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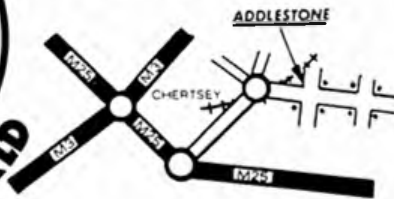
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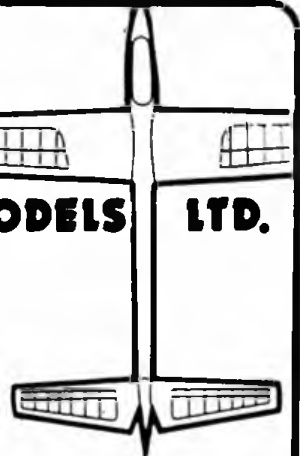
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AERO MODELLER

October 1984

Volume 49
Issue No. 585

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Cover
DH 'Puss Moth' G-AAXY was one of the many interesting models seen at Aeromodeller's Scale Days at Old Warden in June this year. The model was built by David Carpenter of Southampton and is based on a design by Fred Longbon. It is powered by an ACOMS electric motor and was originally intended for radio-control but is now flown free-flight. Weight in two pounds and on 6 x 500 mA H nicads, flights of five minutes are normal.

Photo by Ron Moulton

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Aeromodeller is printed in Great Britain by Loxley Brothers Ltd., Hazlewood Rd, Sheffield, S8 0YS. Mono origination by Ebony Typesetting, Liskeard, Cornwall for the Proprietors and Publishers, Model & Allied Publications (a member of the Argus Press Group). Trade Sales by Argus Press Sales & Distribution Limited, 12/18 Paul Street, London EC2 4JS.

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Aeromodeller Magazine (ISSN 0001-9232) is published monthly by Model & Allied Publications, P.O. Box 35, Wolsley House, Wolsley Road, Hemel Hempstead HP2 4SS, England. Tel Hemel Hempstead (0442) 41221. Second class postage paid in the U.S. at New York, NY. USA Mailing Agent Eastern News Distributors Inc. 111 Eighth Avenue, New York, N.Y. 10011. 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. Distribution to news stands sales by Eastern News Distribution Inc. 111 Eighth Avenue, New York, N.Y. 10011 USA. Tel. 1-212-255-5620.

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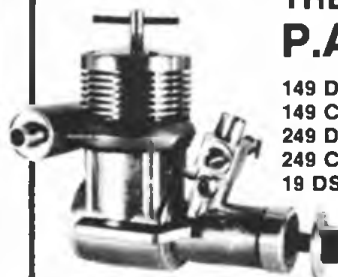
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HANGAR DOORS

Competitions for All

It is amazing how quickly time passes. We seem to rush through our modelling years at an express rate, from model to model, from competition to competition. It seems only yesterday when we were last walking around *The Model Engineer Exhibition* and yet for the last two months *Aeromodeller* has been running an advertisement for the forthcoming *54th M.E. Exhibition!* This will take place at the turn of the year, 31st December to 6th January. We will give you more information as time goes by BUT... *now is the time* to send off for your entry form for the model competitions. The *M.E.* has become famous throughout the world for its variety and quantity of models displayed. Some of which are probably the best examples of their kind to be found anywhere. The aeromodelling sections have a range of models on display, Peanut Scale, Wakefields, Control-line, Free-Flight Power, Scale - something for everyone. Why don't you enter... the competition entry fee (£2.00 for adults, £1.50 for under 16s) includes an exhibition pass for the Exhibition. So having your model on display effectively gives you a free season ticket to the rest of the show! Send off now for your entry form from: Elaine Rushton at *Argus Specialist Exhibitions Limited*, Park View House, Park View Road, Berkhamstead, Herts HP4 3EY. Together with the entry forms you will receive details of the rules and background detail to help you make the most of your exhibit. The closing date for entries is 19th October, so get that form in the post pronto!



474

Martyn Holbook, the man with a dream coming true - designing kitting and selling his own range of model aircraft.

Aeromodelling videos

Many clubs and individuals are now taking video films of their own and their club-mates flying - all in glorious colour on one of the age's marvels, the portable video! A few own their own - others hire the equipment for the day from the local rental agent. We were impressed with the recent launch of a video camera from *Konica*, well known for their miniature camera equipment. What caught our eye was the size and weight - 122mm x 225mm x 6.6mm and only 720 grams. These measurements are a good deal lighter than previously available cameras. Although the necessary recorder is still a bulky object, it must now be nearly within the bounds of possibility to have an airborne package! Please let us know if and when you achieve this goal!

Paint safe. . .

With so much emphasis these days on the safety aspects of nearly everything that we eat, drink, play or work with, it is pleasant to hear that one of the products we use comes out with flying colours (over 100 colours in fact) - *Humbrol Enamel* paints have kindly pointed out to us that although it is not always possible to produce a paint with no lead in it... theirs have something like a factor of ten times lower than the new proposed legislation which is at the moment under discussion. *Humbrol Enamels* have typically about 0.005 percent lead content - that's only 50 - 60 parts per million! The *Campaign for Lead-free Air (CLEAR)* have stated that *Humbrol Enamel* 'has a very satisfactory low lead level'. So for all you scale modellers... paint on!

Latest, smallest video camera from Konica - roll on a similar size video recorder!

Paint hazard

Although we do not wish to act as scare-mongers, a report seen in a recent American magazine is worth drawing to your attention. It concerns someone who sprayed an epoxy paint on his model. He did this in a heated workshop and estimates that he was only in the spraying area for about four minutes. He ended up in short order, in hospital, in a coronary care unit. Now this story is unsubstantiated - we do

Indoor fun for all . . .

Watford Leisure Centre is the place, Sunday 7th October is the date and indoor flying of all types is the aim! *SAMS* of Wheat-hampstead (see Classifieds!), mail order specialists for indoor and free-flight fliers - are holding their first 'event'. There is planned a comprehensive hour by hour programme of fun flying and competitions. From 12 o'clock (midday!) the hall will be curtailed off into two halves (you



'Landfall' by Edmund Miller was a striking example from the Guild of Aviation Artists annual exhibitions - Puss Moth G-ABLS is in black and silver.

not know 1) what type of epoxy paint he was using, 2) what the temperature was, 3) the patient's prior history. BUT whatever the actual facts are in this case, it does point out possible hazards. If the instructions say a paint should be used in a well ventilated area - they might just possibly mean what they say! Perhaps in the case above the epoxy paint was not intended for anything other than commercial use... we don't know. BUT... take heed, *read the instructions*... and take care, there are not that many aeromodellers that we want to lose any of you that way!

can't do that at Cardington!) and fun flying will continue in one half until 5.30 p.m. Competitions are for EZB, Peanut Scale, Hand Launch Glider, CO₂ Scale and Open Rubber Scale. Cost of entry: Fun Fly only - £2.25, Fun Fly plus Competitions - £1.75 (plus 50p per event), Spectators 60p. Needless to say there will be a *SAMS* sales point on hand so (if you are a very quick builder...), there will be a chance for you to buy and fly! Watford Leisure Centre, Horseshoe Lane, Garston, Watford, is only a few minutes from the M1 motorway and there is plenty of parking

Aeromodeller

available. SAMS would like to know in advance if you are going to compete.

Dreams and things

Many people dream of turning their hobby into a living but few get the chance to do it. Martyn Holbrook (*Ross Model Kits* to you ...) for years a keen designer of model aircraft, decided to turn this passion into a full-time job. He has set up *Ross Model Kits* in the small market town of Ross-on-Wye and now works round the clock to establish his business. He has an ambitious range of models available, from chuck gliders to R/C Soarers. One such - "Lady Di" is a delight to fly. Two metre wingspan, simple to build and light in weight all goes to make this attractive, functional model a best seller. Martyn like so many starting out on their own finds that his time is completely taken up with his work - so if you want to follow in his footsteps, you must be prepared to put 'your all' into it. Producing a good product is not the end of the line ... you then have to market it. Distribution, for the newcomer is no easy task much relies on initial presentation and word of mouth recommendation. Martyn produces a nice product so let's hope *Ross Model Kits* make it all the way to your model shop.

Aviation Artist show

The annual exhibition of The Guild of Aviation Artists was on show at the Carisbrooke Gallery near Marble Arch, London through July and included 115 absolutely superb examples of aviation art. We were specially impressed by the number of aeromodelling artists and the extremely high standard of their work. The main theme for 1984 was the emphasis on D-Day and the Normandy campaigns. The show also included a selection of paintings from the R.A.F. Museum War Artists Collection which had never been seen in public before. Aspiring members are invited to contact the Secretary, Mrs Yvonne Bonham, at 11 Great Spilmans, London SE22 8SZ.

Jack Marsh field?

When we published an appreciation for the work of Jack Marsh, Founder Member of Leicester Model Aero Club, a year ago, we had little notion that this great personality who fought so hard to ween flying fields from authority, would actually have had the foresight to bequeath all of his worldly goods to the Club he loved so much. It has taken a full year for probate to pass to L.M.A.C. and the final financial result has yet to be proven, but when capital transfer tax, legal fees and whatever other liabilities remain are deducted, the final figure for the Leicester Club will certainly be not less than £100,000. In his Will, Jack indicated that this money was to be used to obtain a flying field. The 180-strong, fully affiliated S.M.A.E. Club has been somewhat startled by the windfall. Fortunately, we understand they have professionals on their Committee who will guard their interests wisely. Eventual hope is to have a permanent base for the Leicester members, complete

will be available from October and contains many drawings including 8 plans and 5 3-view drawings for scale modelling use. There's going to be a history of CO2 engines and plenty for Peanut enthusiasts. The pre-publication price is to be \$6.95

Brooklands museum

Gallaher Ltd. have revealed their plan for the future of the Brooklands Motor Racing and Aviation Museum. When this company acquired a 40-acre site out of the original Brooklands circuit area, they undertook to repair the famous Brooklands Clubhouse and many of the surrounding buildings which date back to the great days of the banked circuit and early airfield. Negotiations have been taking place for one of the buildings to be set aside as a permanent museum for aeromodelling. This has largely been due to the initiative of Mike Beach, who already has two full-size aircraft in store at Brooklands, ready for the new aviation museum. These are a beautifully restored Drone and his replica "Bleriot" which



The clubhouse at Brooklands, Weybridge currently being restored as a museum of motor-racing and aeronautics by Gallaher Limited.

with Clubroom facilities and social amenities so that they can remember Jack, and his work on their behalf throughout his lifetime.

Also from Bill Hannan . . .

Following the success of his first Scale Scrapbook, Bill Hannan has just put to press Volume 2 of his Scrapbook of Scale 3-views and Nostalgia. It

has also been the feature at a recent TV programme. Mike is currently completing his "Curtiss Racer", which is being finished in the colours of Lincoln Beachley, the famous American pioneer pilot. When completed, the Brooklands Museum area will be a splendid memorial to the famous cradle of motor racing and aviation in Britain.

SCRAPBOOK of SCALE, 3-Views

& Nostalgia

Volume 2



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RWD-6
TRAVEL
SOMMER
WHIMSEY
BELLANCA
BOEING 247
NIEUPOORTS!!
FAIRCHILD 22
FLETCHER FD-25
K. ANTHONY FROM AIRBOY JEN

by BILL HANNAN

Advance copy of Bill Hannans scale scrapbook - should be available in this country when you read this.

Howard Boys Memorial

A memorial fund in Howard Boys' name has been launched with the first donation of £75 from Vintage Engines. The Fund is open until December 31st 1984 and will be used to maintain annual awards in the future for tailless and other unconventional models which will be flown at an Eaton Bray venue for the original Eaton Bray Pterodactyl Cup. It is hoped that the first event will soon be announced for a date presently targeted at April 28th. Theme of the meeting will be to recall Howard's enthusiasm for tailless aircraft, whether they be powered by rockets, rubber, internal combustion or flown as gliders.

Correction

Aeromodeller's report on the Free-Flight Nationals stated that the SMAE Council 'overruled their Free-Flight Technical committee and determined that the Nationals be held at R.A.F. Barkston Heath in May'. The SMAE Chairman has pointed out that the word overruled implies some major difference of opinion and that in fact the Council as a whole agreed to the eventual dates - which were incidentally previously booked by the R.A.F. M.A.A. who very kindly gave up these dates so that the Free-Flight Nationals could be held over the Spring holiday weekend.

What's On . . .

Sept 16	THREE KINGS C/L SCALE DAY: STAND OFF & PROFILE SCALE Venue: Old Croydon Aerodrome Contact: Wal Cordwell, Tel: 01-754 1661 Good prizes, trophies, silencers and insurance compulsory.	Sept 30	ROLLS ROYCE VINTAGE FLY-IN - Optional Texaco Event. Venue: Hucknall Airfield, Nottingham Contact: A. Walker, 5 Farm Close, Belper, Derby DE5 1RY. Tel: Belper 2990 SAE for details.	October 7	SAMS INDOOR EVENT PEANUT. E2B, HLG. CO., OPEN. Fly For Fun. Venue: Watford Leisure Centre Contact: SAMS Tel: 0438 832011	October 14	F38 LEAGUE/ELECTRO. Venue: Church Fenton. Contact: Mike Proctor, 8 Church Rise, Holtby, Yorkshire Tel: 0904 489386
Sept 23	CONTROL-LINE SCALE COMPETITION - TO CURRENT RULES Venue: Roomwide Sports and Social Club, Hughendon Road, High Wycombe Contact: Ron Truelove. Tel: 049481 5300 Silencers and insurance compulsory.	Sept 30	SMAE SOUTHERN GALA R/C, C/L, F/F, Scale. Venue: R.A.F. Odnam Contact: N.F. Couling, 7 The Green Walk, Willington, Eastbourne BN22 0RB Pre-entry is essential for all events please send SAE for details	October 7	FIREBIRDS M.C. AUTUMN R/C Fly In. Venue: Fairthorne Manor, Botley, Hants Contact: Ray Nicholls Tel: 0703 455462 (evenings) Entry - Free, proof of insurance required.	October 14	SMAE MIDLAND AREA 'FLY FOR FUN' Venue: R.A.F. Barkston Heath Contact: G. Ferar Tel: 0533 888519. SMAE members come and 'Fly for Fun' - all activities Welcome informal contests also F/F contests for - A1. Vintage Duration, CDM, Slow Power
Sept 23	SMAE 6TH AREA MEETING F/FL O/R (asm. Farrow Shield, Plugge) FIA (SMAE Cup) 1/2A POWER Venue: Local Area Venues. Contact: Area Comp Secs. OR SMAE 0533 58500	Sept 30	VINTAGE FLY-IN 12.00 start Venue: Montrose Airfield Contact: Bruce Duncan, Burngrange Farm, Burrellton, Perthshire PH13 9PL. Write for map.	October 7	1/2 COMBAT COMPETITION. Venue: The Embankment, Peterborough Contact: B Waterland Tel: 0778 343722	October 14	8TH INTERNATIONAL MODEL EXHIBITION Venue: Ludwig Guttman Sports Centre, Stoke Mandeville, Bucks Contact: Secretary 20 New Road, Milcombe, Nr Banbury, Oxon. Open 11 am - 5pm Models of all kinds and lots of them Adults £1.50 child/DAP £1.00
		October 7	SOUTH BIRMINGHAM MFC VINTAGE CONTROL-LINE RALLY CONCOURS D'ELÉGANCE to SAM 36 Rules. Venue: Rubery Hill Hospital, Rubery, Birmingham Contact: Peter Martin Tel: 021-444	October 7	HMCA OPEN C/L STUNT AND COMBAT COMP. F2B. Novice, Diesel Combat A. 1/2A. Venue: Neston, Recreation Centre, Neston, Wirral, Cheshire Contact: Jim Manor, Tel: 051-355 4075 Entry £1.50 per class, 10 am start		

Photo Prize

MODEL NEWS With Fliar Phil

Win a bumper bundle of balsa wood
 All entries should be good quality black and white or colour prints. Your name and address should be on the back of the print. Details if possible should be given about the model and its construction. Send all entries to: Aeromodeller, Photo Prize Feature, PO Box 35, Wolsey Road, Hemel Hempstead, Herts. HP2 4SS. Photos will be returned after publication.



Receiving your excellent photos is always a pleasure for Fliar Phil. However he rarely receives any "unusual" models! There **MUST** be some ornithopters, flying saucers, hot air balloons, — even the odd airship, around!! So give F.P. a thrill by sending along a pic of that "out-of-the-rut" job that aroused so much interest at your last flying meeting. Now to this month's collection — displaying the aeromodeller's art.

Photo 1

A reliable "maid of all work", the Piper 'Cub' is a favourite subject with scale fans. This fine Piper 'Cub' J.3. comes from Daniel Mungin of Renfrewshire, Scotland. Built from a Pilot kit, span is 55in., power a Fuji 25 SBB R/C motor with Sanwa E.X.70 radio. Daniel concentrates on R/C, but writes, "I still look forward to reading Aeromodeller each month. Keep up the good work". We will Daniel!

Photo 2
 Capable of very spectacular aerobatics is this attractively decorated "Midget Mustang", built from a *Cotswood Models* kit by Terry Hathaway of Moreton-in-Marsh, Gloucestershire. Power, *Super Tigre* G.21, with 4 channel radio. F.P. cannot quite identify the object on the fin leading edge! Terry says it's "the ground crew". Ah well - Terry should know!

Photo 3
 Fliar Phil has had the privilege of publishing several fine photos of model "Tiger Moths". That, of course, is no reason for not publishing another! This most realistically posed "Tiggy" comes from David Hibbitt of Grantham, Lincolnshire. It is flown by Ted Betts and is from a *Veron* kit. Although fitted with 7 channel *Sprengbrook* radio, it is flown using 3 channels only. Power is a *HB 40*. David says it is a stable, strong flyer.

Photo 4
 Although one of the greatest fighter aircraft of W.W.I. the *Sopwith 'Camel'* had some undesirable flying characteristics. Likewise models of the 'Camel' often prove tricky to trim. This example, built and photographed by John Watters from Prestwich, Manchester, also needed careful trimming before it became (quoting John) "a nice flyer - and also a sturdy model". From an *A.P.S.* plan. Span is 28in., power a *D.C. 'Merlin'*. Finished in the colours of No. 45 Squadron (Italy).

Remember folks,
 this is YOUR
 feature and Fliar
 Phil needs YOUR
 photos to keep it
 going!

Photo 5
 It is always great to see the youngsters "getting in on the act". This photo from Geoff Lee of Kings Lynn, Norfolk shows his son Mark proudly displaying Dad's *Dunlop 'Pitts Special'*. Built from a *Pilot* kit and nylon covered. Span 42in. Powered by a *Profi* 40.4 function R/C. Flown in the 1982 *Dunlop* competition.



Photo 6

Fliar Phil just could not resist this photo! Sent in by John Noble of Worsley, Manchester, who, with great humour, entitles his pic: "Heathen, in his blindness, bows down to wood and stone"! Maybe there is not any stone in the construction but John says the glide owes more to the laws of gravity, than of aerodynamics! Model is a 'Dart' powered "Wigan 70". Took ONE night to build! Congrats to John's son Matthew, for speedy camera work too!

Photo 7 Winner

Fliar Phil knows very well that "distance is no object" when an aeromodeler has a fine photo of a fine model. This *Svenson 'Wayfarer'*, built and flown by Paul Turner, comes all the way from Perth, Western Australia. A most impressive biplane, power is a *Merco 61*, with *Futaba 7 FGK* radio. About 3 years old, with 200 flying hours to its credit. Congratulations on being this month's winner Paul.

We have had some problems with our supply of cameras for the winners of "Photo Prize". So ...taking this as an omen we have now substituted a "bundle of balsa". We hope that those winning, will get a pleasant surprise when they open the door to the postman...Ed!



DUE MAINLY to the high cost of entry to this World Championship and the uncertain state of SMAE funds prior to the event it seemed unlikely that Great Britain would be able to field a team. However at the last minute three volunteers were assembled, so Ron Truelove, Chris Bradford and I travelled to France as the British team.

Ron Truelove took his new model, barely finished and not completely test flown. This is an ambitious project being a model of the Heinkel 219 'Uhu' (owl) night fighter, with working u/c, flaps, drop tank etc and powered by two Irvine 40 R/C engines.

Chris Bradford had his well known Nieuport 17 which had a new cowling, dummy engine and rudder for the occasion and I entered my venerable Zlin 526A (built in 1975) and powered by an HP 40F. Chris uses a three line control system to operate



Above, taking second place was the Antonov AN 28 by Valery Kramaranko (USSR).

Below, first place also to the Russians was this line model of an Antonov AN 26 entered by Vladimir Fedosov.

looking at the scores later I am satisfied that it made little or no difference. Each model was given $\frac{1}{2}$ - $\frac{3}{4}$ hour by the five judges and at the end of the day 13 models had been judged (leaving 5 for Wednesday). No scores were displayed until the whole entry had been completed.



Wednesday 4th: The static judging was completed at around midday and the scores posted on a very efficient scoreboard arrangement which allowed the competitors to be displayed in order after each stage of the competition. At this stage the Russians were 1st, 2nd and 4th with Ostrowski 3rd, Chris Bradford 7th, Ron Truelove 13th and me in 14th place.

During the afternoon all the models were weighed and provision was made for engine testing and test flying, but few people took advantage of this facility.

Control line

SCALE WORLD CHAMPIONSHIPS

Vic Willson reports on the recent championships held at Le Bourget, Paris, France.

throttle and elevators in the conventional way, whereas Ron and I use two lines and an electronic control system to operate u/c, flaps, throttle and other functions.

Ron Truelove transported me and a trailer with the three models and, but for this gesture it is unlikely that we would have been able to compete. Chris Bradford bravely made his own way to Le Bourget and back by motorcycle.

We crossed the channel by hovercraft and made the uneventful journey to the outskirts of Paris in about three hours. On arrival we found a good standard of organisation with the models housed in the now disused airport departure lounge and apart from the fact that our 'tables' were situated right at the end of the hall, with a long walk to the flying area, we had no complaints.

After assembling the models and confirming that there had been no transit damage we drove to the 'Novotel' where we stayed for the duration of the competition, together with the rest of the participants.

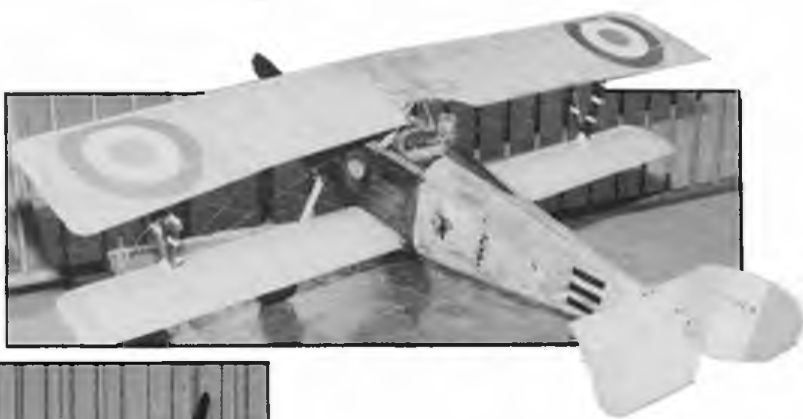
When I glanced at the score sheets that had been given to us when we registered I noticed that the static judging schedule was incorrect and that one of the K factors on the flying score sheets was also incorrect, however these errors were soon corrected by the organisers. There seemed to be a strong entry (18 entries from 7 nations) and we could obviously look forward to some tough competition.

Tuesday 3rd: Static judging got under way at 8.30 a.m. and my model was the first to be scrutinised, this caused much speculation about the pros and cons of being judged early or late in the proceedings, but



Thursday 5th: Weather - very calm and very hot. The first round flights were scheduled to be taken in the same order as the static judging and therefore I was called upon to open the proceedings, however after the trauma of a 65lb pull test the control system 'glitched' haphazardly and an attempt was called - not a very auspicious start for the British team! Worse was to come with Ron Truelove unable to get his outboard engine to tick-over and Chris

Great Britain's highest place was 6th, with Chris Bradford's Nieuport 17 C1. Below, Jerzy Ostrowski's (Poland) P-38 'Lightning', flew to a worthy 4th place.



Bradford overrunning his starting time (although he carried on to complete an unscoring flight). The Russian models also had trouble with jammed cargo drops on both *Antonov's* and the *AIR-1* with a banner that wouldn't release and a flight which overran the 7 minutes maximum and caused a loss of taxi points. Ostrowski was very impressive - leaning back against the very strong pull of the model and releasing his bomb in a zoom climb that shot the missile outside the cage. Mike Gretz, USA, followed with his *Zlin* and performed his usual smooth flight including a superb touch and go landing to earn him the highest flight score of the round at 2806. Ron Sears, USA with his *PT 17* and Bill Logan with the large *Evans VP2* both seemed to be suffering from a lack of power and looked unstable even in the slightest hint of wind.

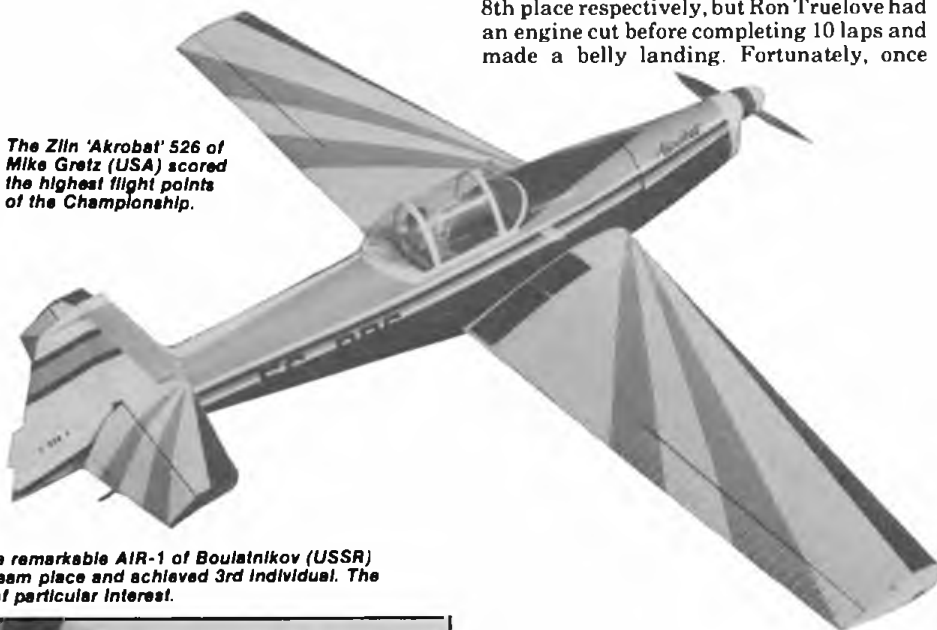
The Bulgarian entered *TS-8* of Stefan Petrov and the *P-39* of Milecho Miltchev flew fast and noisily to record qualifying flights, although the undercarriage on the *P-39* refused to retract. When the second attempts started I was first away and managed a respectable flight to lift me into 8th place, a position I managed to maintain until the end of the competition. Chris Bradford flew very well to earn a high flight score which brought him up to a magnificent 5th place behind the two Russians, Fedosov and Kramarenko, Jerzy Ostrowski from Poland and Mike Gretz, USA. Poor Ron Truelove, although

managing a qualifying flight, had problems with the undercarriage and the drop tank (which wouldn't) but nevertheless we were doing better than expected and were destined to improve.

Friday 6th: Weather - very calm and very hot. First to fly in the second round was Vladimir Boulatnikov with the *AIR-1*. The banner streamed during the flight and then released but the engine cut during the touch and go and the 'leaflets' held by the model

pilot were released while the model was on the ground, but even so this was a high scoring flight and proved to be his best of the meeting. Uncharacteristically Mike Gretz was unable to start his engine and called an attempt. He was followed by Miltchev with the *P39* which this time managed to get its wheels up, although the noseleg collapsed when it landed. Ostrowski elected to taxi before flying but ran out of time before getting airborne and had to call an attempt. Ron Sears had found the missing horses and this time the *PT 17* performed much better to bring him from 9th up to 6th place and consolidate the USA team in second place. Eventual winner Fedosov with the *AN28* completed another high scoring flight, including an impressive parachute drop from the cargo door which opened and closed in scale-like manner, however one engine cut when he landed and the taxi was completed on the other engine. Both Chris Bradford and I substantially improved our flight scores to finish the day still in 5th and 8th place respectively, but Ron Truelove had an engine cut before completing 10 laps and made a belly landing. Fortunately, once

The Zlin 'Akrobat' 526 of Mike Gretz (USA) scored the highest flight points of the Championship.



Left and below, the quite remarkable AIR-1 of Boulatnikov (USSR) confirmed Russia's 1st team place and achieved 3rd individual. The 'working' engine being of particular interest.

again, the drop tank had not released and as this was made from polystyrene foam it absorbed some of the impact and as the model slithered to a stop it ground away about half the thickness of the tank and saved the underside of the model from damage.

Ostrowski made a spectacular second attempt with the 'Lightning', two of the five lines becoming tangled at the leadouts. He was unable to extend the undercarriage and eventually made a wheels-up landing, knocking off some of the undercarriage doors and damaging the underside of the model. At the end of this round the Russians were 1, 2, 3 with Ostrowski 4th and Chris Bradford 5th.



The Stearman PT 17 of Ron Sears (USA) placed 7th and appeared marginally underpowered.



Saturday 7th: Weather - occasional gusty wind ... very hot. Polish team member Kazirod (Zlin Z50) was first to fly and seemed set to put in a very good flight until he touched the ground at the bottom of his loop and knocked one wheel off. His landing was of necessity rather poor and he lost any chance of taxi points.

Ron Sears (PT17) had engine failure after 7 laps and called an attempt and was followed by Fedosov (AN28) who flew somewhat slower this time, dropping 'leaflets' as one of his options. This flight clinched his 1st place and secured him the title of World Champion for the next two years.

Chris Bradford made another fine flight with the *Nieuport*, resplendant in his usual

Below, Ron Truelove (GB) poses with his ambitious new model - a Heinkel HE 219 (owl), had some problems but helped GB team to get 3rd place.



leather flying helmet and goggles (which earned him the nickname 'Biggles'), the model performing an almost faultless loop which together with a fine display of throttle control and slow flying secured him 6th place at the end of the Championships - the highest placing for a British team member since Mick Reeves's 3rd place at Lakehurst in 1974. Mike Gretz once again performed an almost faultless flight to receive a score of 3059 (the highest of the meeting) and spontaneous applause from the competitors and public alike. A stiff breeze blew up at the start of my final flight,

Perez came out for his last flight with the B17, for after starting two engines the sunshade provided for the judges' table was caught by a freak gust of wind and dragged the judges' table, complete with papers and rule books, to the ground! Once the awning had been secured, the B17 got away, but the 4th line had broken on take-off and Jeff was unable to extend the landing gear. Eventually the model was caught by a downdraught and belly landed although not badly damaged.

Ron Truelove managed a full flight, having removed the drop tank and substituted a touch and go option, however after many hours of work on the undercarriage it did retract (just!) the engines cut on landing and so no taxi points were awarded. However, this was enough to lift Ron into 12th place and secure 3rd place for Great Britain in the Team event.

Vic Willson's (GB) Zlin 'Akrobat' 526 about to receive the searching scrutiny of the scale judges - finished 8th.



but after 6 laps it became perfectly calm again and although I improved my score again, it was insufficient to lift my placing and so I finished in 8th place, a much better result than I had dared hope for at the beginning of the event.

There was some light relief when Jeff



Right, Boeing B 17 by Jeff Perez (USA) landed without undercarriage after line failure.

The model of the meeting in my opinion was the Russian Vladimir Boulatnikov's 1/5th scale AIR-1, a biplane built in 1927 and designed by one Yakovlev at the age of 21. Anyone who knows my 'liking' for biplanes will realise that this was



Smart finish on Canada's only entry - an Evans VP2 by Bill Logan, flight scores let down good initial static score.

Below, Bulgarian, Marinov with his LAC 7, flew consistently but ended overall 14th.



Above right, British models neatly packaged for transit. Right, Polish 'Lightning' came protected by aluminum space frame (with zip cover) - model attached via prop shafts.

something very special. The original was fitted with a Blackburn 'Cirrus' engine and the model had what at first sight (and sound) appeared to be a working four cylinder four stroke replica, however, later in the week all was revealed and in fact the model was powered by a Webra 61 facing the rear and driving the shaft of the dummy engine by a 2.5:1 reduction gear. The detail was fantastic, including all working rockers, a carburettor butterfly connected to the model engine throttle and 'Cirrus' engraved on the tiny oilfiller cap of the replica engine. The model pilot turned his head and waved to the judges before take-off.



the brakes for a short take-off. However, the winning AN28 of Vladimir Fedosov looks remarkably like the A14 which won the event at Lakehurst in 1974 and was then operated by Kramarenko, even the box used to transport the model appeared to be the same! (Reference to the report in *Aeromodeller* Sept '74 will confirm what I am referring to.)

The event was well organised, with only a few problems arising from lack of familiarity with the rules and the event was flown in a wire cage (used for the recent European C/L Championships) providing excellent crowd control, but being a trifle small for models flying on 70ft lines. The departure lounge provided ample space to display the models and the public came in large numbers on the Saturday and Sunday, the event having been advertised widely throughout Paris.

The teams were accommodated in the 'Novotel', (5 minutes drive from the airfield)

which is a sort of second class 'Holiday Inn' in an area reminiscent of Slough. Although the rooms were comfortable enough the heat and lack of air conditioning made a good night's sleep difficult to achieve. The proximity of the busiest motorway I have ever seen made opening the window for fresh air a limited blessing due to the roar of traffic. The food was of poor quality and, perhaps fortunately, came in small quantities with the usual interminable wait between courses, the ultimate being the Banquet when we sat down at 9 p.m. and received the cheese at midnight!

Having made new friends and become reacquainted with old ones the farewells were said and we each departed for home, having all benefitted from the experience in many ways.



Unfortunately, Boulantnikov had to call an attempt early in the day and then on his second attempt the banner did not 'stream' and eventually came off completely, then the model landed and ran into the circle, the 'leaflets' blew away in the breeze and considerable difficulty was encountered in stopping the engine. The team prize went to Russia with USA 2nd and Great Britain 3rd.

So ended the 6th C/L Scale World Championships to be held and despite the prophets of doom the event seems to have attracted solid support which should ensure its future despite the undoubted charisma of Radio Control Scale models.

The two Antonovs were possibly the finest examples of Scale modelling yet seen and were both constructed at the Antonov aircraft factory Model Flying Club. Valery Kramarenko's AN26 had brakes and variable pitch props enabling it to taxi round to the judges, stop on the brakes, run the engines to full power and then release



The 'Brits Corner': Ron, Chris and Doug Sheppard (Team Manager) discuss the next days tactics.

World Championships F4B (Control Line Scale)

Name	Count.	Model	Static	Ft. 1	Ft. 2	Ft. 3	Total
1 Fedosov W.	URSS	AN 28	30075	2651	28735	2908	59155
2 Kramarenko V.	URSS	AN 26	2789.5	2664	2908	2941	5730.5
3 Boulantnikov W.	URSS	AIR 1	2953	1645	2687	0	5640
4 Ostrowski J.	P	'Lightning' P.38	2861.5	2701	1906	2699	5562.5
5 Gretz M	USA	Zlin 'Akrobat' 526	2177.5	2806	2807	3059	5236.5
6 Bradford C.	GB	Nieuport 17 C1	2334.5	2831.5	2772	2870	5204.5
7 Sears R.	USA	PT 17	2550.5	1754	2493	2520	5071
8 Willson V.	GB	Zlin 'Akrobat' 528	1898	2695	2813	2860	4748
9 Perez J.	USA	Boeing B 17	2097.5	2571	2418	1794.5	4668.5
10 Podgorski L.	P	TU 2	2045.5	2164.5	2281	2473	4518.5
11 Dannau C.	F	Leo 45	2094.3	2062.5	2375	2375	4469.5
12 Truelove R.	GB	Heinkel He 219	1886	1882.5	0	2215	4201
13 Logan	CA	Evans VP11	2321	1504	1726	1079.5	4047
14 Marinov	Bu	LAC 7	1727	1678	1715	2264	3991
15 Kazirod	P	Zlin 50	2382	1394	0	1456.5	3838.5
16 Faix C	F	AMIOT 356	1806	1406	1291	1995	3801
17 Miltchev	Bu	Bell P-39	1770.5	843.5	1321.5	1812.5	3583
18 Petrov S.	Bu	TS 8	1667	1139.5	0	1464.5	3131.5

AFTER A LONG LAY OFF due to pressure of business I picked up an *Aeromodeller* in July 1983, and read the article by Brian Waterland and Mark Jarrett - 'How to make a start in control line combat Part One'. The popularity of 'A' diesel and its rules sparked me off to purchase the August issue Part Two.

A couple of days at the 1983 Nationals was an obvious choice to see all three events and I spent some time with Vernon Hunt, who was running 1/2A diesel/FAI Fast Combat. This gave me an excellent opportunity to view all three combat events in a different light to that of a competitor. I could comment on all three classes, particularly as it was most interesting to note the vast difference between the events and the keen interest in A diesel and 1/2A combat.

1/2A combat was taking care of itself well and everyone was having a lot of fun, but A diesel not so. It was most evident that after FAI fast combat being popular for several years combined with development of large



NYLON COVERING

A really complete guide to covering combat models with this 'crash resistant' material... by Frank Smart

plastic and foam models plus glow motors, that either the three events were stretching building resources, or 'A' diesel flyers were finding it hard to find a substitute for the big/light/foamy/film covered FAI models, plus being reluctant to take a step back, and it was plain to see less experienced flyers winning by having a stronger model. I saw one or two models using nylon centres and film wings, also some using combination nylon/plastic and similar iron-on shrink material with reasonable success, but all nylon/dope covered models were scarce, maybe the tradition of nylon covering is not being passed on?

'A' diesel allowing unlimited models per event only allows one model per bout (no spares) one of the main requirements is that your single model must have a fair chance surviving the bout (I have heard rumours that some are trying to bring the spare model back). This would be unfortunate if this happened because the one-model bout puts it into a class of its own and a totally different approach is needed in its present form in line with both 1/2A and FAI Fast Combat.

Dave Clarkson said it all in his March 1984 article, plus 1/2A 'Kirin' plan, and I see 1/2A combat in a similar light having the ingredients to encourage combat, which is fun and cheap, to get started, then natural flow into 'A' diesel, which is a stepping stone to FAI Fast Combat, the gradual progression of experience will go a long way to reducing the carnage in fast combat. As no one seems to practise fast combat like we used to with diesels, people fly by themselves till the next combat event takes place and we see more brilliant exhibitions of solo practice

flights.

My personal view is that the one model limit in 1/2A and 'A' diesel encourages more skilful flying and pitting/more air time/greater spectator appeal and per bout hopefully a new breed of tough but light, well finished models of *different* design and motors, battling it out in the air for the full 4 minutes, for the general public to watch and enjoy, which the present flyers are missing out on.

After the 1983 Nationals I dug out my

most promising 'Jaguar' wing model built and flown in the 1972 Nationals with a weight, all up with *Oliver Tiger* was all of 12 1/2 oz (HONEST!!) built entirely of light balsa put together with *dope* (NOT glue) span 36in. and covered in nylon without any spruce whatsoever. After the 1972 Nationals it was flown to second round at Chester and later to the third round at the Dutch International in 1973, having a couple of repairs on the way and a tank solder job done *between* bouts!! The model still weighs, to my astonishment, 14 1/2 oz with a Mk IV

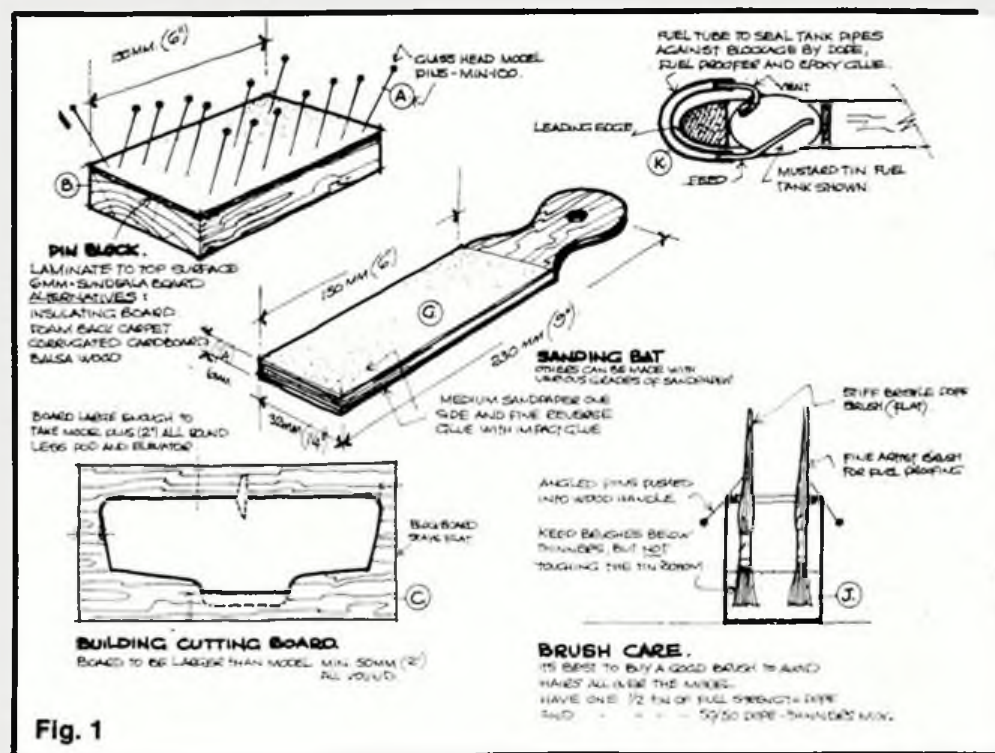


Fig. 1



'Warlord' and 'Orclist', two of Frank's nylon covered 'toughies' for Diesel Combat. The popularity of this class makes a reappraisal of covering techniques well worthwhile.

Oliver Tiger and could be flown after some attention.

Since then I have been experimenting with new ideas and materials, such as nylon, Solartex, Covertex, Polytex, Coverite, Micafilm and Solarfilm in making a special model for 'A' class diesel. Where lengthy building procedures were discarded for mass production, we can now afford to bring some of this back, as construction is of far greater importance now, which is why I prepared this article on how to cover in nylon - for those who have never been shown as I was in 1968, particularly the youngsters and newcomers alike. Incidentally, I was taught by an 18 year old enthusiast now an aircraft technician! I am not condemning the new plastics only the way they are being used and believe nylon has a place for those wanting a tight covering and mixed with the new materials to produce a survivor-type model of good performance.

The article 'Going Solo Glider' by Trevor Faulkner in the *Aeromodeller* makes for interesting reading in conjunction with this article, it will be most beneficial because, where some may disagree, COMBAT is modelling. I often wonder what my approach would have been if I hadn't taken up free-flight and scale first, before joining the Maidenhead club in 1968 shortly after a 1966 second place Nationals with a 'Twister' and a 1967 Nationals first with a 'Warlord' by John Chamberlain. Up till then I had never seen a combat model.

Nylon Covering

Chose medium lightweight close weave nylon off the roll from your local model shop. Check when purchasing for any flaws/snags/runs. If packed folded, iron flat by damping slightly. Purchase a sufficient length for wing span of model, which runs with the roll and not across. (1 metre packs) sufficient for class 'A' and 1/2A models: off

Equipment needed

- (a) Glass headed model pins - you will need at least 100.
- (b) A block of softwood - offcut of floorboard - approximately 150mm (6in.) long to act as a pincushion, the

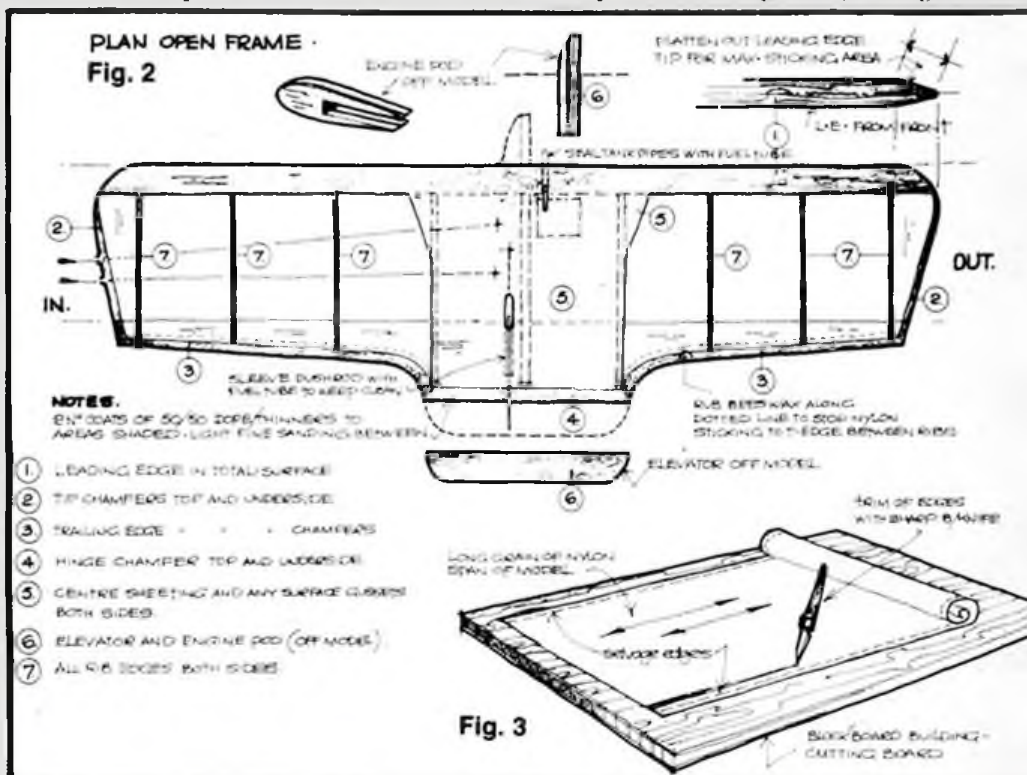
weight allows you to pull the pins out one-handed when covering the model.

- (c) A cutting board bigger than the model.
- (d) A soft pencil HB-B (NOT a biro as this stains and spoils the model).

plenty of sticking areas. (Engine pod fitting after the model is covered - some may prefer pod and tails fitted and covered first.) The models built for this article were the original 'Warlord' kit and the APS 'Orclist', being contrasting famous designs from the equally famous ACE team. Main sketches are based on the straight-forward wing, with a separate sketch (Fig. 10) to show my personal building/covering technique for the 'Orclist'.

Ensure that the model is well prepared and sanded smooth. Mix up a 50/50 mix of dope/thinners in a separate tin and apply only to the areas to which we want to stick the nylon, ie the leading edge, the centre sheeting, elevator and approximately 6mm (1/4in.) permimeter tip (Fig. 2), trailing edge, top and bottom, not forgetting the edges of all the ribs. Allow to dry and sand entire model until smooth, but lightly, then apply a second coat of dope and allow to dry, sand lightly as before.

Unroll nylon over cutting board, making



- (e) A throw-away sharp balsa knife and a safety razor blade.
- (f) Neat clear dope and stiff dope brush (flattie).
- (g) Sandpaper bat, fine one side, medium opposite side and some very fine sandpaper.
- (h) A large soft flattie artist brush for fuels proofer application.
- (j) A tin of thinners to clean out brushes.
- (k) A short length of fuel tube to prevent tank pipe blockage.

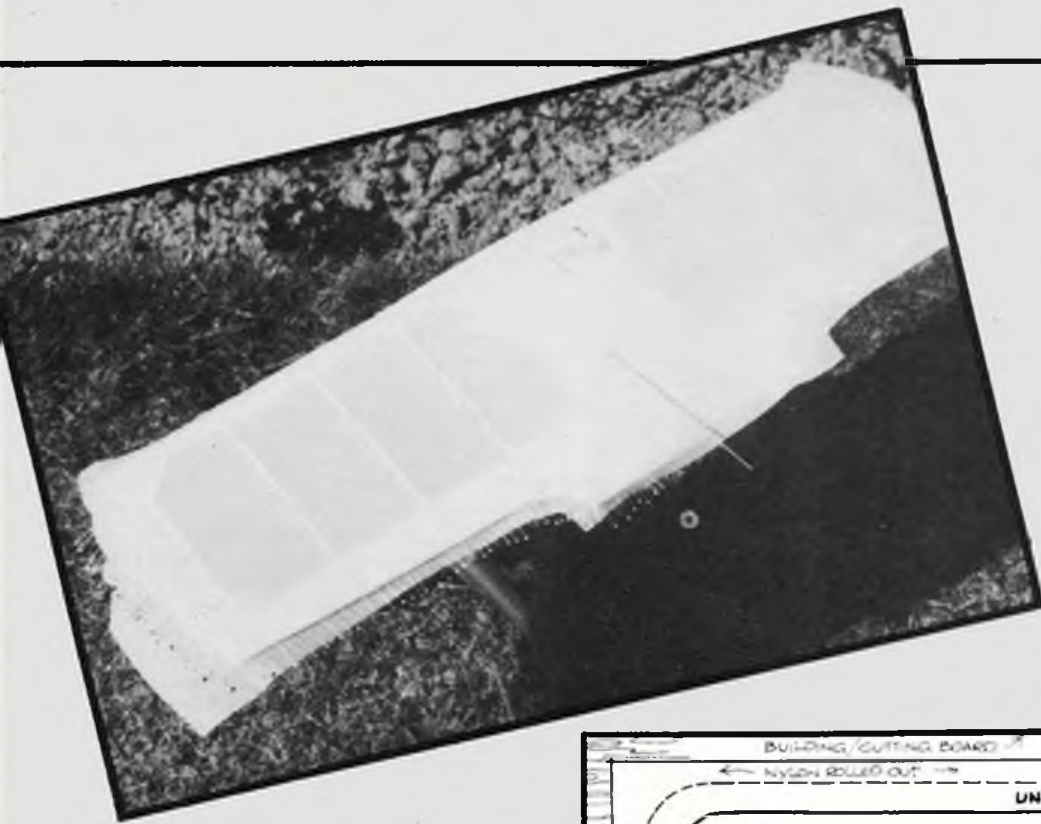
Procedure

For this exercise it is taken that we are covering an open-framed balsa model with centre balsa sheeting, ie kit 'Warlord', APS 'Liquidator', 'Orclist', 'Dominator', which are all ideal for this type of covering with

sure the long weave of the nylon runs the long length of the board: nylon usually has a selvedge with a red thread running along the edges, this should run the same way as the leading edge, but should be cut off, as this edge is difficult to smooth out (Fig. 3) and upsets air flow over wing.

Lay model over nylon and draw round model with soft pencil but allow a minimum of 25mm (1in.) surplus all round for overlap and pulling nylon tight when sticking with dope. (Repeat for opposite side by turning model over on the nylon and repeat drawing round with soft pencil.)

Mark also with pencil on the nylon the 'in' and 'out' on surplus at tips to avoid confusion later. This will also ensure that faces are exact for both sides of the model



Left, pins galore . . . note the need for very close spacing of pins to achieve a uniform, tight covering.

firmer and stronger finish. Brush the dope through the nylon and when tacky rub down with your finger, especially around the tank, until it stays down. Make sure this step is well and truly dry and well stuck then you will be ready for pulling nylon covering spanwise. (I prefer a sunny day and work outside for quick drying.) You can speed things up if you wish using 5 minute epoxy glue or balsa cement, but this does spoil the finish.

For the next stage I prefer to sit on a kitchen chair, with the model on my lap, with all the pins and dope, knife, etc. all close to hand on another chair. Make sure you pin all the pins, approximately 100, onto the wood block first (Fig. 1) this saves a considerable amount of frustration - once you get dope on your fingers it is very difficult to pick pins up - also take out all bent and damaged pins.

Start with the inboard wing first, this gives the tank area extra time to dry. Check

and give equal strength required, as some materials vary.

Remove model and using a sharp balsa knife and nylon flat on cutting board cut both pieces of nylon following the pencil lines, you will find this neater and quicker than using scissors (Fig. 4).

Underside Covering

You are now ready to cover the model and you should start by covering the underside first. Lay the nylon full span across the model in one piece, temporarily pin at all four corners and then mark with a pencil the fuel feed where it enters the tank, remove nylon from model, lay on building board and with a sharp knife cut a small oval hole to allow feed pipe to penetrate the nylon (Fig. 5).

Fit the nylon back on the model as before, slipping the feed tube through the nylon first, then pinning nylon at all four corners (Fig. 5) also at leading edge and trailing edge in line with the fuselage.

Start by neat dopping down the centre of the model, brush width only and round the tank area, (Fig. 5/C). I always fit balsa gussets to the outboard of a tank to allow the nylon to be stuck around the tank for a

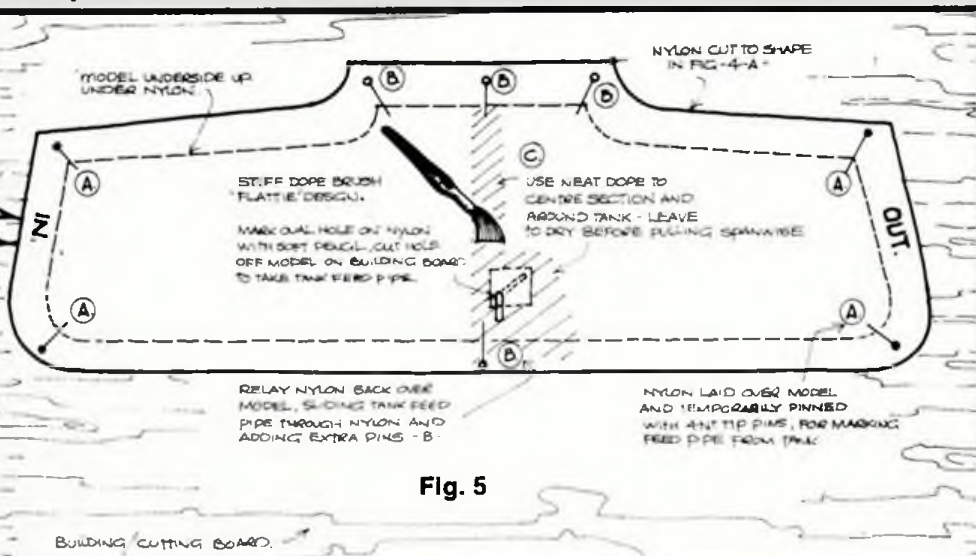
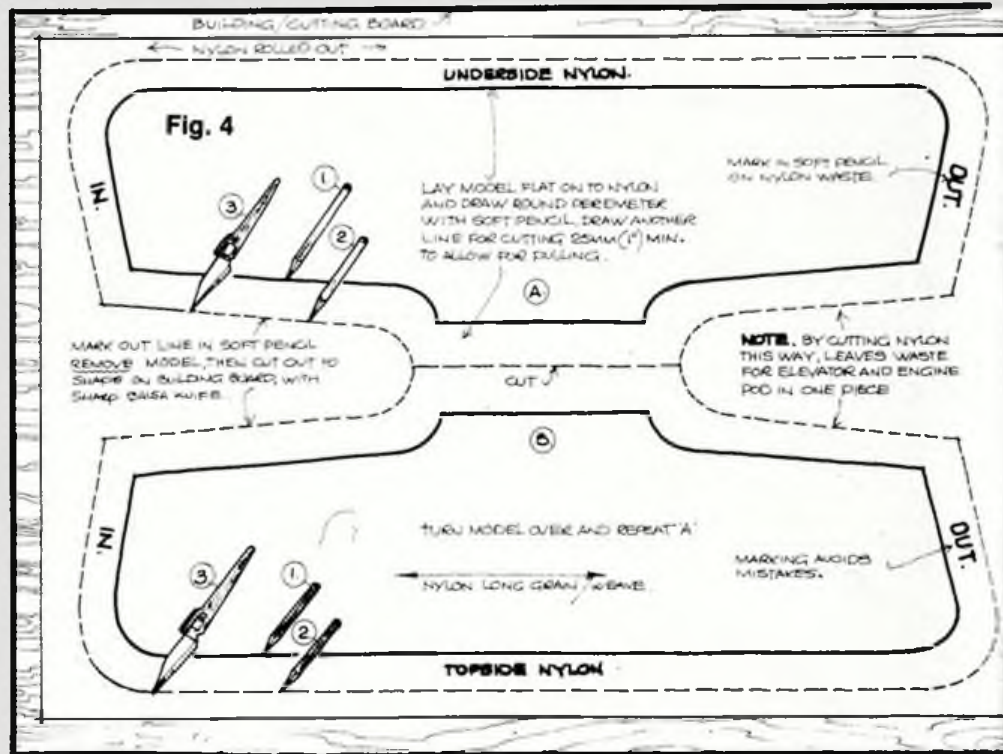


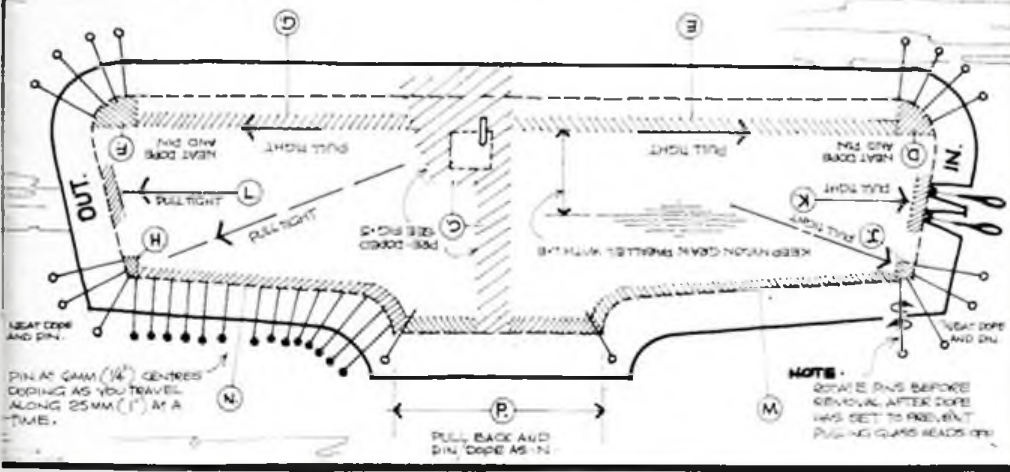
Fig. 5

that the grain of the nylon is in line with the leading edge and pull tight to the tip of the leading edge, then holding the nylon in place with left hand apply neat dope with your right hand (opposite if left-handed), but just the area from the rib to the tip, and rub through the nylon, then put in about 4 pins close together into the edge (Fig. 6/D), not the top, now run dope the full length of the inboard left hand leading edge, about 12mm (1/2 in.) strip and rub through the nylon as before (Fig. 6/C) and leave to dry.

Turn model round and repeat procedure for outboard wing. When this is complete turn model back round to complete the inboard wing.

This is done by pulling the nylon towards the trailing edge tip (Fig. 6/H), diagonally from the tank, dope with neat dope as before, holding the nylon in place (not too tight as this will warp the model) push 4 to 6 pins round corner of tip and rub dope through nylon and allow to dry. Repeat inboard tip (Fig. 6/H).

Fig. 6.



Now pull nylon out spanwise at centre tip and slit nylon with knife where lead-outs occur, (Fig. 6/K), and complete wing tip by pulling spanwise starting from the leading edge and working back towards the trailing edge 25mm (1in.) at a time, pulling, doping, rubbing, and pinning, keeping pins to a maximum spacing of 6mm (1/4in.), this will keep even tension: while waiting to dry repeat procedure to the outboard wing tip (Fig. 6/L).

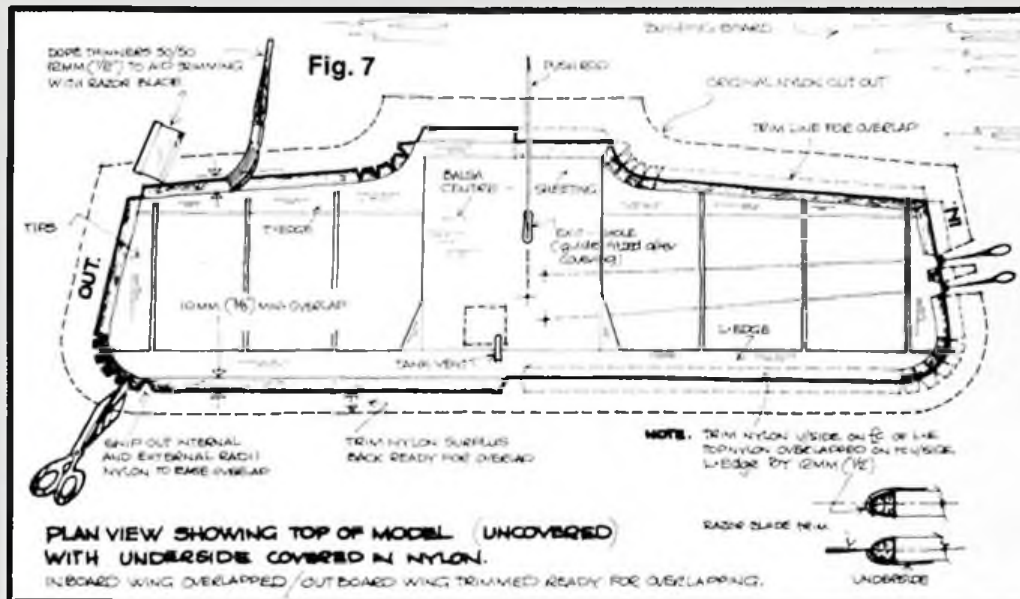
Now go back to the inboard trailing edge starting at the tip and working along the trailing edge in a similar manner to the tips, 25mm (1in.) at a time, pulling, doping, rubbing, pinning, pins 6mm (1/4in.) apart into the edge (Fig. 6/M). This may seem tedious but the final product will pay dividends with a really crisp model finish and improved air performance.

Repeat this procedure on the outboard trailing edge (Fig. 6/N) using the pins off the model from the tips then every other one along the inboard trailing edge. (Note here: when taking pins out, rotate pins between fingers first to break dope holding pin, this will prevent pulling glass heads off.)

Finally pull nylon out along elevator hinge edge, pin and dope as previously described (Fig. 6/P).

To aid trimming nylon to perimeter of model, run some 50/50 dope Thinners around surplus nylon overhang approximately 12mm (1/2in.) (Fig. 7) and allow to dry, but keep off the stuck nylon areas. You will then be able to cut the nylon evenly without pulling out threads and avoid a ragged edge.

Transfer your work back to the inboard wing working along the leading edge. Using a sharp knife or razor blade trim nylon back to allow approximately 10mm (3/8in.) minimum overlap (Fig. 7). Remove all pins from model back to pin block and start by overlapping the elevator hinge edge, first doping down, rubbing flat until the nylon sticks down, slit the overlap on internal and external corner curves in 12mm (1/2in.) spacings (Fig. 7), dope down as before, carry along trailing edge doping and rubbing down as you go (no pins required). Follow round onto tips up to leading edge.



Topside Covering

Before commencing, ensure that all controls are free and put a spot of fine oil on the bellcrank controls before sealing model.

Now lay the nylon out spanwise and pin at four corners as before but the top requires two holes to be marked with soft pencil, the tank vent and the push rod hole, which requires a slot line. Remove nylon from model and cut small oval hole for tank vent and approximately 30mm x 4mm (1 1/4 x 1/8in.) slot for push rod (Fig. 7). Fit nylon back onto model lying flat on building board, first insert push rod through slot, followed by tank vent through oval hole, then lightly pin out at tips to keep nylon in place. Then dope down centre line of model and around tank and push rod slot, rubbing dope through nylon till stuck down. Allow to dry thoroughly and then repeat the procedure used on the underside to secure nylon, final overlap needs only to be 6mm (1/4in.)

Elevator Covering

While waiting for model to dry, cover elevator in nylon off the model, first giving the balsa elevator 2 coats of 50/50 dope thinners, sanding between coats. Ensure nylon runs in line as described on wing to prevent warping, no pulling is necessary, any wrinkles in nylon should be ironed out

Below, mass production... three engine pods almost ready for installation. Building several models at the same time helps ensure consistent models.



prior to application to avoid bubbles. Dope onto elevator, rub down with fingers and allow to dry. Using the sand bat, sand nylon off to the perimeter (Fig. 8/1) then cover opposite side in a similar manner. When dry, trim approximately 6mm (1/4 in.) overlap, slit at 6mm (1/4 in.) intervals on any curvatures (Fig. 8/2) then dope down hinge edge first, followed by remainder, allow to dry under a weight on a flat surface.

Elevator Hinge

To fit elevator to model use a 32mm (1 1/4 in.) strip of scrap nylon pre-doped, then use metal straight edge to cut strip to equal 12mm (1/2 in.) widths to suit elevator (Fig. 9/A), work out spacing along elevator, then dope strips into position and allow to dry holding round edge with pins (Fig. 9/B) to both sides.

When completely dry, offer up to model, pin elevator to level with trailing edge, (Fig. 9/C), then dope hinges onto model. Some prefer stitching but my preference is nylon hinges, mainly for ease of replacement when damaged in combat, a spare can be made up with hinges and horn and be glued with cast cement and pins more quickly than stitching.

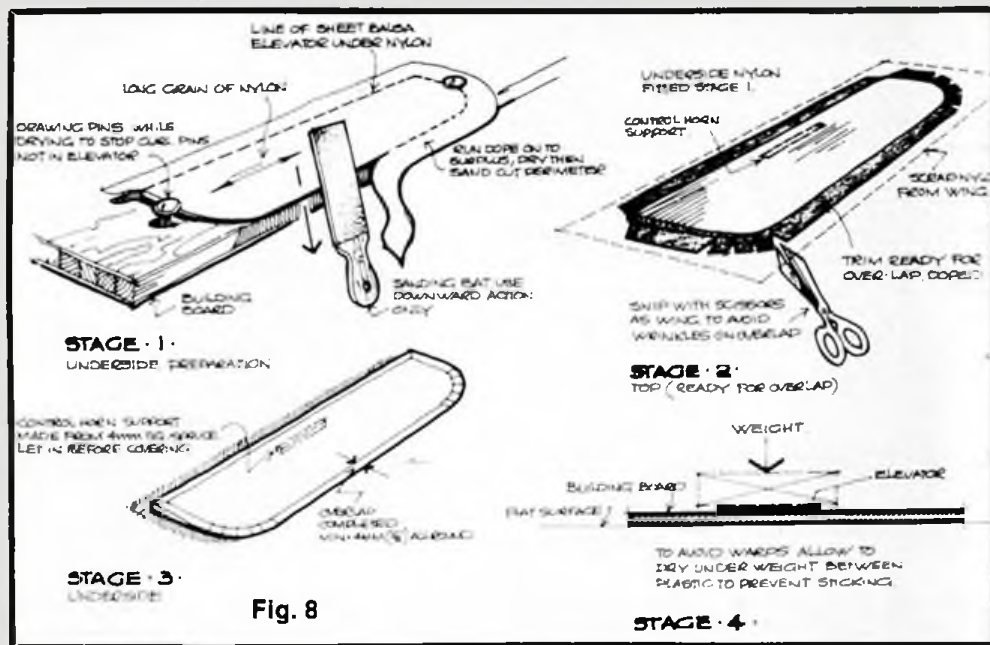


Fig. 8



Above, engine pod construction (can Frank tighten those clamps before the epoxy sets?). Below, 'Warford' covered, less engine pod, 'Orclst', less pod and elevator.

Below, tape engine pod to covered wing, to find optimum position for correct balance point.

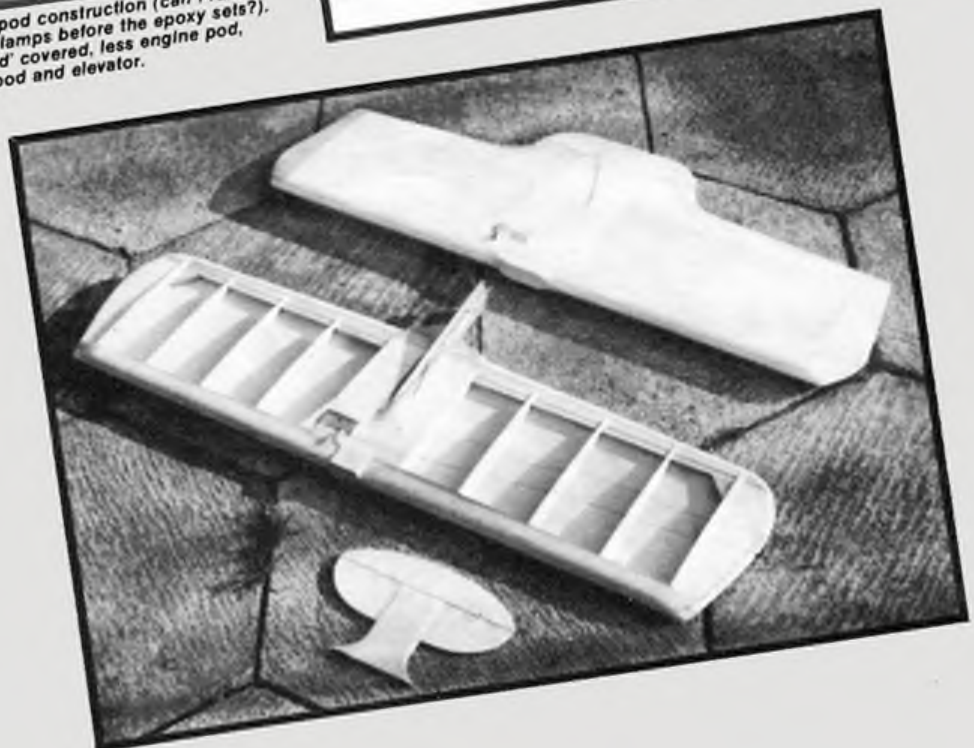


General

Complete the model by setting up the elevator horn. I use a small piece of 4mm (1/8 in.) square spruce let into elevator with epoxy glue before covering, to support top and bottom 1mm (1/16 in.) ply plates, which are double-sided taped into position. Where tank vents and lead-out tubes come through the nylon I run 5 minute epoxy glue around to seal against fuel and generally smooth out the rough edges.

The centre section of the model can now be doped with one coat 50/50 dope thinners and the overlap perimeter sanded with fine sandpaper and given a quick coat of dope.

When model is dry the engine pod can be covered in nylon, fitted, and given the required number of dope coats after fixing onto the model. I prefer to pre-cover pod off the model after making the pod a tight, dry fit before covering the model, then covering in nylon. Pod/model fit must be very good and epoxy glued into position with final





Above, author Frank Smart with finished models. War wounds usually appear only after the second and third heats!

this fashion till you reach the centre sheeting (do not dope this yet as this gives you something to hold on to while you repeat the procedure to the opposite wing, starting at the tip).

You will find if the temperature is warm you should be able to go back to the opposite wing straight away and so on. It is advisable to make a record of the coats applied as it is easy to lose track. After 3 coats sand model with fine sandpaper. Then sand after the following final 2 coats. Any tissue artwork, numbers, etc. *not* transfers or pvc stickers, should be applied with thinners only after the third coat of dope and lightly sand when dry. Also you may coat engine pod with 5 minute epoxy glue, which will allow you to hold the model and apply the final 2 coats of dope to the whole model including the centre section sheeting and elevator.

Finally, sand entire model with fine sandpaper, plug tank pipes with a 150mm (6in.) length of fuel tubing looped around leading edge (Fig. 1) and apply 2 thin coats of polyurethane clear fuelproofer. Allow adequate drying time between coats, approximately 24 hours, plus lightly sanding between coats. Any transfers or pvc stickers should be applied to the model between coats of fuelproofer. Note: check type of base used in polyurethane as some ie *Joy* clear, is thinners based and damages transfers: spirit based ones are best and easier to use being very thin for application using a large soft artist's flat brush. When dry clean off all surplus fuelproofer which has set around the push rod and tank pipes, remove with sharp balsa knife and ensure all controls are smooth and free from snagging. Apply thin oil to all controls, ie horn pivot, push rod exit, lead-out exits. The final model will be best left for a couple of days or so before flying and will have a gloss finish with a superior air performance and strength to any other covering, which is one of the main requirements of the one-model diesel and 1/2A combat bouts, so popular at the moment. Have a go and give those foamies something to worry about!

The above may seem a lengthy if not formidable task but once mastered can be as quick as iron on plastics (only the successive coats of dope and fuelproofer takes the time, which must not be skimped, fuel seepage soon adds weight - also avoid colour dope for weight saving).

Got to go now, the farmer's cut the flying field!

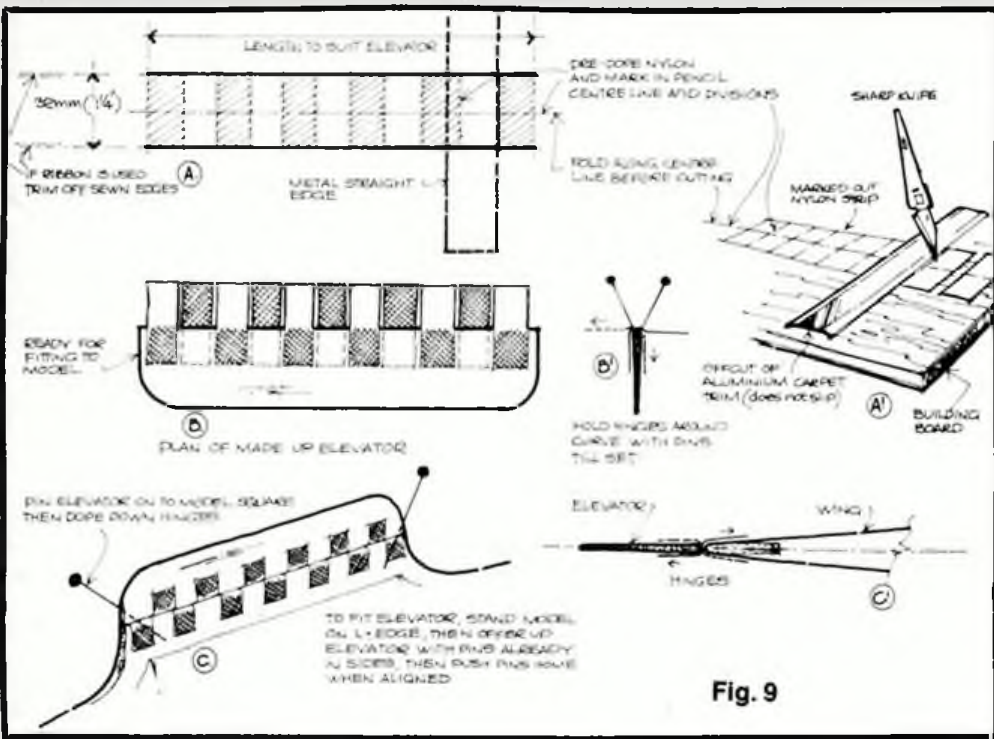


Fig. 9

perimeter epoxy fillets and dowel at bellcrank mount (with the pod fitted it can be used as a handle while the remaining coats of dope are applied to the model on both sides, but hang model up between coats).

Finishing

Finally the main doping is carried out to the whole model. Plug tank pipes with the 150mm (6in.) length of fuel tubing around leading edge. Start by ensuring that you have sufficient 50/50 dope/thinners mixed up and a clean stiff dope brush (one that the hairs don't come out of).

The first coat should be applied almost with minimum dope in the brush to prevent dope falling through the nylon, work quickly, working one bay at a time, rotating the model, tip top first, tip underside second, back to first top bay and then to underside of the same bay, working along the wing in

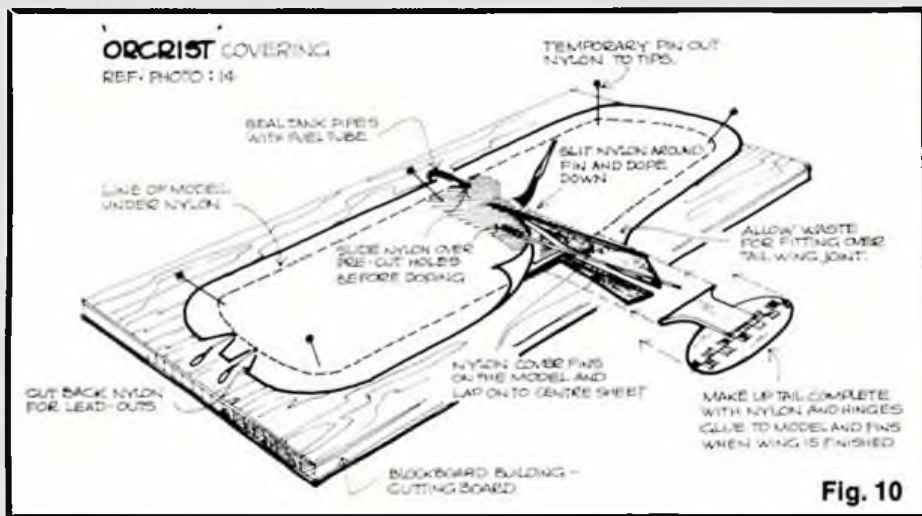


Fig. 10



became available various kinds of glide recovery models appeared.

Two separate forms of model were developed originally. The first was *rocket glider* where the motor itself remains in the model after burnout followed by *boost glider*, where the motor detaches from the glider and descends separately.

Both types have been developed as separate contest classes. The two systems present the modeller with considerable challenge and given the wide range of rocket engine thrust available, the scope for variety is enormous. Models range from ultra-light chuck glider types to large radio-controlled soaring gliders capable of very high flight times. Scale and unorthodox models can also be seen featuring (naturally!) the Shuttle, rogallo-type gliders, "Star Wars" space ships and even good old flying saucers.

Boost Gliders

Many designs have been tried, to overcome the stability problems posed by

A perfect example of a parasite boost glider using a conventional model as 'parent'.

The pod is attached loosely to the glider by a wooden key which locates in a matching slot in the glider. Engine thrust, forces the two components together and the shape of the key also aids the separation caused by the engine ejection charge.

The design of the glider itself can follow conventional "chuckie" practice. My own first models were in fact based upon the "Yellow Bird" (*Aeromodeller Plans Service G/805*) design modified at the nose to accept a pop-pod and toughened up with a fibre glass fuselage. The proportions of "Yellow Bird" are ideal for boost-glidors and it is relatively easy to scale the dimensions up or down to suit the engine size being used. A

AT THE LAUNCH PAD
 Following our introduction to model rocketry last year — John Whaddon blasts off for a regular column

Table 1

Engine Type	Thrust N/Sec	Wing Area in ²
1/2A	1.25	20
A	2.5	30
B	5	45
C	10	60

launching a glider, designed to fly at low speed, by means of a high speed rocket. Boost gliders provide the simplest solution because the engine separates from the glider after burn-out. Usually the rocket is contained in a pod mounted at the nose of the glider. The ejection charge causes the separation of the two parts. The engine can be ejected on its own (with a small streamer attached for safety purposes) or the complete pod can be made detachable. Deployment of a streamer or parachute also aids in recovery of the pod.

good guide to suitable size is shown in Table 1.

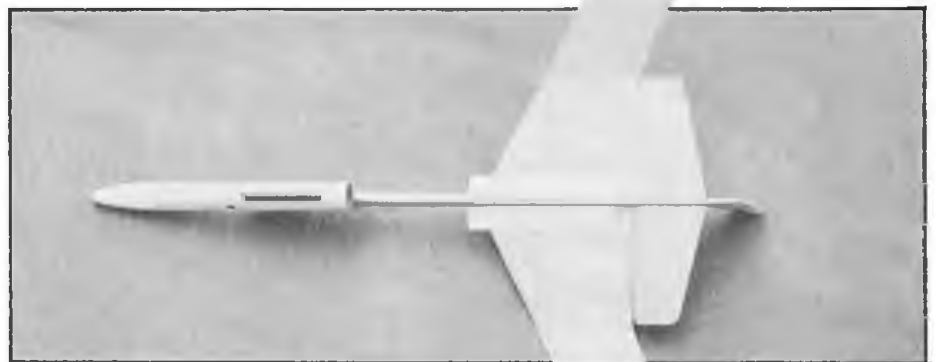
An alternative method of launching boost gliders is using the "parasite" system. In this method the glider is "piggy-backed" on a much larger stable parent, launch rocket. The nose of the glider is firmly located in a fitting on the front portion of the "parent" and the tail can be similarly clamped or, with careful design the tail can be arranged to interlock with the "parent's" fins. The

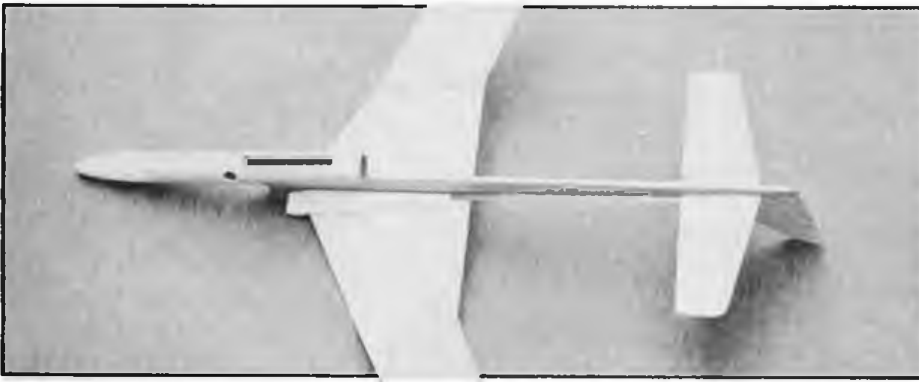
BOOST GLIDER as a class of space flying was originally seen as a form of aerodynamic recovery system for model rockets. In the full size arena there have always been schemes for controlled soft landings ranging from the abandoned "Dyna-Soar", Boeing NASA project to the ultimate in boost-glidors the Space Shuttle!

In aeromodelling, the reverse situation applied in that for many years modellers have looked longingly at the rocket as an alternative form of propulsion for model aircraft. In Britain, the late Howard Boys was especially successful in developing a series of rocket powered tailless models nearly forty years ago! Such experiments do not appear to have been particularly widespread and would-be flyers were discouraged by the widely held belief that it was illegal to fly such models.

However, progress continued in other countries and as soon as suitable motors

'Buzzard' rocket glider, sold in the United States by Competition Model Rockets. Shown here in launch configuration with wings in the rearmost position.





Again the 'Buzzard' but here shown in the glide phase with the wings in their forward position, over the spent rocket motor.

engine ejection charge separates the two halves of the "parent" and the glider is released.

Like all models it is necessary to prove that a design is stable before launch and this can be checked with the simple swing test described in earlier articles.

Rocket-Glider

As mentioned above, rocket gliders differ from boost gliders in that the rocket engine remain with the glider after burn out. This simple requirement however brings about some complication in model design.

In a technical sense the problem is that if a satisfactory boost is to be obtained the

balance point (C.G.) must be located well forward in relation to the centre of pressure (C.P.). Hence the form of a basic rocket with fins at an extreme rear position and C.G. at about midway along the body tube. Placing the engine in a forward mounted pod usually achieves this desirable situation during launch. However, after burn out the motor casing is still sufficiently heavy to produce a forward C.G. and it is not easy to obtain a satisfactory glide!

Something has to change to produce the correct CP/CG relationship. Usually, the wings are mounted on a slide so that they can move from an aft, launch position to a forward glide position. This arrangement is

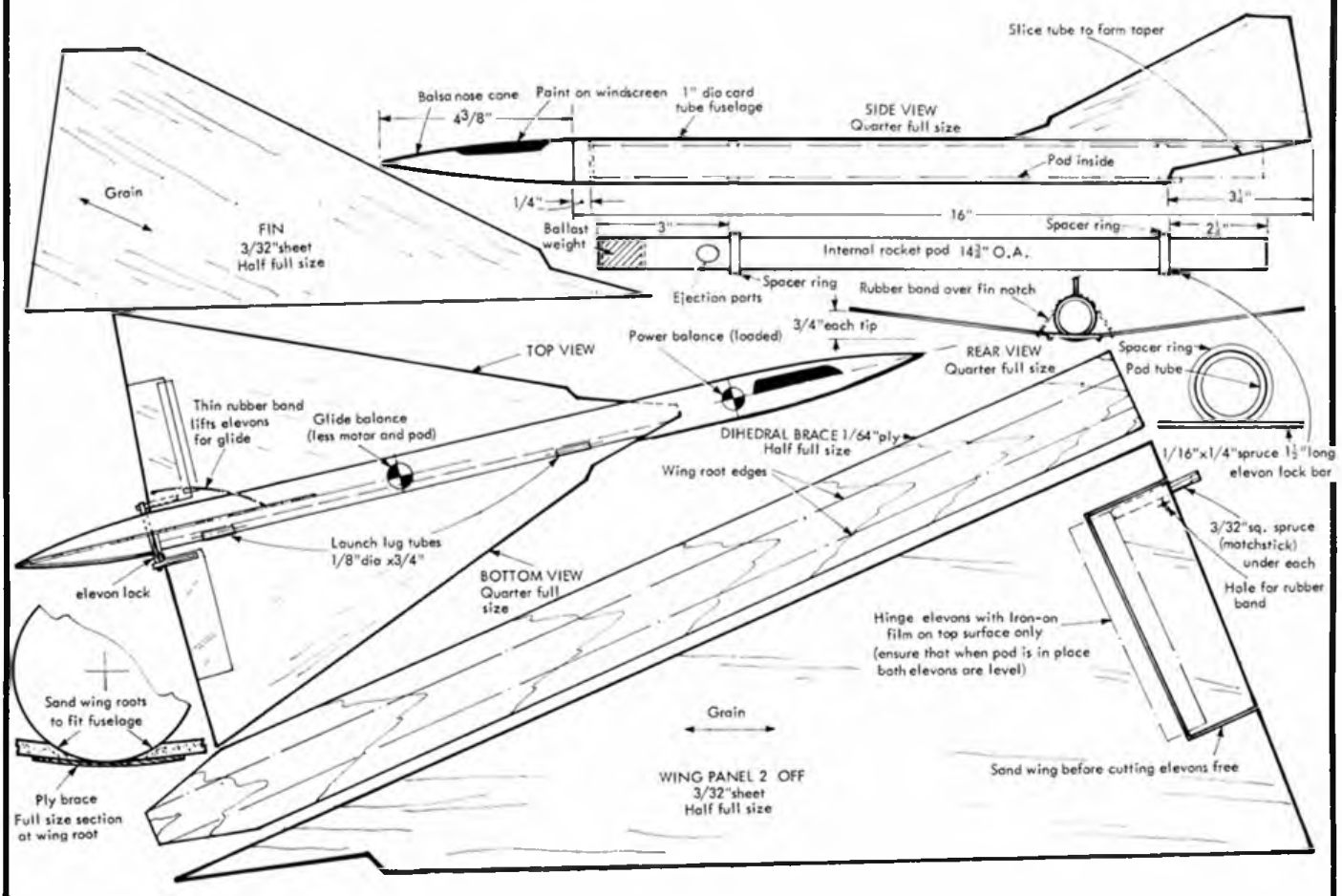
shown in the photographs of "Buzzard" a rocket glider built from a kit produced in the U.S.A., by *Competition Model Rockets*. In "Buzzard" the wings are held in the aft position against the pull of an elastic band by a length of nylon thread which passes through the pod ahead of the motor. At burn out this is melted and the wing is released to move forward to the glide position.

Alternatively it is possible to arrange for the pod to move aft to achieve the correct glide C.G. location. Swing wing variable geometry is also possible and there are also a number of variations on the "flop-wing" system. This method, which has also been tried in free-flight power models, involves folding the wing at about mid-span for the launch and allowing the outer panels to flip out to full span for glide.

An interesting technique, perfected by modellers in Bulgaria is the use of flex wing *Rogallo* style gliders. These can be folded and packed into a conventional rocket body for launch. Due to low drag these models achieve very much higher launches than more conventional types. At ejection the gas pressure inside the rocket is used to deploy the flex wings of the glider and the body tube becomes the fuselage. This efficient system also makes a very effective boost glider.

This branch of space modelling is a very rewarding aspect of an intriguing sport. It is particularly interesting in that it forms a meeting point for the different disciplines of rocketry, free flight aeromodelling and radio controlled gliders.

Here we have yet another variation on the boost glider theme. A rear ejection motor-pod system is used but the motor-pod is extended forward to house the additional forward ballast required for the boost phase. This ballast is ejected along with the spent motor from the gliding portion. The motor-pod also restrains the elevons in their horizontal boost position - releasing them, to the glide position on ejection.



VINTAGE CORNER WITH ALEX IMRIE

Warwick 1984

There was a good turn-out on Warwick Racecourse on June 24th at the meeting held to commemorate the Wakefield International Contest held on the same ground 50 years ago. The day was generally overcast but there were some bright intervals, however, a fresh wind prevailed and apart from the drift, this also produced turbulent eddies that were active right across the field and caused not a few crashes. All types of models were to be seen, the vintage fliers obviously taking advantage of the availability of a place to fly. R/C Assist models were flying all day, as were various small power and rubber free-flight models and gliders. Entries were few in the British pre-war petrol model event organised by Peter Michel, who eventually dropped the original requirements and accepted any vintage power model into the rounds of his



Peter Brown with his Copland 'Streamliner' on the boards. This combination returned three maximums only to be beaten in the 8 ounce fly-off by 1 minute 19 seconds by Phil Ball's 'Hi-Ho'.

competition. Initially of three rounds, this was extended to five rounds because of a lessening in the wind strength, then while flying off these additional flights the wind became stronger than previously and prevented the completion of the competition! By the time this appears in print, a re-run will have taken place, hopefully at Old Warden during the SVAS meeting. Outstanding models in this class were Peter Michel's "Comet II" powered by a Bunch 'Mighty Midget', Noel Barker's Bill White pylon model using a completely cowled 'Super Cyclone' and, although not flown because of the wind, Brian Ferrett's replica of C E Bowden's large low-wing monoplane 'Gull' (as described in *Practical Mechanics* February/March 1940 and not to be confused with CEB's earlier 'Gull' from

Right, Reg Farham with his replica of Frank Zeig's 1934 rear return geared Wakefield entry. The original was proxy flown by R N Bullock to gain third place in the 1934 event at Warwick.



Right, J B Allman's 'Grasshopper' in flight, this model won the 1934 Wakefield Contest and has been restored to original condition by SMAE Honorary Historian Alwyn Greenhalgh.



1933) powered by a Brown 'Junior Model B'. Surprisingly there were only four entries for the one design 'Tiresias' glider competition, some contenders were doubtless 'hors de combat' during trimming flights as was Alan Wiggs' model which suffered a broken wing, the same fate befell Chris Knight's model which had previously been performing very well. Winner was Geoff Smith whose model put up a fine flight to pass OOS after some 5 minutes. In the second glider competition organised by Derek Ridley, an Open Towline event, there were nine entries, six of which flew. Again the winner was Geoff Smith flying a 'Satu', followed by Alan Crompton with a Keil Kraft 'Chief', third man being John O'Donnell with his gyro-glider flown in the event "sans rotor". Because of the wind, competition times were reduced to 1½ minutes maximum, but even this restriction saw gliders out of the field downwind. Other gliders seen, included a 'Sunnanvind', Frog 'Vanda', 'Norseman' and a Warneford 'Sunbeam'.

Especially disappointing was the complete lack of any entries in the compressed-air event for the trophy presented by Peter Martin, while the weather was obviously not suitable for such models to be flown, not a single model in this class was seen at the meeting. Why is there not more industry in this field? Don't tell me that it is the fear of the exercise needed to pump 150 psi into the container! Compressed-air engines and containers are available from Bert Pond, 128 Warren Terrace, Longmeadow, Mass., 01106 USA, and plans for simple models are obtainable from the John Pond Old Time Plans Service. C'mon, get pumping, it's probably better for you than jogging!

Wakefield Anniversary Competition

If the support for the above side-line events was less than expected, the Wakefield entries surpassed all expectations, there being no less than 37 machines entered in the two classes. It is worth remembering that there were 46 entries for

the 1934 Eliminating Trials at Warwick and looking around the parked cars this time, caused Ron Moulton to wonder how the 1934 entrants and spectators actually got there. Travelling in 1934 was not the easy everyday thing it has now become, doubtless many tales could be told of long expeditions by foot and cycle carrying the familiar model boxes. Maybe some of the old-timers will tell us about this aspect of competition flying?

Take-off boards were laid out as far up-wind as possible but unfortunately this location was also in the lee of nearby boundary trees and there were some quite fantastic tussles with this invisible turbulence, when powerful climbs gave way to aerobatic manoeuvres reminiscent of Januz Zurakowski's famous "cartwheel" performed in the Gloster 'Meteor'! Needless to say, the



take-off area was the centre of attraction but spectators tended to get into the immediate path of departing models and there were a number of collisions and a few broken models because of this. The activity around the take-off point was at times intensive, motors being wound and turns counted, then with winding tubes removed, alignment checked, modellers waited their turn to fly. Volunteer timekeepers were kept busy, being allocated in turn, to competitors. The Wakefields were thrilling to watch, leaping off the boards and going up like lifts into the strong wind, then, their forward progress arrested, they usually turned out of what was almost a stall then proceeding rapidly downwind. Models doing three minutes were often outside the racecourse area, some of them coming down amongst houses. Generally because of the drift models were not flown with maximum turns and there was a fine art in knowing just what

Laurie Barr lights the D/T fuse for Bryan Spooner proxy flying the 1935 'Ying' model built and entered by Ed Wallenhorst USA.



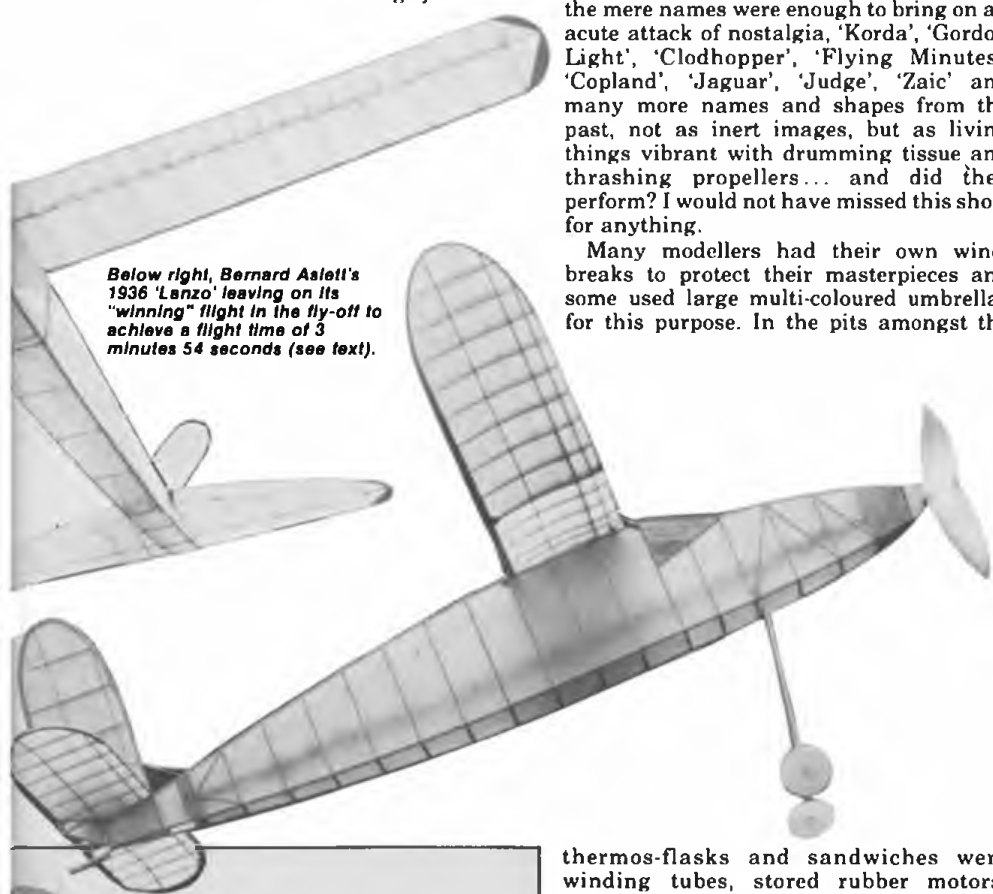
proportion to use. Inevitably, there were broken motors but here the motor tubes usually saved the delicate structures. The models were all of the finest construction and finish, beautifully built by real craftsmen. They were of museum standard, the mere names were enough to bring on an acute attack of nostalgia, 'Korda', 'Gordon Light', 'Clodhopper', 'Flying Minutes', 'Copland', 'Jaguar', 'Judge', 'Zaic' and many more names and shapes from the past, not as inert images, but as living things vibrant with drumming tissue and thrashing propellers... and did they perform? I would not have missed this show for anything.

Many modellers had their own wind-breaks to protect their masterpieces and some used large multi-coloured umbrellas for this purpose. In the pits amongst the

5 3/4 ozs and is powered by 6 strands of 1/4 in. rubber, while the original had a reed tailunit outline, weighed only 4 1/2 ozs and used 12 strands of 1/4 in. rubber. Dennis it was, who researched the model entered by Walter Getsla in the 1934 Competition which was proxy flown by ROG Booth and was described in this column in March last. His work enabled Mike Hetherington to build a beautiful replica which was flown several times during the day. One wonders what feelings Walter Getsla had as he saw this model fly. He had come all the way from San Jose in California to be with us at Warwick. Pat Fillingham, who flew in the British team in 1934 and placed 5th in the Competition brought along his 'Swan' duration model, an own design by this pioneer aeromodeller from about 40 years ago. Alwyn Greenhalgh flew J B Allman's original 'Grasshopper' model that won the 1934 Wakefield, fully described in July *Aeromodeller*, this historic machine was shipped to Alwyn from South Africa by J B Allman shortly before he died and was received in a very dilapidated condition, it has been meticulously restored by Alwyn retaining as much as possible of the original model and is 95% original. Watching 'Grasshopper's' flights was Horace Claymore who was Allman's retriever and "assistant" for a number of years, including that never to be forgotten day 50 years ago, when as a 13-year-old he shared 'Grasshopper's' triumph. What went through his mind when he saw 'Grasshopper' airborne again at Warwick? Maybe Horace will tell us.

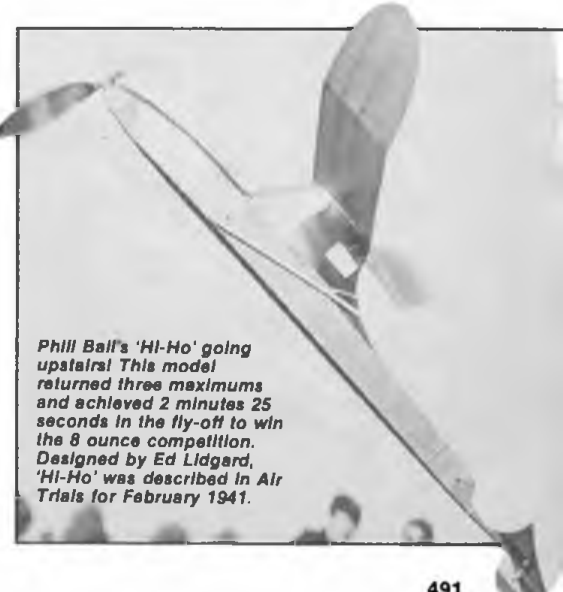
Incidents were many and cannot all be recorded here but one of the most amusing and unusual must have been the occasion when Dave Hipperson lost his 'Korda' in the

Below right, Bernard Aslett's 1936 'Lanzo' leaving on its "winning" flight in the fly-off to achieve a flight time of 3 minutes 54 seconds (see text).



thermos-flasks and sandwiches were winding tubes, stored rubber motors, propellers and geared winders. Dennis Fairlie's winder was an original *Warneford* one, aged but serviceable after more than 50 years! Two models sent over from the USA helped to give the meeting something of the right atmosphere, these were a 'Gordon Light' built by Alan Richardson, proxy flown by David Hipperson, and a 'Ying's Wakefield' built by Ed Wallenhorst flown proxy by Bryan Spooner. Providing more atmosphere (if that is the right word) Dennis Fairlie, who flew in the 1934 Eliminating Trials at Warwick and proxy flew American team member A. Howell's machine in the Cup, brought a replica of his original model painstakingly researched. This model uses a laminated balsa tailunit outline, weighs

Left, fifty years on! Time flies at Warwick. Alwyn Greenhalgh at right with three 1934 competitors. From left to right, Dennis Fairlie with his replica 1934 Wakefield entry, Pat Fillingham with his 'Swan' and Walter Getsla holding the replica of his 1934 Wakefield entry built by Mike Hetherington.



Phill Ball's 'Hi-Ho' going upstairs! This model returned three maximums and achieved 2 minutes 25 seconds in the fly-off to win the 8 ounce competition. Designed by Ed Lidgard, 'Hi-Ho' was described in Air Trials for February 1941.



Phil Ball scorns the take-off boards to let 'Clodhopper' rise off the grass. Don Knight can be seen at the take-off position with P T Capon's original black and white 'Coeur De Lion'.

town in the second round, only to find it, purely by chance, locked up in somebody's car! The finder had obviously placed the model in safe keeping little realising that its return to the competition was essential. Eventually the car owner turned up and Dave was able to hot-foot it back to the take-off boards and continue in the contest.

ATC Retrievers

The fullest praise must be given to the ATC cadet retrievers under F/Lt Matthews. Their local knowledge paid off and strategically positioned downwind, they rescued models from roof tops and trees, with and without ladders and also had search parties active in the grounds of Warwick Castle. Without their energetic enthusiasm many models would have remained lost and out of the competition. Well done, lads.

Bernard Aslett in characteristic pose, launching his 1936 'Lanzo', closely watched by Bryan Spooner in knickerbockers.

At the end of the day, Colin Watts, organiser and chief factotum of this event was faced with a mass of results and had to make a rapid evaluation of the situation in order to produce winners in both the 4 ounce and 8 ounce classes. Four competitors had



Results

Four Ounce Models (1934 Rules)

Competitor	Model		Round 1	Round 2	Round 3	Total
B Aslett	Lanzo	1936	Max	Max	Max	270
V Dubery	Judge	1936	Max	Max	Max	270
E Hopgood	Copland	1936	Max	Max	1:19	259
P Michel	Boehle	1935	Max	Max	1:04	244
K Cooper	Lanzo	1936	1:16	1:02	Max	228
I Dowsett	Judge	1936	0:45	1:26	1:20	211
A Richardson USA (Proxy D Hipperson)	Gordon Light	1935	Max	Max	0:23	203
E H Wallenhorst USA (Proxy B Spooner)	Ying	1935	Max	1:05	—	155
C Hawke	Copland	1936	—	1:11	1:12	143
R Jenyon	Parastar	1936	0:42	1:15	—	117

Eight Ounce Models (1937 Rules)

P Ball	Hi-Ho	Max	Max	Max	270
P Brown	Copland	Max	Max	Max	270
R Oldridge	Krusader	Max	Max	1:26	266
M Kemp	Hereward	Max	1:25	Max	265
J Lawson	Simon	Max	1:18	Max	258
J Claydon	Witch	1:18	Max	Max	258
G Ferrer	Korda	1:16	1:27	Max	253
P Capon (Proxy D Knight)	Coeur De Lion	Max	1:24	1:18	252
G Spencer	Contestor	1:17	Max	1:10	237
M Kemp	Blomgren	Max	0:53	Max	233

returned maximum scores, Vic Dubery with his 4 ounce 1936 'Judge' was top man in that area, while a fly-off was held for Bernard Aslett, Phil Ball and Peter Brown and this resulted in a winning time of 3 minutes 54 seconds for Bernard, who was acclaimed the 8 ounce winner. Only later was it discovered, that due to a misunderstanding he had done this with a 4 ounce 1936 'Lanzo'! So Bernard should really have flown-off against Vic Dubery. However, the situation has been resolved and Bernard became the joint 4 ounce winner with Vic, while the true 8 ounce winner was Phil Ball with his 'Hi-Ho', which achieved 2 minutes 25 seconds in the fly-off beating Peter Brown's 1938 'Copland' by 1 minute 19 seconds. In the heat of the moment such a slip is understandable and Colin accepts full responsibility for the "faux pas". He spent all day at the take-off point, keeping track of all entrants and logging their times. He is to be congratulated on a difficult job well done. The stress must have been high at times and doubtless he was pleased to get to work on Monday morning in order to be able to relax!

The meeting ended with the presentation of the prizes by the Mayor of Warwick and it

was fitting that SAM 35 gave suitably inscribed glass tankards to the original 1934 contestants present, Pat Fillingham, Walter Getsla and Dennis Fairlie. In addition a framed colour photographic composition of Mike Hetherington's handiwork was presented to Walter Getsla, who was visibly moved by this touching gesture.

The "Fly for Fun" approach by SAM 35 in its low key competitions means that one cannot see all of the action because of the dispersed nature of the flying, but this competition had, of necessity, to be held in concentration. I personally feel that it was not just another vintage event but see it rather as the high point of our vintage scene over the last few years and certainly the best SAM 35 competition that I have witnessed. Although I doubt whether we will ever be able to capture again the nostalgic atmosphere that prevailed at Warwick in 1984 in this commemorative Wakefield meeting. The racecourse provides a large area ideally suited for free-flight models of all descriptions, such sites are rarities nowadays and a regular Warwick meeting would be eagerly looked forward to by all vintage modellers.

Names, models and times of the top 10 in each Wakefield class are listed to the left.

SOPWITH PUP

CO₂ powered 16
inch wingspan
scale bi-plane
designed by
Jim Latham

The Sopwith 'Pup' has always been an aircraft popular with modellers, this CO₂ version has no obvious vices and is a delight to see in the air.



START THE MODEL by making all the laminated parts and putting them aside to dry for as long as possible. Cut formers from $\frac{1}{8}$ in. or $\frac{1}{16}$ in. balsa, wax the edges, pin down onto a flat board covered in *clingfilm* and glue the balsa strips with P.V.A. adhesive. A thin plastic strip on the outside of the assembly will stop any weak points caused by pins cutting into the balsa. If any of the assemblies warp when removed from the board replace them!

Wings

Make a rib template from thin brass or aluminium. Select soft wood for the riblets and medium for the full ribs. A few very hard balsa or ply full ribs help stiffen the wings without too much weight penalty.

any excess. With so many joints to be made the glue could weigh more than the timber!

The recommended trailing edge is made from three thicknesses of $\frac{1}{64}$ in. hardwood veneer, glued together and used with the glue lines perpendicular to the plan. If you wish to use a wider balsa t.e. make the necessary adjustment to the rib template. Dihedral is $\frac{3}{8}$ in. at each tip.

Fuselage

Cut the root plate from $\frac{1}{16}$ in. sheet and cut out the slots for the wing spars, checking with the wings to ensure accuracy. The rest of the construction is normal box and former method, though you may care to use foam

Fin and Tailplane

These should present no problems but keep them as light as possible. They are rather fragile so it helps to make and carry spares.

Undercarriage and Cabane

Use 18 s.w.g. wire for the undercarriage and 20 s.w.g. for the cabane. After bending the wire to shape, fit u/c. to fuselage re-bending as necessary to get a good fit. Bind and solder axle. The cabane struts are bent to shape and checked against the model by setting up the wings with the jig. When the wire work is correct, epoxy the fairing strips. The fairings are $\frac{1}{16}$ in. sheet (slotted). When the epoxy is dry fill the fairings and sand smooth.



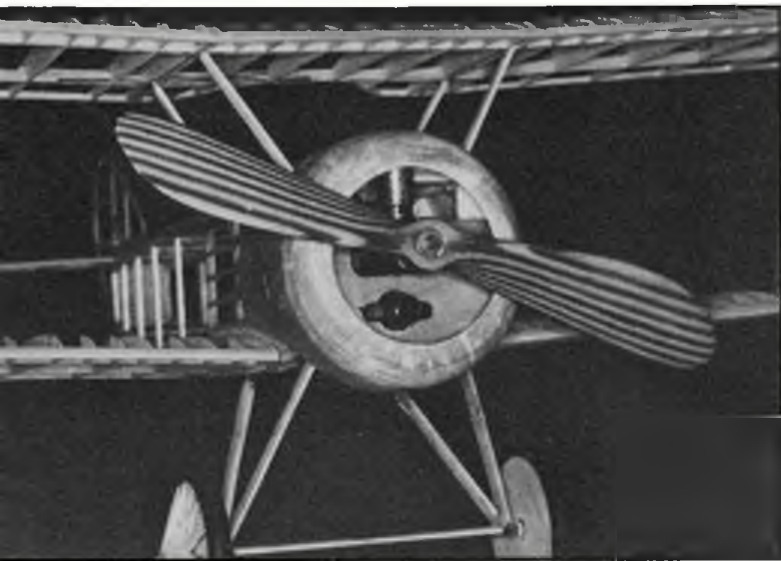
This view of the 'Pup' clearly shows the rigging wires, see text for their use as a trimming aid.

Lower wing root ribs are hard sheet or ply. If you have a saw bench the spar slots can be cut by assembling the ribs and gluing on false leading, trailing edges and ends to the ribs, then proceeding as though you were dealing with a solid block of wood. If using this method be sure to mix up the different wood densities. The actual construction of the wings should present no problems but use adhesive very sparingly and scrape off

blocks sanded to shape instead of the $\frac{1}{32}$ in. sheet decking. Stringers for the rear and side decking can be strips or you can cut long triangles from sheet and trim to shape. When fitting the alloy tubes for the undercarriage and cabane struts epoxy them securely as the landing shocks are very high due to the cross axle catching in the grass and tripping the model up abruptly. The step is formed from two pieces of $\frac{1}{32}$ in. sheet formed over a dowel. When dry cut off a slice and glue to fuselage.

Close-up of the engine bay, sensible use is made of the engine bulkhead to mount the filler valve.





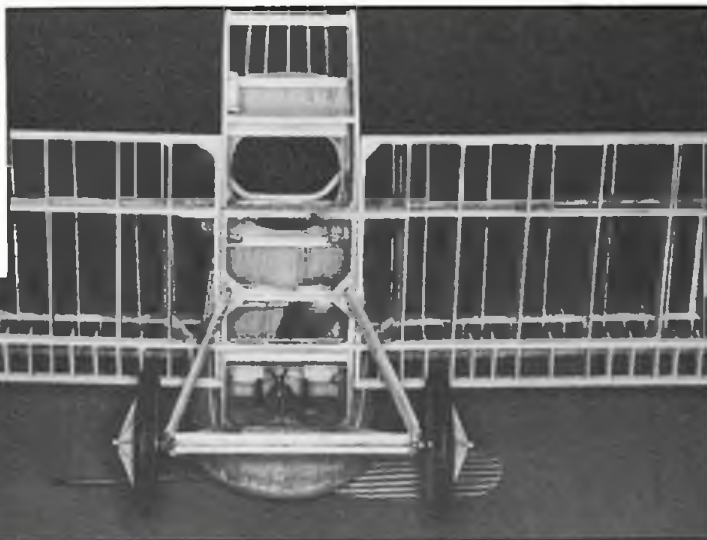
Left, the 'Pup' prior to covering. With all those ribs, take heed of Jim's warning regarding too much glue!

Assembly

Fit lower wings and leave to dry. Fit the rigging jigs using rubber bands and epoxy cabane struts into place. Use balsa cement for interplane struts, if any mistake is made cellulose thinners can be used to unfasten the joint. When all is correct set aside to dry thoroughly.

Rigging

Use 0.015 fishing line which is pulled through a piece of sandpaper until it is



Above, before covering the fuel tank may be eased forward to the front bay to allow for future access. Below, laminated rear skid is glued both to bottom sheeting and vertical 'filler' at rear bay.

Wheels

Cut a $\frac{1}{8}$ in. balsa disc slightly oversize and epoxy to a length of 18 s.w.g. brass tube, ensuring that the disc spins true. Leave some of the tube protruding at each end. Epoxy triangles of obeche veneer or thin balsa to make the spokes. When dry clamp end of tube in drill or lathe and sand disc and spokes true. Sand a semi-circular groove on the outer rim of the disc. Cover wheel with jap tissue and dope well. The tyre is made from rubber tube joined with cyano adhesive and lightly epoxied to the rim.

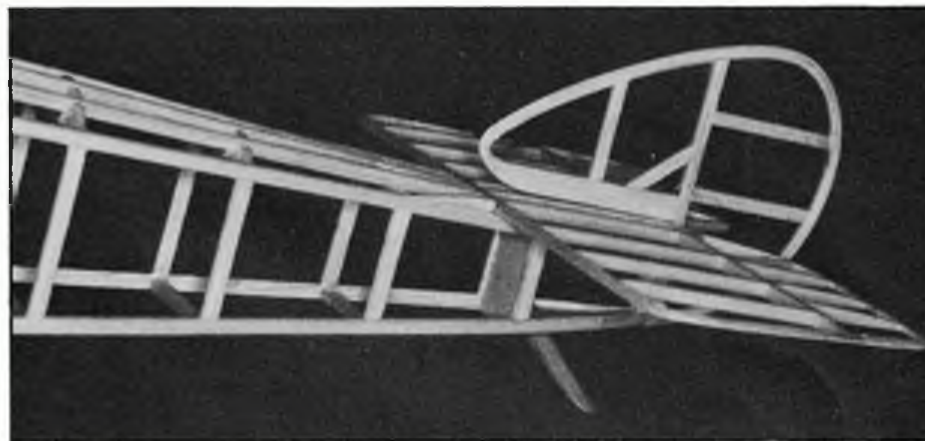
Cowling

This is made from papier mache. Find or make a suitable former, cut strips of heavyweight *Modelspan*, make a number of slits along one edge. Cover the former with clingfilm and using heavy duty wallpaper paste, wrap the former with paper, brushing the slit edges forward over the front curvature. Do not try to make the cowling in one go. Offer it up, sand off the high spots and apply more paper as required. Do not sand until *thoroughly* dry.

Finally, sand smooth and dope.

Covering

Cover upper surfaces in lightweight green jap tissue and lower surfaces in white. Steam shrink and dope with 50/50 dope thinners. Spray or hand paint to chosen colour scheme. Roundels are made off the model and pasted on, as are squadron markings and serial numbers.

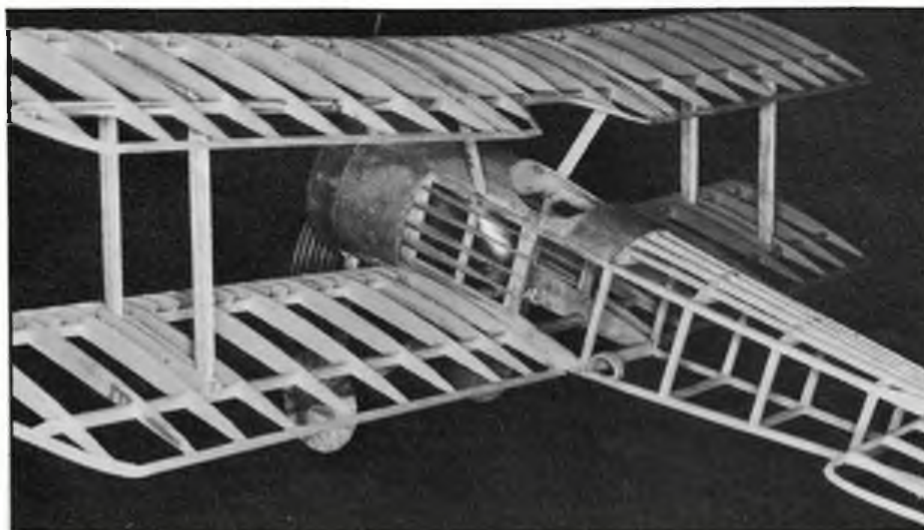


Almost ready for 'jap tissue' covering, note simple construction of 'step' and 'spoked' wheels.

rough. This gives better adhesive quality and gives a dull grey finish which looks better than the shine of the untreated line. Using a very fine pin vice and the smallest drill you can buy, drill holes in the correct places and thread the nylon line through the hole. Use cyano adhesive to fix the rigging in position. It can be useful to delay rigging until after the first flight as the tension of the rigging wires can be used to correct warps or increase dihedral!

Flying

Trim model for as flat a glide as can be obtained, set the motor revs as low as possible. Trim out any tendency to a power stall with down thrust. Trim for a left hand circle. Increase revs when satisfied with the performance of the model. On a calm summer evening with the model set for low revs it is possible to have the model circling overhead at a low height and easing into a slow descent as the gas runs out. Very satisfying!



THIS AIRCRAFT was developed, using lessons learned from a series of aerobatic models, some being quite good, others being not so great! The main problem we have in our club, is a line limit of 15 feet, which is constricting from an aerobatic standpoint. I won't bore you with lengthy descriptions of these earlier machines, other than that they were usually overweight or underpowered. Wingovers and very large loops were the best we could achieve and were not very inspiring. Eventually I designed a small very light airframe, powered with a rewind SP8 motor which could stunt on short lines. It had a real disadvantage in that it was vastly overpowered, the poor pilot needing the reflexes of a Karate man. It was a riot to watch the poor fellow acting like a one armed paper hanger, trying to regain control, after a whole series of loops and wingovers performed at about warp 9.

'Midge' was developed from this intimidating little monster, utilising more wing area and a deep symmetrical wing section, to counteract that typical R.T.P. tumbling loop. The problem of a suitable

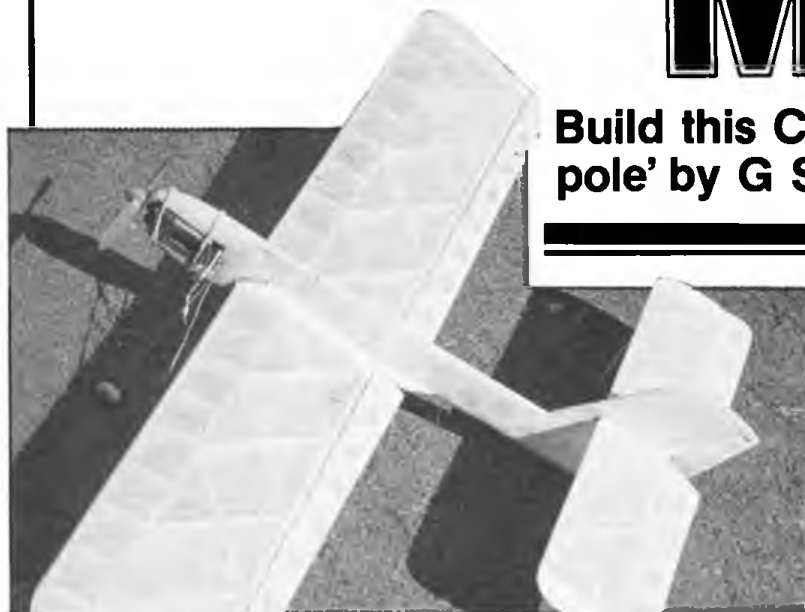
might be useful for a beginner. The one vital thing I must stress, is that the grades of balsa recommended in the instructions, be strictly adhered to, or performance will be impaired. Cyanoacrylate glue should be used throughout, except for a dab of 5 minute epoxy for retention of the undercarriage and tether hook. Balsa cement is out, being too heavy when applied from a tube, it also has the habit of shrinking as it sets and warping a light frame such as this.

Fuselage is made from light to medium 3/16in. balsa. Having cut out fuselage and doublers, accurately glue them together and chamfer rear of doublers. Drill out lightening holes, a *Dremel* tool makes this easy. Alternatively a sharpened brass tube

position, which separates them into two parts. Cut out tip ribs, again leaving tabs. Fourteen leading edge (l.e.) riblets can now be made, using as a template, that section of the tip rib, forward of the spar. Cut out trailing ribs TR1, TR2 and TR3, 8 off each pattern. Make wingspar from hard 1/32in. balsa. Wings are best built over the plan, which should be protected with wax paper or *clingfilm*. Pin down root and tip ribs on one panel, fit and glue spar, which doubles as a guide for the correct dihedral angle of the root rib. Glue on 1/4in. x 1/8in. medium leading edge, and 1/4in. x 1/8in. hard trailing edge. Fit centre-section (C/S) ribs next as this will prevent the front section from being confused with the other riblets. The 7 riblets may now be glued in. Glue in TR1s taking

MIDGE

Build this Canadian wizard of 'round the pole' by G S (John) Davies



'Midge' has proved to be a sure aerobatic winner - even to those new to this class of model. Read John's article carefully to learn all about it . . .

motor was solved when the *Ballards'* 4549 came on the market, most other motors having the familiar weight and/or power problems. With this lovely tractable motor, the model did nice steady wingovers. Loops were a joy to behold, being truly round and about 5 feet possible to tail walk and do tight little loops right over the pole. If you are performing in an unfamiliar hall, it is not really prudent to do advance stunts. I'll tell you why in a later section. All in all 'Midge' has proven the feasibility of short line aerobatics and if the flyer uses common sense and takes time trimming it, he will be rewarded with a spectacular performer. To be honest, high performance is only claimed for short lines, as we have never had the opportunity to use lines over 18 feet. However, for those of you limited by lines, building this model will put some real fun back into R.T.P.

could be used. Sand fuselage to shape shown on plan, leaving square, the area where the fin is joined.

Wings are built in two separate halves to facilitate centre-section sheeting. When glued together the wings are more than strong enough for our purposes. Cut out root and centre-section ribs from medium 1/32in. balsa, allowing for 1/32in. sheeting. Leave tab on root ribs as these act as building jigs. Centre section ribs do not have tabs and have 1/32in. cut from them at the spar

care not to bow out the trailing edge. Carefully fit TR2 and TR3 ribs. The panel can now be removed from the plan and both tabs removed. Carefully sand root rib to allow for the sheeting. I swiped a fingernail board off my wife for this job! Fit C/S medium sheeting, tips and tip formers are next.

Note that trailing edge (t.e.) tip formers are from 1/4in. soft balsa. Shape leading edge to blunt rounded section. Lightly sand panel.

Repeat for other wing panel. When this is completed, the two wing halves may now be joined and if all is correct you will have 1/2in. dihedral under each tip. Last job is to fit 1/8oz. lead under the outboard tip, forward of the spar. I generally use the stick-on weights used for magnesium car wheels - these come scribed to 1/4 ounce divisions, which make it easy to cut off the exact amount of weight needed.

Stabilizer is built entirely of soft balsa. Pin 3/8in. x 1/8in. C/S over plan, followed by 1/8in. tips. Glue in 1/8in. x 1/8in. leading and trailing edges, followed by the diagonals. Remove from plan and sand to symmetrical streamlined section, taking care to fine down tips.

Fin is from soft 1/8in. sheet, made in two parts F1 and F2, note direction of grain. Slot for stab. and drill 3/8in. lightening holes.



Wing construction method gives strong, light and warp free structure - use lightweight glue!

Construction

This is quite straight forward for the experienced but a few hints at each stage

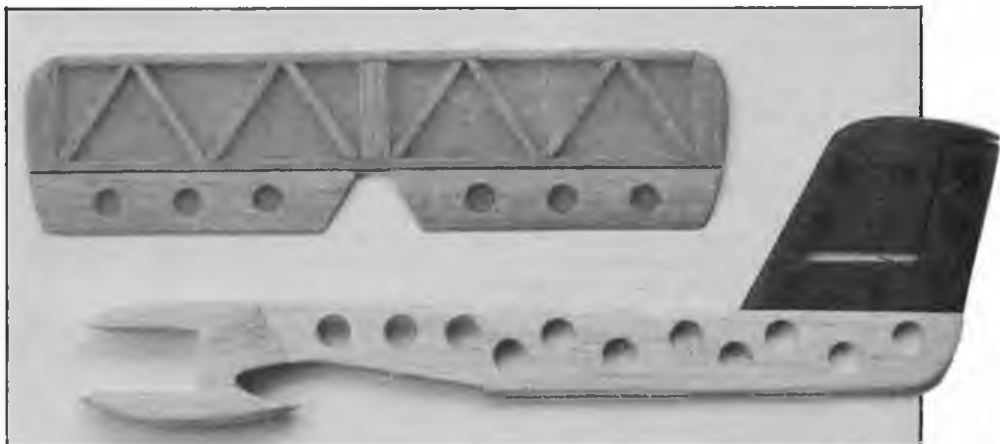
Sand to streamline section. *Flaps elevators and rudder* are all built from soft $\frac{3}{32}$ in. sheet, drilled with lightening holes and sanded to shape. All except rudder, are fitted to their respective components at this stage, using soft iron wire taken from twist ties. A touch of glue will secure the wire in place.

Assembly - Start by slotting stab into fin, making sure everything is square before glue is applied. Rudder can now be hinged to the fin. Tail assembly may now be fitted to fuselage, again watching to see that everything lines up. Next fit wing to fuselage, you can use a small square to ensure that the wings are 90 degrees to the fuselage and if your tail assembly is as straight as it ought to be, you will have a lovely datum with which to check your dihedral angles. The other angle which will concern you of course is wing incidence and this should be taken care of automatically by the wing slot in the fuselage. The flap fairings may now be glued to the fuselage. They must be accurately positioned, as they serve as guides for setting flap positions for flight.

Undercarriage is now made. I have found that this tracks better if made in two identical halves, the spigot ends are bound together with thin, soft iron or copper wire. Next lay the undercarriage on a bench with the spigot end hanging out over the edge. Line up the axles with a steel rule, so that they are perfectly in track with each other. Place a heavy weight across both u/c legs so that they can't go anywhere, then solder the spigot ends together. This may sound tedious but it really isn't and you will be rewarded with reliable takeoffs every time.

There is nothing worse than having a model running in, every time you try to takeoff. Next job is to drill a hole in the bottom of the fuselage at the angle shown on the plan. Force the undercarriage into this hole, ensuring that the axles are at 90 degrees to the fuselage sides and also that the wings are level. Retain with a little 5 minute epoxy. The tail skid can now be fitted. Finally the $\frac{3}{4}$ in. *Williams* wheels can be assembled onto the axles. I used small cup washers soldered either side of the wheels but if you use the same method, be careful you do not melt the wheel hubs!

Covering - I used lightweight *Modelspan*, as it is so simple to put on. Cover entire model except for the nose block area. Apply a fine water spray, just enough to dampen the tissue. When dry, apply no more than two coats of thinned clear dope, 50/50 should be about right. Do not be tempted to put any colour dope on this aircraft. All that is left, is to fit the tether hook, made from a medium paperclip, and held in place with cyanoacrylate or epoxy. The motor is slip-



Tailplane and fuselage, showing extensive use of lightening holes. Take care in cutting out fuselage to ensure correct wing position.

ped into place and retained with a couple of elastic bands. You will notice that the motor fits vertically into the bearers, this is for maximum cooling purposes and is essential as the 4549 runs 'bejabbers' hot when asked to work hard.

Trimming

Trimming 'Midge' for aerobatics is a serious and at times perplexing business. Serious in that trim must be checked before every flight and perplexing in that like any other thoroughbred, she is only too willing to be skittish. As you gain experience with the model, however, sanity will gradually return. R.T.P. aerobatics is a far more complex challenge to the pilot, than most people are willing to admit. It is so easy to believe that you know it all, only to have prevailing conditions, or the model pop your dream! The one great defence working for you, is to train yourself to approach problems in a thoughtful and workmanlike manner. Take the line that you are going to command the aircraft, don't let it or conditions in the hall intimidate you.

Having got that off my chest, we should settle down to some practical work. Having attached your model to the lines, you should first offset the rudder to about 8 degrees, lift the elevators about 5 degrees and go for a gentle hop. The model should unstick like a feather and just float along on the end of the lines. Don't apply much power, your job for the first flight or two is to observe the wings. If they are level or the plane banks in toward the pole, immediately land the plane and adjust the tether hook downwards, until the plane flies with the outboard wing slightly low. Having achieved this, we can now set up the flaps and elevators. A good place to start is 5 degrees down on the inboard flap, with slightly less, say 3 - 4 degrees for the outboard flap. Inboard elevator about 6 - 8

degrees up, outboard elevator 5 - 6 degrees. You will notice two things here, the first being that the inboard controls are deflected slightly more than the outboard. This will help the model turn out, should it lose line tension and will prevent the model from snap rolling toward the pole during sharp aerobatics. The second point, is that the controls have far less deflection than any previous stunt models you may have handled. Your model should now be ready for the milder stunts.

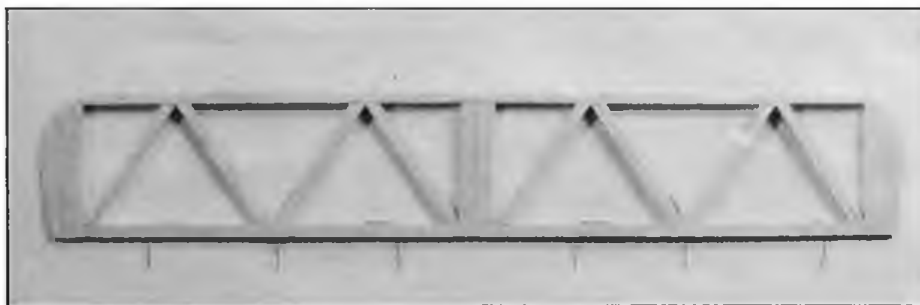
Please be sure that there is a full 12 volts at the motor, you are going to need it! Take off should be very gentle, no horsing about at this stage please, as you are reaching a very critical point. At about 4 or 5 feet and just stooing around, increase power gently, (goes up like a homing angel don't she?). Do not let the model climb to more than 45 degrees to the ground yet. Now decrease power and note the differential between



'Midge' on the right with another of John's family of aerobatic models - 'Paperhanger' - on the left.

climb speed and dive speed. Now you may practice climbs and dives, until you are doing reliable wingovers. If the model does not rotate sharply for wingovers, you may increase flap and elevators slightly. Too much and the model will whip stall viciously into the ground and you can stick the nose back on with the C.A. glue, you thoughtfully brought with you!

Now, if the model is turning well, and showing no kamikaze tendencies, you are ready for your first loop. Monoplanes need a different technique to the biplanes, in that you must have line tension at all times and you do not have to reduce power at the top of the loop. The preparation for the loop will determine its shape and speed, so for the

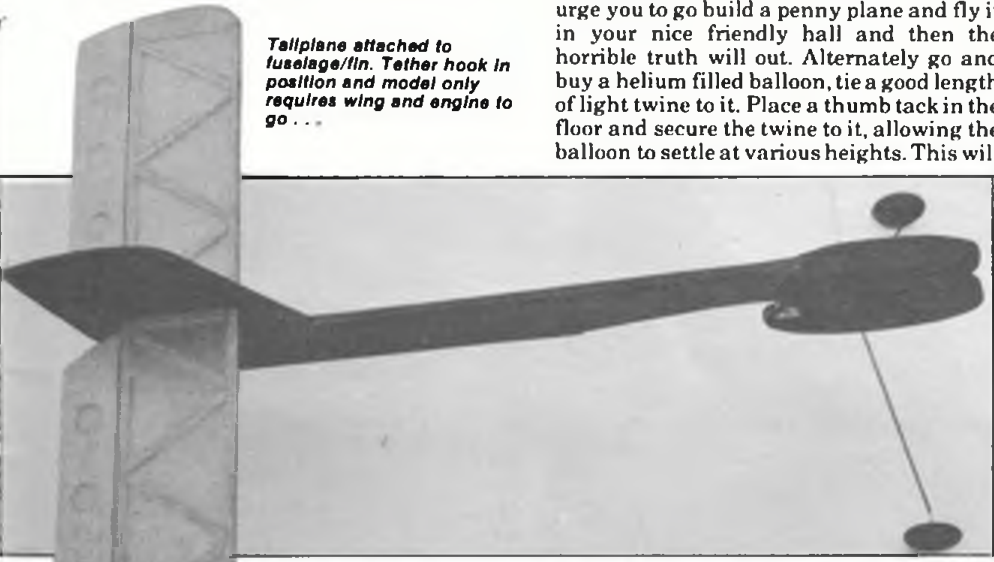


Tailplane construction is straightforward, note wire hinges pushed through trailing edge and secured on inner edge.

first few, float the model along at about 4 or 5 feet, and then slam on full power. The model should curl around nicely, reduce power to a mere tickover, about 25 degrees before reaching the bottom of the loop and the model will just coast out with no ballooning tendencies. Should the model balloon, power was reduced too late and if you have to stick the nose on again, you reduced too early. Don't let looping worry you overly, the first thousand are the worst, after that you can do them while asleep . . .

Having conquered the dreaded wingovers and loops, you are ready for tail walks. These are best done from very low level and again just coasting along, blip the power and rotate the aircraft nearly 90 degrees to the ground. Adjust power so that the model

Tailplane attached to fuselage/in. Tether hook in position and model only requires wing and engine to go . . .



just hangs there, then slowly release power, and place the model back down on the ground. You will probably muff the first few but don't give up, you won't take long to catch on.

Overhead loops are simple, just gently increase power until the model is going full bore. It will climb right over the pole and circulate there until power is backed off, again at first, you will have to be gentle or the model will spiral in. When you have learned just what you can get away with in this manoeuvre, you can bring the model down in a screaming dive to about 3 or 4 feet and then slam it through a loop. Such is the change of direction, that the loop appears to your audience, to have come right from the floor. O.K. Ace, you are now ready for *The Model Engineer Exhibition*, go blind 'em with science.

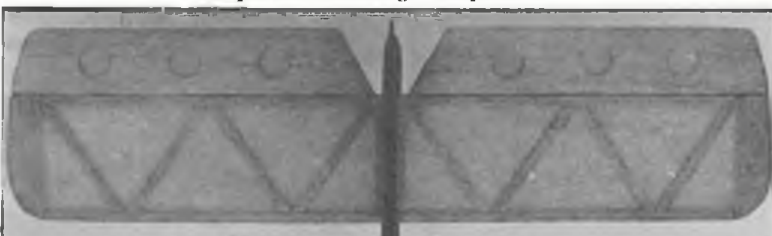
Throughout this article, you will have noticed that I have babbled on about conditions in the hall. Lightweight stunt models are affected by varying conditions very much more than other categories of R.T.P. aircraft. I have learned this to my cost and embarrassment so often now and feel I would be remiss in not making you aware of these phenomena. High tempera-

ture and/or humidity, will play havoc with performance, as will forced air heaters and parafin space heaters. Under extremes, one can find in the average hall, mini-thermals and maxi-downdrafts, just the same as flying outside. I have not heard of many hermetically sealed buildings, least of all the sort of buildings R.T.P.'ers fly in. Every nook, cranny and crack, produce young gales to trap the unwary. The heavy scale model will charge through turbulence, with hardly a bounce. This same turbulence will dash a really light stunt model to the ground and the poor pilot doesn't know who or what to blame for his misfortune. A latecomer to a meeting, just opening and shutting a door, could give you a hard time, trying to regain control. If you don't believe all this, I would urge you to go build a penny plane and fly it in your nice friendly hall and then the horrible truth will out. Alternately go and buy a helium filled balloon, tie a good length of light twine to it. Place a thumb tack in the floor and secure the twine to it, allowing the balloon to settle at various heights. This will

give you a good idea of where the air currents happen to be. Having ascertained which way the wind blows, as it were, you merely do all your critical stunts downwind and you will be pretty safe. The last problem I have encountered in the course of demonstrating R.T.P. is electrical power surge. One does not usually expect this sort of thing but it happens. At a demonstration in Moncton, it hit me twice in succession, severely *re-kitting* two of my models. If anything can go wrong, it will - *Murphy's Law*. It was, with *Murphy* in mind, that I made a point earlier, about checking controls before every flight. Bringing the model to a meeting in the car, or even carrying it in, is likely to disturb control settings. Members of the public and your own clubmates who should know better, are notorious for twiddling anything moveable, while inspecting your handiwork. So take my tip, and check it before every flight. Keeping a list of foul ups, their reasons and solutions is a good idea. If I hadn't done just that when I put my foot in it, I would not have been able to recall this tale of woe for your amusement!

I sincerely hope that these notes will smooth your rocky road on the way to becoming a respectable performer. I would dearly love to hear of your experiences flying this mode, or trying to put my ramblings into practice . . . happy landings!

Keep separation between elevator and tailplane small and ensure wire hinges are securely glued into elevator.



QUICK TIPS

Shock absorber for small models by Mark Finemlen

My innovation is a simple, shock-absorbing landing gear, which I hope will be essentially understandable from the close-up photograph. A short length of aluminium tubing was first slipped on to the undercarriage before the wire was bent. When bent, and extra U-shaped section was included. An area of the fuselage bottom had been planked before the model was covered and the tube was then attached to the sheeted area with glue and sewn in place with needle and thread. The tube thus acts as a pivot for the landing gear. A dowel was glued a short distance forward and by stringing a rubber band across the simple but very effective shock absorbing system was obtained. When the plane comes in for a landing, the gear is pushed down and back against the pivot and the shock is absorbed by the rubber band. It has worked absolutely perfectly to date. . .



Dremel Stripper by Derek Woodward

The photograph below shows a simple, quick *mod* for the lucky *Dremel* owner, giving the facility of a fence saw. I use a length of 1/2 inch square beech (engine bearer) held to the saw table by two 'G' clamps - the fence is at the required distance from the blade. The wider 'straight' cut' type of blade is used. Needless to say, use some form of *push stick* to isolate your fingers from the saw blade! I have used this trick to strip spars and longeron stock from 1/4 in spruce with ease - and far more accurately than using the traditional knife blade and straight edge.



MODELHOB MISTRAL

John Whaddon reviews this
lightweight A1 from
Micro Mold

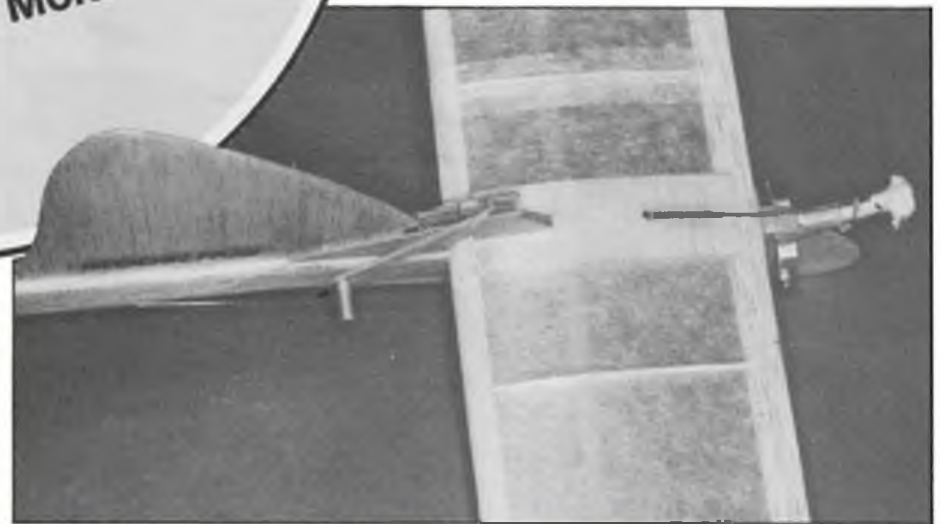
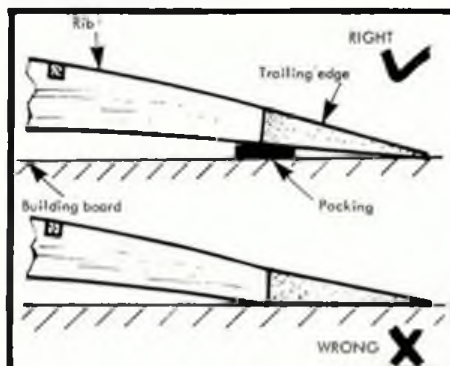
The Modelhob 'Mistral' distributed by Micro Mold comes with instructions to cover buildings two versions, a competition class A1 or as a more simple trainer.

Below, novel locations for the tailplane, horn slides between two ply plates giving positive positioning for glide and when dethermalised.

'MISTRAL' is a towline glider - the "float-er" mentioned in May *Aeromodeller*, designed to meet the International A1 rules. The kit is one of the wide range produced by Modelhob in Spain, distributed in the UK by Micro Mold.

The brightly coloured box contains all of the parts necessary to build the model with the usual exceptions of adhesives and finishing materials. All sheet items are die-cut or pre-sawn to shape, leading and trailing edge materials are machined to section and the kit also has miscellaneous items such as lead shot for noseweight and even a set of rubber bands for wing and tail attachment! White tissue similar to *Modelspan* is supplied. One rather interesting feature coming into the "why didn't someone think of this before" is the plan. This is very clearly drawn and printed on very stout paper with a glossy, non-stick finish. All instructions are in Spanish but it is understood that *Micro-Mold* are now supplying English translations.

Two versions of "Mistral" are shown on the plan. A normal version which is obtained by assembling the kit as provided and a competition model which requires a little more work and some minor parts which are not supplied.



The difference between the two is that the competition model has an undercambered wing with a NACA 6409 section and a tailplane dethermalizer. Construction of either version is quite straightforward so I decided to build the competition model so that any potential problems with the "non-standard" aspects would be shown up.

I started by separating and identifying all the die-cut parts. The ply-wood items were particularly cleanly cut and were virtually separated anyway. The wing and tail ribs needed a little more help however and had to be eased out with a balsa knife. The resulting fuzzy edges needed a clean up with a sanding block. Also the notches for the top spars varied in size and position. A ply template is supplied so that undercambered ribs can be cut from the flat-bottomed ones. This results in a reduction of the spar slot so the substantial standard 10mm x 5mm balsa spar has to be trimmed to 7 x 5mm. This requires a good, sharp knife and a suitable straight-edge.

Construction of the wing is quite conventional and should not present much difficulty to anyone who has built a few simple models previously. It is necessary to make notches for each rib in the leading and trailing edge sections and I have always used a small flat file for this job. I have a number of these files and the right file for a particular notch can be found by making some trial cuts in scrap material. With an undercambered wing it is necessary to pack

up the front of the trailing edge so that it meets the ribs at a suitable angle (fig. 1).

Also, with the undercambered wing, the slots for the main spar in the undersurface are off the surface of the building board. It is not worth attempting to pack up the spar so that the gap is filled. The spar can be fitted after the basic wing panel with top spars has been built and removed from the board.

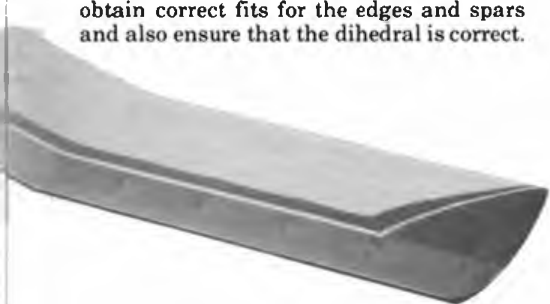
The wing has a flat centre panel with short upturned tips. The plan is not too clear on how this should be built so I followed my usual procedure. I build the main panel first.

Right, contents of the box, provide a pretty complete package including noseweight and rubber bands. Far right, modifications made to the 'Mistral' to allow straight tow and a dethermaliser 'snuffer' tube.





Then place this completed panel on the plan so that one end rib is correctly aligned with the next panel to be built. The completed panel is supported at the correct dihedral angle and pinned firmly into place. The wing tip can then be built directly onto the first panel and I find this the easiest way to obtain correct fits for the edges and spars and also ensure that the dihedral is correct.



Also it prevents me from building two tip panels for the same side of the wing! These things do!

On the normal version the actual wing tips are built up with sheet to form neat upward chamfers. This will not work on the undercambered wing and no alternative suggestions are given on the plan. I simply added soft 3/16in. balsa sheet to the end ribs and carved and sanded it to a simple rounded shape. Perhaps this is not highly efficient aerodynamically but it was quick to do!

The tailplane is simple to build and needs no explanations as such. For the competition model it is necessary to add a plywood horn, some balsa sheeting and a wire dethermalizer hook. The plywood parts are provided but not the additional balsa or piano wire.

The fuselage can be assembled very quickly since it consists of three accurately sawn 6mm balsa pieces which form the core for the pod, two soft balsa cheeks and a hard balsa tail boom. The upper fin is 3mm balsa and is first assembled over the plan by joining two die-cut parts. A novel feature is that plywood keepers are then added to each side of the fin. These project behind the fin and form a slot to locate the plywood horn which protrudes from the top of the tailplane. The horn locates the tailplane in normal flight and dethermalized positions

and also acts as a stop when the tailplane tips up.

There is no suggestion on the plan to include a snuffer tube for the fuse on the dethermalizer-equipped competition version and this is a serious omission. *S.M.A.E.* rules do require a snuffer tube and it is a simple task to fit one. I used a short length of 1/4in. aluminium tube, pushed into the solid balsa tail boom.

I was concerned that 'Mistral' does not have an auto-rudder. This gadget makes a tremendous difference to the towline performance of any glider so I decided to fit the simple system illustrated (fig. 2).

The fuselage is completed by adding the plywood wing and tail platforms. The top of the fuselage has to be built up with scrap balsa so that the wing platform can be curved to suit the undercamber of the competition wing. After carving and sanding, the fuselage is sealed with thinned sanding sealer.

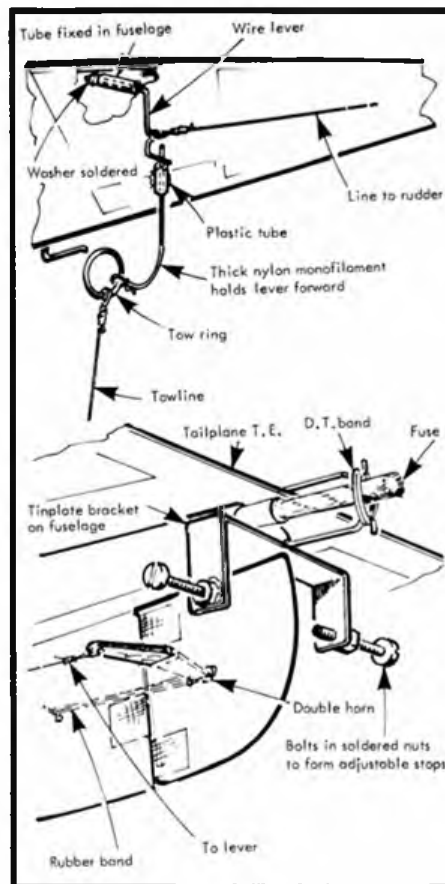
Covering the model with the tissue supplied gave no problems. The two large sheets are more than enough to cover the wing and tailplane and I have some left for the inevitable patch repairs! I used *Polycell* 'wallpaper paste' to stick the tissue which I always apply dry. One packet of *Polycell* lasts a long time as small amounts of paste can be prepared by sprinkling the dry granules into a saucer of water.

I did find, however, that after water-spraying the Spanish tissue shrank a lot more than *Modelspan* and after drying, had pulled away from the undercambered surface of the wing. So do use plenty of adhesive to attach the tissue to the wing undersurface or you will end up with a flat bottomed wing after all!

The model was finished with a 50/50 mixture of clear dope and thinners. Four coats seemed "sufficient to seal" the tissue. The tissue covered areas can be made more damp-proof by the addition of a few drops of castor oil to the dope mixture but this does lessen the shrinking effect so don't use the oily mixture until the tissue has been adequately taughtened.

Assembly of the model showed that plenty of noseweight was required to achieve the balance point shown on the plan. I used all of the lead shot provided plus some more. The ballast compartment in the nose is quite large and it is a good idea to add a few drops of glue to stop all that ballast shaking about. No doubt all of the extras added to tail for the dethermalizer and auto-rudder caused the need for the additional noseweight - everything has its price! However, overall weight of my 'Mistral' is still just over 100gms which means that ballast will still have to be added to the fuselage at the centre of gravity to bring the model up to the official A1 competition weight!

First flights of 'Mistral' were made in the beautiful flying weather at Easter. Hand



launches showed that the adjustment available at the auto-rudder would be sufficient and a gently turning flat glide was quickly obtained. There was just enough breeze to allow me to launch the model myself, gradually paying out towline from my lightweight *Maxaid* winch. The first attempt saw the model swinging off to the left during tow so it was quickly released and it was obvious that the glide turn was also rather too tight. So, I adjusted both auto-rudder stops and tried again. This time 'Mistral' went straight to the top of the full 50 metres of towline and I was able to gently lead the model round into the direction of the glide turn and gently release. A slight stall developed but this was probably just as well because the flying field is really too small for this type of high performance model. So I was grateful to retrieve the model with no damage and I'm now looking forward to flying it on a proper site with some thermals to help!

There is no doubt that the dethermalizer will be necessary - who does sell the fuse these days?

Overall I am very pleased with "Mistral". The model is easy to build and is obviously going to be a good performer. At £7. 15 the kit represents good value for money.



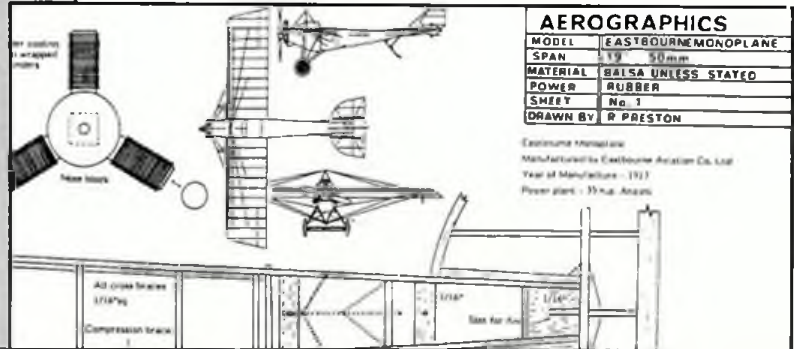
SHOP TALK

NEW MODEL HOBBY PRODUCTS REVIEWED



This Ballard's transformer for R.T.P. models is part of their large range of R.T.P. accessories and plans covering this field.

Part of one of Aerographics latest plans, the series is masterminded by Richard Preston - well known to readers for his small rubber powered models.



R.T.P. for all . . .

Ballards R.T.P. of Tunbridge Wells have for some time supplied the complete needs for the R.T.P. flyer. Electric Motors, mini plugs and sockets, kits, plans, power supplies - you name it ... they've got it! R.T.P. (Round the Pole!) can be as simple or as complicated as you wish to make it. Fly it in your garden, school hall or clubhouse. Ballard's can supply you with the correct bits and pieces. Latest plans are for *Short 'Seamew'*, *'Chipmunk'*, *Douglas 'Dauntless'* all at 75p. *Hawker 'Tempest'* and *'Space Shuttle'* at 95p. Plans are simply drawn and show easy to make models. There are also more ambitious plans available for the *Avro 'Lancaster'* and *Lockheed 'Hercules'* at £2.50. There is a new transformer unit for two to four metre length lines, giving 18 volts with maximum current of 1 amp - includes automatic overload cutout - at £10.00 (plus £1.50 p & p). If in doubt send for their catalogue at £1.00: *Ballards*, 54 Grosvenor Road, Tunbridge Wells, Kent TN1 2AS

Unusual tissue

Tissue paper can come in all sorts of colours - especially that used as fancy wrapping paper! Most of these are unsuitable for aeromodelling as they do not shrink on application of water or dope. BUT - *Peck Polymers* should receive a prize ... they have introduced two unusual colours to their range - brown and tan - just the thing for some of *Peck's* scale peanuts (surprise! surprise!). Why paint on extra weight when you can use the right colour tissue in the first place - just for the record this tissue does behave like the tissue we know and love! *Peck* tissue is available from *SAMS*, 2 The Drive, Blackmore End, Wheat-hampstead, Herts at 30p per sheet plus 15% post and packing. *SAMS* have also introduced a range of lightweight tissue - similar in weight to the *Peck* - in various colours (red, yellow, blue, black, orange) at 15p per sheet (+ 15% p & p). *SAMS* of course are well known for their stock of Peanut kits - there is yet another one on the list - The 1982 'Zippy Sport' by *IMS*, £6.70 (+ 15% p & p).

Scale plans

Aerographics have several small, scale model plans already in their range - *D.H. 'Gypsy Moth'* and the *Auster J4*, all about 23 inch span. Their latest addition is the 1913 'Eastbourne Monoplane', 19 inch span and designed for rubber power or conversion to CO₂ power. The lightweight structure should produce a model that has fine flying qualities. Price of all above *Aerographics* plans is £1.60 each and are available from *Aerographics*, 43 Chamberlain Road, Chippenham, Wilts SN14 0TF.

A What? . . .

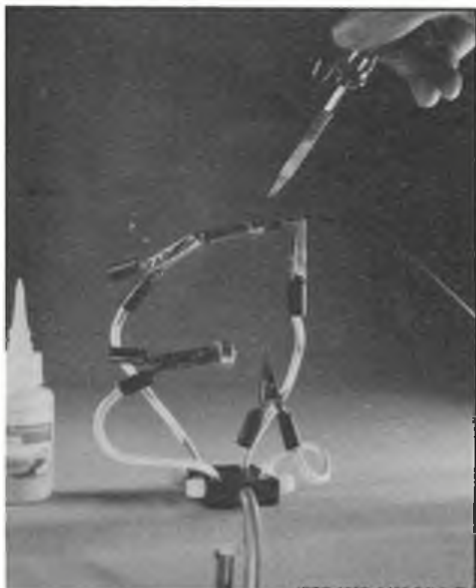
We're sure this could be useful to the indoor enthusiast or scale modeller - in fact anyone with small items to manipulate. 'Gripmate' is a simple idea to provide a 'third hand' for those small fiddly jobs that require both 'your hands' and someone else to hold the work steady whilst you stick something, solder something or otherwise act on something! A base block that can be clamped to the bench carries four semi-rigid wires, each fitted with a crocodile clip to hold the work. Alternatively, any of the wires may be replaced with one holding either a magnifying glass or a magnet. The four arm model costs £4.85 and the magnifier and magnet are £2.50 and £1.50 respectively - all inclusive of V.A.T. and postage, from *Kemplant Ltd.*, Durfold Wood, Plai-stow, Billingshurst, W. Sussex RH14 0PN.

Red Arrows in your home

Quadrant Video who have previously released a video film (VHS or Betamax) on Farnborough '82 have added to their range with a 55 minute programme on the world famous R.A.F. Aerobatic Team, The Red Arrows. The video includes unique footage from the 1983 United States Tour and shows the Arrows flying with the F16 Thunderbirds at the Andrews Airforce Base, Washington. The breathtaking flying sequences are described by Team Leader, Squadron Leader John Blackwell. 'Smoke On-Go!' is available from *Quadrant Video*, Surrey House, Throwley Way, Sutton, Surrey SM1 4QQ, cost £19.95 plus £1.25 p & p - you also get a free Red Arrows wall Chart!

Scalpel saga. . .

Following our mention last month of the disposable scalpels from *The Balsa Cabin*, a reader has sent us yet another version of this 'trusty blade'. This time from that well known supplier of quality tools - *Stanley Tools* of Sheffield. Their scalpel comes complete with three different blades and has a black, diecast metal handle with anti-slip grooves. Should be found in your local DIY shop at about £1.20.



Left, the multi-use Gripmate from Kemplant Ltd of Billingshurst.



Left, the latest in our scalpel saga, from Stanley Tools. Right the Red Arrows video film from Quadrant video.

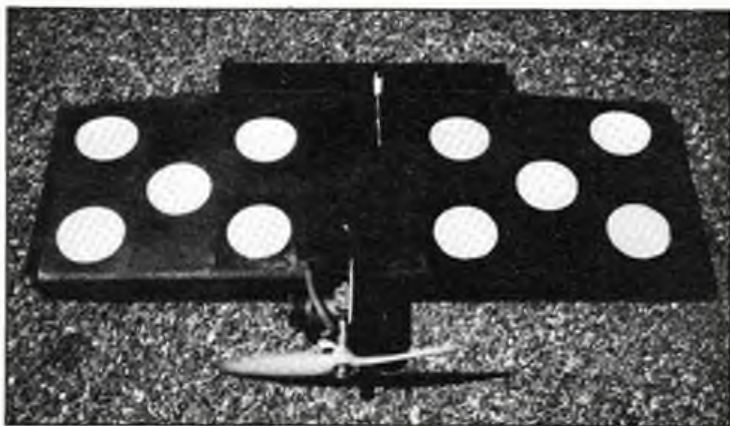


DOMINO

Build this simple, rugged control-line flying wing trainer for 1.5 cc engines.
Designed by John Watters.

THIS MODEL is the result of my son requesting that he would like to learn to fly control-line models. As it was, the only control-line models I had were not really suitable for a beginner to practice on, so a search was made through my plans collection for a typical beginner's model. The power was to come from the only engine I had which was big enough. Namely an old DC 'Sabre'. The model was duly built, flown and in a short time broken but the wings of the model remained intact. The elevator was removed and re-sewn back on again to the trailing edge of the wing. A quick simple engine pod was made up and glued onto the front of the wing and we were airborne once again . . . with a scratchy looking combat style flying wing, which actually flew better than the original! Inevitably this modified flying wing was destroyed but some very useful practice had been achieved. The design of the Domino is then a result of all the parts assembled together from the previous models but this time, as a 'Combat' style model with all the necessary modifications.

the trailing edge from stiff 1/8in. sheet balsa and from the dimensions shown on the drawing, mark onto the trailing edge the position for each wing rib. Cut the wing ribs from stiff 3/32in. sheet balsa and the centre rib from 3/8in. balsa sheet. All the wing ribs on the inboard side of the model should have suitable slots cut in, to allow the lead-out lines to pass through. (The position of each slot should be cut out to suit the lead-out line position.) Next glue together the 1/8in. ply bellcrank mounting plate (which should already be drilled to suit the 6BA bolt), into the 3/8in. thick centre rib, and rib R1. This assembly should now be pinned down and the trailing edge glued into the slots in the ribs. The remaining wing ribs can now be added onto the trailing edge, and the whole structure pinned down onto your building board, making sure that the ribs are square to the trailing edge. When the wing has set, the 1/2in. square leading edge can be added along with the 1/8in. sheet tips and corner fillets. The wing can now be removed from your building board and the leading edge shaped to the section shown and the whole



'Domino' ready for flight. I wonder why John didn't go the whole hog and make it a "double six" . . . perhaps he ran out of spots!

Building

With a model of this type which will inevitably receive many knocks, choice of wood is important, hard balsa being a *must* for the leading edge.

Start by cutting out the 1/16in. ply and 3/8in. balsa sheet engine pod pieces, these should then be glued together along with the engine bearers and the 3/8in. sheet fill-in. A strong glue such as epoxy, PVA or even one of the many contact adhesives should be used to glue these pieces together (I used PVA white glue for the remainder of the model). When all the pod pieces have been assembled they should be put aside to set, preferably on a flat surface and a heavy weight placed on top to keep all the pieces flat whilst setting. Start building the wing by first cutting out

wing generally sanded smooth. The bellcrank complete with pushrod and lead-out lines can now be fitted, not forgetting to add the lead-out guide tubes and the outer wing-tip weight. The fuel tank can now also be fitted. I used a commercial wedge tank but modified the engine feed pipe to come up over the leading edge. Whichever type of tank you fit, it should be glued in between the wing ribs as shown using scrap balsa packing.

The wing centre section can be covered either in 1/16in. balsa sheet or thin cardboard (cornflake packet thickness or slightly thicker). Whichever type of covering you choose, first cut out the slots to take the push rod and the holes for the fuel tank vents and glue into position onto the wing ribs.



John's daughter Nicola holding "Domino" clearly showing the chunky nature of this rugged wing . . . Its low aspect ratio makes it rather reminiscent of the vintage 'Unlimited'.

The engine pod can now be drilled to suit your particular engine and the whole pod generally shaped and sanded smooth. The engine pod can either be fitted to the wing before or after covering, either way covering of the model is best done with lightweight nylon (see article on nylon covering . . . Ed.) A tissue covered model will not usually stand up to the knocks!

Finishing and flying

Before covering the model it should be given two coats of thinned clear dope, rubbing down smooth after each coat. The nylon is attached to the structure by using a thinned down dope mixture, which should be brushed through the nylon onto the model and the nylon liberally pinned in place until each section is dry.

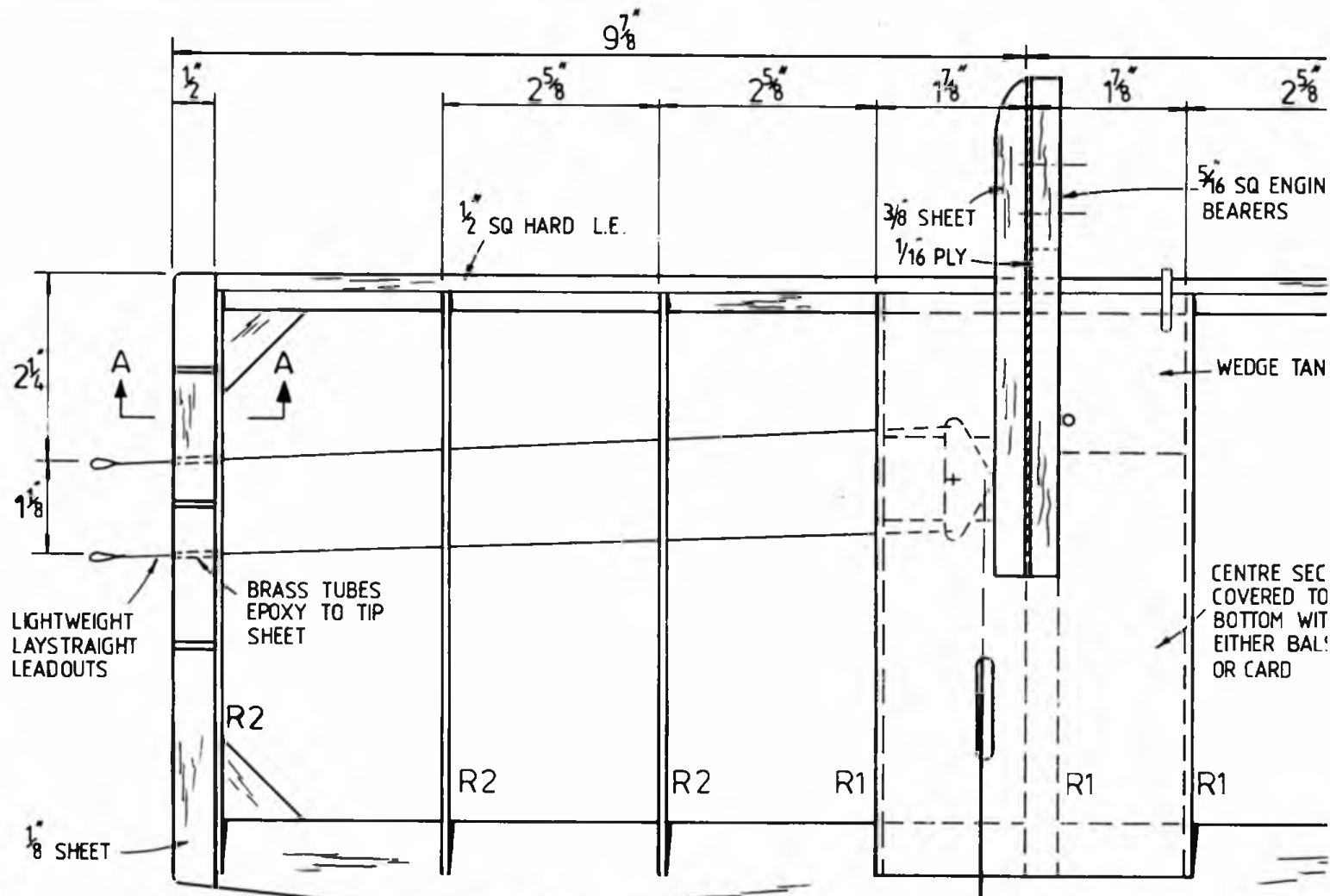
When the model has been covered it should be given at least three coats of thinned 50/50 clear dope over the entire airframe, or as many coats as are required to fill the weave.

The elevator should now be attached to the trailing edge by sewing on with *strong* thread - the elevator need only be covered with lightweight tissue and doped to a smooth finish.

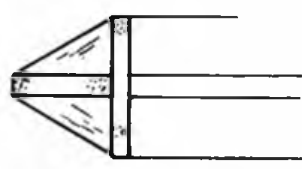
The model is now ready to decorate to your choice but remember if you are using any form of paint or dope finish, do thin it down. The entire model should now be given a coat of either fuel proofer, or polyurethane varnish.

Fitting the engine mounting plate shown in the sketch is important if you are using an engine whose needle valve has to point downwards. Without this plate the needle valve assembly will probably not withstand the first landing! When fitting the engine remember to pack up the front of the mounting lugs with washers, to give the engine some side thrust.

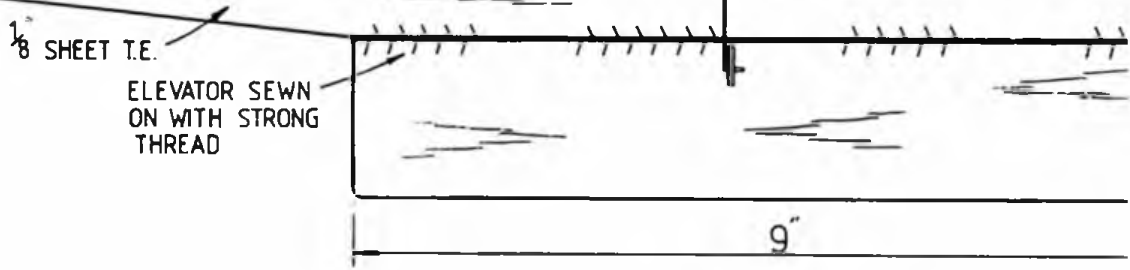
The model was flown using 32 foot lightweight lines and it flew as they say *off the board*. I am sure in the right hands this model is capable of almost all manoeuvres.



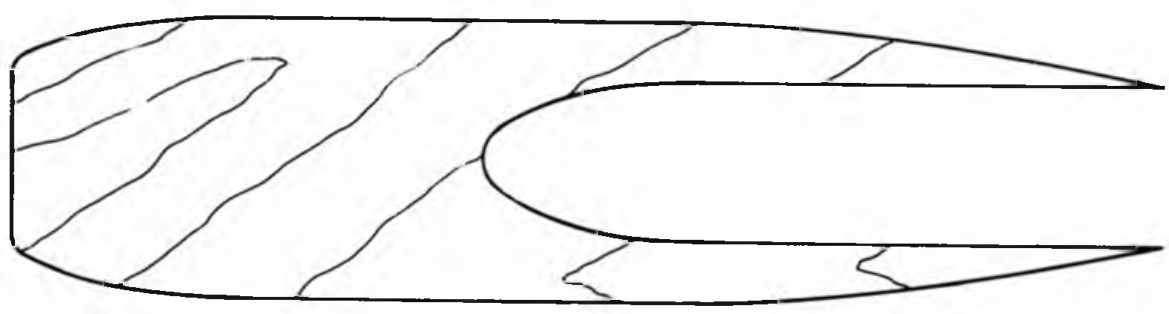
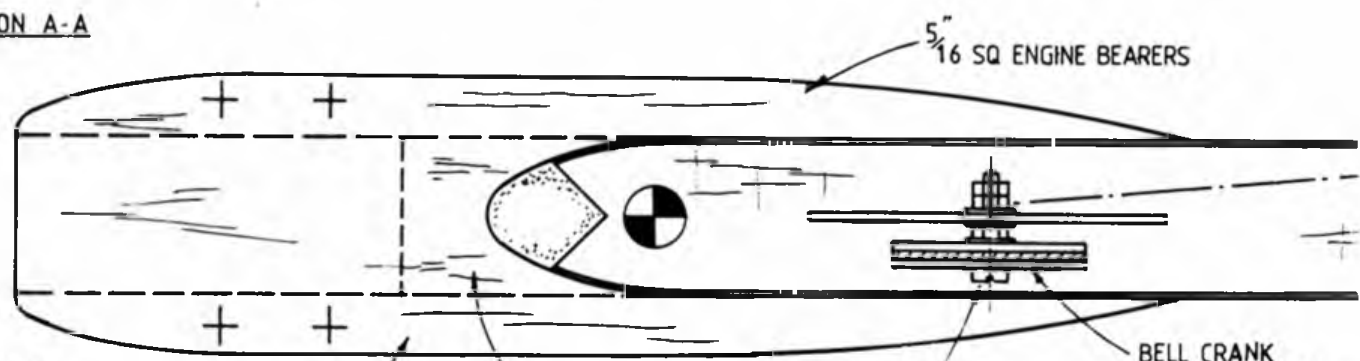
SCALE HALF FULL SIZE



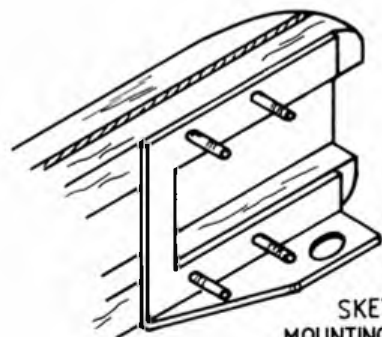
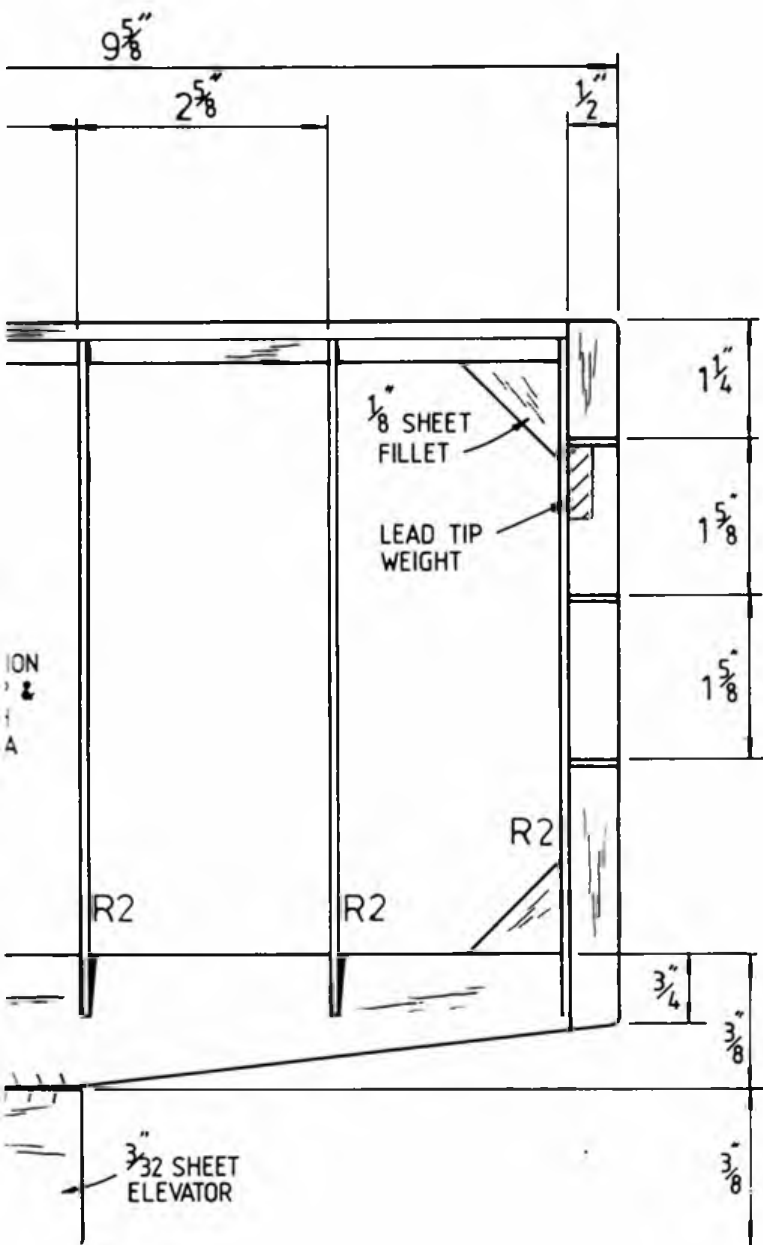
SECTION A-A



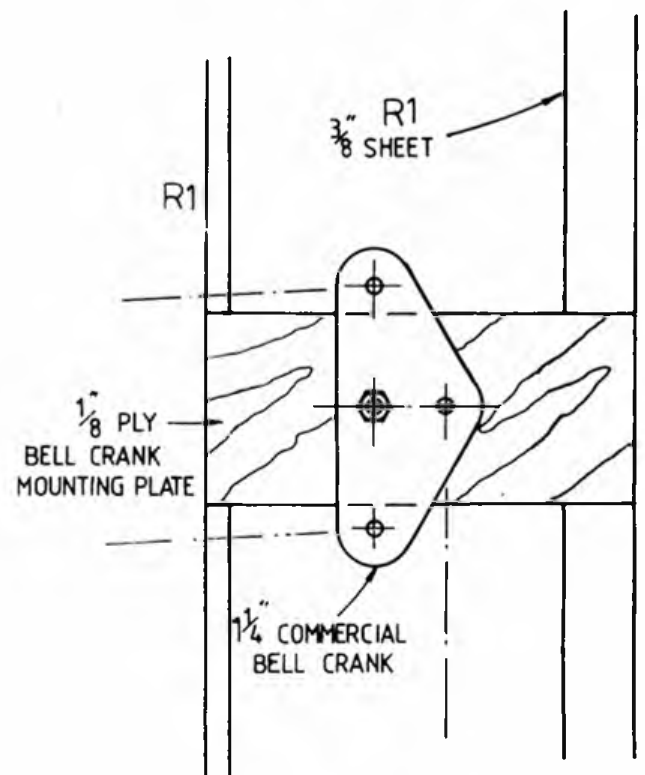
FULL SIZE PARTS



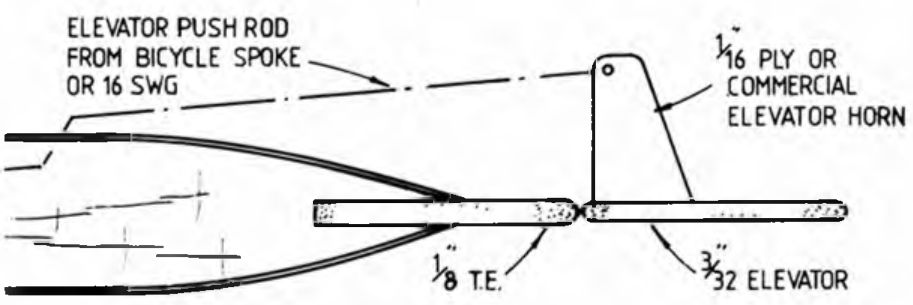
1/16 PLY POD PLATE



SKETCH OF MOUNTING FOR MOTOR SHOWING NEEDLE VALVE PROTECTOR

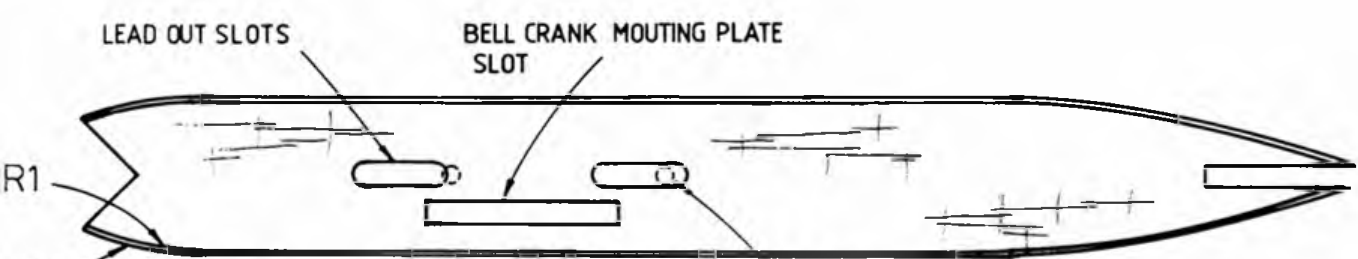


SKETCH SHOWING POSITIONING FOR BELL CRANK PLATE



DOMINO

FLYING WING C/L MODEL FOR 1-1.5cc ENGINES BY J.H. WATTERS.



- WING RIBS
- R1 1 OFF 3/8" SHEET
- R1 2 OFF 3/32 SHEET
- R2 6 OFF 3/32 SHEET

FREE FLIGHT SCENE

Dave Hipperson reports

Crookham Gala . . . Beaulieu . . . 8-7-84

Whilst much of the Country sweltered in a sticky heat that brought temperatures on the centre court of Wimbledon to a staggering 100°F a breeze kept it fresh at Beaulieu. It also made long flights very dicy as it blew in the worst direction for much of the time - towards extensive woods $\frac{3}{4}$ of a mile away. Nevertheless entries were encouraged by a substantially reduced max and consequently three out of four of the events were decided by fly-offs. Combined FAI was the exception where Andy Crisp topped with a perfect score from his A2.

In the Open glider final Sharman launched first and held buoyant air only to have it decay after a couple of minutes. His model was then struggling but sniffed around the edges of another patch - and did well to exceed 3 minutes. Pete Williams couldn't equal this despite a very clean zoom launch. Virtually the entire entry maxed out in power and by the time the qualifiers were ready the breeze had dropped to something nearer 5mph tempting a number to fly on longer fuses than they were originally intending. Pete Harris launched quite early and flicked off into the glide very high. Within a minute it was obvious the model was set for a long flight. Peers, using a smaller model than he would normally, might well have decided otherwise had the wind dropped earlier. His pattern was perfect but the run rather short. Just as Hopper released there was an almost totally calm patch so it was rather surprising not to see his model hold better on the glide.

Right, Peter Harris with 'chunky' Open Power model - had timekeeper problems. Below, Nigel Lee was pushed into second place by good flight from John Carter.

With such a smart model Mr R J Cummins should surely be considering sending the plans to Aeromodeller!

although it was certainly gliding well enough later. Having watched, Screen opted for almost a token flight as like Peers he was being wary of his model with a Senior Champs event only a week away. Harris emerged the victor but not without some controversy as one of his time-keepers watches had stopped almost a minute early. The CD accepted the *highest* time rather than the *average* as one would have expected. This was understandably not popular with Hopper who had done but a few seconds less. The suspect watch was tested by the CD and it stopped again at the same time exactly! This should have made no difference to his decision but that is easier to say now than in the heat of the moment. He was faced with a very difficult choice and under pressure made the wrong one. After all why insist on two time-keepers if at the first sign of a discrepancy the lower time is disregarded!

Results

Open Glider (2:00 x 4)			
1	C. Sharman	B&W	8:00 + 3:07
2	C. P. Williams	Richmond	8:00 + 2:10
3	B. Parkinson	Nottingham	7:28
Open Rubber (2:00 x 4)			
1	J. Carter	Falcons	8:00 + 5:40
2	N. Lee	East Grinstead	8:00 + 5:00
3	N. Cox	Southampton	6:00
Open Power (2:00 x 4)			
1	P. Harris	Birmingham	8:00 + 6:02
2	J. Hopper	Freebird	8:00 + 5:48
3	R. Peers	Falcons	8:00 + 3:58
Combined FAI (2:00 x 5)			
1	A. Crisp	Biggles	10:00 (A2)
2	G. Madelin	Crookham	9:41 (A2)
3	J. Buskell	Crookham	9:36 (FC)

Derl Morley's 1984 Open Rubber Model

Those that were flying in the early 60s will remember Derl's very impressive contest record in Open Rubber around that time particularly during '63. In fact you will see him with his model on the cover of the November '63 issue of *Aeromodeller*. A model which outwardly appears quite similar to this one which he flew to good effect at the Easter Meeting this year. Although it uses more conventional solid rather than sliced ribs that were used on that '63 model Derl has made much use of strands of Boron fibre to reinforce the very light tail plane and fin components. Actually the aft end of this model is really very delicate utilizing as it does the distinctive trade mark of the hinging fuselage rather than pop up tail dt.

I calculate the wing area as around 312 sq. inches which up until quite recently would have been reckoned - 'large' and that low drag flat bottomed section increases the climb and still allows an excellent glide, as all up weight is only 8 oz - over half of that being rubber!

Aeromodeller



The two way fly-off in Rubber was with less incident. Carter launched first and although in neutral air a tidy on trim 5.40 was enough to oust Nigel Lee. The usual array of very fine silverware was distributed at an informal prize-giving a little over half an hour later.



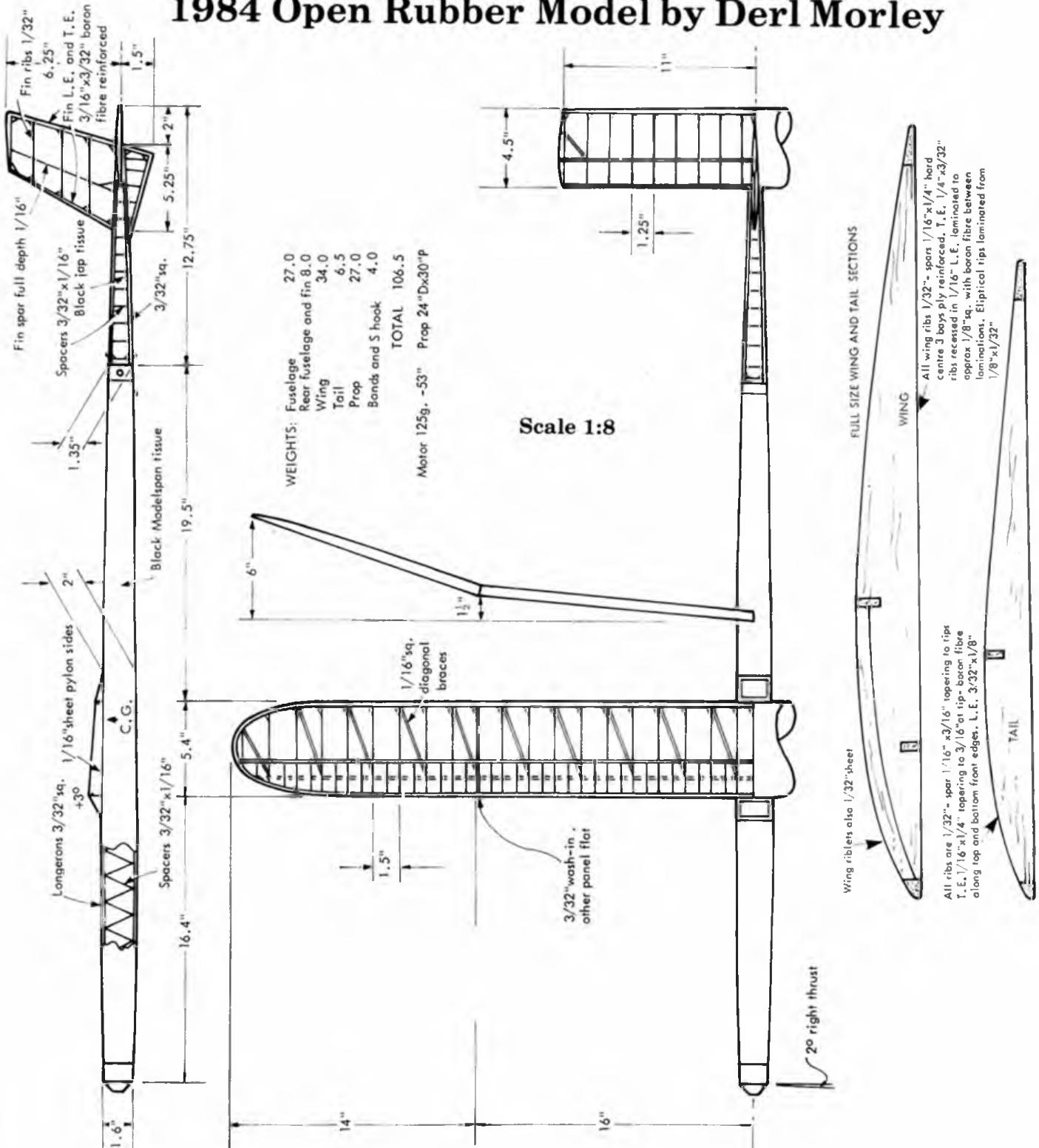


Derl Morley's Open Rubber model features the not often seen, hinging fuselage dethermaliser. Location of rear end must be very positive to ensure consistent trim.

Seen here in the normal flying condition, note restraining wire loops located under 'staple' and 'T' stop. Width of these ensures tail section does not part company from d t'd model!



1984 Open Rubber Model by Derl Morley



FROM THE HANDLE

CONTROL LINE NEWS

SPEED with Dick McGladdery

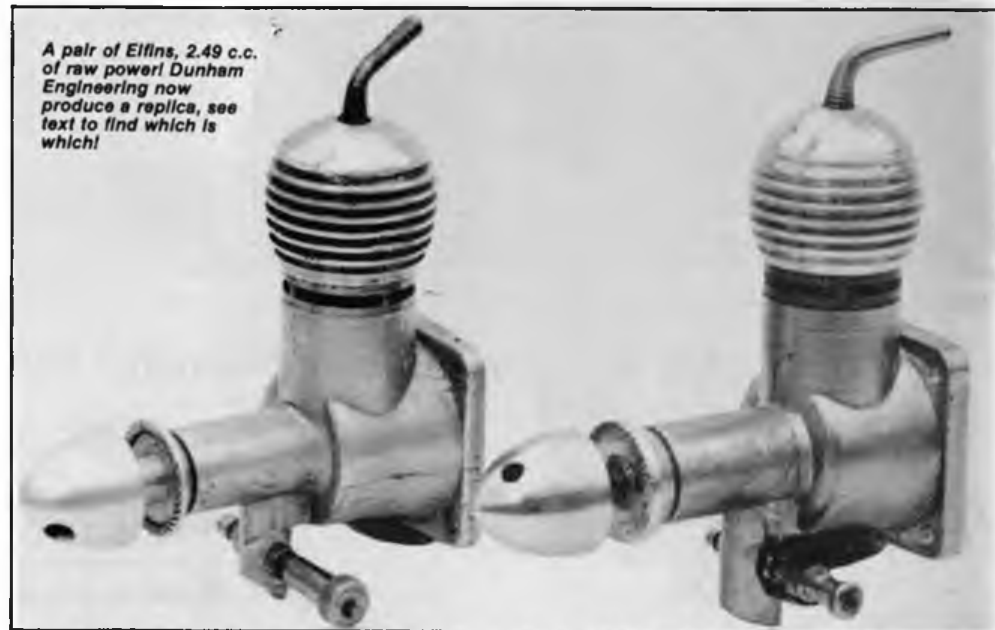
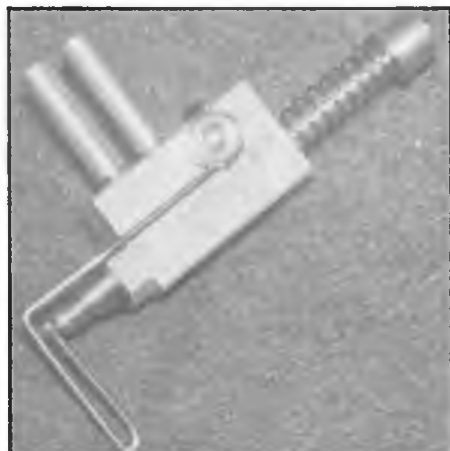
The handicap system

For many years now, speed contests in this country have been run on a handicap basis, rather than as individual classes. The way the system works is that each competitor's best speed is expressed as a percentage relative to the appropriate class record established during the previous calendar year. The object therefore is to achieve the highest percentage, rather than the highest speed and in this way an 049 can beat a 60, in fact this actually occurred a year or so ago.

In pre-handicap days, if my memory is accurate, support was not as high as at present and the contemporary standard of flying generally is vastly improved, not only in terms of performance but also in respect of the number of attempts and flights achieved in any given event. I believe the introduction of the handicap system has stimulated the underlying sensation of participating in a real competition, with consequent satisfaction in gaining a high placing; previously, with a slightly lesser number of entrants diluted amongst an uncomfortably similar number of separate classes, there were too many petty 'chiefs' and hardly any 'injuns' at all and only those in the know could discern between merely a 'first in class' and a truly outstanding performance.

The handicap event, at Bicester on 20th May, attracted a large and varied entry. Although the weather was again poor, the level of performance was still high, with every place down to 7th exceeding 90%. The winner was Peter Halman with his *rossi* R15 FAI asymmetric/suction/Halman steel pipe. Peter broke the FAI record the the second time this year, recording 162.58mph/103.13% — obviously benefiting from standing down after three years as Speed Sub-Committee Chairman. Second place was stolen by Allcock & Myszka with Joe's

The simple but extremely useful fuel cut-off from Jurgen Lenzen.



sleeved down *Webra* 'Speedy' 09 model. This is a symmetrical model, using a pipe-pressured fuel system and a steel pipe also made by Joe and has netted a formidable number of 1st and 2nd places over the past few years; this time, they achieved 127.83mph/97.71%, just pipping Paul Eisner's 153.43mph/97.33% with his FAI. The next few placings were respectively taken by a Formula 40, a 60, another FAI and a Formula 21.

Amongst the 'injuns', Ronnie King brought along a monoline 60 model powered by an ABC rear exhaust motor made entirely by Ronnie himself. It looked and sounded good but suffered a classic monoline low orbit, shaftrun and blow-up. A similar fate befell Ian Skinner's intriguing OS46 powered 60 class model — this weighs a scant 24½oz. — the cause of disaster was probably stone damage to the prop on take-off, with further bits coming off during flight until it finally threw the whole lot off — very unlucky but the formula looked promising and hopefully Ian will persevere. Also deserving a mention was Paul Owen, achieving his second and fastest ever official flight with his *Supre Tigre* G20/15 open 15 class model. Paul placed last but he did record an official time and this itself is no mean achievement in the currently highly-competitive state of speed flying.

RACING with Jim Woodside

Jurgen Lenzen Fuel Shut-Off

Jurgen has developed this neat little item to fit his latest side-winder speed model — 'Speedstar'.

The ability for the pilot to be able to stop the engine at will, in either a speed or team-race

model is a highly desirable design feature. To re-cap briefly these are:

- preventing engine damage should the needle valve be set too lean.
- to get in several attempts during the 3 minute period allowed in F2A events.
- increase pit-stop efficiency.

The *Lenzen* item is set by pushing in the spring loaded plunger. Fuel can then flow from the tank to the engine via the two tubes until the plunger is released when the wire loop is given a tug by a wire attached to the bellcrank.

Although the illustrated item is specifically designed for a side mounted engine design it may be possible to adapt this for ½A type models.

Details: Cost, 40 DM from *Jurgen Lenzen*, Alfred Dobbert Str 57, 5600 Wuppertal 1, W. Germany.

The contest results of Rob Mektlemeijer's earlier engines speak for themselves and so we await with interest the outcome of this present venture. The brothers have already recorded times in the 3:30s but obviously the target is to put in race times of around 3:15 in order to better the existing fastest race of 3:19 recorded by Kramarenko - Kutnetsov at the 1983 European Championships. Good luck.

Even older vintage teamrace!

Two events, in themselves quite separate, have combined by that rare quality happenstance which re-introduces the topic of vintage teamrace.

The first of these was the finding of a magazine from 1950 called *Model Aviation*. The main feature was an article on the latest rage — teamrace — and it was penned by *MAP's* Director, Ron Moulton. To say that there is nothing new under the sun is an understatement. Not only did the article outline the main racing priorities as we know them 35 years later but also detailed a

fuel shut-off, operated by a sharp tug on the UP line. Another interesting section dealt with performance comparisons amongst the, then, currently available engines. The first rules allowed 30 c.c.s of fuel and a maximum of 5 c.c. of capacity. The Mills 1.3 gave 42 m.p.h. for 15:45 (!) while the Yulon 29 yielded 70 m.p.h. for a mere 1:58.

To round off the article was Ron's design "The Battler", a neat model based on full size Goodyear lines. The power plant in "Battler" was the *Elfin* 2.49 radial mount. Along with its smaller brother, the 1.8, these early *Elfins* provided a new benchmark in power output and paved the way to other classic designs like the *Oliver Tiger* series.

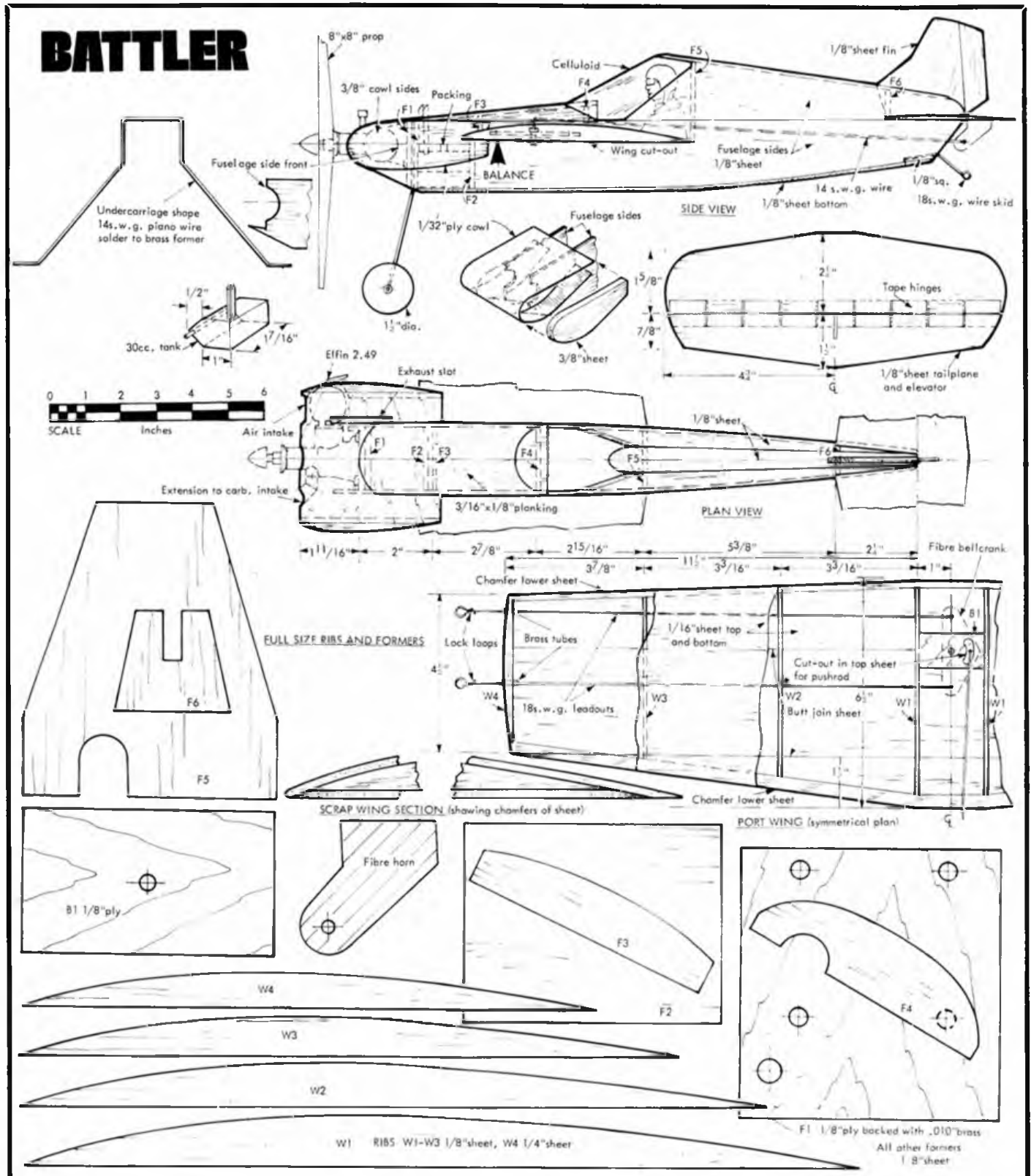
As with the "Battler" design over 30 years have passed since production of the first series *Elfins* ceased and good original examples have become prized collector's items. Now *Dunham Engineering* have introduced the *Replica Elfin*.

In the accompanying photograph the *Replica Elfin* (right) is pictured alongside an original example (left). I am sure you will agree that the externals of the engine have been matched very closely. Internally the replica version benefits from the use of modern precision production techniques and the use of first class materials.

Dunham Engineering have already established their reputation with such engines as

the spark ignition 'Mechanair' and their original 5 c.c. side port diesel 'Valkyrie'. By the time you read this the *Elfin* engines should be available in quantity from: *Dunham Engineering*, 12 Lawns Avenue, Orrell, Wigan WN5 8UQ. Price £35.85 plus V.A.T.

A small scale copy of "The Battler" is designed for a side mounted engine design, it detail to build a version of this historic model. A chat with Tom Millar of the Whitefield Club revealed that he has in fact had one of these models partly built for some time and that he hopes to use it in the Wharfedale '1000' Class B Silver Anniversary event.



Going Solo

Part 7. Trimming and flying the DPR "HyperCub" a practical approach by Trevor Faulkner.



All modellers develop personal preferences as time goes by. These might lead them towards one particular branch of the hobby, or towards particular ways of doing things which seem to work best for them.

One of the temptations a kit reviewer has to avoid is that of altering the model as he proceeds with its construction to make it fit his ideas of what is best. However, it should not always be assumed that improvements are not possible. After all, the instructions provided with any kit cannot be expected to cover all aspects of the technique of model-building and flying. Text books are in existence which give detailed descriptions of these matters. The kit-manufacturer will tend to confine himself to particular aspects of his products, with perhaps a precis of general information.

The writer had misgivings about one particular feature of the 'Hyper-Cub' kit: this was the difficulty found in manipulating the gearbox back into its correct position, after the motor had been wound,

without losing grip of the gearbox and having it spin madly out of control before being securely fitted.

A 'dummy run' before going out to fly affirmed these fears and so a call was made to DPR Models for their comments. The proprietor listened carefully to the observations and then brought a model to the phone so that he could be sure of the problem as described. No difficulties had been noted at the development stage and he had had no problems with the models tested from the production run.

The conclusion that the writer was not so dexterous or was perhaps less familiar with the manipulation of small parts was inescapable. It was also clear that at DPR they *did* test the product beyond prototype stage and in view of this it would be unfair to level a very personal criticism at this part of the design. But even after further practice the writer did not feel comfortable with the way he was performing the operation and felt that in order to give the model a fair chance when its flying characteristics were being assessed, the business of winding and fitting the nose/gearbox prior to flight had to work in as foolproof a manner as possible.

As a result, it was decided to adopt a temporary solution for the first test flights, with the expectation of producing something a little more elegant in the light of further experience "in the field".

A modification was made to the spare CO₂ motor bulkhead which was supplied and was, of course, not being used. This was sawn and carefully filed to be a close fit on the gearbox rear, and then cemented across the front of the nose (fig. 1). This had the effect of making the job of refitting the noseblock much easier, although there were still a few doubts over the very limited projection rear of the gearbox flange and the slightly radiused area of the pressing (fig. 2).

Preparation for Flight Testing: It is not always possible to have a helper available to hold the model for stretch-winding (as described in the 'Hyper Cub' instruction manual). Most fliers like to be able to operate single-handed anyway, and so the use of a winding jig (sometimes referred to as a "stooge"), gets round the problem. A very simple type is illustrated (fig. 3). The model is linked through the rear motor peg to the jig, thus keeping all the strain involved in winding away from the structure of the model. The single modification to the model is the substitution of a tubular motor peg of light alloy for the dowel stipulated. Just so long as a piece of 16 or 14 s.w.g. wire can be passed through the peg easily, the outside diameter of the tube is

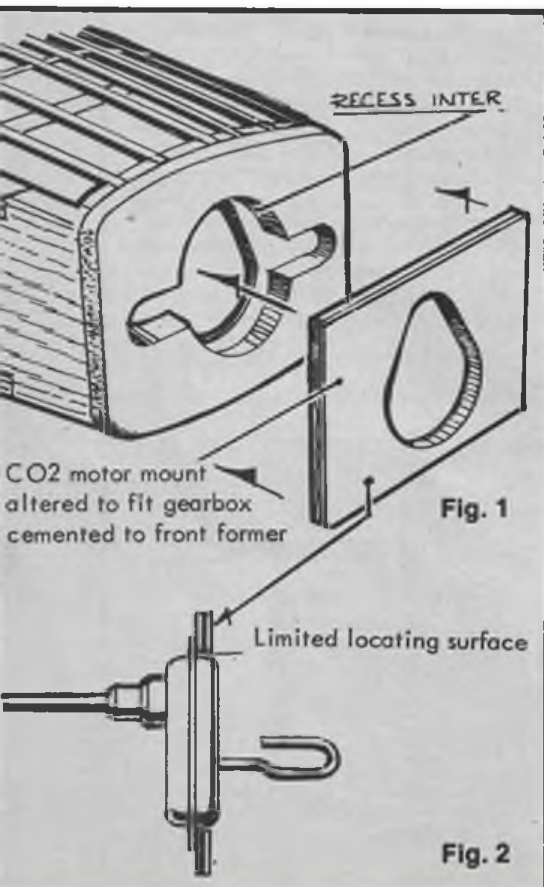
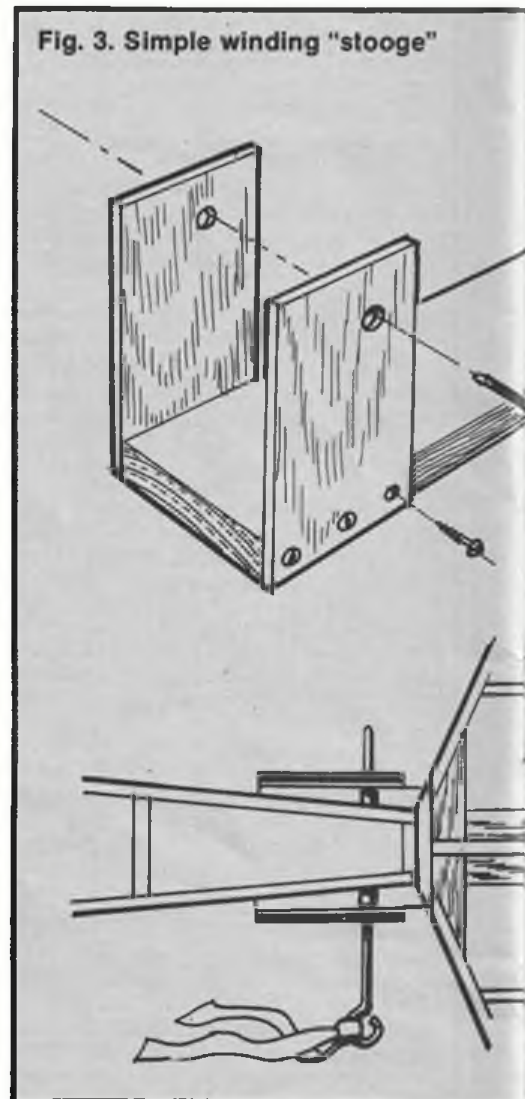
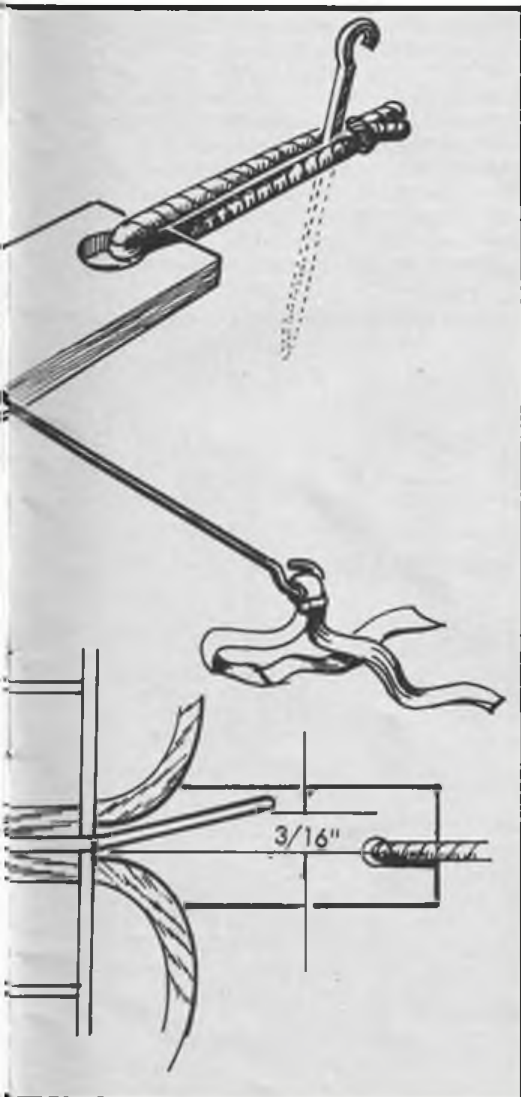


Fig. 3. Simple winding "stooge"





This "Hyper Cub" produced and built by DPR Models looks very smart indeed covered in Solarfilm.



not important. The holes to take the rear motor peg will, of course, need to match that of the tube's outside diameter.

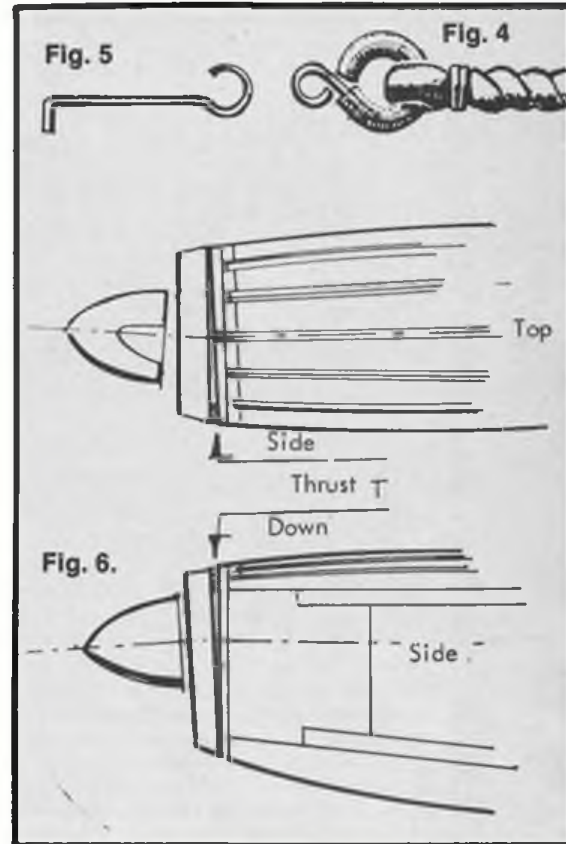
A sensible addition to the motor hook is shown in fig. 4. A piece of valve-tubing or thin plastic tube serves, (the exhausted ink tube of a cheap ball-pen, softened in hot water can be used). The hand drill used for winding needs a hook which is securely held in the chuck. Its security is improved by making it to the shape shown (fig. 5) which will lock behind the chuck jaws.

The chuck of the drill must be tightened as much as possible. Were the winding hook to work free with a wound and stretched motor attached, a great deal of discomfort would be felt by both the model and any unfortunate helper.

Flying: As referred to in the last article, the 'Hyper Cub' will fly quite quickly due to its wing loading and other design characteristics. It is therefore advisable to make initial flights over long grass if at all possible. Test glides are not always easy to interpret as clues to the trim of fairly 'draggy' models, (i.e. those with undercarriages and struts), and in such cases a straight flat glide should be the aim. To get this result, it was only necessary to add a piece of 1/32in. packing under the rear of the stab of the prototype for the earlier gliding attempts.

At this stage, it was found that the spats were being knocked upwards, the shallow locating slot in which the u/c wire fitted being insufficient to resist a firm impact. Before parts began to wear, the wire was cemented into the slot. This temporary measure seems to have worked quite effectively since.

With the glide set as above, there was no obvious tendency for the model to start to turn, and the adjustment of the rudder was left alone for the time being. With approximately 50 winder turns applied, (about 200 motor turns with a 4:1 drill) the model was launched into a steady straight climb, stalled, dropping its left wing and dived in under power. (The long grass prevented any damage). The rudder was shifted about 1/8in. to the right in order to get a right turn during the climb, hopefully averting the stall. Still the left wing dropped, admittedly a little later than before, and at this point an adjustment to the thrust-line seemed in order. Here a snag occurred, as with the motor wound as before, the fitting of a sliver of 1/32in. ply at the left of the gearbox flange to give right thrust (fig. 6) was very fiddly indeed, even with the

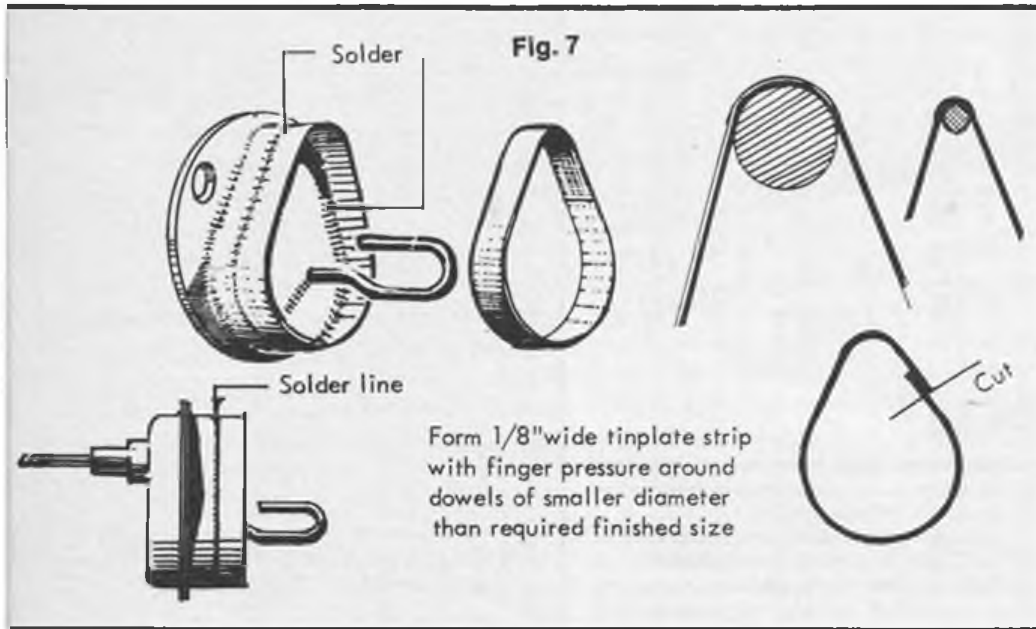


modification described earlier. However, the ply seemed to be having the right effect, and although a slight stall did occur, the model quickly recovered and began a wider open right turn with one or two gentle stalls en route.

The effect of right thrust is to help to keep the nose of the model down and initiate a right turn under power. (It has no effect on the glide, of course.) Now, unlike a power model, the energy produced by a rubber motor diminishes throughout the flight. There is a sudden burst, a longer period of average power and then the tapering off to nothing. Thrust line adjustments can have different effects at the various stages of the power run. For example, excessive right thrust could stop a model climbing during the early part of the motor run as it exerts such an extreme right turn and nose-down force. (You can spot this effect if the model starts to climb more when the initial power falls off a bit.)

Knowing this, more turns were added to discover whether the extra burst of energy from the motor would keep the nose down. The effect was still the same but with a higher point being reached before the stall and left wing dropping came in. (The model was cruising reasonably well, all the turns on the motor running out before the landing.)

Under normal circumstances, a little more packing to give extra side thrust would have been added, but in this case, the location of the gearbox was not as secure as one would have wished. At this point the decision was made to return to base and devise a more substantial nose-block set-up which would allow the easier adjustment of thrust lines and, (for fumbling fingers), a greater degree of safety when holding the prop and wound motor prior to fitting.



Modified nose block: The simplest solution to the problem would have been to cut a strip of tin-plate, (using a discarded food can or similar), and forming it carefully to fit the pear-shaped outline of the gearbox rear pressing. This would then be soldered to the gearbox as shown, (fig. 7) having first removed the plastic spinner and prop of course to avoid damage by heat. It did seem that this was taking the model yet another step away from the kit as provided and so a modification was devised to use the left-over bits from the printed ply and balsa sheets, and use balsa cement to join everything. Obviously, balsa cement cannot be relied upon to glue wood to steel satisfactorily and the suggested approach was based upon a system of enclosing the gearbox in a secure wooden "envelope" which would do two things. First, provide a deeper locating flange and second, give a more substantial purchase for the fingers holding prop and noseblock after winding (fig. 8).

Pre-cementing is essential for this modification, with particular care being taken in the matter of joining balsa to ply, balsa cement being much more effective for the closer grained material if it is well rubbed into the surface (using a scrap of balsa) to ensure adequate penetration.

Once the newcomer to rubber-powered flying has had initial experience of the techniques involved, it soon becomes apparent that *the* crucial issue with regard to rubber model performance, (once a reasonable basic trim has been achieved) is the matter of the propeller and rubber combination. A kit manufacturer has to put a prop into his package which will suit a range of models varying in weight, (and therefore flying speed) and structural characteristics, (e.g. warps, surface finish and so on). With a model such as the 'Hyper Cub' it is always interesting to experiment with different props and motor combinations. The suggested modification to the front former (for nose block location) will make it much easier for anyone wishing to investigate alternatives. For example, direct drive to a larger prop. with a possible rearrangement of strands comes to mind. The kind of noseblock illustrated in the

"Stick Model" design would be suitable.

Nor should experimenters feel obliged to leave a prop at its standard supplied diameter. Careful trimming of the tips can often change an 'over-propped' model quite significantly.

The working area of the supplied prop. (the section falling outside the nose confines) seemed a bit on the marginal side, and so the writer prepared an alternative noseblock using a larger prop which could be swapped 'on the field'. (Remember that the balance point (CG) will change if the noseblock/prop units are not the same weight)

Earlier references in the first instalments of the series laid emphasis on the need to work deliberately and painstakingly. This

is always assisted by preparation and a little thought prior to flying can make experiments so much more interesting.

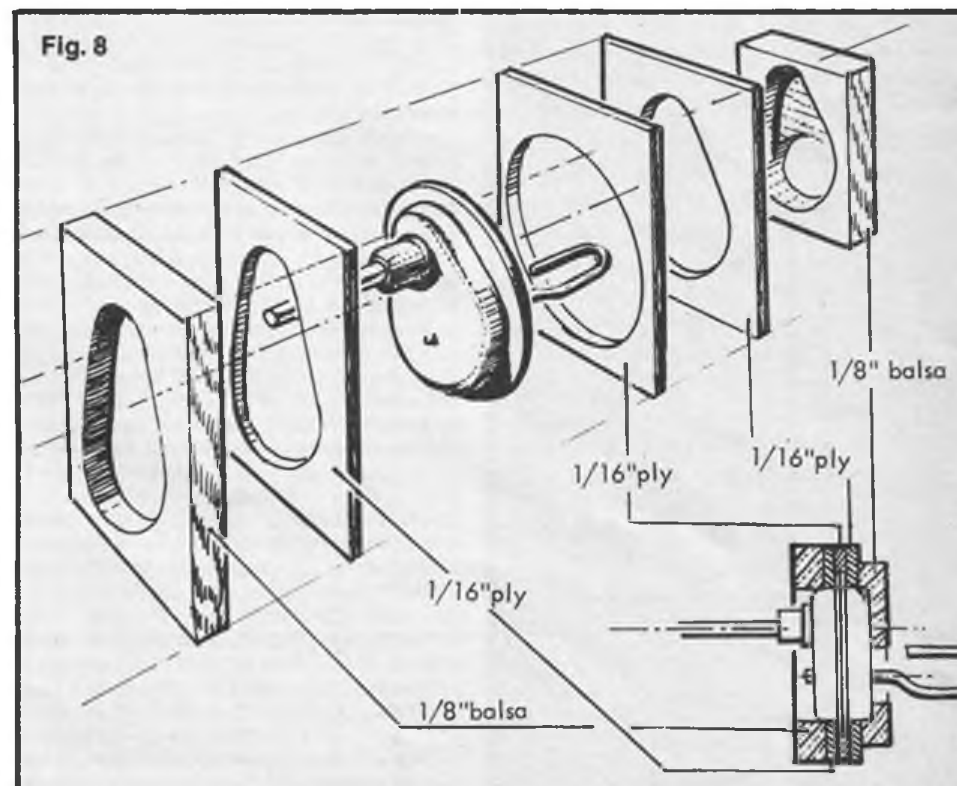
For example, a motor could be made up of four strips of the exact length of the motor hook to rear peg dimension. Extra loops, (two strands) could also be made to be added to the basic four strands if power seemed inadequate. A second matching motor hook and a long wire hook for pulling motors through the fuselage are invaluable items and save a lot of time and frustration. So with the above hardware, extra motors and modified noseblocks, the test model was ready for further evaluation.

As the new nose-block was an unknown quantity so far as the thrust line was concerned, a start was made as though from the very beginning. On 25 winder turns the familiar stall and dropped left wing came in, and so a $\frac{1}{16}$ in. ply packing piece was added to the LHS of the nose block. Remember that as the noseblock was now wider than in the original version, the effect of packing was less in terms of the thrust line offset.

The effect of this was a satisfactory cruising flight in a R.H. circle, and so increases in the number of turns were begun. At 400 motor turns, (100 on the winder), there was a distinct increase in right thrust effect, with the model really motoring but not gaining height. One layer of the $\frac{1}{16}$ in. ply was pared away with the result that we were back with a high level stall and a bit of a twitchy transition before the open circle came in.

A little more offset rudder, (total now $\frac{3}{16}$ in. as in fig. 3) gave what was required, the model getting up about 20ft and looking very pretty against a bright blue sky.

One particular point should be made here; the scale-type rudder is very effective and any trimming using the rudder should be most carefully undertaken. The small diameter prop I assume, causes a very



concentrated and powerful slipstream effect and subjects the rudder to a good proportion of this. It follows that when the prop is revving hard (and it really does go!) the blast of air is very different from the draught at the end of the power run. Hence the need to work up to more turns in gradual stages and the significant difference becoming noticeable at around the 400 turns point.

Some of the worst surge effects of rubber motors can be prevented by letting the prop run for a second or two before launching. It's a trick worth using with non-contest models and can be employed right from the start so that it becomes a habit.

After a few more flights to ensure that everything was working, the *DPR* prop and gearbox were swapped over, a larger prop and a 2:1 *Benton* gearbox being used with the same power. The effect was a faster climb but a shorter motor run, and suggested that this change-over might respond better to a 6 as opposed to an 8-strand motor.

One thing that was happening was that the hard ground and short grass, on which the second tests were being carried out, had started to make the U/C legs flex backwards more than somewhat, as some splitting of a securing cross-piece was occurring. This resulted in a spat moving backwards so far (fig. 9) that one of the lower stringers was neatly removed, and with time pressing it was decided to return to base to do the repairs and give the model a thorough check over.

The harder surface had been deliberately chosen because not everyone has access to soft meadow or moorland grass, and it is only fair to report how the model stands up to a typical parkland flying field. The answer to this is, (undercart excepted) "Very well indeed". There had been one or two 'bounces', all taken extremely well with no joints having sprung, probably due to the pre-cementing technique employed.

Surprisingly, the white plan-paper covering used to give a foundation for the windscreen lower front edge (and which had remained wrinkled at first), was noticed to have shrunk completely to a nice smooth surface, evidence that the dope continues to shrink long after it is dry . . . (and incidentally, why it's always a good idea to check whether surfaces have warped after storage).

Referring to fig. 10 will show that half-dowels had been used to act as locating devices under both wing and stab. These allow the accurate re-assembly of components and are better than the marks suggested in the last article. Certainly some form of check is required and the dowels are almost 'automatic'. They had also survived the session safely.

Repairs . . . and other mods: The writer, while not exactly enjoying the job of repairing models, finds it a particularly intriguing aspect of the hobby because it gives a good insight to the design virtues and shortcomings of any model, and also gives a clear indication of how well-assembled the model is.

Never discard a model which has been damaged before at the very least making an attempt to learn from the remains. In fact, once a clear assessment has been made of

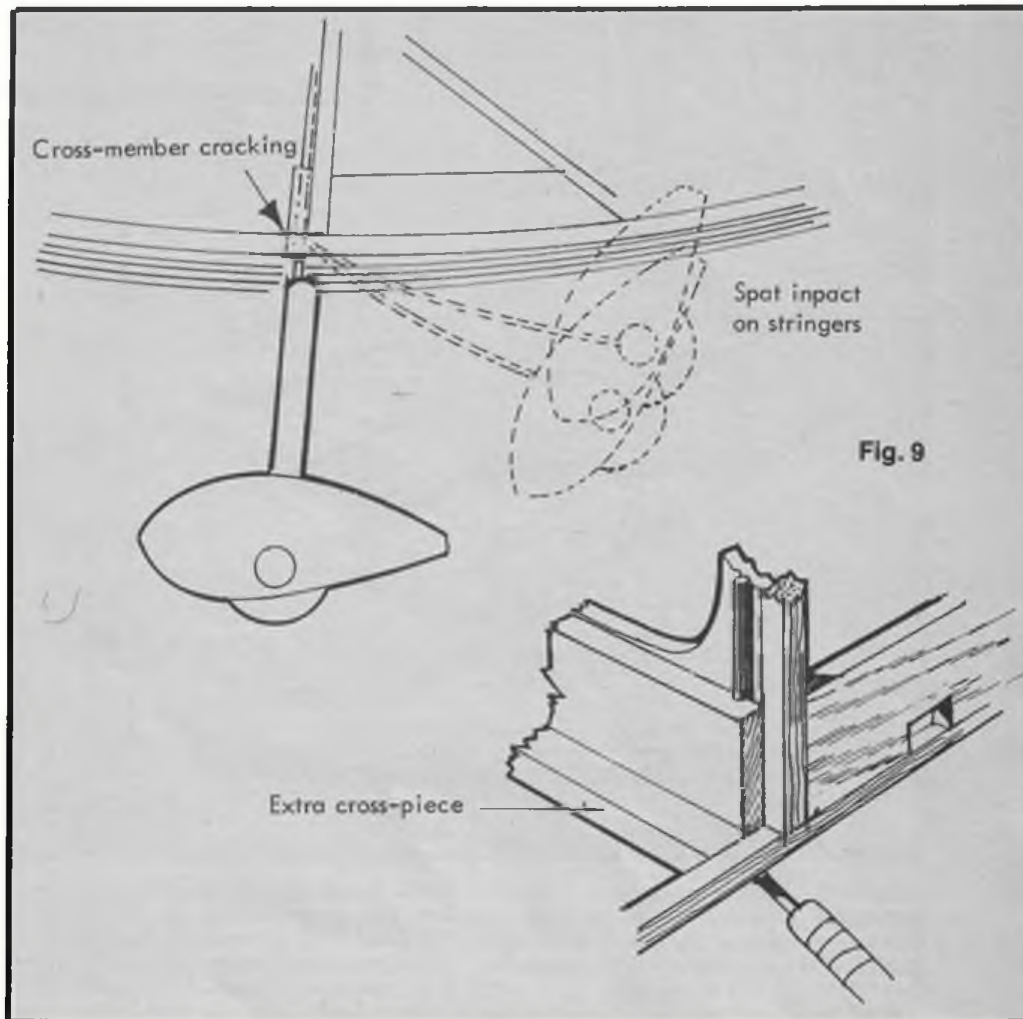


Fig. 9

the airframe, it is surprising what can be repaired.

It's always necessary to cut away covering material to give access to parts needing attention or replacement. Give yourself plenty of space in which to work. The stringer, ($\frac{1}{16}$ in. sq.) was a quick job which required a little thought. The removal from the end former of the tiny cube of balsa from the broken part was easily done, and then a shallow saw-cut was made in the remaining piece of the stringer cemented

into the forward former. This was opened out to a shallow V-shape (about $\frac{1}{32}$ in. long) and a replacement stringer shaped to fit into this recess. Longer to describe than perform, the repair was virtually invisible. Although the longerons had suffered no damage, the insertion of a matching piece had damage occurred would have been equally simple as long as a good overlap between original and repair material was made. This splicing technique is one with which most modellers become very familiar. Under competition

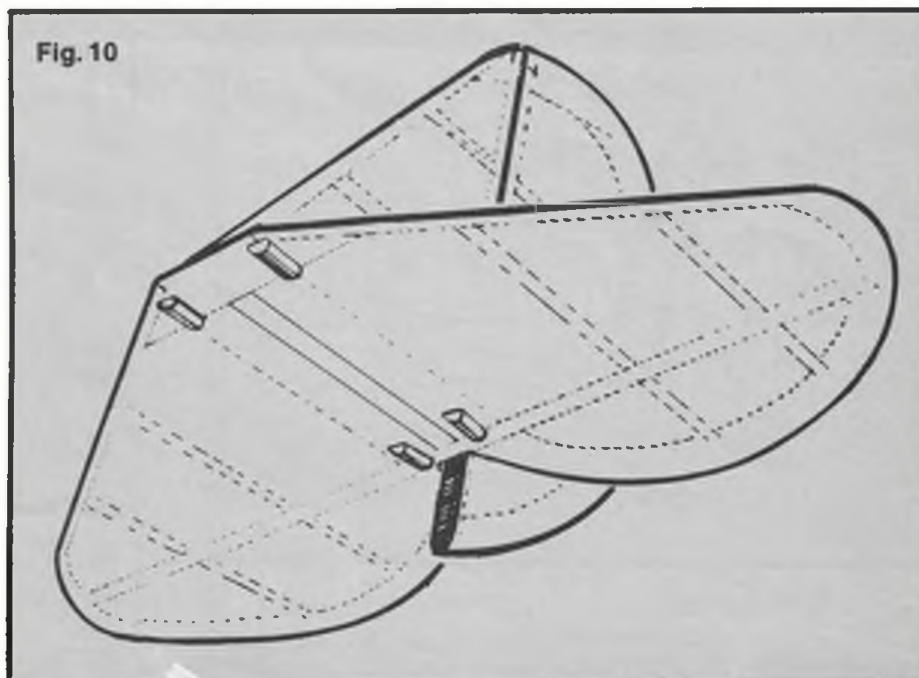
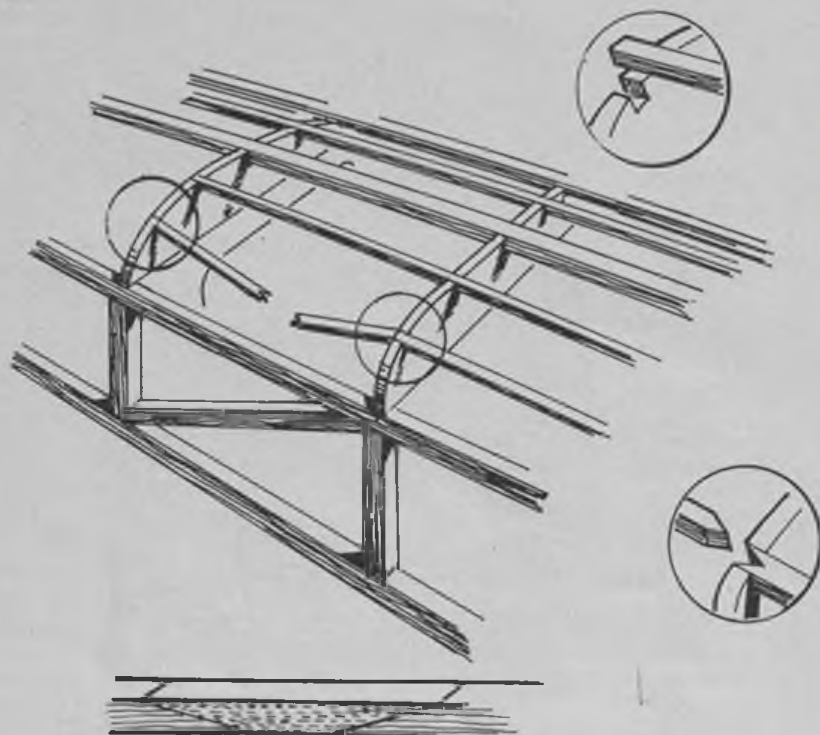


Fig. 10

Fig. 11



conditions, quite complex repairs do get performed in double quick time as the number of models permitted is always limited, and so repairs are often necessary (fig. 11).

After repairing, always check that the balance point (CG) has remained unaffected

before going through a shortened version of the trimming process. It can never be assumed that a repaired model will be *exactly* as it was before. So, with the 'Hyper Cub' we have a tough, fairly quick flying model, interesting to build and quite challenging to trim. It is definitely *not* a

beginner's first model, (and it is not claimed to be so by the manufacturers).

The main points of personal criticism concern the nose-block/gearbox and its manipulative problems, (certainly with a good number of turns on the motor, the extra purchase provided by the modification helped) and the U/C flexion. The very good rubber provided in the kit gives plenty of power and matches the prop and gearbox supplied, the motor run was more than adequate for small-field flying. There is no need to use the full potential of the turns the motor is capable of taking to get a satisfactory performance.

The undercarriage flexing will perhaps respond to a simple device to limit the movement, rather like the rebound stops or straps on some makes of car. A small wire loop or hook, (22 s.w.g. would do) could be cemented and bound to each U/C leg as shown. A third small hook could be inserted from *outside* the fuselage and cemented to a former, so that any loads could be distributed over a large area. These hooks could then be linked to the U/C legs by either rubber bands or light fishing line to prevent the extremes of backwards movement (fig. 12).

This, of course, is what attracts so many modellers to the hobby . . . the opportunity for innovation, improvement and the chance to see whether or not one's ideas are sound. To those readers who have taken the first steps towards the goal of designing, building, flying (perhaps ultimately competing and winning with) a model entirely their own creation, the writer wishes the best of success. After all, the very first *solo flight* did lead to quite surprising results, didn't it?

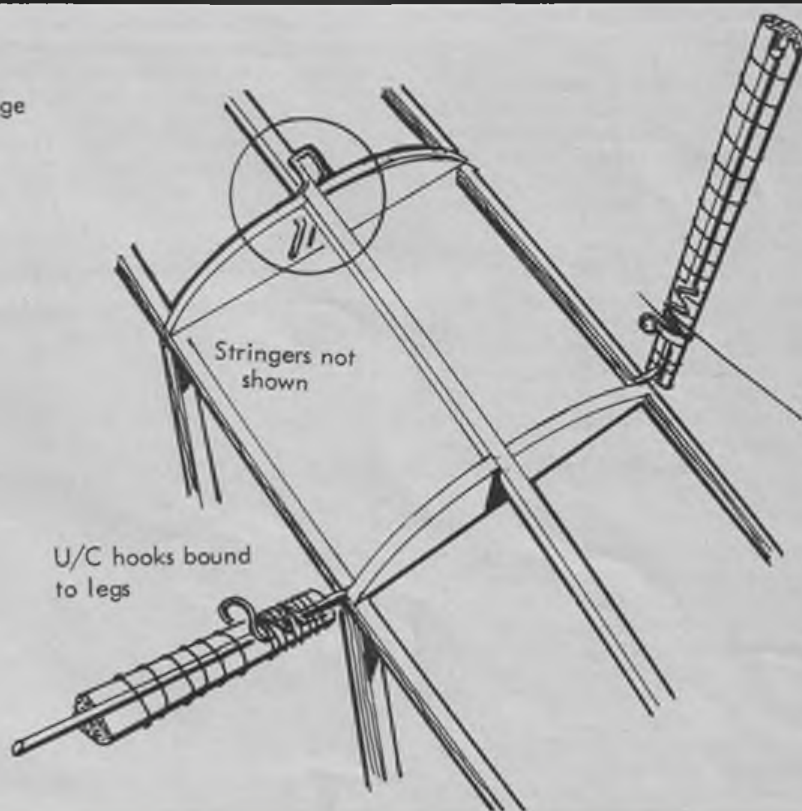
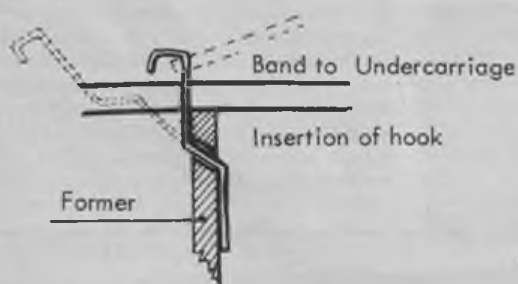


Fig. 12

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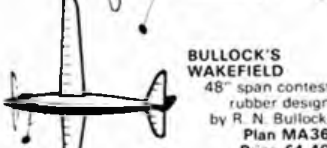
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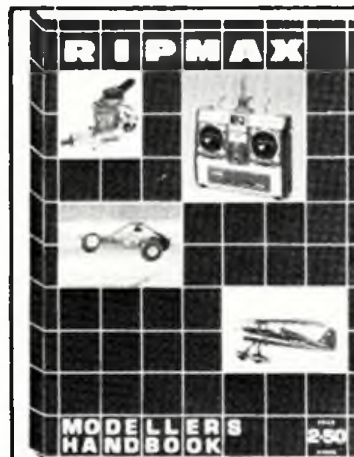
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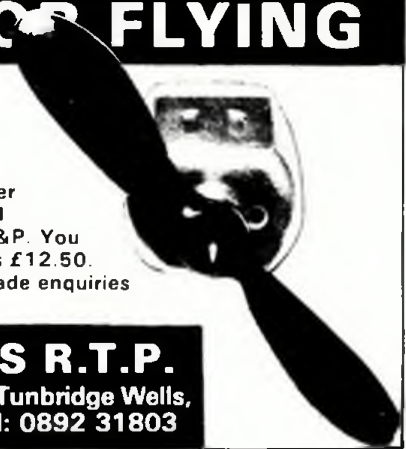
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Open 9 am-5:30 pm. Closed Wed

PRESTON Tel (0772) 51243
PRESTON MODEL CENTRE LTD
(Opposite Polytech)
2 FYLDE ROAD
Open 9:30 am-6 pm Mon-Sat

NOTTINGHAMSHIRE

NOTTINGHAM Tel (0602) 412211
GEE DEE MODELS LTD
19 21 HEATHCOTE STREET
OFF GOOSEGATE
Open 9:30 am-5:30 pm
Early closing Thursday

You can buy with confidence from the shops in this shop guide.

SUSSEX

BRIGHTON Tel (0273) 418225
 HARRY BROOKS *
 15 VICTORIA ROAD
 PORTSLADE
 Open every day except Sun.
 8.30 am-5.45 pm (no half day)

CARDIFF Tel (0222) 29065
 BUD MORGAN *
 22 CASTLE ARCADE
 SOUTH GLAMORGAN CF1 2BW
 9 am-5.30 pm

KEIGHLEY Tel (0535) 65662
 AIREDALE MODELS *
 156 STATION BRIDGE
 BRADFORD ROAD
 Mon-Sat 9.30-6 Tues closed
 Thur 9.30 am-7 pm

YORK Tel (0904) 34281
 DAVE SMITH MODELS *
 17 DAVYGATE CENTRE
 DAVYGATE
 Open Mon-Sat 9 am-6 pm
 No half day

WEST MIDLANDS

CRAWLEY Tel (0293) 21921
 HEATHER CRAFT *
 9 SOUTHGATE PARADE
 SOUTHGATE RH10 6ER
 Open 9 am-5.30 pm Mon-Sat
 Closed all day Wednesday

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

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

NORTH YORKSHIRE

KNARESBOROUGH Tel (0423)
 JH AERO MODELS 866096
 57A HIGH ST (above Kitchen Centre)
 Mon-Fri 9.30 am-5.30 pm
 Sat 10.00 am-1.00 pm
 Late night Friday till 7.30 pm

WILTSHIRE

EAST GRINSTEAD Tel (0342)
 SOUTH EASTERN MODELS 21750
 5 THE PARADE
 LONDON ROAD, FELBRIDGE
 Open Mon-Sat 9.30 am-5.30 pm
 Closed Wednesdays

MELKSHAM Tel (0225) 703311
 MELKSHAM MODELS
 19 BATH ROAD
 Mon, Tues and Thurs 9 am-5.30 pm
 Wed closed all day Fri 9 am-6.30 pm Sat 9 am-5 pm

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

YORKSHIRE

WORTHING Tel (0903) 207525
 SUSSEX MODEL CENTRE *
 10 TEVILLE GATE
 9 am-5.30 pm Open six days a week
 Monday to Saturday

BARNSLEY Tel (0226) 43561
 DON VALLEY SPORTS *
 28 NEW STREET
 Open 9 am-5.30 pm Mon-Sat
 Closed Thursday

TYNE AND WEAR

NEWCASTLE UPON TYNE
 Tel (0632) 322016
 THE MODEL SHOP *
 18 BLENHHEIM STREET
 Mon-Sat 9 am-5.30 pm
 Closed all day Wednesday

BRADFORD Tel (0274)
 MODEL DROME 726186
 217 MANNINGHAM LANE *
 BD8 7HH
 Opening hours 9.30 am-5.45 pm
 Closed Wednesday

WALES

CARDIFF Tel (0222) 31367
 THE CARDIFF MODEL CENTRE *
 34 LLANDAFF ROAD
 CANTON, CARDIFF
 Open 9.00-5.30 5 days a week
 Closed all day Wed

DONCASTER Tel (0302)
 EVANS MODEL CENTRE 27255
 D C EVANS & CO (HOLDINGS) *
 LTD 65 SILVER STREET
 Open Mon-Sat 9 am-5.30 pm
 Closed all day Thursday

How to get the most from your advertisement in
AERO MODELLER
 Give a full description of the product or service which you want to sell.
 Book a series of advertisements to ensure that you reach the whole potential market. Remember your customer could quite easily miss the issue which contains your advertisement.
 If you want to cancel your advertisement then simply pick up the phone before copy deadline and tell us.
 Lastly, to get the most from your advertisement consult us first.
We are here to help you - Tel: (01-437) 0699 and ask for Ian Atkinson.



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Private and trade rate 25p per word; minimum £5.00. Display box rate £6 per single column centimetre (minimum size 2.5cm £15.00; maximum 5cm £25). All advertisements are inserted in the first available issue, unless specified otherwise.
 Write your advert in BLOCK CAPITALS in the grid below, ticking the section you wish it to appear under, INCLUDING YOUR NAME AND ADDRESS IN THE WORD COUNT and send it to: AEROMODELLER, ADVERTISEMENT DEPARTMENT, ARGUS SPECIALIST PUBLICATIONS LTD., 1 GOLDEN SQUARE, LONDON W1R 3AB. Tel: 01-437 0699.

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Name
 Address

 Post Code.....
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For Sale

THE PEATOL LATHE



£120 including 3 or 4 jaw chuck, Milling attachment and other accessories available. Centre height 2' 1/2". Distance between centres 5".
Please send S.A.E. for full details.
Peatol Machine Tools, 19 Kinglew Road, Harborne, Birmingham B17 8PS. Price inc. VAT

Rivers Spray Bar Assembly. Authentic quality. Reproductions Mk1 and MkII only £5.50. Each sent surface mail extra 20p airmail. R. D. White, 10 Orchard Close, Chalgrove, Oxford OX9 7RA, England.

We are the officially approved service agents for Austro-Webra, Cipolla, Cox, D.C., Enya, Fox, Fuji, HB, HGK, HP, Merco, Meteor, PAW, Saito, Super Tigre. Retail Dealers for OS, Irvine, ED. 20,000 plus spares always in stock. 777 service (7a.m.-7p.m. 7 days a week). Motors, accessories, spares, repairs, overhauls. Express service. Access, Visa. John D. Haytree, The Haven, Rixey Park, Chudleigh, Devon TQ13 0AN. Tel: (0626) 852330. T/C

Whether you're a beginner or a hardened enthusiast try us for that elusive item. Model Images Retail, 56 Station Road, Letchworth, Herts. Phone 046 264859.

Mills 75 purchased new 1953. In mint condition. Will still fly model aircraft. £30 with spares. Telephone Maidstone 831787 after 6pm.

MODEL WORKSHOP

Aircrafts, Boats and Cars

Good supplies of balsa wood, plywood, spruce, mahogany, tissue, rubber etc. Futaba radios and OS engines.

(Help and Advice)

31 Kneesworth St., Royston, Herts. Tel: (0763) 45375

D.C. Wasp £5. Original Mills engines with cutouts. 0.75 in original box £35, 1.3 MkII £25 ono. 051-342 4489.

NOW AVAILABLE
1984 CATALOGUE
95p POST FREE

Exports Tax Free
Catalogue
£2.50—S/M

Engines, kits and accessories by Ripmax, Graupner, Keil Kraft, DPR Veron, Model-hob, Comet, Guillows, P.A.W. D.C. Merco, Enya, OS, Cox, Telco, Balsawood, Tools.
S. H. Grainger Ltd., 108 Caldmore Rd., Walsall WS1 3RB. Tel: 23382.

WHATEVER YOU'RE SELLING — GET THE BEST RESPONSE FROM AERO MODELLER 01-437 0699

Gliding

TRY IT FOR REAL

Take your holiday gliding course with the YORKSHIRE GLIDING CLUB. Fully residential Clubhouse with licensed bar. Full time professional instructors. Three logs. Winch. Glasflite K21 two seater. Falke motor glider. Hill thermal and wave soaring. Courses April to October. For details contact

The Secretary, Yorkshire Gliding Club, Sutton Bank, Thirsk, Yorks. Tel: Thirsk (0845) 597237

General

INDOOR/FREE FLIGHT SUPPLIES

NEW 43 page 'RED' catalogue now available FREE with long S.A.E.

SAMS, 2 THE DRIVE, BLACKMORE END, WHEATHAMPSTEAD, HERTS. TEL: (0438) 832011

Crowborough Models, 2 St. John's Road, Crowborough, Sussex Tel: (089-26) 4951. All your aeromodelling needs — kits, motors, accessories, radio etc. HJ

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

Interested in 1930s Dinky Toy aeroplanes? Then visit the display at the Vintage Toy Museum, Field's, Market Place, Sidmouth, Devon. F-K

Wanted

Allbon Engines for historic display. Condition unimportant, anything regarding Alan Allbon is of interest. Allbon-Saunders Ltd., Pembroke Lane, Milton Abingdon, Oxon. 0235 831343. HJ

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

Single motors or collections of Diesel, Glo, Spark. Write with proposals, include condition, postage, realistic prices. R. Wright, 197 Henry Street, Greensborough, Victoria 3088, Australia.

Wanted Robarts three line control handle and suspended bell crank. Tel: Wedon (Staffs) 270642.

Wanted

WANTED

to complete my British Diesel collection — I need the following engines . . .

E-P-Moth, Majesco Mite, Rawlings 3c.c., Leesel 2c.c., Clan-9, Hallam 2.5c.c., Any Western, Raylight Rapier 3c.c., Kemp 8c.c. twin — will pay up to £200 per engine — will also buy incomplete examples. Have very rare petrol and diesel motors for swaps.

Tel: (0634) 408268 (daytime) or (0634) 719011 (evenings) or write to:

PAUL ROSSITER,
112 Watling Street, Strood, Kent.

Kielkraft Swift and Hunter Jetex 50 kits wanted by interested builder. Any condition. Details to: H. Conley, 334 Leechmere Road, Sunderland, Tyne & Wear.

Books & Publications

Do you have a crafty family? Then they need Popular Crafts Guide to Good Craft Suppliers. This definitive guide for the crafts person has 192 pages packed with information listing Craft Suppliers, Wholesalers, Associations, Courses, Craft Fair Organisers — all cross referenced to enable you to find the information you need quickly and easily. Price £1.95 from your craft shop or bookseller or £2.50 including postage and packing direct from Argus Books, Wolsey House, Wolsey Road, Hemel Hempstead, Herts. HP2 4SS. T/C

'Sailplane and Gliding' — the only authoritative British magazine devoted solely to the sport of gliding and soaring. 48 pages of fascinating material and pictures. Published every other month. Send £8.15 (\$17.00) for a year's subscription to British Gliding Association, Kimberley House, Vaughan Way, Leicester, England. T/C

Books & Publications

AMERICAN

AERO-MODELLING MAGS

R/C Modeller prices inc. postage £2.90
M.A.N. £2.20
Flying Models £1.65
Scale R/C Modeller £2.50
Model Builder £2.40

Current — and some back issues available
THE AVIATION BOOKSHOP
656 Holloway Road, London N19 3PD

Aeromodellers back issues mart. Vast stocks of back issues held in stock Beaumont, 656 Holloway Road, London N19 3PD ALT-T/C

Guide to Special Interest Holidays — your passport to a new beginning. Special Interest Holidays are ideal for those people who 'have always wanted to, but somehow never got round to it'. Now is the time to start. Get away from dull routine. Spend a few days in pursuit of your favourite subject or an entirely new craft. The Guide lists Special Interest holidays from Art to Yoga, Computing to Pottery. Tells where they are, how much they cost, what to take with you and what to expect when you get there. Over 150 centres offering 900 courses waiting to be discovered! Don't delay — get your copy today! At your Newsagent, Bookshop or £1.95 plus 25p postage from Popular Crafts, Wolsey House, Wolsey Road, Hemel Hempstead, HP2 4SS. ALT-T/C

'Opens up a whole new world.' Dollmaking in Six Easy Lessons by Niesje Wolters van Bommel. The revolutionary new method of doll-making that has swept the Continent. Requires no kiln or equipment. Everything you need to start can be found in the average home workshop. A must for every craft enthusiast, acclaimed by experts. Price £1.95 plus 25p postage from Popular Crafts, Wolsey House, Wolsey Road, Hemel Hempstead, HP2 4SS. ALT-T/C

AERO MODELLER

SELL IT WITH AN AEROMODELLER CLASSIFIED

BACK TO RAILWAYS

Like most of us you probably started your modelling career with railways and then thought you grew out of it. But we all know that models aren't toys and that a really good working layout can be very satisfying and easy to achieve. In order to lure you back into railway modelling we're launching a new magazine which, amongst many other things, shows you how to make a very attractive layout in just a few weekends.

So why not take a break from that two-year project and have a few weekends fun with the "YOUR MODEL RAILWAY" layout – only 80p.



OUT NOW!

MICRO-MOLD

FIRST CHOICE for Aeromodellers!

Bentom ★ RUBBER POWERED FLYING MODELS ★

16 1/2" span model of balsa 'built-up' construction from precision die-cut parts. Complete with tissue, prop, wheels, etc. Ideal introduction to real aeromodelling!



Balsa Model Series SKYPAL £3.95

27 1/2" span 'all-foam' model with parts ready for assembly. The kit includes Bentom's Bi-Matic gearbox, props, rubber, decals, wheels, etc. Absolutely complete! Superb flyer.



Bi-Matic Series SCHWEIZER £7.25

* CAN BE EASILY CONVERTED TO CO2 POWER!

SPITFIRE



SPAN 19.3" £4.95

Military Series

Kits include injection moulded foam polystyrene fuselage, wings and tail surfaces, superb 2:1 ratio gearbox, spinner, plastic propellers (2), rubber motors, moulded wheels and accessories, pre-bent detachable wire u/c legs, dowel, balance weight, formed clear canopy, impact adhesive, authentic waterslide decal sheet and fully illustrated assembly instructions.

★ IDEAL FOR CONVERSION TO CO2 OR ELECTRIC RTP

MUSTANG & ZERO also available

Messerschmitt ME.109E



SPAN 19.3" £4.95

TELCO CO2 POWER

* Designed for Telco TurboTank 3000

PIPER PA-18 SUPER CUB



24" span model, mainly of simple sheet construction from pre-cut balsa and ply parts, vac-formed cowling, scale plastic wheels, wire u/c parts, cabin glazing, waterslide transfers, full-size plan and building instructions.

£6.50

ATTACKER SKYRANGER STARHAWK



* Designed for Standard Telco

19" span all-sheet model kits with pre-cut parts, decal sheet, plan and building instructions. Super value! £3.25 each

3 COMPLETE SYSTEMS TO CHOOSE FROM —

STANDARD MOTOR —
Complete with 5 1/2" Propeller, Fuel Tank and Filler Nozzle, Charger Unit, Throttle Spanner, Thrust Wedge, Hardware Set, Decals, Full Instructions and One Soda Syphon CO2 Bulb.
£11.45

READY TO FILL-UP AND GO!

THE TURBOTANKS —
For More Power/Duration
Complete, as above, but featuring an advanced design integral CO2 tank for easy, one-piece installation.

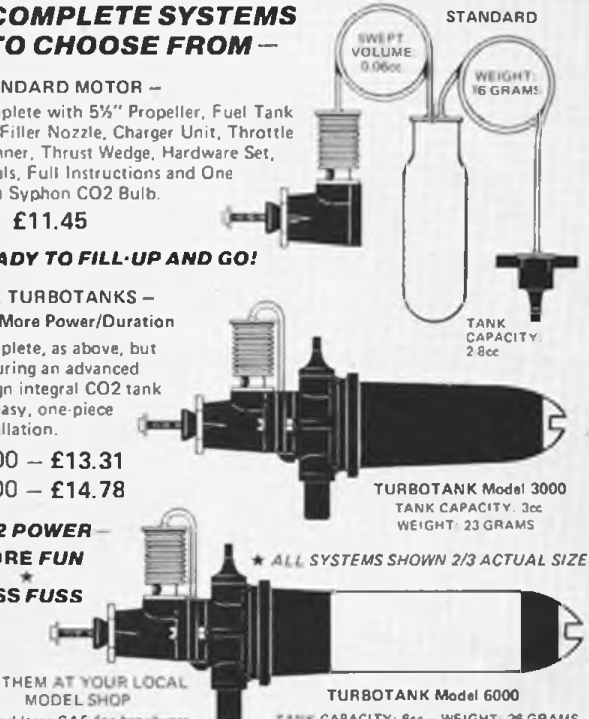
3000 — £13.31
6000 — £14.78

CO2 POWER — MORE FUN LESS FUSS

★ ALL SYSTEMS SHOWN 2/3 ACTUAL SIZE

SEE THEM AT YOUR LOCAL MODEL SHOP
Or send large SAE for brochures

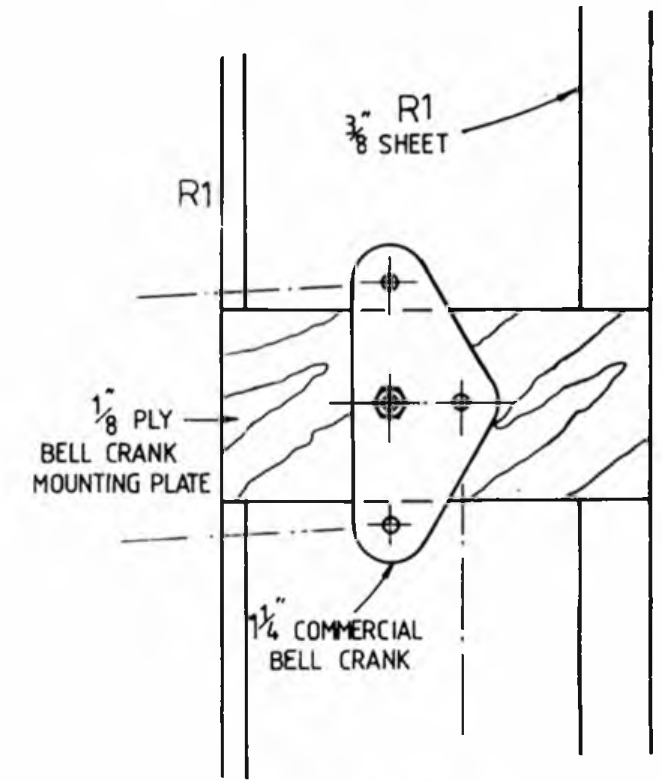
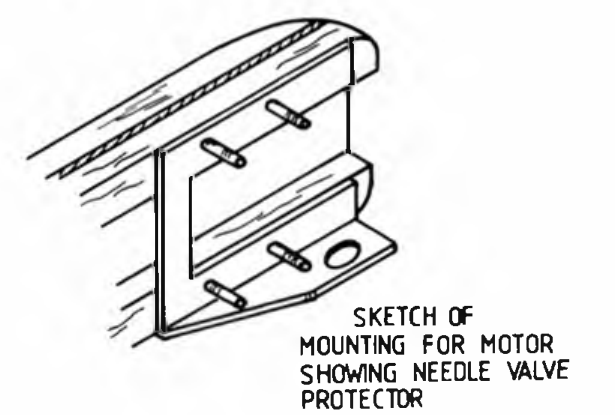
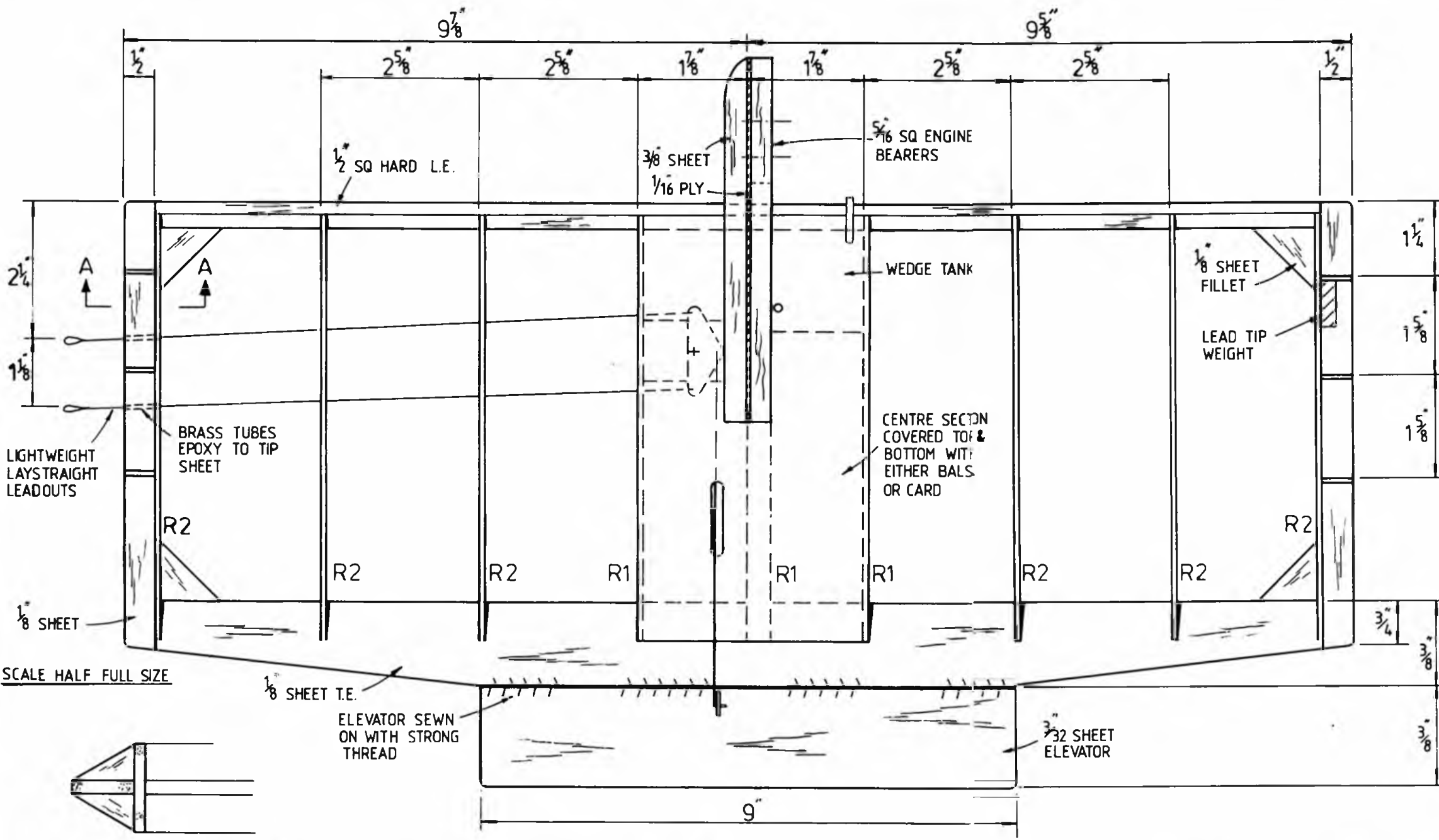
FLY SAFE • FLY QUIET • FLY TELCO



STANDARD: SWEPT VOLUME 0.06cc, WEIGHT 16 GRAMS, TANK CAPACITY 2.8cc

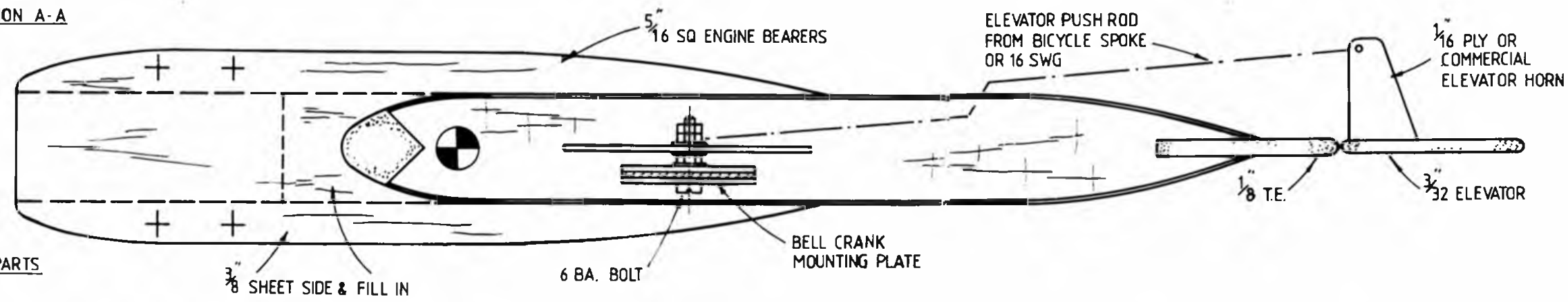
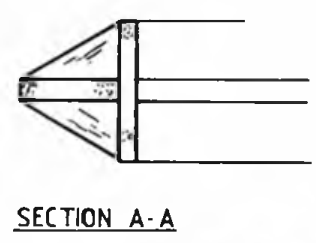
TURBOTANK Model 3000: TANK CAPACITY 3cc, WEIGHT 23 GRAMS

TURBOTANK Model 6000: TANK CAPACITY 6cc, WEIGHT 26 GRAMS

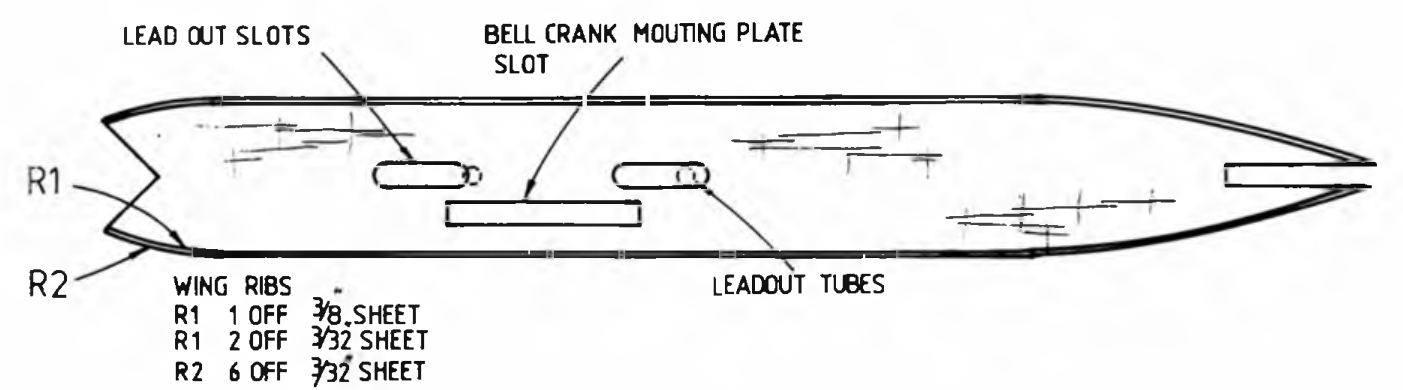
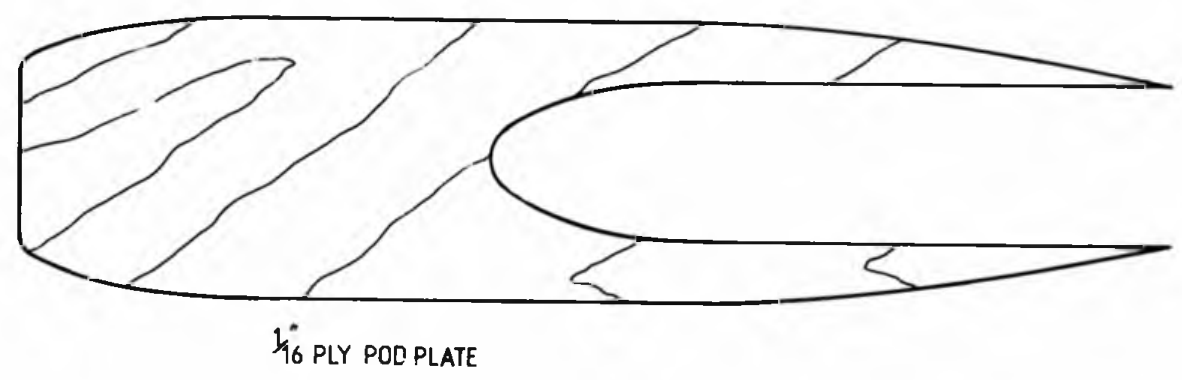


SKETCH SHOWING POSITIONING FOR BELL CRANK PLATE

SCALE HALF FULL SIZE



FULL SIZE PARTS



DOMINO

FLYING WING C/L MODEL
 FOR 1-1.5cc ENGINES
 BY J.H. WATTERS.

APPENDIX: LINKS to the plans

The original magazine comes with two free plans (Sopwith Pup and Midge) printed front/back on a pull out banner of four sheets. The banner is not included in the document.

Sopwith Pup by Jim Latham

FF scale model WWI biplane for CO2 or electric power.

https://outerzone.co.uk/plan_details.asp?ID=1838 ...

[Document Page: 25](#)

Midge by C. Davies

RTP Electric

https://www.hippocketaeronautics.com/hpa_plans/det...

[Document Page: 27](#)

Domino by John Watters

CL Flying Wing

[Union Page: 53](#)

[Document Page: 33](#)

Battler by Ron Moulton

CL Model based on Goodyear Lines

[Document Page: 39](#)

WORLD
SCALE STAMPS
BUILD-BUILD-BUILD
Sopwith Pup for CO₂ power

Fly aerobatics
indoors with
electric power

MODEL
ROCKETS

