 9.10
Eggs Press 2 ..... 9.10
Novapayloader 2 ..... 7.05
Voyager II 2 ..... 7.05
Scorpion 2 ..... 10.00
Mini Mars Lander 2 ..... 4.20
Blackbird SR71 3 ..... 12.60
Stealth 3 ..... 8.05
Nike Apache 3 ..... 7.05
Dragonfly 3 ..... 6.20
Ramjet 3 ..... 5.25
Argosy 3 ..... 5.85
Geo Stat LV 4 ..... 14.35
Mercury Redstone 4 ..... 15.00

SOMETHING DIFFERENT!
TAKE A 110 PHOTO FROM YOUR FLIGHT!
Astrocam 110 - 2 ..... 32.55

ENGINES
1/2 A3 - 2T 3.35
1/2 A6 - 2 ..... 3.20
A8 - 3 ..... 3.35
A8 - 5 ..... 3.35
B4 - 2 ..... 3.35
B6 - 4 ..... 3.35
B8 - 5 ..... 3.35
C5 - 3 ..... 3.65
C6 - 7 ..... 3.85
C6 - 5 ..... 3.85

BOOSTER STAGE
A10 - 0T 3.55
A10 - 3T 3.55
B6 - 0 ..... 3.35
C6 - 0 ..... 3.65

ACCESSORIES
Recovery Wadding 1.90
Parachute 12in 1.95
Parachute 18in 2.40
Ignitors 1.90
Launch Pad II 12.60
Electron Beam Launcher 15.45
Altitrak - Altitude Finder 12.75
Power Kit X15 ..... 9.50

ENGINES - COX
New Queen Bee 049 ..... 32.99 with Throttle/muffler
Tee Dee 049 ..... 26.99
Black Widow 049 ..... 17.99
Babe Bee 049 ..... 16.99
Pee Wee 020 ..... 14.99
049 Glow Head 2.95
Glow Clip 1.65

A.E.
New .5 ..... 28.50
1.cc 25.50
1.5cc 26.50

QUICKSTART
Merlin 17.99
Dart 21.99
Spitfire 18.50
Sabre 19.50

P.A.W.
80 Mk 2 ..... 23.00
100 Mk 2 ..... 23.00
149 DS - 3 ..... 24.15
149 Contest 3 ..... 26.45
249 DS4 ..... 27.60
249 Contest 4 ..... 29.90
249 DS BR 35.65
19DS - 4 ..... 29.90
19DS BR 37.95
29DS (inc Sil) 42.55
35DS (inc Sil) 44.85

P.A.W.B.B.
249 DSBR 35.65
19 DSBR 37.95
249 R/C A/C BR w/ S 42.55
19 R/C A/C BR 44.85

PAW R/C
80 R/C A/C 27.60
100 R/C A/C 27.60
149 R/C A/C (inc S 31.95
249 R/C A/C (inc S 35.65
249 R/C A/C BR (inc Sil) 42.55
19 R/C A/C (inc Sil) 37.95
19 R/C A/C BR (inc Sil) 44.85
29 R/C A/C (inc Sil) 46.00

NEW PAW
Vintage 80 Classic 28.75
Vintage 80 Classic R/C Hi-Torque 33.35
80 mk 2 BR 27.60
80 mk 2 BR RC 32.20
100 mk 2 BR 27.60

NEW! PAW Competition Engines - Twin Ball Race Mounted Crankshaft
80 TBR £46.00
100 TBR £48.00
249 TBR £49.45
19 TBR £51.75
249 TBR-GY Combat Special £51.75
80 TBR R/C £50.60
100 TBR R/C £50.60
249 TBR R/C (inc S £58.35
19 TBR R/C (inc S £58.65

BOOKS Inc. P&P
Flying Models Favourites of The Fifties - Vic Smeed 7.95
Fifty Years Of Aeromodelling 6.95
Model Flying - The First 50 Years 7.95
Aircraft Plans Handbook 2.65
Ben Buckle Plans Book 2.65

NEW ROCKETRY MANUALS
Estes Catalogue 1.50 inc P/P
Second Stage - Advanced Model Rocketry - incl six computer progs! ..... £1.99 Inc P/P
Aero Dynamic Drag of Model Rockets ..... 2.10 Inc P/P
Elem. Maths of Model Rocket Flight ..... 1.25 Inc P/p

KITS TO BUILD RUBBER POWER K.K.
Achilles 4.99
Robin 4.99
Competitor 6.99
Ace 7.99
Gemini 4.99
Eaglet 4.99
Senator 6.99
Ajax 5.99
Pixie 4.99
Back in stock
Union Electric Bellanca Champion 17.99
Cessna 150 ..... 17.99

CONTROL LINE MODEL - HOB
Mustang P51 ..... 17.95
Smoulder 18.95
Baron 29.95
Veyto 15.95

TOP FLITE
Baby Flite Streak 9.99
Flite Streak 19.95
Junior Hobbler 19.95

PEGASUS
Mayflord 9.95
Warlord 11.95
Veron Colt Trainer 10.99

NEW
Free Flight Ben Buckle Vintage 34" .5 - 1cc Pirate 16.45
Airstail Heron GAS Buggy 48"
1 - 2.5cc 21.95
Gieseke Nobler 50" 54.95

COVERINGS?
- Try Litespan, very light but strong **£1.00** per sheet 36" x 20" choice of colours: Yellow, Orange, Red, Blue, Black, DK. (WWI) Green, Cream, Silver, White.

Balsaloc Adhesive **£2.21**

BAGNALLS MODELS

THE UK'S LEADING MAIL ORDER HOUSE

TEL 0785 223349/50
FAX 0785 54427

STANDARD ENGINE ROCKET KITS P/P £1.00

ALPHA III	5.99
WIZARD	2.99
SCORPION	9.75
HERCULES (2 Stage)	9.75
YANKEE	3.50
SPACE SHUTTLE COLUMBIA	9.99
	5.99
SIZZLER	5.99
MERCURY REDSTONE	5.75
STEALTH	6.75
SR-71 BLACKBIRD	10.95
BIG BERTHA	6.75
NOVA PAYLOADER	5.99
GEOSAT LV	12.99
LONG SHOT	6.75
SENTINEL	9.75
ARGOSY	6.75
RAMJET	5.75
HELICOPTER	8.75
EGGPRESS	8.75
VOYAGER II	7.75
ASTRO CAM Complete For Aerial Photos	33.95

DESIGNER'S SPECIAL
ALL THE BITS YOU NEED TO BUILD & DESIGN YOUR OWN ROCKETS 26.95

MINI MEAN MACHINE	7.75
MINI TRI PACK	7.75
MINI MARS LANDER	4.75
NIKE APACHE	7.75
DRAGONFLY	6.75
JUPITER	14.75

ROCKET SETS P/P £2.00

ALPHA III	24.95
SIZZLER	26.95
DISCOVERY	29.95
SPACE SHUTTLE	27.95

ACCESSORIES P/P £1.00

PORTA PAD LAUNCH	10.95
ELECTRON BEAM LAUNCHER	12.95
PARACHUTE 12"	1.75
PARACHUTE 18"	1.99
RECOVERY WADDING	1.75
MODEL ROCKET IGNITORS	1.75

MODEL ROCKET ENGINES P/P £1.00

A8 - 3	2.99	C6 - 3	3.25
A8 - 5	2.99	C6 - 5	3.25
B4 - 2	2.99	C6 - 7	3.25
B6 - 4	2.99	C6 - 0	3.25
B6 - 0	3.25	C5 - 3	3.25

ENGINES Add £1.00 P/P

COX

TEE DEE 049	26.95
BLACK WIDOW 049	17.95
BABY BEE 049	16.99
QUEEN BEE074	32.99
PEE WEE 020	14.99

PAW Add £1.00 P/P

PAW 80 STD	18.99
PAW 100 DS STD	18.99
PAW 149 CONTEST 3	22.95
PAW 149 DS STD	23.95
PAW 249 DS STD	23.95
PAW 80 CLASSIC	27.95
PAW 80 MK II BR	29.95
PAW 100 MK II BR	29.95

COX CONTROL LINE SETS Inc PLANE, ENGINE & LINES Add £2.00 P/P

PT19 TRAINER	31.95
TOP GUN	21.95
CESSNA 150	34.95
AIRWOLF (FREE FLIGHT)	29.95

K.K., VERON & MECURY KITS P/P £1.00

POLARIS	2.99
CADET	5.99
NOMAD	4.75
INVADER	6.99
DOLPHIN	3.99
CONQUEST	4.75
CAPRICE	10.95
WISP	3.99
SOARER BABY	5.99
PIONEER	4.75
CHIEF	14.99
PIXIE	4.99
GIPSY	9.99
SENATOR	6.99
COMPETITOR	6.99
ROBIN	4.99
ACE	7.99
PLAYBOY	4.75
EAGLET	4.99
ACHILLES	4.99
AJAX	5.99
GEMINI	4.99
CHAMP C/L	12.49
PHANTOM MITE C/L	9.99
MARQUIS C/L	15.99
CARDINAL	10.95
DEACON	18.95
TIGER MOTH	14.95

Visa and Access Welcome. Just Tel. your order for immediate despatch. COD please ring for details. 24hr Datapost cost £10 extra. Ensure cheque card no. is on rear of cheque to made payable to BAGNALLS MODELS LTD.

SALTER STREET, STAFFORD
TEL 0785223349
(CLOSED WED.)
Only 3 ml from Jn 13 or 14 M6

WOLVERHAMPTON ST. WALSALL (W. MIDLANDS)
TEL 092223984
(CLOSED THURS.)
Only 1 ml from Jn 10 M6

Kindly mention Aero Modeller when replying to advertisements

JANUARY 1990
Volume 55
Issue 648

ISSN 0001-9232

AERO MODELLER

p.6

p.25

HANGAR DOORS	News, views - What's what and what's on	**4**
FUN FLYING AT WATFORD	Indoor high jinks at a favourite Southern venue	**6**
RED STAR STRIKERS	Dave Clarkson scoops the rest with a first Western look at those Soviet combat craft	**8**
HIGH POTENTIAL	Electric motor mounting matters - the practicalities examined by Chris Coote	**12**
FLYING AS YOU OUGHTA - IN MALLORCA	Control-line competition in the sun - Dick McGladdery reports	**16**
ITALIAN JOBS	Lovely Latin old-timers in glorious colour	**18**
GLIDERS FOR THE GREAT ESCAPE	More secrets of prison-camp activity revealed	**19**
WHAT'S THE DELAY?	DPR mechanisms - and how to use them - described by Dave Hipperson	**20**
HEINKEL 51	Build Jim Latham's pretty CO_2 biplane from our full-size plans	**23**
YAK 55	Pat Lloyd's superb drawings for this Soviet aerobatic aircraft are augmented by Tony Lloyd's informative text	**25**
BALSA CUTTINGS	Aviation 'appenings cogitated upon by Cyano de Bergerac	**37**
VINTAGE CORNER	Concluding part of Alex Imrie's appreciation of super-enthusiast Juste van Hattum	**38**
THE GRAND NATIONALS	A look back at the friendly '89 Nats - and some questions are posed	**42**
CZECH UP!	Super Slovakian scale models pictured by Tonda Alfery and Lubomir Koutny	**45**
A TALE OF TWO GALAS	John O'Donnell visited the Northern and Southern Galas in the name of F/F competition	**46**
FOAM FUN FOLLOW-UP	More on modelling in bubbly plastic with Steven Midson	**48**
SMOOTH TECHNOLOGY	Mike Woodhouse looks closely at some Scandinavian Wakefields	**50**

Editor	*Geoff Clarke*
Group Editor	*Alec Gee*
Art Editor	*Ron Cunnington*
Design	*Peter Kirby*
Advertisement Manager	*Alan Cole*
Advertisement Copy Control	*Marie Quilter*

Cover: Hiromitsu Yokoe from Japan, currently working in London, was a welcome visitor to the 1989 C/L Nationals with his distinctive, own-design Kawasaki Hien Gold Trophy entry. Both Nationals meetings this year were much enjoyed - we review and comment on p.42.

ASP
Argus Specialist Publications

Argus House, Boundary Way,
Hemel Hempstead, Herts HP2 7ST.

ABC

AN Argus SPECIALIST MAGAZINE

UK Distribution by SM Distribution Ltd. 6 Leigham Court Road, Streatham, London SW16 2PG. Telephone 01-677 8111. Telex 261643. Fax 01-677 0136.

Advertisement Offices. Argus Specialist Publications, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST. Tel 0442 66551

Postmaster: Send address changes to Aeromodeller, c/o Mercury Airfreight International Ltd Inc, 2323 Randolph Avenue, Avenel, NJ 07001, USA.

Subscriptions: Direct subscription rate including Index: Home £23.40. Europe £28.20. Middle East £28.40. Far East £30.20. Rest of the World £28.70 or US $50.00. Airmail rates upon application from Infonet Ltd., 5 Riverpark Estate, Billet Lane, Berkhamsted Herts HP4 1HL. Tel 0422 876661/4.

Overseas Availability: Second class postage paid at Rahway N.J. USA. Postmaster: send address corrections to Aeromodeller, c/o Mercury Airfreight International Ltd Inc, 10B Englehard Ave, Avenel, NJ 07001. Distribution to news stand sales by Eastern News Distributors Inc, 1130 Cleveland Road, Sandusky Ohio 44870. Distribution to North American hobby and craft stores, museums and bookshops by Bill Dean Books Ltd., 166-41 Powells Cove Blvd, Post Office Box 69 Whitestone NY 11357 USA. Tel 1(212) 767-6632. USA Subscription agent Joseph D Daileda, Wise Owl Worldwide Publications, 4314 West 238th Street, Torrance CA 90505

HANGAR DOORS

ME latest

Got the dates noted from 30th December to 7th January? The ME Exhibition at Alexandra Palace is lined up, ready to go. Plenty to see; plenty to do. Dave Rawlins of DPR Models will run his DPR Model Flying Championships as detailed in What's On (opposite page); and Thursday 4th January is the day set for our Model Fun-Fly, from 10am till late (Thursday is the Exhibition's 9am finish). All sorts of Indoor demos and free-for-all slots. Fancy taking part? Let us know!

...and the F/F Forum

There will be a F/F Forum at the time of the ME Exhibition, but not at Alexandra Palace because the Lonsborough Room (scene of last year's gathering) is not part of the Exhibition arrangements this year. Nevertheless, Newham Beaumont tells us that the new venue is the Raglan Hall Hotel, Queens Avenue, Muswell Hill, London N10 - just fifteen minutes walk from the ME. Date and time is 30th December at 3.00pm (guides available from 2.30pm at Ally Pally). The agenda:

Mike Woodhouse: How not to stall
Steve Philpott: F1E Magnet Slope Soarers
Per Finahl: Aspects of F1A
Jim Baguley: Wakefields
John O'Donnell: How to win

Plus question time and a mystery contributor! Newham suggests a 'pass-the-hat-round' £1.00 contribution. More gen from Newham on 01-393 4398.

Anniversary invite

John and June O'Donnell extend an invitation to celebrate their Silver Wedding at a special Champagne Fly-In plus Aeromodelling Party, to be held from 8.00pm on 30th December at the Raglan Hall Hotel - to match up with the F/F Forum announced above.

Buffet tickets will be £7.50 per person; pre-entry as soon as possible is requested. Contact John direct on 061-427 3711. Bring your lady timekeeper - or even your fetchermites!

New at Old Warden

One or two changes for our 1989 programme of model flying at Old Warden. Season's opener is a new event - the ASP Design Model Flying Day on 29th April. Eligible aircraft are all those in our Plans Service, including the X-List of vintage or superceded designs. Clearly, this has the makings of a fine fun-fly event for all-comers at this super venue, so sort out a favourite and get building! Actually, we reckon that every model flyer must already have at least a couple in the workshop, so dust them off too. Look out for more news - but remember, this is a general fun-fly for all types of models and modellers.

'Mother brought the roof-rack to carry the aeroplanes!'

Above: Terry Rose's view on the ME! Below left: A famous Aeromodeller duo - McGillicuddy and Drambuie. Peter Spence discovered this notable brew of Schnapps on a recent Wardair flight. The Drambuie is a standard miniature...

Other dates are as noted below. One important change, particularly relevant to Vintage Weekend, concerns 'car-boot trading'. We recognise that swapping and dealing in old engines, kits and mags is an integral part of such meetings, and deserves treatment as a positive asset. For the '90 season a special area, or swopper's corner, will be set aside particularly for this activity, and, of course, no charge will be made. Flavour of this ASP 'Collecto' depends on the participants but it is meant to benefit enthusiasts of the old or unavailable.

Rest of our Old Warden menu is familiar and comprehensive. Diaries out now!

29th April: ASP Designs Model Flying Day
20th May: ASP Large Models Fly-In
23-24th June: ASP Scale Weekend.
15th July: ASP Golden Era Model Fun-Fly
18-19th August: ASP Vintage Weekend
15-16th September: ASP Four-Stroke Weekend
Great weather booked - so see you there!

Fly safely

In connection with the above, we'd like to remind all model fliers (at Old Warden and elsewhere) that safe flying in our crowded airspace is a common-sense essential. Given that accidents do happen, the chances must be minimised as close to zero as possible.

We heard of just one incident that needs a touch of investigation. While preparing his own F/F model at Scale Weekend, Don Coates was unfortunately hit by a low-flying craft, believed to be of Colonial Skimmer type,

necessitating a hospital visit for repairs. We do need to know the identity of the other enthusiast involved, really to check just a few routine details. All that's needed is a swift telephone call to us at Aeromodeller; that is, on 0442 66551. Thanks!

Stateside Assistance

Got a Humbrol CO_2 motor - the one with the tank as part of the motor mount? One you don't want, that is? Thomas Odgen writes from New York requesting such an item, with charger too, please. We'll pass on details - various trades are offered, mostly of the .049 glow type...

Aeromodelling effects

Executors are selling the late Vic Dubery's aeromodelling effects. Ron Knight tells us that a list is availble under the following headings: models and kits, scale models, plans, aircraft plans, materials, model magazines and books. Interested? Please apply, with SAE, to Ron at 14A Enmore Gardens, London SW14 8RT.

WHAT'S ON

28th January
CRAWLEY INDOOR MEETING
Venue: Crawley Leisure Centre, Hasiett Avenue, Crawley. HLG, EZB, Peanut Scale CO, and Open Rubber Scale. Contact: John Dolding. Tel: 0293 510272.

4th March
SAMS INDOOR FUN FLY
Venue: Watford Leisure Centre. 10am start. Fly for fun all day! Contact George Wallbridge of SAMS on 076 388 384.

29th April
ASP DESIGNS MODEL FLYING DAY
Venue: Old Warden Airfield. Contact: Aeromodeller Tel: 0442 66551.

20th May
ASP LARGE MODELS FLY-IN
Venue: Old Warden Airfield. Contact: Aeromodeller Tel: 0442 66551.

23rd-24th June
ASP SCALE WEEKEND
Venue: Pld Warden Airfield. Contact: Aeromodeller. Tel: 0442 66551.

15th July
ASP GOLDEN ERA MODEL FLY-FUN
Venue: Old Warden Airfield. Contact: Aeromodeller.

30th DECEMBER - 7TH JANUARY
59TH MODEL ENGINEERING EXHIBITION

New Year's Day 1990 - All the details - DPR Model Flying day at the 1990 ME!

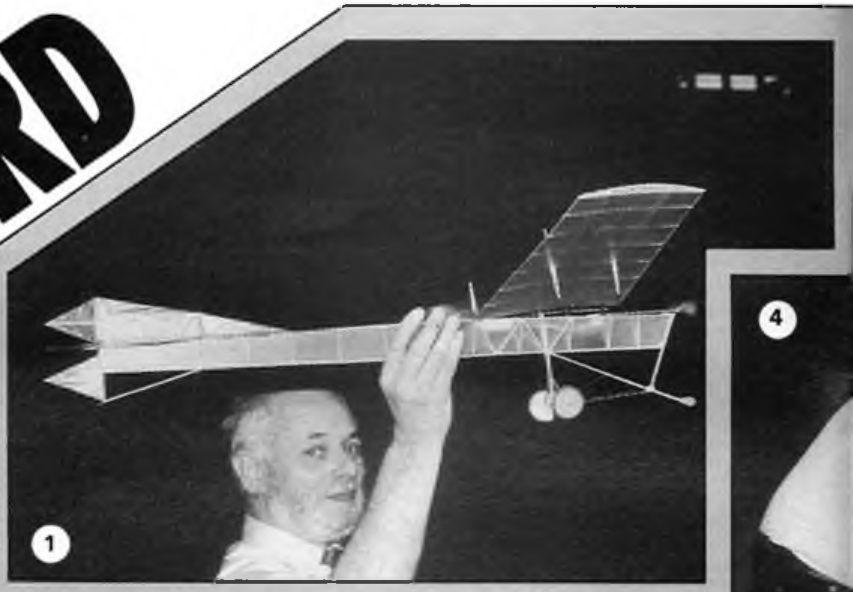
'HIT THE KIT' COMPETITIONS AT 11.00 am — 1.00 pm and 4.30pm
If you are under 13 years old, you can enter these events on the day! Score a direct hit on one of the D.P.R. Model may be used. (NO catapults to be used) Build a model and bring it with you - or make one on the day!

2.00 JUNIOR 'SUPERFIGHTERS
Another event for the under 13's using the Slot-Together rubber powered 'SUPERFIGHTER' models. Choose a SPITFIRE, HURRICANE or MUSTANG which can be assembled in a matter of minutes on the day!
SUPER PRIZES TO BE WON FOR THE BEST FLIGHTS

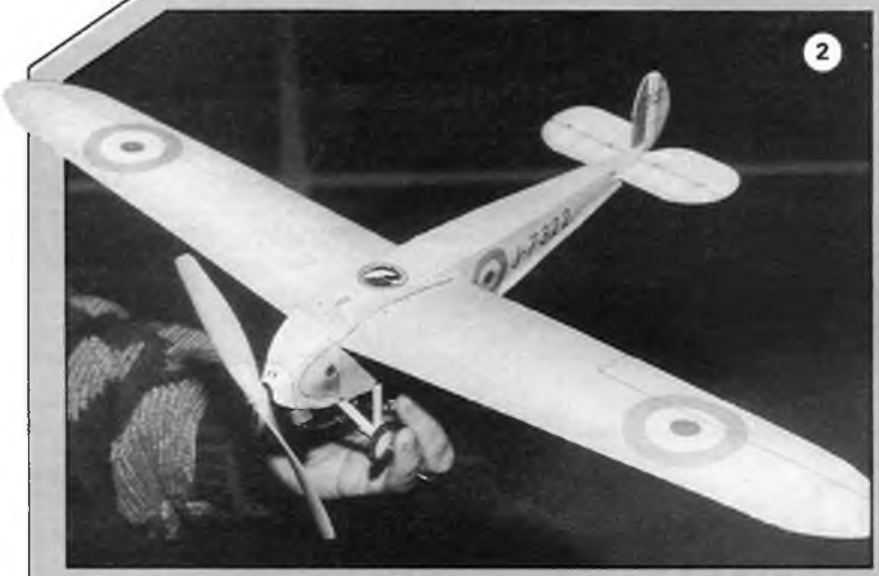
2.30pm JUNIOR & SENIOR 'NATIONAL CHUCKIE CHAMPIONSHIPS'
Anyone can enter this indoor duration event using D.P.R. Models high performance 'CHUCKIE' hand launched gliders kits are available from your local model/toy shop or direct from D.P.R. Models and may be built in less than an hour. FREE ADMISSION TO THE MODEL ENGINEER EXHIBITION FOR 'CHUCKIE CHAMPIONSHIP' COMPETITORS

Contact DPR Models at The Vanguards, Shoeburyness, Essex SS3 9QY + SAE for entry form!

FUN FLYING AT WATFORD



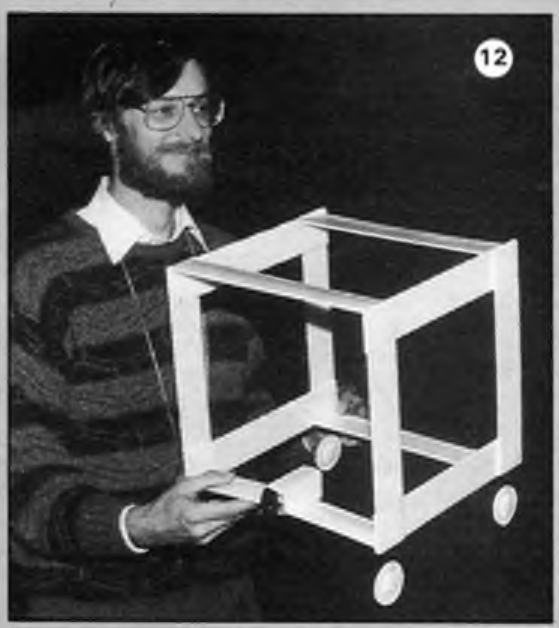
1: Gentle-flying electric Antoinette by Peter Weller impressed everyone. 2: Tom Kingston's Telco-powered Avro 560 from the Paper Planes book. 3: Willard Wiggan also flies this mylar-covered lightweight in his living-room at home...



Another great medley of Indoor activity courtesy of SAMS' George Wallbridge on 29th October

4: Ever-helpful Simon Firth of Fly-Me Models about to release neat mini-Korda. 5: New to Indoor, Ian Wood, flanked by son Alex and daughter Evangeline, with Union Cessna, Bentom Spitfire, and a selection of Fullers Fun Fliers had loads of fun!

6: Butch Hadland eyes up the tail of his splendid Westland Widgeon rubber job – flies as if on rails. 7: Bob Brown enjoyed himself with Sleek-Streek-propped EZB.



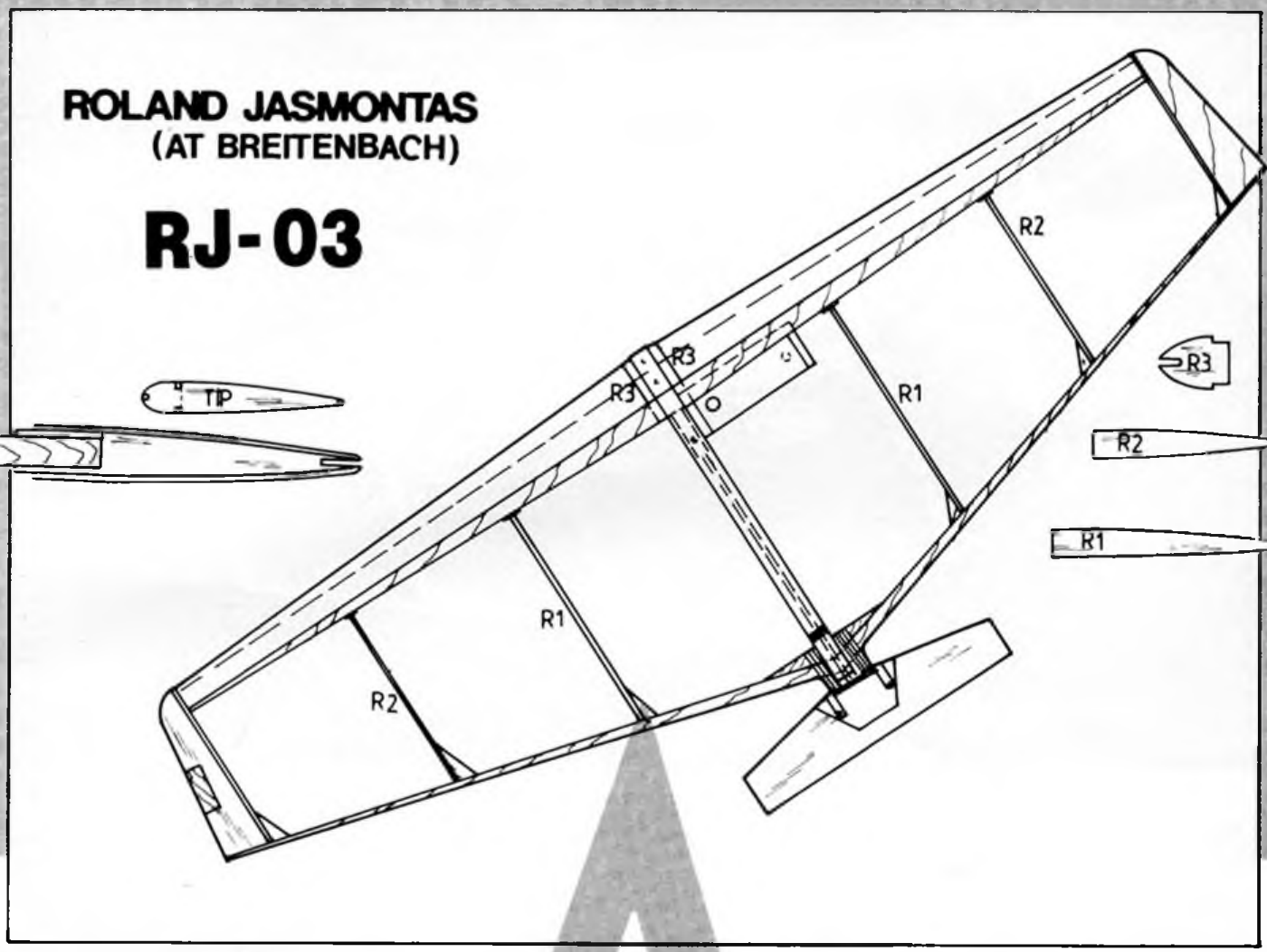
uperdrug shop wrapper overs Mark Bees' Mini se – original built uring an episode of lackadder on TV! 9: ara Horsey Holds a obin James flying sh...

10: Electric R/C demos by Peter Frostick were popular. 11: New from Steven Midson, our Foam correspondent – 747 was stable and impressive. 12: It wouldn't be Watford without Robin James! Foam flying box is a Telco-powered showstopper. Robin also flew his R/C Electrolight, semi-scale Moth biplane.

RED

Dave Clarkson takes a world-exclusive look at a Russian combat trio – full-size templates and one-third-scale drawings at centre of magazine

Remarkable strength, speed – and, above all, manoeuvrability – has amazed all privileged to see Soviet combat craft in action; here Beliaev prepares his at the '89 Eurochamps.



STAR STRIKERS

AS we all know by now, *Glasnost* means 'open-ness' - and this is what this article is all about, for it is the first attempt here in the West to open for all everything about the best F2D Combat models in the world, those of the Soviets. Those of you who, in recent years, have had the privilege of watching these models in action know that they are as fast as any other in level flight, are faster and tighter in manoeuvres than any other, and are immensely strong. This year the Soviet F2D Combat fliers have travelled more than ever before here in Europe and so the opportunity presented to gather and analyse their wreckage has been taken. This article is the result.

What have we got

Presented here are the designs for three models, the FB-37 of Boris Faisov (current World Champion), the BV-255 of Vacheslav Beliaev (current European Champion) and the RJ-03 of Roland Jasmontas (1985 Eurochamps team member). The fliers come from very different parts of the Soviet Union; Boris from Novosibirsk in Siberia, Vacheslav from Leningrad in Russia and Roland from Vilnius in Lithuania, so we can conclude that their designs are not those of a small clique in the Soviet Union, but rather that they are of the best from throughout that vast country. In terms of Western European geography this is like studying the best models from Denmark, Holland and Italy.

Similarities

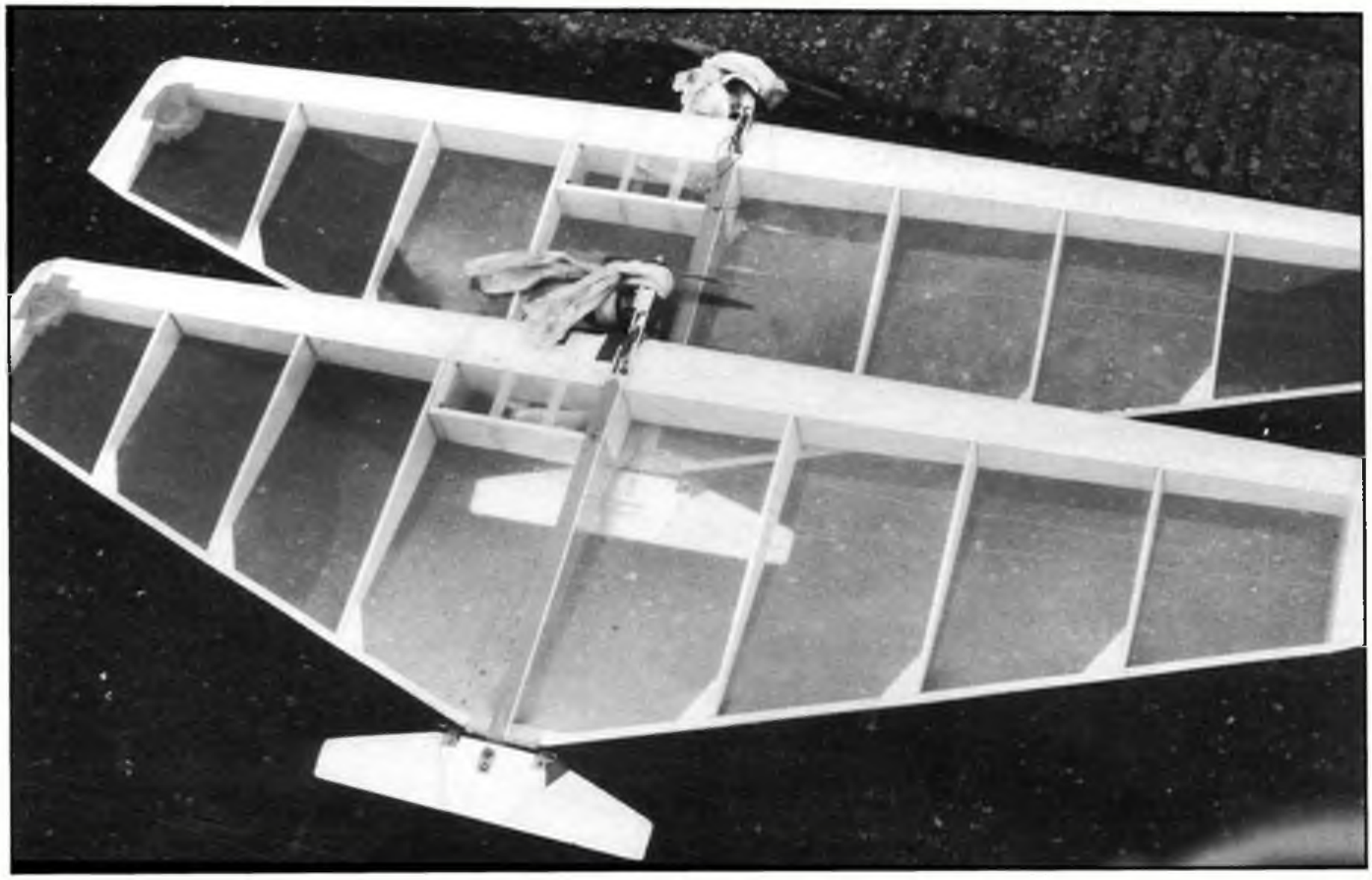
Considering that these models come from places so far apart, it is at first surprising that they are so similar. We know that a lot of Combat is flown in the Soviet Union, for they have the world's biggest F2D Combat contests and Vacheslav Beliaev has confessed to building forty of his immensely tough models each year; so perhaps this explains the similarity - they have developed in the most active Combat environment in the world today and it is for this reason that we should take them so seriously. I start therefore by reviewing their common features, trying to conclude the 'whys' and 'hows'.

The shape

By British standards all the models have relatively high aspect ratios and planform taper ratios. Why should this be? We have seen these models flying continuous loops and bunts of close to one metre in radius at speeds of around 100 kph. At a flying weight, including fuel, of more than 500gm, this means a lift generation of about 30kg. To do this without generating equal drag (which these Soviet models obviously manage) means that they are of very efficient aerodynamic design. I conclude that their high aspect and taper ratios are responsible for this. One other feature they all possess is very high structural stiffness without high structure weight; and the obvious explanation for this is high taper ratios. The evidence is that these Soviet models have the best shape yet used for F2D Combat models.

The structure

All three models are basically polyester film-covered softwood structures containing very little EPS foam and balsawood. Why so little foam? After all, the Soviet Union is third in the world in terms of EPS (expandable polystyrene) production; and hot-wire cut



Ken Miles snapped Beliaev's No. 1 models at the recent Breitenbach meeting - report next month. Note taped-on coins for tip weight and simplified tank compartment.

UPS foam is such an easy, cheap and fast way of making Combat models - as we Brits proved to the world in the SuperStar ten to fifteen years ago. The answer is that EPS foam has very little strength or rigidity - and you need both for that 30kg lift loading. Balsawood is similarly handicapped in Combat models with a more compelling reason for the Soviets to minimise its use being be cost and availability versus that of softwood in the Soviet Union, the world's biggest producer of softwood. We do not have a problem with obtaining balsa, but all Combat fliers have a model cost problem and softwood is cheaper than balsawood. High quality softwood like stika spruce has the highest strength/weight ratio of any wood, and when used in the intrinsically rigid, triangulated structures seen on these Soviet models their great strength is understandable.

So these Soviet models have strong, cheap and light structures but why are they covered in polyester film? And why is the EPS foam used - covered with paper?

First, the covering. Of the plastic films, polyester is the strongest per unit weight in all of the usually tested parameters (tensile, tear and puncture). Sensibly, the Soviets (and the Americans) use this material. Polyester films like ICI Melinex do not come already coated with adhesive; a 'plus' point, for on an open-structure model most of the adhesive coating would remain unused and would be just wasted weight. To apply Melinex the structure is painted with an adhesive such as Balsaloc or Balsarite which is then left to dry, after which the film is ironed-on and heat shrunk in the usual way. These adhesives attack EPS foam, hence the need to pre-cover with paper over the foam. Besides acting as an adhesive barrier layer, the paper also provides a heat block, preventing the high temperatures, needed to shrink Melinex, from penetrating and melting the EPS foam. I have little doubt that this paper pre-covering is used not just as an effective barrier layout but also for reinforcement. Vacheslav Beliaev obviously thinks foam surface reinforcement is important, for he binds his foam/pine leading edge assembly criss-cross fashion from tip to tip using Kevlar thread; and even that had ruptured on the wreckage of a model that I saw.

On the subject of strength-for-weight (which is what this section has been all about), I should point out that all models have tapered leading edge members, and in the case of Roland Jasmontas' RJ-03 model, tapered trailing edge members; and all use thread binding reinforcement around the centre-rib and around the trailing edge joint areas (12lb Dacron fishing line does the job perfectly). Builders of Combat models know that extra, unimportant work in construction is a no-no. Obviously, all this tapering and binding really pays off in terms of weight and strength - something any structural design engineer would tell you.

The systems

I cannot say anything about the motors these Soviets use apart from the fact that they are light, powerful and reliable. But then, so are the USE and Nelson motors used in the West; and flight testing of these in Soviet models has shown that we are not seriously handicapped by the motors we use. But these Soviet models are better in the air - so, why? The first answer is that these models are immensely rigid - you will not believe how rigid until you have handled one - and so the horsepower is not wasted in flapping and vibrating everything about. Secondly, the answer must be in the systems the Soviets use, like machined Dural motor bearers, for example; surgical tubing tanks and relatively small FRP props. Most British Combat fliers have already accepted that metal motor bearers and FRP props give better motor runs, but few have yet discovered the surgical tubing tank. The fact that such a tank can be contained entirely within the wing must be good from an aerodynamic point of view, but I suspect that the higher fuel pressure given by such a tank (compared with a pacifier) may be important when you consider that a combat model can switch suddenly from +60g to -60g in lateral acceleration.

Vacheslav Beliaev's prop is surprisingly small at 160 x 90mm. (6.1/4in dia x 3.1/2in peak pitch) with very narrow blades of 12mm (1/2in) max width. At the last World Championships in Kiev we Brits learned that our props were over-pitched at 4 to 4.1/4in peak dimension, and that the 4mm dia venturi rule had made prop selection very critical. Beliaev's prop shows how wrong we were. Still, after seeing John James' Nelson .15 FI SE motor turning Beliaev's prop at 29,400rpm static I remain sure that a bit more prop diameter might be beneficial.

Whilst on the subject of systems, I must say that certain features of these Soviet models really appeal to me. They mount streamer clips on the bottom of the model, bolted to the motor bearer and not (as we do) on the top. The 'model' man and the

'streamer' man thus work on opposite sides of the model and so cannot get in each other's way. Where we Brits bolt the streamer clip, the Soviets fix a bent wire fuel line clip that holds the fuel line tightly squeezed shut. Soviet pitmen start their motors on a prime, and when it chimes in they flick the fuel line out of this fixed clip. No messing round with bulldog clips that can get lost, dropped or forgotten.

It was the Soviets who introduced the external leadouts/bellcrank/pushrod arrangement seen on Beliaev's and Jasmontas' models. Notice the neat clevis pins they use to hold the bellcrank to their models, secured in place not by nuts (which can so easily get lost on the field when switching lines and controls from a damaged model) but by a wire clip on the end of the compulsory motor cable. Neat and smart. These guys really think about how to do the job the best way. Most who saw this apparently imperfect aerodynamic arrangement must have thought that it was the result of laziness; but notice the hole drilled in Beliaev's model's outboard wing tip to accept its bent wire line guide. We Brits were utterly gobsmacked when in Hungary we first saw his pitman switch the line guide from his model's smashed inboard wing to its still-whole outboard wing and relaunch to win the bout. Models finishing bouts with no outboard wing are common enough but to do it with no inboard wing was unknown before then. Brilliant! Frank Smart would have loved that one.

Finally, on the subject of systems, notice the elevator hinging arrangement on these models - quite the simplest devices I have seen, allowing really quick-change elevators. Their pushrod connections are equally well thought-out as explained below.

So what are the differences between these designs? How could they be improved? Not being a combat flier myself I can only point out that (compared to the wood available to us) these Soviet models are built out of poor quality stuff. Even their glue seems to be inferior, for it appears to be soft, pliable PVA that peels away from the wood rather easily. Not a drop of aliphatic or cyano appears to have been used. I have little doubt that using our wood and glue would result in stronger, lighter models.

As to the differences, Beliaev's BV-255 is the biggest at almost 33sq.dm (510 sq in) in total area; Jasmontas' RJ-03 is the smallest at almost 29sq.dm (450 sq in), with Faisov's FB-37 in between almost 30sq.dm (460 sq in). The FB-37 has equal span inboard and outboard wings whilst the BV-255 has 20mm asymmetry - the RJ-03 even more at 25mm. In other words, zero to moderate wing asymmetry. Line rake is, similarly, small to moderate levels with the BV-255 the least with front line guide holes at three degrees; then comes the FB-37 at four degrees followed by the BV-255 (using its rear line guide holes) at five degrees, followed by the RJ-03 with the most at six degrees. By British standards, these are all of small to moderate amounts, and when doubled with zero to moderate wing asymmetry, as revealed above, even the heavy wood outboard wing tips used on all models could mean less than perfect upwind performance in our weather. I conclude that the wind never blows in Novosibirsk, blows rarely in Leningrad, but sometimes does in Vilnius. Both Boris Faisov and Vacheslav Beliaev had to tape on outboard wing tip weight at the 1989 Euro Champs at Three Sisters, showing that more line rake and wing asymmetry would benefit their designs in our conditions. No combat flier likes tip weight for it is wasted weight, and in placed in a bad place from a structural point of view. Only Roland Jasmontas' RJ-03 looks as if it would be problem-free in our wind conditions. The only other significant point of difference is the amount of centre-section reinforcement at the trailing edge with the RJ-03 having the most, and the BV-255 very little. Interestingly, it was in this area that the BV-255 I saw had suffered major failure.

Conclusions

My conclusion is that the RJ-03 is the most suitable for our conditions. If built from our woods and glues, it would turn out slightly nose-heavy with a Nelson. Obviously the Soviets design their models to be slightly nose heavy because all had been trimmed out by adding tail weight. Bearing this in mind, it would be my guess that a slightly enlarged RJ-03, with perhaps 10mm or more on the inboard and outboard wings and on the centre rib (increasing the total area by 1sq.dm to almost 465 sq in) with a USE using a Beliaev prop, or a BV-255 with an RJ-03 trailing-edge centre section (and therefore increased root chord) and 5mm shorter outboard wing (thus keeping the total area about the same) plus leadouts 15mm further back at the tips with a Nelson FI installed would both be formidable here and could wack foamies at a rate that would make even Mike Whillance wince.

So these models have very different aerodynamic designs, have very strong and rigid structures, are equipped with very well thought out and effective systems, and could be adopted to our materials and motors using only small changes. By following this Soviet lead we could have what we once possessed 10 years ago - the best F2D Combat models in the world; but many of you will be wondering just how to build one warp-free? This last point is important for (as has already been discovered by builders in this country) if you build a warp into one of these Soviet designs, you will never get it out - they are that rigid. The obvious answer is a great big jig that enables the centre rib/leading edge assembly to be put together straight and true. Also needed is an alignment jig to enable the ribs and the trailing edge to be added with no built-in warps. Another requirement is a cutting jig for the EPS foam leading edge members; these are relatively flimsy, and unless held firmly along their span in a jig, they will waggle horribly whilst the spar and leading edge slots are being cut. A quick trip to B&Q for 1.8m of 50 x 25mm softwood plus some 12 x 6mm ramin strip will produce these jigs but, in combination with the production of foam, rib and gusset patterns, makes for a lot of preparatory work. I suspect that the Soviets are as advanced in their jig technology as they are in their design, structure and system technology; and this is one area which still needs work in this country for we are EPS foam cutting experts. Worthwhile work I suspect, for good jigs must be in Beliaev's workshop to enable him to turn out forty models per year and to have produced, by now, in excess of 260 F2D Combat models.

Contact!

I finish this article by giving some important addresses for suitable materials for these models in casy any of you want to have a go at, the best F2D Combat models in the world.

Moulded nylon elevator retainer wire clips, horns, bellcranks and Beliaev props:
Aerocomputer, Dept of Model Aeronautics, Ulitsa Sezhinskaya 4, Leningrad, Soviet Union.

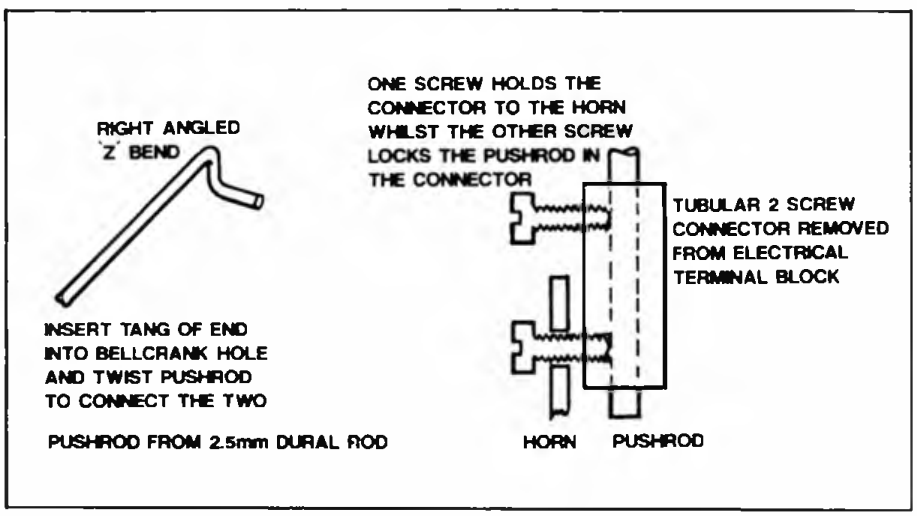
25 micron Melinex film:
Ken Miles, 2 Pollit Croft, Romiley, Stockport, SK6 3EL.

48in lengths of Sitka spruce, 12 x 3mm (for sapars), 20 x 3mm (for leading edges), 8 x 5mm (for trailing edges) and 20 x 5mm (for trailing edge gussets and extensions and for outboard wing tips):
The Balsa Cabin, Unit 5, Mill Lane, Fullbridge, Maldon, Essex, CM9 7LD.

Lastly...

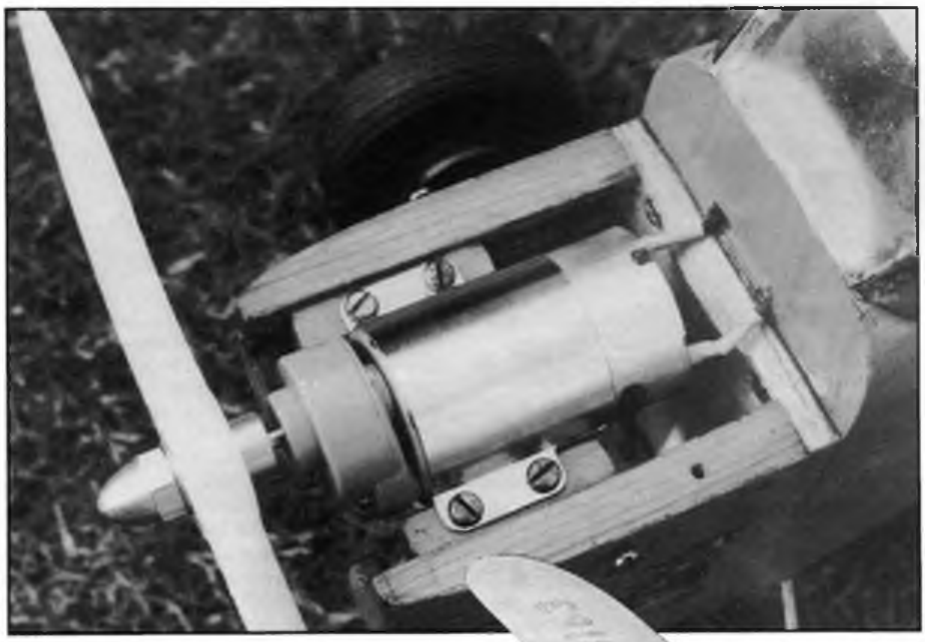
I have gained the firm impression that Combat is an event subject to design revolution, not evolution. The first that I can remember is the Vernon Hunt Warlord era in the mid-60s, which had every serious Combat flier then choosing virtually identical models. The next was the Richard Wilkens Super Star foamy revolution in the late 1970s that changed Combat to the form we know today. Are we now to have the Russian revolution? I am sure that even the combined brain power of Lenin, Stalin and Gorbachev would fail to understand that no other Russian revolution could work here...

Bellcrank and horn end of pushrod. Soviet style. Screwed connector prevents pushrod rotation (and thus the danger of disconnection at the bellcrank). Pushrod adjustment - or removal - also easy to arrange.



High potential

Move over for Chris Coote's monthly analysis of electric flight matters – this time, with the accent on motor mounting



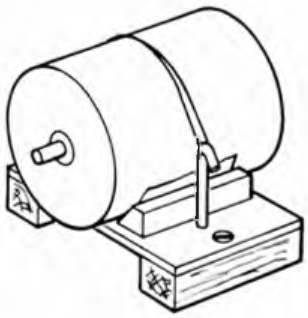
Engine bay close-up of 60in Halfax Spartan (shown ready-to-go, below) reveals Graupner 600 geared motor. Total model weight is just 36oz!

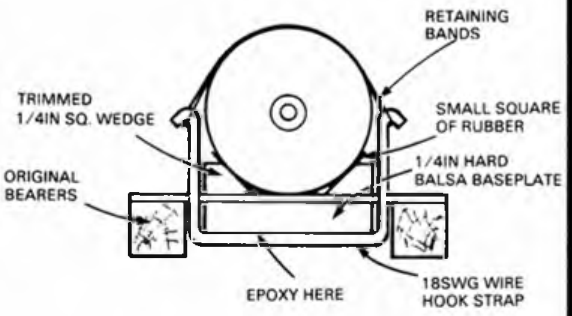
THIS month I want to answer a few questions that have arisen over the summer months concerning motor mountings and prop adaptors. Quite a few of you out there seem to be wanting to try out electrics with motors that you already have, but in an unconverted state. The two basic requirements are, therefore, how do you attach it to the model, and how do you fix a prop onto it?

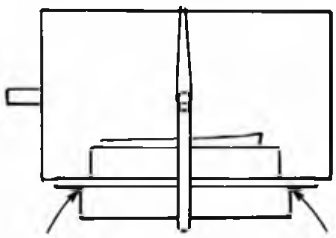
Let's deal with the basic motor mounting first. There are several ways of doing this, some more crashproof than others. I always like to incorporate a bit of flexibility in the mounting, so that in the event of a sudden arrival the mounting gives a bit and perhaps saves the propshaft or adaptor from being bent. One of the advantages of electric power is that smooth and vibration-free power is delivered (assuming you have balanced the prop!). This means that flexible mounting does not have to restrain the motor overmuch, and a simple rubber band type arrangement is OK for all but the largest installations.

Fig. 1 shows one of my favourite methods, which can usefully be applied to converted models as well as those purposely designed for electric power. It consists of a flat ply or balsa plate onto which are glued a couple of hard balsa wedges. A couple of wire hooks or a simple single piece of wire bent into a 'U' shape with hooks formed at the tops of the legs of the 'U', is attached so that they sandwich the motor case neatly between them. A small square of rubber sheet cut from a cycle inner tube or an old kitchen type rubber glove is laid into the recess formed by the gap between the two wedges, and the circular motor case dropped on top. A simple wrapping of rubber bands from hook to hook then retains the motor easily, and the small scrap of rubber sheet provides enough friction between motor case and mount to stop any rotation. The bands do not need to be very tight, thus giving a good degree of crash protection. The basic mounting plate can be either glued in between or on top of existing engine bearers or, if of ply, can be drilled and attached with a couple of screws to hardwood inserts in the model. A mounting of this type using a 1/4in balsa base glued between the original bearers is the system I have used in my conversion of the 43in span Fly Baby for either a HiLine or MFA 02 motor. An advantage of this method is that motors of similar case diameter can be easily substituted, and the thrust line can be altered by simply inserting bits of packing at either the forward or rear edges of the base plate. A similar method is shown in Fig. 2. In this case the 'engine bearers' are arranged sufficiently close together so that the motor can sit in their chamfered edges to be restrained by a band, or a dowel can be glued under the bearers and the bands passed just over the top. Again a scrap of thin rubber sheet will assist in preventing unwanted motor rotation. There are many other possibilities; the concept of strapping the motor to a trough is a good one to follow. The Acoms geared unit uses exactly this method. Yet another variation on this theme is shown in Fig. 3. In this case the motor is dropped into a rectangular shaped cutout in a ply or aluminium plate. The cutout is sized such that the motor will not drop through it. Retention is then once again by bands passing over the top of the motor from hooks

Fig 1

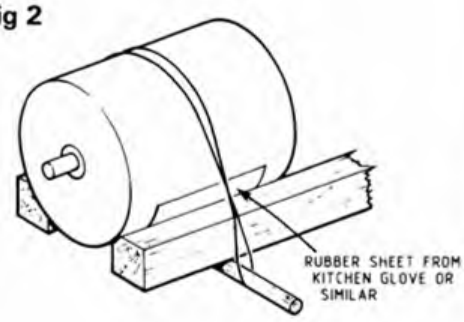




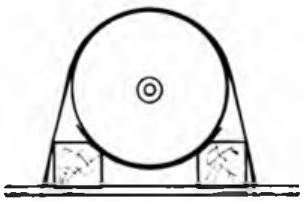


PACK BETWEEN HERE FOR THRUSTLINE ADJUSTMENT

Fig 2

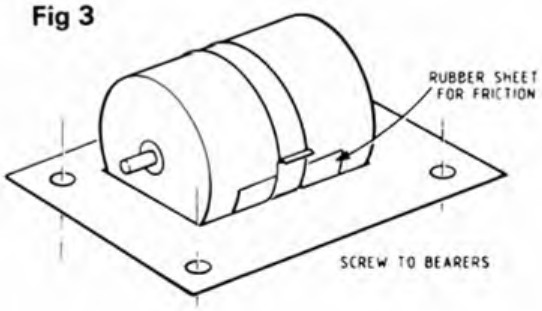


MOTOR SITS ON CHAMFERED ENGINE BEARERS. DOWEL GLUED ACROSS UNDERNEATH HOLDS RETAINING BANDS



RUBBER SHEET. FOR FRICTION TO STOP TORQUE ROTATION

Fig 3



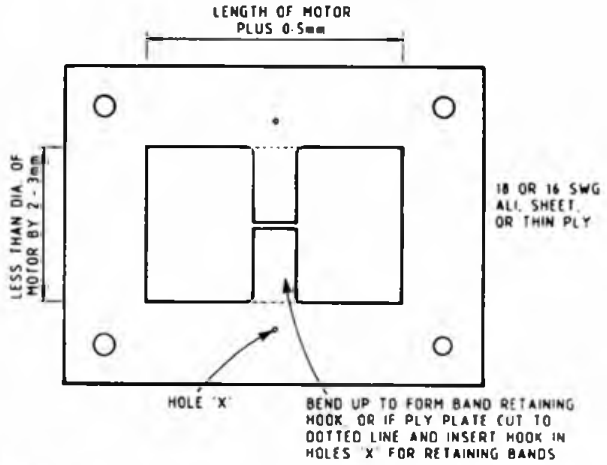


Fig 4

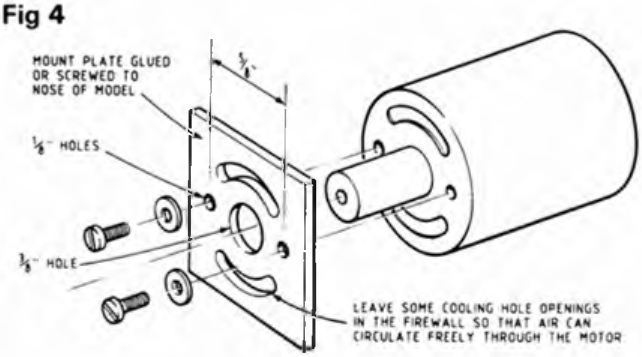
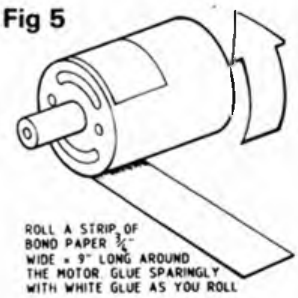
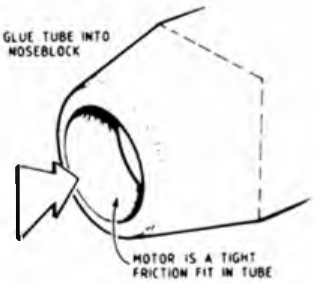
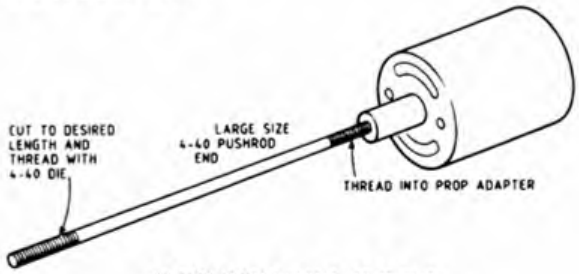


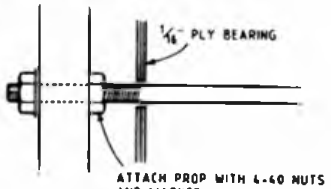
Fig 5







AN EASY EXTENSION SHAFT CAN BE MADE FROM A DUBRO THREADED PUSH ROD END



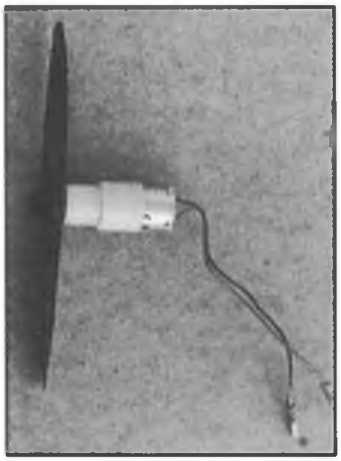


Fig 6

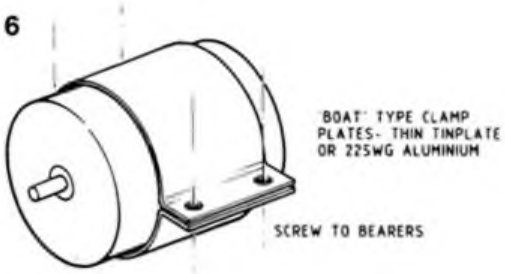
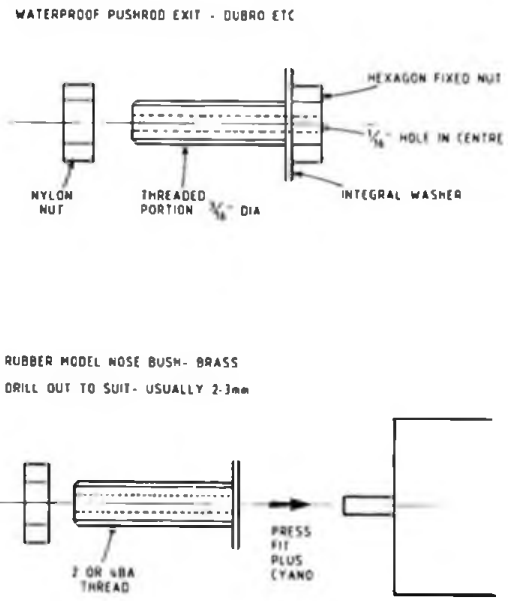


Fig 7



Above left: HiLine Imp comes with prop adapter or brass pinion. 360 size motor takes 30 watts. Left: VL products HY 42 geared 280 motor with special 7x4 prop.

either side of the cutout. If thin alloy sheet is used the hooks can be formed in one piece from the central material of the cutout (see sketch). The plate can then be drilled and mounted just like a conventional beam mounting engine, or simply glued in place so that it can break away in a crash.

Tap it out

Many of the motors that we use come with a couple of tapped mounting holes in the front of the case or can. These are invariably to be found on either side of the ouput shaft and are usually tapped out to a small metric thread. If a removeable prop shaft adaptor is being used, it is a simple matter to make up a thin ply front bulkhead with a central hole for the shaft flanked by two clearance holes for the mounting screws. You have to be careful to make these screws just the right length, by cutting or packing with washers, so that the screws do not go so far into the case as to foul the rotating armature. Remember that the armature will move forwards under the influence of the prop thrust, so check it in this condition. With this type of mounting it is advisable to cut some extra holes in the bulkhead to allow a direct blast of cooling air from the prop to get into the motor casing. Although not possessing any flexibility for crashproof protection, at least this method allows the stress to be concentrated on a strong point in the fuselage design! Fig 4 shows the basic idea.

An early recommendation for motor mounting was a suitable tube into which the circular motor can was a good friction fit. The tube can be simply made by wrapping the greased motor case with a winding of glued paper strip. Once dry the motor can be extracted and the tube glued firmly into the front of the model. Motor mounting is then simply achieved by shoving into the front of the tube, sometimes with a piece of thin tissue to increase the tightness of the fit. Thrust line adjustments are not possible with this method, and it also tends to obscure the brush cooling slots cut in the sides of the motor casing. However, it must be about the fastest way to make a motor change! See Fig. 5 for an example of this.

For those with a 540 or 550 type motor to mount, the easiest way is to buy a ready made plastic item such as that sold by electric R/C specialists Mole Technology. This consists of a short tube into which the motor can be pressed and fixed at its front end by short screws into the front of the motor case (as in front bulkhead mounting above). The tube has integral beam mounting lugs which can then be fixed, as usual, to engine bearers. See enclosed photograph for illustration. Some model boat shops sell mounting plates which clamp to top and bottom of the motor case and provide beam mounting type lugs. These can be home made from thin aluminium or tinplate materials - see Fig. 6 for details.

Prop it up

Now for a few ideas on prop adaptors. These are available commercially for the larger motors from companies like MFA, SLEC, and Mole. They all comprise an alloy turning with a threaded section grub screwed to the motor shaft. Some, like the MFA, come with a simple hexagon nut to hold the prop on; others, such as the version from SLEC have a rounded safety spinner type nut. These are all fine for 380 and larger motors (some like the bigger Graupner motors with 4 and 5mm shafts will require the adaptor to be drilled out a little). However, it is the smaller sizes that give us a problem. One solution is to look around at the wide variety of fittings available for radio control linkages, and especially those for boats as well as aircraft. One that I have discovered is a range of waterproof pushrod exits (or bulkhead fittings). See Fig. 7. These comprise a nylon, threaded bush with a central hole which is a nice tight push fit on the 3/32in shafts of the smaller 140 and 260 type motors. The ones I have were made by the American firm of Dubro and were spotted by our US correspondent, Phil Stanson. I also use nylon nuts and bolts in both 4BA and 2BA sizes, with holes drilled as shown in Fig. 8. The advantage of using nylon rather than brass or steel is that apart from the weight saving, the actual hole size to fit the shaft is much less critical than with metal. The nylon will expand a little if an undersize hole is used to give a good tight fit in the shaft. If you file off the head of the bolt to a smooth surface and carefully centre punch the resulting flat surface, drilling by hand with a hand brace is possible as long as you hold the bolt between the screw thread yet give a firm grip on vice. The balsa will protect the screw thread yet give a firm grip on the bolt. Of course those with access to a lathe can knock out drilled bolts at a rate and supply the rest of us. I recommend that you make friends with some model engineers! For those who want a metal version then the traditional brass rubber model nose bush can be used if drilled out suitably and either press fitted or cyanoed onto the motor shaft. If you cannot get such old-world-type aeromodelling accessories in your local shop then I suggest you write off for a catalogue of such items from one of the specialist suppliers like SAMS or Fly-Me models.

For the ultimate in simplicity you can just push fit a prop direct to the shaft. This is possible with the KP and Peck range of props, as well as the excellent Williams products. However, what do you do with a prop with too big a hole? Well, one technique I have used, which worked quite well even on high powered 380 type motors, is to push a piece of 1/16in bore PVC or similar fuel tubing on the shaft for only 1/4in leaving an inch or so hanging off the prop hub. The whole lot is then put into the vice taking care to keep it square, and the prop/tube insert pressed onto the shaft. The tubing will compress and squeeze out a bit but the prop will be firmly jammed onto the shaft. Like a lot of things that we do it's crude, but with the low power we use, it works! See Fig. 9 for the general idea.

Fig 8

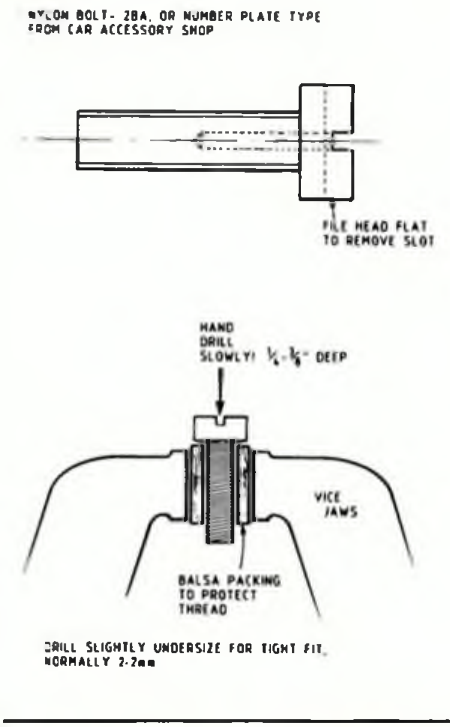
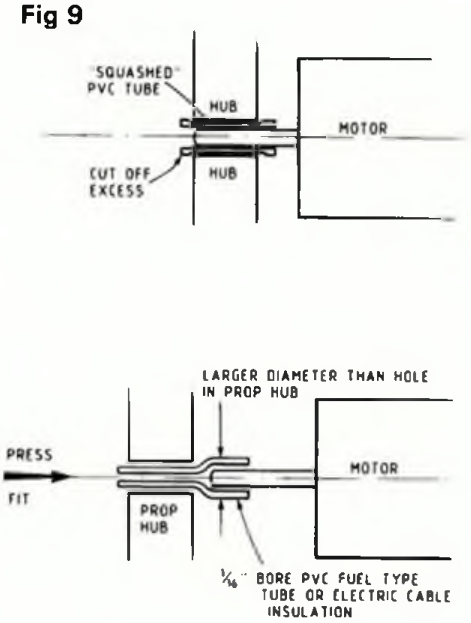
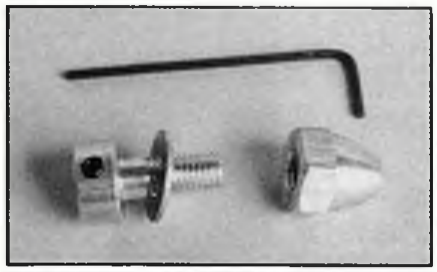
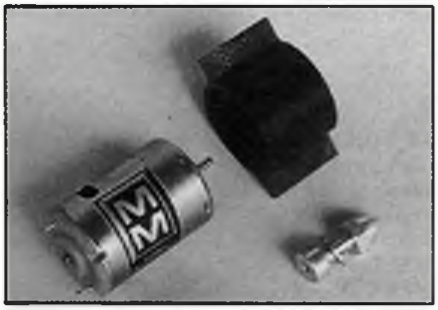
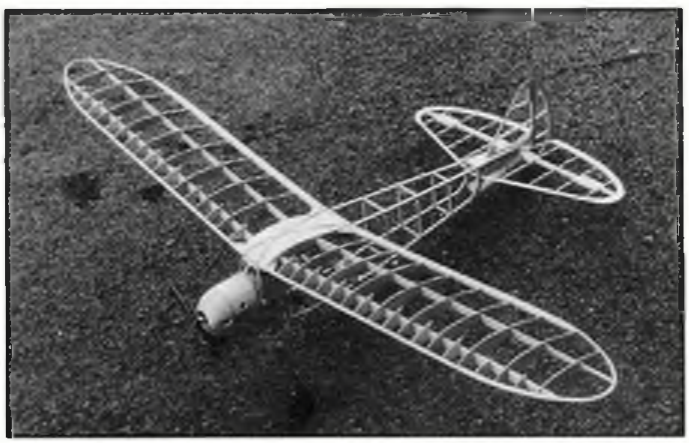


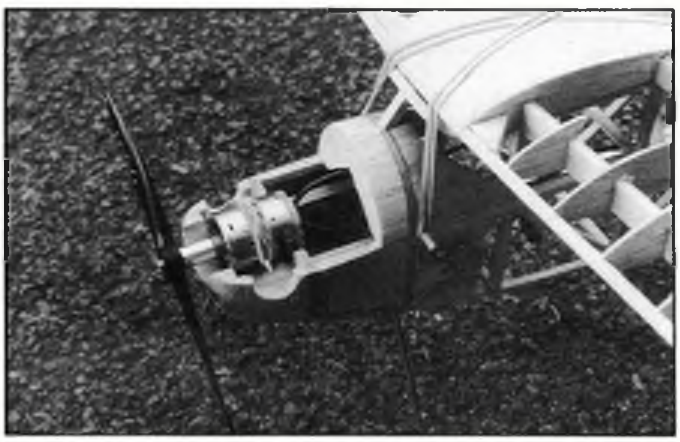
Fig 9











Trio of photos, above right, shows powerful Graupner 600 motor, special mount and prop adaptor. More on this attractive unit next month... Above left: Uncovered Vintage Fly Baby is 43in span; just right for HiLine or MFA 02 motors. HiLine is installed in this version - note simple 'banded-on' mounting at right.

The HiLine highlife — again

I have mentioned the American company HiLine several times in previous articles. I am pleased to be able to report that I have at last managed to obtain some samples of their products which are aimed very much at the small end of electric flight. They have in fact been in production for some time with the smallest motors, which are very similar to the KP01 available here in the UK. However, they have recently introduced a larger motor for outdoor free-flight, which is of much interest to yours truly, since I have mourned the passing of the old style Astro 02, which to my mind was the most useful sized electric system for general free-flight, and this new motor is very much akin to to the old Astro. All these motors are based on what is known as a 360 sized motor case. You can buy a Mabuchi 360 from MFA, but it will have to be rewound to make it of any use for flight. The new HiLine 'Imp' motor has a hefty winding of about 22swg wire and is set up to run off three cells only (see photograph). These can be as small (and light) as 150mAh, but the motor takes up to 9amps on load, so 270mAh cells are more realistic for a reasonable duration. The motor is available either with a brass pinion or a simple alloy prop adaptor. The recommended prop sizes for direct drive are from 5 x 3 to 6 x 4. The larger props should only be used on lower power setups if you want to avoid burning the motor out! HiLine do say that for contest type performance four cells may be used with a small high-revving 5 x 3 prop, but only if the motor run is limited to around 20 seconds via a timer. This, it is hoped, will prevent the motor from getting so hot that it melts the rather weak soldered commutator connections. Better quality motors have crimped connections to the commutator (such as the lamented Astro 02) and can take more heat and therefore power. Having said all that, this is a very useful addition to the range of commercially available motors, and my initial tests show it to be at least as good as my favourite home rewound Mabuchi 360.

Indeed, so pleased was I with the initial tests, which showed a potential of 11,000rpm on a 5 x 3, that I set about installing the motor in a vintage 'Fly-Baby' model. This is quite a big 43in span high wing cabin model with about two sq ft of wing area. The total flying weight with four 270mAh cells on board is around 15oz, so this is quite a load for the 'Imp' which is quoted by Highline as being suitable for models up to 300sq. in. areas and 10oz weight. It is a Vintage model with inherently gentle flying characteristics, so I am hoping that the combination will be OK. An advantage of the type of installation I have chosen to do is that it is very easy to change the motor for a standard 380 type which is slightly larger and more powerful. Indeed the standard MFA 02 motor which I have detailed before is more than powerful enough for a 20oz model, so would give the 'Fly-Baby' a real contest type performance! A photograph of the uncovered model is shown as a tribute to the original builder, fellow South Bristol clubmate and vintage enthusiast John Down. He was going

Continued on p.52

Flying as you oughta- in Mallorca

September sunshine for the second Mallorca

International Dick McGladdery reports

RUN on 23/24th September by the Mallorca Model Aero Club, with substantial backing by Sol Hotels SA, this second Mallorca International was once again favoured with superb weather; calm, sunny and hot. Possibly as a result of my report on the '88 International, this year's event was even more heavily supported by the UK, with a total of 35, including supporters. Most stayed a week or more, taking the opportunity on the non-contest days to soak up the sun, explore Palma and inland, or in my case, to get acquainted with wind-surfing. I was greatly aided by Rob Metkemeijer, who is pretty good at this rather energetic form of masochism, and he saved me a lot of unnecessary thrashing about...

The competition was staged in part of the Aquapark car park on the outskirts of Magaluf. The surface was very good except for a couple of manhole covers, but these could be avoided with care. One of the perks of entering the competition was free entry to the Aquapark itself (see last year's report) and also to the nearby 'El Dorado', a replica Western township which staged a bank-robbers versus townspeople tableau, followed by an Indian raid - horses and wagons dashing up and down the sandy street, animated war-whoops and much shooting of handyguns and rifles; two complete performances a day, well done and much appreciated by visitors, especially the kids! All this was within easy walking distance of the Sol Hotel Don Manolo where the contestants and supporters were accommodated. This was not only convenient, stunning value at £19 per day, half-board for a single room (double cheaper per person), comprehensively equipped with a useful-sized swimming pool and patio with a barbeque dispensing appetising lunches, a roomy and comfortable bar and lounge where free evening entertainment was provided (discos, cabaret and audience-participation shows which were a bit risque and rude, but harmless fun) and all rooms have their own balcony, basin, WC, bidet and shower or bath. The food was super, too; a buffet-style breakfast and dinner with a huge selection of appetising dishes - there were at least twenty different sweets in the evening. I think everyone was very impressed with this package; many have already determined to come again for next year's international on the 22/23rd September 1990. A week is no more than a taster of Mallorca's attractions, so many were talking of extending next year's stay to at least a fortnight.

The contest

In the contest, the programme included speed, team racing and aerobatics, but in the last case, all but one of the promised entrants failed to arrive for sundry reasons. Claus Maikis made the trip, however, and brought a smallish semi-profile model, brightly decorated and powered by an Enya 35 fourstroke. Though it was not really a contest, Claus made three flights which were judged and scored, as much to please the spectators as anything else. Sadly, the organisers feel they cannot justify inclusion of aerobatics in the 1990 programme - this will be a pity, though it might be averted if sufficient aerobatics fans could organise themselves and promise, say, at least five firm entries. Over to you, chaps.

GB's Colin Brown in Team Race action, releasing at left; and above, the model's away!

Halman highlight

In speed, Peter Halman provided the meeting highlight with his second round flight of 302.26kph - that's about 188mph - the highest speed recorded in any international to date. Peter used his lightweight Russian-influenced model with integral tailboom and 120mm wing, with a stock Irvine 15R dremelled in sundry places and with modified induction timing; the pipe was standard Irvine 15 with a 4.6mm tailpipe, and the prop was 7.5mm radius x 6.3in pitch, of Peter's own make. Peter reckons his mods have dubious value as regards power output and what really counts is the piston/liner fit. Getting an ABC to perform like this is a hit or miss affair, and the only way to find a goodun is to try lots of them. Running-in of new liner/piston sets is critical, and as the Irvine leaflet advises, the engine should not be bench-run at full power of the pipe for any longer than is absolutely necessary to obtain a tach reading - five or ten seconds at the most. Any longer than this, and the engine may overheat and distort - not visibly, but subtly.

Fiddling with the needle while the engine is on full honk prolongs 'on power' running for too long, so always pre-set the needle, take tach reading when the engine is up to power and then shut down immediately; if the needle is apparently in need of adjustment, do it while the engine is stopped, restart, tach, and shut down again. We usually shut down by partly covering the carb with a thumb or finger so that the engine richens up and 'falls off the pipe', then pinch off the fuel tube; this lets the engine down gently, and it will usually stop over-rich or burble off gently as it uses up the mixture in the crankcase.

Peter's performances rather overshadowed the rest, but Dave Brewin and Rob Metkemeijer (Irvine 15Rs) both topped 270kph, which is no mean feat. Dave could have gone better than 280, but on his first flight, a circlip came adrift and damaged the line and piston, spoiling the run and subsequent attempts. Rob Metkemeijer had initial trouble with a loose venturi which completely messed up the mixture, but managed to effect a cure with epoxy. Ian Mander (Irvine 15R) demonstrated that he can now handle a F2A and can turn his attention to details such as propellers and compression ratio, to realise his potential.

Continued on p.52

Far left: Peter Halman and his 302.26kph Irvine .15R speed model, plus thoughtful, young bystander. Left: UK 'new boys' in F2A – Ian Mander and Des Ratcliffe with Ian's model, also Irvine-powered.

Right: Smith/ Brown's winning Team Race model; Cippola power, moulded carbon-fibre fuselage. Far right: Tony Pujalte looks worried as he flushes the tank of Carlos Olive's F2A craft.

Far left: Second in speed – Dave Brewin and Irvine .15R model. Above left: Claus Maikis and Enya .35 four-stroke stunter pleased the spectators. Below left: Richard Short and Dave Fry had a great time in Team Race despite placing only seventh.

Italian Jobs

A colourful look at some of the Vintage activities of the SAM-Italia group

Top left and right: Healthy participation at the fifth annual get-together. Davide Pattima's Fiat CR 32 at top left looks a fine prospect. Centre photos: Splendid Trentone Super by Arve Mozzarini spans 71 inches for OS FS 40. Bottom left: Bernie Gross tailless – a Stateside design – is the choice of Luca Marinigh. Above: More RC-assist craft. All photos by Roberto Marzoli, except for Trentone Super – the builder's own work.

Gliders for THE GREAT ESCAPE

Geoffrey Thompson reveals more details of model gliding endeavours in Stalag Luft 3...

IN August 1940, while being briefed by our RAF Squadron Commander, any thought of model gliders was far from my mind. Our mission was a daylight raid to destroy the hundreds of German E boats and Landing Craft which were massed along the French coast in preparation for the invasion of England.

The Germans were at the height of their military successes, having fought their way through the countries of Europe. Their intention now was across the Channel.

The several thousand pounds of bombs from our twenty-eight planes left the landing craft in disarray, but soon the ceaseless attacks by Messerschmitt 109s forced us to lose height. Next, the starboard wing disintegrated under fierce anti-aircraft fire. The ailerons too were hit and the order was 'Hold tight!' as the plane crashed into Boulogne Harbour, which at least prevented a holocaust of fire.

Imprisoned...

Soon surrounded by German Wehrmacht, I became P.O.W. 234. F/Lt. Dilly, referred to in the July edition of Aeromodeller, was P.O.W. 3450; and later on, many thousands of RAF aircrew were held in POW camps. I was in Stalag Luft 3, as was F/Lt. Dilly; so the article in Aeromodeller revived many memories.

The sight of a model glider flying into the compound one summer evening caused excitement among the increasing population of RAF NCOs. It came from the officer's compound some distance away; and we soon realised that a message in code was fastened to the inside of the glider's fin. This proved to be a warning that the Gestapo were to raid our barracks in the early morning. Our first thought was to protect the camp's secret radio which was our only source of news from England. Normally hidden inside a billy can, the radio had now to be dismantled and the components distributed among a hundred personnel with orders to be guarded at all cost.

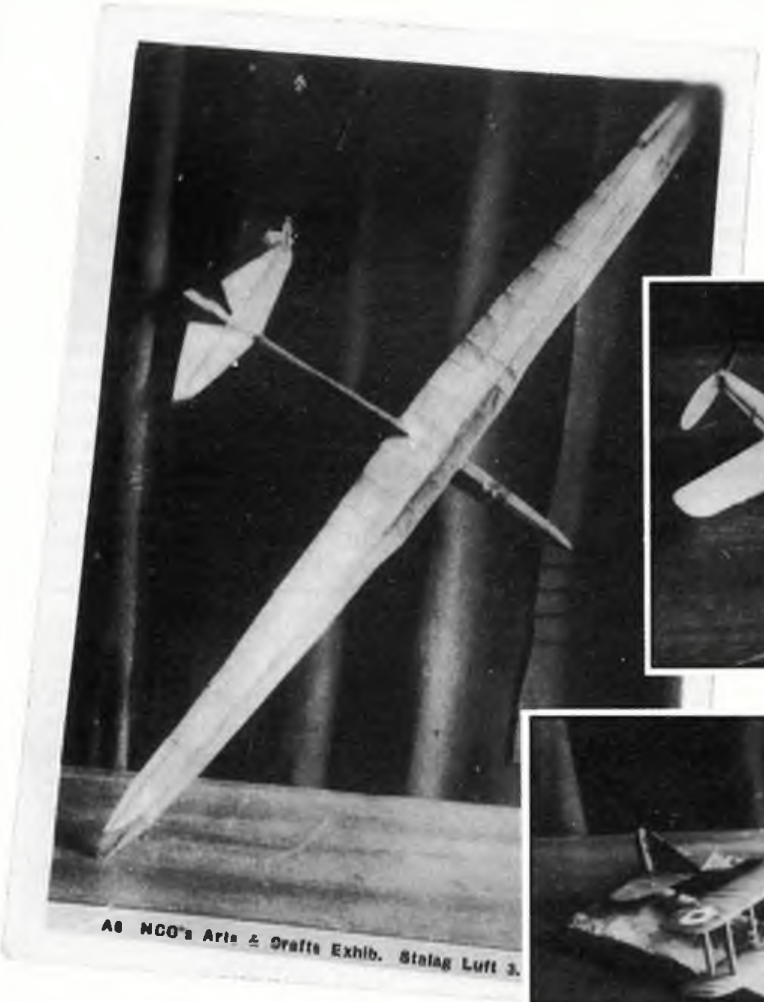
Ingenious

Building model aircraft now became a welcome and important occupation, and a useful 'filler' of endless spare time. Many ingenious models were made but, as we had no recognisable materials, how was this achieved?

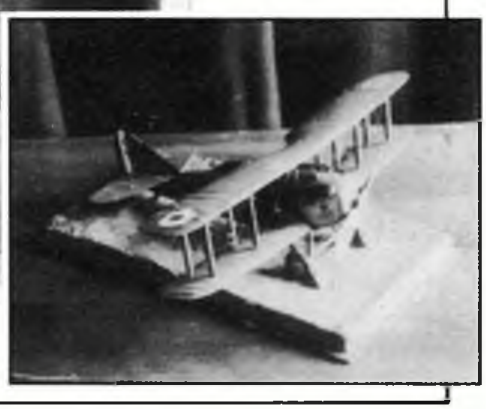
Prisoners were allowed two personal parcels per year, all of which were opened and checked, and anything thought to be of use for escaping purposes was confiscated by the German authorities. However, some items got through the net and such things as Rizla cigarette papers, pins, cellophane and glue of any type were handed-in to the newly established modelling group. The framework of the gliders was, in our case, cut from bed boards.

The next problem was how to launch the gliders. This was solved by the ingenuity of the camp Boffins using such things as empty dried milk tins and lengths of string.

The gliders were used for communication on many occasions, particularly for the preparation of the real Great Escape - the gliders carrying forged rail tickets, identity cards, and so on between the NCOs and the officers' compounds. So here lies another tale of the use of model gliders during the war...



Heading: Our correspondent, seen in the 1939/40 winter, with his aircrew. Left: POW constraints still allowed production of this glider.



Photos at right show solid scale models, also produced at Stalag 3 for exhibition in August 1942.

What's the DELAY?

Dave Hipperson takes a close look at the whys and wherefores of delayed prop systems

AS A result of my Nationals 'Coupe' flyoff there has been some interest in the Delay Prop system I used on my Coupe d'Hiver model. As my experiments in this field have been progressing for more than four years I thought it would be useful if everyone had a look at how far I had got.

Delay prop release systems might easily have appeared decades ago in one of those excellent Frank Zaic Yearbooks. Most inventions saw first light of day there. However, the earliest competitive application I know of was on Reine Hofsass's Wakefields of '72 seen that year at the World Champs held in Sweden. Since then, and almost immediately, the idea was put to useful effect by Mike Thomas of Canada and, of course, John O'Donnell in both CDH and F1B. It is indeed a variation of John's release system that I use now.

However, the idea was hardly universally accepted. I suspect the reason wasn't so much that modellers thought they were incapable of managing the mechanics, more that they were unable to figure out a way of successfully modifying their existing systems – particularly if they had become used to purchasing the same in a finished form!

Why DPR?

Is it an unnecessary frill? The obvious gain is that it ensures that no turns are run off wastefully before the model is released and timing commences. It also guarantees that blades cannot foul your arm or sleeve on release; and, of course, it allows a freer, more energetic throw. In fact, it positively dictates that you have to put your all into the throw – with the prop stationary for half a second a gentle throw could be disastrous. That presupposes that your model will benefit from an energetic throw in the first place, so before we go any further we should clarify the rudimentary aspects of Variable Incidence Tail (VIT) and Power Auto Rudder (PAR).

VIT/PAR

To fully benefit from DPR the model must be equipped with at least VIT and, desirably, an auto rudder for the first power phase. I shall not go into the details here as the principles are fairly well established now. Suffice it to say that to benefit from a steep, hard throw it is essential that all looping tendencies have been eradicated from the model. This may require considerable amounts of positive incidence to the tail. My current arrangements are about 5mm of trailing edge movement after four to five seconds (on a F1B) or 3·4mm trailing edge movement after four seconds on the CDH. Also, considerable left rudder (PAR) is introduced for the first couple of seconds on both classes of models to ensure the power burst stays straight. Some people can get away without this rudder – I can't.

My experiments began in 1975 when I equipped a couple of my Wakefields for that year's Pierre Trebod event with a 'release on launch' system. (Incidentally, these systems have become quite popular on the Continent now. It's certainly a half-way stage well worth considering, but, after all the efforts that go into the hardware it seems a shame not to get the full effect and benefit more). They all blew up, mainly because of problems with the blades fouling the fuselage and wrapping themselves around it before they had a chance to open. It was actually this trouble that led me to introduce my slightly unusual blade hub which supports the blades slightly away from the fuselage when folded. I don't use DPR with these blades now but have retained the back stop on the fold as I believe they are tidier that way and offer less drag in the glide – but that's another story.

After '75 and some more experiments the following year I shelved the idea as being too fiddlesome. My interest wasn't aroused again until I attended the '85 World Champs in Yugoslavia, where there were numerous F1B flyers many who hadn't even started free flight back in the 70s, but were already a good deal better than me! It sank in slowly, but it wasn't until the end of '85, triggered by that appalling turbulent Aeromodeller Coupe do at Henlow in which I didn't fly, that I decided something had to be done to achieve a climb which would be less effected by wind and turbulence and could also efficiently tame the enormous initial torques developed by the FAI rubber, Pirelli being no longer available.

The experimental phase

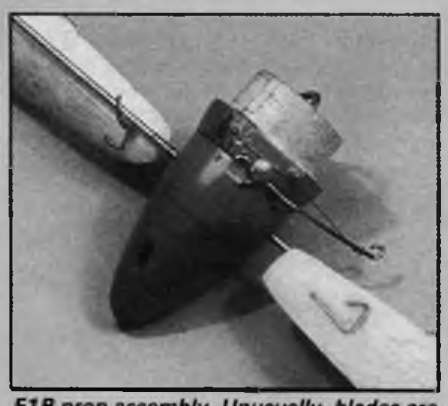
The experiments began in '85 with purpose built CDH models. Two were made (one is still flown occasionally). They have tapered wings of flat-bottom section with very strong, full-depth I-spars. Of usual size, 190sq inches, they are built tough. The DPR system was integrated into the prop assembly. To overcome any fouling problems the blades were outrigged and back-stopped so they could neither flop about nor fold too far to catch, or spin the glide later. The models were set up with masses of VIT and AR and were trimmed to be launched vertically as hard as possible. A hard, consistent vertical launch is not easy to achieve: although the models would fly very well (occasionally spectacularly) they were not consistent. It wasn't until I began to reduce the VIT movement and launch them slightly less steeply that reliability in contests returned. However, experimenting with DPR on CDHs was learning the hard way, with low-powered models. When the DPR and VIT systems were applied to Wakefields the gains were both more noticable and much easier to achieve consistently. This was during the summer of '86.

The set-up

It is commonly assumed that, because of the considerable torque force exerted by a wound motor, the timer that release the line to the propeller has to be powerful to overcome friction. This is not true. Using the laws that govern the forces of leverage it is possible to dissipate virtually all the torsional load at the prop end by designing the release level with the maximum mechancial advantage. Similarly, the tensile loads in the release line, which have to be well in excess of what is actually necessary – as in my case I use nylon line which stretches slightly under load, for reasons to be explained in a moment – can be lost in the same way at the timer end. Hence the actual force under the timer plate can be reduced to something equivalent to a tail hold-down line – maybe less.

As you will see from the photographs, the blades are outrigged. In the F1B's case this has the added benefit of allowing a large prop on a comparatively short nose with no danger of the blades fouling the wing on deployment or at prop fold. What is more (and probably just as important) the blades, even in their folded-back position, offer some resistance to the motor immediately the power is applied as they are already at a distance from the centre line. This stops things accelerating too suddenly and straining the set-up.

For simplicity and lightness the release lever actually engages with one of the blade retaining arms on my CDH, but a separate pin is used on the F1B where space and weight are not at such a premium. The release levers are bent from wire (20swg for CDH; 18swg for F1B) and they rotate on another spigot driven into the hub. They are lightly sprung to ensure that when released

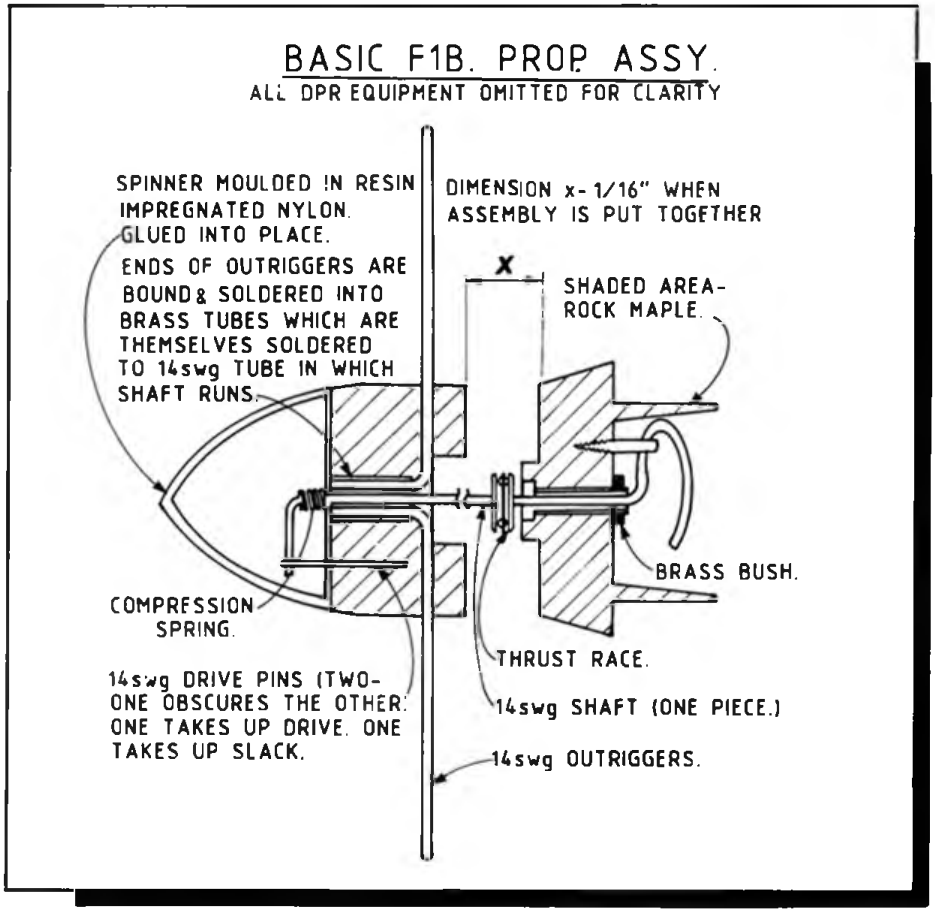


F1B prop assembly. Unusually, blades are in front of, rather than behind, the hub arms on rotation.

they can't drift back and impede the rotation of the prop. In both cases I use 50lb breaking strain monofilament nylon to connect the release lever on the prop assembly to the lever on the timer. This means the line has to be stretched slightly when being linked up prior to flight. The prop end of the line is attached first and the other end slipped over the timer release arm.

Nylon is used because it can be replaced easily, doesn't fatigue quickly and can be adjusted in length if necessary with a knot or two. I often do this on a damp day if the release tension looks a bit slack; then, on the next hot, dry day, when the line might shorten again, I can simply remove the knot. It is important that these things are quick and easy to adjust on the field. The actual amount of necessary stretch varies but in the case of the Coupes this is usually 3/16in; the F1Bs, nearly 1/4in. As can be imagined, some quarter-inch stretch in less than a foot of line means a considerable load – certainly more than the operation of holding the prop prior to release would require.

At the timer, a long lever is useful but probably not necessary. When the timer end of the line slips onto the lever it can be pushed all the way down to the fulcrum point so that virtually all the load is left to activate the lever when released by the plate. Incidentally, this load-releasing trick can go too far. If the line is pushed on to the lever and around the bend in the wire at the pivot you could lose all the load and the timer would not start the prop. To avoid this, I incorporate a spacer by the fulcrum.



The timers

I have found Tomy motors ideal for this application. To avoid confusion on the field (and the possiblity of making a mistake setting a timer) I use two motors for DPR/VIT/PAR models. One motor looks after the dethermaliser function in the usual way, slowed down to about one revolution per 60 secs. The other, fitted lower, is usually not slowed at all; or, at least, only enough to revolve once in perhaps five seconds rather than four (which is standard issue). This is the timer that controls all surfaces and DPR. The disc is taken from another Tomy toy (in which is it used as a wheel) and a suitable slot is filed into it.

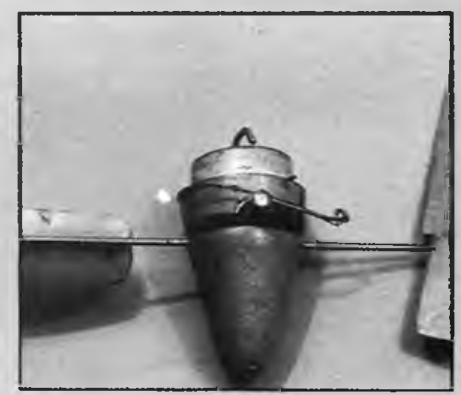
This is a lot of machinery to deal with just five seconds of flight, but it weighs little, and even CDH models with the twin timers are only a few grams over weight. It won't be easy to get two timers arranged like this into the new, slim fuselage now allowed for CDH. A new design system is being thought out for that challenge – it may have to incorporate one timer running everything!

Perhaps it is worth stressing how important the timer on/off switching is. There must be a facility for the timer or timers to start as your hand leaves the model and therefore the trigger must coincide with a finger or thumb holding the model comfortably, as you would when you launch it. This may seem obvious indoors when you set the model up but you will undoubtedly find quite another position is necessary when you actually try launching the model hard. Exactly how and where you have the trigger can only be discovered by experiment. My system has been published before. It simply comprises extensions to the high-geared take-off shafts of the Tomy motors protruding like revolving buttons through the far side of the plyon, coinciding perfectly with where a finger 'falls'. These have the additional advantage of allowing back winding, very fine setting and even 'blip' runs just before launch to double check that the timers are functioning correctly.

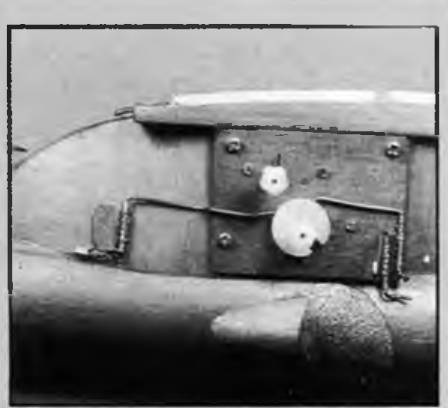
Failures

I take my life in my hands stating this, particularly now there is no reflight for flights under 20 seconds, but no DPR I have made has ever failed to deploy. The failures have been in other areas. There have been occasions when the line has slackened and skipped a few times immediately after launch. On one occasion this knocked out the VIT and we got a nastly loop, but usually it just spoils the initial climb speed. It hasn't happened recently. A more serious failure has been the blades over-riding their forward stops at the moment of deployment. This is because of tremendous flexing of the hub as the power is applied. Normally this wouldn't be a problem but my blade and hub set-up for DPR is the opposite way to normal with outriggers behind the blades rather than in front (the idea is to simplify and neaten the back stop). If a stop is over-ridden one way

Coupe d'Hiver prop system is similar to F1B arrangement.



Back stops hold prop blades parallel to fuselage when folded, preventing flapping about.



Coupe timer with DPR connected. Note grip and thumb rest.

it doesn't follow that it will over-ride back the other when the blade is required to fold, so the failure manifests itself as the model transfers to glide.

If the inner blade sticks out the model will dive in. If the outer blade sticks out, a more likely result is a tight left-hand circle, I have had five such failures – one on each comp. flights; the rest in testing. The last comp flight failure like this was back in '86. Both ruined good scores and lost me prizes. More recently I failed to spot a back stop failure, and this caught the blade and restricted its deployment when the power came on. With one blade out only and the other whacking the fuselage it still maxed – I was lucky. Failures are becoming fewer now.

Learning to fly with DPR/ VIT/PAR

This is the tricky bit. For me it was more difficult than it will be for you because I always launch with the right hand but whenever I throw something hard I use my left hand! When I fly HLG I have always used my left arm. Therefore, at quite an early stage I debated whether to re-equip all my models for left-handed launch or learn to throw with my right arm. I chose the latter, because the power of the throw is actually not as important as some enthusiasts imagine. it is useful, but not vital, to be able to throw hard. However, accuracy of direction is crucial and in that regard I had all manner of problems. Learning on the original CDH set-ups I did little damage but Coupes have a way of showing up launch faults with their small reserves of power. It is very important that the throw is accurate and the harder you throw, the more errors creep in. In most cases I trim the CDHs to fly out at about 75 degrees. This is still very steep but it is attainable and allows a comfortable stance. Because CDH models are light they are actually very difficult to throw hard. You will see the various tabs that I have added to my best one – the Nats model – to help a decent grip. Even the motor peg comes into play. It protrudes through both sides of the fuselage so that my forefinger can curl around it for the flick – very much like an HLG. The prop delay itself is 3/4 sec for CDH and F1B. The really hard thrower could lengthen this but it is important that the model is still going forward at least a bit when the prop deploys otherwise you can get a nasty wobble about the fuselage as the power comes in.

The F1Bs are much more susceptible to throw errors. My models are trimmed to fly straight away at 80-degrees-plus, so the back-swing before launch is very important. To keep the model straight it must come right over your head with the wings level and you must release as late as possible – but before the arc of your throw begins to pull the nose down again. It takes practice to get it perfect everytime. Even now I push them a bit 'left' from time to time.

If it all sounds like hard work – it is. But it's very reassuring to know when you are winding that all of the torque you can get into the motor will be used to climb the model steep and straight. That in turns helps you wind further.

Trimming

In the early stages at least, this is not different to a conventionally-equipped VIT model. First low-turn flights are made with the tail and rudder in the glide-cruise setting.

As the power is increased the delay

Coupe DPR arm connected up. Arm is sprung onto outrigger. Arrows aid alignment.

F1B timer with DPR connected. All the tension is taken by the pivot; only a light pull needed to unlatch. Note spacer to prevent hook riding up trigger arm.

Shirring elastic holds one blade in on fold – gravity holds the other. Spinner hole is for locking pin through hub and noseblock.

mechanism can be brought in – if you are only launching gently and the delay is minimal. This has the added benefit of testing the system on low turns and getting yourself accustomed to it. After three-quarters-maximum torque the model should be flown with the VIT and Power Auto Rudder plus the delay prop. If you are very nervous, throw it gently but steeply with a very short (i.e. virtually none) delay to start with.

It is quite easy to get the model to a safe flying trim on full turns. However, these are the only configurations that I have found to require many more trim flights from then on to reach perfection. It will all depend on how consistently you can get a firm, straight throw. If you are good you can trim the model to that reliable throw quickly; if your throw is inconsistent you may not be able to reach the best trim and will have to settle for something that flies safely, no matter how badly you launch. Perseverence improves it no end. If you get into real consistency difficulties ask someone to watch you launch a few flights. Most likely you aren't even standing comfortably. It all starts at the feet.

Remember a javelin thrower has it easy – he doesn't have to throw dead into wind!

It was after a few years that I started noticing inconsistencies in the throw which were not repeated when I flew similar F1Bs with VIT and PAR but no DPR. After all, the DPR system is supposed to allow the flyer a more unimpeded throw, and thus a more accurate one. There is a snag that no one has ever mentioned before. Apart from getting directional advice from that left hand holding your blades than you would think the other thing missing from a DPR model at the moment of launch is the stability created by the prop both rotating and pulling. A conventional model is helped to stay on track during an energetic throw by the gyroscopic stabilising effect of the rotating prop. The DPR model doesn't have this. Neither does it have any pull from the front. Poor arm action or a hooked throw with a DPR model can be disastrous.

Another problem is flying them in wind. Any F1C flyer will tell you the problems of launching hard with one hand in the wind, not just from the 'bank left/right' point of view but also the release angle. Try holding a model into wind at the usual release point around the CG, tilting it near vertical and keeping it there in 15 mph gusts as you slacken your grip. Not easy. The tail gets blown up. This can happen at the instant of launch on a windy day with catastrophic consequences.

It may be for this reason that some of the Russian flyers grip the fuse well behind the CG (i.e. behind the pylon) before attempting such a throw. What is more, their DPR systems – with blades fully deployed but feathered – would inevitably offer some upward turning moment at launch if arranged (as they always seem to be) with blades parallel to the wing. Certainly that would be enough to compensate for the downward effect of the tail.

The future

I believe that the ideal DPR system could follow that Russian principle with blades extended, feathered and out parallel to the wings, but the engineering necessary for such a system is considerable. It is no coincidence that I have spent most of this article explaining the flying considerations rather than the mechancial or building ones as I believe it will not be too long before a DPR prop assembly of this sophisticated sort is actually available on the market. I have seen a prototype...but when you see the price you may still wish to build your own system.

In conclusion, the DPR system – at least mine at its present stage of development – hasn't really assisted the rough weather performance of my CDH or F1B models – the VIT functions do most in that direction. But it has allowed every bit of energy to be utilised in the model's climb without impossible complication. It's certainly most beneficial in calm air when every bit counts and drift is slight enough to be able to just about guarantee a perfect launch. The overall motivation for all this effort and attention to just the first few seconds of the power phase is quite simply that it is all these little improvements and advantages that give one model the edge over another. As we reach the ultimate performance potential for a given set up the improvements and differences in performance between one model and another become less and less. Finer and finer. Not only that but if you give every sensible idea a try at least you feel you are making the effort. Someone said to me after the CDH Nats flyoff this year my delay prop had not had a decisive effect. To an extent he was right (it is always the air the model is in that decides the contest) but who is to say that very little bit extra climb wasn't the difference between contacting the good air and the real lift.

BUILD FROM OUR FULL SIZE PLANS!

HEINKEL He51

Jim Latham's neat between-wars fighter

is just right for CO_2 power

THIS pretty little biplane caught my eye when I saw it in the Salamander book 'Fighters', for it seemed to be just right for CO_2. Three models later it still seems an ideal subject. Let's go!

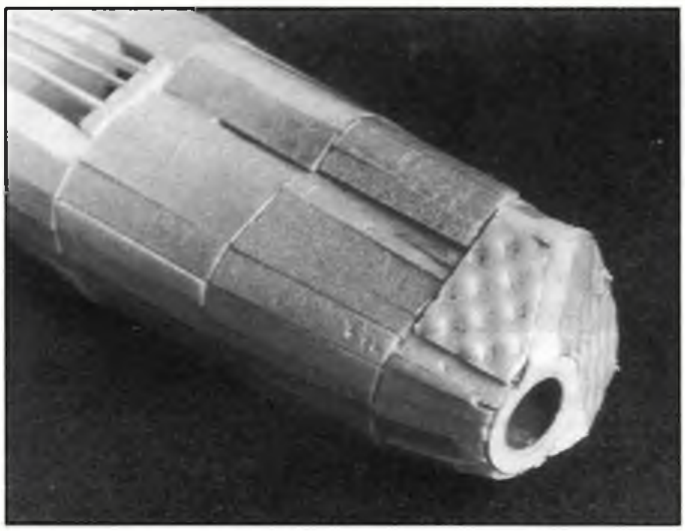
Fuselage facts

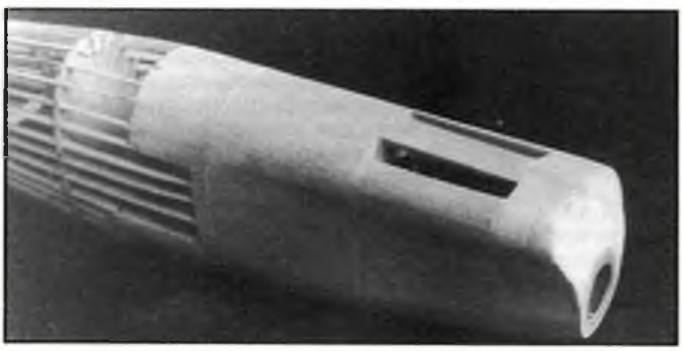
This is of conventional former-and-stringer construction except for the front end which employs foam cut from food containers. Cut pieces to size and glue between the formers using PVA glue. When thoroughly dry, carve and sand the foam to shape using the formers at templates. Using foam in this fashion gives a rigid structure which is lighter than balsa - and cheaper, too.

Mark formers for undercarriage (U/C) tubes, lower wing location strip and tailplane location peg before assembly. Formers E and H are slotted before assembly, but formers D, F, G and I are fretted on the model using a hacksaw blade to cut a 1/32in slot, lining up the stringer slots with a straight edge or by eye. This ensures straight stringers.

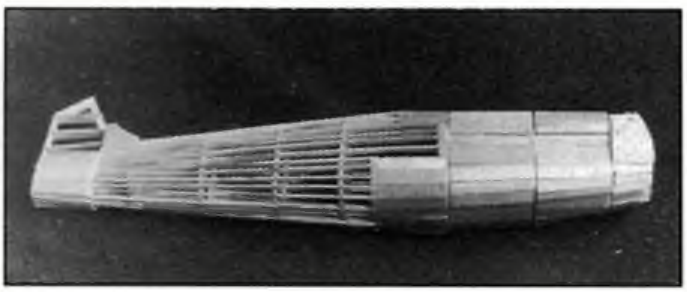
Insert the U/C tubes and epoxy in place; fit U/C wires and bind and solder together. Cover the wires with foam and carve and sand to shape. Fair in with Polyfilla or similar. Cover with Jap or other lightweight tissue using PVA glue on the foam portions. Sand lightly, re-covering any foam areas which are exposed.

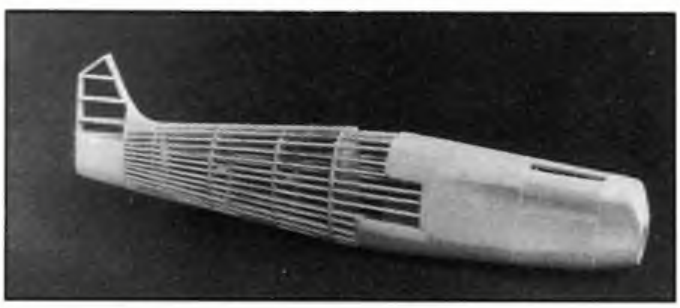
Spats, spinner and ventral radiator are made from tissue pasted over moulds. The spinner is glued onto the prop so make a few spares for the inevitable prop change. Vacuum form or buy 1.1/8in diameter wheels.



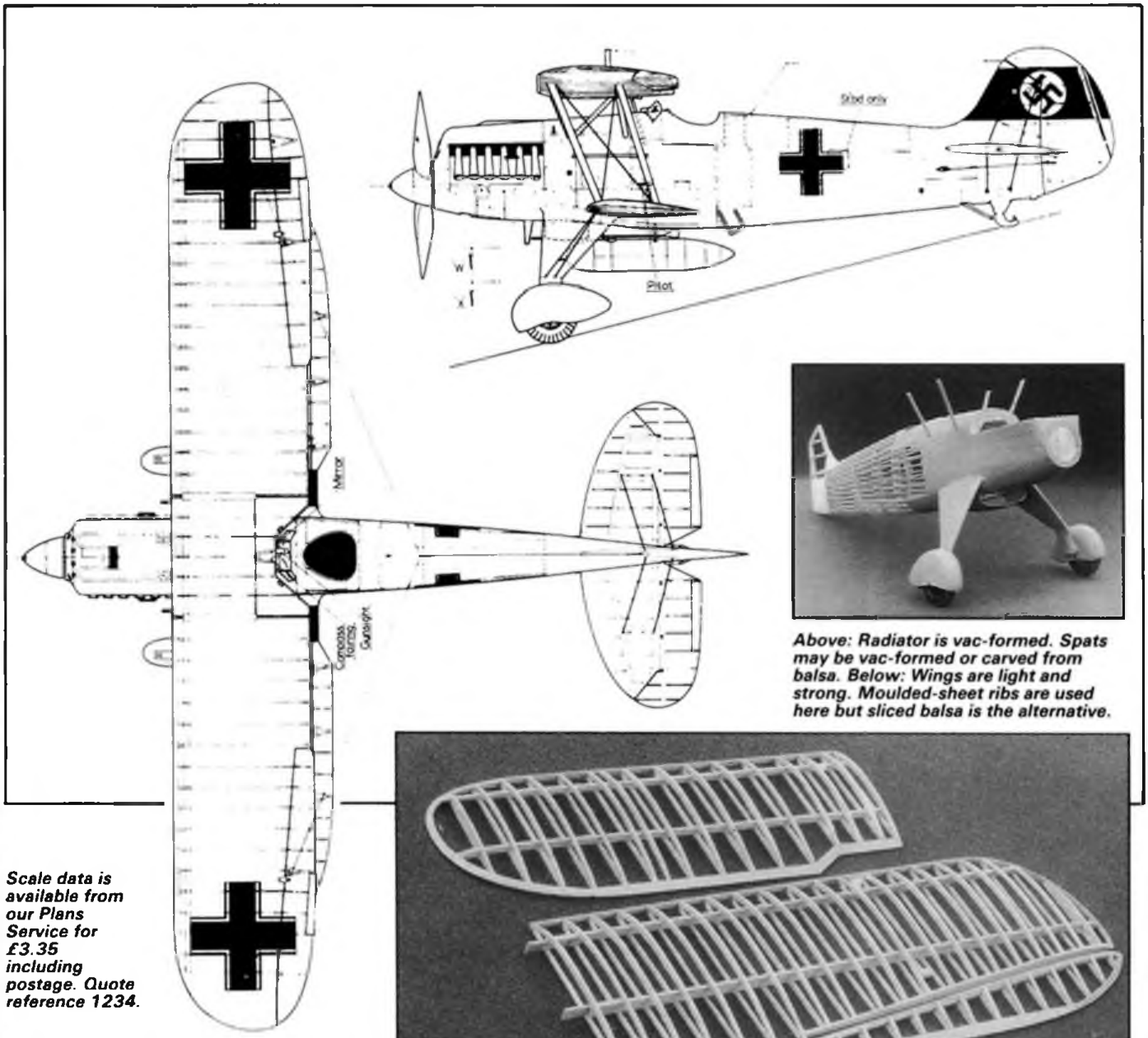


Top: Small pieces of foam are glued between fuselage former with PVA glue. Below: Careful sanding to correct contours gives a pleasing result.

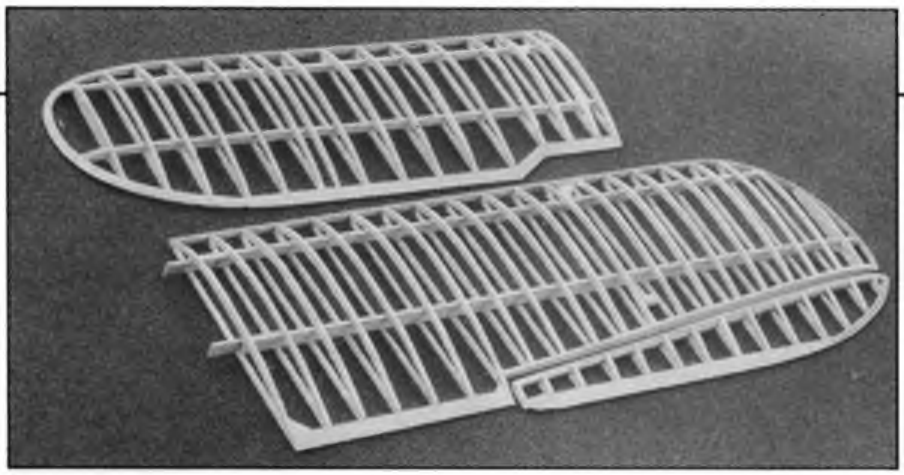




Top: The complete fuselage, reading for shaping, as shown above. Left: Structure is straightforward but patience pays dividends...



Above: Radiator is vac-formed. Spats may be vac-formed or carved from balsa. Below: Wings are light and strong. Moulded-sheet ribs are used here but sliced balsa is the alternative.



Scale data is available from our Plans Service for £3.35 including postage. Quote reference 1234.

Next, the wings

The wing construction looks fiddly but it is very strong and light, and very suitable for a wing which is tapered or possesses a variety of sections. Make the rib moulds first. If you do not have a bandsaw then make the male portion of the mould by carving it to shape from a block of wood. Build a box around this portion and pour in glass resin well laced with inert filler powder of talcum powder. When dry separate and trim up. Cut 1/32in balsa slightly oversize, wet, and and sandwich between the halves of the mould. Apply pressure with rubber bands or strip rubber. Sand the leading edge (LE) of the rib section flush with front of mould. When dry slice to thickness. Pin down LE, trailing edge (TE) and wing tips. Glue lower ribs in place using a minimum of glue, as a blob in the wrong place can effect the fit of the top rib. Glue in spars and allow to dry thoroughly. Fit upper ribs. When sanding the wing check by eye to ensure that there are no flats sanded in.

If you wish to incorporate ailerons glue two balsa strips 1/16in apart either side of the aileron line. Sand to shape, checking with a cut rib until they fit. Add top ribs and when the wing has been sanded separate and trim off the rib protusions. Glue soft balsa strips to aileron and wing and sand down. Ailerons add a bit more weight and are a bit more of a fiddle but they improve appearance and may be adjusted for flight trim.

Tailplane and fin

No problems here as the construction is perfectly straightforward. The model has a fairly long nose; thus there is a tendency towards nose-heaviness so it is possible to build in a bit of a strength without penalty.

Assembly and rigging

Cut cabane and interplane struts oversize. Make holes in the fuselage and insert cabane struts, gluing in position with PVA or epoxy. Before the glue sets, offer up the upper wing and check that all looks good. Slide lower wing onto location strip and glue in place. Add root fairings of thin card and fair these in with Polyfilla. Do not omit, for these fairings add to the strength of the joints. Ensure that the lower wings are square and that there is no dihedral. Fit uppper wing and when dry spring the wings apart and insert the interplane struts. Patch the tissue around the struts if necesary and rig the model as shown. This is also fiddly but it makes a strong job.

The colour scheme is R.L.M Hellgrau with black trim. My model is painted in the colours of J.G 132 Richthofen. Pages 12, 176 and 177 of 'Hitler's Luftwaffe' from Salamander Books give excellent examples of this and other colour schemes. Other references are found in 'The Birth of the Luftwaffe' by Hanfried Schielphake, published by Ian Allan.

Flying

Trim for right hand circles under power and glide. The model is docile and no problems should be experienced. Happy Heinkeling!

AIRCRAFT DESCRIBED

YAK 55

No.268: Pat Lloyd's superb drawings of this

Soviet aerobatic challenger for your delight

THE Yakovlev Design Bureau have for many years produced training aircraft for the Soviet Union, and in many seasons of Aerobatic competitions these aircraft have consistently placed highly. Successes were gained with the tri-gear YAK 18 and also with its lightened tailwheel variant, the 18 PMS. Then in 1974 came the improved YAK 50, and the 1976 52; these last two remarkably similar to their predecessors. In spite of the continued competitiveness of these dated designs, the Design Bureau obviously sought the ultimate; in this case, our subject – the YAK 55.

New ground

The power plant remained the usual M14 seven cylinder radial, reliability and power at low rpm being primary reasons for its retention. Design of aerobatic single seaters can never be really radical, but nevertheless the resultant formula reached by the design team A A Yakovlev, B P Condratev, Y N Briachev and B N Frolichev obviously broke new ground because a Patent, No 2440872 was filed in a number of countries, possibly to help with negotiating future licence production.

Eventually the prototypes appeared with very low-aspect-ratio wings of symmetrical airfoil, and of eighteen per cent chord thickness. Incidences were all set at zero degrees; and as far as possible, emphasis was placed in symmetry to assist with inverted performance.

The YAK 55 is of metal construction, with fabric covered control surfaces. Fuel tanks are integral with the wing roots. Landing gear is a single leaf spring of titamium alloy, carrying small wheels with hydraulic disc brakes, initially intended to be faired with small spats – but these are rarely seen fitted. The previously mentioned M14 radial is fitted complete with a constant speed V530 TA-D35 two bladed propeller, and an inverted fuel and oil system.

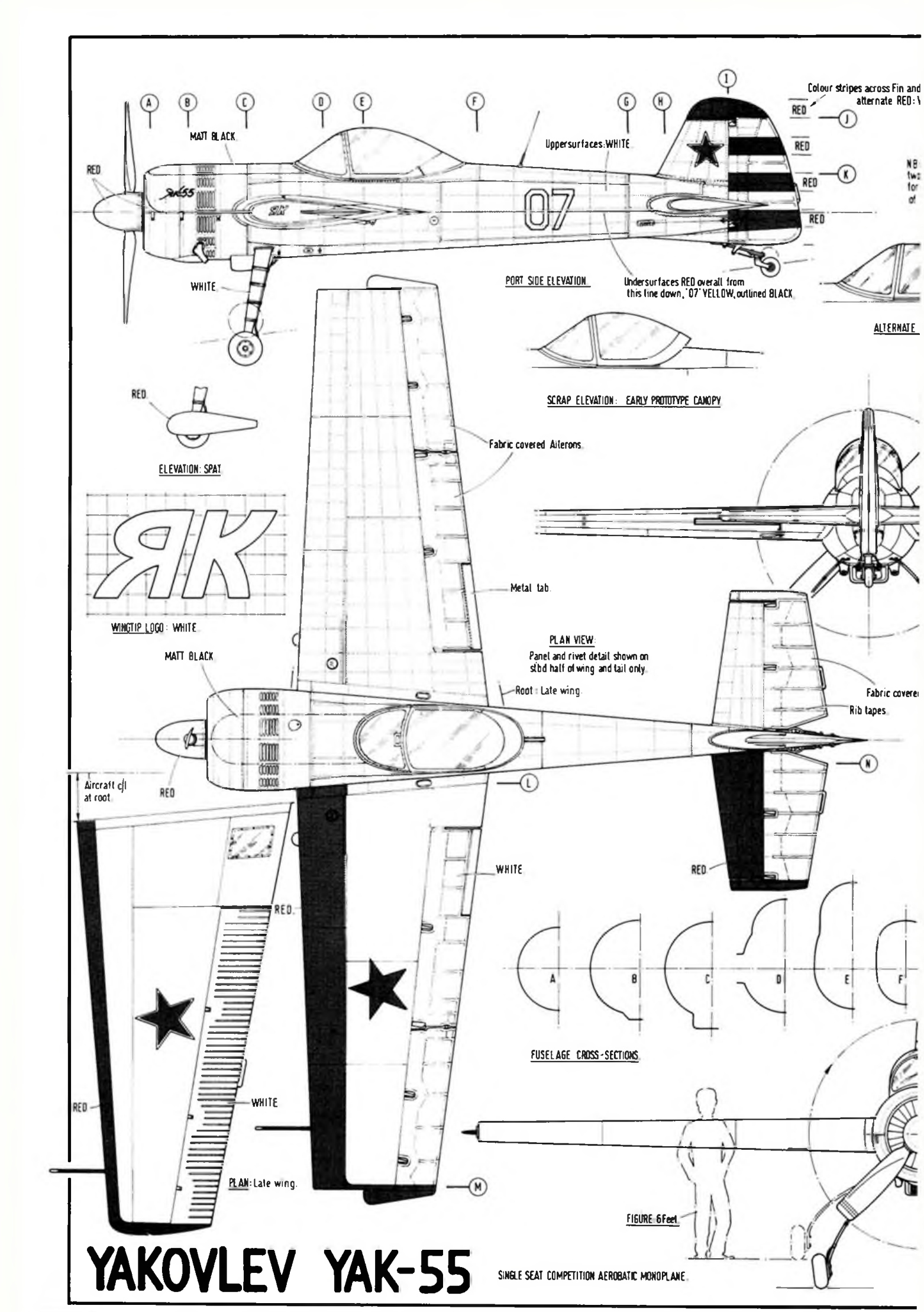
First flight was by Oleg Bulegin in May 1981 but even after 'working up', the aircraft seemed to compare unfavourably with the then current Zlin 50L and CAP +20.

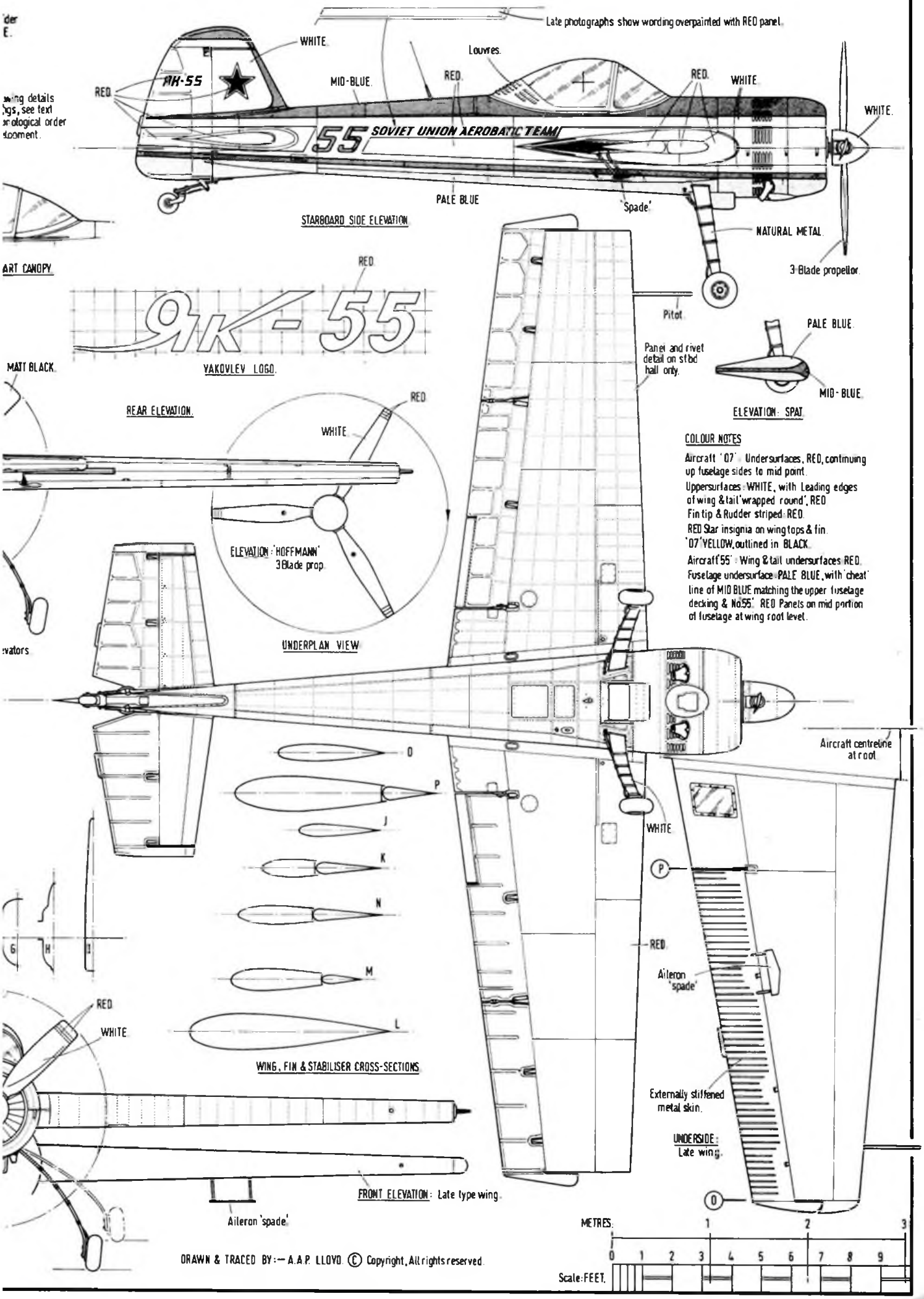
Improvements

Roll rate was improved by shortening the span, and, in turn, the speed and wing loading increased. All this improved handling, leading to the production of some machines intended to equip the USSR aerobatic team for the 1982 World Championships. This is the wing illustrated in the main views of our drawing. The machines in this competition at Spitzerberg, Austria did not compete very successfully with the western machines, such as the Pace Spirit and Lasers. Michael Molchanink managed sixteenth place.

Apparently the Soviets showed a great deal of interest in the wing of the Pace Spirit, even to the extent of taking measurements. In the next World Championships in 1984 at Bekescsaba, Hungary, the YAK 55 appeared with a 'new' wing (see the scrap views on the drawing) which had a modified aspect ratio, and looks more streamlined. The most noticeable feature is the almost full-span, one-piece ailerons, with prominent external stiffening ribs. A new modification was the fitting of an aileron 'spade' beneath each wing; these assist with stick loadings to make the pilot's job less tiring.

Heading and photo below show aircraft '3' at the 1985 European Championships.





DRAWN & TRACED BY:— A.A.P. LLOYD.

Top: '07' at Bekescaba, Hungary, in August 1984. Above left: '55' at Hosin, a year later. Above: '3', also at Belescaba in '84. Left: '3', with original wing, at Spitzernberg, Austria, in August 1982. All differences between craft fully detailed on drawings. All photos: Tony Lloyd.

In the 1984 competition Viktor Smolin and Nicolai Nikitiuk took fifth and seventh places respectively, whilst ladies Khalide Makagonova and Lintor Nemkova took the top two places in their category. Unexpectedly, 1984 saw the debut of the Sukhoi 26 prototypes, although they did not acquit themselves very well, possibly because the development pilots were not very 'competition-wise'.

Eclipse

The last real competition for the YAK 55 was the European Championship in 1985, where it featured yet another wing, with interconnected aileron and elevator – similar to the system pioneered by the Hirth Akrostar. Vicktor Smolin took fourth place, up against Zlin 50Ls and the new Extra 230. Obviously the Sukhoi 26 was offering more promise, and from 1986 the very best male and female pilots have flown the Sukhoi, as explained in the May 1987 issue of *Aeromodeller*.

Strangely, this eclipse of the YAK 55 was accomplished by an aerodynamically very similar machine. Beyond doubt, this type of layout has now become established as the 'norm' for championship machines. Nevertheless, the fate of an aircraft design does not dictate whether or not it should be recorded, so to continue our collection of aerobatic aircraft we present the YAK 55. We may not yet have seen the last of this aircraft, as rumours exist of a further variant, not powered by the trusty Ivchenko radial.

Acknowledgements to Tony Lloyd (no relative!) for much help with photographs and chronological information and Mary Wulfson for translations from Russian text.

YAK 55 data

Span: 9m. 64cm.
Length: 7m. 52cm

Reprints of this feature plus a 1/24 scale dye line print of the YAK 55 drawing are available from ASP Plans Service, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST. Price £3.10 (inc. p&p). Ref. 3087.

BALSA CUTTINGS

Cyano de Bergerac's latest nose around aeronautical affairs

Ouch!

On the glide, a two-ounce CO_2 effort tapped an elderly bending-down gardener chappie on the back of the neck. He smiled all over his rosy old face as he handed it over, but little lights came on all over our Safety Officer, and later he had quite a go at the flyer concerned. The last-mentioned is a meticulous type who scratches a livelihood flying somewhat larger jobs full of prang-potential, passengers and paraffin, or whatever else it is those stinking things run on, and the telling-off he got for something completely trivial and which he couldn't have helped, seemed a bit much. Perhaps it was, but it did bring up another very small thing which turned out very badly for a mutual friend. All he meant to do was to launch a radio model into a clear sky. Okay, so you don't want one smacking you in the old boat race, but a weary forty four-stroke isn't what you'd call exactly fiendish. Well, the fuselage was oily, the model started to pivot in his right hand nose-down towards the deck and his knees – to support it under the nose he instinctively brought his other, transmitter-holding hand across, whereupon the prop used the trannie case like a chopping-board. One finger was only mutilated, but its neighbour... yuck! Pas bon. Nicht gut. Non buono. Noh bueno. Whichever was you looked at it, it was not good. On the basis that it is better to travel hopefully than to arrive, they took it with them to Casualty, but it was not good.

Hullo, Sailor!

We had one of those 'It could only happen to Ray' things when the September storms marked the end of the wonderful summer. Because he has a big old car suitable for getting it over the rough bits, Mad Ray is always appointed to bring out our rather creaky Control Caravan, which we were going to get ready for our At Home comp on the week-end. He was late. We banged in all the spikes, strung the string, set up our dope-written notice 'Gents' so that it pointed towards The Clump, smartened up around the gate with a brishing hook, then settled down for a drag on a fag whilst watching, in evening sunshine, the mother and father of a purple storm raging over what we laughingly call the County town. Ray arrived with (*a*) the front of his car bashed in (*b*) the back of his car bashed in, and (*c*) no caravan, which he diffidently stated had already been hauled off to the scrappie-chappie's. He had left work, cobbled the van up to the blunt end of his mobile pile of junk, and headed out towards us, grinding up the long hill between the old houses which would presently give way to newer houses, and then green fields. It wasn't just raining; the windows of Heaven were open, the gullies were in consternation and manhole covers were popping up everywhere. Suddenly, through the flailing of his w/wipers, he saw what appeared to be a road-wide wave of water rushing down out of the fork with Hammersley Road. The car ahead of him didn't just lose traction. It floated down on him, pushing Ray and our important caravan into the jaws of a French juggernaut roaring up behind. When Ray opened his door, water gushed in seat-high. When he splashed out, the other driver's view that it was all Ray's fault was ably supported by the Gallic reasoning of the Continental gentleman before the last-mentioned backed off and belted away for Dover, growling that the bateau wouldn't wait.

When the police arrived, the jug had gone, the water had gone and, even to their practised eyes, the circumstantial set-up suggested that Ray's car, with its forward-utterly-collapsed caravan, had run into the back of the other car at an ambitious rate of knots. 'Your car, Sir?' Ray nodded glumly. 'Done a fair old bit of harm, haven't you?' 'No', mumbled Ray in confusion, 'He just sailed into me, on the tide, as it were, and the lorry driver had to catch the ferry.' This unlikely tale of disaster on the high seas caused a notebook to appear. 'Your caravan too?' 'Oh, no. We use that for flying.' 'Well it won't do that no more,' said the constable sadly, 'The wings have gone, haven't they? Would you like to breathe into this, Captain?' Result negative, but let us draw a veil over the rest of the proceedings. Or rather, Proceedings.

Best idea yet?

In the unlikely case that there should be such a thing as an interesting sociological question, here is an interesting sociological question – where has fifty per cent of everybody got to? We know where one half is – all going Haw, Haw, elbow to elbow in what used to be a quiet little pub down the road, but the rest seem to have disappeared. We're told there are no teachers, no doctors, the army is always advertising for chaps, industry is eternally binding that there are no scientists, and the police are relaxing their requirements to the point where you may soon get nicked by what appears to be a heavily-bespectacled poisoned dwarf. Already there are cracks about the short arm of the law. Aeromodelling is not alone in its dilemma, but now aeromodelling has a solution. Because of the nature of things, when we seek recruits, it is among young *gentlemen* that we make our search. It has now been suggested that nothing would refresh our ancient spirits more than a change of direction. There is at least one club bung-full of old jossers who would be only too willing to teach suitable young persons of the opposite kind all they know. And according to common report, that wouldn't take long.

What is going on here? Best caption to this Eurochamps action wins a prize...

Fun for future fetchermites

Tom, Tom, and his Piper Cub,
Spend the afternoons round the pub.
When he's drunk the premises dry,
Then they both go out to fly.

A friend will read this for you

Mother might have cut up rough about the smell of clear dope all over the house, but generally speaking, traditional materials, if kept off the tablecloth, didn't get us into a lot of trouble. How different are the later ones! Comic paints give off noxious odours causing people to come over all unnecessary. Chaps with the wrong sort of skin get epoxy on it and cop inflammation of the epidermis. Unlike Guinness, some forms of glass fibre can be less than Good For You. There are those who stick not only their fingers, but their eyelids together with superglue. And now somebody has asked if it is harmful to inhale its fumes. Ye gods! Doesn't the cyano in cyanoacrylate (not to mention in de Bergerac) convey *anything!* Well, soon these problems should all be in the past. Just fill in the coupon overleaf and send it to B. Cttngs' Readers' Services for details of a special primary course called The Cat Spat On The Mat. Those who complete it should be able, albeit stumblingly, to read the WARNINGS manufacturers invariably plaster all over the labels under which these goodies arrive. Yes, folks – learn to read, overcome your Product Vulnerability Syndrome, recover your health and build up your strength. Then you can buy a handsaw, swtich on, and send to B. Cttngs' Readers' Services for a booklet called Plastic Surgery for Beginners. Preferably in the other order.

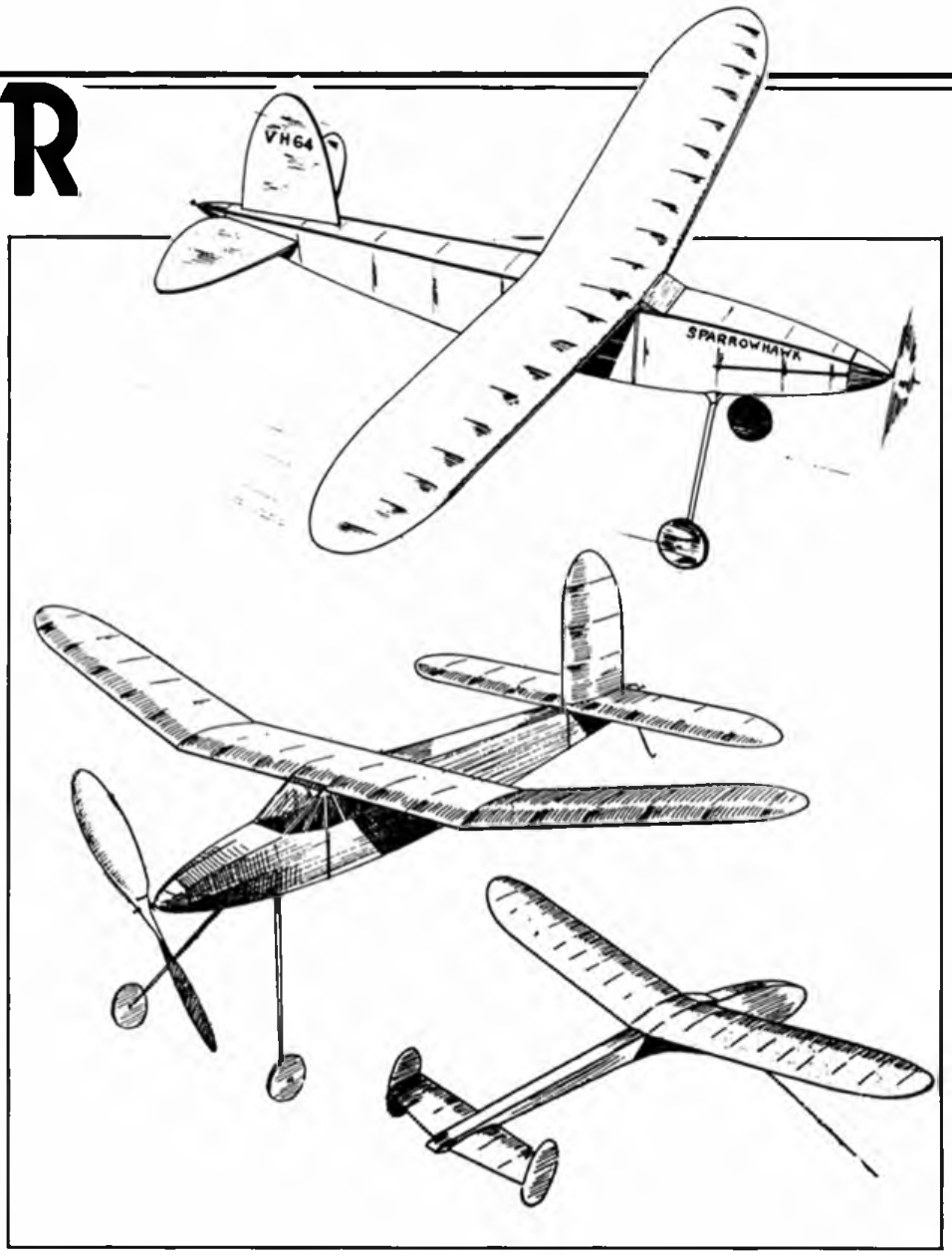
VINTAGE CORNER

Alex Imrie's tribute to the life and times of Juste van Hattum: conclusion

The War and after

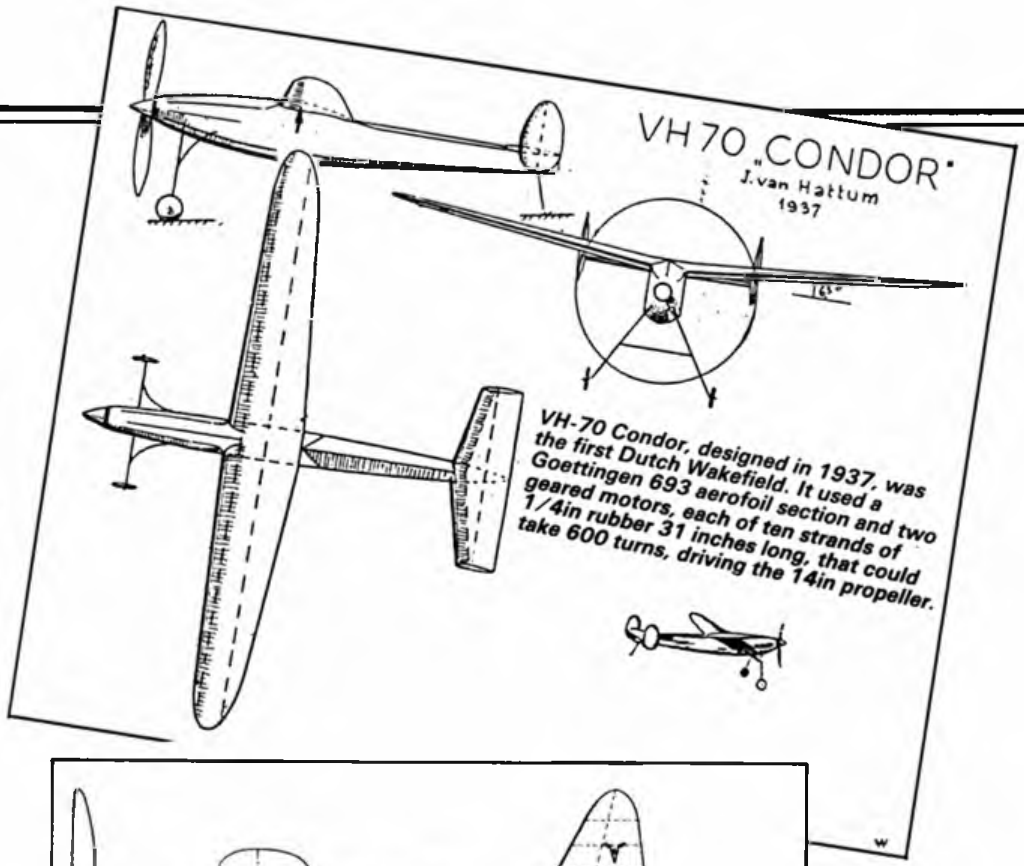
Following the invasion of Holland in 1940, it was inevitable that interference by the occupying power would adversely effect the running of the Dutch aeromodelling movement. This reached such a state in 1942 that the Technical Committee could no longer continue its work, so Van left the Aero Club to become assistant to Professor van der Maas in the Aeronautical Department of Delft University of Technology. During this time he completed the bulk of a two-volume work on model aircraft construction. The theoretical part appeared in 1943, but the practical volume with its many fine drawings would not be published until some years later. Immediately after the liberation of Holland the Aero Club resumed its activities and Van returned to his former post being now also responsible for the section dealing with full-size sporting aviation and private pilots.

The whole organisation had to be recreated, and it says much for Van's enterprise that despite the chaotic conditions prevailing, in a very short time the magazine with modelling news (publication of which had been stopped in 1941 due to 'paper shortage') reappeared, and this provided the link that caused modellers and clubs to emerge again in active participation of the hobby. The first Dutch power model had appeared in 1940, and Van produced his VH-88 in 1941 powered by a Syncro Bee of 2cc. This model also served as a practical example of the necessary economical methods of using what little balsa was available and the use of substitute materials like thin card and commercial hardwoods for modelling, a situation that continued in the immediate post-war years. The coming of the diesel engine meant a dramatic increase in the number of power models and soon controlline had to be attended to, while the popularity of the small A/1 and A/2 gliders and the beginnings of radio control meant that specialisation in Aero Club supervision of modelling activities became necessary. The growth of the hobby was such that Van, essentially a free flighter, felt distanced from the rapidly changing competition scene, and when in 1962 sub-committees for the different disciplines were introduced, Van reluctantly left the Aero club.

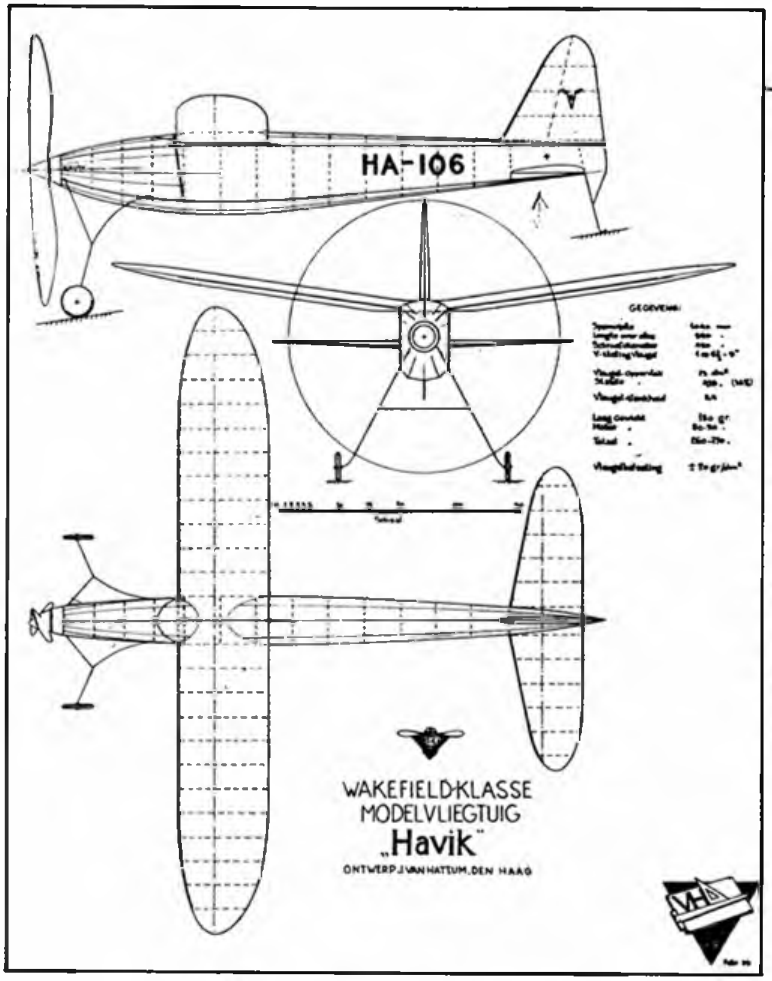


A trio of van Hattum designs. Left: VH-64 Sparrowhawk, an improved Woodpecker, was described in Aeromodeller, March 1939, the full-size plan being presented free with this magazine. Below left: Vampire 1 was a 34.1/2in towline glider designed in May 1937 for the newspaper-sponsored competitions that were held during that August. It was fully described (along with Chanticleer) in an eight-page supplement which was all Van's own work. Below: Chanticleer was Van's first model. It featured a lifting tail, and was designed for the 1937 competitions sponsored by the Hague Courier newspaper. Jan Bezemer of Rotterdam made a more powerful, swept-wing, twin-ruddered version (JB3) which was described in Model Aeroplane Constructor, June 1938.

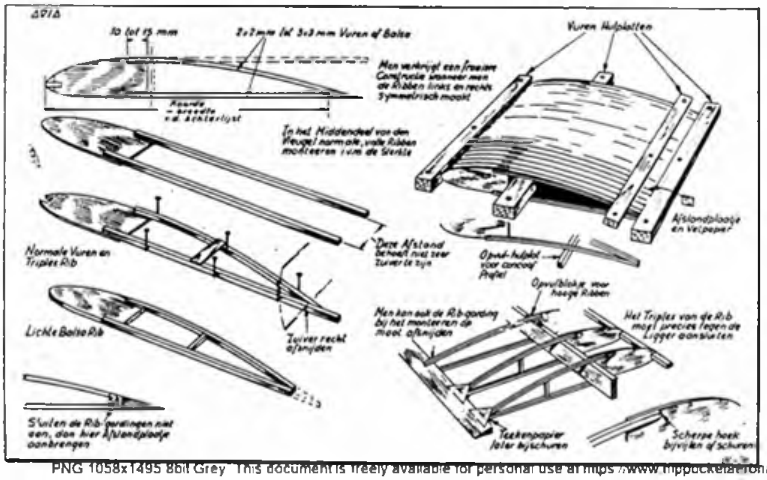
Left: Van with some of his proteges examining Bob Dijkman's VH-78a Havik 1940 Wakefield at the last modelling camp held at Ermelo during the war in September 1940. Dijkman, at right, and Piet Napjes (extreme left) were both first-class competition flyers.



VH-70 Condor, designed in 1937, was the first Dutch Wakefield. It used a Goettingen 693 aerofoil section and two geared motors, each of ten strands of 1/4in rubber 31 inches long, that could take 600 turns, driving the 14in propeller.



Left: VH-78 Havik, a Wakefield from 1939, employed an NACA 6412 wing section. Its 18in balsa propeller was driven by a single, 24-skein motor, 43 inches long that took over 1000 turns.



A typical van Hattum illustration from a series of articles that he wrote for Avia magazine in 1941 describing methods of saving modelling materials and the use of substitutes.

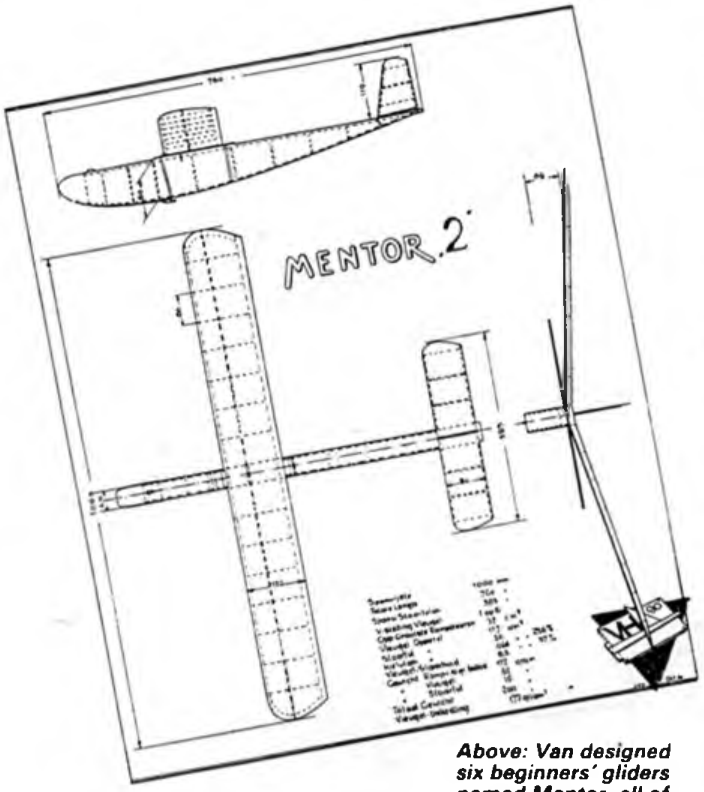
He took a position with Hollinda NV, an import/export firm connected with the aircraft industry, but when in 1968 he had the opportunity to return to the Aeronautical Department of Delft University as a senior instructor he happily made the change and remained there until his retirement in 1973.

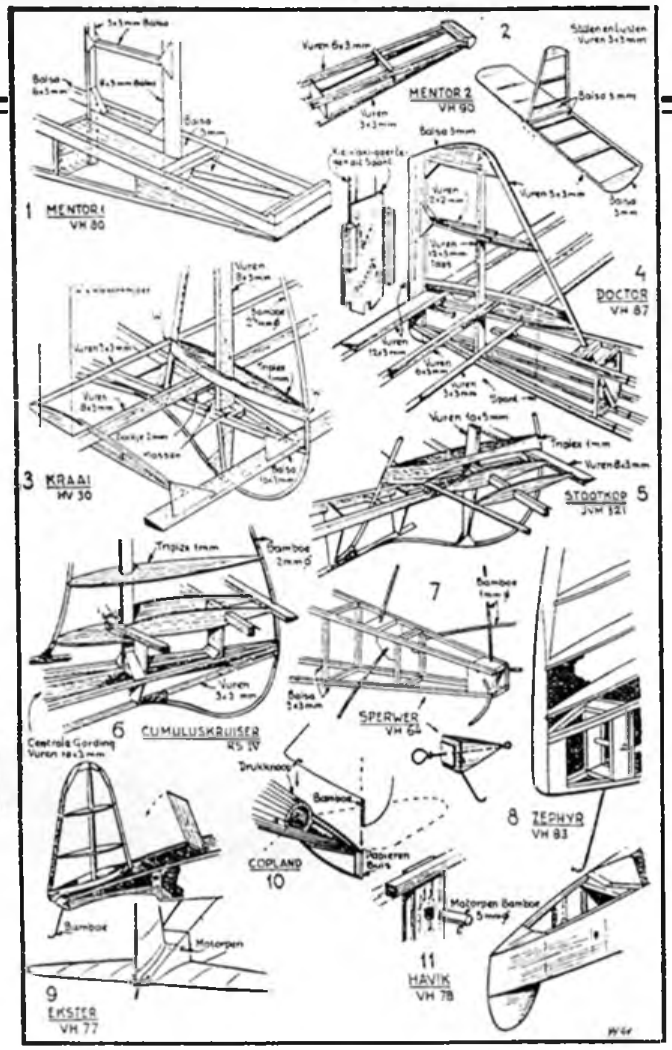
Ab initio helper

Always the educator, Van wrote five books on model practice, the three already mentioned and one on competition sailplanes, plus what he considered to be his best work, a book on model aircraft engines. However, he was disenchanted when the publisher of this last book was taken over by a large organisation that had no time for slow selling hobby books and disposed of the entire printing to a second-hand dealer. For over fifty years he contributed countless articles to model periodicals in many languages; the content of these varied from detailed constructional descriptions of models to his pet hobbyhorse, aerodynamics. He felt that modellers would obtain more satisfaction from their building and flying if they devoted just a little time to understanding the basic principles of flight, Van found that the R/C branch of the hobby was attracting many modellers who were often lacking in the fundamentals that he maintained came naturally to enthusiasts reared on free-flight models.

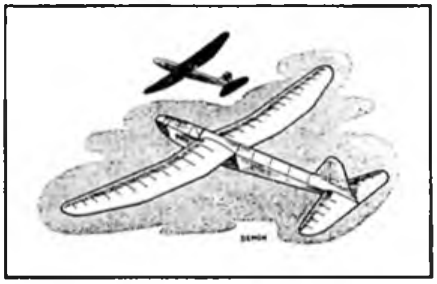
His contribution to the success of Dutch aeromodelling is not easily exaggerated. Van is recognised as the most active promoter of the hobby, not only in the years before the war but for a considerable period thereafter. Beginners were forever in his mind. He ensured that up-to-date designs were always available for them that were not too difficult to make; and, more importantly gave the novice encouraging results. In later years he did not like the general trends towards expensive R/C kits and the fact that hobby shops neglected the needs of the real aeromodeling beginner who only wanted '...a few sticks of balsa, a couple of sheets of tissue and some rubber...' In 1974 he wrote '*...The problem is how to train up a younger generation without the use of kits at fabulous prices. I am not catering for the man in the Bentley or Jaguar, but for the young boy who may one day be a top free-flight man or just a chap who enjoys building and flying models for amusement and relaxation.*' Several years later he voiced an opinion on large, flying scale R/C models: '*...they may well scare off the young fellow, who feels that he will never be able to reach that level, either technically or financially. I stick to designing models of utmost simplicity instead of extreme sophistication, so that the young generation may be aided to make a start – there are enough people who build super contest ships...*'

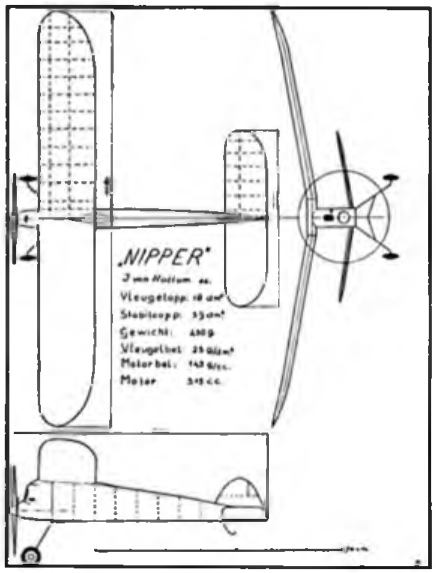
He frequently engaged in quite lengthy translation work in his retirement, which meant that he could not spend as much time as he would have liked on modelling. He was plagued with arthritis, and his stiffening fingers made it difficult for him to draw and build; but he continued to turn out simple designs, albeit at a much slower rate than previously. VH-145 Mentor 6, a one-metre glider; VH-146 Marissa, a 24in small-field rubber duration; and VH-147 Nipper, a





Above: Van designed six beginners' gliders named Mentor, all of one-metre span, during a forty year period. This is VH-90 from 1941.





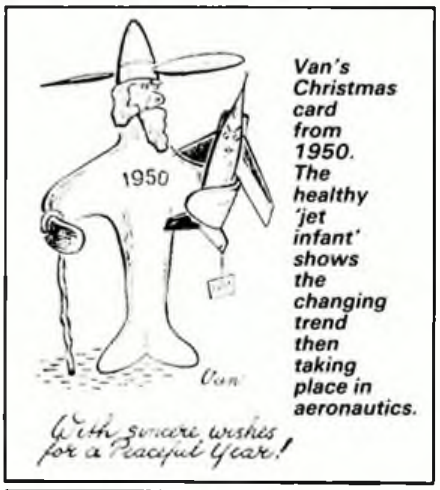
Top: The 63in competition sailplane VH-96 Demon from 1944 was of necessity built from substitute materials, employing much card and hardwood in its construction. Above: VH-98 Nipper, a power model from 1944, featured triangular cross-section rear fuselage and was initially powered with a 3cc petrol engine. Once attracted to a name Van used it again. So there were other Nippers, not all of them power-driven.

25.1/2in pod-and-boom glider were all created with difficulty during this trying time. While he was pleased to be a Life Member of SAM 35 (and had written various articles on modelling history over the years) he had little time for the past - his oft quoted Henry Ford expression 'History is bunk' made this clear, but his real objection to looking back was that it '...holds up the real work...' He was essentially concerned with present day problems of flight and while his final models could be called Vintage Style, they only looked that way since he felt that the time honoured shapes and methods of construction were better suited to beginners' needs than the plastic and foam kits on the market.

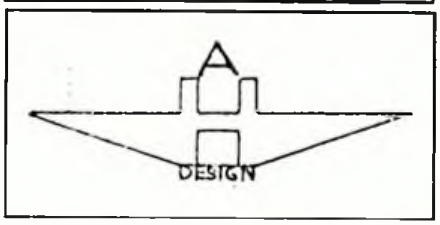
Rascal

While at Delft, Van developed a number of simple small sheet balsa gliders of various configurations to show his first year students that longitudinal stability could be obtained by means other than the conventional horizontal tail behind the wing. After describing nine of the most promising Delft demonstration models in a magazine article, there was a limited model kit production of some in Sweden, and Ron Warring included all of them in the original edition of The Solarbo Book of Balsa Models. One of these designs, based on the Viggen tandem close-coupled canard delta exhibited a slow, stable, parachute type of glide. Experiments showed that this characteristic remained if the foreplane was removed and half-span slats fitted instead. Van called this idea RASCAL

Top of page: A pleasing feature of all Van's books was the splendid artwork. This example is from Part Two of his mid-1940s work. Below: Van is right, as team leader of the Dutch contingent at Eaton Bray during the 1948 Bowden Trophy competition. Modeller at left is J van de Caay, who was the sole Dutch entrant for the same event the following year.



Van's Christmas card from 1950. The healthy 'jet infant' shows the changing trend then taking place in aeronautics.



Left: An early van Hattum insignia from 1931. Far right: Van as he saw himself, with favourite pipe well alight, working on that next design.

Above: Van with Frank Zaic (whom he first met at the 1937 Wakefield) in the Royal Aero Club at Londonderry House during the 1949 Wakefield Contest. Left: Still at it! Van caught during a test flying session with VH-145 Mentor 6 in the mid-seventies before the publication of the design in Model Aviation.

Above: Angular outlines to ease the lot of beginners are apparent in VH-146 Marissa, a simple small field cabin rubber model, one of his last published designs. Below: Rascal gliders showing auxiliary raised slats of different configurations on identical 45 degree delta wing. Models showed good stability. With CG at 40 per cent of the main wing chord, they immediately returned to a level attitude when launched in a bank.

(Raised Auxiliary Slat Control and Lift) and for a number of years he unsuccessfully pursued every possible avenue world wide in order that a wind tunnel evaulation of its applicability to full size practice could be made. He had few illusions that his work was original but, was encouraged when aerodynamicists admitted that they had not encountered the layout in literature and called it 'The Van Hattum Wing'. At least a trial on an R/C model at higher Reynolds Numbers would have confirmed whether the slats could be used for control as well as invigorating the lift of the main wing. Unfortunately he could not build such a model himself, since the arthritic affliction of his hands had become progressively worse and prevented him using even simple hand tools. Nor could he now even tension the shutter of his trusted Voigtlaender camera or use a manual typewriter, but modern technology allowed him to overcome these problems for a time by the substitution of an automatic Canon AF53m camera and an electric 'touch' typewriter; so he once again could take photographs and was soon back to his usual output of several letters per day and maintaned a weighty correspondence ('...the yeast of my life...') with Frank Zaic, Bill Winter, C E Bowden (who intended to try Rascal slats on one of his big deltas), and, of course, with his old Wimbledon Common collaborator, James Pelly-Fry. Sadly, however, Van's condition deteriorated further and he was bed-ridden for a number of years before passing away on 28th July 1989, aged 82 years. The hoped for R/C Rascal never materialised. Perhaps there was no advantage over a canard layout with the added complication of providing large displacement variable incidence slats or... might we yet see practical application of 'The Van Hattum Wing'?

Van had an unquenchable enthusiasm for all things aeronautical – his writings show his sensitive and creative approach to aerodynamics; he was a person who understood aeroplanes and how they worked, and he was keen to pass this knowledge on to others especially those of the younger generation. He loved England and was proud of his connections with it. We in our turn are grateful that Juste van Hattum passed this way; he is part of our aeromodelling heritage.

(The writer acknowledges with thanks the assistance given by Mrs Ann van Hattum, Group Captain James Pelly-Fry DSO, Mr Cor Burger and Aeroplane Monthly.)

GRAND NATIONALS!

Views on Free Flight and Control Line at the '89 National Championships

WHAT an encouraging year! Proof positive that UK aeromodelling is happily thriving was for all to see at the 1989 F/F and C/L Nationals, with few Barkston blues this time round.

Reputation

Flying conditions at both meetings (F/F in May, C/L – and R/C, of course – in August) were just as the Barkston regulars would expect. At times the airfield lived up to its Blasted Heath reputation, although the warm, cheery weather at the F/F Nats, to be maintained as a major feature of that glorious summer, established a merry atmosphere which swept cheerfully through the three days of competition. The value of firm, settled contest direction was again emphasised; but, thankfully, close encounters with the missile compound and surrounding farmland were fewer than on past occasions. Early deterioration of conditions at the C/L Nationals, with a particularly woeful Sunday, meant skilful, hard work on the last day to complete events on time, but the sun finally broke through to give everyone a Nationals at Last. We were delighted to see a notable resurgence of interest in Control Line, boosted, no doubt, by a highly successful – and thus enjoyable – Eurochamps at Three Sisters a month before. Indeed, the impact will surely have been noticed in the pages of this magazine; a flood of bright, comprehensive material has been generated further to enliven the C/L scene.

But onto the most notable feature of this year's National Championships...

Get together?

More than ever, since the Nationals was divided back in 1979, this was the occasion of shared interest. Growing numbers of enthusiasts are enjoying the combined virtues of F/F and C/L. Slow Open Power has gradually become a proving-ground for control-line enthusiasts wishing to indulge in competition F/F; easy availability of suitable motors (well suited to, say, Goodyear involvement) provides healthy cross-fertilisation here. Almost as noticeable – but not quite – was wider participation in the C/L scene; most notably Aerobatics.

Much of the 'all-in' fun remains in the evening on field entertainment at the August Nats. Free Flight sport creations of every type from Vintage favourites to quirky curiosities took the twilight air. At such times of reflection comes the renewed question: Why not amalgamate the two disciplines?

Options

Two points are clear. First, the R/C flightline deserves its own event. Safety considerations alone, given that the current R/C Aerobatic schedule demands plenty of airspace, dictate this. Second, F/F and C/L scale activities which demand little space; both could easily be accommodated at a combined event. The only possible drawback might be the splitting-away of R/C Scale. Acceptable, perhaps...

Another disadvantage of the current system is that the F/F National Championships are decided early in the year, rather that at the climax of the season. Danger to crops at retrieval is unusually quoted as the reason; maybe if the control-liners don't mind, they too could adapt to a May decider. After all, a year must elapse between each discipline's Nats. Isn't May to May just as valid as August to August?

How about runway space? True, the racing and aerobatic circles would occupy the western end of Barkston's runway space as at present; but is that really a serious problem? And F/F models just might, theoretically, drift across the circles – but rarely, given Barkston's prevailing drift. Aren't the odds worth the gamble?

Traders would surely welcome increased attendance; and here would be a great opportunity for healthy PA work to describe the combined activities to the interested spectator. Or is that too difficult a prospect?

We'd like your views. Meanwhile here's a mixed reminder of the splendid '89 Nats – the best-attended, and the friendliest, for many a moon...

Junior and senior; soaring flight and fast circulation – the ideal Nationals mixture.

Main picture: Brian Kenny's newly-refurbished F-82 Twin Mustang looks great – and sounded fine at the Nats. More like this, please! Right: And let's see the Russian Team Racers, too – not just at the Euros! Far right: SIG Magnum kit is a fine aerobatic contender; Nick Evans placed ninth in the Gold Trophy with his in '89. Below right: Fun-loving Ray Moore prepares distinctive F1C craft. Below far right: Large Open Glider model flown by Steve Philpott would provide gentle contrast with sound and fury of C/L racing or speed; surely time to reconsider amalgamation?

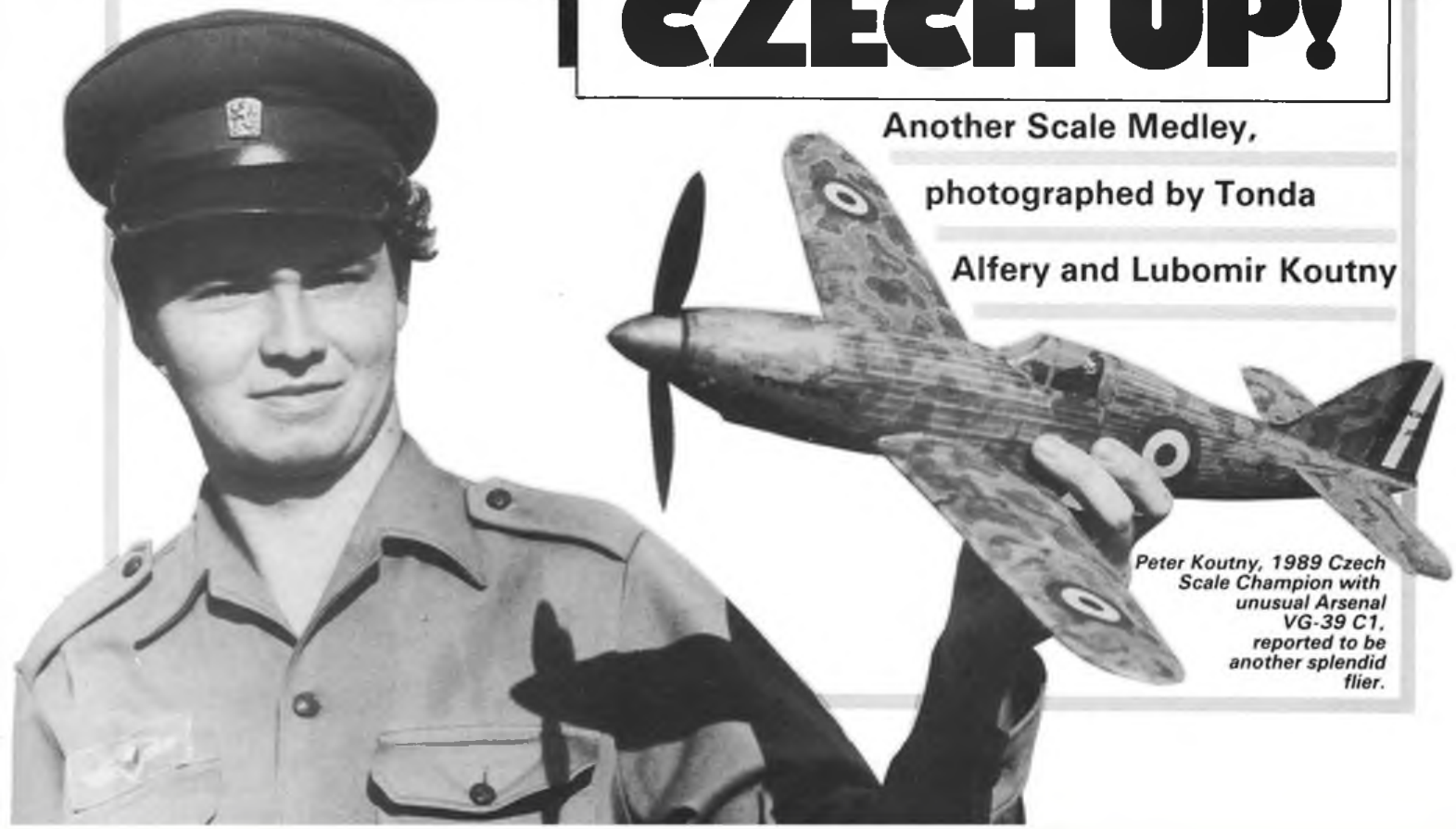
Top left: Tony Brown and multi-spar 1/2A contender. Top centre: George Sharp waits for lift in Coupe d'Hiver. Top right: All the energy of FAI Power evident in this launch shot. Above: Actually at the Eurochamps, Sergei Balesio's Extra 230 for F2B is exactly the type of model – and he is the calibre of competitor – that the Nats should attract from overseas. Right: The colour of control-line racing: Goodyear attracts an ever-greater involvement. Tension shows as the countdown approaches for the McPeake/Crozier craft, down from Scotland at the Nats... Below: Wakefield fly off time as Mike Woodhouse watches the opposition. Below right: Perestroika is with us – bearing in mind recent Soviet involvement at European meetings other than Championship events, isn't it time we saw them at the Nationals? Here's Salsonek's superb eleventh-place Eurochamps stunter.

Above: Tonda's neat Ansaldo A-1 - originally for CO_2, but now with Gasparin diesel and mini-R/C gear! Above right: Zdenek Poduska with all-foam P-63A - a touch heavy at 65 grams but flies well. Right: Sharp airbrushing on Tonda's Telco-powered Boeing P-26A.

Left: Osvald Janisch and his wife prepare Breguet 820, an excellent performer from Lubomir's own plans. Above: Impressive Bristol F2B by Tonda is to common Czechoslovakian scale of 1:20.

CZECH UP!

Another Scale Medley, photographed by Tonda Alfery and Lubomir Koutny



Peter Koutny, 1989 Czech Scale Champion with unusual Arsenal VG-39 C1, reported to be another splendid flier.

A Tale o

John O'Donnell travels North and South with F/F competition in view

This photo: Noel Parry was second in A/1 at the Southern Gala with this straight-dihedralled design. Below left: Good to see new names in the Northern Gala Glider flyoff; Ray Hall and Dave Thomas.

Left: Mike Lester prepares his .40 size Open model. Below: Tim Grey won Coupe d'Hiver at the Southern Gala with this conventional model.

TRADITIONALLY these two, major Open events are held in September; usually a fortnight apart with an Area meeting in between, and another just afterwards. Perhaps I should not ask just why it is necessary to overload the early Autumn like this! Certainly it makes for a very hectic month for many of the regular competitors.

Those who attended both Galas will surely have compared the two. Indeed, such an exercise is interesting. The differences start with the choice of a Friday for the Southern Gala at Little Rissington, whilst the Northern Gala was the usual Sunday affair at Alamein Barracks (near Driffield Aerodrome). The first Friday Gala caused much comment – but now the idea seems acceptable. Getting a day off work does not seem to pose a problem to many modellers... Mind you, it won't be that long before many current contest fliers are old enough to be free of such constraints!

Also noteworthy was the disparity in the number of events held at the two Galas. The Northern meeting had but three SMAE events – Open Rubber, Glider and Power – plus a combined Mini contest run as a Northern Area venture for small cash prizes. In contrast, the Southern Gala had almost twice as many events – again three Open, but also three separate Mini contests plus HLG. All were fully-fledged SMAE events.

In this situation, it was just as well that the Southern Gala attracted by far the larger number of participants – Friday flying notwithstanding. Perhaps there are simply more modellers in the South! Certainly Driffield is considered out-of-the-way by many – but even the locals are far from numerous.

Perhaps it is also worth recording that Little Rissington is still a conventional aerodrome, whilst Driffield has been landscaped to suit its present role as an army training ground. This includes artificial hillocks and similar 'improvements'. An assortment of tracks still permits bicycle retrieving, however.

Sunny and calm

The actual contests were held in remarkably similar weather. Both days were fine and warm, with plenty of sun and only light breezes. Driffield probably had the calmer day, with many maxes only half-way across the drome. Little Rissington had some ominous-looking woods outside the airfield, and these gave trouble to a few fliers with long DTs (or, at least, long descents through strong lift).

Not surprisingly, maxes were commonplace at both meetings, and the flyoffs filled up rapidly. Even so, a couple of events at Little Rissington were decided without the need for extra flights. Phil Ball topped HLG with an excellent 8:00 score against little opposition, whilst Tim Gray won Coupe with the event's only perfect score, just ahead of Gery Ferer and Phil Uden who dropped a few seconds apiece.

f Two Galas

The rest of the Southern Gala events needed the usual flyoffs, spread out over a two-hour period during which the breeze decreased steadily. Taking things in order, the A/1 flyoff had three qualifiers, but only two participants. Colin Sharman had lost both his models in the downwind woods, and had to settle for third place. Noel Parry had a straight-tow (and straight-dihedral) model, but launched into poor air to leave John Cuthbert home-and-dry for the third year in succession. Such aeromodelling hat-tricks are not common - and should be credited when achieved.

Next was 1/2A Power, which saw Stafford Screen and Pete Watson fly early with fast climbs into good air, to finish in the order given. Eric Redfern flew that little bit later, but the lift had gone, and he had to be content with third position.

There was still obvious lift for the three-way Open Glider flyoff. John Bailey was first to launch, and soon appeared to be in very useful air. Off to one side Gordon Beal not only found better lift, but drifted in a totally different direction for what proved to be the winning flight. Surprisingly, John Carter missed both patches of lift, and eventually recorded a disappointing score of under two minutes.

Open Rubber followed with a round dozen qualifiers. The lift had apparently gone, so no-one seemed to find any real help. William Beales won with a 265sq in. (wing area) own-design model that looked remarkably like a Hipperson aeroplane! He was using the new 'Tan' FAI rubber, and apparently got very high. This got him almost over the thick Tangly Wood (as it is named on the relevant OS map) that claimed the models of Matthew Chapman, George Sharp and Phil Ball. I repeated my Nationals trick of drifting exactly over an obstruction at the far side of the drome, and losing a lot of score in consquence. All I needed was another three seconds! Still, I am sure the Flight Cup will mean a lot more to Williams than it would to me...

Over-runs...

The last of the fly offs was for Open Power with eight fliers, plus Julian Hopper who opted out. This was his answer to an earlier official protest regarding the engine runs for his three maxes. Other competitors check-timing this claimed that he was consistently over-running by a quarter of a second, or so. The timekeepers obviously thought otherwise. Julian used his normal helpers for his first two flights, but not for the third. Predictably, the protest was not accepted by either the CD or the jury - but the damage was done, as Julian refused to fly off. The incident can reflect little credit on those involved in the complaint, particularly as I have heard similar (or different) accusations too often of late.

Ironically the Power flyoff was won by Trevor Payne - who had timed Julian's final max! From what I hear, Trevor had the best pattern and transition in the flyoff - and reaped the benefits by having the necessary lead over Peter Watson and Russell Peers. Scores were unimpressive, so the air must have been pretty dead. By now, of course, it was getting late. In fact, by the time I returned from retrieving my flyoff (a straight forward there-and-back recovery) it was too dark to read the list of results dutifully recorded by my wife! The CD (Ian Bracken yet again) had already left, but I understand that there had not been a prizegiving.

Northern notes

Two weeks later, the Northern Gala really was a flyoff contest, with all events needing the extra flight. CD Ray Hoff decided to hold the Combined Mini flyoff first. The definition had been extended to include Mini-Vintage - an aspect I discovered too late in the day to utilise! Len Aukland was better informed, and flew his Hepcat folder lightweight to second place - well ahead of the A/1s, but equally well behind the winning 1/2A of Gordon Cornell. His power model was unusual in employing egg-box structures for both wing and tail.

Power was the first of the Open flyoffs - with nine of the fifteen fliers having qualified. The final outcome was hardly what would have been expected, as Ray King topped the results by a clear half-minute using a F1C model. Certainly he had good air, thanks to flying early; but he also had a textbook climb and transition. It all helped edge out the .40-powered Open models. Russell Peers was second despite a slightly off-pattern climb, followed by half-a-dozen very close scores. Last to fly, having waiting to almost the end of the fifteen-minute period, was Julian Hopper, who was watched by almost every-one. A good climb and recovery was to no avail, as the engine stopped, paused and then gave a little burble. How this could happen is difficult to explain, as the K&B .40 was equipped with a Brodersen brake. But happen it did, and Julian was out of contention with a fractional over-run and no time to refly. I'm only surprised that the watches were not stopped when the motor first appeared to cut. The flight itself was good enough to have been worth second place - sickening!

There were six in the glider flyoff despite most of the better-known entrants having dropped score, usually early in the day when the air was said to be tricky. Surprisingly, the select few were divided evenly between the Birmingham and Morley clubs. When the flyoff period started a couple of circlers were soon up, and circling. In the very calm conditions the straight-tow fliers waited and watched - but not for long enough. The help available was very weak, although Peter Watson (yes, the power flier) eventually found just enough to clear three minutes for a comfortable win over his clubmates Alan Gibbs and Bill Colledge. Meanwhile Doug Bartle had towed-in, and consequently attempted to relaunch. Alas, time ran out on him.

Open Rubber was held last in very calm conditions. The best time to launch was early, as shown by Russell Peers and Dennis Davitt who both got away right at the start of the period. Dennis flew an enormous model (of 560sq in wing area) that must have been in lift to climb as high as it did. I broke a motor at this stage, so flew at about the time Russell's model landed at just over ten minutes. Nevertheless I managed an up-and-down flight that was enough for second place - again! Dennis Davitt's eventual time for almost fourteen minutes was quite remarkable - and he looked very pleased indeed. Not so pleased was Len Aukland who did over nine minutes - and didn't place.

In these conditions the fliers were back from retrieving very quickly - so the prizegiving was noteworthy in that the winners were actually there to collect their awards in person. A fitting end to a remarkable day! It was also a pleasant change to leave the airfield in daylight.

To sum up - if such is required - two good contests. I'm glad I went to both!

Southern Gala
Friday 1st September 1989: Little Rissington

Open Glider (27 entries; 21 scores)

1 G. Beal	9:00 • 5:06

Open Rubber (27 scores)

1 W. Beales	
2 J. O'Donnell	9:00 • 7:27
3 M. Chapman	• 7:25
	• 6:45

Open Power (16 scores)

1 T. Payne	
2 P. Watson	9:00 • 4:22
3 R. Peers	• 4:14
	• 4:01

A/1 Glider (11 entries; 10 scores)

1 J. Cuthbert	
2 N. Parry	10:00 • 1:55
3 C. Sharman	• 1:08
	• No flyoff

Coupe d'Hiver (17 entries; 12 scores)

1 T. Guay	
2 G. Ferer	10:00
3 P. Uden	9:54
	9:50

1/2A Power (14 entries; 13 scores)

1 S. Screen	
2 P. Watson	10:00 • 5:04
3 E. Redfern	• 4:26
	• 2:36

Hand Launch Glider (11 entries; 9 scores)

1 P. Ball	
2 G.L. Smith	8:00
3 T. Hopgood	5:55
	5:14

Northern Gala
17 September 1989; Driffield, Alamein Barracks

Open Glider (18 entries; 18 scores)

1 P. Watson	
2 A. Gibbs	9:00 • 3:03
3 W. Colledge	• 2:49
	• 2:37

Open Rubber (16 entries; 15 scores)

1 D. Davitt	
2 J. O'Donell	9:00 • 13:51
3 R. Peers	• 11:27
	• 10:01

Open Power (16 entries; 15 scores)

1 R. King	
2 R. Peers	9:00 • 5:24
3 S. Screen	• 4:50
	• 4:03

All-in Mini (9 entries; 9 scores)

1 G. Cornell	
2 L. Aukland	10:00 • 3:10
3 A. Gibbs	• 2:32
	• 2:05

FOAM

Part Three of Steven Midson's look at foam modelling techniques

fun fol

AS you will have realised from earlier articles, working with foam sheet is very different from traditional aeromodelling methods.

If you start from scratch, the foam you buy will be in a roll and when a piece is cut off it will curl up when released. It is therefore necessary to flatten it by ironing between two sheets of paper. The heat setting of the iron must be found by trial and error - start cold and gradually increase. When the foam melts and sticks the two pieces of paper together, the iron is too hot! See Fig. 1.

After ironing there may be a slight residual curvature, but this does not matter and can sometimes be used to advantage to give unreinforced pieces strength and shape - for example, right or left rudder. Also - especially when making single-thickness wings - curvature of the foam helps assembly, as long as you use it the right way round!

If you buy one of the several sheet foam model kits that are now available, this and many other stages of construction have been done for you.

Rough cutting of the foam can be with scissors, but the finished edge should be cut with a sharp razor or similar blade.

The foam can be marked with biro or fibre tip pen, or with a soft pencil. The latter tends to put a small groove in the foam. The problem with biro or ink is that it shows on the finished model, so it is suggested that the pieces are marked with the line on the outside of the piece, i.e. with the INSIDE of the line the correct size, and that you cut off the line to leave clean part. See Fig. 2.

This system is somewhat different from the traditional method of cutting on the waste side of the line; takes some getting used to - but works well.

A deviation from the traditional 'make the frame and cover' sequence is suggested for the fuselage. Start by cutting the foam sides then glueing the reinforcing strips and vertical spacers to them (on the inside).

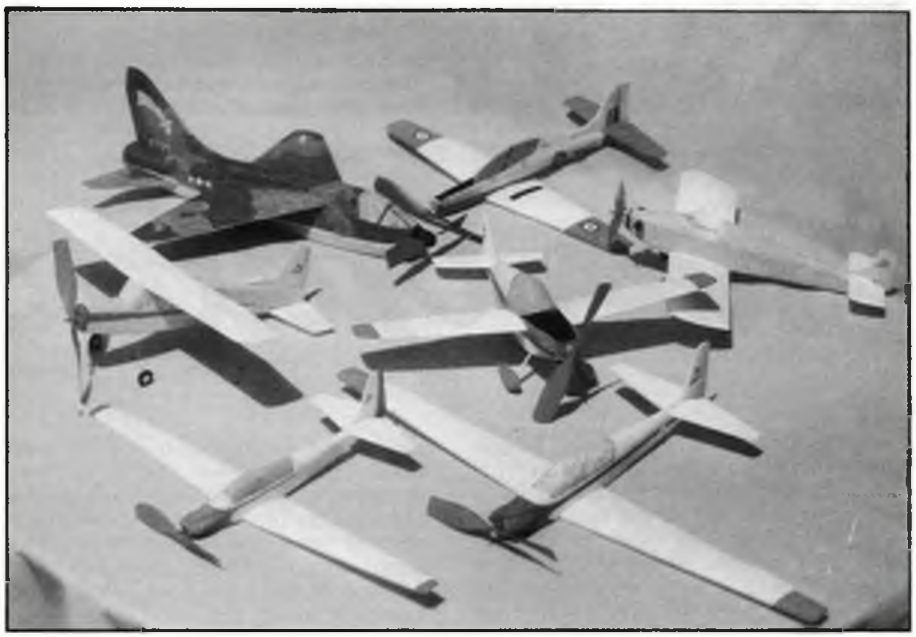
Next add the cross-strips. For simplicity I lap these over the longitudinal strips rather than make an 'end-on' join. For convenience I also make up a cardboard assembly jig for this stage of construction.

Any undercarriage assembly and bulkheads should now be added, before fixing the top and bottom panels.

Wing construction is also different. The arrangement to make a single thickness wing was described in the previous article, and the sequence for making a double surface wing is shown in Fig. 3. Do not make two left hand wings - it is very easily done!

As the foam has some inherent strength it can be simply bent over the spars, no wing ribs are essential.

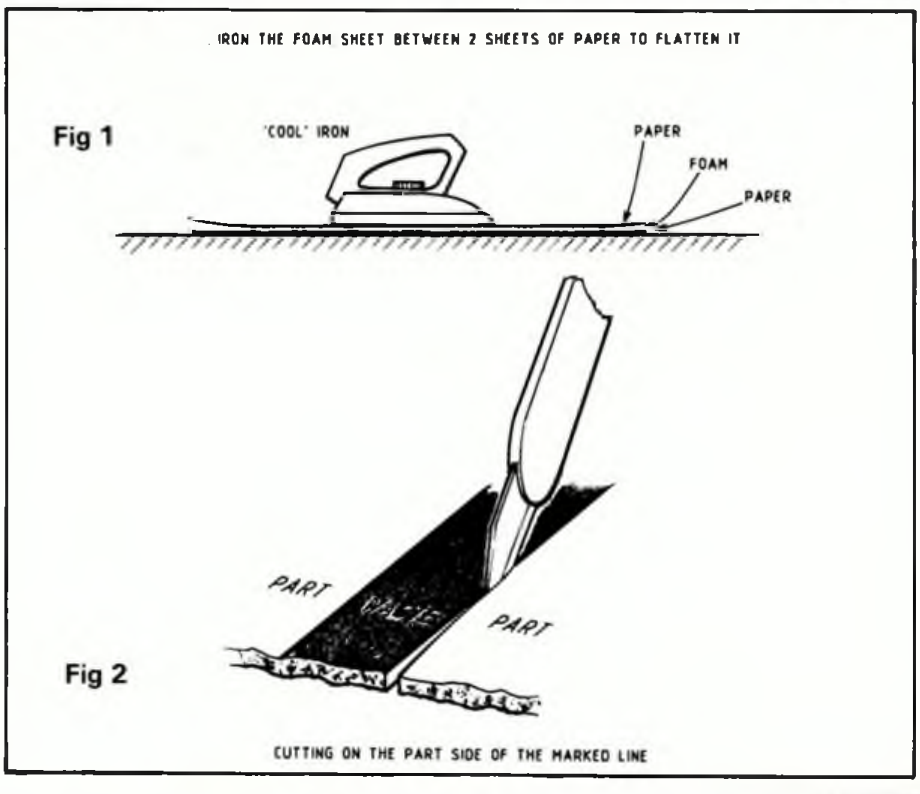
The tailplane and fin can be single or double thickness, with or without reinforcing strips - whichever you wish. Fig. 4 shows a sequence for making a double-surface tail, similar to, but slightly different from that for the wings.



Finishing and colouring

You now come up against the one problem that has possibly restricted the use of sheet foam as an aeromodelling material over the years, and makes it uncompetitive in scale competitions; the open texture of its surface.

For minimum weight the model should be flown 'white'. However, even a small amount of colour completely transforms a scale style model and brings it to life.



Acrylic or plastic enamels, used well thinned, are recommended. Some other paints and finishes dissolve the foam, so try a sample first.

Airbrushing is preferable as the paint then penetrates into the spaces between the cells of foam. Brush painting tends to leave white spots amongst the painted surface, particularly if a dark colour is chosen.

From only a few feet away you cannot see the surface detail, but if it is essential that you cover your model, I suggest you do some tests first to decide on the method you are going to use. Do not paste on and water shrink - you will distort the foam.

The most successful method I have found is to glue a piece of tissue over a wooden frame, water shrink, then spray paint with thinned acrylic to the colour required - the paint adds very little weight.

Sparingly glue the smooth tissue to the foam making sure it is taut. Do not attempt to spray or shrink it again. This is more easily achieved if small pieces are used, and an interesting lining effect results if you overlap at the edges.

Trimming and flying

I find a balance point at approximately 25 per cent chord works well with longitudinal dihedral of one-and-a-half to two degrees. On models with a short tail moment, such as 'jet' outline models, this angle needs to be increased to three or even four degrees.

Foam bends easily but gradually returns to the position it started from, which is infuriating if you are relying on bending to trim the model. To overcome the problem, thin fusewire can be glued on or in the control surface, or alternatively a card trim tab may be added to the foam. Yet another which (which looks very realistic) is to cut out the rudder/elevator/ailerons, and to tack glue them into their flying positions.

Add downthrusts as needed to take off the effect of the initial high power from a fully wound motor.

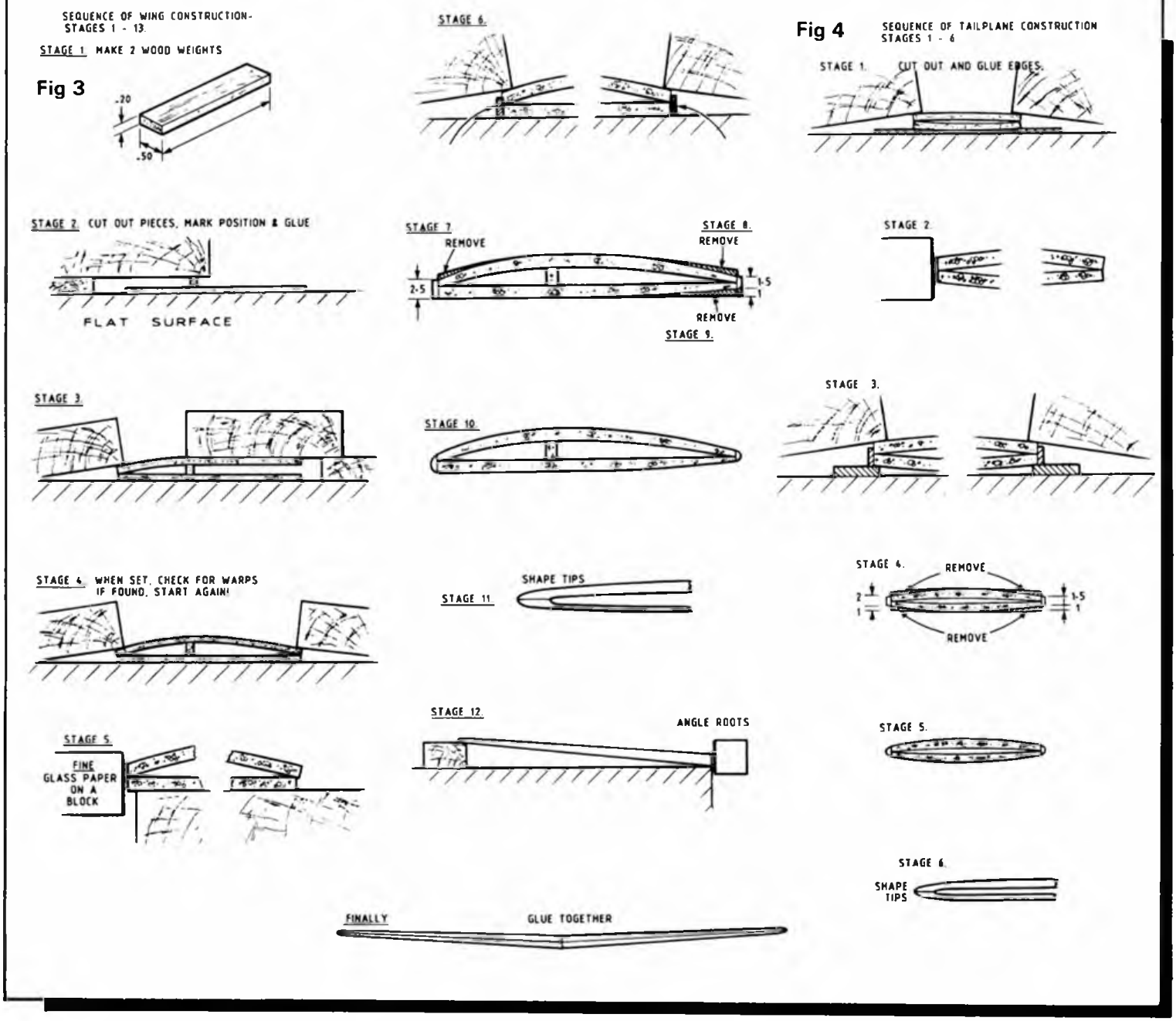
At the risk of stirring up a hornets' nest, I think flying to the right is preferable to the more easily obtained left-hand turn which is induced by propeller torque.

As the foam structure is very light compared with the weight of the rotating propeller, I feel there is a significant gyroscopic effect which tends to put the nose down when turning right, but to pull the nose up and induce a stall when turning left. This is particularly undesirable with a slow model flying close to its stalling speed.

To overcome the left turn tendency, reasonable amounts of right thrust and right rudder are needed, plus a bit of 'right hand down a bit'.

I leave the thought with you.

Next month we will publish two plans to give you a chance to try out the processes described in this series.



Smooth technology

Mike Woodhouse

reports technicalities from the 1989

Holiday on Ice meeting at Norway

THERE IS always something of interest at International Contests. The Holiday on Ice was no exception. As mentioned in the report on the event (*Aeromodeller*, June issue). Stefan Rumpp of West Germany was using a Kevlar D-box structure on his F1A. The structure is similar to that used by Isaenko, as described in the May 1986 *Aeromodeller*. The D-box is made from one layer of 58 gram Kevlar and one layer of 36 gram Kevlar. The weave of the '58' lies square to the structure, and the 36 gram is aligned at 45 degrees. To reduce the amount of resin needed, the open weave of the Kevlar is closed up by carefully 'shunting' the threads with a smooth-edged spatula. Even when the resin is set, the Kevlar is still flexible, so the tendency for it to bow between the ribs is reduced by the use of two riblets per panel.

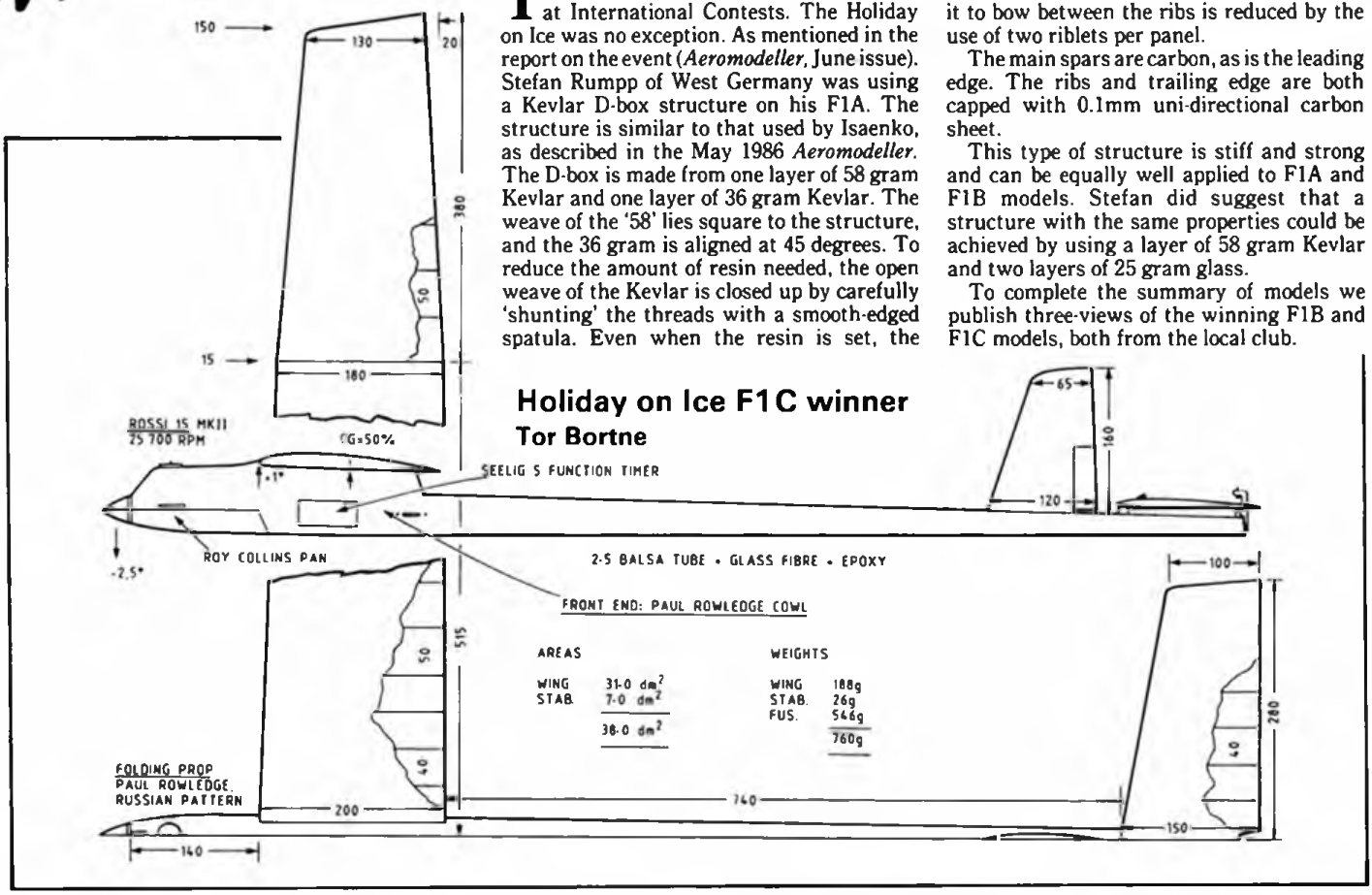
The main spars are carbon, as is the leading edge. The ribs and trailing edge are both capped with 0.1mm uni-directional carbon sheet.

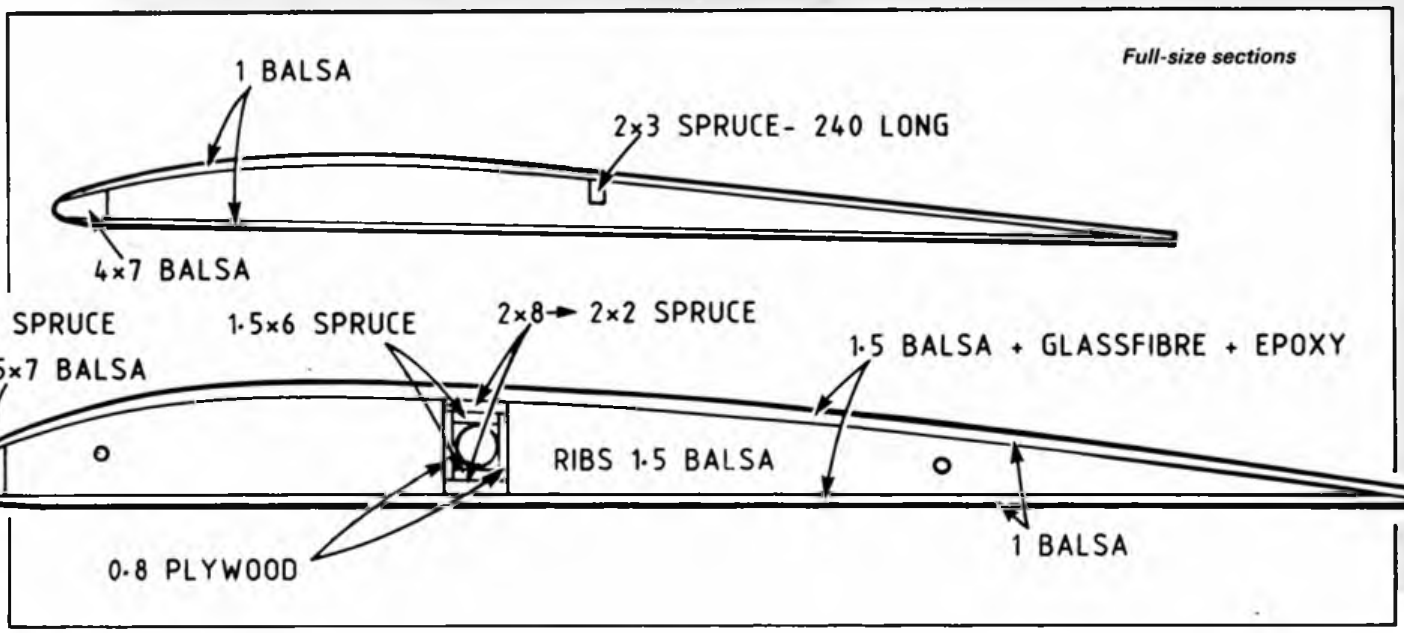
This type of structure is stiff and strong and can be equally well applied to F1A and F1B models. Stefan did suggest that a structure with the same properties could be achieved by using a layer of 58 gram Kevlar and two layers of 25 gram glass.

To complete the summary of models we publish three-views of the winning F1B and F1C models, both from the local club.

Holiday on Ice F1C winner

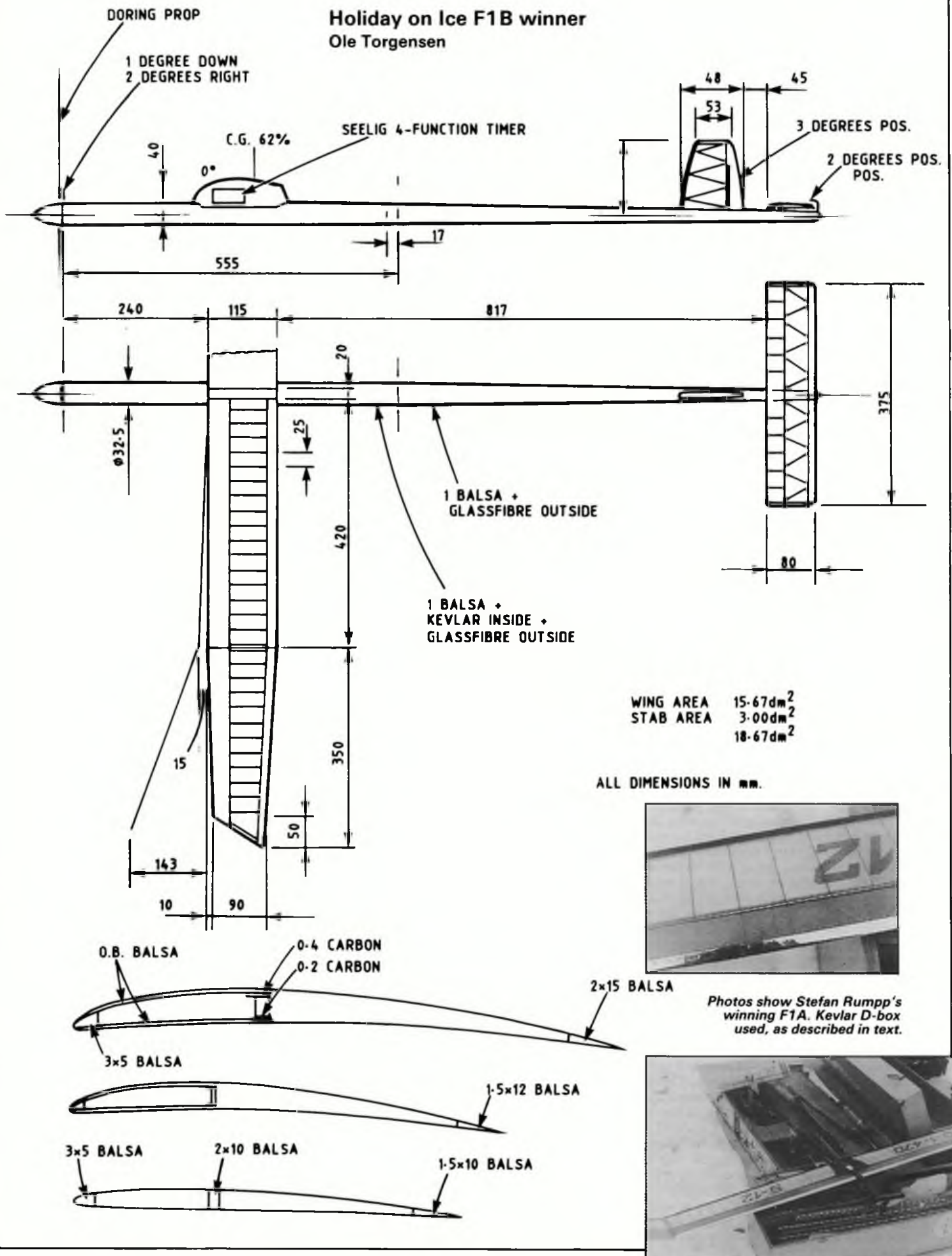
Tor Bortne



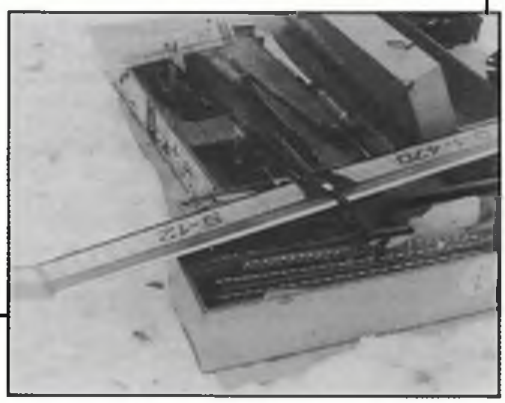


Holiday on Ice F1B winner

Ole Torgensen



Photos show Stefan Rumpp's winning F1A. Kevlar D-box used, as described in text.



January 1990

Mallorca continued from p.16

1989 Mallorca International

F2A

1	P Halman	GB	286.62	302.26	268.25	276.49	302.26
2	D Brewin	GM	276.49	270.47	270.47	270.47	
3	R Metkemeijer	NL	250.52				

4 I Mander GB 268.07 5 R McGladdery GB 264.51 6 S Smith GB 261.05 7 C Olive S 219.24 8 D Ratcliffe GB 8: A Pujalte S

F2B

1	C Maikis	D	742	696	661	1428	

F2C

1	Smith/Brown	GB	3.34.5	3.32.2	7.10.7	7.21.8	DQ
2	Surugue/Metkemeijer	F/NL	3.36.5	3.32.7	3.39.8	3.31.7	
3	Langworth/Campbell	GB	3.44.5	3.41.0	3.50.3		

4 Florit/Crespi S 5 Sancho/Olive S 6 Mata/Pastor S 7 Frye/Short GB 8 Liebanas/Ferran

I had various troubles with my Irvine 15 keeling over mid-run, later traced to vibration from poorly-prepared props and/or the tank contacting the body internally. Steve Smith, flying an old MkIII Rossi 15 (Halman shaft, line and piston) managed 162kph but needs better props and more attention to the engine – his 'preparation' presently consists of a shot of WD40 at the end of a flying session. Carlos Olive struggled with even more ancient Rossi MkIII and did well to wring 219kph out of it. Tony Pujalte was similarly equipped, but his Rossi was even more tired than Carlos', and he couldn't manage ten timed laps. Des Ratcliffe, UK recruit to F2A, discovered that they can be tricky beasts to fly, and generated a lot of repair work for himself, unfortunately without any reward for his effort.

Team race topics

The F2C (team racing) entry was small, only eight, but the performance level was still formidable, with some close and exciting racing. To reach the final, a sub-3:40 time was needed, and although the finalists were easy to predict, the opposition was not that far behind. The final started well, all three getting away were first to pit, being shorter on range than the others, Colin Brown doing his usual lightning-fast catch/fill/flick/away. Langworth/Campbell came down next, followed about a lap later by Surugue/Metkemeijer. This resulted in S/M gliding in over L/C just as the latter restarted – Langworth/Campbell's model came up and collided with S/M's underside, pitching the former back into the tarmac and causing the latter to do an extra lap on the glide. An inspection to check for critical damage used up vital seconds, fortunately there were only a few propeller chop-marks, and S/M set off in pursuit of S/B. The race then progressed uneventfully, with no-one making any mistakes, and Smith/Brown finished just eleven seconds in front. But for the first-stop collision, it could have been a very close thing. Equipment-wise, Smith/Brown had their Cippola as usual, Surugue/Metkemeijer used the former's Nelson-based engine, and Langworth/Campbell's engine was their own concoction based on a Burford case with some Nelson parts and some of their own manufacture. The four Spanish teams were a bit outpaced by the visitors, but acquitted themselves well and probably learnt a few tricks from mixing it with such high-class opposition.

So we all had a thoroughly enjoyable competition and holiday and we all want it to be bigger and better next year, but more support from mainland Europe is needed to sustain this as an annual event. Sweden should be coming next year, and it is hoped that as the event becomes more widely known, more will join in. It is difficult to find superlatives to adequately express the sheer enjoyment that this event provides, and all those who attended this year I'm sure will join in a big 'Muchas Gracias' to the members, wives and families of the relatively small Mallorca Club for their hard work, setting up the equipment, time-keeping, lap counting, marshalling and so forth, and for their imagination and enterprise in mounting a contest in such idyllic surroundings.

High Potential: continued from p.15

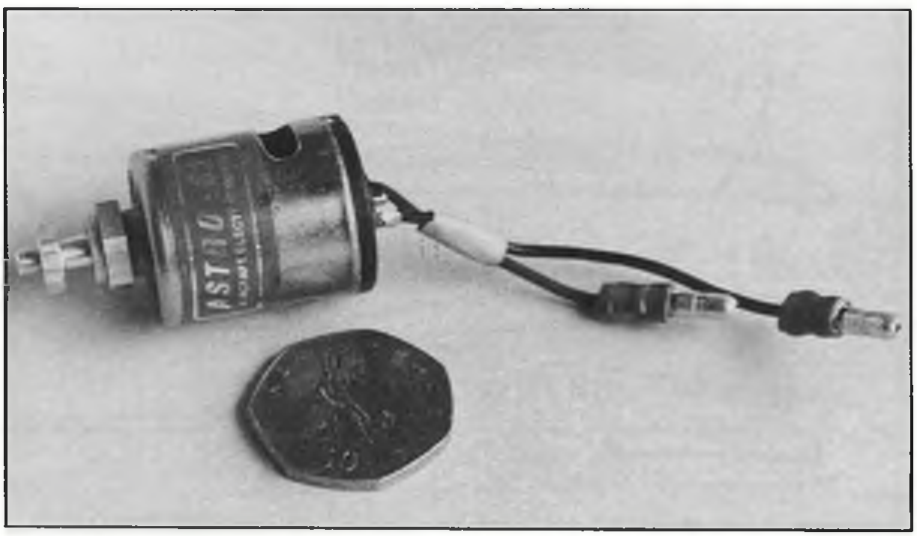
to put a 540 size motor in it, which would have been way too much power and weight, so has kindly donated it for research. The details of the actual installation will have to wait for another article, but hopefully by that time I will be able to report on flying performance as well.

Kit it out

Finally, just to whet your appetite, here are some pictures of the small HiLine units. These are supplied in a rather different form to usual. What you get is a kit of parts to build up two geared units, using mostly standard bits and pieces obtained by HiLine from various sources. The motors are the familiar 'flat' disc camera type with a very fine winding which is too low-powered for flight; so you are also supplied with a reel of rewinding wire and an excellent set of instructions for doing the rewinding (remember the similar instructions in an earlier High Potential?). Once you have rewound the motor it can be assembled as a geared unit by cyanoing on precut thin ply end plates and making up a piano wire propshaft to run in the small brass R/C servo gears. The tiny pinion is simply press fitted to the motor shaft with a bit of cyano for security, whilst the main spur gear is held with a soldered tin stirrup engaging two flats cut into the small pinion which is moulded integral with the bigger gear. This seems to be quite a good and positive arrangement and neatly overcomes the usual difficulty of firmly attaching the output gear to a thin wire shaft. The only special bit is the prop adaptor which consists of a brass threaded turned component designed to be slipped on the end of the 16swg wire layshaft and soldered in position. Small props of the Williams and KP type can then be clamped up between small nuts making for an easy change system as on a conventional motor. The actual gear ratio seems to be about 5:1 which is similar to the KP01. Performance is pretty dependent on how much care you take in setting up the mesh of the gears by adjusting the position of the ply endplates before firmly glueing in place. Thus this system is not quite so foolproof as the ready-made product, but you do get two motors potentially for the price of one. The motors themselves are available at very low prices for those who want to tinker and make up their own gear systems. You can buy a pack of 10 motors for only a few dollars! I must say that the set of instructions that come with each motor kit are excellent and contain much useful advice on electric flight in general covering such aspects as charging and installation as well as motor preparation. Address to write to is: HiLine Ltd, PO Box 341283, Bethesda, Maryland 20817, USA.

With all the superb summer weather we have had I am expecting lots of reports from you all out there on your electric experiences; do write in and share them with us all!

Astro 02 is another splendid power unit for medium-sized aircraft, also no longer in production.



FREE ISSUES

A subscription to your favourite magazine is the best way of making sure you never miss an issue.

And from now until 28th February 1990 you can get extra copies ABSOLUTELY FREE, by taking advantage of our special Christmas subscription offer. With a monthly title for example, this means you get 15 issues for the usual price of 12.

Order your subscription today using the coupon below and you will receive the best in reading entertainment right into the 1990's. This offer is also open to subscribers wishing to extend/renew their current subscriptions.

Standard subscription rates ▶ ▶ ▶

	UK	Europe	Middle East	Far East	Rest of World
Monthly titles (15 for the price of 12)					
A & B Computing	£21.00	£30.30	£30.60	£34.10	£31.25
Aeromodeller	£23.40	£28.20	£28.40	£30.20	£28.70
Antique Clocks	£27.00	£32.40	£32.60	£34.70	£33.00
Citizens Band	£18.00	£21.95	£22.10	£23.60	£22.35
Commodore Disk User	£33.00	£39.00	£39.30	£41.60	£39.70
Electronics Today International	£18.00	£22.20	£22.40	£24.00	£22.70
Film Monthly	£16.80	£21.10	£21.30	£22.90	£21.60
Ham Radio Today	£18.00	£22.50	£22.70	£24.40	£23.00
Micro Music	£21.00	£28.00	£28.30	£30.90	£28.80
Military Modelling	£18.00	£24.80	£25.10	£27.65	£25.50
Model Boats	£18.00	£22.40	£22.50	£24.20	£22.80
Model Railways	£16.80	£22.70	£22.90	£25.10	£23.30
Photography	£23.40	£30.50	£30.75	£33.45	£31.25
Popular Crafts	£18.00	£23.30	£23.50	£25.40	£23.80
Radio Control Model Cars	£17.40	£22.30	£22.50	£24.35	£22.80
RCM&E	£16.80	£22.80	£23.00	£25.30	£23.40
Radio Modeller	£16.80	£22.40	£22.60	£24.80	£23.00
Renovate	£18.00	£22.80	£23.00	£24.80	£23.30
Scale Models International	£18.00	£21.45	£21.60	£23.35	£21.90
Video Today	£18.00	£23.20	£23.40	£25.35	£23.70
Video X	£18.00	£22.30	£22.50	£24.10	£22.80
Which Video?	£18.00	£22.35	£22.50	£24.15	£22.80
Woodworker	£18.00	£25.20	£25.40	£28.10	£25.90
Your Amiga	£23.40	£29.00	£29.20	£31.40	£29.60
Your Commodore	£23.40	£31.00	£31.30	£34.20	£31.80
Alternate monthly titles (8 for the price of 6)					
Radio Control Boat Modeller	£8.70	£11.30	£11.40	£12.35	£11.55
Radio Control Scale Aircraft	£13.50	£16.65	£16.80	£17.95	£17.00
Practical Wargamer	£11.70	£14.80	£14.90	£16.10	£15.10
Fortnightly title (28 for the price of 24)					
Model Engineer	£31.20	£40.20	£40.50	£43.90	£41.10

Please commence my subscription to ..... with the ..... issue.

I enclose my cheque/money order for £..... made payable to ARGUS SPECIALIST PUBLICATIONS

or debit my Access/Barclaycard number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐ Card expiry date .....

Signature ..... Name .....

Address .....

..... Postcode .....

Please return this coupon with your remittance to:
Infonet Ltd. (AMF1/3) 5 River Park Estate, Billet Lane, BERKHAMSTED, Herts. HP4 1HL UNITED KINGDOM.

AERO MODELLER

Rates: Lineage 49p + VAT per word. Min 15 words. Display box rates £10.00 per single column cm (minimum size 2.5cm).
Write your advert in BLOCK CAPITALS in the grid below, ticking the section you wish to appear under including your name and address in the word count and send it to: **AEROMODELLER CLASSIFIED ADVERTISEMENT DEPARTMENT, ARGUS HOUSE, BOUNDARY WAY, HEMEL HEMPSTEAD, HERTS. HP2 7ST.**

CLASSIFIED COUPON

ALL CLASSIFIED ADVERTISEMENTS MUST BE PRE-PAID. THERE ARE NO REIMBURSEMENTS FOR CANCELLATIONS.
I enclose my Cheque/Postal Order for £ ..... for ..... insertions, made payable to Argus Specialist Publications.
(* Delete as necessary) or
PLEASE DEBIT MY ACCESS/BARCLAYCARD NO. EXPIRY DATE

£ ..... for ..... insertions

Name .....
Address .....
..... Post code .....
Daytime Tel. No: .....
Signature ..... Date .....

IF YOU DO NOT WISH TO CUT YOUR MAGAZINE, PHOTOCOPY THIS FORM

CLASSIFIED advertisements

We accept Access/Barclaycard

Private and trade 49p + VAT, minimum 15 words. Display box rate £10.00 per single column centimetre (minimum size 2.5cm). All advertisements are inserted in the first available issue, unless specified otherwise.

Write your advert in **BLOCK CAPITALS** indicating the section you wish it to appear in, **INCLUDING YOUR NAME AND ADDRESS** and send it to: **AEROMODELLER, CLASSIFIED ADVERTISEMENT DEPARTMENT, ARGUS HOUSE, BOUNDARY WAY, HEMEL HEMPSTEAD, HP2 7ST. Nick Peters Tel: 0442 66650.**

FOR SALE

Remakes of the 1952-1953 series of German Graupner TAIFUN diesel engines. Cast in original dies. Supplied with reprints of original boxes and instructions. Immediate delivery; limited series of 100 each. Catalogue (64 pages) showing many Germany vintage kits of 1938-1963. £2.

TAIFUN Blitz
2.47cc
£95

Mail orders
less 14%
German VAT
Ball bearing types 2.5
and 3.5 coming soon

TAIFIN Junior 0.98cc
TAIFUN RECORD
1.48cc **£90 each**

A-M-Z, Im Strasser Feld 29, D5120 Herzogenrath, F.R.G. 2406/5952 (After 6.00pm)

CHINESE RACING MOTORS
Glows - 049, 061, 09, 15, 21, 60.
T/R Diesel 2.5 + Carb.
Brochure and prices from
PETER CARTER
27 Alexandra Rd., South Woodford, London, E18 1P2
(01) 530 5360

CLEAR MELINEX SHEETS HIGH QUALITY
10½ x 6½ x .007 inches
£1 for 5 sheets
£8 for 50 sheets incl. P&P (UK)
PFT CO.
2 Waterside, Hamm Moor Lane, Weybridge, Surrey KT15 2SN.

VINTAGE and collectable model engines. Call in to Godalming RC Models, 3, & 3A Bridge Street, Godalming. Shop hours 10.30am - 5.30pm Mon - Sat. The Shop with the stock.

SELL YOUR ITEMS IN AEROMODELLER CALL 0442 66551

THE PEATOL LATHE

£140 including 3 or 4 jaw chuck. Milling attachment and other accessories available. Centre height 2". Distance between centres 9".
Please send S.A.E. for full details
Peatol Machine Tools, A.M. 19 Knightlow Road, Harborne, Birmingham B17 8PS Price inc. VAT

MULTIPLEX

in IRELAND

MULTIPLEX FM Module R/C Systems
SPORT - COMBI - PROFI - the top WEST GERMAN 35MHz Equipment

O.S. ENGINES

IRELAND'S LARGEST SELECTION OF KITS & ACCESSORIES by:
Kavan, M.F.A., Ripmax, Veron, Zinger, Multiplex, Irvine, Humbrol, Micro-Mold, Keil-Kraft, SOLARFILM, etc.

FUTABA R/C SYSTEMS

W.J. OWENS 41 Main Street, Bray, Co. Wicklow.
Tel: Dublin 863664. Wed. - Closed 1pm

SAMS
INDOOR, FREE, FLIGHT, VINTAGE. NEW FREE 1100 ITEM BUFF 89/90 CATALOGUE (FREE)
9 x 7 26p SAE to
SAMS
The Chapel, Roe Green, Sandon, Nr Buntingford, Herts SG9 0QJ
Telephone (076) 388 384
Available also in French. Overseas send 4 Postal Coupons. Sorry no callers.

PLANS

MODEL REDUIT D'AVION PLANS
The full range of detailed plans from this long established French Magazine are now available in the U.K. *89/90 Catalogue with over 650 illustrations costs only £3.50 incl. post.* Plans can be ordered in UK currency.
KIP MARKETING
33 Yorke Gardens, Reigate, RH2 9HQ

SERVICES

AM, COX, FOX, P.A.W., Silver Swallow, Motor Spares & Services. John D. Haytree, The Haven, Rixey Park, Chudleigh, Devon. TQ13 0AN. Tel (0626) 852330 Access, Visa.

GLIDING

Now try it full size!
Courses and membership open to beginners and experts. Un restricted air space. Trial lessons just **£15.00**

Norfolk Gliding Club
Tibenham Airfield,
Norfolk 037 977 207

Try Somewhere Different...
Visit our ridge top gliding site at Nympsfield in the Cotswolds. We can teach YOU to fly at our superbly situated scenic site. We have a residential clubhouse, bar and professional instructors. Treat yourself to an excitingly different holiday. Courses run from mid April to October.
For further information please call
Stan Franklin on
0453 860342 860060
or write to the
Bristol & Gloucestershire Gliding Club,
Nympsfield, Stonehouse,
Glos. GL10 3TX.

Gliding Holidays

At Britain's most famous and best equipped club!
Friendly, professional instructors! Scenic Dunstable Downs Location! No experience necessary! Free colour brochure.
London Gliding Club
Tring Road, Dunstable, LU6 2JP. Beds.
(0582) 663419

GLIDING HOLIDAYS

Now you've built a model
Why not build a full size aeroplane? Join the Popular Amateur Aircraft industry with the **Popular Flying Association** and learn how to build your own flying machine. Send 75p for information pack.
POPULAR FLYING ASSOCIATION
Terminal Building, Shoreham Airport, Shoreham by Sea, Sussex, England
Tel Shoreham by Sea 61616

PEAK SCHOOL OF HANG GLIDING
TRY THE FRIENDLY PROFESSIONALS
For further FREE information contact:

PEAK SCHOOL OF HANG GLIDING
The Elms, Welton, Nr. Ashbourne, Derbyshire DE6 2AF

CALL CHARLES UCHEOBI ON 0442 66551 TO ADVERTISE

KITES

DISCOVER A NEW WORLD-OF KITES
• EASY TO FLY
• BRILLIANT COLOURS
• TOUGH SAILCLOTH FABRIC
• FAST MAIL ORDER
(credit cards welcome)
Please send stamp for free illustrated catalogue
MALVERN KITES, Unicorn Yard, Malvern, WR14 4PZ. Tel. 06845 65504.
MAIL ORDER HOTLINE 06845 60100
Ideal gifts for all ages

WANTED

WANTED: Kits and plans for "Flying Model War planes: An International Guide Book." Individuals and Companies encouraged to register. Contact: John Fredriksen, 69 Flamingo Drive, Warwick, RI 02886 USA.

WANTED - Ready-built model aircraft, boats, yachts, cars, steam-driven models, also engines, kits, radio control equipment etc. If you are selling up. Tel: Godalming 21425. T/C

CLASSIFIED ADVERTISING TERMS & CONDITIONS

Our terms for new advertisers (semi-display and lineage) are strictly pro-forma payments until satisfactory reference can be taken up (excluding recognised advertising agencies). Cheques and P.O.'s should be crossed and made payable to ARGUS SPECIALIST PUBLICATIONS and sent to:
THE CLASSIFIED DEPT ARGUS HOUSE, BOUNDARY WAY, HEMEL HEMPSTEAD HP2 7ST.
There are no reimbursements for cancellations. Advertisements arriving too late for a particular issue will be inserted in the following issue unless accompanied by instructions to the contrary. It is the responsibility of the advertiser to ensure that the first insertion of every series is published correctly, and corrections must be notified in time for the second insertion, otherwise the publishers will not accept liability or offer any reduction in charges.
All advertising sales are subject to Government Regulations concerning VAT. Advertisers are responsible for complying with the various legal requirements in force eg: The Trade Description Act, Sex Discrimination Act & the Business Advertisements (disclosure) order 1977.
Full Terms & Conditions of Advertising available on request.

Model Shop Directory

THE COMPREHENSIVE MODEL MAKERS GUIDE

Rates:- £11.85 for 12 series
£13.00 for 6 series (exclusive VAT)

Classified Advertising Tel. no. 0442 66551.

COUNTIES

CAMBRIDGESHIRE

PETERBOROUGH Tel: 0723 68200
ORTON MODELS
36 HEREWARD CENTRE ★
CAMBS. PE1 1TF
Open Mon - Fri 9.30 - 5.30 Thurs 9 - 6
Sat 9 - 5

CORNWALL

FALMOUTH Tel: 0326 317475
HARRY BROOKS
MARKET ON THE MOOR
THE MOOR
FALMOUTH, CORNWALL
Open every day except Sunday

DEVON

PLYMOUTH Tel. (0572) 263133
RUNWAY SOUTHWEST ★
22 FRANKFORT GATE
CITY CENTRE
Mon. - Sat. 9 a.m. - 6 p.m.

ESSEX

HAINAULT Tel: 500 3891
MODELAND
219 NEW NORTHE ROAD,
IG6 3AG
Open Mon, Tues, Wed, Sat 9-6pm
Thurs - 9 - 1pm. Fri - 9-7.30pm
24 hour mail order specialists

ESSEX

CHELMSFORD Tel: (0245) 442164
RADIO ACTIVE (MODELS)
100 MAIN ROAD
BROOMFIELD
Mon, Tue, Wed, Thur, Sat 9-6
Barclaycard & Access

UPMINSTER Tel: (040 22) 50272
RADIO ACTIVE MODELS
UPMINSTER LTD
34 ST MARY'S LANE, UPMINSTER
ESSEX Open Mon, Tue, Wed, Thur, Sat.
9am - 6pm Fri 9am - 7pm

HAMPSHIRE

PORTSMOUTH Tel: 0705 827117/ 750774
FRATTON BARGAIN SHOP
171-173 FRATTON ROAD, FRATTON
Open 9-6pm 6 days a week
Access, Visa, American Express, Diners Card

HEREFORDSHIRE

MODEL CITY Tel (0727) 64654
129 HATFIELD ROAD
ST. ALBANS
HERTS
9-5.30pm Mon - Sat
VISA ACCESS

KENT

MODEL AERODROME
UNIT 223 Tel 0622 691184
STONEBOROUGH CENTRE ★
MAIDSTONE, KENT
Open Mon - Sat 9am - 6pm
American Express Barclaycard Access

SWANSCOMBE Tel: 0322 843182
SWANSCOMBE MODELS
2 THE PARADE
Open: Mon, Tues, Fri, Sat 9.30am-6pm
Wed 9.30am-1pm Thurs 9.30am-8pm
Access - Barclaycard

CANTERBURY Tel: (0227) 453896
CANTERBURY MODEL SHOP
4 BUTCHERY LANE ★
Open: Mon - Sat 9am - 5.30pm

LANCASHIRE

NELSON Tel: 0282 64818
PENDLE MODELS ★
319 LEEDS ROAD
Mon-Wed-Fri, Sat 10am-6pm
Tues, half day Thurs 10am-8pm
Phone anytime!

LONDON

LONDON Tel: 01-228 6319
E. F. RUSS
BATTERSEA RISE SW11
Open 9 am - 6 pm
Early closing Wednesday 1 pm

CAMDEN TOWN Tel: 01-458 1818
AERONAUTICAL MODELS
39 PARKWAY NW1 ★
Mon-Fri 9.15-5.30 Sat 5.00pm
Londonsleading model specialist
American Express

KINGSBURY Tel. 01 205 6177
AERO MODEL MART 205 0817
165 CHURCH LANE (24 hr) ★
NW9 8JU Fax: 01-200 7438
Mon.-Thurs. 9.5 Fri.-Sat. 9-6
Access - Visa - Instant Credit

LONDON

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

LONDON

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

FULHAM Tel: 01-385 9864
PATRICK TOYS 01 385 2187
+ MODELS (Estb. 1948)
107-111 LILLIE ROAD
Scalextric and Hornby
Open: Mon - Sat 9-6

MIDDLESEX

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

WEST MIDLANDS

WOLVERHAMPTON 0902 26709
WOLVERHAMPTON MODELS &
HOBBIES 1 MEADOW ST
CHAPEL ASH
Open Mon - Sat 9 - 5.30
Mail Order Welcome

SURREY

MODEL AERODROME
UNIT 30 Tel: 0483 578682
THE FRIARY CENTRE
GUILDFORD
Open Mon - Sat 9am-6pm
American Express Visa Access

LONDON

EWELL Tel: 01-393-3232
MICK CHARLES MODELS
192-194 KINGSTON ROAD
Mon., Tues., Thurs., Sat., 9.30-5.30
Friday 9.30-7.00
Access Barclaycard Mail Order

GODALMING Tel: (048 68) 21425
GODALMING RADIO
CONTROL MODELS
3 & 3A BRIDGE STREET
10.30-5.30 Mon-Sat incl. lunchtime
Evenings & Sunday by appointment

SUSSEX

BRIGHTON Tel. 0273 430751
HARRY BROOKS (3 lines)
15 VICTORIA ROAD ★
PORTSLADE
Monday - Saturday 9am - 6pm

SUSSEX

MODEL AERODROME LTD
68 SEASIDE RD Tel: (0323)
EASTBOURNE 644001
BN21 1 3HA (0323) 411736
Barclaycard, Amex, Access

SUSSEX

BRIGHTON Tel: 0273 26790
MODEL AERODROME
37 WEST STREET, BN1 2RE ★
Open Mon-Fri 9am-5.30pm
Sat 9am-6pm
We accept Am. Ex. Access. Barclaycard

CRAWLEY Tel: 0293 540331
MODEL AERODROME LTD ★
36 THE BOULEVARD
WEST SUSSEX, RH10 1XP
Mon.-Sat. 9amm-6pm
American Express accepted

SOMERSET

SOMERSET Tel: 0963 50433
SOMERSET MODELS
THE TRIANGLE
CASTLE CARY, SOMERSET
Open Monday - Saturday 9 - 5.30
(Lunch 1 - 2)

★ MAIL ORDER WELCOME

TYNE AND WEAR

THE MODEL SHOP
BRITAIN'S FIRST EST 1924.
18 BLENHEIM STREET
NEWCASTLE UPON TYNE
NE14AZ Tel: 091 232 2016
Open Monday - Saturday 9.30 - 5.30

WILTSHIRE

MELKSHAM MODELS Tel (0225) 703311
19 BATH ROAD
MELKSHAM
WILTS SN12 6LL
Mon, Tue, Thurs, Fri, Sat 9.30am - 5.30pm
Closed all day Wednesday

ALL SHOPS MARKED WITH AN ASTERIX PROVIDE A MAIL ORDER SERVICE

YORKSHIRE

LEEDS Tel: (0532) 646117
FLYING MODELS ★
88 CROSSGATES ROAD
CROSSGATES
Mon. - Sat. 8 am - 6 pm
Sun. 8 am - 1 pm.

BRADFORD Tel: (0274) 726186
MODELDROME
217 MANNING LANE
BRADFORD, BD8 7HH
Open 9.30am - 5.45pm
Closed all day Wednesday

SCOTLAND

GLASGOW Tel: (041 221) 0484
DUNNS MODELS ★
3 WEST NILE STREET
Open: Mon. - Sat. 9.00 am-5.15 pm.

WALES

ABERGAVENNY Tel: 0873 2566
ABERGAVENNY MODEL SHOP
32 FROGMORE STREET ★
NP7 5AL
Open 9.00am - 5.30pm Monday - Saturday
Sanyo Nicad Batteries Distributors
Under new Management

TO DISCUSS ADVERTISING RATES RING 0442 66551

CANTERBURY MODEL SHOP

THE LARGEST SELECTION OF ROCKET KITS IN ENGLAND.
Introducing our NEW ROCKETS for 1989*
4, BUTCHERY LANE CANTERBURY KENT
TEL 0227 453896 Fax 0227 459564

ROCKET PRICE LIST

STARTER SETS

Description	Skill level	Price
Alpha III Starter Set	1	£25.45
Sizzler Starter Set	1	£29.50
X-15 R-T-F Starter Set	1	£32.95
Space Shuttle Starter Set	2	£31.95

Rocket Kits:

Longshot	1	£6.95
Yankee	1	£3.50
Wizard	1	£3.50
Alpha III	1	£6.85
Scout II	1	£3.95
Sizzler	1	£7.05
Transtar Carrier	1	£6.35
Big Bertha	1	£8.05
Astrocam 110	2	£32.55
Bull Pup 12D	2	£6.35
Sentinel	2	£9.10
Space Shuttle Columbia	2	£10.95
Helicopter	2	£8.95
Eggspress	2	£9.10
Nova Payloader	2	£7.05
Gemini Titan	2	£9.95
Voyager	2	£7.05
* SDI Satellite	2	£9.10
* Tornado	2	£3.45
* Iris	2	£5.95
* Strike Fighter	3	£10.80
* Recruiter	3	£9.75
* SWAT	3	£16.60
SR-71 Blackbird	3	£12.60
Stealth	3	£8.05
Ram Jet	3	£5.25
* Nike-Apache	3	£7.05
Geo Sat LV	4	£14.35
Space Shuttle	4	£20.85
Mercury Redstone	4	£15.00
Crusader Swing Wing	4	£14.95
* Jupiter C	4	£14.95

Mini Rocket Kits

Description	Skill level	Price
Mosquito	1	£1.95
Mini Mean Machine	1	£7.05
Mini TriPak (3 Rockets)	2	£7.05
Mini Scale Combo (2 Rockets	2	£6.35
Mini Mars Lander	2	£4.20
NASA X-15	3	£6.35
* Dragonfly (Boost Glider)	3	£6.95

2 Stage Rocket Kits

Description	Skill level	Price
Clipper	2	£5.95
Scorpion	2	£10.00
* Super Nova	2	£8.85
Hercules	3	£9.10

D Engine Rocket Kits

* Mean Machine	2	£15.95
* Commanche 3 (3 Stager)	3	£9.10
* Phoenix	3	£15.95
* Black Brant II	4	£9.60
* Explorer Aquarius (Boxed)	4	£16.60
*Super Big Bertha (Boxed)	2	£21.95
* Pathfinder	3	£10.15
* Mega SIZZ	2	£10.65
* Titan IIIE (Boxed)	4	£25.45
* Saturn V (Boxed)	4	£51.15

LAUNCH SUPPLIES PRICE LIST

ENGINES:

1/2 A 6-2	(x3)	£3.25
A 8-3	(x3)	£3.25
A 8-5	(x3)	£3.25
B 4-2	(x3)	£3.25
B 6-4	(x3)	£3.25
B 6-6	(x3)	£3.25
B 8-5	(x3)	£3.25
C 5-3	(x3)	£3.25
C 6-3	(x3)	£3.25
C 6-5	(x3)	£3.25
C 6-7	(x3)	£3.25

Booster Engines:

A10-0T*	(x4)	£3.25
B 6-0	(x3)	£3.25
C 6-0	(x3)	£3.25

Mini Engines*

1/2 A 3-2T	(x4)	£3.25
A3-3T	(x4)	£3.25
A10-3T	(x4)	£3.25

Accessories

Porta-Pad Launch Pad	£11.95
Electron Beam Launch Controller	£13.95
Igniters (x6)	£1.90
Wadding	£1.90
Altitrak	£11.95
Fin Alignment Guide	£14.95
Estes Illustrated Catalogue (colour)	£1.95
1/8" Two Piece Launch Rod	£3.70
3/16" Two Piece Launch Rod (Maxi Road)	£4.80
Blast Deflector Plate	£2.95
Micro Clips	£1.45

A full selection of Rocket Parts and Spares are now available.
See our illustrated catalogue (£1.95 + 35p P&P)
All mail order orders: £2.00 Post & Packing

THE BOOK PAGE - ALBION SCOTT'S GUIDE TO THE LATEST AND BEST AVIATION LITERATURE

Dear Readers,
Below is just a basic listing of new books - for further details of these and a complete listing of all of the 1,000s of aviation/Maritime/military books we stock, write with an SAE/IRC for our Christmas 1989 catalogue. Happy Reading! Russell Hadler

500050 HENRI MIGNET AND HIS FLYING FLEA Story of home-built aircraft for man in street	£17.95
500436 WRECKS AND RELICS 1989 POCKET EDITION Abridges survey of preserved/derelict airframes UK	£2.95
500437 WRIGHT BROTHERS A Biography Reprint of what is considered the definitive work	£8.95
500449 AIR DISPLAY INTERNATIONAL BEST OF INTERNAT. AIR TATTOO Stunning col. ph. [illegible] this major aviation event	£5.95
500021 RESCUE - THE TRU-LIFE DRAMA OF RAF SEARCH AND RESCUE Full dramatic story of RAF SAR helicopter units	£8.95
500451 HOW WE INVENTED THE AIRPLANE An illustrated History Wright Brothers achievement of 1903 in words & Bw	£8.95
500450 HIGH GROUND WRECKS A survey of crash remains in UK & Ireland	£4.95
510001 AIRCRAFT ILLUSTRATED CIVIL AVIATION REVIEW 1989 Articles on many respects of civil a/c & aviation	£8.00
510312 CIVIL AIRCRAFT MARKINGS 1989 Updated & re-illustrated guide for spotters	£3.75
510120 ABC AIR TRAFFIC CONTROL (3rd Edition) Comprh. guide to air traffic control ops. in UK	£4.95
510038 ABC AIRPORT OPERATIONS Examination of complex "behind the scenes" ops	£5.95
510037 ABC EUROPEAN AIRPORTS Comprehensive guide to 26 airports in West Europe	£4.95
510330 AIRPORTS 1: SOUTHAMPTON (EASTLEIGH) AIRPORT Traces full exciting history & full illus	£4.95
510150 BRITISH AIRPORTS (3rd Edition) Lists all major airports, with descriptions	£3.95
510272 BOEING AIRCRAFT SINCE 1916 Describes all aircraft designed & produced	£20.00
510288 MODERN CIVIL AIRCRAFT 6: BOEING 757/767 Illustrated history of these two airliners	£5.95
510322 AVRO CANADA C102 JETLINER Inside story told by chief design engineer	£20.95
510338 MODERN CIVIL AIRCRAFT 8: LOCKHEED TRISTAR History from 1960s-to date. 70+ ph & line dwgs	£8.95
510340 JET AIRLINER PRODUCTION LIST Immensley detailed & comprehensive reference	£8.95
520000 AIRFIELDS OF THE EIGHTH Then and Now Superb illus guide & history to airfields in UK	£17.95
520588 STRIKE FROM THE SKY Anti-Shipping Weapons & Aircraft Dev. & operational use of airborne weapons & a/c	£14.95
520870 WORLD'S GREAT ATTACK AIRCRAFT In-depth text, line dwgs, scan markings, fold-out art	£14.95
520585 AERONAUTICA ILLUS REFERENCE GUIDE FOR COLLECTORS Comprehensive listing, up-to-date price guide	£8.95
520012 ACTION STATIONS 07: SCOTLAND: NORTH-EAST, N. IRELAND 2nd edn. includes fresh details & update on present	£13.95
520668 SILKSHEEN The History of East Kirkby Airfield Wartime home of 57 & 630 Sqdns, then USAAF & museum	£4.95
520666 AIR WARS AND AIRCRAFT Record of Post-War Air Combat Extremely detailed record, many illus & maps	£35.00
520586 VIETNAM: THE HELICOPTER WAR Chronological account of helicopters, men & ops	£15.95
520011 WARBIRDS WORLDWIDE No 10 Hellcat, Airworthy Hurricanes, MiG-15 UTI etc etc	£4.50
520627 WARBIRDS WORLDWIDE No 8 Corsair, Charles Church Spits, Tempest, Mustang, Jets	£4.95
520628 WARBIRDS WORLDWIDE No 9 Catalina, Tigercat, Stearrman, P-38, Chino, OFMC, Corsair	£4.50
520667 WORLD WAR ONE SURVIVORS Lists every aircraft, with type, history & location	£18.95
520010 BATTLE OF BRITAIN: THE JUBILEE HISTORY Magnificent new account, well documented & illus	£16.95
520664 BY DAY AND BY NIGHT - THE BOMBER AIR WAR IN EUROPE Describes in detail over 40 Allied & Axis raids	£17.95
520668 COMPLETE BOOK OF WORLD WAR II COMBAT AIRCRAFT Massive collection of full colour artwork	£29.95
520663 FIGHTER PILOT The Real Story Behind "A Piece of Cake" Classic account of No 1 Sqdn in France in 1940	£12.95
520009 STRIKE FROM THE SKY Story of the Battle of Britain Fascinating authentic record of experiences	£16.95
520662 STUKA PILOT Classic eyewitness narrative of Stuka operations	£14.95
520572 MILITARY AIRCRAFT MARKINGS 1989 Latest edn. of the standard plane-spotters guide	£3.75
530956 49TH FIGHTER GROUP Personal experiences of top aces Pacific, masses Bw	£4.95
530951 HOT JETS Supersonic Fighters of USAF Packed with exciting col photos, artwork & tables	£4.95
530946 MIGHTY EIGHTH: A HISTORY OF THE US 8TH ARMY AIR FORCE Details ops, combat units, men, a/c, appendices etc	£19.95
530898 STRIKE ACES Sumptuous col photo record of modern US air power	£14.95
530895 US NAVY CARRIER AIRCRAFT COLOURS 1940-45 Units, colour & markings, great for modellers	£12.50
530950 US STRATEGIC AIR POWER: EUROPE - THE 8TH AIR FORCE Photoalbum with detailed text, specs, OB, markings	£4.95
530897 A-4 SKYHAWK IN DETAIL & SCALE VOL 32 Covers all US Navy and USMC versions	£8.95
530957 DEFENDERS A Comprehensive Guide to Warplanes of USA Basic history & specs, user countries, 3-view, col	£12.95
530789 NORTH AMERICAN F-100 SUPER SABRE (Osprey Air Combat) Fully researched and well-illustrated history	£8.95
530947 F-111 - SUCCESS IN ACTION Development & service, in-depth tech coverage	£19.95
530949 F-111 AARDVARK (Warbirds Fotofax) Photoalbum packed with Bw ph & detailed text, dwgs	£4.95
530003 AIRCRAFT ILLUSTRATED SPECIAL: RAF PHANTOM History of RAF service. Packed with col/Bw action	£5.95
530958 PHANTOM SQUADRONS OF THE RAF AND FLEET AIR ARM Chronicles squadron career; colour schemes & marks	£9.95
530002 VOUGHT F-8 CRUSADER PART 1 (Naval Fighters No 17) Covers Navy & Marine photo-recon squadrons	£11.95
530952 JOLLY GREEN GIANTS US Combat Helicopters Spectacular col photos, artworks, diagrams & tables	£4.95
530948 P-47 THUNDERBOLT (Warbirds Fotofax) Photo-album with detailed date section & line dwgs	£4.95
530945 COMBAT PROFILE: MUSTANG The P-51 Merlin Mustang WWII Mustang combat operations, with 100+ ph and line dwgs	£7.00
530001 ALPHA STRIKE VIETNAM The Navy's Air War 1964-1973 Personal experiences Navy aviators on strike role	£13.95
540002 AIRSHIP VC Full biography of William Leefe Robinson, VC	£14.95
540645 HAMISH - THE STORY OF A PATHFINDER Autobiography of Gp Capt "Hamish" Mahaddie	£14.95
540618 FLY NAVY Aircraft of the Fleet Air Arm Since 1945 Description & operational history, well illustrated	£16.95
540647 JAGUAR (Warbirds Fotofax) Photoalbum with detailed captions & specs, markings	£4.95
540003 AVRO LANCASTER THE Definitive story, with 500,000 words & rare Bw	£36.95
540631 MYNARSKI'S LANC Story of two surviving Lancs, one flown by air VC	£20.95
540644 AIRCRAFT ILLUSTRATED SPECIAL: LIGHTNING History, variants, sqdn service, markings, & liaes	£8.95
540070 MOSQUITO - THE WOODEN WONDER (Revised Edition) Extensively revised third edn of a classic book	£14.95
540071 MOSQUITO AT WAR (Reprint) First-hand accounts of operations & many Bw photos	£14.95
540005 SHACKLETON AT WAR AND PEACE Definitive account of a popular & successful a/c	£14.95
540595 SHORTS AIRCRAFT SINCE 1900 Completely revised & updated edition	£25.00
540646 SOPWITH CAMEL (Vintage Warbirds Fotofax) Packed with Bw photos, tech data, markings, scale dwg	£4.95
540004 BORN AGAIN - SPITFIRE PS 915 History & restoration of Bob Memorial Flight Spit	£3.95
540643 SPITFIRE SPECIAL New Light on an Historic Fighter Photographic tribute from early days to post-1945	£5.95
540001 SHORT SUNDERLANDSuperbly researched & complete history. Rare Bw ph	£16.95
540006 SUNDERLAND AT WAR (Reprint) History with first-hand accounts & dramatic photos	£14.95
550485 GERMAN NAVAL AIR SERVICE (Vintage Aviation Fotofax) Bw photos, data section with specs, markings, dwgs	£4.95
550486 STUKA Ju-87 Exciting illus history of the infamous "Stuka"	£3.95
550200 MESSERSCHMITT Bf 109 - AIRCRAFT AND LEGEND Operations & development, appendices, ph & 3-view	£19.95
570122 AVRO ARROW Story from its Evolution to Extinction Very comprehensive hist. of this Canadian fighter	£29.95
570419 BATTLE ZONE Fighters of the NATO Allies All USAF & NATO a/c described & illus in colour	£4.95
570409 NATO MAJOR AIR COMBAT AIRCRAFT (Pocketbook No 1) Type-by-type coverage for recognition, incl Saaab	£8.95
570001 A PORTRAIT OF MILITARY AVIATION IN SOUTH AFRICA Magnificent full col paintings of all SAAF a/c	£19.95
570418 RED STAR RISING Latest information & some stunning col photos	£4.95
570410 WARSAW PACT MAJOR COMBAT AIRCRAFT (Pocketbook No 2) Type-by-type coverage, Bw & 3-view for recognition	£8.95
580002 SPEED SEEKERS High-speed flying & comp. in pioneer years 1918-26	£29.95
590104 FROM THE FLIGHTDECK 4: APOLLO 11 MOON LANDINGS Documents the historic flight, detailed dwgs & ph.	£6.95
590105 SPACE EXPLORATION PHOTO POSTCARDS IN FULL COLOUR What a brilliant idea! 24 full-col ready-to-mail	£3.95
590094 ILLUSTRATED HISTORY OF SPACE SHUTTLE: X-15 TO ORBITER US high performance winged spacecraft to present	£16.95
590099 ROCKWELL INTERNATIONAL SPACE SHUTTLE (Datagraph 5) Data led technical evaluation of Shuttle & history	£8.95
700211 RADIO-CONTROLLED MODELS Design and Construction Practical book with 12 R/C model projects	£8.99
710207 BUILDING AND FLYING MODEL AIRCRAFT Introduction, much valuable info, very well illus	£5.95
710007 CUTAWAY AIRCRAFT OF WORLD WAR TWO Finely-detailed dwgs of 30 fighters & bombers	£4.95
710008 DUCTED FANS FOR MODEL JETS Excellent guide to this state-of-art technology	£8.95
710003 AIRCRAFT ARCHIVE: AIRCRAFT OF WORLD WAR ONE Vol 3 Finely detailed scale A/C plans & helpful photos	£5.95
710004 AIRCRAFT ARCHIVE: FAMOUS RACERS AND AEROBATIC PLANES Constant scale plans & Bw photos - excellent ref	£5.95
710001 FOLD IT - FLY IT A New Dimension in Paper Planes Clear instructions, uses ordinary sheets of paper	£3.50
710205 INSTANT PAPER AIRPLANES 36 simple aerodynamics marbels. Easy instructions	£7.95
710206 MAKING AND FLYING FIGHTER KITES Principles & instructions for building 29 models	£10.95
7100005 R/C HANDBOOK: FLYING RADIOCONTROL GLIDERS Practical book on all aspects of flying gliders	£4.95
710006 R/C HANDBOOK: VINTAGE RADIOCONTROL MODELS Practical book on all aspects of flying old a/c	£4.95
710009 RADIOCONTROL AIRCRAFT QUESTION AND ANSWER BOOK Compendium hints & tips taken from "Radiomodeller"	£6.95

CONNOISSEUR MODELBOOKS

RETAIL BRANCHES - FOR CALLING CUSTOMERS
Warehouse/Showroom: 51 York Road, Brentford, Middx. TW8 0QP (01-560 3404/5). Mon.-Fri. 9.00-5.30, Sat. 9.30-4.00. (No parking problems).
London: 1st Floor, at Oppenheim Booksellers, 7/9 Exhibition Road SW7 (01-584-4143). Open 7 days a week. Mon.-Sat. 9-5.30. Sunday 10-5.00. Closed for lunch 12-1.00.
Wakefield: 18 Wood Street, Wakefield, W. Yorks. (0924-364316). Open Mon.-Sat. 9-5.00.
MAIL ORDER: To: AEROMODELLER Reader Service, Albion Scott Ltd., 51 York Road, Brentford, Middx. TW8 0QP, England.
Please make cheques/POs payable to Albion Scott Ltd. and quote book numbers and titles.
POSTAGE: £2.25 (UK) or £4.95 (overseas) on all orders. We also accept Visa/Access/Amex/Diner's Club. Telephone orders 01-560 3404/5, 560 0595 or 01-847 0511 outside business hours. Overseas customers, please note that individual Eurocheques must not exceed £100.00. USA customers, if paying by personal cheque, please convert at $2.00 = £1.00. Credit card orders: we reserve the right to change additional postage on split deliveries.
(All prices correct at time of going to press but could be subject to change). Credit card orders must state expiry date of credit card.

Kindly mention Aero Modeller when replying to advertisements

59th MODEL ENGINEER AND Modelling EXHIBITION

DECEMBER 30TH **JANUARY 7TH**

ALEXANDRA PALACE

Are you an active modeller, keen to get started or to try something new, or perhaps you're just someone who likes to look at scale models of every description, whichever it is Alexandra Palace is the place to visit between December 30th and January 7th.

This is when you will have the opportunity to view the models in the prestigious national competition, see model steam locomotives running on the track, see model boats, cars and planes in action, get helpful hints from fellow enthusiasts and have the chance to see and buy the enormous range of modelling products that will be shown by the trade - plus lots more !! - You'll need a complete day to visit.

The Palace provides an ideal venue and is easy to get to, public transport is easy and there is lots of FREE PARKING.

Travel by British Rail to Alexandra Palace Station and then by free shuttle service or W3 bus. By road follow the AA sign posts.

Opening Times -
10am-6pm daily
except
10 am-8pm Thursday 4th January

Admission Prices -

Adults	**£4.00**
Senior Citizens	**£2.75**
Children	**£2.00**

CATALOGUE ON SALE DECEMBER 8TH

AN ARGUS GROUP EXHIBITION

Details available from Argus Specialist Exhibitions, Argus House, Boundary Way, Hemel Hempstead, Herts HP2 7ST. Tel: 0442 66551.

No need to struggle up the hill take advantage of the FREE COURTESY COACHES

YAKOVLEV YAK-55

SINGLE SEAT COMPETITION AEROBATIC MONOPLANE.

PORT SIDE ELEVATION.

STARBOARD SIDE ELEVATION.

NB: Drawing details two wings, see text for chronological order of development.

ALTERNATE 3 PART CANOPY.

SCRAP ELEVATION: EARLY PROTOTYPE CANOPY.

YAKOVLEV LOGO.

REAR ELEVATION.

ELEVATION: SPAT.

WINGTIP LOGO: WHITE.

PLAN VIEW:
Panel and rivet detail shown on stbd half of wing and tail only.

UNDERPLAN VIEW.

ELEVATION: 'HOFFMANN' 3 Blade prop.

FUSELAGE CROSS-SECTIONS.

WING, FIN & STABILISER CROSS-SECTIONS.

PLAN: Late wing.

FRONT ELEVATION: Late type wing.

UNDERSIDE: Late wing.

FIGURE: 6 Feet.

COLOUR NOTES

Aircraft '07'. Undersurfaces, RED, continuing up fuselage sides to mid point.
Uppersurfaces: WHITE, with Leading edges of wing & tail 'wrapped round', RED.
Fin tip & Rudder striped: RED.
RED Star insignia on wing tops & fin.
'07' YELLOW, outlined in BLACK.
Aircraft '55': Wing & tail undersurfaces: RED.
Fuselage undersurface: PALE BLUE, with 'cheat' line of MID BLUE matching the upper fuselage decking & No 55'. RED Panels on mid portion of fuselage at wing root level.

METRES 0 1 2 3
Scale: FEET 0 1 2 3 4 5 6 7 8 9

Appendix - Links to the plans

The issue comes with three free plans (the Russian Combats of Vacheslav Beliaev and Boris Faisov at 1/3 scale, and the Heinkel HE51 by Jim Latham) printed front/back on a pull out banner of four sheets. The banner is not included in the document.

Russian Combat by Boris Faisov
CL Combat
https://www.hippocketaeronautics.com/hpa_plans/det ...
Document Page: 8

Russian Combat by Roland Jasmontas
CL Combat
Document Page: 9

Russian Combat by Vacheslav Beliaev
CL Combat
https://www.hippocketaeronautics.com/hpa_plans/det ...
Document Page: 8

Heinkel HE51 by Jim Latham
FF CO2 Scale
https://www.hippocketaeronautics.com/hpa_plans/det ...
Document Page: 23

YAK 55 Aircraft Described by Pat Lloyd
Soviet aerobatic challenger
Union Page: 53
Document Page: 25