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AERO MODELLER

JULY 1984

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Cover

This month s cover comes from that aeromodelling photographer John O'Donnell and features in order of wingspan, the delightful Sue McGivern and one of John's CO₂ powered duration designs. The latter has 'Melinex' / 'Mylar' covered surfaces and uses one of Telco s Turbotank motors — has lower wing loading than Sue and is reported to fly more successfully!

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2 Free Plans – Sopwith 'Dove' Found 'Centennial'

72 pages of scale information

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R/C SCALE AIRCRAFT – HOW TO BUILD THEM – HOW TO FLY THEM

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Sopwith 'Dove' Free pull-out for a 1/8th scale model of the delightful Sopwith two seater, based on the famous 'Pup'. Designed for 3-4 function radio equipment and 15 to 19 cu ins engines, the 'Dove' is a beautiful model to fly and there is enough building content to keep the real scale enthusiast happy.

Found 'Centennial' The second free plan features the lesser known Found Model 100 'Centennial', a high wing cabin design with ideal proportions for a scale R/C model — or free flight. This 39 inch wing span model is suitable for .75-1.00cc engines (particularly diesels) and the inexpensive two function radio control outfits — very easy to build.

Fairchild Argus Graham Smith gives a very informative description of how he designed and built his large — but not too large — Fairchild 'Argus'. His unique construction and detailing methods are profusely illustrated.

'Painting the Firebird' World class scale modeller, Ross Woodcock, gives the low-down on how to apply these complicated decorative patterns to models. His subject, the Lockheed Vega 'Firebird', is highly decorative.

Liquid Cooling Simulating inline engines has always created cooling problems for the modeller. Ken Lawson explains how to overcome these engine cooling problems by using liquid cooling — as per the full size aircraft. A unique system which has been proven in performance.

Three Greens An in depth consideration of the various types of retracting undercarriages. Brian Taylor needs no introduction to scale modellers and we are indebted to his assistance in preparing this article.

Improving Your Scale Flying Full size aeroplane pilot, and R/C modeller of many years experience, Peter Russell illustrates the ways to make your flying of models more like the real thing. As an exponent of both types of flying, Peter is able to speak with authority on the similarities — and differences — between the two.

Corrugations A surprising number of prototypes feature corrugated finishes and this article 'picks the brains' of top modellers, Arthur Searle, Pete Neate and Ross Woodcock for a how-they-do-it feature.

Scale Realism "Build light and follow full size practices", recommends Dr. Mike Sun and he has thousands of flights with his scale R/C models to prove that the theory works. There are plenty of illustrations to show you how to make your models fly even better.

Large Scale Models A contentious subject perhaps, but David Boddington helps to put the Large Scale Model movement into perspective. Before you condemn these 'Giants of the air', read this article.

Carrier Deck Contests Looking for something different in the way of scale competitions. Try the Carrier Deck contest, it requires little work to prepare the models and few officials to run the competition — and it is great fun.

Contest Director You may have thought about organising a scale competition but have been unsure about your responsibilities and functions. This article may not reduce your liabilities but it does detail all of the pre-planning and competition organisation which is required.

Structural Rigging To build an *accurate* replica of many of the biplanes and early monoplanes it is essential to use structural rigging. Modellers have often been frightened away from subjects because of the rigging problems — worry no more, we will tell you how to do it.

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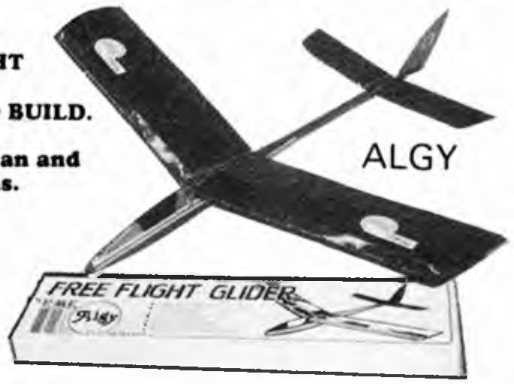

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HANGAR DOORS

Flightrider lifts off . . . British Airways has just launched a new club for their younger travellers (under 16), with particular attention to those that travel unaccompanied.

While the cat's away . . .

. . . the gremlins walk (run!) in. Those of you with even pretty mediocre vision will have spotted something amiss on page 292 of the June Aeromodeller! I can assure you that Martyn Cowley really does know that F1B is a 'Rubber' event ('B' is for band — seel). A set of rather unfortunate circumstances led to only part of the previous month's heading being changed . . . sorry Martyn.

Human-powered Aircraft for Thamesmead

On July 7th/8th 1984, contests will be held for human-powered aircraft — like the 'Gossamer Albatross' and 'Solar Challenger' — as part of the *Thamesmead Festival of Human Power*. There will also be events for the increasingly popular land tricycles and high-speed pedaloes — all out to win attractive cash prizes and exchange notes about this pioneer technology. Indeed it will be the first time in the very long history of sporting transport of any power, that land, air *and* water events have been held at the same venue.

Thamesmead is a new town development in South-East London built on the reclaimed Woolwich and Erith Marshes. It has been designed around a complex of lakes and canals. The Festival has been pioneered by the Greater London Council (GLC).

This year there will be three different air events: Take-off and flight of 200 metres; Take-off and flight round a triangular course under Kremer Prize rules; a £1,000 prize offered by the GLC for the first human-powered aircraft to fly across the River Thames at Thamesmead — a distance of ¾ mile.

It is not at the moment thought to be practical to construct a purely human powered aircraft, unless one has a huge amount of money to spend on the project . . . and a completely windless day for flying. The organisers of the Kremer prize recognise this, and the rules of their new contest permit a machine to have a power storage system, so long as it is discharged at the start of the attempt. Ten minutes is allowed for charging up, which must be by the pilot's power alone. By the end of this ten minutes, the run must have started and the machine must be at least 6ft. off the ground. There will be one, and possibly two machines built and flying by then and observers from the Royal Aeronautical Society will be asked to make themselves available if competitors so wish.

Anyone wishing for further details of this unusual event, only 20 miles from Central London, should contact Peter Selby, *Thamesmead Festival of Human Power*, 13 Tristan Square, London SE3 9UB.

Thanks and Thanks again

The response to our appeal for some missing *Aeromodeller* archive pages (May issue) has been almost overwhelming. It makes us realise (1) the power of the press and (2) what an excellent lot our readers are . . . many thanks to all of you who offered and sent to us the missing pages.

This remarkable model was wrongly credited last month, it is in fact a reconstruction by Alwyn Greenhalgh of Walter Getsla's entry in the 1934 Wakefield contest.

Demonstration flying at the SMAE Nationals

With the object of entertaining and interesting the visiting public at this year's SMAE R/C Nationals to be held at RAF Barkston Heath on August 25/26/27, Clubs and individuals who are SMAE members and competent flyers are invited to give flying demonstrations of Sport, Scale and Vintage types under the guidance of Ben Buckle and Mike Whittard. Frequencies allocated are 27MHz Green and Yellow, 35MHz channels 62, 64, 66, 69 and 78.

Flight safety is of paramount importance. All flyers will check their transmitters with Rex Boyer on arrival. All models will be scrutinised for safety prior to flight. In the event of any pilot experiencing difficulty, competent assistance will be immediately rendered

This we must stress is *not* a Trade Demonstration.

There will be no charges made at the flight line. Flyers are requested to report to Flight Line 5 (adjacent to the Eastern Boundary) before 10 a.m. at which time briefing will take place.

More benefits for 100 per cent SMAE clubs

After well over a year of negotiation by former SMAE chairman John Jones and others, the Ministry of Defence has finally agreed that from April 1, 1984 100 per cent SMAE-affiliated clubs that use MoD land for model flying will be covered by the society's Crown indemnity insurance policy. For some clubs that can mean a saving of over £300 a year. During the past couple of years the Ministry has required that clubs using military lands must be covered by a special insurance policy; their levy has been 85p 'per use,' and that phrase 'per use' has sometimes been locally interpreted to mean 'per day' where a club has had year-round access to a flying site.

Now, thanks to the work of the country's national organisation for model flying, the SMAE, some club bank balances will be £310 better off every year. No wonder the move to 100 per cent SMAE membership within affiliated clubs has been a popular one. For full details of the Society of Model Aeronautical Engineers and its work for all model flyers, send a stamped addressed envelope to Kimberley House, Vaughan Way, Leicester. A year's membership can cost as little as £5, and that's less than 1½p per day.

1984 Chuckie Championship

Following the success of last year's National Model Flying Competition, DPR Models are pleased to confirm that a 1984 'Supergloy Chuckie Championship' will take place throughout 1984, with many heats around the country with schools and clubs taking part, culminating in a grand final which will provisionally be held indoors at Middleton Hall, Milton Keynes in October/November as last year.

Due to popular demand, an additional age group for youngsters 13-16 years old has been added to the under 13's event, to enable ATC, Scouts and similar groups to participate.

The rules remain basically unchanged as follows:

1. All competitors to be within the age specified at the time of the competition heat (i.e. under 13 or 13-16 years old).
2. The model should be built from the standard DPR Models 'Chuckie' kit, without any modifications to the construction or alterations from the original shape other than crash damage. It must include doublers and stickers, with no undercamber allowed on wings, etc.
3. Each preliminary heat must involve at least 12 entrants and may take place either in a large hall or outdoors.
4. All competitors are allowed three flights each. Their best

flight-time will count as their overall score.

5. The person who achieves the longest flight time will be the winner of that heat. In the event of a tie, a fly-off will be necessary to establish first place.

Why not organise a local competition heat indoors on a club night or outdoors during the summer, so that your club or group will be represented at this year's finals.

Every finalist will receive a DPR Models 'Rare Bird' kit and special T-Shirt at the championships. The outright winner in each category will win a super 'RIKO' electric powered Cessna, complete with Acoms radio control equipment, etc., together with the magnificent Supergloy Chuckie Championship Trophy. Second prize will be a DPR Models 'Hyper Cub' with Telco Turbo Tank 6000 CO_2 motor, and third place a DPR Models 'Hyper Cub'.

Official entry forms and details of how to run your own Chuckie Championship heat may be obtained from David and Janine Rawlins at DPR Models, Unit 9, The Vanguards, Vanguard Way, Shoeburyness, Essex SS3 9QY. Telephone (03708) 5110.

Does this represent the world's oldest modelling society? This book looks back over 75 years of modelling in Hungary.

Piper 'Super Cub' — additional

April Aircraft Described produced the following information from Brian Dunlop of Sussex. Owning a 'Super Cub' he was able to give us a few more pointers on spotting which is which!

PA-18-95. Continental C90 power, small side and roof windows, no flaps, straight elevator hinge with no horn balance. Some with landing lights, etc.

PA-18-105. Lycoming 0-235-C1 power. Special version for military training with provision for seat parachutes, toe brakes, no flaps, horn balanced elevators. (242 built).

PA-18-125. Lycoming 0-290-D power. Small side and roof windows, flaps, horn balanced elevators. Most with landing lights, etc., two wing tanks on some.

PA-18-135. Lycoming 0-290-D2 power. Small side and roof windows, flaps, horn elevators, most with landing lights and all with two wing tanks.

PA-18-150. Lycoming 0-320, 0320-A2A, 0320-A2B power. Standard production aircraft with small side and roof windows, flaps, horn balanced elevators, most with landing lights, etc. and all with two wing tanks.

PA-18-180. Modified 150s with Lycoming 0-360 power otherwise identical.

Then we come to the odd-balls the military versions: These are the PA-19 series and were for various military contracts mainly the Marshall Air Plan.

L-18C. Continental C-90 power. 150hp fuselage with flap control and pulley fittings, but no controls. 150hp wing spars with holes drilled for flap attachments but no flaps. No electrics and large military side and roof windows. A quick and cheap version using existing production parts. Also straight elevator hinge as in PA-18-90, some with two tanks.

L-21A. Lycoming 0-290-D power. Military glass, flaps, two tanks and some with lights. There are also 135hp versions of this model.

Also some aircraft do not have any fabric covering on the gear legs or the last small section of the lower rear fuselage and this is to help with inspections usually on glider tugs or other well used aircraft.

You will find a lot of PA-19s registered as PA-18-95s due to lack of knowledge on behalf of the owners and even the CAA.

My own aircraft which I have had for over 12 years is a PA-19, L-18C, G-AZRL and was formerly OO-SBR in Belgium and 51-1331 in French Army service where it must have had some desert service (Algeria?) due to the sand that came out from the wings when I recovered it. I use it for my own private flying and it is also in use by the Sussex Police for photography and surveillance work and in looking for lost persons. It can do most of the things needed of a helicopter at a fraction of the cost and although it can't hover it can go very slowly and if needed can land in any suitable 200yd. field.

As with a lot of the other aircraft mine has been modified, and has full IFR capability with full electrics and radio equipment.

What's On . . .

June 22 — **FRIDAY EVENING FAI T/R**
Venue Three Sisters Contact Jim Woodside Tel 051-724 1442

June 24 — **WHARFEDALE OPEN MINI GOODYEAR — SMAE RULES BUT NO AGE LIMIT AND OPEN MODELS**
Venue Dewsbury, West Yorkshire Contact Jeff Smith Tel Leeds (0532) 663432

June 24 — **½A COMBAT COMPETITION**
Venue The Embankment, Peterborough Contact B Waterland Tel 0778 343722

June 24 — **BLACKBURN & DMAC SCALE/NEAR SCALE OR UNUSUAL MODEL RALLY**
Venue Pleasington playing fields — Blackburn Contact Ray Stott, 18 Adelaide Street, Crawshaw Booth, Rossendale, Lancs BB4 8PW

June 30/July 1 — **THREE SISTERS C/L INTERNATIONAL 1984**
F2A, F2B, F2C, F2D, Open Speed, Novice Stunt, Goodyear, Mini-Goodyear, Diesel Combat Venue Three Sisters Contact Jim Woodside Tel 051-724 1442

July 1 — **ELMBRIDGE CLUB STUNT COMPETITION**
F2B, Novice Venue Elmbridge Club Circle, Fairmile Common Contact M Radcliffe Tel 01 397 4407

July 1 — **WALSALL MAC VINTAGE DAY: CLASS 1, 2, 3, TEXACO**
Venue Walsall Airport, Greenacres Entrance. Contact Jim Shelley Tel 0922 28553 Three trophies for each event, no pre-entry

July 1 — **VINTAGE FLY-IN**
10am start Venue Montrose Airfield Contact Bruce Duncan, Burngrange Farm, Burrelton, Perthshire PH13 9PL Write for map

July 1 — **INDOOR — UNIVERSAL CONTESTS AND FUN FLYING PLUS SCALE CONTESTS AND PEANUT TO MIAMI RULES**
Venue Cardington Contact C Hadland Tel (0628) 72402

July 6 — **FRIDAY EVENING GOODYEAR**
Venue Three Sisters Contact Peter Jephcott Tel 0509 230262

July 6-8 — **PFA INTERNATIONAL RALLY 1984**
Venue Cranfield Aerodrome Contact Popular Flying Association Tel Shoreham-by-Sea 61616

July 7-8 — **INTERNATIONAL AIR SHOW '84**
Venue Army Air Corps Centre, Middle Wallop, Hants SO20 8DY Contact Tel Andover (0264) 62121

July 7/8 — **YORKSHIRE SCALE MODELLING WEEKEND**
Electric Off-Road Car Competition, Model Boat Competitions, Plastic Modelling Competition, Model Helicopter Competition Venue Newby Hall, Ripon, N Yorkshire Contact Mr R Thorn, 22 Chatsworth Place, Harrogate, North Yorkshire Send large SAE for further details

July 8 — **ARDINGLEY SCALE DAY**
Venue Ardingley College, Nr Haywards Heath, Sussex Contact Graham Aldhurst Tel Barcombe 400113 Flying fee £1.50 on the day — The H J Towner Memorial Cup to be awarded

July 8 — **BLACKPOOL AND FYLDE RCMS VINTAGE R/C ASSIST FLY-IN**
Venue behind Blackpool Zoo Contact Chris Bromley Tel 0253 25080

July 8 — **CROOKHAM F/F GALA. O/R, O/G, O/P, All in FAI**
Venue Beaulieu Old Airfield Contact David Cox Tel Ashford (Middx) 51696

July 8 — **NORTH LONDON RADIO CONTROL MFC — VINTAGE DAY**
Venue North London MFC — Baldock Contact R Barley Tel 04427 4737 No Free Flight, barbecue grill — bring your own food

July 14, 15 — **CLAPA CHAMPIONSHIPS — C/L SCALE, CARRIER, NOVICE STUNT F2B (CLAPA only)**
Venue Showground Nr Braintree, Essex Contact P Burgess Tel Witham (0376) 516881 Pre-entry only camping from 13th

July 15 — **SMAE SCALE SUMMER MEETING R/C, C/L, F/F**
Venue RAF Abingdon Contact Vic Willson Tel 0734 471946

July 15 — **CONTROL LINE SPEED COMPETITION — ALL CLASSES**
Venue Old Parade Ground, Piddington, near Bicester Contact Dick McGladdery Tel 01-994 6320

July 15 — **SMAE SCALE SUMMER MEETING R/C, C/L, F/F**
Venue Abingdon Contact Vic Willson Tel 0734 471946

July 21 — **AIR DAY 1984 AT HMS DAEDALUS**
Venue HMS Daedalus, Lee-on-Solent, Hants Sharks Display Team Red Devils Parachute Team, Royal Naval Historic Flight, Marlboro Pitts Display Team — many others Bands, Karate, Gymnastics Gates open 10.30am — flying display from 2.00pm

July 22 — **RAF FAIRFORD'S OPEN DAY**
Venue RAF Fairford, Glos Hosted by the USAF — British and American aircraft RAF Red Arrows, RAF Falcons Parachute Display Team Battle of Britain Memorial Flight Gates open 8.30am, flying programme from 1.00-5.00pm

July 22 — **3RD ROUND CLASS 'A' BRITISH DIESEL COMBAT CHAMPIONSHIPS**
Venue The Embankment, Peterborough Contact B Waterland Tel 0778 343722

July 22 — **SUTTON COLDFIELD RCAC FRADLEY SCALE '84 R/C SCALE, FLY FOR FUN, VARIOUS TROPHIES, CLUBHOUSE, TARMAC RUNWAYS**
Contact Bob Polson, 299 Lichfield Road, Rushall, Walsall, WS4 1EB Tel 0922 29239 — or entry on the day

July 22 — **INDOOR UNIVERSAL CONTESTS AND FUN FLYING**
Venue Cardington Contact B Hunt Tel (0484) 862353

July 22 — **WAKEFIELD — OPEN NOVICE STUNT**
Venue Wakefield Contact Brian Temoral Tel 0924 270690

July 22 — **ELLIOT CONTROL-LINE COMP FAI T/R, B T/R, GOODYEAR, STUNT, NOVICE STUNT, SPEED**
Venue Rochester, Kent Contact R W Tribe Tel 0322 63791

July 29 — **SMAE CONTROL LINE MEETING — F2B, F2C, F2D, SPEED, ½A T/R, A COMBAT**
Venue Three Sisters Contact Bob Horwood Tel 0272 48769

August 4, 5 — **WOODVALE INTERNATIONAL RALLY**
F4C, Stand off Scale, Quarter Scale, GBR/CAA Scale, Aerobatics, F/F Scale Venue RAF Woodvale Nr Southport Contact John Armstrong, Tel 051-526 6857

August 5 — **LEEDS & DISTRICT MFC 50th ANNIVERSARY RALLY**
O/R, O/G, O/P, SOP, A1 and Cd'H, Precision Venue Contact M Hargreaves Tel Guiseley 72069 Entry £1.00 — SMAE members only

August 5 — **THREE KINGS C/L CARRIER DAY: SCALE AND 40 PROFILE**
Venue Old Croydon Aerodrome Contact Derek Bird Tel 01-874 6394 Silencers and insurance compulsory

August 5 — **INDOOR — UNIVERSAL CONTESTS AND FUN FLYING PLUS SCALE CONTESTS AND PEANUT TO MIAMI RULES**
Venue Cardington Contact B Hunt Tel 0628 72402

August 12 — **WHARFEDALE 1000 SILVER JUBILEE B T/R**
Venue RAF Dishforth Contact Jeff Smith Tel 0532 663432 Pre-entry only £2.00

August 18/19 — **PLUMPTON MODEL SHOW —**
R/C aeroplanes and boats, cars and steam trains, traction engines and helicopter rides, powered hang gliders, plus Dutch 300mph pulse jets Camping facilities available venue Plumpton Racecourse — 10 miles from Brighton, Sussex Contact Dave Bishop Tel Tatsfield 550

August 19 — **VINTAGE FLY-IN**
Venue Newbigging Contact Bruce Duncan, Burrelton, Perthshire, PH13 9PL Flying starts at 12.30pm

August 19 — **AEROMODELLER VINTAGE DAY**
Venue Old Warden Contact Aeromodeller Tel 0442 41221

August 19 — **INDOOR — UNIVERSAL CONTESTS AND FUN FLYING**
Venue Cardington Contact B Hunt Tel 0484 862353

August 25/26/27 — **SOARING NATIONALS**
Open 100S, F3B, HL R/C, Club Team, Scale, Cross Country, Electro Venue Cranwell Contact Richard Douglass, 87 Scartho Road, Grimsby, S Humberside Tel 0472 71245

September 1, 2 — **INDOOR NATIONALS — E28, 1.2g INDIVIDUAL (HOULBERG TROPHY), AGM TROPHY (NOVICE/EXPERT), PAIRS FINAL, MANHATTEN, CO$_2$ (SPARKLETTS TROPHY), 13in PEANUT DURATION, 35cm, 65cm F1D (AEROMODELLER TROPHY), OPEN MICROFILM (HUMBROL PLATE), ALL-IN E28.**
Venue Cardington Contact Laurie Barr Tel 0628 25595

September 8/9 — **F3B WC TEAM TRIALS**
Central Venue Contact Geoff Dallimer, 36 Farthing Drive, Letchworth, Herts Tel 04626 78745

September 9 — **SHEFFIELD AERONAUTICAL RC SOCIETY RC VINTAGE COMP AND FLY-IN.**
Texaco, Walsall rules. Full details from D Hanson, 23 Meadowhead, Sheffield S8 7UA

September 9 — **5TH AREA MEETING — F/F: O/P (TEAM, PLUGGE), F1B GUTTERIDGE TROPHY) A1**
Venue Local Area Venues Contact Area Comp Secs OR SMAE 0533 58500

* Change from previous information

PHOTO-PRIZE MODEL NEWS

with Fliar Phil

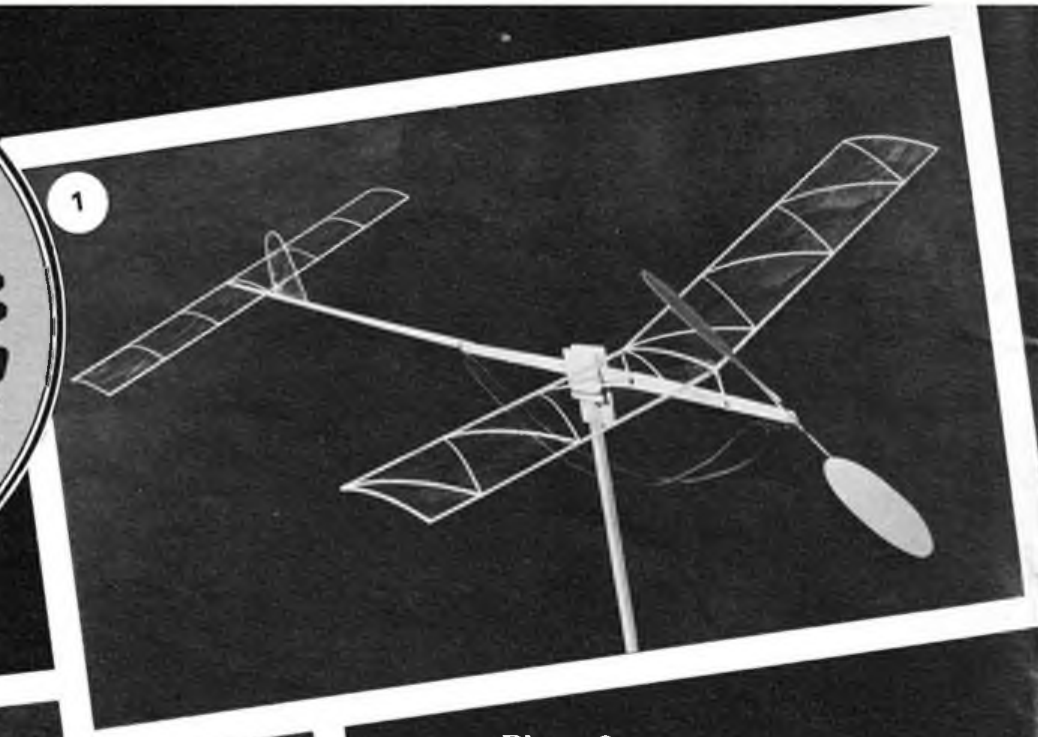
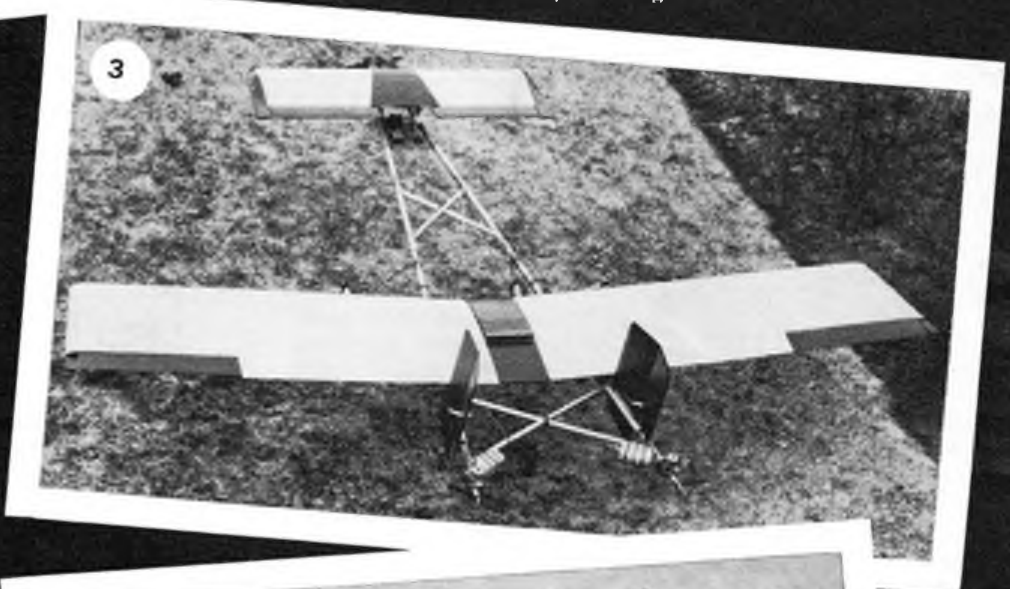


Photo 3

Alan Holmes junior of Wigan, built this double-size version of the famous twin pusher, rubber-powered Cook 45 'Riser' of 1914. In that year it set the rubber-powered duration record. Alan's model has three 2.5cc diesel engines, spans 114in., and flies well. With R/C assist it is very versatile. Very interesting *and* unusual Alan.

Photo 4

Mr. M. Eyre of Surrey sent this photo of his beautifully finished free-flight scale *Corsair* F4U-1. Span 18in., weight 3½ozs., wing area 60sq.ins. Engine is a *D.C.* 'Bambi'. (F.P. recalls *his* 'Bambi' — a sweet little job!) Fliar Phil wishes you well with your flight tests Mr. Eyre. Model features planked balsa fuselage, with removeable cowl, and wings.



SO MANY PHOTOS of beautifully finished models are sent to Flair Phil, that he is often reminded of that famous remark made by America's Jim Walker (probably aeromodelling's greatest exponent of control-line flying). When a young enthusiast asked Jim how he got such a nice finish on his model aircraft, Jim replied: "Son, the only difference between a good finish and a bad one is a little piece of sandpaper." Obviously this month's entrants know the value of that 'little piece of sandpaper!'

Photo 1

Our first photo is also 'a first' for this feature — a microfilm covered model called 'Fly-rod', it was sent by Simon Godfrey of Luton. It 'weighs in' at about 1.35g, without rubber motor. Fliar Phil was not surprised to learn that it has several 8 minute flights to its credit. A neat stand — *and* a nice photo Simon.

Photo 2

Fliar Phil has a special affection for biplanes. This one, with most attractive lines, is called 'Duet'. It comes from John Roberts of Florida, U.S.A. Data is: 46in. span, 4-channel R/C, with, as John puts it, "an ancient *Fox* .15 up front." From one 'bipe-lover' to another: "Thanks John, an imposing biplane."

Photo 7

This revealing (!) photo sent by Gordon Rae of Gt. Malvern, Worcs. is of his *Elfin* 2.49 powered, 58in. span 'Demon'. He intends to fit it with proportional R/C. In his interesting letter Gordon recalls that Fliar Phil published in *Aeromodeller* a photo of his original 'Demon' way back in 1952! Yes Gordon it is the same old F.P. — and thanks for your appreciative remarks about this feature.

So long for now. *Do* look out that photo of *your* masterpiece. It *must* be tucked away somewhere! F.P. would love to see it.

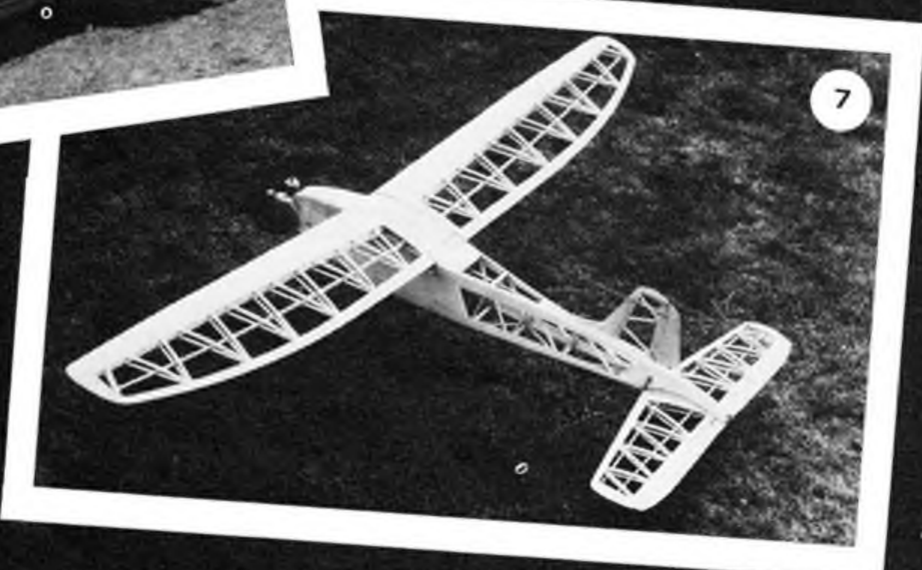


Photo 5 — Winner

A superb model of the *Britten-Norman* 'Trilander', superbly photographed in front of its big brother, by Andy Lindsay of the Dumbarton and District M.A.C. The model was built by fellow club member Andy McLean. It is 8ft. 5in. span, weighs 21.5lbs. Power is two 40's and a 20 — has ten servos! Landing and navigation lights work, *and* the pilot is modelled on Captain David Dyer of *Loganair*. Full of admiration, Fliar Phil hands Andy Lindsay this month's camera.

Photo 6

From 'down under' comes this *Fokker* D.8, modelled from the German fighter of W.W.1. It was sent by Darren Cook of Victoria, Australia, who took this excellent photograph at the Lilydoke (hope that's right!) Model Flying Associations Scale Day. Details are: wingspan 60in., power *Enya* 60, weight 5lbs. One of the best models of a *Fokker* D.8. Fliar Phil has seen in a long time Darren.

Win a Cosina SLR Camera

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 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.

GRASSHOPPER

J. B. Allman's winning entry in the 1934 Wakefield Contest described by Alwyn Greenhalgh C.Eng. FRAe.S MI.Mech.E

JUSTIN ALLMAN had been developing a strain of contest models to the Wakefield Trophy specification, starting in 1932. He was one of the few aeromodellers at that time who had any faith in balsa structure with a tissue covering. By 1934 he was ready to enter the Wakefield contest with his model, the 'Grasshopper'.

This model was of conventional design and construction as regards the airframe but the power was supplied by a twin-skein rubber motor to a gear train which stepped up the propeller revolutions by a ratio of 4.5:1. This arrangement gave a very long motor-run with a flat power curve, resulting in a slow climb, the model not gaining a high altitude but remaining there for a considerable period of time.

Free-wheel and rubber-tensioning mechanisms were embodied in the gearbox. The details of the model are as follows and except for some plywood in the noseblock and bamboo for the undercarriage, balsa is generally used.

Fuselage

This is built up using 3/16in. square longerons and 1/8in. by 3/32in. vertical and horizontal members. The longerons terminate at the step down to the tailplane mounting platform, the bottom longerons being extended with 1/8in. sheet cut to the shape of the curve up to the rear end of the fuselage. After building the two sides of the fuselage, they are assembled in the usual manner with the horizontal members. A diagonal strut, 1/8in. by 3/32in. is fitted at each corner where a vertical and a horizontal member meets; see the typical cross-sectioned view of the fuselage.

The nose is stiffened by pieces of 1/32in. sheet at the sides, top and bottom, then bound with thread as indicated on the drawing. There is no nose former per se, the adaptor fits into the front of the fuselage. The vertical and horizontal members are extended in size by fitting additional pieces 1/8in. by 1/4in. behind them.

The rear attachment for the motor is a bamboo pin 1/8in. diameter on which are mounted three discs of 1/32in. thickness to segregate the skeins. The pin is mounted in slots formed by 1/8in. by 1/4in. balsa cemented to the 1/8in. sheet members at the stern; see the detail sketch. The pin is constrained in a forwards direction by a piece of hard balsa, 1/8in. by 3/16in. cemented vertically at the front end of each slot, again shown in the sketch.

The undercarriage mountings are made from pieces cut from a tin can. They are 3/16in. wide and 5/16in. long and bound to the bottom longerons in the four positions shown. A piece of bamboo, 1/8in. by 1/32in. is cemented on the top of the bottom longerons in way of the undercarriage front attachments.

Empenage

The tailplane is built up using rib cut from 1/32in. sheet, a trailing edge 1/16in. by 1/8in., a leading edge 3/32in. by 3/32 and two spars 1/16in. by 1/16in. It is advisable to steam the leading edge to shape prior to assembly. The tips are cut from 1/32in. sheet. A box from 1/32in. sheet is built up at the centre section leading edge to conform to the shape of the fuselage. An adaptor is cut from 1/8in. sheet and is cemented to the front of the box, locating the tailplane in the correct position when fitted in the hole formed by the step down to the platform. 28swg wire hooks are cemented to the centre ribs near the rear spar at the lower surface to accommodate a rubber band securing the tailplane. A paper tube is let into the forward end of the top of the box and this forms the front attachment for the fin.

The fin is built up using 1/32in. sheet ribs and a 1/16in. sheet base rib. The spar is cut from medium 1/16in. sheet. The trailing edge is 1/16in. by 3/16in. and the leading edge 3/32in. by 3/32in., steamed to shape. The tip is cut from 1/32in. sheet.

After assembly the lower end of the leading edge is cut away and replaced by a piece of bamboo, extending 3/8in. below the base rib, shaped to fit in the paper tube in the tailplane centre-section box. The bamboo is spliced to the balsa. The rear attachment of the fin is by means of a hook of 28swg wire which grips the trailing edge of the tailplane yet can be moved in order to achieve adjustment.

Mainplane

The ribs are cut from 1/32in. sheet, except for the two root ribs which are from 1/16in. sheet. The spar is cut from hard 1/16in. sheet, the leading edge is 1/8in. square and the trailing edge 1/16in. by 1/4in. The mainplane is built in two halves. The joint between each rib and the spar may appear to be cross-halved but this is not so; each rib is in two pieces, one fitting forward of the spar, the other behind. An unusual method of strengthening the spar is by cementing a piece of cotton to the top and bottom edges and running the full spar from tip to tip.

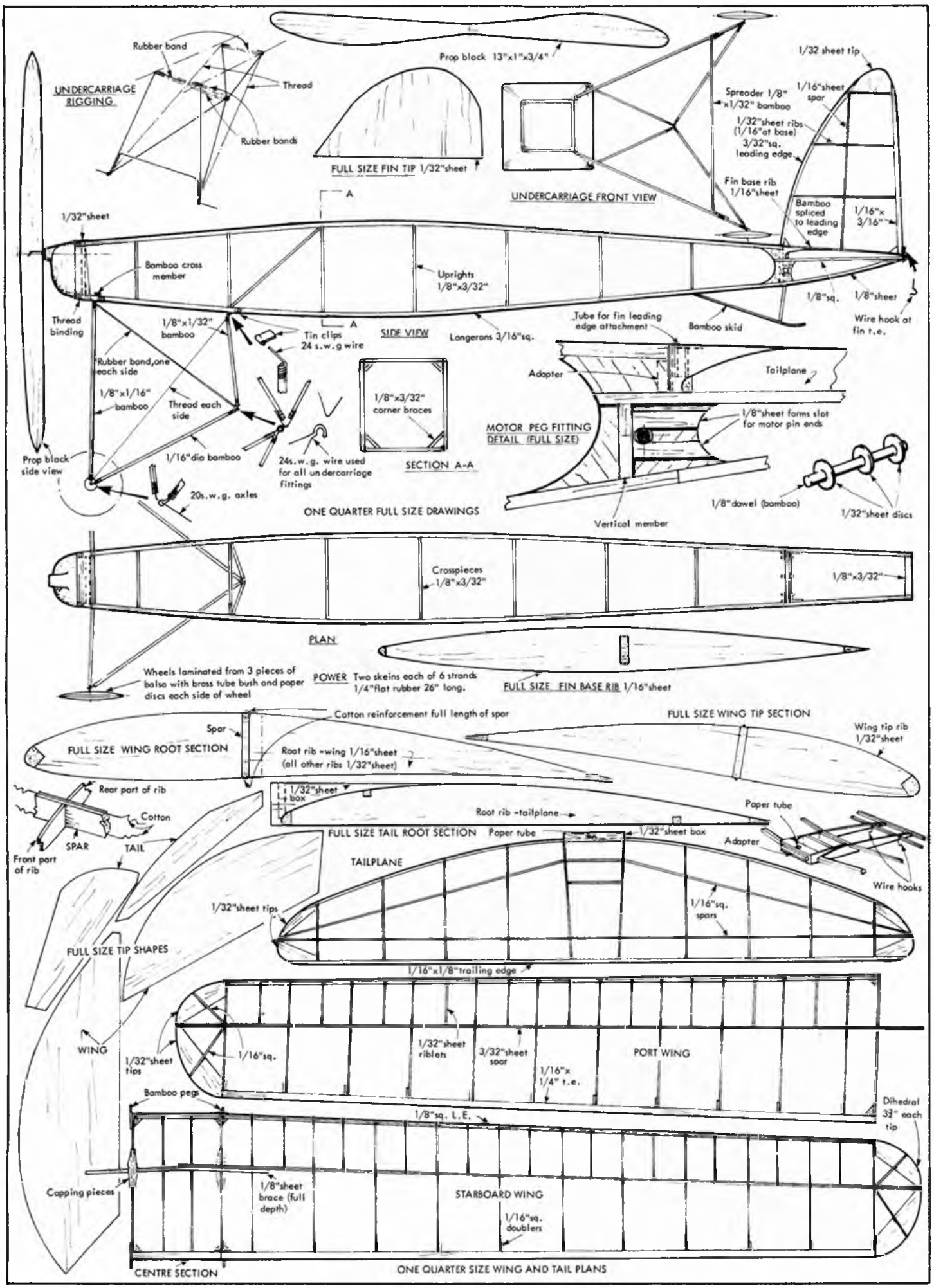
The easiest method of construction would be to make the two spars, one for each half of the mainplane and attaching the cotton at that stage. Having made the ribs and cut them in the position of the spar, also removing an equivalent amount of wood to the spar cross-section, build the front section of each half, assembling the spar, rib halves and the leading edge ensuring that the spar projects at least half the centre-section width beyond the root rib half. The rear portions of the ribs and the trailing edges are subsequently assembled.

The mainplane tips are cut from 1/16in. sheet and cemented in position. The riblets should now be cut and fitted. The next item needed is the joining member for the mainplane halves. This is cut from hard 1/16in. sheet and steamed to a shape to accommodate the small degree of sweep-back of the spar. Care should be taken when steaming to ensure that the wood fibres are not damaged, thereby reducing the strength of this most important joint.

Cut the leading and trailing edges flush with the centre ribs and cut the protruding spar ends to a length of half the centre-section width, angling the cuts to accommodate the dihedral angle. Detach the rear portions of the centre and first ribs and cut away sufficient to allow for the thickness of the mainplane joining member.

Assemble the two halves of the mainplane to the joining member not forgetting to raise

Far right: undercarriage detail. Below: reconstruction of 'Grasshopper' - fair weather flying only?



each tip for the required dihedral. After the cement is dry fit the centre-section leading and trailing edges and the two ribs contained within its width. Fit the corner blocks as shown and also the bamboo pegs for attachment of the mainplane to the fuselage by means of rubber bands.

Undercarriage

This is built from bamboo with pianowire fittings as shown on the drawing. The main legs are connected to the point of the 'V' by two 1/16in. diameter struts, one from each axle. The assembly, being hinged at its four attachment points is able to swing. The assembly is constrained by strong thread, running from the top of each leg of the 'V' to the axle on the same side and so prevents the main legs from swinging any further forward than the position shown in the drawing. The assembly can move backwards in order to accept the landing shocks, which are absorbed by rubber bands, one each side, running from the top of each main leg to the bottom of the 'V'.

All wire fittings are from 24swg pianowire with the exception of the axles which are 20swg. The fittings are bound and glued to each member in their appropriate places as shown on the drawing. Rubber bands hold the undercarriage to the fuselage.

The wheels are two inches diameter and 3/8in. thick. They are made from three laminae of balsa glued together with their grains crossed. A bush from brass tubing is cemented in each wheel and discs, 3/8in. diameter are cemented at each side of the wheel to keep the bush in place. The wheels are kept on the axles by a turn of fuse wire soldered on at their ends.

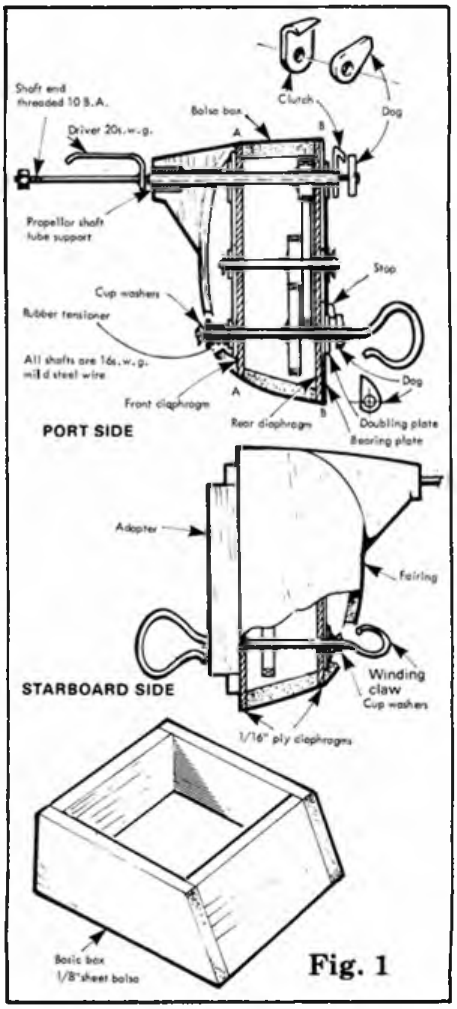


Fig. 1

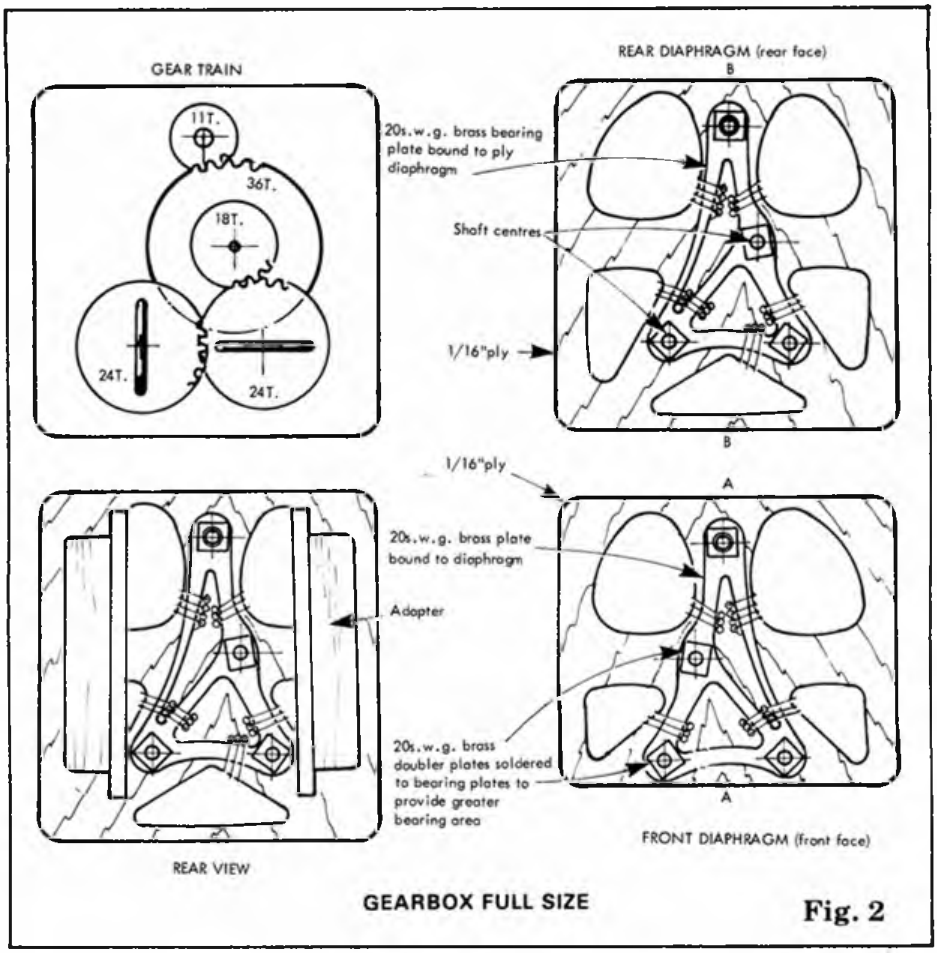


Fig. 2

Gearbox

The gearbox carcase consists of a box made up from 1/8in. sheet with a front and a rear diaphragm made from 1/16in. ply (fig. 1) ply. Bearing plates for the gear shafts are fretted out of 20swg brass sheets. A doubling plate of 20swg brass sheet is soldered on to the brass plates in order to improve each bearing area.

The top doubling plate is 3/16in. by 3/16in. and average size of the others is about 1/8in. by 5/32in. and all should be centred accurately over the bearing position. The two bearing plates should be clamped or bound together and the holes for the shafts accurately marked and drilled. The plates are then separated and bound and glued to the diaphragms (fig. 2) with their doubling plates facing outwards. The hook shafts are made from 16swg mild steel wire as is the centre shaft carrying the two intermediate gears. The gears are soldered to the shafts, those on the hook shafts first being pushed through their holes in the rear diaphragm. The propeller shaft bearing is a brass tube, the inside diameter a running fit for the 16swg propeller shaft, whilst the outside diameter is 1/8in. The final gear is soldered to this tube, which is carried by the top bearings in the plates. The rear diaphragm is now glued to the box and the gear train assembled after which the front diaphragm is glued in place. Collets are soldered onto the ends of the intermediate shaft to restrain its axial movement and also to the front end of the propeller shaft bearing tube. The rear end of the tube is constrained by the free-wheel clutch which is soldered onto this tube. The hook shafts are different at their forward ends. The port shaft carries the 22swg rubber-tensioning spring at its front end and this is held by two cup-washers as shown, the outer washer being securely soldered to the shaft. The tensioner dog, which is soldered to the shaft immediately next to the rear bearing plate, engages with a stop mounted on the rear diaphragm the depth of which determines, by experiment, the number of turns remaining on the motors.

The starboard shaft is constrained at its forward end by two cup washers, the outer one of which is securely soldered to the shaft. The shaft end is bent to form the winding claw.

The propeller shaft tube support block, complete with its bearing is now cemented to the front diaphragm in the position shown. The propeller shaft is made from 16swg mild steel. The free-wheel dog is soldered to the inboard end of the shaft which is then fed into its bearing tube. A collet is soldered on at the front end to prevent axial movement in the tube. The front end of the shaft is threaded 10BA for the propeller retaining nut. The driver for the propeller is from 20swg piano-wire and is soldered to the shaft in the position down. The gearbox is completed by carving and fitting the fairing.

Finishing

The model is covered with superfine Japanese tissue and clear-doped. All wooden parts, i.e. the propeller, gearbox and wheels are given a number of coats of clear dope to establish a gloss finish.

Propeller

This is carved from a balsa block 13in. by 1in. by 3/4in. medium weight. The shape of the block is given on the drawing. A brass bush is fitted and should be a running fit on the 16swg propeller shaft.

The motor consists of two skeins, 26in. long, each having 6 strands of 1/4in. rubber, lubricated as thought best by the builder.

F1C POWER TECHNICALITIES

as seen at the 1983 World Free Flight Championships in Australia, by Martin Cowley.

Powerful launch from fifth place Zhijian Cheng - all Chinese models used aluminium surfaced balsa sheet skins on centre panels with built up tips.

Silvano Lustrati

The new F1C World Champion, Italy's Silvano Lustrati, is indeed a seasoned competitor. His name appears in contest results back in 1950 when he then flew glider. Surprisingly, in Spain he finished almost last, able to make only three flights. But 1983 was truly Silvano's year.

One of only four competitors to complete the arduous seven maxes at Goulburn, Silvano dominated the fly-offs with a powerhouse model immaculately on trim. His models use the increasingly popular bunting transition, which quickly caught on after its success was demonstrated at the 1980 European Championships.

The design named I-520A is set up quite unconventionally with +0.2° wash in on the left inboard panel! The propeller brake is operated 0.3sec. after the motor floods off. For the bunt transition, the tailplane moves from —0.5° to +3.5° at 0.5 sec. after flood off, until two seconds later it moves to —2.0° for the glide. The rudder last to actuate, at six seconds, to put the model into a left glide! The wing is set at 0° to the fuselage axis with the motor having 3° downthrust.

Silvano drew loud applause during the fly-offs for very fast high climbs, with perfect bunts that resulted in no trace of a stall. The motors he uses are not surprisingly *Rossis* fitted with 180 x 76mm folding props.

When everyone else was struggling in those conditions, Silvano made it look easy — congratulations Champ!

Top team

Italy has long been synonymous with speed and power — from *Ferraris* to *Rossis* they are usually out in front. This year the Italian F1C team nearly made a clean sweep, with Silvano joined in the Fly-offs by Georgio Venuti. The 1979 Champion, Mario Rocca, who also made the fly-offs in 1981, missed just 39 seconds on his last flight. With performance like that, no one else had a chance for the team prize. But that was not all — the Italians also placed 2nd team in F1B and 3rd team in F1A — truly a Champion Nation in 1983.

Folding props

In just four short years, since Canadian Dave Sugden showed how it could be done at Taft, folding props have become standard issue hardware to F1C flyers. Benefit to glide performance is probably marginal, though it must help. The real advantage lies in the fact that prop blades, especially brittle carbon ones, once folded are much less liable to damage on landing. This pays off not only in cost savings but primarily in climb pattern consistency — so often upset when a replacement prop is fitted.

One interesting new departure this time was the appearance of single blade folders. Mario Rocca has made many experiments to find that effective single blade props need to be a larger diameter of about 200mm. The advantage is that the single blade now operates in less disturbed air than two blades can, the disadvantage being that the larger diameter blades are nearing sonic tip speeds.

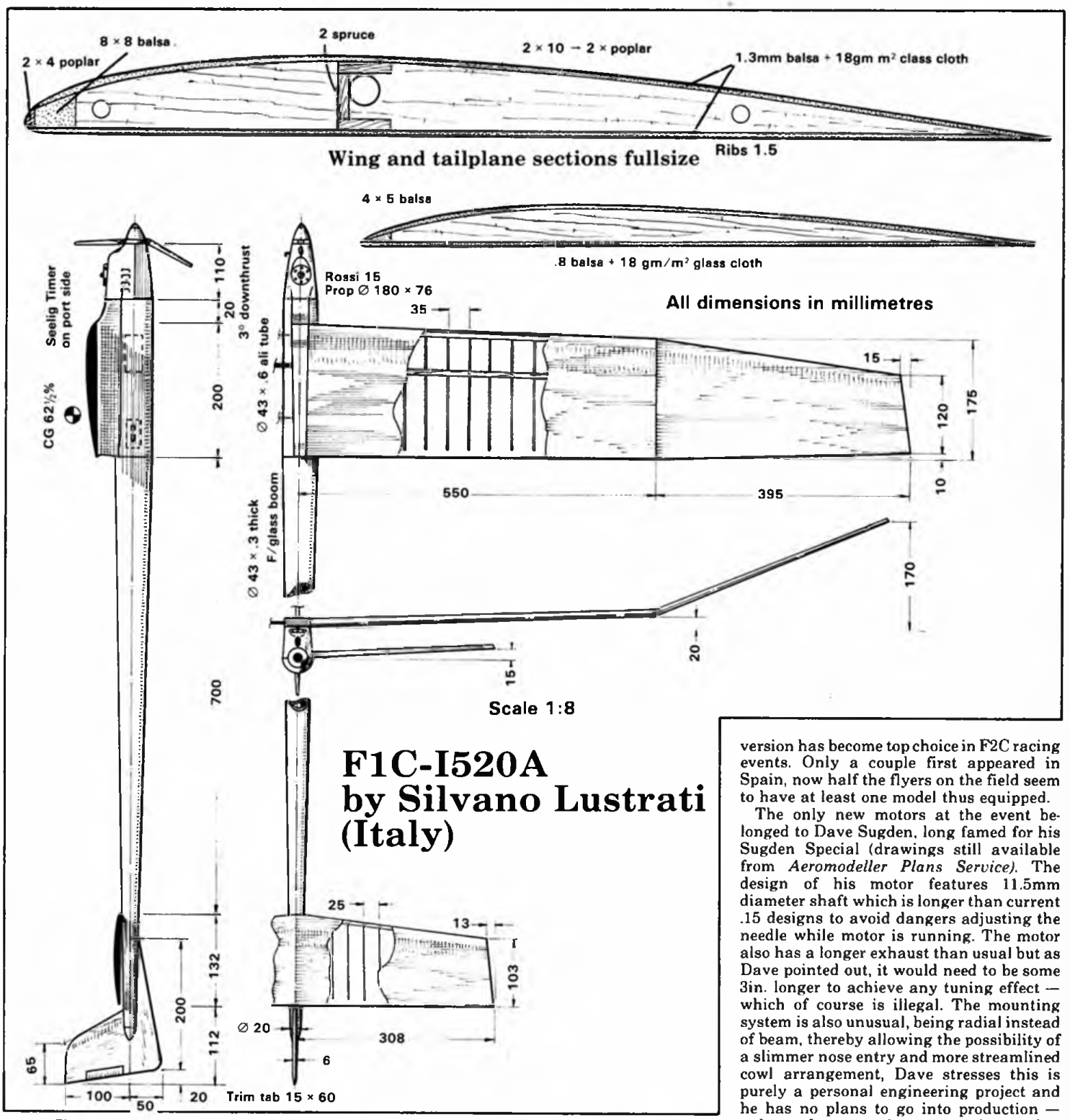
Single blade folding props are becoming very popular, as used by all Japanese team. This unit from past champion Mario Rocca is available commercially.

Dave Sugden's handmade F1C motor, note long propshaft, long exhaust, and radial mount. Motor made by lost wax investment casting as described in W/C Symposium Report.

Mario now offers single blade props for sale together with a custom balancing rig, as the blade and counter-weight must now be set up with spinner attached. A single blade costs about $9 and with the balancer, spinner, counter-weight, etc. about $45 plus postage from: Mario Rocca, 44020 Rovereto, Ferrarese, Italy.

New engines

The biggest swing in F1C since the last Championships has been towards the American made *Nelson* 15G. The diesel



F1C-I520A by Silvano Lustrati (Italy)

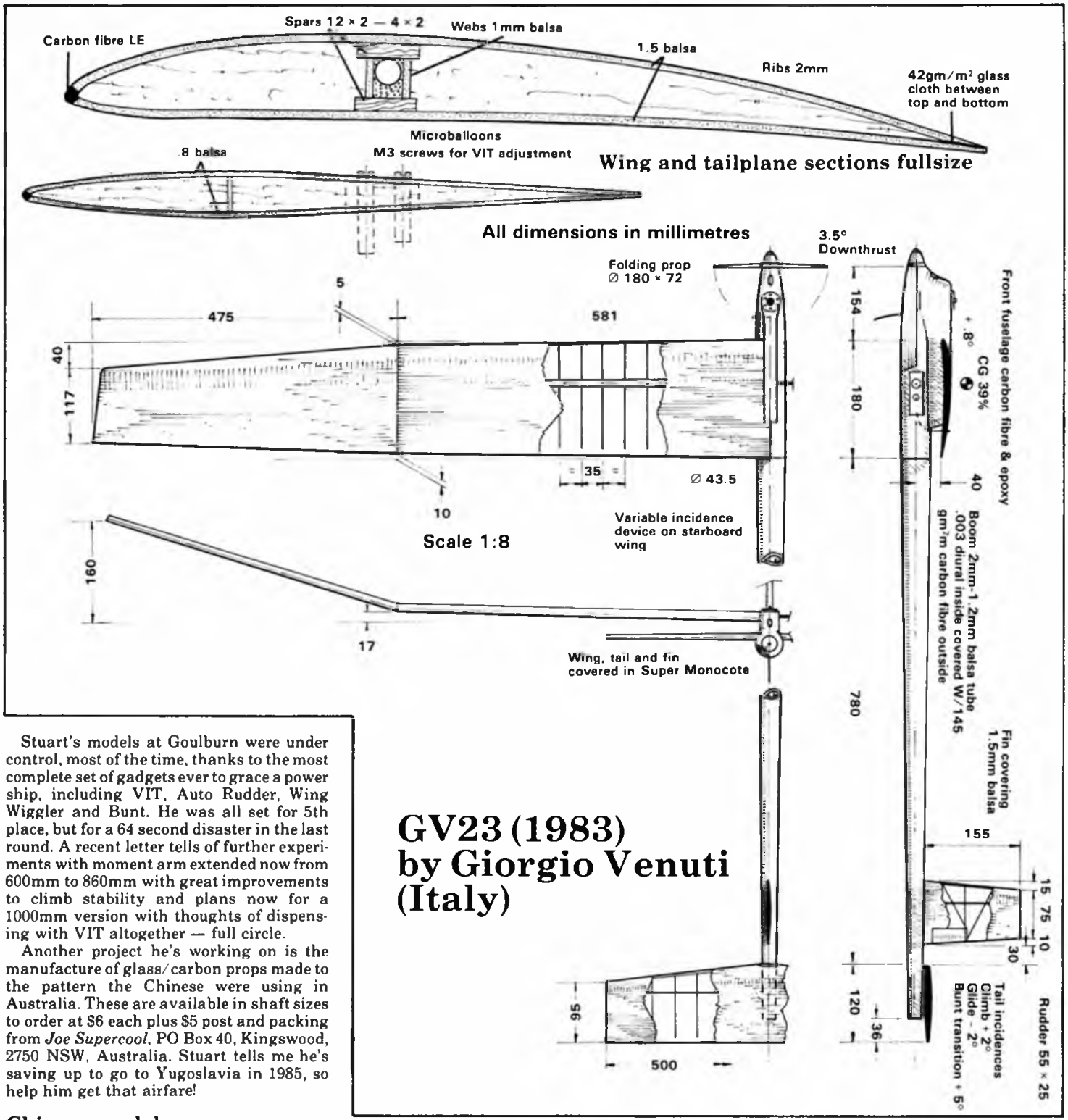
version has become top choice in F2C racing events. Only a couple first appeared in Spain, now half the flyers on the field seem to have at least one model thus equipped.

The only new motors at the event belonged to Dave Sugden, long famed for his Sugden Special (drawings still available from *Aeromodeller Plans Service).* The design of his motor features 11.5mm diameter shaft which is longer than current .15 designs to avoid dangers adjusting the needle while motor is running. The motor also has a longer exhaust than usual but as Dave pointed out, it would need to be some 3in. longer to achieve any tuning effect — which of course is illegal. The mounting system is also unusual, being radial instead of beam, thereby allowing the possibility of a slimmer nose entry and more streamlined cowl arrangement, Dave stresses this is purely a personal engineering project and he has no plans to go into production — unless of course they out-perform other motors!

The Ned Kelly of F1C motors. Stuart Sherlock's OPS used head fin insulation to prevent motor cooling during climb to avoid power loss. Motor runs on pacifier and floods off using crankcase pressure metal tank to give advantages of both systems.

Joe Supercool

Certainly one of the more interesting characters on the Australian team was Stuart Sherlock, alias *Joe Supercool.* Stu has covered a lot of ground recently experimenting with F1C model layout. His original concept was to use VIT and to use a shorter tail moment on models using a forward CG, which would normally have a looping tendency under power. What he got was a problem with power stability, as a model which appears to have sufficient tail volume at glide speed can become radically longitudinally unstable at power climb speeds! This he believes is due to centre of pressure shift when flying fast at low angles of attack, i.e. with VIT operating.



Stuart's models at Goulburn were under control, most of the time, thanks to the most complete set of gadgets ever to grace a power ship, including VIT, Auto Rudder, Wing Wiggler and Bunt. He was all set for 5th place, but for a 64 second disaster in the last round. A recent letter tells of further experiments with moment arm extended now from 600mm to 860mm with great improvements to climb stability and plans now for a 1000mm version with thoughts of dispensing with VIT altogether — full circle.

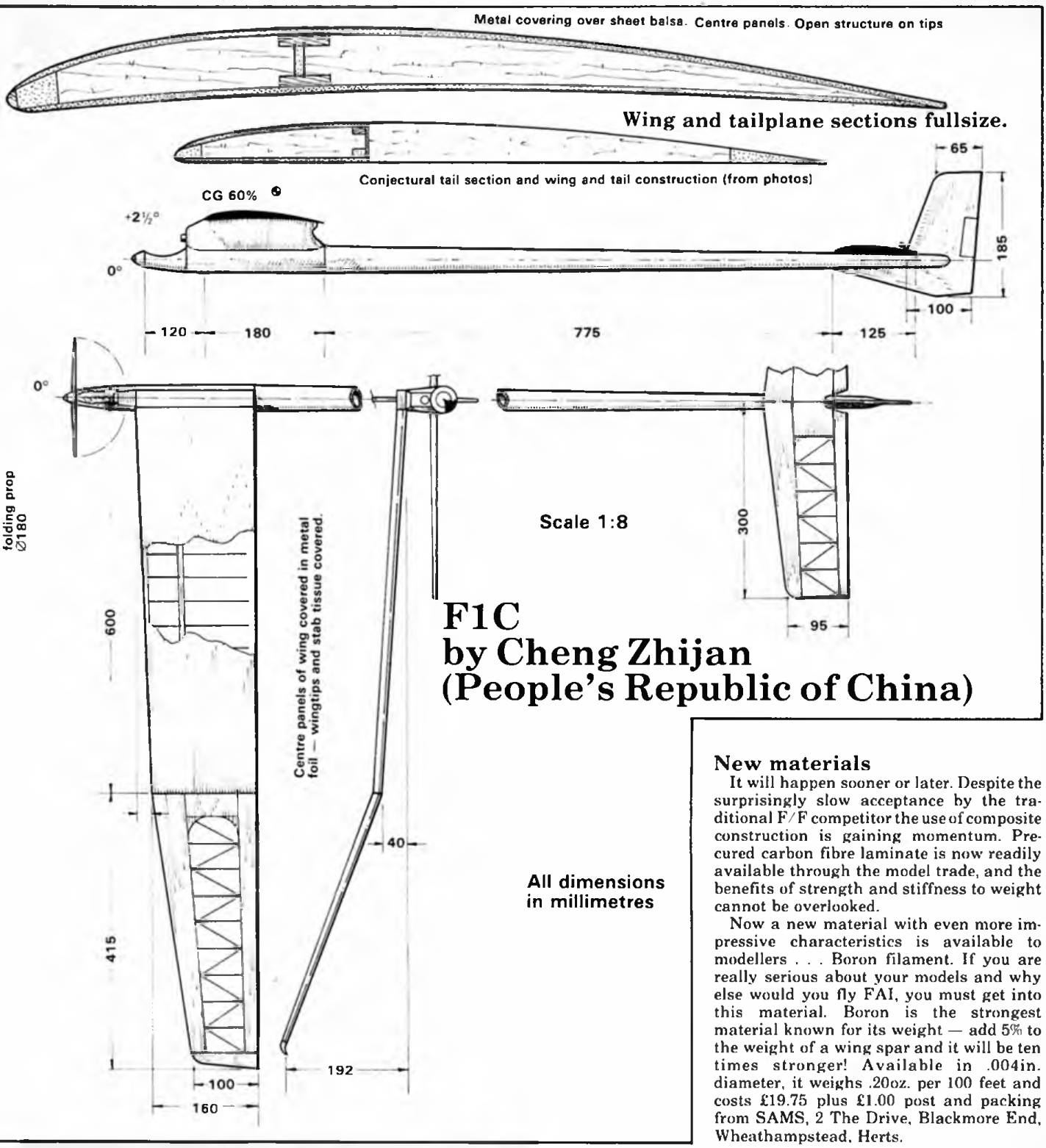
Another project he's working on is the manufacture of glass/carbon props made to the pattern the Chinese were using in Australia. These are available in shaft sizes to order at $6 each plus $5 post and packing from *Joe Supercool*, PO Box 40, Kingswood, 2750 NSW, Australia. Stuart tells me he's saving up to go to Yugoslavia in 1985, so help him get that airfare!

Chinese models

The first Championships that the Chinese competed in, in recent years, was 1979 at Taft. Now three Championships later they have to be the *most improved* Team. Their F1C team was, with due respect to the Italians, the best equipped on the field with high-tech models that are truly state of the art in construction and performance. Regrettably after 15 straight maxes they fell apart in the last two rounds.

Constructionally the Chinese utilised carbon fibre reinforced wing construction with thin aluminium foil surfaced sheet balsa covering. The wing tips however were not sheeted to help save weight at the extremities. Motors were *Nelson* 15's with folding carbon fibre blades and all models bunted into glide. If the weather is as expected, calmer in Yugoslavia in 1985, the Chinese will be the team to beat!

Mini-Tab on Stuart Sherlock's model activated to encourage bunt - yes it was included in surface area calculations.



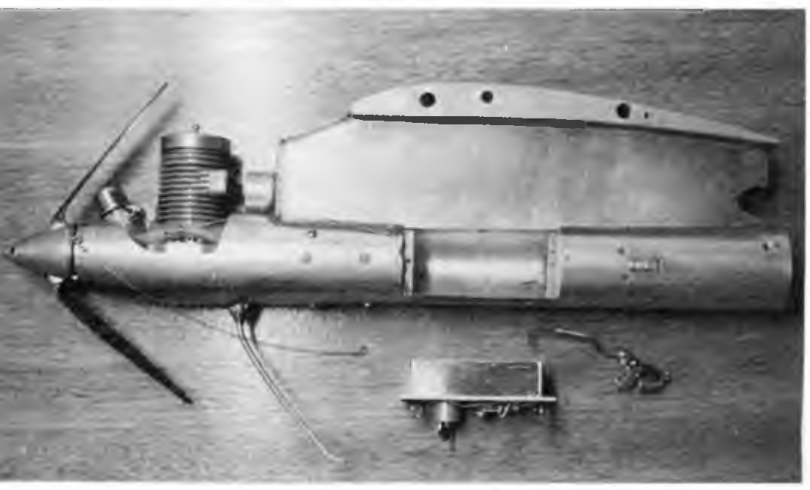
F1C
by Cheng Zhijan
(People's Republic of China)

All dimensions in millimetres

New materials

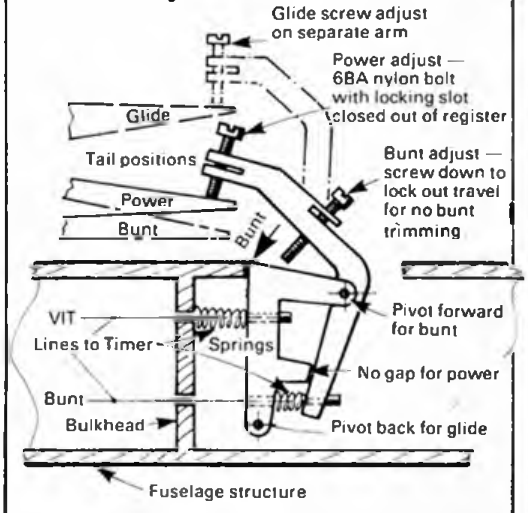
It will happen sooner or later. Despite the surprisingly slow acceptance by the traditional F/F competitor the use of composite construction is gaining momentum. Precured carbon fibre laminate is now readily available through the model trade, and the benefits of strength and stiffness to weight cannot be overlooked.

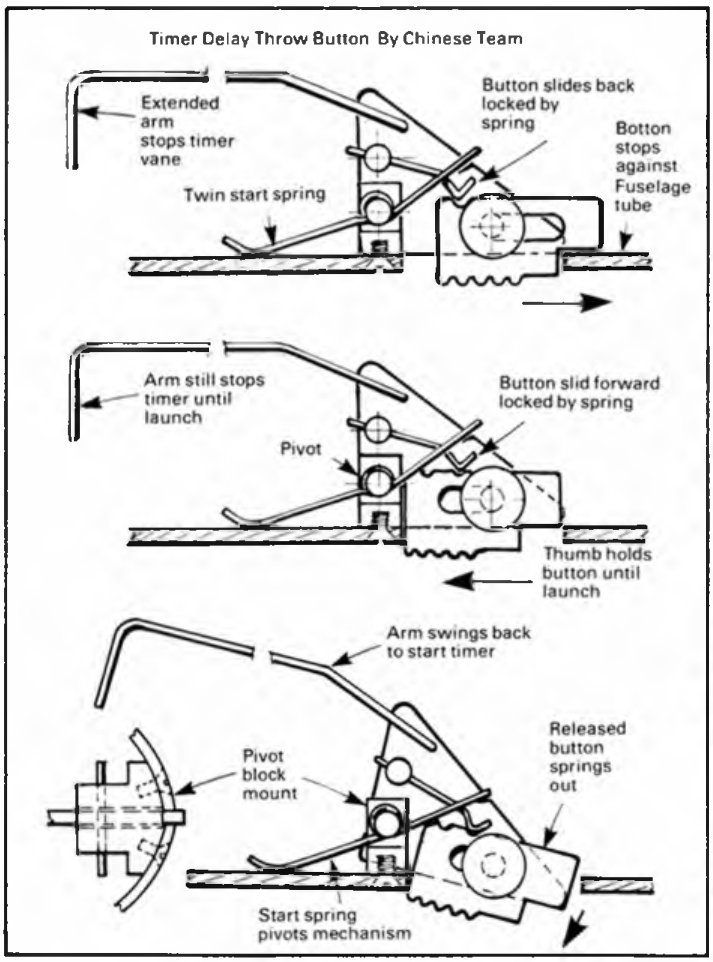
Now a new material with even more impressive characteristics is available to modellers . . . Boron filament. If you are really serious about your models and why else would you fly FAI, you must get into this material. Boron is the strongest material known for its weight — add 5% to the weight of a wing spar and it will be ten times stronger! Available in .004in. diameter, it weighs .20oz. per 100 feet and costs £19.75 plus £1.00 post and packing from SAMS, 2 The Drive, Blackmore End, Wheathampstead, Herts.

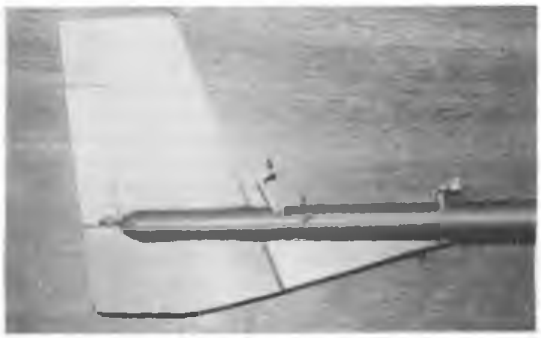


Chinese front end shows high-tech state of the art fabrication. Folding carbon fibre prop on Nelson 15 motor. Seelig timer with remote throw button. Pylon is balsa covered with thin aluminium foil.

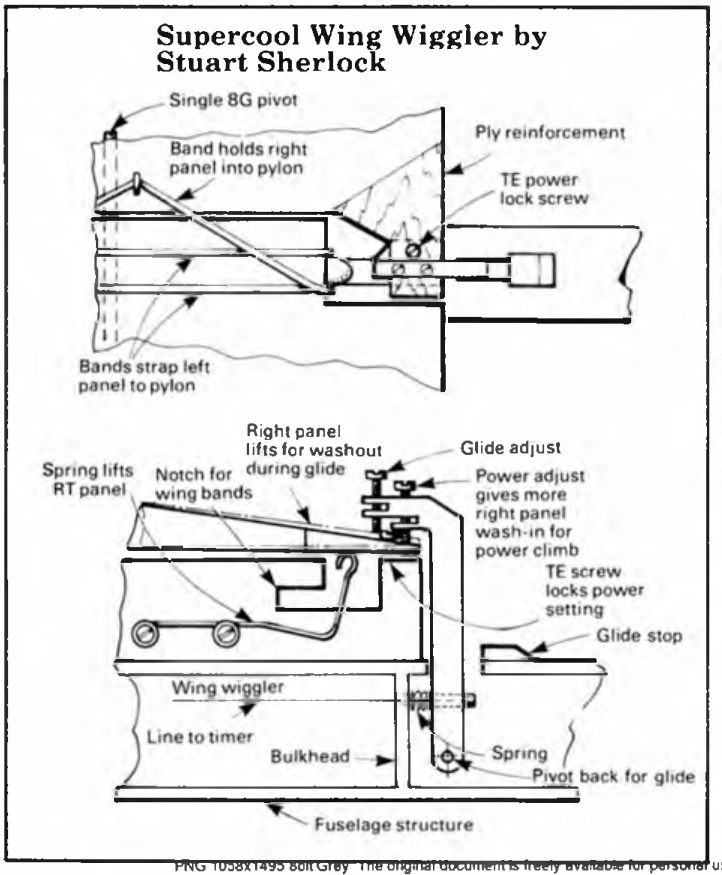
Supercool bunt system with lock out by Stuart Sherlock







Rear end of Chinese power models shows high LE mount to allow tailplane TE to drop as bunt mechanism holds glide trim and swings back to DT.



VINTAGE CORNER WITH ALEX IMRIE

'Jungflieger' at an early 1930's - Wasserkuppe meeting 'on parade' with their sailplanes. While 'A 317' is a 'Grosse Winkler,' the other machines show strong Winkler influence with their tip dihedral and profile fuselages with forward CLA.

Modelling in Germany up to 1933

In the beginning, models were used by the full-size pioneers of flight for experimental purposes. Otto Lilienthal was making flying models long before his first successful glides in 1891, and around the turn of the century, Hans Grade's models certainly paved the way for him to make the first power-driven aeroplane flight in Germany when he hopped at Magdeburg on October 28th 1908. Although models had been exhibited in Berlin at the International Sport Exhibition in April 1907, it was not until an International Aviation Exhibition (ILA) was held in Frankfurt in 1909 that a noticeable interest emerged. Clubs for model aircraft were formed in the main centres of population and the magazine *Flugsport* founded by Oskar Ursinus catered for the model builders from this time. By 1912 there were some 20 clubs united in the Verband Deutsche Modellflugvereine (Society of Model Aviation Clubs). In these respects the origins of the hobby in Germany were little different from our own.

Then came the war, shortages of all kinds, especially rubber and silk made themselves felt, and although *Flugsport* continued to support the hobby during the four year struggle, many clubs simply faded away. Following the Armistice there was no real increase in modelling in Germany, despite the return of many modellers from the armed services, most people in those grim days had other more pressing things to do, not the least of which was trying to get sufficient to eat. But worse was to come, since, when the Treaty of Versailles was put into effect in June 1919, the severe restrictions on full-size aviation effectively stopped the model aeroplane movement. Many clubs that had been formed in 1917 following government support for modelling as a first step towards creating air-mindedness, were disbanded. Organised model activity was almost non-existent, but, lone hands, of course, still engaged in the hobby, rubber became available again, and eventually there was some relaxation in the restrictions that allowed the Sunday gatherings of model enthusiasts at local flying fields to adopt club names as in the old days and these clubs became affiliated to various aviation societies. Soon inter-club competitions were being held and the complexity of one of these marathons held four times annually by the Mitteldeutsche Arbeits-Gemeinschaft (MAG) (Middle German Union) certainly shows how high it had set its sights, effectively separating the men from the boys! Held for rubber-driven stick tractors, each model entered had to compete in eight different sections, these were for maximum distance and duration, both off the ground and hand launched, as well as hand launched flights for circling and target distance, plus off the ground events for maximum altitude and weight carrying. In this last section the model had to carry at least 1/10th of its own weight as ballast over 100 metres distance. Points were awarded for each of the eight sections and the winner had to be not only a first class model builder but naturally also a very capable model flyer in order to come out on top. Werner Schulz from Magdeburg won such a competition in 1924 when his stick tractor biplane flew over 100 metres and gained the highest number of points in all sections.

In the meantime on the Wasserkuppe in the Rhön Mountains, German flyers, banned from participating in powered flight, were beginning to attract world attention with their ever improving performances with gliders. It was natural that the model builders should also pursue this type of aircraft and more attention was focussed on these when the German Navy Inspectorate at Wilhelmshaven announced a competition for gliders to be held in July 1924. The reason behind this contest was to determine whether large model gliders might provide a useful function as aerial targets for anti-aircraft artillery. There were 44 entries and the first prize was won by two members of the Modell-Flieger-Club 'Lilienthal 1911' from Berlin, Bruno Horstenke and Horst Sawatzki, who had been co-ordinating their efforts on model gliders since 1922. Their machine, a low-wing strut braced monoplane of 2.45 metres span, flew for one minute 46 seconds after having been taken to altitude by a large kite, the time given was that taken to glide from a measured height of 100 metres. This method of launching was that normally used over flat terrain in order to get the glider to a reasonable height before release.

Despite this early interest in model gliders, the majority of German model builders concentrated their efforts on rubber-driven models. In attempts to improve performance, models were now, generally being built in larger sizes than previously, average wingspans being over one metre, longer fuselages meant more rubber, and the increasing use of thin plywood with smaller section spars and longerons meant less weight, this coupled with the greater wing area of the increased wingspans resulted in models with lighter wing loadings and times of 45 seconds now

The winged propeller insignia seen on some of these 1920's gliders on the Wasserkuppe indicates that this club was affiliated to 'Ring Deutscher Flieger' whose members were mostly ex-flying personnel from WWI. Some models have stick fuselages but note the tailless machine about to be launched.

Right: a 'Grosse Winkler' poised for hand-launching. The 'A' number indicates that this is an entry in the junior class (under 18 years of age) apparently of the distance event at an early 1930's Whitsun Wasserkuppe meeting. Far right: Oskar Schoppe (right) with his duration winning machine on the Wasserkuppe in 1930 during the Whitsun meeting (see text).

became normal and distances of 200 metres usual. Different parts of the country tended to concentrate on particular types of model, for example, in Central Germany fuselage models were favoured, while in the South the stick model was still holding its own, tail-first versions (canard) being built in Nürnberg. In 1924 one of the pioneer modellers, Curt Mobius from Hanau caused a sensation when his rubber-driven stick canard model dropped its motor and propeller at the end of its power run, and flew, climbing in circular flight in a strong thermal, until it passed out of sight after 21 minutes! This method of improving a model's performance obviously met with disfavour, since competition rules were hurriedly altered to indicate that the dropping of motors and propellers was 'verboten'! (One can assume that the event in its day must have had a similar impact to Joe Weathers' gear-dropping 'Mystery Man' gas model in 1939).

Apart from modelling in the hobby sense, models were playing an important part in full-size aviation and on the Wasserkuppe, Alexander Lippisch (later famous as the designer of the *Messerschmitt* Me163 rocket fighter) was building tailless glider models of up to four metres wingspan. These were heavy machines weighing some 15 kilograms and were launched from a ramp by means of a catapult. Since his youth Lippisch had been a strong supporter of the flying wing concept and envisioned aircraft without drag producing components like fuselages and tail units.

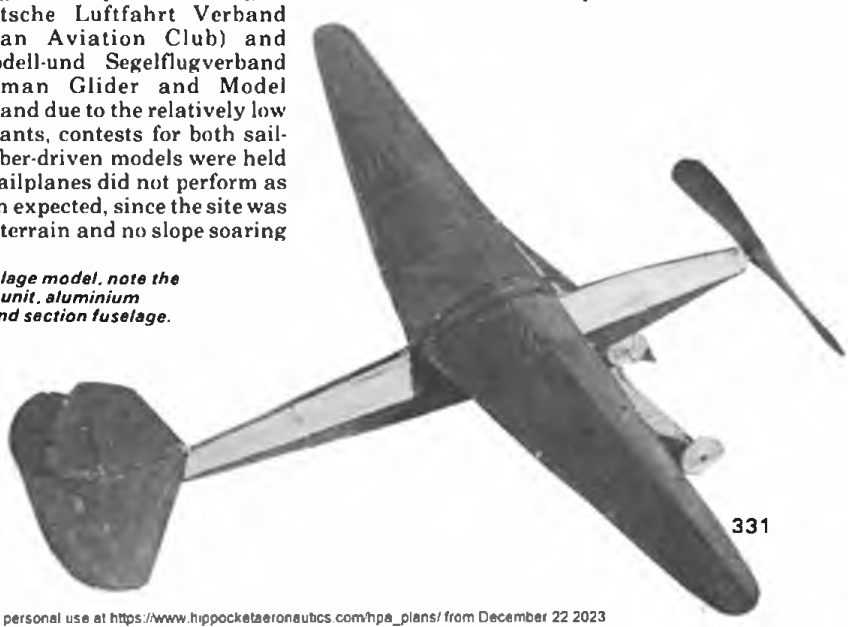
By dint of continual experiment he progressed to tailless models with forward swept, flexible wings like those of the buzzard, and showed that aerofoil sections with little centre of pressure movement could give good results in tailless designs that had no sweep at all! Swept back wings with end-rudders on the wingtips led to his famous 'Storch' series of full-size flying wing gliders and powered machines.

Newspaper sponsored competitions were held, and the 'BZ am Mittag' described a stick model in its junior edition, holding a competition for this machine in Berlin in October 1926. The event was won by schoolboy K. Kähne from Magdeburg when his model covered 165 metres after rising from the ground. The highest prize money yet offered for a model aeroplane competition (3,000RM, approximately £150) enabled the winner to learn to fly full-size gliders and qualify for his pilot's licence. The first sailplane competition was held near Dessau in 1927, organised by MAG, times and distances were poor, but this is considered to have been the real beginning of model sailplane competition work in Germany. The rubber-driven model continued to improve and in 1927 performances that had been thought impossible only 12 months previously were now frequently obtained, distances of 500 metres being surpassed. The first seaplane competition, also organised by MAG, was a failure, most models refusing to unstick from the surface of the water, thus indicating that more time would have to be spent on float design. Modelling was introduced into Prussian schools in the larger cities in 1927 and this method of introduction to the hobby was to be considerably extended during the next 15 years.

In October 1929 competitions held at Jena were jointly organised by the two largest societies, Deutsche Luftfahrt Verband (DLV) (German Aviation Club) and Deutschen Modell-und Segelflugverband (DMSV) (German Glider and Model Aviation Club) and due to the relatively low number of entrants, contests for both sailplanes and rubber-driven models were held together. The sailplanes did not perform as well as had been expected, since the site was situated in flat terrain and no slope soaring was possible. The winning machine's time was 55 seconds, flown by Oskar Schoppe from Weissenfels, this was an all-bamboo model with single-surfaced wings. The rubber-driven models did better, and the best duration was one minute 42 seconds by a then unknown Heini Dittmar from Schweinfurt. In later years Dittmar as a record-breaking sailplane pilot became the first recipient of the Golden 'C' certificate, and was the first man to fly faster than 1,000km/hr which he did while test flying the *Messerschmitt* Me163 rocket fighter. Because of experience in these contests, it was decided that in future, separate competitions, should be held for rubber-driven models and sailplanes.

By 1929 the DLV had 45,000 members, 7,000 of which were youths under the age of 18, known as 'Jungflieger.' This society held the first German National Model Sailplane Competition on the Wasserkuppe during Whitsun in 1930 in conjunction with the first meeting of its 'Jungflieger.' Over 1,000 flights were carried out by the 175 entrants in competitions for duration and distance.

Horst Winkler from Berlin flew his 1.7 metre span high performance sailplane whose deep profile fuselage gave it exceptional directional stability, and he won the



Early German fuselage model, note the single surface tail unit, aluminium wheels and diamond section fuselage.

first prize with a distance flight of 2,780 metres. This model was eventually to be known as 'Der Grosse Winkler' and later he made a similar smaller version named 'Winkler Junior,' both of these highly successful models were to be built in their thousands over the next ten years. The best duration flight was three minutes 23 seconds put up by Oskar Schoppe. Both Winkler and Schoppe, amongst others, used double surfaced wings, and it was at this time that their obvious advantage over the almost universally used single surfaced wings was established.

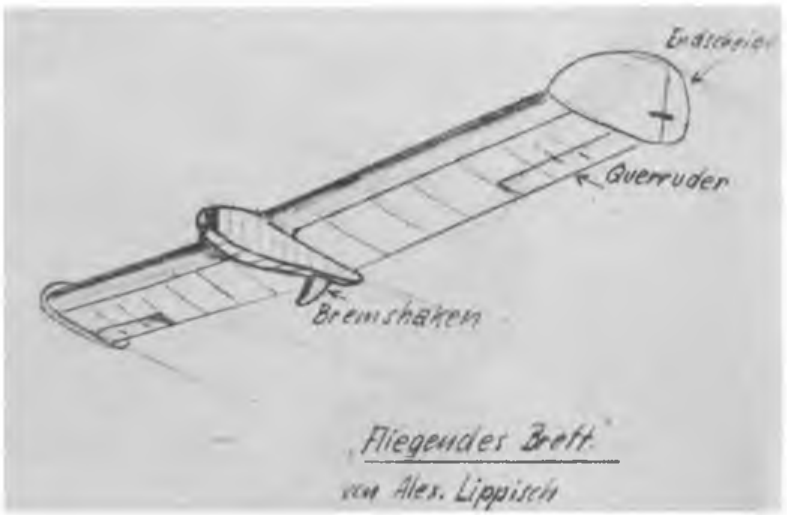
This was the first occasion that kite-launching was allowed in a large contest (apart from the German Navy event held in 1924), a facility much used by modellers living in the flatter parts of the country. However, the system was time-consuming to use and was dependent on wind to get the kite aloft in the first place. Hot summer days with little wind gave good soaring conditions, although at this time, little was known about thermal behaviour. An improved method of launching sailplanes came from Horst Winkler, known as his 'Hochstart-methode,' this extremely simple solution is still in use today. Winkler defined that quarter of the total length of line used should be elastic, and that the hook on the model should be positioned, not on the nose as in full-size practice, but at 60 degrees to the horizontal axis through the centre of gravity. This system and increasing thermal knowledge meant that good sailplane performance was now no longer the prerogative of modellers with access to suitable soaring slopes.

In 1931 the number of entrants in the National Sailplane Competition was 227, the longest distance flight being made by Oskar Gentsch from Dresden with a 1.52 metre span, slightly swept wing model that used less dihedral than Winkler's machine, the directional stability so necessary for this event was obtained by extending the fin along the top of the fuselage. Hand launched, the model covered a distance of 8,850 metres.

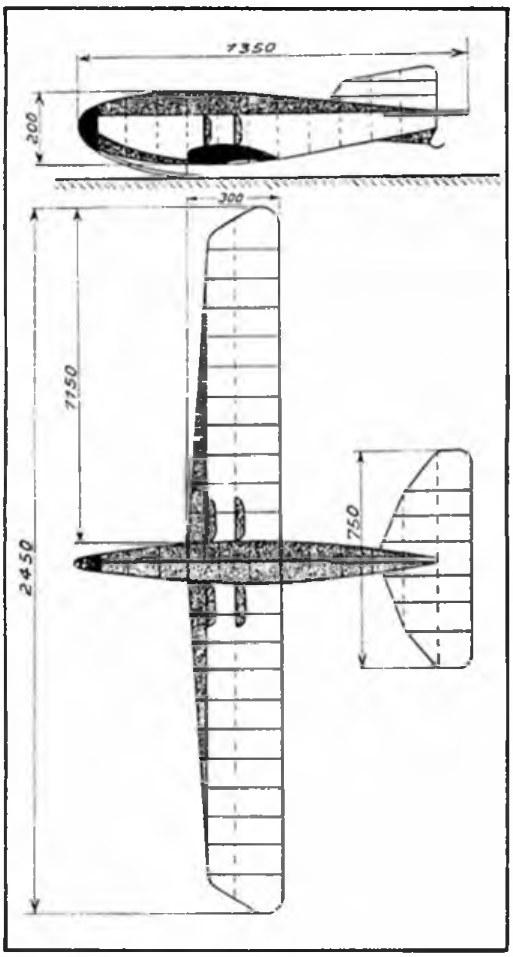
In Germany the emphasis was now very definitely on sailplanes and 490 models were entered for the annual Whitsun event in 1932 on the Wasserkuppe, where the names of Winkler and Gentsch were still amongst the winners. In order to achieve even better results in the distance competition, models were beginning to appear with different types of steering apparatus, the most novel probably being that by Ladhe from Berlin, whose rudder moving electric motor, switched on and off by the deviations of a compass needle, was powered by a windmill driven DC generator.

During the period outlined, materials used were wire, bamboo, cane and various strip woods like spruce, alder, fir, lime, and pine with assorted wood veneers and plywood. These materials were usually purchased from garden supplies or wood dealers, although, of course, some specialist model shops did exist that were also able to supply additional items like finished propellers, aluminium wheels, gears etc. Glues were either carpenter's glue-pot types, that took about one hour to warm up, cold water glues made by mixing powder and water, or the handier fish glues in ready-to-use tubes. Joints made with these adhesives were not waterproof, so it was necessary to apply varnish for this purpose, shellac being popular. Models were covered with silk, which was expensive, or a cheaper raw linen, paper was also used and various grades of Japanese paper were available, including parchment. Cellulose dopes were in use only towards the end of the period, these were expensive, although early handbooks tell of dissolving celluloid in acetone to make a good type of waterproof varnish, as we all know this was also a fine cement for balsa, but this ideal aeromodelling material had not really arrived yet, and up to the end of 1932 was not used to any great extent.

The advances made in the previous five years were truly remarkable, the German model builders' energy, industry and enthusiasm were achieved without doubt by the splendid example set them by the full-size pioneers on the Wasserkuppe who had triumphed in adversity. In a future issue it is hoped to look at the changes that took place in the German aeromodelling scene over the twelve year period from 1933.



Lippisch evolved this flying plank glider as early as 1926, and demonstrated the 3.5 metre span machine and its catapult launch method to modellers at the first German National Sailplane Competition on the Wasserkuppe in 1930.



Two views of the Horstenke-Sawatzki design, based on the then current full-size glider layout, that won the German Navy competition in 1924 (see text). Two semi-circular hoop skids replaced the single central skid shown here.

SAM Meeting in Germany

Known as the 'Horst-Winkler-Freundschaftstreffen,' a meeting with competitions is being held at Winterberg in West Germany during the period 3rd-5th August. Winterberg is situated approximately 100 kilometres east of Cologne, and the flying field is nearby in the hills called 'Rauhen Berge.' Accommodation is available at only 22DM per day (approximately £6) and this includes meals! Tents and caravans can be pitched/parked on site. Readers, interested in attending should inform the organiser, Herr Friedhelm Mink, Im Weissengrund 9, D-5778 Meschede-Grevenstein, West Germany, giving names and types of model that they intend to fly. Please note that should you be planning to take a German model from the period 1933-1945 it must NOT be decorated with the insignia of the time, although this can be done in this country, it is still against the law in Germany. For the historically minded it is worth noting that Winterberg is approximately equi-distant (some 35 kilometres/22 miles) from the Moehne and Eder dams, so this is Dambuster country!

A Sunday meeting on Tempelhof aerodrome in Berlin during the 1920's, nineteen enthusiasts line-up for the camera, 12 of them with stick tractors.

SHOP TALK

NEW MODEL HOBBY PRODUCTS REVIEWED

Latest from Progress Aero Works - PAW 100, available in standard or R/C versions.

Spiralux screwdrivers now come complete with wall mounting 'keep tidy' holders.

New addition to the stable . . .

Progress Aero Works (PAW) have recently added a new engine to their already extensive range of engines. This latest member could well prove to be an ideal 'workhorse' for the sports/scale/vintage modeller. A very neat 1.00cc diesel available in standard or R/C versions with identical external dimensions to the already popular *PAW*80. An *Aeromodeller Engine Test* on the *PAW*100 will be featured among these pages within the next few months. Prices are: Standard £14.38, R/C £20.70, available from your local model shop or direct from *Progress Aero Works*, Park Mill, Hobson Street, Macclesfield, SK11 8BE.

History made easy

'The History of the Royal Air Force' — recently published by *Newnes Books* of Feltham, Middlesex, is a comprehensive history of the Royal Air Force from its formation up to the present day. It's publication coincides with the recognition of consultant editor John Rawlings' standing as a leading authority on the service: he has been awarded the C. P. Robertson Memorial Trophy for 1984 for his work as an aviation writer in the 'interpretation of the Royal Air Force to the public'. This book shows his influence, as it is not only informative but very easy to read — no dry as dust history, but a book that you will enjoy reading. Large format (9in.x12in.) 336 pages and hundreds of superb colour and black and white illustrations — highly recommended at £12.95.

Painless and enjoyable history, a book to put on your 'birthday present list.' From 1918 to present day . . . hundreds of good pics.

History in Pictures

. . . and 'three views', Swedish Air Force Trainers 1926-83 with drawings to 1/50th and 1/72nd scale, is a well presented book full of potential scale models. Minimal text (but in both Swedish and English), 132 pages (10½in. x 8¼in.) of good drawings and photographs. At £6.95 well worth looking for, as amongst the expected 'Tiger Moth', 'Vampire' and 'Viggen' are some designs that would make a fine subject for your next flying scale project. Full title is 'Flygplans — Ritningar 1' by Björn Karlström, published by *Förlag: Allt om Hobby* — and should be available from the better aviation bookshops.

A selection of three views that should give the scale modeller something to think about, from the CVM 'Tummelisa' of 1927 through to the modern Scottish Aviation 'Bulldog.'

Something for free!

Spiralux Handtools produce a range of fixed blade screwdrivers to suit most purposes (they also market the *Shapercraft* woodworking products). Now, if you buy one of their screwdrivers you get at no extra cost(!!) a neat individual holder made in a sturdy yellow plastic. As can be seen in the photograph these holders clip together to make a convenient storage system — all you need is the space on your workshop wall. The tools are a good quality product with prices comparable to other brands and should be available from your local 'Do-It-Yourself' shop — why not collect a full set . . .

Digital revs . . .

Mainlink Systems have introduced a very compact 70mm x 50mm x 25mm (easily lost?) electronic rev-counter. A liquid crystal display (LCD) is incorporated so not only do you have a digital readout (to the nearest 100rpm) but very low battery consumption and no need for any range change switch. The unit has its own internal nicad battery and *Mainlink* suggest that charging will probably only be necessary every couple of months. A push-button brings the rev-counter into operation and sensing of the propeller is by optical means, so there is no load on the engine whilst taking the reading. It is possible to use the rev-counter to measure rpm from a few hundred up to about 70000! Cost is £35.50 from *Mainlink Systems*, Horne Lane, Potton. Beds.

Grips like . . .

A very useful tool to have in any workshop would be the *Vise-Grip* long nose locking pliers. *Vise-Grip* an American Company, produce a number of designs of locking clamps, wrenchs, pliers, etc. The double lever action, although not the same, is not dissimilar to the well known *Mole* wrenches. Size of jaw opening is by easy adjustment screw and the jaw shape although slightly strange will securely grip a number of different shapes. This particular tool is extremely convenient, is only 135mm long and the jaws taper to 3mm. If you have never used anything like this before then *do* try and find one in your local D.I.Y. or model shop, they really are incredibly versatile. Price is around £2.50.

Join the digital revolution . . . why wonder what speed your engine is running at when you could know to within 100rpm.

VIKING

by John Watters —

A 24¾in. CO_2 powered suitcase size replica of that popular vintage model of 1940.

THE ORIGINAL full-size model 'Viking' was first produced in America in 1940 and was powered by an *Ohlsson & Rice* 23. This CO_2 version is a scaled down replica of that model with some structural modifications to suit CO_2. The model is not difficult to build and I am sure could be easily attempted by any relative beginner.

Fuselage

Start to build the fuselage by first selecting some firm 1/16in. sq. pieces of balsa to make the top and bottom longerons, the spacers need not be as hard. Two identical fuselage halves should be built, one on top of the other, including the sheeting at the nose and all the fillets. When completely dry remove the two halves, split them apart and sand smooth. Next re-pin one of the fuselage halves down onto your building board and glue on formers F1 and F2, using a small set square to ensure that they are square to the frame.

Remove this structure from the board when completely dry and add the other fuselage side to the formers and allow to set. Pull the fuselage frames together at the tail post, positioning directly over the centre line on the top view of the plan and glue together holding with either a clothes peg or masking tape. When the glue at the tail posts has set add the remaining top and bottom spacers.

The undercarriage wire and engine mounting block can now be fixed onto former F1. The motor can be temporarily fitted and the 1/32in. sheeting added to the front of the cockpit. The piece of sheet to locate the gas bottle can be added if required (I find this method of holding the bottle works quite well). Finally fit the side pieces to the nose and sand the whole fuselage structure smooth.

Tail and Fin

The tailplane should be started by pinning the centre spar down over the plan, also pinning down and gluing together the trailing edge pieces, joining them to the leading edge. Position the ribs and glue them in place. When the structure has set, sand to a smooth section. The fin and sub-fin are cut from a piece of medium hard 1/16in. sheet and sanded smooth.

Wings

Make a plywood or aluminium template of the wing ribs and by using either the sandwich method, or by cutting individually cut out all the wing ribs. The leading edge should first be carved and sanded to section, before dihedralling as the wing is best built as one piece and then sectioned at the dihedral breaks.

Pin the leading and trailing edge pieces down over the plan and build up the tip pieces at both ends, leaving out the two bottom wing spars for now. Glue the individual ribs in place, cutting to the correct length as required but leaving out the ribs at the dihedral breaks. When dry, cut or saw through the leading and trailing edges at the wing tip dihedral breaks. Sand the mating edges of the leading and trailing edges to the correct angle and glue the tips in place, packing up to the required height. When the wing tip panels have set, glue in the wing rib at the joint.

Repeat this operation for the centre dihedral joints and allow this to set thoroughly before continuing.

Remove the completed wing structure from your building board and add the two bottom spars (making sure not to build in any warps!). Finally glue in the dihedral keepers and sand the whole wing to a nice smooth finish.

Finishing

Cover the model using lightweight tissue, first giving the whole airframe a coat of thinned down dope, sanding lightly after the dope has dried. Cut out the windscreen from thin acetate sheet, attaching it to the cockpit with either balsa cement or thinned dope.

If this is your first introduction to covering undercambered wings, the main point to remember is that the tissue must be stuck to all parts of the underside of the wing, to obtain the proper contour.

Attach the tissue to the structure by again doping the area to be covered. Lay on the tissue and rub over the doped area with your finger, keeping the tissue taut. Cover the whole model in the same way, trimming off any excess tissue with a sharp blade. Water spray all the tissue lightly, to shrink it and when dry apply a coat of thinned down dope about 50% dope 50% thinners.

Tissue decoration can now be added if you so desire, using thinned dope and a further coat of thinned down dope should be given to the whole airframe to finish. If you feel uncertain about doping the wings and tail without them warping, pin them down onto a board whilst the dope is drying.

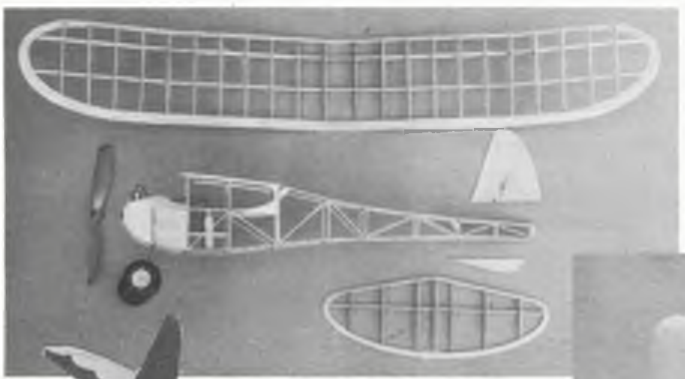
The wheels are made from laminated pieces of balsa sheet, which were first roughly hand-carved and finally sanded smooth. A small piece of aluminium tubing being epoxied in the centre of the wheel for the axle bearing. Any lightweight wheel can be used but try to keep it in character with the period.

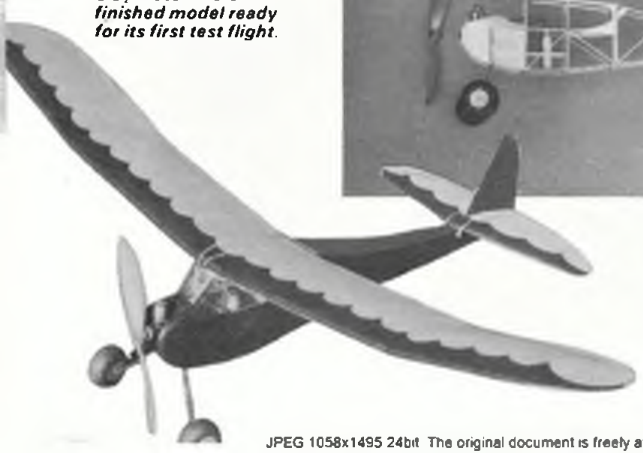
My model finished up with an all-up weight of 40 grams and required only a small amount of ballast in the tail to get the balance correct.

Test flying took place early one morning in less than ideal flying conditions for CO_2, although the wind was light, it was cold. Test gliding the model showed a slight dive, this was cured by placing a piece of 1/32in. packing under the trailing edge of the tailplane. Low powered flights were then tried, using a gas charge. The power with each flight was built up to a final liquid charge. The model proved to be a very stable flyer and in the cold conditions performed very well — roll on the warmer weather.

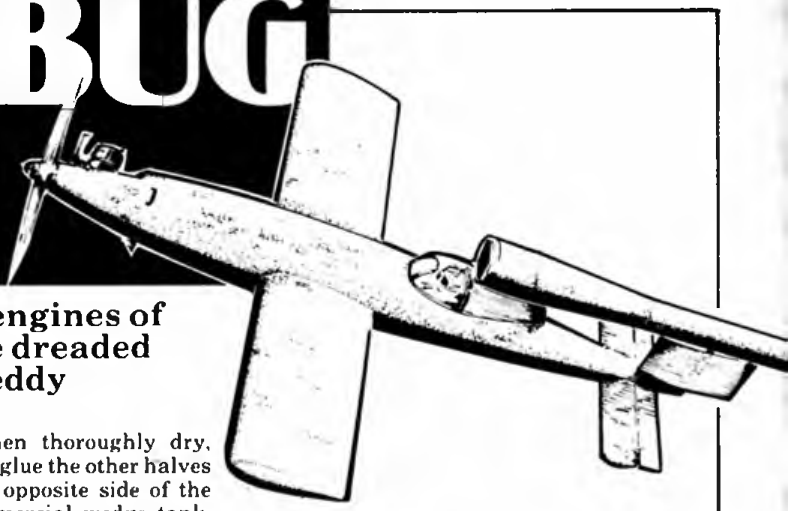
Heading: daughter Nicola with 'Viking' prior to first flights.

Right: completed structure ready for covering. Far right: tank installation for CO_2 motor. Below: finished model ready for its first test flight.





DOODLE~BUG Fi 103



A semi-scale control-line model for 1.5cc engines of the Fieseler Fi103, a piloted version of the dreaded 'flying bomb' of WWII by Jym and Dave Leddy

THE 'DOODLEBUG' first appeared in the Guildford Model Flying Group in the early 70's as a novelty model for the control-line displays we used to give. The most impressive being a *Merco* 35 powered, 4ft. span monster. They have recently been revived as something unusual, to encourage young control-line enthusiasts. The construction is straightforward and results in a strong flyable trainer that is certainly different.

The wing

This is made from one sheet of 1/16in. × 4in. balsa cut in half. The bottom is laid on the plan. Leading edge, trailing edge, ply plate and ribs are then glued on. At this point drill the bellcrank mounting hole right through the plate and the bottom sheet. Trim and fit the top sheeting and add wing tips. When dry remove from the board and drill the bellcrank mounting hole from the bottom, through the top sheet and enlarge the hole in the top sheet to take a 6BA bolt and washer. The wing, after sanding is now ready.

The fuselage

This is based on a hard 1/8in. sheet crutch with the bearers glued in whilst flat on the plan. Formers F1a, F2a-F7a are glued to this 1/8in. sheet spine, when thoroughly dry, remove from plan and glue the other halves of the formers to the opposite side of the 'spine.' Install a commercial wedge tank. The wing and tailplane can now be glued in position, squared up, and left to dry.

When the glue has thoroughly set, install the bellcrank, control wires, pushrod and elevator horn. The fuselage around the tailplane can now be blocked in and carved approximately to shape. Covering the fuselage can be done in one of two ways.

(1) It can be planked with 1/4in. × 3/32in. strips and then sanded to 1/16in.

(2) It can be covered in moulded panels of 1/16in. sheet. This is easier than it sounds. Panels of 1/16in. sheet are cut slightly overlength for each bay. These are soaked in hot water and held with masking tape onto a suitable former (our favourite is a *Humbrol* No. 2 size paint tin). When dry, trim and fit to the crutch and formers.

Tailplane

This is made from 3/16in. sheet and joined with any commercial hinge or even linen hinges.

We now add the 3/16in. fin and rudder, not forgetting to offset the latter 2° or 3° to starboard. Add the pulse jet mounting spine and block, and the block around the motor. The fuselage is now ready for sanding and covering.

Pulse Jet

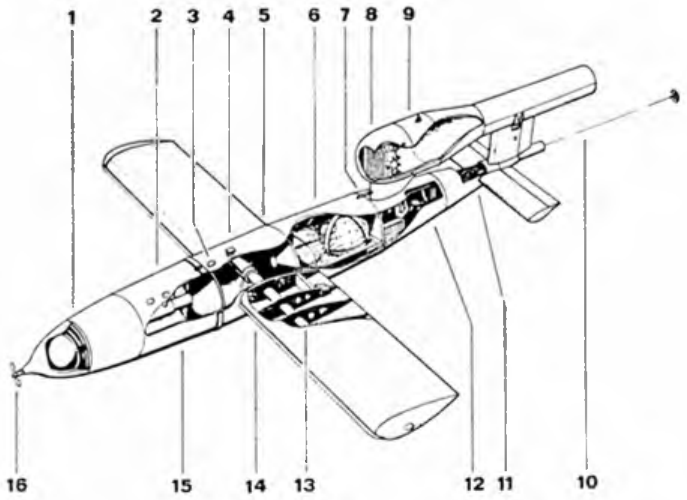
This can either be carved from foam or block balsa, or it can be fabricated from 1/32in. sheet. The latter is fiddly but not difficult and is made by pinning 1/8in. formers

to 1/4in. hard spine and wrapping with soft 1/32in. sheet. Once the soft block is added the spine can be withdrawn and the unit sanded.

Cover the entire model with lightweight tissue and three coats of sanding sealer. Glue the pulse jet to the fuselage and add the wire lead-out guides. Paint in German WWII camouflage colours.

Flying

The prototype was balanced between the leading edge and the first lead-out and was flown on 35ft. lines. It was stable and had no vices and in fact is an ideal training model although in common with the full-size Fi103 it has little glide when the engine cuts!

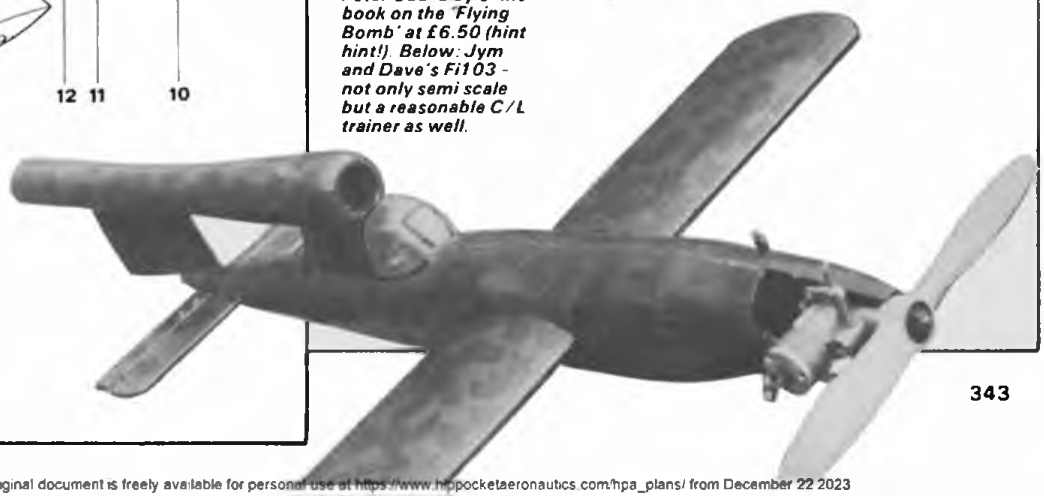


Internal details of a Type 1 flying bomb

Key:
1 Compass to control guidance gyros
2 Twin fuze pockets.
3 Fuel filler cap
4 Lifting tank
5 Fuel tank
6 Compressed air for pneumatic motors
7 Ram tube
8 Jet motor
9 Combustion chamber
10 Aerial for ranging transmitter carried on a few
11 Pneumatic control motors
12 Guidance controls and battery
13 Wooden ribs on metal spar
14 Optional cable cutter
15 War-head
16 Air-log

Above right: showing panel of sheet balsa moulded (damp) around convenient Humbrol paint tins.

Left: cut-away drawings of the V1 (without pilot!) reproduced with the kind permission of AIRFIX MAGAZINE who incidentally still have a few copies of Peter Cooksley's fine book on the 'Flying Bomb' at £6.50 (hint hint!). Below: Jym and Dave's Fi103 - not only semi scale but a reasonable C/L trainer as well.



EXPERTS FORUM

History-Design-Building, Tony Cordes' approach to free-flight gliders

Tony Cordes with the latest in a long line of his winning designs - 'AC36.'

History

I have been actively involved with aeromodelling since 1951 but my first recollection dates from three years earlier when as a seven year old, I watched my father covering and finishing a typical mid-forties style cabin rubber model. Strangely, I cannot recall him building it or flying it and no more model aircraft graced the household until I purchased a *Keil Kraft* 3/6d (17½p) scale model kit in the summer of 1951. Why I bought it I cannot remember but that purchase represents the start of the interest which even now absorbs the majority of my spare time. Perhaps I should explain before I go any further that in my case, the term 'aeromodelling' relates to only free-flight and its associated competition flying since I have never built or flown a control-line or radio-controlled model of any sort.

My attempts to complete that first model met with abject failure and after three or four more paltry attempts at other kits in the series my father bought me a *Mercury* 'Magpie' glider kit. This I built and achieved my first success in aeromodelling in that at last I completed a model that was ready to be flown. Flying was attempted in the local park but the model was irretrievably damaged due to my total inexperience. Several hours of work indoors had been eliminated within one hour outdoors. Far from deterring my interest it served to stimulate a determination to produce an aeroplane that would fly successfully. It also kindled a desire to design my own.

The *Mercury* 'Gnome' was my next model and this time I listened to my father's advice. I waited for suitable trimming weather and used a more appropriate flying site, namely the Newcastle Town Moor. It became my first aeroplane to actually fly and last long enough to enjoy it. I still recall the many happy flying sessions with that model; I even took it away with me on the family holiday in the summer of 1952.

My father's active interest was rekindled and so an aeromodelling partnership was established that lasted for the next eleven years. His conviction that rubber powered models were the only class worth pursuing was inherited by me and so it was 15 years before I built another glider.

Over the next year or so, the *Keil Kraft* 'Ajax' and 'Senator,' the *Mercury* 'Mentor' and two or three attempts at my own design were completed. None of them flew well or lasted any length of time but I was becoming quite a competent builder, mainly due to my attitude of not tolerating any workmanship that I considered was not up to standard. I strived all the time for perfection and when this was not approached my frustration coupled with a youthful quick temper resulted in whole structures or components being destroyed and a number of models never reaching completion but instead ending in pieces in the dustbin.

I had been modelling now for two years with very little success in flying terms, apart from the 'Gnome,' but my next model was to provide the breakthrough I needed. I built the *Keil Kraft* 'Gypsy,' my biggest model yet and it not only flew but it did so quite well, regularly turning in flights in excess of two and a half minutes. I now considered I was good enough to join the local club and as a club member, was introduced to a new dimension in aeromodelling, namely competition flying. The 'Gypsy' was the last kitted model I ever built.

Over the next ten years or so a succession of Open rubber models and Wakefields were built, including some *Aeromodeller Plans Service* designs such as 'Smoothie,' 'Tyke,' 'Bazooka' and 'Upstart' but most jointly designed by my father and myself and named 'Popinjay.' I have lost count of how many versions of 'Popinjay' were built but I would guess it was in the region of 40. Competition flying was virtually restricted to club or area events and *SMAE* Area decentralised events with the occasional coach trip to a centralised national rally. Reasonable contest success was enjoyed at local level but very little was achieved nationally.

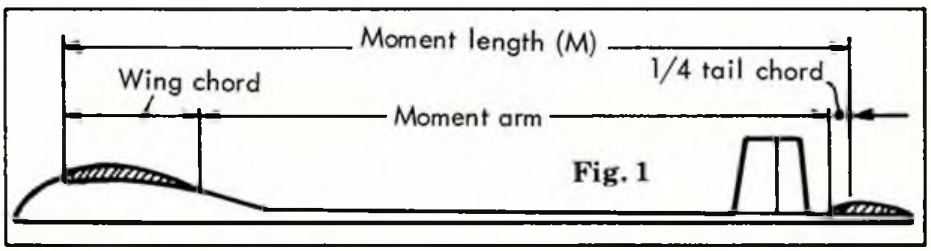


Fig. 1

It was during this period that a lasting friendship was established with Ron Pollard who is still renowned for his achievements in the field of rubber power but who at that time served to spur me, via local rivalry, towards better performance with my own rubber models. Many years later we were to establish what is now the worldwide name of *Ronytube* (Ron + Tony + Tube).

By the end of the fifties and in the early sixties free-flight generally was in fairly rapid decline but I was broadening my aeromodelling interests into Open Power and in particular into ½A power. I had some success in ½A competition with models similar to my *APS* design 'Cuddy.' In 1963 I met Jim McCann who had recently moved house into the Newcastle area. As I mentioned earlier, I strived for perfection in building and in Jim I met someone who in my opinion had effectively achieved it. His modelling technology was years ahead of the time. For example his FAI power models featured sheet covered flying surfaces and bunting mechanisms and he pioneered the method of propeller manufacture used by many of today's specialists. Naturally, I was greatly influenced by his approach and much of what is to follow in this article relating to building technique can be attributed to him.

Free flight continued to decline during the sixties and those enthusiasts who remained, increasingly attended more and more centralised meetings in order to compete among reasonable numbers since local competition entries had more or less dwindled to single figures. The decade also saw the emergence of many more specialist modellers i.e. those who concentrate on one class only in order to become or remain competitive at the highest levels. I became one of them.

At the end of the sixties my closest aeromodelling associates were Ron Pollard and Jim McCann who were both recognised as specialists in rubber and power respectively. Although it was not a conscious decision at the time, I think now that my specialising in gliders stemmed from the convenience of having an interest complementary to that of Ron and Jim. Certainly in the seventies and now in the eighties Ron and I have enjoyed a very successful working relationship on the competitive flying field directly attributable to our different interests.

Thus in 1967 I built my first A2 and had immediate success in both local and national competitions. This perhaps confirms a belief that gliders represent the easiest contest class in which the less experienced contest flyer can do well but 16 years of experience has formulated my belief that to sustain success or to become a consistent winner requires the same commitment to development and design and the same attention to detail as in other classes.

Between 1967 and the present time, I have built 36 A2's, five A1's and one open model and have had three of my designs published through the *APS* namely 'Loner,' 'Little Hinney' and 'Big Dad.' I have enjoyed more or less continuous contest success which, if I am being honest, is the driving force that makes me continue and if it were to stop, would be the reason I would retire from aeromodelling.

Design approach

First of all, I shall attempt to set out the interrelated criteria which determine success in a free flight glider contest.

1. interpretation of weather conditions
2. interpretation of the flying site conditions
*3. model selection:
   (i) model specifically designed for the conditions
   (ii) optimised design for use in all conditions
*4. quality of trim of the model:
   (i) zoom launch
   (ii) thermal riding ability
   (iii) model structure
5. straight tow or circle tow
6. release of the model at the right time and in the right place
7. location of towing mode:
   (i) circle upwind or downwind or fly tactically from the line
   (ii) mobility over the flying site — physical fitness of the flyer

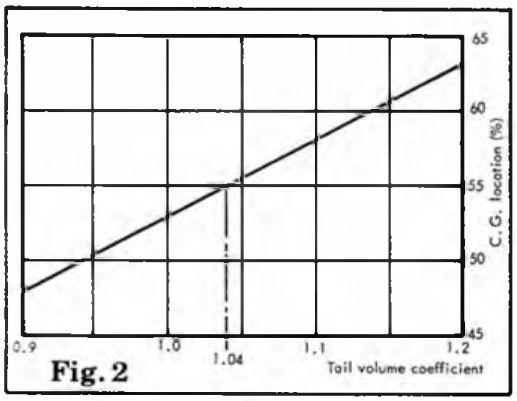


Fig. 2

8. knowledge of opponent's skills or strengths and performance of their models i.e. who to watch and who not to watch
9. availability/use of thermal detection equipment
10. knowledge of the rules and how various Contest Directors interpret them
11. availability of personel to assist the flyer:
   (i) full time helper
   (ii) reliance on fellow competitors
12. location/retrieval of model downwind.

Only two criteria (marked with an asterisk) are directly related to design and so for a given input of time, priority given to the acquisition of skills in flying and contest tactics (all the other criteria) will produce more and consistent contest success than priority given to sophistication of model technology and design.

This has been my philosophy over the years and consequently the simplified design method presented here has been well tried. The reader must not assume, however, that because a simplified approach is used that the resulting model is necessarily lacking in complexity. The design approach simply produces a model outline which may be referred to as 'external' detail but structure, circle towhooks and other 'internal' detail may reflect sophistication. Indeed, the third section of this article has been devoted to structural and modelling techniques and reflects the importance I place upon 'internal' detail. The remainder of this section refers to an A2 but the method may be applied to any glider class.

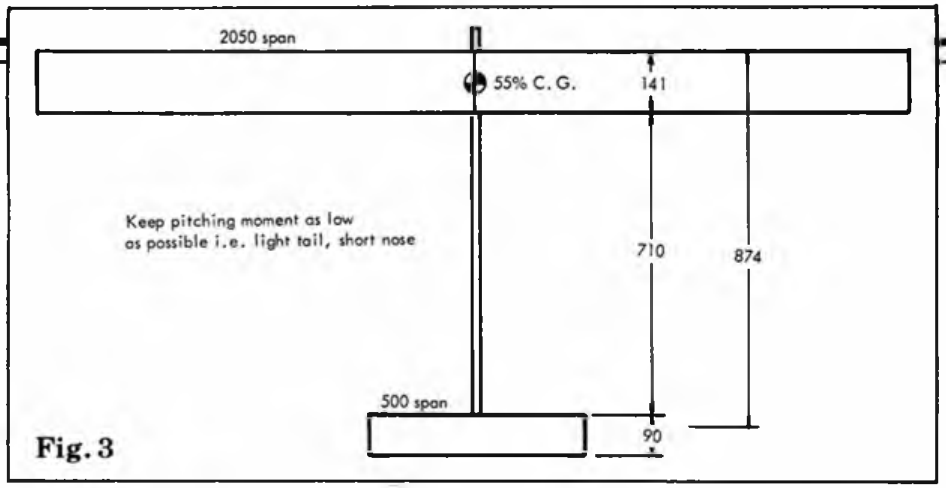


Fig. 3

An analysis and comparison of many successful A2's over a long period of time, say ten to twenty years, reveals a remarkably consistent set of parameters. I am afraid space does not permit me to enlarge upon the analysis but I shall merely quote the results. They are:

wing aspect ratio	=	14-15:1
size of tailplane	=	15-18% of wing area with aspect ratio of 5-6:1
CG location	=	50-60% of wing root chord
wing aerofoil	=	6-7% maximum thickness with 3-5% undercamber
tail aerofoil	=	6-8% maximum thickness either flat bottomed or moderately undercambered (less than 3%)

Apart from the choice of aerofoils all the other parameters are related to what is known as the 'tail volume coefficient':

$$\text{tail volume coefficient } (V_o) = \frac{\text{projected area of wing } (A_w)}{\text{projected area of tailplane } (A_t)} \times \frac{\text{average wing chord } (C_o)}{\text{moment length } (M)}$$

where moment length (M) = distance from wing leading edge to 25% of tailplane chord (figure 1).

$$\text{average wing chord} = \frac{\text{projected wing area } (A_w)}{\text{wingspan } (S)}$$

$$\text{and aspect ratio} = \frac{\text{wingspan squared}}{\text{projected wing area}}$$

$$\text{OR} \quad \frac{\text{wing span}}{\text{average wing chord}}$$

From figure 2 with a CG of 55% then tail volume coefficient (V_o) will be 1.04.

(a) to find wingspan (S):

$S = \sqrt{\text{aspect ratio (AR)} \times \text{projected wing area } (A_w)}$

$S = \sqrt{14.5 \times 29.0}$

i.e. S = 20.5 dm OR 2050 mm

(b) average wing chord $(C_o) = \frac{\text{projected wing area } (A_w)}{\text{wingspan (S)}}$

$\therefore (C_o) = \frac{29.0}{20.5} = 1.41$ dm OR 141 mm

(c) from $V_o = \frac{A_w}{A_t} \times \frac{C_o}{M}$

we now have all the information except M.

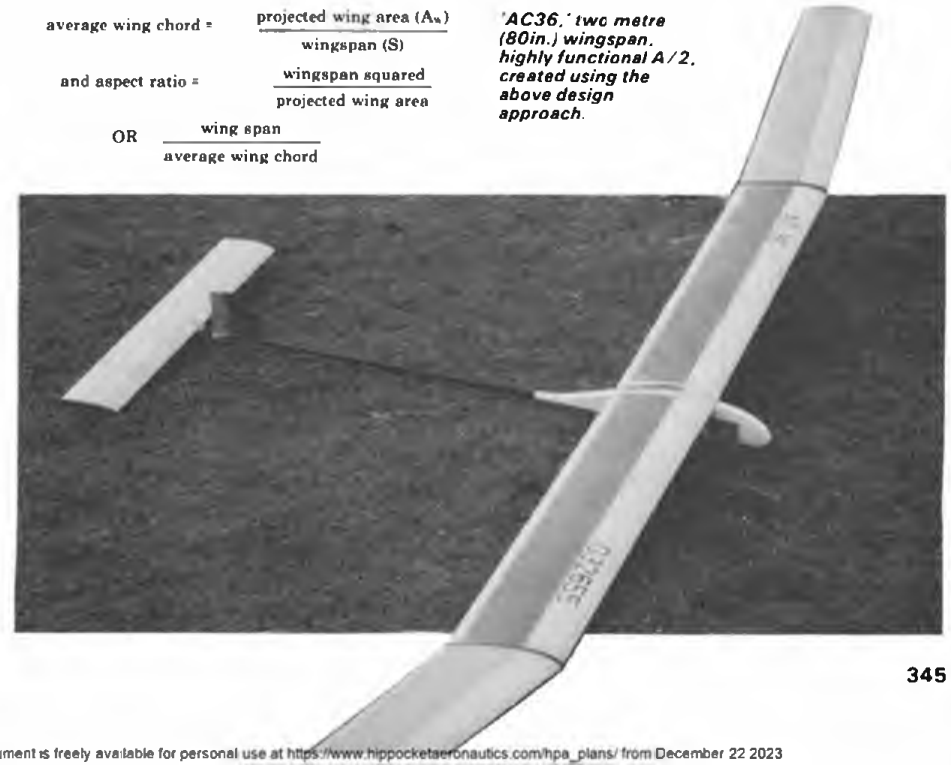
hence $M = \frac{A_w}{A_t} \times \frac{C_o}{V_o}$

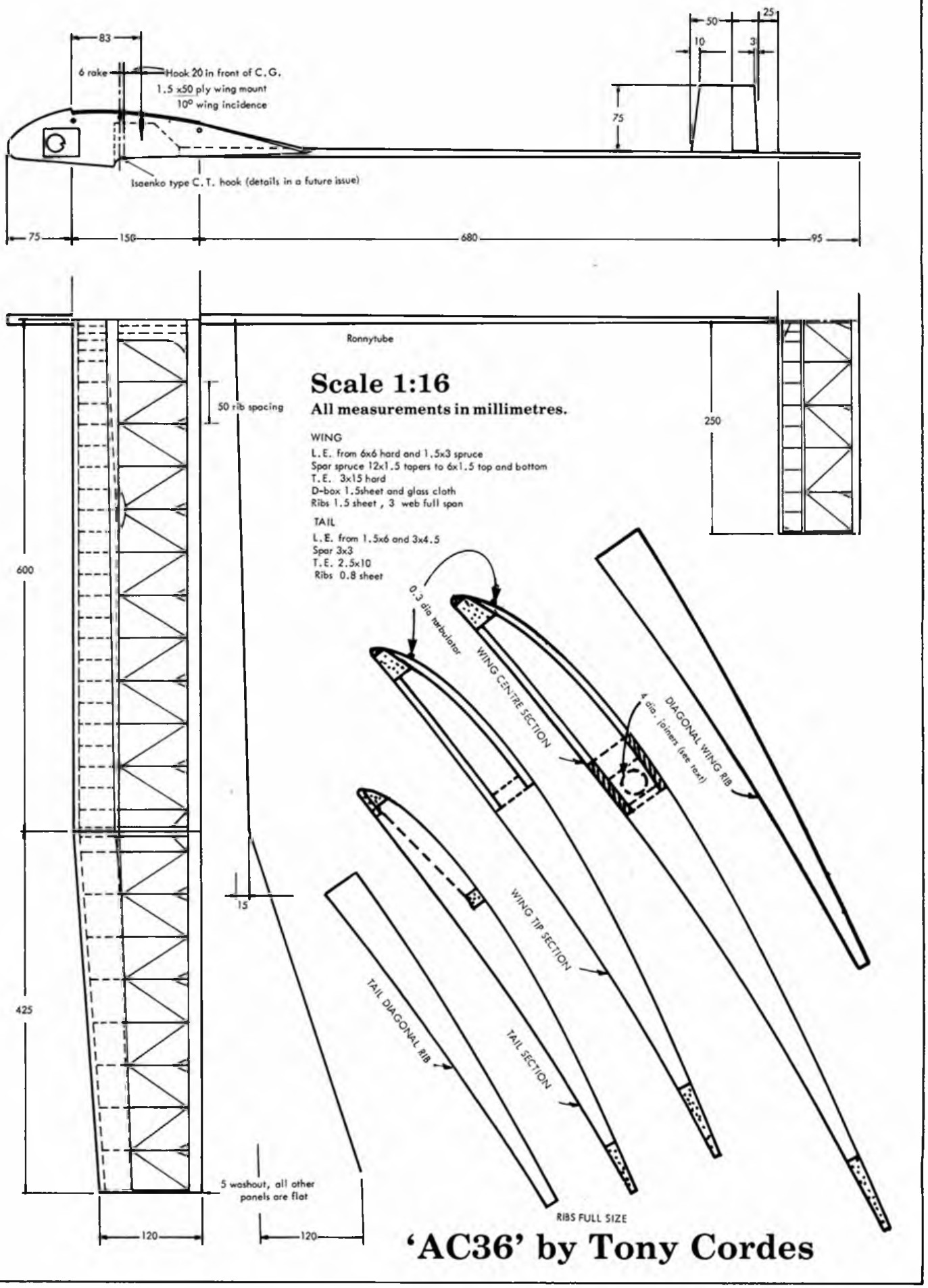
$= \frac{29.0}{4.5} \times \frac{1.41}{1.04}$

i.e. M = 8.74 dm OR 874 mm

Figure 3 shows the design in its simplest form using typical modern tailplane dimensions of 500mm span × 90mm chord. Provided the initial values quoted remain constant then the outline of the model is merely arranged to suit personal taste or to follow current fashion. Obviously, by changing any of the initial values then infinite variation of figure 3 is possible. Try some calculations yourself!

The choice of aerofoils is again purely personal, the B6356b or variations on it being an accepted favourite. 'AC36' indicates my current development using the simplified approach just described.


'AC36,' two metre (80in.) wingspan, highly functional A/2, created using the above design approach.



'AC36' by Tony Cordes

Building techniques

I have long believed that simplification of building processes will lead to better quality workmanship and a saving in time. By saving time, either more models can be made or more time can be devoted to acquiring the flying and contest skills listed earlier or both. These days much of my modelling is done on a sheet of plate glass rather than on the traditional wooden building board. I thus take advantage of a very smooth flat surface that can be easily cleaned and does not wear. Obviously pins cannot be used so instead, various lengths of steel bar act as weights or masking tape is used to hold down items while glue sets. All my flying surfaces are constructed on jigs (a full description of the construction of a jig and how it may be used was given in the December 1974 *Aeromodeller*).

Butt joining of sheet wood can now be done as follows. The sheets to be joined are laid out on the glass plate and taped together as tightly as possible. The assembly is then folded back to apply the glue along the joint, flattened out again and finally weighted down on the plate using a steel bar. When dry the tape is removed and the whole sanded smooth. I use this method when joining tapered spruce wing spars to the D-box sheeting and the D-box sheeting to the leading edge and excellent flush joints result.

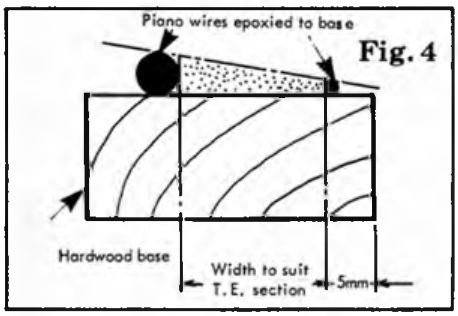


Fig. 4

Masking tape can prove more useful than pins when adding the top sheeting on a D-box or for simply sheeting leading edges on flying surfaces. First align the wing structure on the jig so that the leading edge is flush with the front face of the jig. Apply the glue to the structure as appropriate. Cut the sheet to size and stick lengths of tape at about 75mm spacing along its length. Place the sheet on to the structure aligning it along the rear web of the D-box and hold in place with a steel bar weight. Bend the sheeting over the structure by pulling the lengths of tape over and attaching them to the front face of the jig starting at the middle of the structure and working towards the ends. Finally the whole leading edge joint is taped down with a continuous longitudinal length of tape.

Modern gliders have aerofoil sections that are relatively thin and so require thin trailing edges. It is very difficult to find the good quality, hard quarter-grain sheet balsa from which to make these trailing edges, especially if you are limited to the local model shop for supply. Further it is very important to produce trailing edge section that is accurate, consistent and straight. Complex methods of manufacture using balsa, hardwood and carbon fibre are becoming more popular to achieve these aims. My solution is to laminate balsa strip and then shape it in a simple trailing edge jig. The quality of balsa strip found in most model shops is ideal for the purpose i.e. straight, one face quarter grained and hard, so hard the surface is difficult to indent with the thumbnail.

Consistency is vital to any flier, particularly so in competition flying. Having more than one similar model helps take away the worry of changing models in the event of an unscheduled crash or loss. Tony's son Andrew is seen here with two of Dad's 'stable.'

The trailing edge jig is very simple to make and obviously can be made to suit individual requirements in length and cross section. Essentially the jig consists of two lengths of standard piano wire, one of diameter to suit the front thickness, the other the rear thickness of the trailing edge (figure 4). Simply epoxy the wires to a straight length of hardwood spaced to permit the correct width of trailing edge to be made. Typical sizes for a modern section would be 8-10 swg at the front, 18-20 swg at the rear spaced 20-25mm apart.

I use 4.5mm square strip and laminate four lengths together gluing with balsa cement and laying the resulting section on my glass plate under a steel bar weight. This should be left to set for at least 12 hours. When set place in the jig, carve and sand to shape, sanding both sides to prevent bowing.

It is very important with modern gliders to have centre sections of wings strong enough to withstand the bending loads applied during a powerful zoom launch. For simplicity I use a single $\frac{5}{32}$in. diameter wire joiner and to distribute the concentrated loading this set-up gives during tow, I mould the brass joining tubes, using epoxy, into the mainspar web, which in plan view tapers from roughly the full width of the I-beam at the wing centre to 3mm thick approximately 350mm out. A pair of joining members are constructed prior to fitting into the wings giving an exact match to both halves.

The first stage in making these joining members is to cut two lengths of 1.5mm plywood of width equal to the internal depth of the I-beam. Cut the brass tubes to length and slide them over a straight length of joining wire which has been oiled. Oil two lengths of 6mm thick balsa strip and pin them each side of the two plywood strips as shown in Figure 5, remembering to overlap. Glue to the plywood bases two lengths of 4.5mm strip to make up the difference in length between the brass tubes and the plywood. Half fill the cavity with epoxy and squeeze home the brass tube assembly. Infill the top surface and scrape away the surplus epoxy. When set remove the side moulding strips and cut through the epoxy moulding to separate the two halves. To complete, epoxy a second 4.5mm balsa strip over the full length of the members and when dry taper in plan view to suit.

When building the inner wing panel on a jig the joining member is epoxied direct onto the bottom I-beam spar and the ribs as appropriate are cut in two for assembly. If a D-box is used in conjunction with this I-beam then a very strong centre section structure results.

Finally, a simple way of applying lightweight glass cloth to sheeted surfaces is simply to dope it on. The glass cloth is first 'sized' with a weak (10 per cent) mixture of dope and thinners by placing the cloth over the glass plate and liberally brushing on the weak dope. When this has dried, peel off the cloth and using thinners attach to the sheet surface, which has been doped and prepared. When dry, apply extra coats of dope to achieve the desired finish or strength. This method is much easier and less messy than using epoxy.

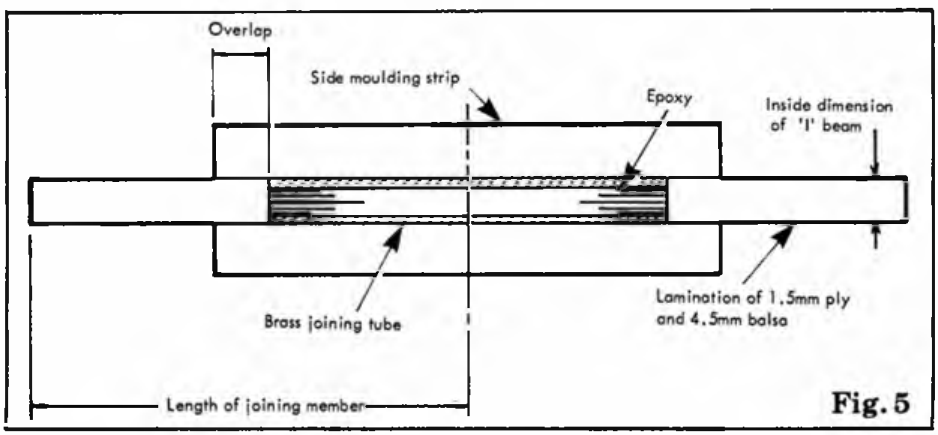
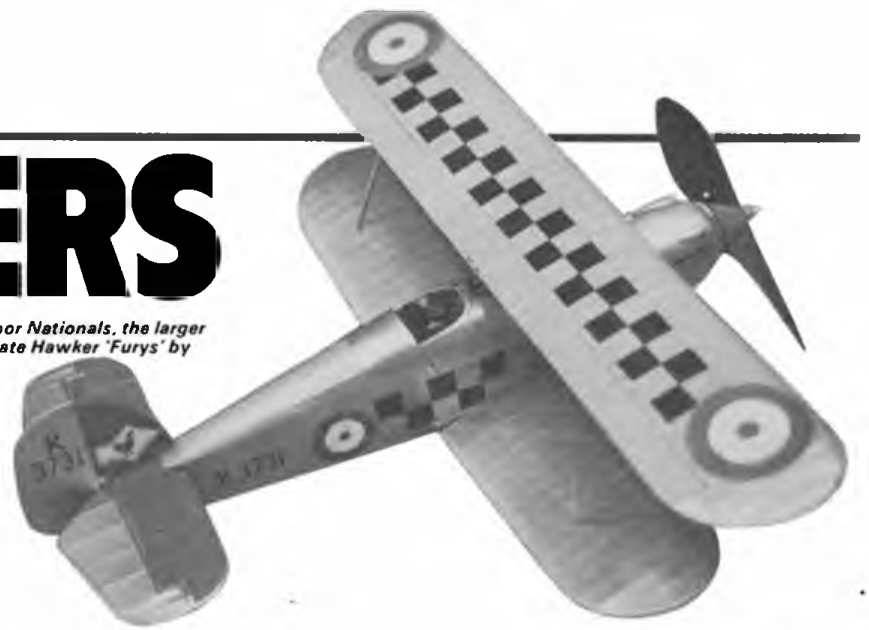


Fig. 5

SCALE MATTERS

Free Flight with Bill Dennis



Seen at the Indoor Nationals, the larger of two immaculate Hawker 'Furys' by Paul Briggs.

Indoor Nationals . . . April 1st

April 1st was one of those days where the appeal of indoor flying was very obvious — cold and windy, with tales of snow 'up north'. The venue was Alumwell Sports Centre at Walsall and it was a very good site indeed. While not quite as salubrious as some other sports centres, it is ideally placed for access from all parts of the country and very important these days, reasonably priced. Although the ceiling was a mass of girders, I don't think any models became entrapped or seriously damaged.

As usual, Peanut attracted the greatest entry, although the gap between this and the other classes narrows each year. First place was taken by Mark Hinton's 'Santos Dumont' with its phenomenal flying performance. Although this was the same subject as Mark has used before, I believe it is a new version. In fact it struck me that many of the top models have been around for some time. Having latched onto a winning formula, the temptation to stick with it is strong, but to me the challenge of scale is always to be tackling new subjects and if they win as well, that is an added — but secondary — bonus.

However, I am glad to report a total absence of the 'Lacey'/'Fike'/'Tailwind' types so beloved of the 'pot hunter'. Instead, a glance through the full results shows a choice of subject far wider than any other scale contest, which must be a sign of a healthy class. Unfortunately, I did not see much of the flying, but the impression I got from the static judging was that many of the peanuts would have swept some of the open rubber models off the table. It is three years since I last attended an indoor meeting and I expected to see an improvement in standards but I was to be disappointed. I was surprised, for example, that at the National Championships, one third of the entry did not bother to present any documentation worth the name and as a result only marks for craftsmanship could be awarded. Another instance was the total absence of scale propellers; in many cases the judges attempts to mark the front elevation were thwarted by ridiculous elephant-ear blades covering the fuselage!

However, none of this detracts from David Wolstenholme's very nice 'Widgeon', which was the only model to score well in both sections and it won by a mile. It was very neatly built and convincingly painted, with only an elongated undercarriage to mar the effect. Altogether a worthy winner of the new *Hotham Trophy*, donated by Barrie — a very attractive Cup in the traditional style, unlike some of the 'things' seen on the table at the *SMAE* prizegiving!

Of particular interest to me was Barry Pursgloves *DH*34 — what a subject for indoor! The model had scale tail surfaces and showed symptoms of inadequate fin/rudder area, as well as being underpowered. Paul Briggs had a brace of very fine looking 'Furys', but flew the smaller one in the contest where it suffered a little through its 'Banshee' type dihedral.

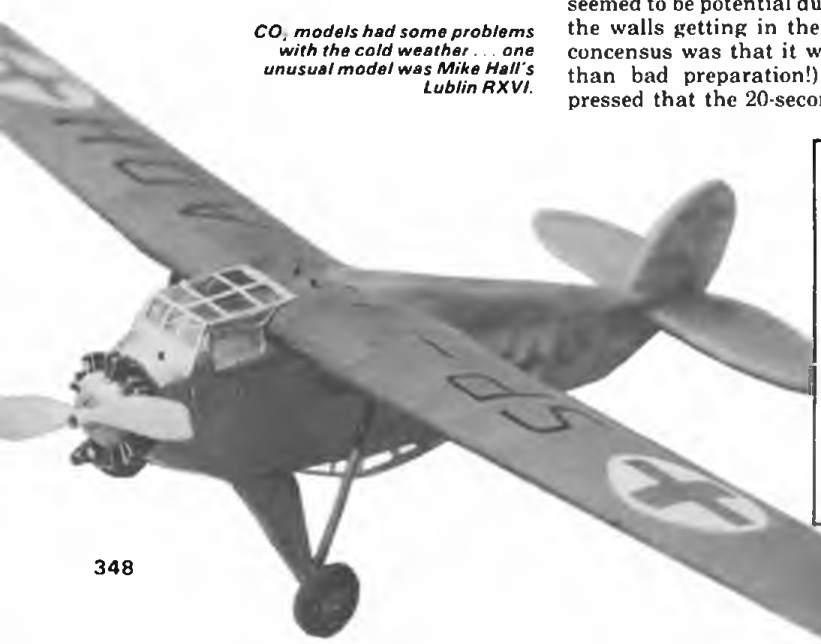
The *Flyline* 'Heinkel 100' is a very popular kit but rather inaccurate. Reg Boor has done a lot of work correcting outlines, reducing the dihedral and tail area but the biggest fault still remains the nose profile. These models always fly well and I am sure they could carry a little extra weight in the way of shaped block around the nose . . . and a coat of paint.

The judges of CO_2 found the standard of presentation similar to that in rubber but the failure rate in qualifying was higher. The limiting factor, surprisingly to me, seemed to be potential duration, rather than the walls getting in the way. The popular concensus was that it was too cold (rather than bad preparation!) Opinion was expressed that the 20-second qualifying time should be reduced, but having flown CO_2 models outdoors for well over a minute in colder conditions, I remain unconvinced, although individual *Telcos* do seem to vary enormously. The knack must be in getting the optimum wing area and loading but I have never seen any guidelines given for the beginner. It would be very useful if readers with successful indoor CO_2 and rubber models could send me details of their models, i.e. area, weight, rubber weight etc., to get some idea of what to aim for. After all, unlike a diesel model, you cannot just put in a bigger CO_2 engine if you need more power!

Again, there was a clear winner — Robin James' *Blackburn* 'Monoplane', which was one of three pre-WWI types in the top five. I particularly liked the 'Lysander' of Barry Pursglove which looked very convincing in the air and M. Leach's *Avro* 504K which was unfortunately a 'wall banger'.

As always, some of the most interesting models were seen outside the contest, including Mike Hall's large *Lublin* RXVI, which would make a very attractive outdoor subject with its wooden wings and silver fuselage and tail. Also present was the seemingly huge uncovered structure of John Blagg's *Blackburn* 'Blackburn' which dwarfed the *Telco* in its nose.

In conclusion, this was a very enjoyable meeting with a good atmosphere and none of the bickering about judges scores experienced at some contests in recent years. All three classes are very open, with no dominating 'experts' and anyone who is prepared to put in a little extra effort has every chance of winning. I for one was encouraged to have a go next year. Incidentally, a raffle for the R/C and C/L teams for the World Championships raised £85, while the judges doing the 'work' were largely R/C types — evidence indeed that scale cuts across all the disciplines.



CO_2 models had some problems with the cold weather . . . one unusual model was Mike Hall's Lublin RXVI.

Results:

Open Rubber - 12 flew

		Static	Flight	Total
1 D Wolstenholme	Widgeon	985	950	1935
2 M Hinton	Santos Dumont	463	1096	1559
3 M Hetherington	Junkers D1	895	636	1531

CO_2/Electric - 14 flew

1 R James	Blackburn Mono	820	1134	1954
2 G Spencer	Tiger Moth	844	798	1642
3 C Strachan	Bristol Prier	292	1112	1404

Peanut - 20 flew

		Static Pos.	Flight Pos
1 M Hinton	Santos Dumont	6	1
2 P Briggs	Sopwith Triplane	1	9
3 M Hetherington	Fokker DVIII	8	3

Seen at High Wycombe was this huge Fokker 'Triplane' built by Geoff Burkett - uses a Merco 61 for power . . .

Odiham Gala . . . April 15th

There was quite a good turnout by F/F standards but it is very disappointing to report that strong winds precluded flying, particularly as most of the models present were untested, underpowered, or both. Nevertheless, static judging revealed that the models were of a fairly uniform high standard, led by John Coker's *Spartan* 'Arrow' which, being new, did not have some of the 'battle scars' worn by the others!

The weather gave me the chance to look under the bonnets of some of the aeroplanes, notably Derek Knight's fine 'Fury', which I last saw at the 1974 Nationals. While the aeroplane needs a little renovation, the beautiful metalwork around the nose is unblemished. On lifting the lid I was surprised to find an *AM*10 mounted upright and totally concealed, with no obvious cooling system. An exhaust collector ring channels the hot gasses out of the engine bay, reducing the load on the relatively inefficient ducting of cooling air through the belly radiator. When the model was first built, Eric Coates described the ingenious system Derek had installed, linking engine power to the rudder and elevator. Put simply, engine crankcase pressure is fed to a diaphragm operated actuator which in turn is linked by pushrods to the control surfaces, giving V.I.T. and autorudder. The ability to reduce tail incidence under power may or may not be useful on a scale model but the great benefit — and the reason why Derek installed it — is that side and downthrust can be eliminated, hence there is no unsightly change of angle between the prop and streamlined nose. Another possible use of this system would be to lower an undercarriage when the engine stops, following retraction via a 'ground sensing' wire lever.

Michael Smith has done an extensive rebuild on his *Bristol* F2B, including correcting the wing incidence and dihedral faults which contributed towards its crash at the Nationals. Mike has also rigged up an optional working scale exhaust system and it will be interesting to see if the long pipes produce too much back pressure. We have still to see this large model perform properly, but the potential is definitely there for very realistic flight performance since its wing loading is lower than average.

The only flying done by the scale types was Eric Coates and Bill Dennis with their *KK* 'Bandit' and 'Slicker 50' and it was interesting to note that the latter does not hold a right power turn any better than a scale model! Let's hope for better weather at Abingdon on July 15th.

Silk . . .

In my recent series on F/F models I mentioned the problem of availability of silk. I recently received a note from Mike Woodhouse who can supply this precious material, in white only, although colours can be ordered. The price is £2.50 and £4.80 for one and two square yards respectively, post free. Mike also has various other goodies, including *Esaki* jap tissue, his address is *12 Marston Lane, Eaton, Norwich, Norfolk, NR4 6LZ.*

The weather was poor at Odiham as can be seen by the 'wrapped up' Charlie Newman holding his Mills 1.3 powered 'Fox Moth.'

Control Line with Vic Willson

High Wycombe Fly-in . . . April 8th

This was the opening event of the '84 C/L Scale season and followed a successful event at this venue during the Autumn of '83.

The day was chilly for standing around and rather dull and overcast for most of the day but for this class of model the very light wind was ideal.

There was a good turn-out of models, some making their first appearance. Ten models were 'entered' and a judging system as pioneered at Old Warden was used, where the two officials (Ron Truelove and Alan Fritz) watched the models fly and assessed their accuracy at leisure during the day. This event was not intended as an out and out competition but more as 'fly for fun' day where models could be test flown or sorted out after a winter lay-off.

Geoff Burkett arrived with his well known *Hanriot* HDI, but more interestingly also brought a huge *Fokker* DRI Triplane (based on the R/C plan by Tony Lunt). This model was the subject of much speculation about its possible flying qualities but all the pundits were silenced (which is more than can be said for the engine!) when it took to the air for its maiden flight, powered by an old *Merco* 61 of dubious vintage. The model performed very well and appeared to be quite stable although requiring considerable down elevator to maintain level flight. It flew several times during the day and promises to be a strong contender in C/L Scale competitions when it is finished.

Another fine new model was Bernard Sexton's 'Gere Sport,' an American light biplane of the type favoured by this painstaking modeller. Powered by an *HB*20 with throttle, it performed satisfactorily, although flying a little too fast for scale appearance.

The remainder of the entry were all well sorted and reliable models, each having several flights during the day. Particularly impressive, as always, were Mick Staples with his *Avro* 504 K, Alan Callaghan's *Miles* 'Satyr' and Chris Brandford's *Nieuport* 17, these three finishing 1st, 2nd and 3rd respectively.

Thanks are due to Ron Truelove, of High Wycombe Club, for organising the event and the number of entries seems to endorse the feeling of last season, that there is a resurgence of interest in C/L Scale, which hopefully will be maintained this season.

Control-Line Scale Events 1984

Above is a list of C/L Scale events scheduled for '84 and any queries about them please contact Vic Willson — Reading 471964.

Control Line Scale Events 1984

Date	Venue	Event	Scale Comp. Licence reqd.
10th June	Amesbury	Scale Competition	Yes
16th/17th June	Old Warden	Aeromodeller Scale Days	No
2nd-8th July	Le Bourget Paris	Scale World Championships	Yes
15th July	RAF Abingdon	Scale Competition	Yes
15th July	Witham, Essex	Scale Competition	No
22nd July	Old Warden	Scale Competition	No
25th-27th August	RAF Barkston Heath	Nat. Championships	Yes
16th September	Croydon	Scale Competition	No

FROM THE HANDLE

CONTROL LINE NEWS

SPEED with Dick McGladdery

1st SMAE Centralised Meeting — Bicester — April 8th

Despite a rather cool day, there were 14 entries, most of whom recorded speeds. Early leader was Dave Brewin with his *K&B* 21N model recording 147.37mph (96.05 per cent on handicap). Switching to propylene fuel promised to improve this score but brought with it setting problems which persisted even when Dave reverted to his previous nitromethane/methanol fuel, so he was thwarted in his efforts. Meanwhile, Alcock/Myszka had pinched top place with their monoline 09 model using Joe's trusty converted *Webra* 'Speedy', scoring 125mph (98.7%). The FAI flyers were struggling to get a decent run in the cold temperature but Peter Halman celebrated his return to the ranks by cracking Gordon Isle's long-standing record and scooping first place thereby. His flight of 158.54 (100.57%) ultimately prevailed for 1st place, with Alcock/Muszka second and late in the day, crafty ol' Dick Miles nipped into 3rd slot with his *K&B* F40 model recording 169.7mph (98.26%) and Paul Eisner took 4th place with 152.6mph (96.79%) with his FAI, pushing Dave Brewin down to 5th place. Three other entrants scored over 90% with Dick McGladdery 6th with 148.74mph (94.35%)-*Rossi* 15 FAI; Martin Radcliffe 7th with 186.73mph (93.07%)-*O.S.*60 and Graham Bryant, 8th with 142.76mph (93.04%) — *OPS* F21. Tail gunner was Ray Cose, in 9th with 167.57mph (83.52%) from his *O.S.* 60.

This was the first meeting under the new management with entrants participating in timekeeping and pull testing, etc. and the positive reaction of all, to this new system contributed to a successful and pleasurable meeting. The next meeting will be the 2nd Centralised at Barkston Heath and hopefully the weather will be kind again and more records will be set.

COMBAT with Brian Waterland

British Diesel Combat Championships — Round 1

Peterborough Model Flying Club ran the first round of the 1984 British Diesel Combat Championships on April 1st 1984. The weather proved to be the biggest joker, providing sleet and strong winds. Twenty-six entries, a two-life system and an eleven o'clock start all combined to give a 7.15p.m. finish!

With entries from as far afield as Grimsby, Leeds, London and Bath the competition certainly lived up to its name. One competitor who deserved a medal was William Wallace who drove all the way from Kirkcaldy, Scotland.

In fact William tied his first round bout with Jeremy Wilson (Cosmo), thus getting at least another four minutes flying time, before emerging victor in the refly.

Despite soft ground the mortality rate was high. Sixty per cent of entrants used foam models and although there appeared to be no clear-cut advantage, most of the last seven in the competition used foamies.

Two competitors found slightly different ways of losing their bouts.

Chris Wellington (P'boro') had a flyaway in his bout with M. Lord (Urmston), the model finishing up on an incompleted section of a dual carriageway while B. Waterland lost two consecutive bouts with broken plastic elevator horns (perhaps the cold got to them!).

In a very close bout Pete Grange (Sharston Speed) flying a diesel converted *Cox* 'Conquest' engine narrowly beat Mick Hember (Cosmo) and his *Oliver* 'Tiger' powered model. Pete finally went out in Round 4 to Neil Gill.

A spot survey of motors used gave the following breakdown. *Oliver* 'Tiger' — 17: *MVVS* — 5: *PAW*19 — 2: *Rossi* — 1: *Super Tigre* — 4: *Cox* 'Conquest' — 1: (The above adds up to more than the entry since some people used different motors in different bouts).

Perhaps the most unusual model was a mono boom built-up wing used by J. Alcock (Bilston). Very fast but possibly a bit low on area.

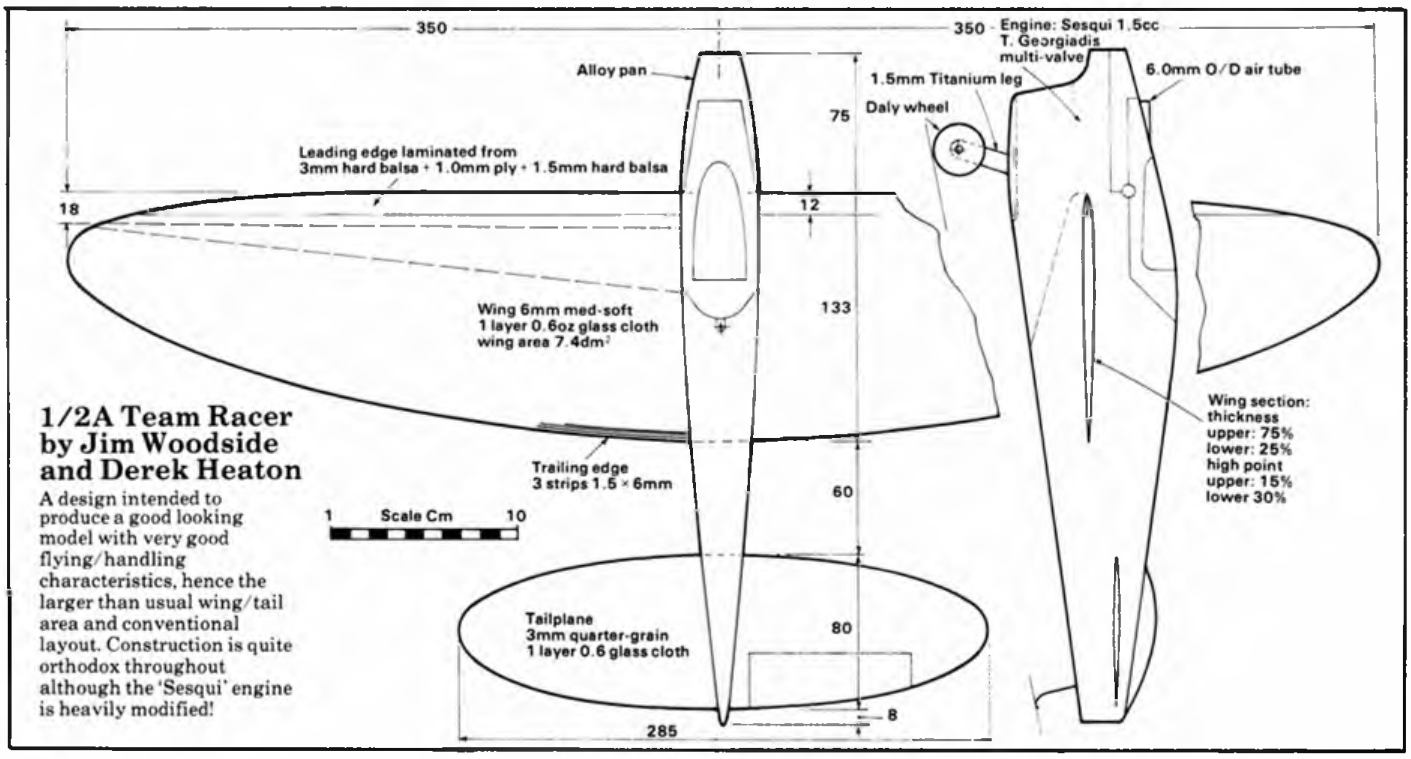
At the end of the fourth round the following fliers had not lost a bout, Mark Jarrett (P'boro') Rob Roy (P'boro') Neil Gill (P'boro') and Ernie Burles (Melksham). Ernie had in fact had the good fortune to get byes in the 4th and 5th rounds!

In addition to the above, the following had lost only one bout. Paul Vallins (Cosmo) J. Alcock and R. Herbert (Thurrock).

Rob Roy met R. Herbert in the semi-finals. With one each they had a re-fly which Rob lost when his engine parted company with his model.

In the other semi Neil Gill beat Ernie Burles (256 to 151) leaving Neil to meet R. Herbert in the final. This Neil narrowly won by one cut to none (195 to 226 points).

In view of the lateness it was decided to fly the 3rd/4th bout at the next event at Barkston Heath on May 6th.



1/2A Team Racer by Jim Woodside and Derek Heaton

A design intended to produce a good looking model with very good flying/handling characteristics, hence the larger than usual wing/tail area and conventional layout. Construction is quite orthodox throughout although the 'Sesqui' engine is heavily modified!

FREE FLIGHT SCENE

Dave Hipperson reports

Dave Greaves waited for ages on this flight before finally maxing out in very marginal air.

Odiham Spring Meeting ... 15.4.84

A CND demonstration at the main gate nearly stopped this one. Some quick thinking and hard work the night before by both South Eastern Officers and host RAF personnel, allowed us in through a rear crash gate checkpoint and equipped everyone with an official pass allowing them to hop on and off the 'drome when required without arrest! The slick operation at this hastily rigged entrance delayed competitors far less than would have been expected.

Dry, overcast, with a moderate wind, encouraged a start but soon the sky cleared and the wind freshened to 20mph, occasionally more. Large powerful lift at regular intervals through the rest of the day made thermal picking easy but *flying* hazardous and recoveries a long hike. Despite the shortened max most good flights landed well off the end of the longest runway. Newham Beaumont had three maxes in Wakefield by early afternoon but was having difficulty finding his model after an enormous third flight 'boomer.' Taylor had completed a respectable score in poorly entered C'dH. He had dropped badly on just two flights. Gibbons likewise had, considering the weather, flown well with his tiny yellow winged CO_2 model to look like the winner in this class. By mid-afternoon, activity was slackening as the chances of a significant drop in the wind looked less likely. As it veered northerly around 4pm 'control' was moved. The immediate reaction to the sensation of slight wind reduction, was to put it down to turbulence! However as more and more were tempted to fly HLG it was soon obvious that some were making respectable flights and not travelling too far in the process. John Buskell started about now, Crisp and Page also putting in some useful flights.

Thirteen minutes before the end of the contest and in now rapidly reducing wind a yellow 'Very' light signalled a hold for full size helicopter activity — it turned out later that he had only come in for a cup of tea! It took 20 minutes before it materialised (the helicopter not the tea!) and so Mike Howick by now a rather cold but game CD was stuck with a final 13 minutes of the contest to fly when and if we were ever allowed to re-start! The minutes of inactivity ticked by and the wind reduced still further. It began to dawn on one and all that the longer the wait — and it seemed like we were in for a long one — the calmer it was likely to be when we started those now final crucial final 13 minutes. A scan of the results sheets particularly in those thinly entered classes revealed many open for the taking with a little planning and two quickly flown maxes — easy for those with the models ... the delay was giving everyone time to think and prepare. Eventually the helicopter left, refreshed, the green 'Very' light went up and Mike Howick sounded the 'start of the finish' as it were. In seconds the air was full of models and the ground covered with people running in all directions — very reminiscent of a scramble.

Beaumont had had time to return from his searching and assemble another model for his last decisive flight — a steep climb into good air won him F1B with a perfect score. Bob Bailey came back out of his corner in F1C to push Bond out of a certain third place and Phil Uden likewise used the time to crash into the placing in F1B with a couple of good flights. Ian Dowsett flew two C'dHs and maxed with both to take second in this class from nowhere. Peter Carter came in third with only four flights total but all good ones. This must have reminded him of a similar instance in '79 when he won this very event by flying all his flights late on in a calm hour after a downpour. Buskell finished off a perfect total in HLG with Mike Page chasing all the way — two seconds behind. In the lightest class both in terms of entry and model weight, poor Gibbons all day leader of CO_2 was pushed out by Benns and Hipperson who made two flights each — the latter nearly making three!

Although the pleasant finale was a popular finish to the event it was hard luck on those that had flown determinedly during the windy part and were now 'pipped at the post.' A chance of a break in the weather is always present in Open events — it's often what maintains interest. Even Mike Howick managed a smile at the end despite his obvious cold. It had not been the sort of day to stand behind a control table. Our thanks to him and whoever decided boldly to issue the full complement of plaques down to third in all events no matter what.

Results

(All FAI — four flights 2:30 max)

F1A — 18 flew

1.	Gregorie	Freebird	9:54
2.	J. Bailey	Biggles	9:13
3.	S. Darmon	Birmingham	9:09

F1B — 7 flew

1.	N. Beaumont	Croydon	10:00
2.	R. Peers	Falcons	9:39
3.	P. Uden	Crookham	9:22

F1C — 5 flew

1.	S. Screen	Birmingham	9:56
2.	P. Harris	Birmingham	9:43
3.	R. Bailey	St. Albans	7:53

HLG — 10 flew (best five of nine, 1 min max)

1.	J. Buskell	Crookham	5:00
2.	M. Page	Peterboro'	4:58
3.	M. Benns	Peterboro'	4:32

CO_2 — 3 flew (Five flights — 2 min max)

1.	M. Benns	Peterboro'	7:27
2.	D. Hipperson	Grantham	6:00
3.	P. Gibbons	Peterboro'	5:34

C'dH — 6 flew (Five flights — 2 min max)

1.	D. Taylor	Richmond	7:33
2.	I. Dowsett	Croydon	7:30
3.	P. Carter	Croydon	7:25

Together they struggle ... with the remains of a Judge Vintage Wakefield after fuselage collapse - seen at the Odiham Spring meeting.

2nd Area Centralised ... 25.3.84

Those that flew in the South of the country had no chance on Gamage day. Gales brought heavy and often continuous rain from Merryfield to Ashdown. It is clearly illustrated by the names of the clubs topping the results that better weather existed in the

Midlands and the North. Still not good ... but better.

Even here winds rose quickly to fresh and in most places long periods, in some cases continuous rain from lunch-time made visibility and soggy structure a headache. At Albermarle two Tynemouth clubmates Fairless and Brown probably surprised themselves as much as anyone else by topping the Gamage with very modest fly-offs that bore little relation to the time airborne but did at least give a measure of rain density! Phil Ball doing much the same at Barkston vanished at a little over 1½ minutes in heavy rain when a few minutes later it stopped altogether and calmed off! John Pool will doubtless be able to remind himself in the years to come of the day he could have won the Gamage. He did not bother to fly-off at Driffield after a late last max left him too easily convinced that it was *saner* to stop. It was probably the only place where it was *not* raining — he could have won it!

At Barkston, where incidentally more people flew than in the rest of the country put together, many were caught by the rain that set in at lunch time. A number of rubber fliers stopped at two maxes when they realised they would never be seen for the third but Kinder of Falcons managed a reasonable last glider flight in the wet after two maxes and although the model vanished, the score as enough to give him his first major win. Chas Plant — well known for his ability in rough weather — maxed twice at Driffield but dropped his middle flight to take second ahead of Pollard at Albermarle whose flights deteriorated along with the weather after a first max.

There seems almost an air of resignation amonst F1C fliers when it gets a little windy. They seem resigned to the fact that they will not beat Stafford Screen even if they try ... so they don't try. Credit to him therefore that even without the stimulus of competition he flew magnificently. Wary of the approaching rain he had made all his five flights before 2pm. They were all maxes and showed utter contempt for the 20mph wind. The flights I saw, climbed straight and almost vertically to tremendous altitude without so much as a twitch. True he had strong and encouraging ground support from his club-mates but his performance in the Halifax this year puts into even sharper focus the growing opinion that he is in a completely different league to his fellow F1C fliers. Dare I suggest almost a case for a 'season ticket' to the British F1C teams — certainly whilst this apathy from his competitors continues.

The lure of Plugge points at least kept Bailey of Biggles flying to the end, despite his last two disappearing quickly into the rain. At Watton, Bob Wells put up a fine show on behalf of his club and last year's Plugge winners, Anglia. Bob's flights tailed off as Watton felt the full effects of increased wind and rain by mid-afternoon. One wonders what Bob thought of his F1C equipped clubmates that attended Barkston and didn't even return a score!

Results

Open Glider — 15 flew

1. M. Kinder	Falcons	7:45
2. C. R. Plant	Darlington	7:17
3. R. Pollard	Tynemouth	6:45

Open Rubber Gamage Cup — 15 flew

1. S. Fairless	Tynemouth	9:00 + 2:26
2. A. Brown	Tynemouth	9:00 + 2:25
3. P. Ball	Grantham	9:00 + 1:36
4. J. Pool	NYFFG	9:00

F1C Halifax Trophy — 10 flew

1. S. Screen	Birmingham	15:00
2. J. Bailey	Biggles	12:25
3. A. Wells	Anglia	12:23

Plugge positions after two events

Biggles	408
Birmingham	349
Crookham	306
Anglia	254
B&W	251
Grantham	251

Left and below: propeller blades using 'fanblock' construction - almost ready to carve.

Above: 'fan Block' after the back of the blade has been carved to a flat helical surface.

Prop blades from constructed blanks

I have always had rather an aversion to prop blades carved from ½in. sheet. Most examples seem to look too much like warped lolly sticks and my own experiments although satisfactory, involved a lot of marking up that didn't seem worth the time for an inferior product, despite the economies in balsa. Nevertheless it still seems wasteful to carve any prop from a complete block particularly now when the large diameters and pitches typical of the modern Open Rubber model are contemplated. It stands to reason that if a blank could be constructed to more closely resemble the finished blade, wood and time could be saved.

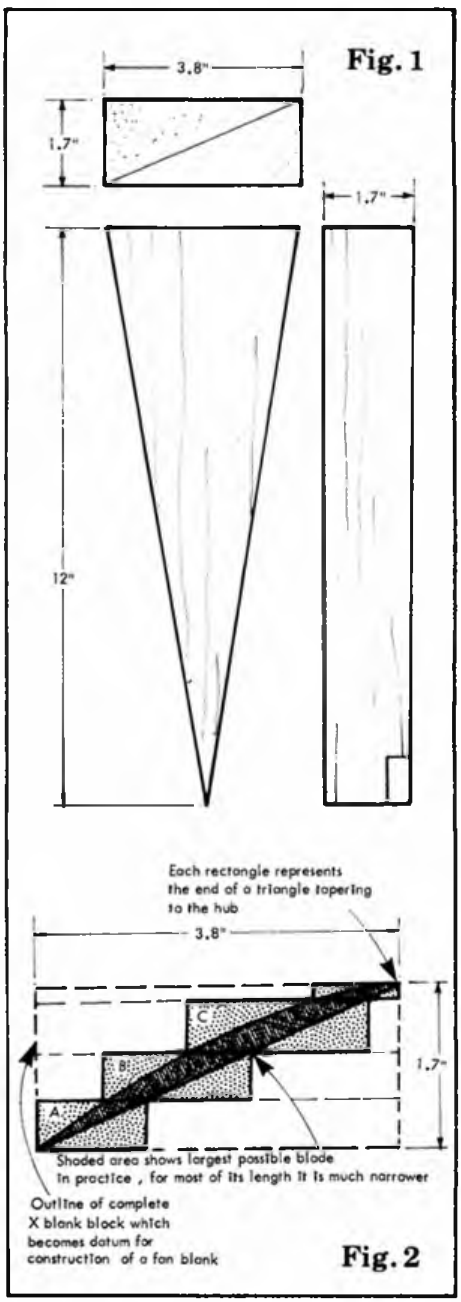
The best solutions are often simple and now, having experimented, I can recommend this 'Fan' arrangement. I have successfully applied it to the production of quite a fair sized prop — 24in. × 34in. pitch with enormous savings in time, balsa and mess but without losing the repeatability and precise helical configuration inherent when working from a complete 'X' blank. (Ref. my article on carving props *Aeromodeller* August 1966 page 446!).

The full-scale 'X' blank plan was drawn first and it was immediately evident, that requiring wide blades and such coarse pitch a very deep block would have been necessary — 1.7in. Thus the construction would require three pieces of ½in. sheet plus an extra piece of 3/16in. sheet to make up this depth. (Fig. 1). From a full scale drawing of the end of the block the maximum widths of the individual segments of the fan could be estimated, allowing of course for the thickness of the blade. (Fig. 2). At this stage it was thought safest to presume a triangular blade. In other words superimpose a complete full thickness blade section on the tip block diagram so you are sure to have sufficient thickness of balsa all the way down the blade.

I actually made a scale drawing of each of the four segments at this stage, which proved largely unnecessary as only the rear lamination or bottom piece 'A' affects the shape of the hub. It is only this piece that extends that far, once the blade is finally shaped — the other laminations being eventually carved away. It is important that your 'gluing-up' comes out with the correct blank width at the tip, and with trailing and leading edges coincident with the plan view of the 'X' block ... as it is the position of these, that govern the pitch. The laminations are glued with balsa cement and as overlapping areas need not be huge (unless you have been very generous) drying time should only be a few hours in a warm room. Be on the safe side though as it would be a nuisance to hit a wet seam when carving and of course cement does shrink, so let it do all its shrinking while the blade is in a rigid block form. Whilst drying, the assembled pieces should be pinned together (it would be a very difficult shape to clamp effectively!). If the laminations are arranged so that the steps on the underside coincide exactly with the bottom of the flat blade surface, it can form a very useful datum when carving the back.

Of course, the blank need not be constructed of ½in. sheet. Many more thinner laminations could be tried to effect smaller steps and thus an ever greater balsa saving, although of course too much glue would present some weight penalty if this was taken to extremes. Against the slight disadvantage of the marking up, which itself can be greatly reduced once you have the hang of things, there are the very considerable gains of consuming less than 1/3 as much balsa and remember good quality (light) sheet is much easier to find than similar density block. On top of this the

Another Vintage Wakefield at Odiham - a considerably modified '39 'Korda' from P. Norman. Nice launch but poor flight!



slight cross graining effects and of course the glue seams themselves add considerably to stiffness, so super-light wood could be used and harder density sheet introduced wherever extra strength is required, such as the trailing edge lamination that forms the hub (piece 'A'). Just one sheetof light ½in. sheet 4in. × 36in. and a small piece of 3/16in. sheet was all that was necessary to construct two of these large blades. The resulting finished blades with tissue and dope — six grams each.

Stop the contest — I'm ahead

Many if not all of our best venues are the subject of regular and sensitive renegotiation. Often we are made to feel that our presence is a matter of fine balance. So it is particularly interesting to consider that during the past 20 years or so when venues were lost to us it was almost invariably nothing to do with our behaviour either on the 'drome or around it. Much more likely, the entire matter was completely out of our hands; the sale of the land, road schemes, change of military use etc. That is not to say we should feel free to run riot and of course tactful behaviour never *lost* any sites but let us not allow 'site sensitivity' as it is known nowadays to swamp the issue.

In some cases I believe we are approaching a situation where the access to sites is becoming more important than the purpose to which we put them! Once started, the contest is the most important thing otherwise why go to all the trouble of finding a site to fly on? There is a school of thought that disagrees with this and would have us cancel or postpone events if in *their* opinion the site availability in the future might be threatened by its use on any particular day. But just what constitutes risk and in who's opinion? An even more disturbing aspect to this is the definite tactical flavour colouring some of the louder voices of this opinion. One wonders ... when models are landing outside the site and long retrievals are involved, are these people really concerned for relations quite as much as for their models. Is it not perhaps flying in a wind that really concerns them?

It is quite obviously in everyone's interest to endeavour to schedule events on suitable venues rather than hoping for the best and then applying drastic and usually ineffective restrictions on the day, like reduced maxes and downwind launch limits. The alternative is to allow the CD to call a halt at his discretion. Thankfully this is presently only allowed in the case of trials under SMAE rules.

If last minute cancellations became the norm I can see attendance dropping drastically even perhaps vanishing altogether in all but perfect weather.

It is interesting to note that it is usually those that live relatively close to a contest venue that come down in favour of the cancellation idea. Tell a man he might be wasting a journey of 80 miles and he will probably risk it but a round trip of 200 plus? I wouldn't and I am keener than average.

Let us not forget we require large sites for *competitions*. There are many more places for casual flying sessions on calm days and they are invariably closer to home. That is not to say both cannot occur at a contest when the weather permits but don't lose sight of the reasons we go to all this trouble. Unless we fly them in contests our models are, sad to say, intrisically so much junk!

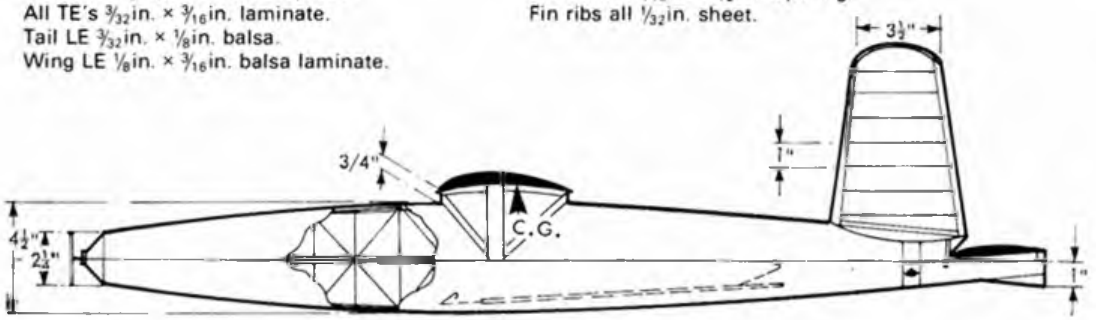
1950 Rule Wakefield

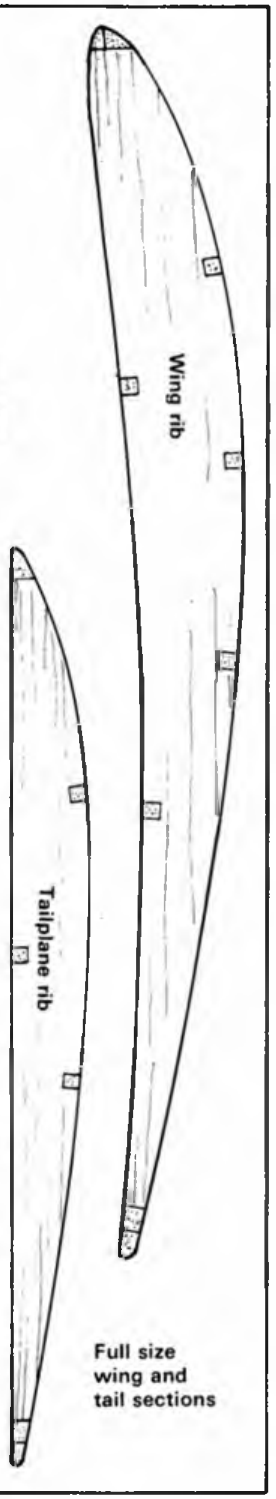
Bob Wells initiated his idea of a mixed vintage Wakefield day with the intention of encouraging the 1953 rule models. It attracted a few enthusiasts but never caught on, instead, the true vintage model, also part of the proceedings, became the most popular . . . probably because such models were also suitable for *SMAE* events. Since the beginning some six years ago the appearance of *SAM* has done much to foster still greater interest and their rather looser adherance to both the original and the current *SMAE* rules has encouraged modifications to good effect without losing the overall spirit of Vintage flying. It is logical therefore that an idea muted for some time has finally emerged as a new contest class. At the Anglia Wakefield day towards the end of the season the main event will be for *any design* as long as it complies with the Wakefield rules circa 1950. These necessitate an all up weight of at least 8oz., a wing area of 200sq.in. plus or minus 10sq.in. and a tail area of no more than one-third of the wing. If like me you take the rules to the limit you build a 210sq.in. wing and a 70sq.in. tail. It's the restrictions governing the fuselage that make life difficult. Its cross section and that does not include parts of the wing

Russell Peers showing grim determination as he prepars for the off - watch that wing Russell!

Wings and tailplane
All ribs 1/32in. sheet balsa.
All spars. Hard 1/16in.sq. balsa except top centre wing spar which is spruce.
All TE's 3/32in. × 3/16in. laminate.
Tail LE 3/32in. × 1/8in. balsa.
Wing LE 1/8in. × 3/16in. balsa laminate.

Fuselage and fin
Longerons hard 1/8in.sq.
Spacers and diagonals medium 1/8in. × 1/16in.
Fin outline 1/16in. × 1/2in. tapering.
Fin ribs all 1/32in. sheet.



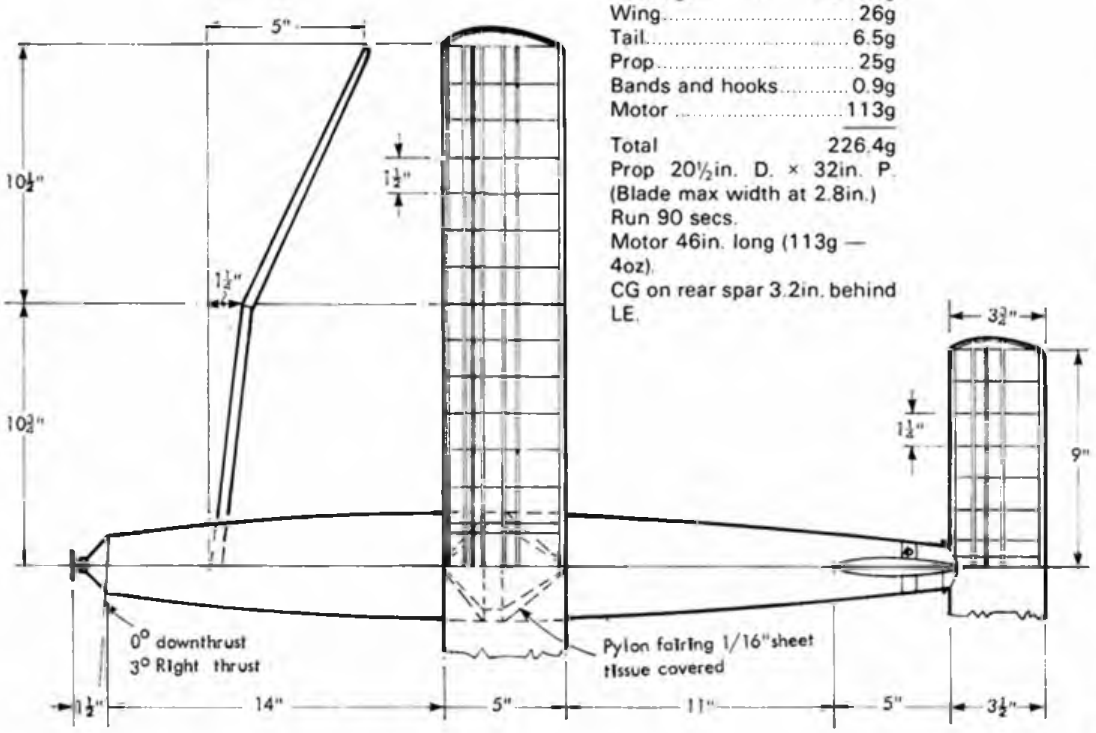


1950 Rule Wakefield
by Dave Hipperson

Weights:

Fuselage	55g
Wing	26g
Tail	6.5g
Prop	25g
Bands and hooks	0.9g
Motor	113g
Total	226.4g

Prop 20½in. D. × 32in. P. (Blade max width at 2.8in.)
Run 90 secs.
Motor 46in. long (113g — 4oz).
CG on rear spar 3.2in. behind LE.



Scale: 1/8th full size

Full size wing and tail sections

that might be built into the fuselage, has to be equal to the square of the overall length divided by 100. Therefore to avoid too huge a cross-section destroying the glide from the already heavily loaded and relatively small wing it is necessary to limit the length of the fuselage drastically and that makes holding large amounts of rubber difficult.

I and it seems numerous others, were rather surprised by the performance of my 'Korda' at last year's meeting and of course this model meets both the original rules and the *SMAE* definitions of a Vintage model. Encouraged by this model's consistency as much as by its duration I have designed and built my prototype 'own design' around the same principles. Gears were considered, but in my experience a long slowish run is not actually what a small heavily loaded model likes best. A short running fast climbing model has been aimed for. Even this could have been subdued with a larger prop, but this too has been actively avoided as experience with the '53 rule models over the past few years has pointed towards too large a prop on a small winged model tending to de-stabilise the pattern under power, particularly towards the end of the run. Such a set-up often became hyper-critical on the climb, resulting in power stalls which would not damp out.

The power plant was estimated at 4oz. of rubber turning a modest sized but fairly coarse pitch double-blade folder. The structure was strongly built with the 4oz. available and quite a long fuselage (40in.) meaning a penalty of 16sq.in. cross-section. The wing section is the reliable *Davies* or more accurately my modification of it with multi-spars as is usual on my 'Skywalker' series of Open models. The model has plenty of dihedral too, to help control the very energetic start to the 90 second climb.

I would not be a bit surprised if it glides no better than the 'Korda' but expect that it will climb sufficiently higher and for slightly longer to make flights of 4:00 - 4:20. Will that be enough?

Going Solo

Part 4 Solo II Glider

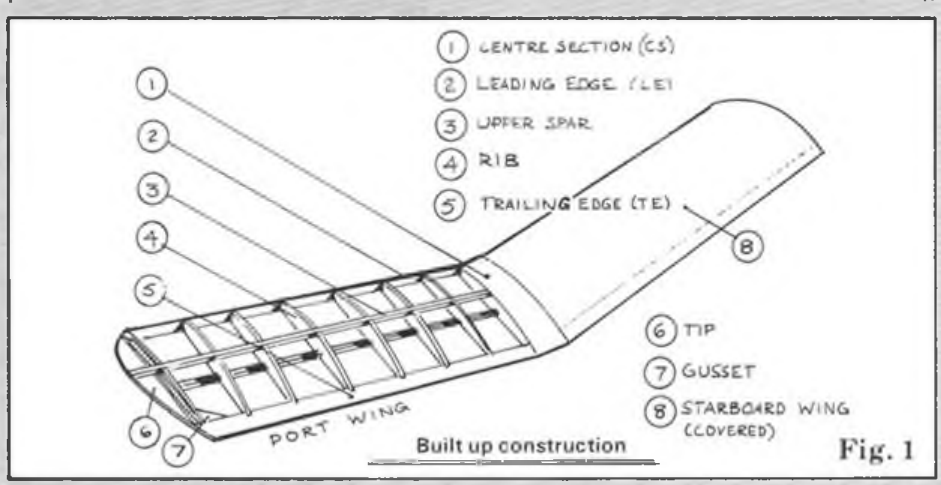
a practical approach for the beginner with Trevor Faulkner

IN PREVIOUS INSTALMENTS our models have used a direct method of marking-out the wood which has not required the use of a *full-size plan*. As you have probably noticed by reference to magazines and books about aeromodelling, this is not the most common way of proceeding; it only works best when all-sheet construction is involved.

The built-up system relies on a framework being made (Fig. 1); this is then covered with tissue or plastic film which provides the surfaces of the required components.

The framework may appear fragile in some instances but it has one enormous advantage ... it is light in weight by comparison with similar 'solid' constructions. As models become larger the more noticeable this weight factor becomes. For example, suppose your 'Trim Trainer' was to be built twice the original size, (span, length, wood thickness). The new version would weigh eight times that of the prototype. Reason? Well although each bit is only twice original size measured in one direction, it becomes four times the area and eight times the volume of its smaller brother!

There's a saying in modelling that 'nothing weighs less than nothing'. So when we build up a framework, we're actually producing empty spaces outlined by small pieces of balsa.



Built up construction

Fig. 1

The covering contains these spaces and the volume of material is drastically reduced by comparison with a 'solid' version. There is another definite advantage . . . it is cheaper!

Of course, it is impossible to mark out every component as we have done until now and then assemble a multitude of bits accurately without having some sort of guide. The most useful aid is a *plan* and most kits will contain plans for all but the simplest, or almost-finished models. Plans of a high standard are available from the *Aeromodeller Plans Service* and if you find that the modelling bug bites you, it's a safe bet that before long you'll find great satisfaction in simply 'reading' the plans printed at a reduced size in this magazine. You don't have to build every model shown in order to get some benefit from it.

Plans

In 'Going Solo' we're attempting to move smoothly from one aspect of aeromodelling to the next, giving something to build or do each time. On this occasion, we shall need to draw a very simple plan for ourselves (Fig. 2), by doing this, even the young reader who doesn't have engineering drawing lessons at school will begin to understand how these things work.

A sheet of paper about 20in. × 12in. will be needed. Although its nice to have a piece of good quality 'cartridge' paper from an office stationer's or an art shop, shelf-lining paper can be a reasonable substitute. It's not so tough, so go easy on the rubbing out if mistakes occur. Better to put a series of crosses on wrong lines.

(Those readers who find this part rather basic can jump ahead).

The paper must be placed on a smooth flat surface which can then act as a drawing board. You'll also need a rule, (18in. or more if possible) and a set-square. Fasten your paper down with masking tape or Sellotape. Have a good look at the dimensioned sketch to ensure that you know what your drawing will look like. The wing will be drawn in two halves and the stabiliser (tailplane) as a single part.

Start with a straight line about ½in. from the bottom of the paper and go all the length of the sheet.

Draw a line at 90° to this 'base line' about ½in. from the left hand side of the sheet all the way up. The two lines intersect at a point we'll call 'A'.

Measure 18in. from 'A' along the base line. From here ('B') draw another line at 90° as shown. Up both the lines from 'A' and 'B', measure the following distances carefully. 4in. then 1in. then 4in. If your rule is long enough, join these measurements to give three lines parallel with the base line. If your rule falls short, either use a straight edge which will span the gap or repeat the vertical measurements as at 'A' and 'B' but somewhere in the centre of the base line. (Incidentally, a straight edge can be almost anything which will guide your pencil in a straight line. Check straight edges by 'sighting' along them from one end. Any curve becomes obvious). Now transfer the measurements shown in the drawing to your plan. Label the two lines in the centre 'T.E.' (trailing edge) and project the measurements required up to and then beyond them. This will give you a grid on which to work as described later.

The stabiliser plan (Fig. 3) is easy . . . just follow the system as for the wing panels, referring to the illustration if any doubts remain in your mind.

The building board

This has two crucial requirements, (i) flatness, and (ii) that it takes pins easily. Sometimes you'll find a piece of chip-board or block-board which is flat and of the size required, (about 24in. × 12in. would be ideal for this model). Unfortunately, these materials can be very resistant as far as pins are concerned. Don't despair. Get a piece of insulation board, (a cheap material of a soft fibrous nature) which can be glued down to your flat but harder board. Of course, a pensioned-off drawing board (especially the light-weight obeche-wood type) is first class if one can be found, and for the cheapest board of all, a hefty section of expanded polystyrene packing, (such as used for protecting fridges, etc.) could be a good substitute if all else fails. *Whatever you do, don't build on a warped board and then expect things to be right . . . they won't be.*

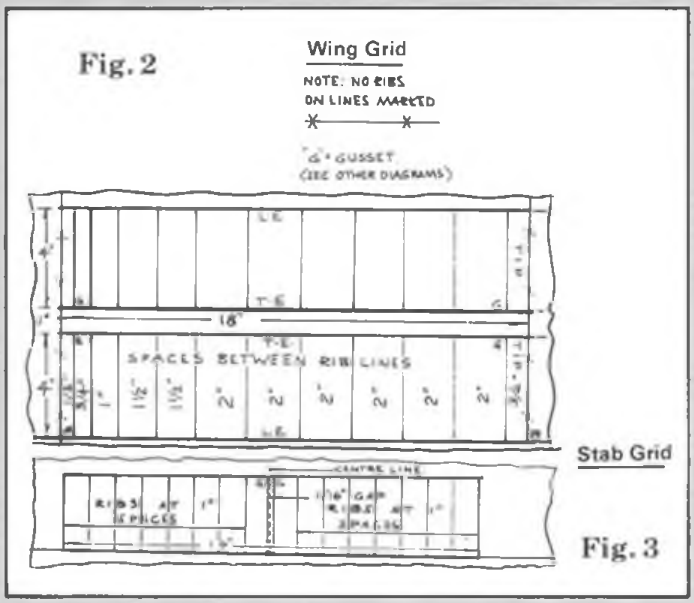
Lay your plan flat on the board, ironing out any creases if the paper has become wrinkled. Fasten it down in any way you choose. Over the top, to protect it from adhesives, fasten a sheet of thin plastic (Fig. 4). (The stuff in which clothes return from the dry cleaners is excellent).

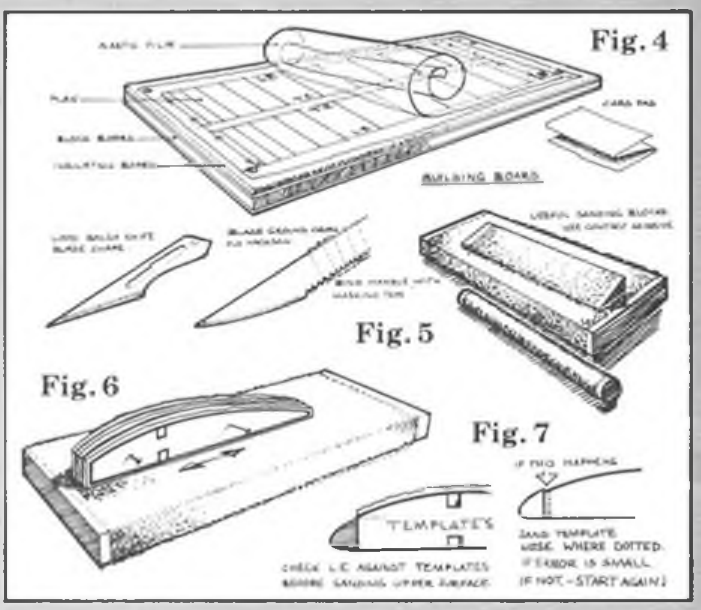
Finally, sort out some old card and double this to form a pad. Always do as much cutting as you can on this pad. Because it's fairly soft, it won't spoil the edge of you balsa knife or razor blade.

Other tools and equipment

Reference was made in Part 2 to sanding blocks and blades (Fig. 5) for balsa-cutting. If you didn't get a knife with a handle, get one now and feel the difference! Knives for balsa *must* be sharp. Sanding blocks are equally crucial. You can hardly have too many. Have a session making up blocks and applying grit-paper and produce a variety of shapes and sizes.

Assemble some other bits and pieces . . . a box of pins, a couple of strong needles about 1/16in. in diameter and an old hacksaw blade section, about 6in. long. It doesn't matter if the blade is broken, as a piece is all that we need. A nail-file helps with slotting the ribs to take the spars.





Wood selection

Choose a piece of light quarter grain 1/16in. × 4in. × 36in. for wing and stab. ribs, two lengths of 1/4in. sq. for spars, (these must be straight in direction and grain), one piece of 1/16in. × 1/4in. for the stab spar and a length of hard 1/8in. sq. for the stab leading edge. The leading edge of the wing is best bought as a shaped section approximately 1/4in. × 1/2in. and the wing trailing edge is a special section 3/8in. × 1/8in. (See diagrams). For the stab. you'll find it difficult to get a triangular section of the small size required, and so this part will be sanded from a strip 1/4in. × 1/16in. In fact, the problems of getting shaped sections of stock for L.E. and T.E. can present the beginner with considerable difficulty. Not all model shops carry a wide range of the smaller sizes and the majority of experienced modellers either shape their own or design their models to avoid the need for these special shapes. Because of this, pay particular attention to the advice in Fig. 8. If you can't get what you want, buy strip material and make your own sections as described.

Rib templates

We've met these before (Fig. 17) with the sheet wing version of Solo I. With the exception of spar slots, the shaping of these parts is exactly the same. Cut them from a sheet of ply about 1/16in. thick using a fret saw on the outside of lines transferred to the wood by pricking through the full-size template shape shown. Hold the sawn templates together with a couple of pins tapped through both. Stand them on your sanding block and keeping them upright, sand the lower edges smooth and level (Fig. 6). Before finishing the upper surfaces, take a piece of your balsa leading edge, (shaped or unshaped) and hold it against the template with bottom of strip and template level. Now, check that the curved surface of the template *does not come below that of the L.E. section*. Mark the height of the L.E. on the ply and proceed to sand the upper surface down to this mark (Fig. 7). At the T.E. the ribs are going to be inserted into this part by 1/16in. to assist assembly and to create a stronger job. So the rear of the rib template *at the point shown* (Fig. 17) must match the thickest part of the T.E.

Mark the slots for the spars very carefully (Fig. 13). They must be in line. Saw them out on the waste side of the line (Fig. 12) so that you have to file back to the full-size. Just before you reach the line, check that a strip of 1/4in. sq. will fit in snugly. (Not forced in, nor sloppy). The fit of spars into slots is crucial when building this sort of wing. If your templates are not good enough, scrap them and make another, better, pair.

The stab. ribs are made in the same way with reductions in the size of spar, L.E. and T.E.

Rib shaping

The wing ribs are 1/2in. deep, and so a block of oversize rectangles of balsa 3 3/4in. × 1/2in. are cut. (Refer also to 'Going Solo', Part 2). You'll need 22 of these from your 1/16in. sheet. If you're handy with woodworking tools, you'll find that a marking gauge is just the thing for stripping 1/2in. wide lengths from the sheet. If you're not familiar with this tool, mark the strips in the normal way and cut off with a balsa knife using a straight edge.

Stack about eight of these rectangles together (Fig. 10) and force pins through the ply and into the balsa. This produces a ply-balsa 'sandwich'; (this is the name by which the technique is commonly known); sand the whole sandwich to match the templates.

Using your section of hack-saw blade, gently saw the top spar slot, easing it open to the correct size. (Special slotting files can be had which help in doing this job but the saw-blade can start the slot and then the work finished using a balsa knife or stiff-backed razor blade.) Check the size of the slot with a 1/4in. square strip and when you're satisfied, pack the slot with scrap balsa, (e.g. two strips of 1/16in. × 1/8in. — Fig. 11, before turning the job over and cutting the lower surface slot. By now, you'll have realised how valuable your sanding blocks are for controlled, accurate work. It's a lesson well learned.

Shaping balsa sections

Let us assume that your local model shop has no 1/4in. × 1/2in. L.E. balsa in stock. This is what you do. Buy a straight-grained piece of medium weight 1/4in. sq. strip. Make a mark along one face approximately 1/16in. from one edge. Use a marking gauge, compasses or even first finger and thumb-nail for this (Fig. 14). Run a soft pencil or fibre-marker along this groove to make it show clearly. Shave the top corner of the strip off with a knife (Fig. 15) until the chamfer looks like that in the diagram. With your sanding block *stroke* the wood away from the point at which you're holding it to get a rounded surface. Turn the strip over and round the lower side as shown (Fig. 16). Always use your sanding blocks lightly. A coarse grit used lightly will distort the wood less than a fine one used heavily.

The trailing edge is harder to shape, even though it may appear simpler. The difficulty is that material needs to be removed from the top surface only and this will make the wood bow upwards. A good tip is to make a number of marks across the top surface before starting to sand (Fig. 8), using a fibre-tip pen or very soft pencil so as not to score the wood. As sanding proceeds, the marks will guide you by showing how even or otherwise your efforts are. After the shape has been achieved, turn the wood over and lightly sand the underside until the strip flattens. One of the best tools for removing wood in a safe and controlled way is a *razor plane*. This little chap takes a heavy type of razor blade and will remove fine shavings with great accuracy. If you're going to stay with the hobby for a while, it's a good contender for a place on your 'Christmas list'. Again, for those with a competence in woodwork, a well-sharpened, small 'low-angle' plane is equally efficient, although its extra

weight makes careful handling essential.

Figure 18 will show you most of the steps in building the wing-panels from the prepared parts. As the sections are deliberately generous there's no reason why you shouldn't pin through L.E. and T.E. strips to hold them flat. *Don't pin through the spars.* But before we start juggling the parts around, take a special note of the way the T.E. is notched to accept the rear of the ribs. These notches only 1/16in. deep × 1/16in. wide ensure that the ribs don't wander when you start assembly. Pin two T.Es together as shown (Fig. 9), having marked them with the rib-spacings from your plan. Make a shallow cut (1/16in.) with your hacksaw blade to the *right* of each mark. Then with a razor blade ease a little wood from the *right* of the saw cut until the slot will accept a rib comfortably, very much like the spars in the rib-slots. This will leave you with the mark still visible and a correctly sized slot on its right. Do this 11 times to get the 22 slots required in the trailing edges.

Now pin the T.Es to the board, take an 18in. length of your spar material and one rib. Put the rib in the T.E. slot, (no glue yet) and adjust the spar to sit in the lower rib slot. Do this with another rib at the other end of the wing panel so that the spar is located at each end. Assemble two more ribs at fairly even spaces along the panel and offer up half your L.E. strip. If all is well, this should have its front end in line with the L.E. drawn on the plan. If not, check through carefully and if you've got a set of slightly undersize or oversize ribs, just use the drawn line as a guide. Pin the L.E. in place. Now start fitting and glueing the seven ribs not used so far in the panel.

Squeeze some PVA (white) glue onto a scrap of plastic or similar non-absorbent stuff and dip each rib front and rear onto the glue. With a small stick, glue the lower rib slot and the T.E. notch. Push the rib into place making sure it stands upright and flat to the board.

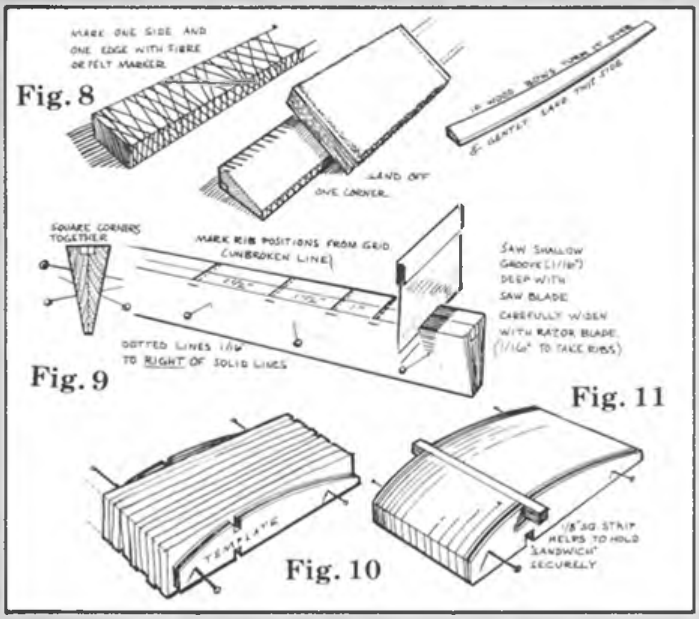
Repeat this until all seven ribs are glued in place, then remove the original four, glue them, and add the upper spar, (glued into the slots, of course.) Before the glue sets, check each rib carefully. Is it 'home' in the T.E. slot? Does it contact the L.E. properly? Is the lower spar flat on the board? (If not, pin the spar closer by inserting sloping pins from either side to keep the spar flat). Finally, is the top spar lined up in its slots and not undulating half-in, half-out? (The top surface of the wing will only be smooth if spar and ribs are flush. You can always sand a *little* from a protruding rib. Never sand a spar ... better to add a sliver of wood to the rib and sand that to match the spar.

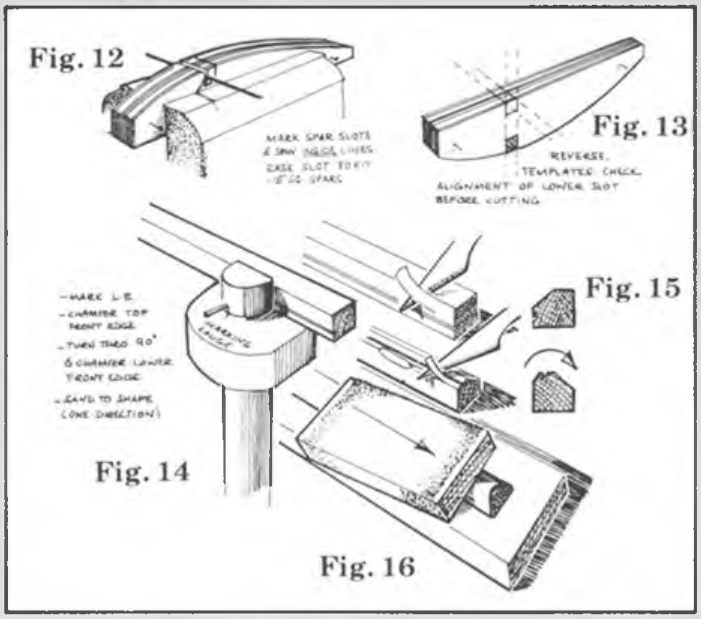
The second panel is the mirror image of the first, while the stabiliser is a miniature version of both.

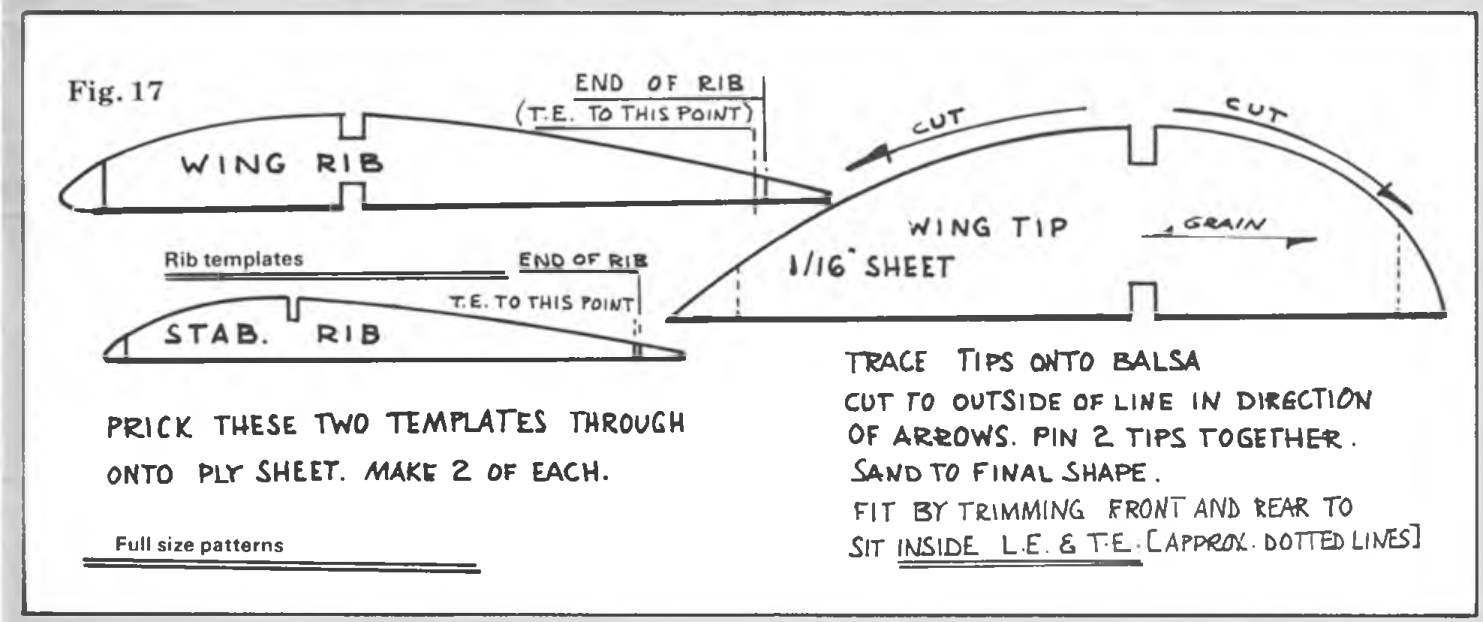
Leave these items overnight to dry if you possibly can and prepare the simple dihedral jig guide (Fig. 20) and the wing-tip shapes (Fig. 17). The ply dihedral keepers (Fig. 23) can be made, again with as much accuracy as you can manage. The dihedral joints are always areas of 'stress concentration' . . . which means that's where the likelihood of breakage is focused. Time spent getting this bit right is never wasted.

Wing tips and dihedral joint

Refer to the drawings for detail marking and cutting the curved tip parts from scrap 1/16in. sheet. The slots for the spars are arranged to let the tip be glued to the bottom of the end rib, *over* the lower spar and *under*







the upper one. Glue tip to spars and when dry, trim the projecting sections of 1/8in. sq. (Fig. 19). Examine the dihedral joint (Fig. 21); its slope means that the lower spar will be longer than the upper ... *don't get it the other way round!* ... Fasten the dihedral jig to a bench or table so that it projects a couple of inches or so (Fig. 22). One of the wing panels will need to be trimmed with the T.E. *upwards*, the other with the L.E. in that position. It's a good idea to draw a sloping line across the spars front and rear as shown, to help you visualise the angles involved.

When you're happy about the system, chamfer the L.E. (or T.E.) depending on which panel you treat first), then trim the spars and finally the T.E. (or L.E.).

Stand the *wing roots* (i.e. the pieces you have just worked on) on your large sanding block to check the level of the chamfers. If necessary, rub the panels gently back and forth to ensure that all the chamfers are on the same plane.

When things look ready, fasten one panel to your building board offer the other panel to it and support the sloping panel as shown. Make sure that both leading edges and trailing edges are in contact with the board, otherwise the panels will appear differently angled when seen from the front (Fig. 24). Then glue the two biggest dihedral keepers in place, holding them either side of the spars with clothes-pegs. While this is drying, work a little glue between the chamfers on L.Es and T.Es. Let the glue dry completely before you lift the panels from the board and add the small dihedral keepers (or braces, as they're sometimes called) at front and rear. Clamp again with pegs and leave to dry.

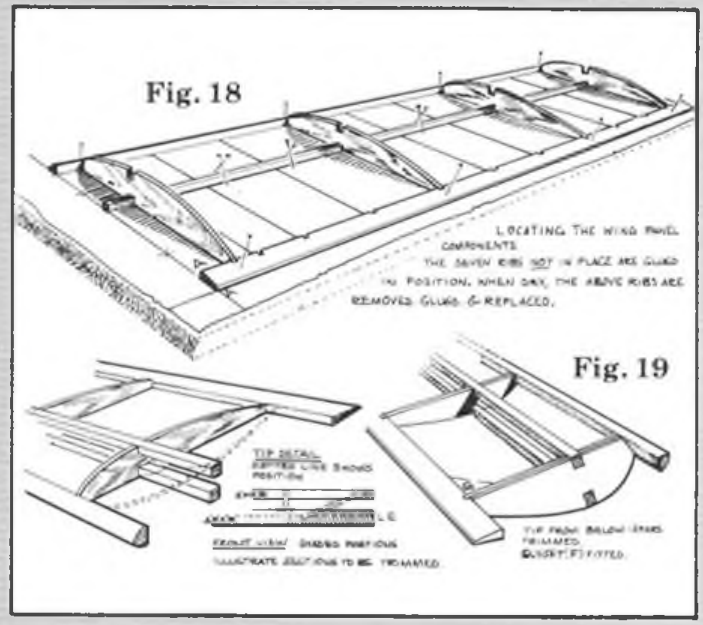
The narrow *centre section* between the two centre ribs is sheeted with scrap 1/16in. You'll need to add a bit of shaped scrap to the upper sides of both L.E. and T.E. to level off the shallow 'V' where they join (Fig. 25). Again, let dry and now sand the whole of the underside of the centre section to remove the points of the 'V' forms where they join. Finally, cut scrap 1/16in. sheet to fill between the lower surfaces of the centre ribs, making sure that the sheet is neatly fitted and glued (Fig. 26). Carefully sand the underside centre-section flat; this part is eventually glued to the incidence block and wing locator in exactly the same way as in the case of 'Solo I', but *after* the wing has been covered and doped. Note and fit the gussets where shown.

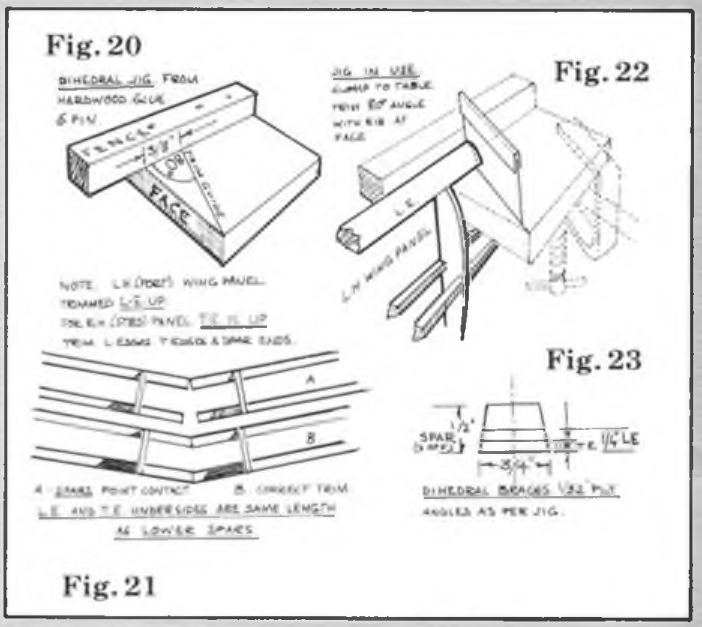
Covering materials

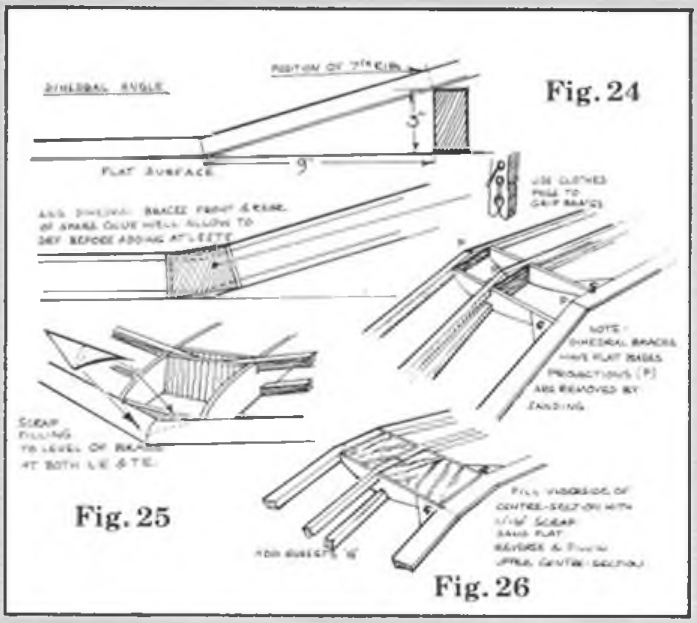
Both wing and stabiliser are *tissue covered*. This method supplies a degree of stiffness to the structure and is a good introduction to the behaviour of several covering materials. We use the ability of tissues to *shrink* as an aid to getting a smooth wrinkle-free surface. Other substances such as silk, nylon and plastic films also shrink when treated in certain ways and make them valuable covering materials. Of the simpler coverings used for models, tissue rates as one of the lightest, is probably the cheapest and arguably the easiest to use.

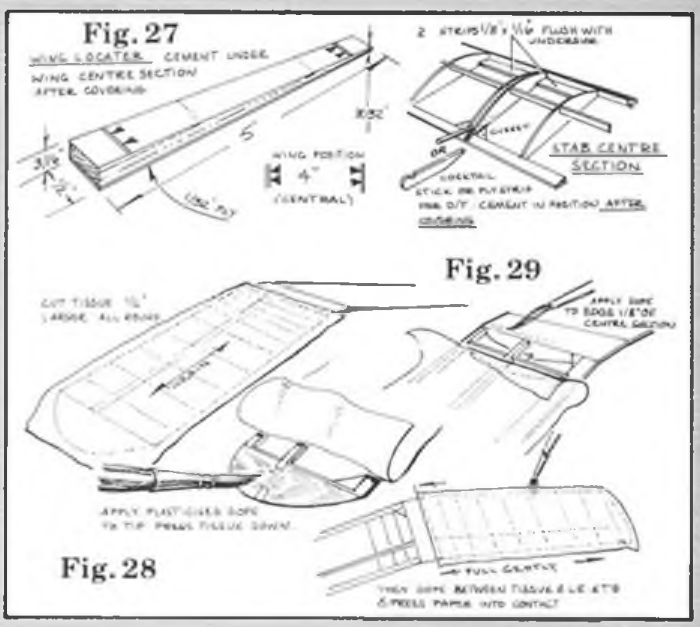
Covering method

As water is going to be applied to our tissue covering to initiate shrinkage, we need to begin by making sure that the wooden framework will not be adversely affected by damp. (If you take a scrap of thin









sheet balsa and wet one side, you will notice that it assumes a curve almost immediately. Such uneven wetting would distort your carefully-built structure and create a lot of problems with the resultant warps.)

The answer is to apply a coat of plasticised dope, (castor oil mix) to all parts of the balsa likely to come into contact with the tissue. This waterproofs the wood and also helps to stick the paper to it.

The safest method of covering is called 'dry covering'! This is a good method for a beginner to use. Later we shall have a shot at 'wet' covering but first it's best to use a system which gives you plenty of time to operate. The diagrams go through the sequence involved. Tissue must be of the type specially sold for model covering.

When you have bought your tissue, (lightweight grade if there is a choice), hold it up to the light. If it shows a definite 'grain' with fine lines running in one direction, pay particular attention to the comment on the drawings. If the material has a random structure, don't worry ... the tissue won't need to lay in any particular way.

Aim to get the sheet *even, not tight* when you first apply it (Fig. 28). The tightness will come from water shrinking and doping. Use plasticised dope as the adhesive, this time with a mixture of 50% dope, 50% thinners and about 20 drops of castor oil to the ounce. (As this slows down the drying and prevents shrinkage of the adhesive, extra castor oil is very useful). If you find the mix drying too quickly add more oil, if too slowly, more dope/thinners. Label your mixture and don't make up more than ¼ of an egg-cup full, it's very economical.

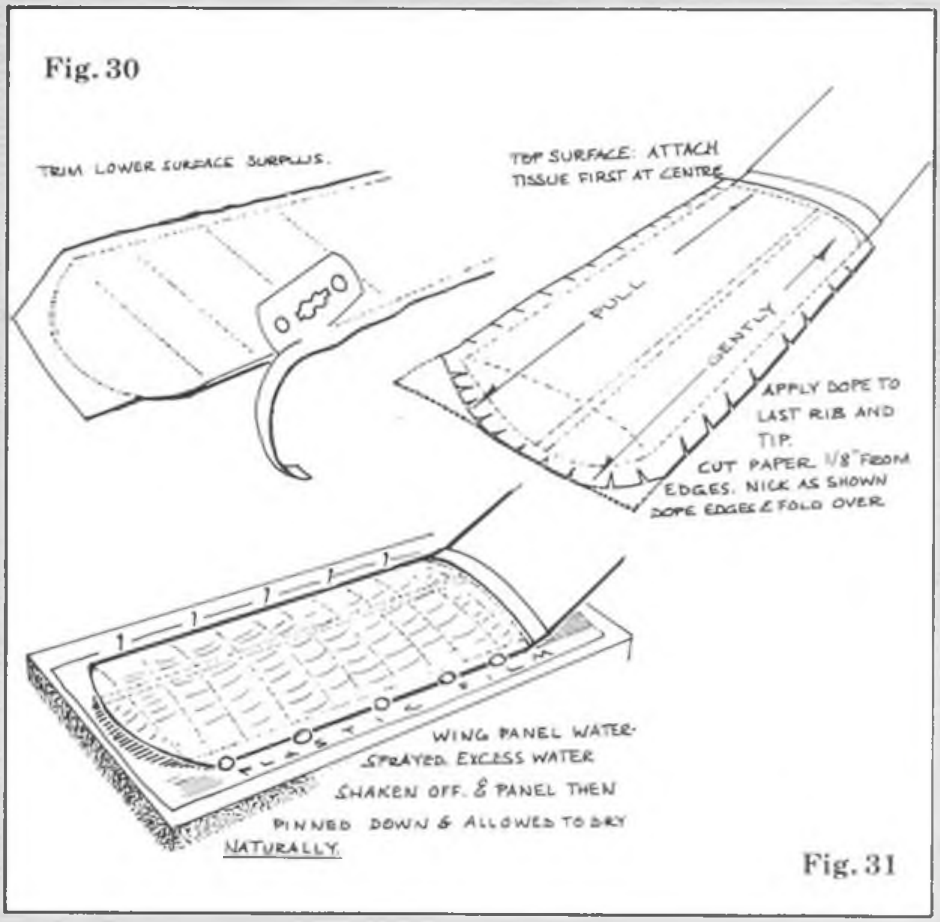
Cover both wing panels, top and bottom (Fig. 30). Spray one panel with water, spattering with a tooth or nail brush to get an even dampness. Pin down as shown and allow the panel to dry (Fig. 31). Then repeat with the second panel.

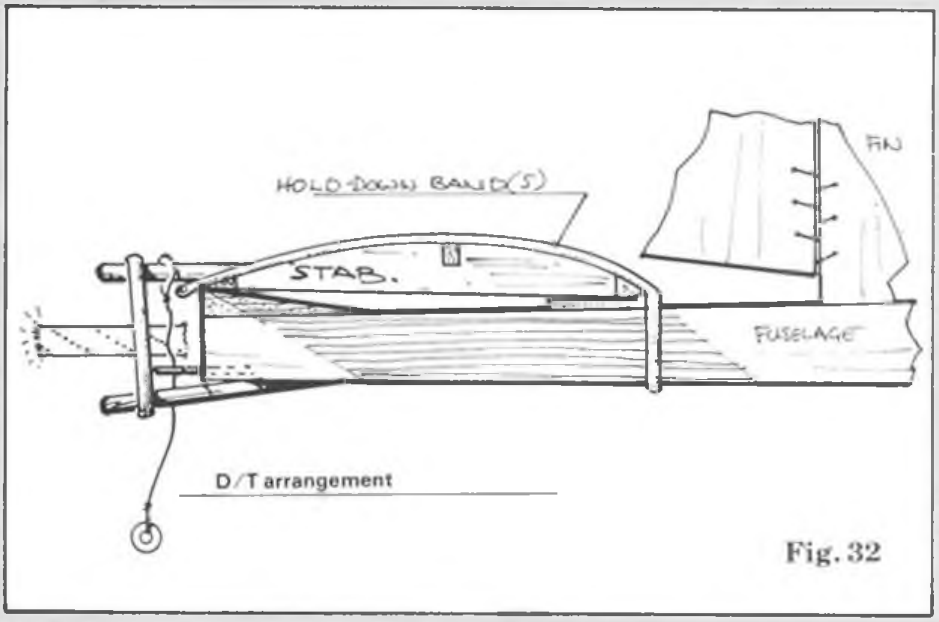
The dry panels should be much tighter than before. If they're not perfect, don't worry. (Perfection in terms of no wrinkles is less important than freedom from warps).

Mix up some 30% dope, 70% thinners and, using a soft brush at least ½in. wide, apply this *unplasticised* mix to the tissue of one panel evenly and quickly. Don't try to 'work' the dope; lay it on and move to the next undopes patch. 'Cover slowly, dope fast' is the motto. Let the doped panel dry a little so that there is no liquid on the tissue, (which will have slackened again), then pin it down onto your plastic covered building board until the dope has dried thoroughly. Repeat with the other panel. A second coat of 30/70 dope which has been plasticised is then applied to the complete wing. This helps to air- and water-proof the surface, and also lessens the likelihood of continued shrinkage distorting the wing.

The stab. is treated almost the same way. Dope the airframe, apply tissue, lightly water-spray and pin down. Dope with two coats of the *plasticised dope* ... for an almost 100% guarantee against warps on this very light structure.

Fit a cocktail stick, thin dowel, or ply strip, as shown for a D/T 'hook' (Fig. 29). The D/T arrangement differs slightly from that on Soli I. Slip a thin rubber band or two, (about 1½in. long), over the fuselage rear and the stab mount. Then pull the loop(s) *up*, across the mount, over the stab and then the D/T hook (Fig. 32). This arrangement holds the





stab down to the mount, and also tips it at 45° when the small D/T band burns through.

Drill two extra holes ½in. in front and ½in. behind the original wing dowel holes in the fuselage. (This is why the ply plates were designed longer than seemed necessary for 'Solo I'). Add the incidence block and wing locator (Fig. 27) and go through the procedure of checking the C.G. and the squareness of wing and stab. as before.

The original needed an extra ½in. packing at the rear of the stab. and was successfully launched by the catapult, (Part 3) first time. The launch was improved even more with a small sliver of balsa removed from the rudder restraining block to give a spot of *left* bias to what had been the 'straight' rudder position on 'Solo I', (probably due to a slight warp or heavy wing panel). Once your trim is right, (the advice for the 'Trim Trainer' still applies), get out and fly as much as possible. The increased wing area and lighter weight make this a more potent model than its predecessor and once you feel familiar with it, you can begin to use a longer catapult, (still keeping the same rubber-to-line proportions). When you get to this stage, use the D/T every flight whatever the weather. Better safe than sorry!

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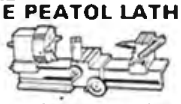

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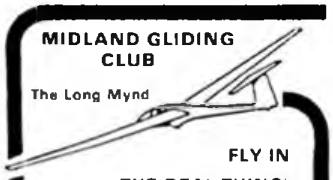

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APPENDIX - LINKS TO PLANS

The original magazine comes with two free plans (Viking, Doodle Bug) printed front/back on a pull out banner of four sheets. The banner is not included in the document.

GRASSHOPPER by J.B. Allman
Alwyn Greenhalgh describes J B Allman's 1934 winning Wakefield
Page: 10

Viking by John Watters
FF CO2 powered replica of the Vintage FF Viking
https://outerzone.co.uk/plan_details.asp?ID=3275 ...
Page: 22

Doodle Bug Fi103 by Jym & Dave Leddy
CL semi-scale model for 1.5 cc engines of the Fieseler Fi 103
https://www.hippocketaeronautics.com/hpa_plans/det ...
Page: 23

1/2A Team Racer by Jim Woodside, Derek Heaton
Plan with dimensions
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