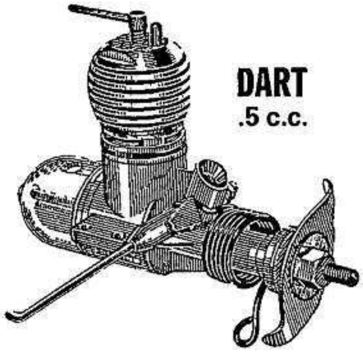
# Aero Modeller

February 1974
20p
(USA & Canada $1)

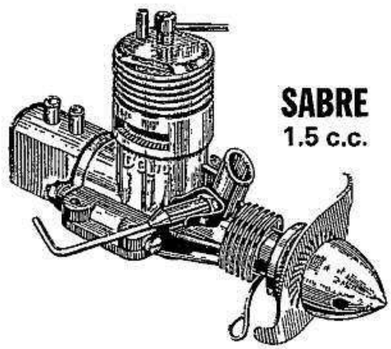
POWER CRISIS ISSUE

*INCORPORATING*
**MODEL AIRCRAFT**

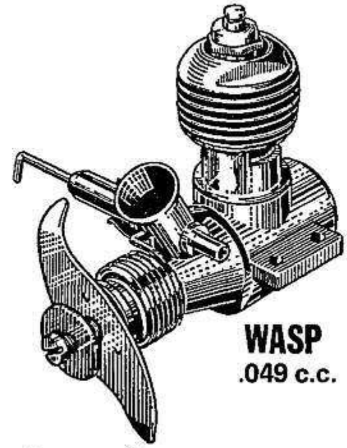
MAP HOBBY MAGAZINE



**DART**
.5 c.c.



**SABRE**
1.5 c.c.



**WASP**
.049 c.c.

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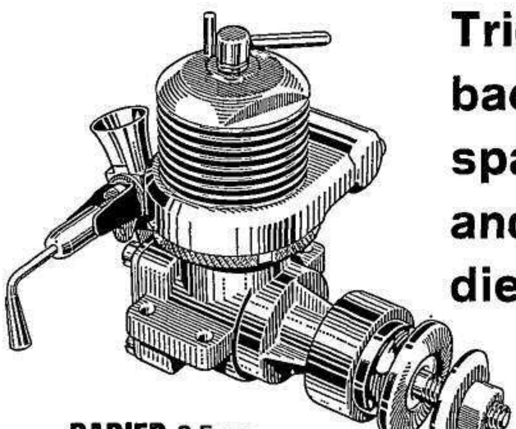

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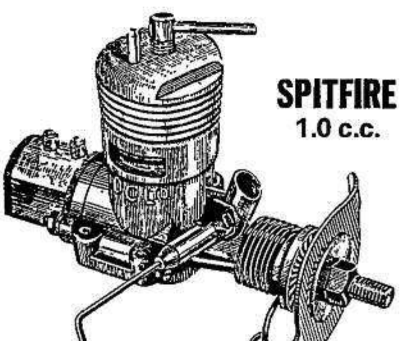
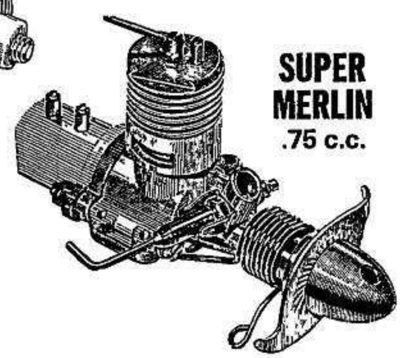
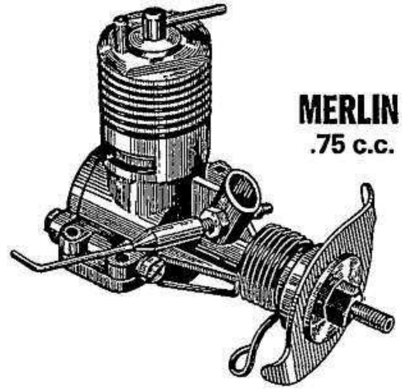


**SPITFIRE**
1.0 c.c.



**SUPER MERLIN**
.75 c.c.



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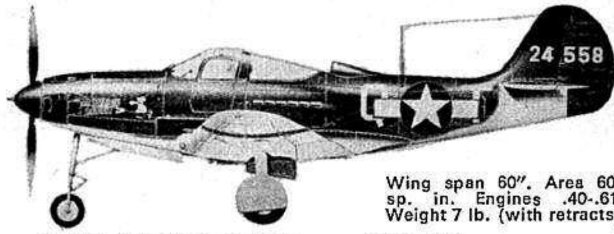

Wing span 60". Area 600 sp. in. Engines .40-.61. Weight 7 lb. (with retracts)

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Weight up to 7 lb.

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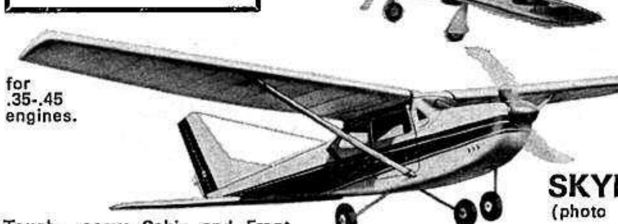

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(photo left) **£25.80**

Tough, roomy Cabin and Front End, for 2 to 4 Channel Propo. Steerable Nose Gear. Span 62". Weight 4½-5 lb.

## SKYLARK 56 ... £15.60

(photo below)

56" span single or twin

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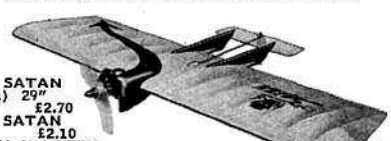
## GOLDBERG CONTROL LINE



**JNR SATAN** (right) 29" span £2.70
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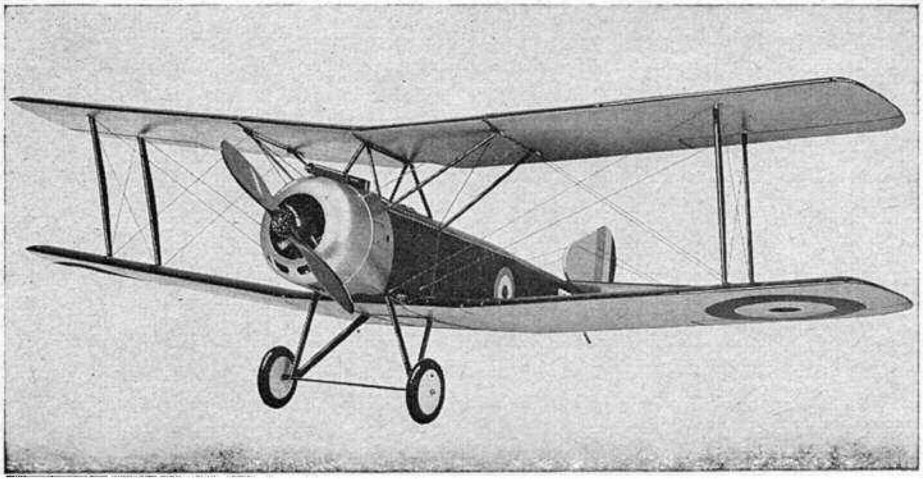

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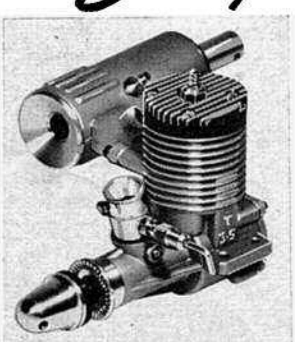

TAIPAN 3.5 GLOW

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(Plain Bearing—Illustrated)

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| R.C. Version ... | £15.37 |
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**MODEL AIRCRAFT (B'MOUTH) LTD — NORWOOD PLACE — BOURNEMOUTH**

# Heard at the HANGAR DOORS

**Government Emergency Power restrictions on the use of electricity supply for industry have had serious effects on printing schedules. Faced with a drastic reduction (by over 60 per cent) of what is known in the printing trade as 'machine room capacity' we have produced this crisis issue with reduced content in order to preserve continuity.**

**We apologise for omission of classified advertisements, Model Shop Directory and condensation of some regular features. At least we can say 'we never closed' for this month – unhappily at the expense of our sister magazine** Model Boats **which has been placed on the sacrificial block in order that this issue could be produced. Hard times!**

**CONTROL-LINE** enthusiasts mourn the loss of Alan Woodrow who died suddenly after a brief illness on 3rd December, aged only 28 years. Alan had been a British team member three times, and was once again in the team due to go to Czechoslovakia in September with his speed models. British record holder, founder of clubs at Imperial College and Yeovil, always keen to help the junior members and twice a Team Manager, Alan's infectious enthusiasm has encouraged many to success in aeromodelling. An aerodynamicist, he worked at Hawker Siddeley, Hatfield; and then at Westland Helicopters, Yeovil, where he formed the Yeovil Aeromodellers club to foster the younger element and control-line flying. Our deepest sympathies go to his young wife Julia and her 16-week old daughter Emma in their tragic bereavement.

**FREE-FLIGHT** enthusiasts will be saddened to learn that Reg, the second of the famous Boxall twins died at Brighton on 5th November. Like his brother Fred, Reg was a stalwart competitor, ever ready to help others and famous for retrieving escapades. Reg survived his brother by two years (an appreciation appeared in Dec. '71 issue when Fred died) and was 52.

**VIVATUARY** as opposed to obituary makes pleasant news and we'd like to wish Claude Beesley of Coventry the happiest of retirements after his very long service to aeromodelling. Claude opened his model shop in 1938 when Megow kits were ninepence (that's 3¾p today!). A stalwart of W. Coventry MAC, he kept the *Model-Drome* running through the war with his late wife Kathleen in charge, while Claude was in the Army. When he produced some of the first aerobatic C/L kits under the 'Kandoo' banner, his choice was of Peter Cock's 1948 Gold Trophy winner. He also kitted the 'Radio Queen' for ED Ltd. His many customers and friends wish him well, with perhaps a little time for active modelling after so many years the other side of the counter.

**FAI DECISIONS** taken at Paris in the CIAM meeting 29/30th November resulted in two major changes for free-flight models and a rejection of other proposals. The changes are that Wakefields are now required to have a minimum airframe weight (less motor) of 190 g as distinct from the previous requirement for min. total weight of 230 g. Max. weight of the rubber motor is still 40 g. Power models have their standard fuel formula changed to 80 per cent methanol, 20 per cent lubricant (castor oil or synthetic equivalent). There is also a change in arrangement of the starting line.
*CONTROL-LINE* proposals to decrease minimum area of speed models (U.S.A.) and Team Race tanks to 4 c.c. (U.S.S.R.) were defeated and referred to the technical sub-committee for 1974, but at last Combat rules became official and this means a first move toward inclusion in the C/L World Championships. Dutch proposals for 40 degree cone angle on all C/L spinners and 5 mm radius tips plus only one thread showing on crankshafts were referred back.

**The late Alan Woodrow, with his British F.A.I. speed record at the 1972 World Championships. Many of his friends wish to see his memory perpetuated in the form of a trophy, and Steve Blake of 108 Ash Road, Luton, Beds, has offered to receive donations towards the trophy for speed flying, to be given to the S.M.A.E., at the Nationals.**

**OPERATION FRIENDLIFT – 2**
As in 1971 when 248 European, Asian and S. African modellers travelled by charter flight to Doylestown, U.S.A., there will be a transatlantic airlift to the U.S.A. in 1974. Departure points are Frankfurt and London to Kennedy Airport, New York on 30th June, returning 12th or 13th July. Final details are dependent on the prevailing fuel situation but the target fare is £85.50 sterling as of December 1973. This includes bus transportation from New York to Lakehurst but not accommodation at Lakehurst from 1-7th July which is $100. Application for further information should be made to: Academy of Model Aeronautics, 806 Fifteenth St., N.W., Washington D.C. 20005, U.S.A.

**on the cover**
***Largest model? Jacques Martinache of M.Ae.C de Paris made this latest entry in the contest for the Kremer Man-Powered-Aircraft prize for famous designer Maurice Hurel. Span 132 ft., area 581 sq. ft., weight, without pilot Jean-Pierre Thierard, about 140 lb. 10 ft. 6 in. prop weighs 30 oz. and will fly the 'Aviette' at little more than 13 m.p.h. Magnificent balsa construction took three years, was first flown, towed by car with its 77-year-old desinger at the controls, November 1973.***

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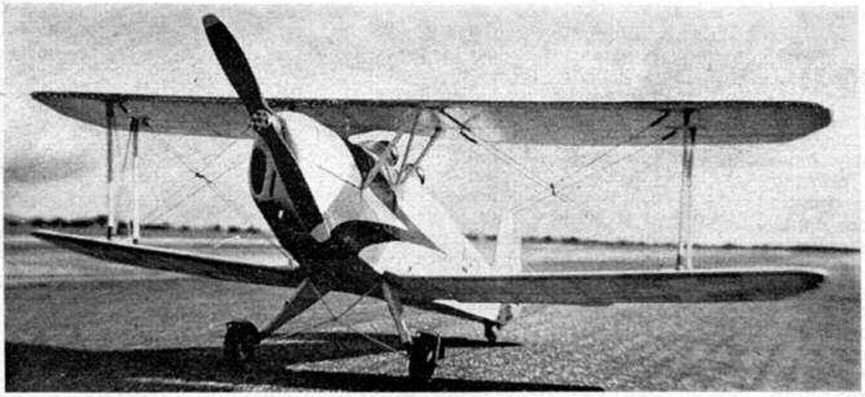


**Eric Coates' well tried and tested (six years!) 36 in. span, ⅛th scale, free-flight model for 1.5 c.c. engines**

# BUCKER JUNGMANN

WHILST ON HOLIDAY in Socarno, Switzerland, in 1965 I was surprised to see that Bucker Jungmanns were still in service as primary trainers with the Swiss Air Force at the local airfield. I spent a morning there and took several photographs of these machines in their attractive yellow and black colour scheme – reminiscent of the splendid Tiger Moths and Blackburn B2s I remember from pre-war days. It was obvious that a similarly attractive and stable model could be produced.

Returning to England I made a fruitless search for available data, but discovered that one was on the British Register at Jenkins Farm in Essex. Descending on this establishment one miserable wet day that December, at the kind invitation of the machines' owner – Ron Fautley, I then spent the entire day taking measurements and photographs from which I later prepared three view drawings which indeed form the basis of this month's *Aircraft Described* feature.

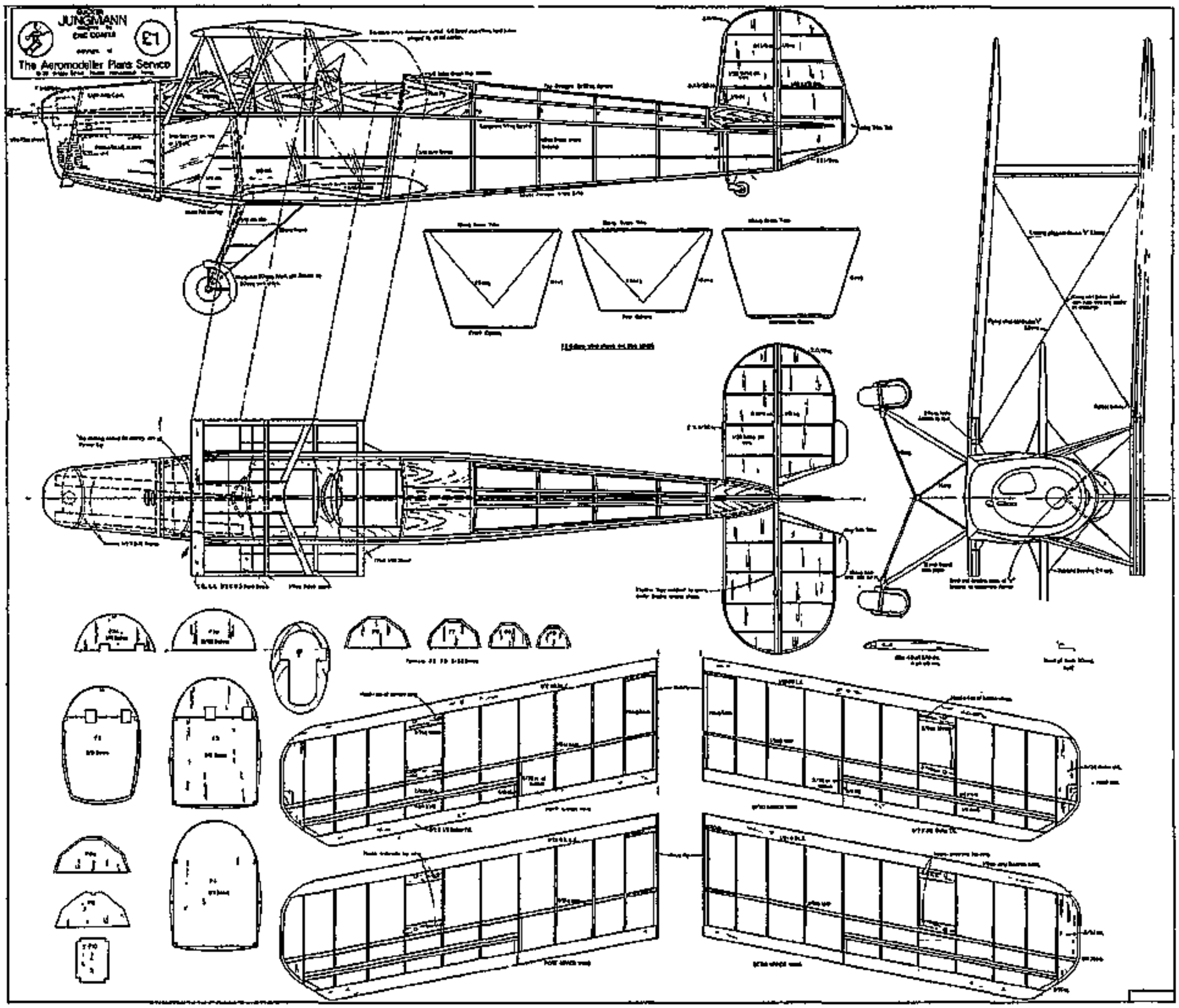
The model was built early in 1966 and enjoyed considerable competition success in the late sixties. It won the *Super Scale Trophy* in 1967; being second the previous year.

Being built some eight years ago some of the structure is somewhat dated in design and does not incorporate my latest thinking on this subject. (The B.E. 12b, for instance, published last March was designed several years later and can be regarded as more in line with my present practice.) Nevertheless, there has been considerable demand for the publication of this design and it is presented as built in 1966 with only a few minor amendments.

All areas and airfoil sections are to exact scale and the structure is as accurate as possible, only notable non-scale feature is the fact that the upper wing has +1° of incidence as opposed to —1° on the full-sized machine as there is no need for a free-flight model to have good inverted performance and with the rather small wing area the extra lift generated is very useful. The engine thrust line is also, by necessity, anything but scale. The only major structural deviation is the large section wing trailing edge. With a relatively small thin wing like this there is really no other sensible practical solution. Thanks to a long nose and sweepback there is, for once, no problem with getting the C.G. far enough forward. In fact, for once I had to use tail ballast.

This is not a light aeroplane and combined with its large fuselage, in relation to the small wings, requires a lot more power than one normally associates with a 36in. span scale model. It needed all the power of a Mills 1.3 c.c. engine for take offs on my original. If fitting a modern engine use something of equivalent practical power. Although a relatively fast flyer it is very stable and mine invari-

Looks real, doesn't it? The Jungmann has ideal properties for free-flight scale, the long nose overcoming the usual rearward – centre of gravity problems, while the swept back wing aids stability. Engine cowl is from glass-fibre and light alloy, but the shapes are simple and should provide no difficulty. Block and sheet balsa could be substituted if necessary but are not so durable in the event of nose-overs or careless handling.




FULL-SIZE COPIES OF THIS 1/7th SCALE REPRODUCTION ARE AVAILABLE AS PLAN NO. FSP.1217 PRICE £1 (INCLUDING POSTAGE AND V.A.T.) FROM AEROMODELLER PLANS SERVICE, P.O. BOX 35, BRIDGE STREET, HEMEL HEMPSTEAD, HERTS HP1 1EE.

ably weathercocked into wind, on the glide, so the 'approach' speed was quite slow. If built correctly it is a very strong model and should not come to much harm. Mine flew for six years before being 'retired' after it flew into the doors of a garage. . . .

Construction is relatively straightforward and mainly follows the lines outlined in *Flying Scale Models* published in this magazine during 1971-72.

**Fuselage**

This is built in the conventional fashion using spruce longerons and stringers exclusively. The two sides are built normally with the lower longerons continuous. These are cut away when the fuselage structure is complete and the cut out for the lower wing centre section is being made. $\frac{1}{8}$in. sheet is let in between F2 and 3 and above the lower wing aft of former F3 only up to the centre stringer line.

The lower part of the cowl, between formers 1 and 2, is planked with $\frac{1}{8}$in. x $\frac{1}{4}$in. balsa, soft 3/16in. balsa sheet overlapped over the $\frac{1}{8}$in. sheet allows the nose contour to be carved to blend in with the oval cowl shape.

**Undercarriage**

This is a torsion bar job, the main legs being bent from a single piece of 12 swg wire attached with eye bolts to the rear of F3 while the spreader bars are 16 swg wire, bound and soldered on. The outlines of the trouser fairings are bent from a single piece of

A couple of pilots in the cockpit really add to the realism of a scale model – nothing looks worse than an 'empty' machine flying sedately down the airfield! The Jungmann is rather a heavy design, and so needs adequate power to get it airborne – take-offs tend to be lengthy, so make sure the undercarriage tracks true.

20 swg wire, also bound and soldered to the main legs. The diameter of the main legs is then increased by binding with paper soaked in epoxy resin – 1/16in. balsa ribs are then epoxied between the legs and the fairing outlines. Fairings are covered in nylon, doped in place. The mudguard stays are made from 20 swg wire and soldered in place after the wheels are in position. Finally the mudguards are beaten from soft aluminium and epoxied to the stays. The whole assembly is free to swing back, under load, so slots have to be cut in the lower centre section to allow the fairings to enter without damage.

**Centre Sections and Cabane**

The two centre sections are made just like miniature wings. The 14 swg dowels, bent to accommodate the sweepback, are epoxied to the leading edges and the main spars. The lower centre section is glued to the ⅛in. sheet doublers at 0° incidence.

The cabane struts are bent to exact length over the drawing from 18 swg wire, including the lower 18 swg tubes and sprung into the upper tubes. The lower tubes are epoxied to the appropriate position on fuselage. When set the upper centre section is epoxied to the upper tubes taking great care to see that it is at +1° incidence before the 22 swg bracing wires are soldered in place. The cabane struts are then faired in with balsa epoxied to the wire.

**Tail surfaces**

These are constructed on the now fairly well-known 1/32in. sheet centre-core method, the spar, outlines and ribs being glued either side and the whole sanded to the required airfoil section. Moving surfaces are attached to the rigid ones by stiff tinplate hinges, while trim tabs are from the same material epoxied to the trailing edges.

**Wings**

These are absolutely straightforward. The ailerons are built along with the main panels and separated and finished separately. Tips are constructed like the tail surfaces. Handholes are incorporated only in the lower wing tips.

**Covering and Finishing**

Cover the whole model with lightweight Modelspan tissue and then cover *again* with lightweight silk doped on. The original was doped yellow (six thin coats for an even covering) and decorated as A27 of the Swiss Airframe. For full colour details I recommend the purchase of Profile No. 222.

**Rigging**

This is a very simple operation, being single bay with only single root anchorage. Landing and flying wires are bent to form 'Vs', with hooks at their extremities, from single pieces of 22 swg wire. The apex of the flying wire 'V' engages with the hook attached to the lower centre section. Two hooks at the extremities of the landing wire 'V' engage with the hooks on the lower wing adjacent to the interplane struts, while upper ends of the wires are connected to their respective hooks on the upper centre section and wings by means of small rubber bands. Scale dihedral is sufficient for lateral stability i.e. upper 1½°, lower 3½°. When this has been rigged correctly the piece of 16 swg wire is laid across the bracing wire intersections, bound to the respective wire with fuse wire, and soldered. Bracing wires for each bay are therefore all in one piece to promote rapid assembly after transport. The incidence wires are best reproduced by rubber bands which engage on pins protruding from the interplane struts.

**Trimming and Flying**

Ballast up to correct C.G. position – this may appear to be further aft than usual but this is due to the sweepback. Test glide over long grass adjusting for a fast flat glide with the trim tabs (Bucker must have been thinking of future generations of modellers when he fitted them!) Continuing over long grass, commence power flying with the engine at half power to produce a powered glide. Model should fly straight on with slight left turn. Correct any tendency to turn right with a little left rudder. Similarly, stalling tendency with the elevators. Slowly increase power until a climb to the left results but the glide should be almost straight. If large amounts of elevator or rudder movements are necessary to produce the desired powered trim, then the glide will have suffered. Adjustments to the engine thrust line may then be necessary in order that the control surfaces can be returned to the optimum glide trim position.

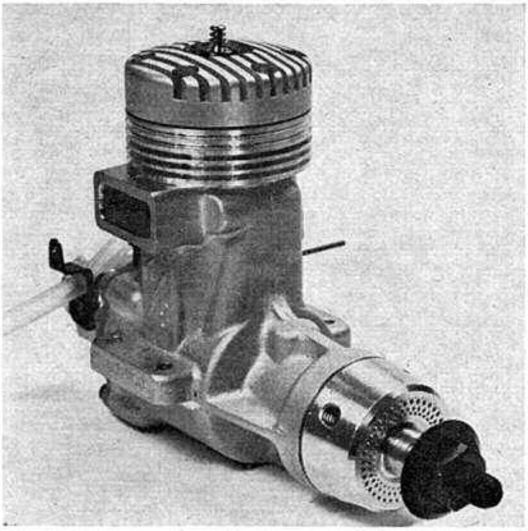
Take-offs can now be attempted. Because of the high wing loading these are fairly long and acceleration is slow to build up to the required flying speed. It is, therefore, essential that the undercarriage is running free and tracking properly.

Once trimmed this model is a joy to behold in the air, especially if painted yellow!

**Peter Chinn's**

# ENGINE TEST

## K&B 40-Schnuerle

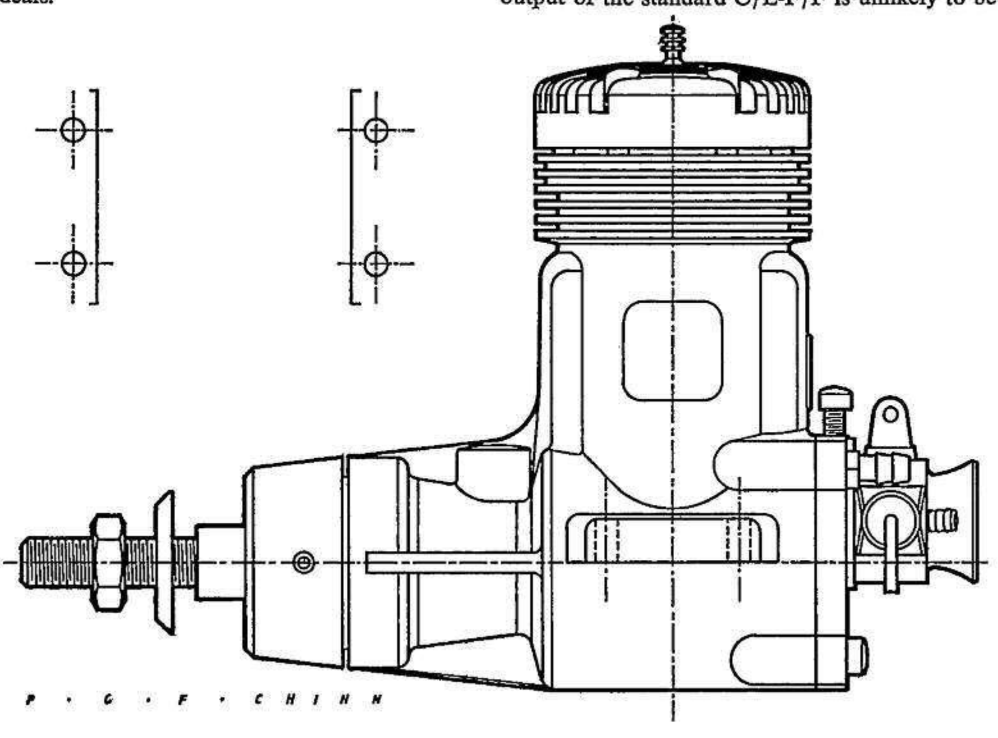


IT WAS WITH A stock pylon-racing K&B 40-S that Mike Billington won the South Midland Area control-line speed event at Cranfield last year at 172 m.p.h. and, in so doing, set a record for the .40 cu. in. speed class.

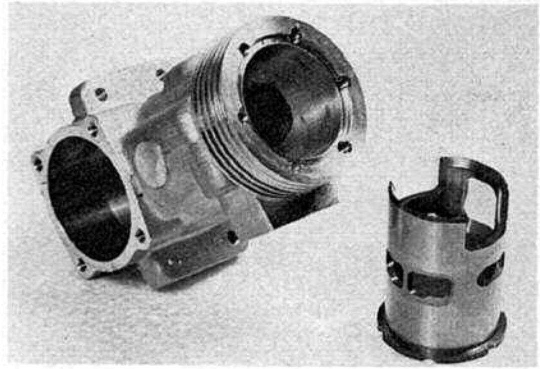
This outstanding American engine was designed in 1971-2 with the object of regaining K&Bs position as the No. 1 racing .40 motor. For most of five years from 1966 onwards, the K&B Torpedo 40 had dominated the highly competitive radio controlled pylon racing class, its performance improving year by year until its design finally reached, with the Series 71R model, what was considered to be the limit of its development. In 1972, an entirely new design employing Schnuerle loop-scavening and more rigid construction was announced and a pre-production batch of 100 engines were built using sand cast crankcases. These were then released to selected K&B users in order to evaluate the design in actual competition. The engine, known as the K&B 40-R (the Torpedo name that had survived since 1946 was finally dropped), was an immediate success and, one year later, in the summer of 1973, the first examples of the production model, now known as the 40-S, began leaving the factory. It is with this latest type that our present report deals.

Two versions of the 40-S are being offered. First and foremost there is the pylon racing model. This, like most pylon engines (and in contrast to normal R/C motors) does not have a true throttle. Instead, it has a fuel shut-off device to enable the engine to be stopped (rather than slowed down) for landing. Secondly, there is a 'standard' model, without fuel shut-off, for control-line and free-flight use. This has the same type of intake venturi as previous standard rear-induction K&B racing .29 and .40 engines, in which fuel is fed to six surface jets from an external collar containing the needle-valve assembly.

Because by far the largest demand for .40 cu. in. size racing engines comes from the pylon-racing fraternity, the first deliveries of the new model to reach the U.K. distributors (Irvine Engines of Barnet, Herts) have been of the former type and our test motor was also one of these. However, the power output of the standard C/L-F/F is unlikely to be any

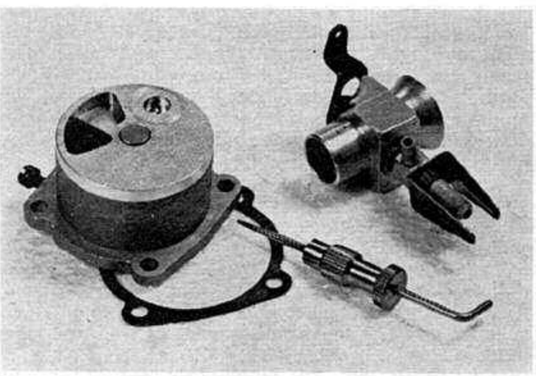


**SPECIFICATION**
**Type:** Single-cylinder, air-cooled, glow plug ignition, Schnuerle loop-scavenged two-stoke with rear rotary disc valve and twin ball-bearings.
**Bore:** 0.840 in.
**Stroke:** 0.720 in.
**Swept Volume:** 0.3990 cu. in. (6.539 c.c.)
**Stroke/Bore Ratio:** 0.857:1
**Checked Weights:** 284 grammes (10 oz.) with PR carb. 277 grames (9.8 oz.) with standard carb.
**General Structural Data**
Gravity cast aluminium alloy *crankcase/cylinder-casing/front housing* unit with drop-in steel *cylinder-liner*. Internally counterbalanced *crankshaft* having full circle crankdisc with peripheral slots and aluminium sealing rim. Pressed-in 0.218 in. o.d. crankpin with 0.187 in. o.d. spigot for rotary-valve take-off. Shaft supported in two ⅜ x ⅞ ball journal bearings. Deflectorless flat-crown aluminium alloy *piston* machined from bar stock and fitted with single Dykes type *piston-ring* pinned to prevent rotation. Tubular 0.180 in. o.d. *gudgeon-pin* lightly press fitted in piston and retained by wire circlips. Forged aluminium alloy *connecting-rod* with bronze bushes and lubrication slits at both ends. Pressure-diecast aluminium alloy crankcase *backplate* with hard-chromed rotary-valve face. Machined aluminium alloy counter-balanced *rotary-valve disc* mounted on steel pin pressed into backplate. Machined aluminium alloy finned *cylinder-head* with 12.7mm dia. bowl-shaped combustion chamber and 4.3mm wide squish-band. Machined aluminium alloy *prop driver* pressed onto crankshaft end and secured by rolled steel pin and Allen grub screw. Separate ¼ UNF prop stud with steel washer and hexagon nut. Machined aluminium alloy intake venturi with orthodox needle-valve assembly and fuel shut-off device (pylon-racing version) or peripheral jet type venturi with six surface jets fed from external collar containing needle-valve assembly and without shut-off device (C/L – F/F version).
**TEST CONDITIONS**
*Running time prior to test:* 1 hour
*Fuels used:* (i) 25 per cent Duckhams Racing Castor oil
75 per cent methanol (Running-in)
(ii) 20 per cent Duckhams Racing Castor oil
80 per cent methanol (Test 1)
(iii) K&B Speed Fuel – approx. 50 per cent nitromethane (Test 2)
*Glow plugs used:* K&B KB-1S short-reach, platinum filament
*Air Temperature:* 18°C (64°F)
*Barometric Pressure:* 1032 mb



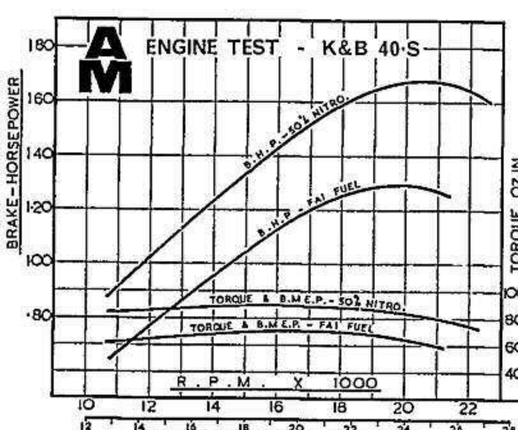
Above, cylinder liner is cut away, as is the piston skirt, to avoid masking the entry to the main transfer channels. Note also the sizeable third port.

Below, the rotary disc is now machined from aluminium alloy, running against a hard-chromed backplate face. Note also the pylon race carburettor – the hole in the arm simply squashes the fuel tubing to stop the motor.



different since its effective choke area (just under 60mm²) is the same as that of the pylon version. The manufacturer, in fact, rates both engines at exactly the same output figure. The only advantage, perhaps, of using the standard version is that it is about ¼ oz. lighter and has 1/16 in. less rear overhang.

Like all previous .40 cu. in. K&Bs, the 40-S uses a Dykes-ringed aluminium piston but, as befits a Schnuerle scavenged motor, this is of the flat crown deflectorless type. The piston has a rectangular window in its skirt which registers with the sizeable third




port in the cylinder liner and there are large rectangular cutaways in the skirt of both piston and cylinder liner to avoid masking the entry to the main transfer channels. A new departure for K&B is the use of a fixed gudgeon pin. This is a light press fit in the piston and movement is thereby confined to the small end of the conrod which is now bronze bushed for this purpose. Wire circlips are, however, fitted in the piston to prevent any risk of the pin moving and scoring the cylinder bore.

A specially shaped exhaust port causes half the width of the port to open about five degress early and results in a total exhaust period of some 156 degrees of crank angle. Exhaust opening leads the main transfer opening by some 15 degrees and the third port by 20 degrees.

The disc type rotary-valve, made of a Tufnol type phenolic material in the original pre-production models, is now machined for aluminium alloy and runs against a hard-chromed backplate face. The valve is timed (according to measurement of the test motor) to open at 33 deg. ABDC and to close at 58 deg. ATDC.

K&B do not make silencers for this engine and as no suitable commercial type for the 40-S was available, all tests were carried out with the engine in standard open-exhaust trim.

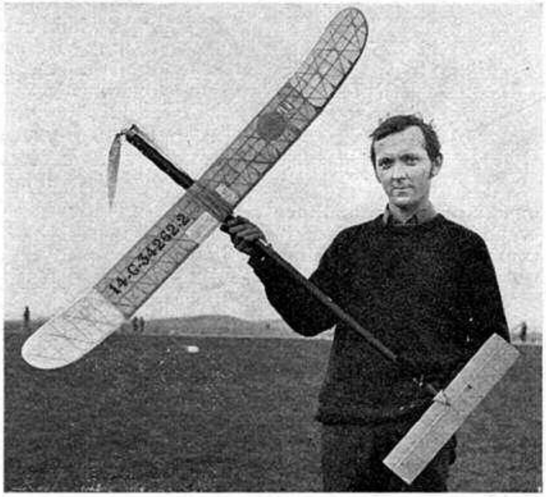
*continued on page 82*

**Why use one piece of wood when you can use two?**

**MIKE WOODHOUSE**

**explains his preferences for**

# LAMINATED STRUCTURES



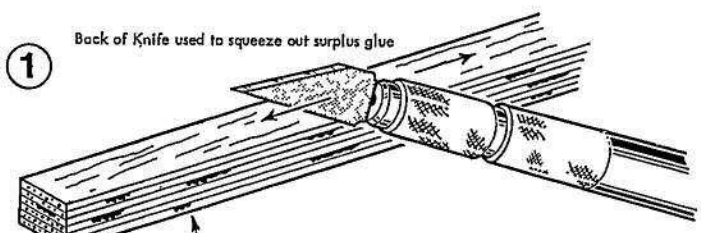
Practising what he preaches! Mike displays his current Wakefield which uses laminated balsa wing tips to give greatest strength and rigidity for this shape.

USING TWO PIECES of wood when one would do has always been a habit of mine and this trait has led to the use of laminated construction to a greater and greater extent. However, my first laminating processes (and thus results) were rather crude, simply using balsa cement as the adhesive and just pins for the jig. The process of laminating does have many advantages over other structures in that the grain of the material will follow the curve of the lamination, giving the greatest possible strength for the least weight, while the grain can also be cross laminated to give rigidity and strength in certain applications.

The glue I prefer to use is *Cascomite* due to the fact that it is water-based; the water helping the glue to penetrate the timber as well as easing the bending, while PVA glue is also suitable for a laminating job that requires a little elasticity in its construction. UF (urea formaldehyde) resin glues set solid and any flexing of the finished part can cause damage to the glue link – selection of the correct glue will produce the best result.

Jigs used for laminating should be produced to the same quality of workmanship as desired in the finished component. They can be made from scrap balsa sheet and block, and used time and time again, but areas that come into contact with the laminated structure should be sealed with dope and coated with wax polish to prevent unwanted attachment.

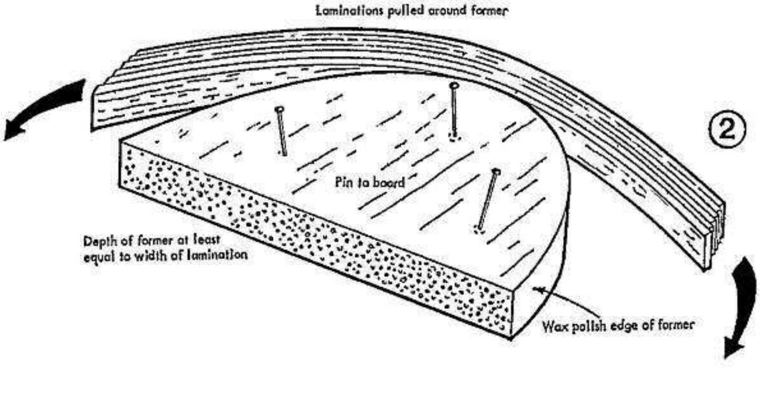
Having loosely discussed the reasons why, and the basic procedure, what should be laminated? Popular choices are tail, wing tip and fin outlines, while other parts that are worthy of investigation are leading and trailing edges and the production of 'balsa plywood'.




## Wing Tips and Fin

Firstly, a jig is produced to the size of the inside of the tip or fin from scrap material, with a thickness at least equal to that of the lamination. As mentioned previously, the edge of the jig should be coated with wax polish to prevent sticking. The type of material I advise is medium grade 1/32 in. balsa with a very straight grain, the type that looks as if it would be very flexible, if this is not too obvious! This 1/32 in. sheet balsa should be stripped to the required thickness and length. Next a sufficient quantity of *Cascomite* should be mixed to a smooth paste and all the strips stuck one on top of another to form a laminated length. Care should be taken to get the whole 'square' with all edges in line – excess glue is forced out by running the back of a knife blade along the strip; the squeezed-out glue is quickly wiped off.

The whole lamination is held on with firm finger pressure on the



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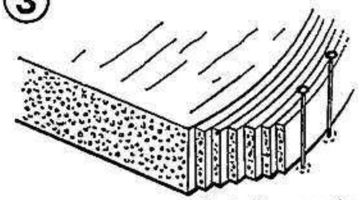


Laminations secured and against former with pins

middle of the jig, and then worked around the jig to keep it in close contact, the ends being secured with a pin – see *figures 1-3*.

## Leading and Trailing Edges

A change of glue is required here – 'white glue' (PVA) is the most suitable adhesive in this instance due to its inherent flexibility. The normal approach is to use a hardwood strip such as spruce to reinforce the usual balsa wood section to produce a much stiffer and stronger item (*figure 4*). Reading through some magazines of around 20 years ago, I came across a method described as the 'German Sandwich System', and this idea (see *figure 5*) would work well in the context of the latest forms of structure, when again PVA would be the glue to use. The trailing edge can be produced very thin with the plywood strengthening the edge.

## Balsa Plywood

This involves the cross graining of balsa; three layers of sheet will produce sheet stiffer and stronger at a very similar weight to a sheet of the thickness of the combined lamination. Ideal applications would be for power model pylons and sheet fins where stiffeners are warp resistant and of great importance. Plywood or hardwood sheet can be mixed in to give even greater strength for specified applications.

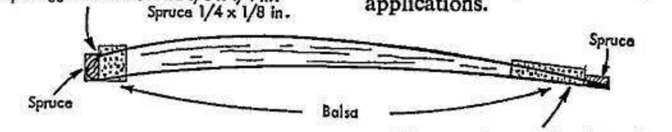



Figure 4 – Spruce and balsa laminations for leading and trailing edges.

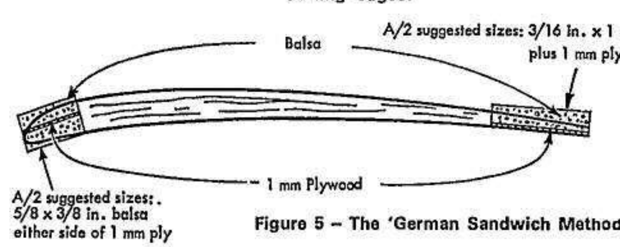
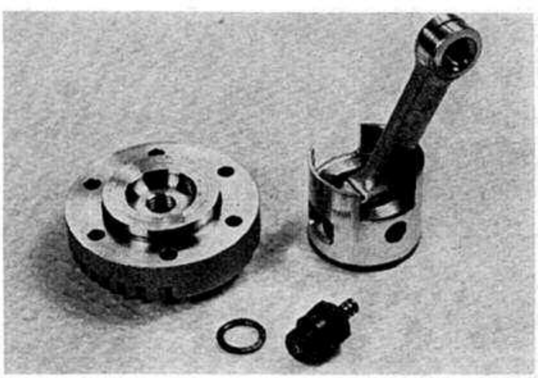



Figure 5 – The 'German Sandwich Method'.

# ENGINE TEST

*continued from page 80*



A glance at the performance curves obtained from our test sample 40-S tells most of the story.

Like previous K&B 40 engines, this latest motor is intended primarily for operation on fuels containing a high proportion of nitromethane, although even on straight F.A.I. fuel, it is still a powerful engine.

After running-in on 75/25 methanol and castor-oil, we took a series of readings on F.A.I. 80/20 and obtained figures for the first set of curves. Maximum torque was indicated at just over 16,000 r.p.m. and peak b.h.p. came out at nearly 20,000 r.p.m. with a figure of 1.30 b.h.p.

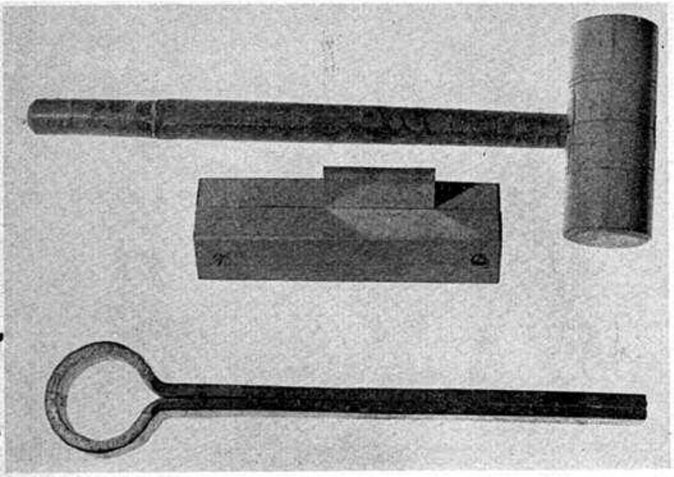
The maker's recommended fuel for the 40-S is K&B 'Speed Fuel' which contains some 50 per cent nitromethane. This is pretty expensive (£8.70 per gallon in the U.K. at present) but when top contest performance is required, is a very worthwhile luxury. Not only does it add about 30 per cent more power: it also makes for smoother and steadier running and a less sensitive needle-valve. One can, of course, expect to burn out plugs rather more often but our 40-S was not at all heavy on plugs under the conditions prevailing at the time of testing. Actually, only two plugs were consumed during the whole series of tests including many runs at speeds of over 20,000 r.p.m.

The handling and running qualities of the 40-S were very good indeed. The Dykes ringed piston provided excellent compression seal right from the beginning and this ensured quick starting both hot and cold. The engine liked to be given its head and propped for speeds around the peak: if overloaded it would lose quite a bit of power as it warmed up whereas, on lighter loads, speeds were held steady with no power loss whatsoever. This is, however, a purely academic point as, quite obviously, if one needs a 40 that will turn an 11 x 6 prop, one does not buy an engine designed to run at 20,000. A more appropriate purchase for such duties would be the shaft-valve K&B Torpedo 40 model.

Stripped and inspected at the end of the test session, the 40-S was found to be in excellent condition.

A most impressive motor on all counts.

*Power/Weight Ratio* (as tested – less silencer)
2.08 b.h.p./lb. on F.A.I. fuel
2.69 b.h.p./lb. on 50 per cent nitromethane
*Specific Output* (as tested – less silencer)
199 b.h.p./litre on F.A.I. fuel
257 b.h.p./litre on 50 per cent nitromethane



Bill Burkinshaw continues his aeromodeller's guide to

# BASIC METALWORK

Tools for bending sheet metal – a large wooden mallet and beneath this a set of wooden folding bars with sheet metal in place, as drawn in Figure 1. At bottom is the 'de-luxe' item, a pair of metal folding bars which, due to their small section, are perhaps rather more versatile when it comes to making small fuel tanks, etc. However, a little ingenuity and the wooden items will suffice.

BENDING sheet metal into fuel tanks, undercarriages and engine mounts is a problem often encountered on model aircraft plans. It is relatively simple to shape thin sheet accurately, provided the right method is adopted, but before bending some metals preliminary heat treatment can make the job very much easier. Most metals have a property known as 'work hardening', which means that any hammering, bending or even drilling can harden the metal so that it becomes progressively more difficult to shape. Some materials, aluminium alloys in particular, work harden so quickly that even with a straightforward bend the metal can become brittle along the bend line and crack. Before describing the bending of metals I will deal with the softening, or 'annealing', process required for each of the materials in Table 1.

Steel and stainless steel will need fairly frequent annealing if very much bending or shaping is to be done, but you should find that unless you wish to make things like beaten metal cowlings or spinners that the non-ferrous metals (metals that do not contain iron) will shape up quite easily with only one annealing. If, however, you make a mistake in bending, before attempting to straighten the piece out for a second attempt, and after straightening before re-bending, a further annealing should be undertaken.

One metal that is frequently used, and very often abused, is DURAL. Dural is an alloy of aluminium, copper, manganese and magnesium and has the property of becoming harder after heating to a critical temperature. Dural is often specified for undercarriage legs and cabane struts on models and because of its very high strength-to-weight ratio is perfectly suited to these purposes, but unless it is properly treated it can fail disastrously. This is not a very likely occurrence really because the sort of thicknesses of metal that we are likely to use for model work are generally grossly over-strong for the particular job they have to do. But particularly on undercarriages which can be subjected to heavy shock loads (!) failure could be annoying and can possibly be avoided. If dural is bent without annealing it has a tendency to 'work harden' extremely rapidly on the bend line, in fact it hardens so quickly that it can fracture right across as it is being bent, or at best on the first heavy landing. If, however, it is annealed first it should not crack, but it will not have the strength that it ought to possess. The technical data for heat treating dural is as follows.

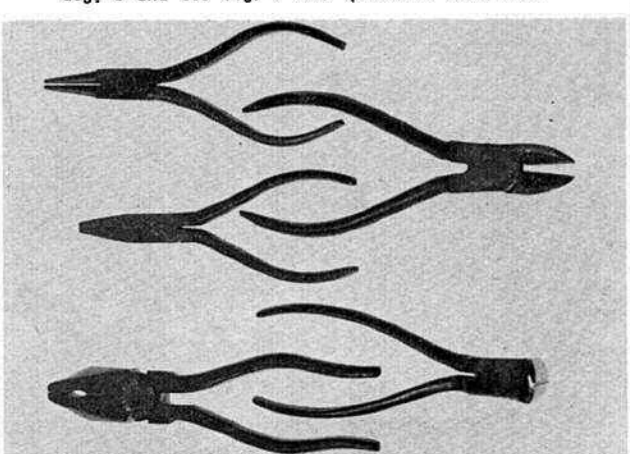
(a) Anneal at 400 deg. C.
(b) Heat treat for hardness by heating to between 450 deg. C and 550 deg. C then quench in clean cold water. (Metal now soft but will harden with age over a period of 1-2 weeks.)
(c) To speed up the hardening process it can be re-heated to 200 deg. C.

**Table 1**

| | |
|---|---|
| Aluminium | As for alloy. |
| Aluminium Alloy | Heat to 350-400 deg. C. Quench in cold water. Soap blackening at 400 deg. C so coat in soap heat up till soap blackens. |
| Dural | Anneal as per aluminium. |
| Brass | Heat to dull red. Cool slowly, sudden cooling can cause fracture. Pickle in vinegar. |
| Copper | Heat to dull red, quench in water. Pickle in vinegar. |
| Steel | Heat to cherry red, allow to cool in air. |
| Stainless Steel | Dull red heat, quench in clean cold water. Scour surface before heating. |

Now the above mentioned temperatures are fairly critical and I can assure you that a domestic oven will not get that hot! Really the only way is to use a muffle furnace with a method of reading the temperature inside it, but most of us do not have access to one although still want to use dural. I have experimented with heat treating this material at home and have come to the conclusion that if you are very careful and reasonably practised at heating up alloys, it is just about possible in a very non-technical way. The procedure is as follows:–

1. Coat piece of dural with soap (soap blackens at 400°C).
2. Heat until soap blackens then (the dodgy bit) continue heating for a short time in order to get over the 450 deg. C 'hump' when the alloy can become hardened. The length of time you carry on heating could be judged by roughly heating for 15-20 per cent longer than it took to reach 400 deg. C. A little bit of scrap could be used to try this out first.
3. Quench – that is plunge it into clean cold water, stirring it around vigorously. The metal should now not only be soft enough to bend but should also immediately start to



Useful selection of pliers – at far left, top to bottom, round nosed, gimp nosed and 6 in. engineers' combination pliers, while near left are side and end cutters. The latter are luxury items and in any case should only be used on thin section wire. Otherwise, use a file for cutting wire.

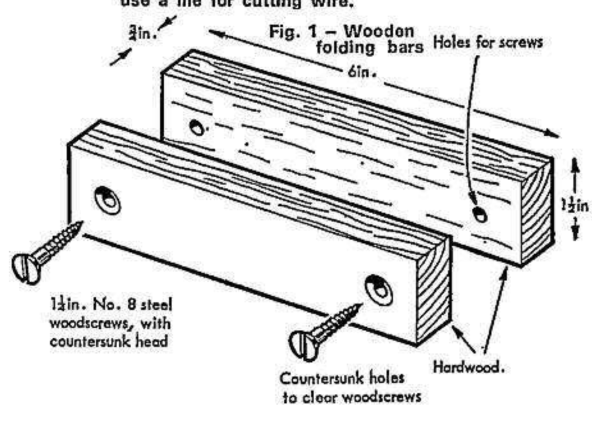
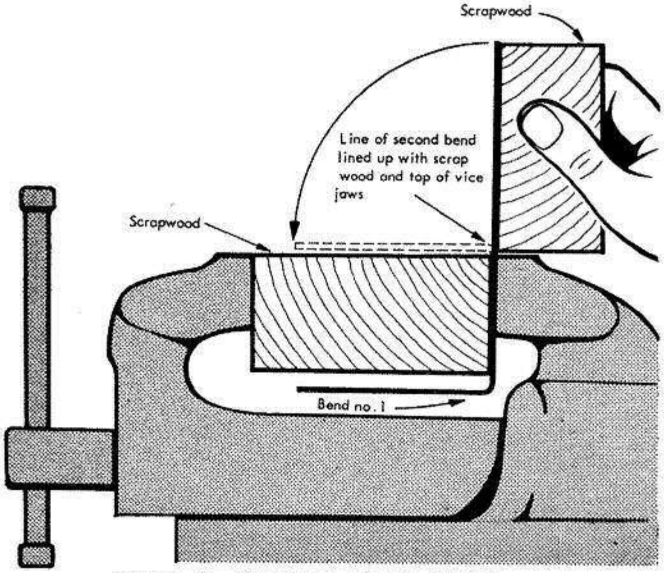
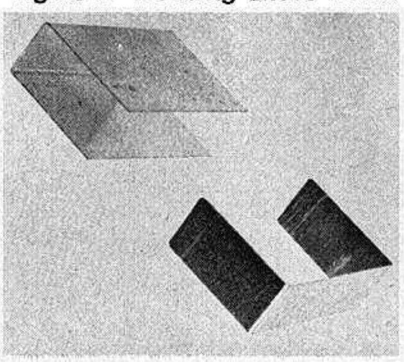



Fig. 1 – Wooden folding bars




## Figure 2 Bending sheet metal



Typical 60cc. 'pressure fed' stunt tank (as illustrated in figure 3) shows the two U-shaped pieces which are later soldered together. Accuracy is important to avoid relying on solder to 'fill the gap'. Note rounded corners inside piece to clear radius of bend.

get harder again. The final heating to 200°C, to speed up the hardening after shaping can be done in a domestic oven.

There is another method of gauging the temperature accurately involving the use of a crayon which melts at different specified temperatures dependent on the grade chosen. With this method a crayon which melts at say 500 deg. C would be used to mark the metal, and then when the metal reaches 500 deg. C the crayon mark can be seen to melt and material could be quenched. Unfortunately, these crayons are difficult to obtain in small quantities retail.

I hate to be pessimistic in this sort of article, but there is one other material which modellers use miles of, and which is heat treated and which is extremely difficult to re-treat; that being piano wire. This is a high quality carbon steel wire which has been hardened by heating and quenching and then tempered (a process which removes the absolute brittleness of the hard wire and makes it springy). Many people seem to have difficulty in shaping the thick gauges 12, 10 and 8 into undercarriage shapes and seem to think that the answer lies in softening the wire, bending it and then re-hardening. I would feel that this is not necessarily the case, and that a re-think of the methods that they have used in trying to bend the wires is needed. The heat treatment of piano wire really does need a muffle furnace if it is to be 100 per cent successful. I spent some time (and many feet of piano wire) in fruitless endeavours to soften 8 swg wire to bend it into a noseleg type of undercarriage and then re-harden and temper it. After many attempts the legs made from my own heat treated wire just did not give as good a performance as that which I bent from the wire as bought. The annealed wire was also only marginally easier to shape. The reason for the wire being difficult to re-heat treat is very simply that it is next to impossible to obtain an even temperature throughout the piece of wire when heating it over a gas stove. This results in a component which is too hard, and therefore brittle, in one place whilst next to it there is a part which is too soft, and therefore bends too easily. The exception to this would be for very small components that could be placed in a tin or metal box to be heated, hopefully more evenly. In case there are any die-hard experimenters that will want to try heat treating piano wire the method is as follows:

To anneal – heat to cherry red heat and allow to cool slowly, preferably in a hot oven, cooling down with the oven.

To harden – heat to an even cherry red (that's the killer) and quench in clean cold water.

To temper – clean the surface of the component thoroughly with emery cloth then re-heat very gently whilst carefully observing the surface of the metal which you should notice becomes firstly a pale-yellowy colour which darkens through brown and purple then becomes blue. Immediately the colour becomes blue it should be quenched in clean cold water. The colours are caused by oxides, which have different colours at different temperature and can thus be used to assess the temperature that the metal has reached. The colour should ideally be gauged in daylight.

## Bending Sheet

An invaluable aid to sheet bending is a pair of folding bars. These can be improvised from scrap steel (25 x 3 mm. 1 in. x ⅛ in.) rectangular stock should be adequate and about one foot would be necessary. Annealing is necessary before the very sharp bend is attempted, and to make sure that the top edges are level. The folding bars could be dispensed with and hardwood blocks used instead, preferably joined together with woodscrews (Figure 1) but something has to be used to support the sheet right up to the bend line. Now nothing looks worse than pieces of sheet metal that have been battered with a hammer whilst being bent, so avoid direct contact between the piece being shaped and your hammer. Either push the sheet round the bending bar with a flat piece of wood or if the metal is too hard or thick to push over easily, use a scrap of wood between the hammer and the sheet.

The first bend is always the easiest one to do and the subsequent bends often tax the ingenuity, and also the number of hands available, to hold packing blocks and metal and tighten a vice simultaneously, but usually with the help of a carefully positioned knee the problems are solved (I often use my knee to do up a vice).

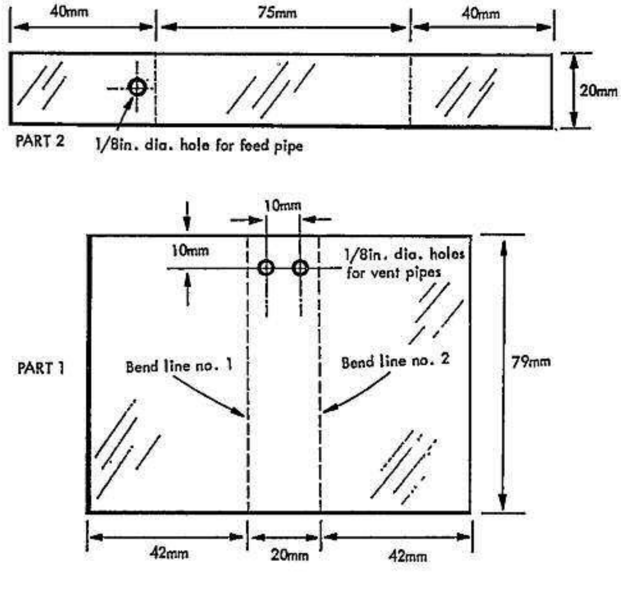
If you are trying to make fuel tanks for example the easiest type I can think of is the 60 cc. type illustrated in the photograph. The parts would be made as follows:–

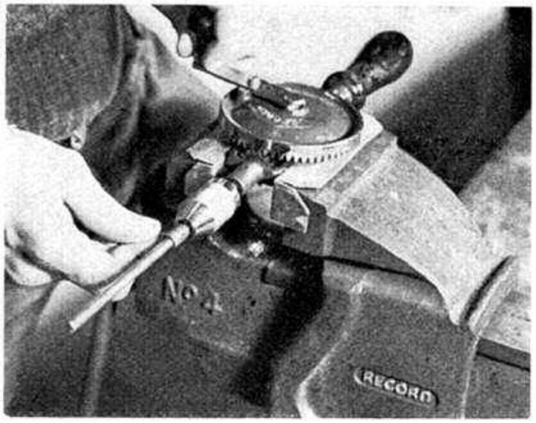
1. Mark out the main parts of the tank as per Figure 3 on template with a pencil (see first article).
2. Drill the vent holes and outlet pipe hole.
3. Place metal in folding bars and make the first bend at 90 deg.
4. Find a piece of scrap wood over 42 mm. wide and up to 21 mm. thick, and grip the sheet with one bend in it as shown in Figure 2, making sure that the second bending line is level with the scrap woodblock and the vice jaws which now act as a pair of folding bars whilst you make the second bend.
5. Repeat, using the same methods but adjusting the size of the scrapwood as necessary for the second part.

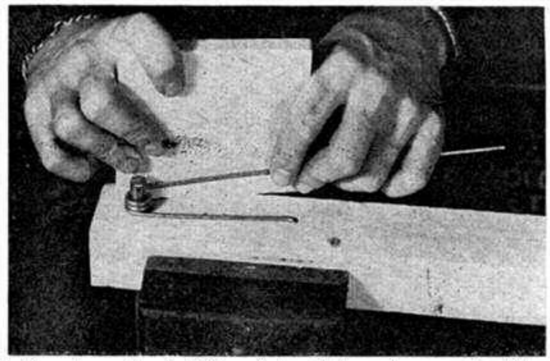
If a complete box shape is required it will be necessary to make a block of wood the internal size of the finished shape so that the sheet can be bent right around it. When you are using the scrap block spacer method of bending you must remember to use aluminium or copper protectors in your vice as required in order not to mark the sheet.

There are bound to be some mathematically minded readers who will query the dimensionings shown on the tank drawing. The reason for the larger dimensions of the main part are that an allowance has been made for a

## Figure 3. Typical fuel tank dimensions







Left, using a hand drill and dowel to make a spring from thin gauge wire, while above is shown the method of winding a coil spring in a nose-leg from thick (10 swg) wire. Note supporting piece of wood used to push wire round the steel peg.

small flange all the way round the seam to help strengthen the joint, but more about soldering later.

## Bending Piano Wire

I have already mentioned the problems associated with heat treating piano wire and said perhaps if you find it difficult a revision of method is needed. The following hints and tips should be of use if you have had difficulty in the past. The essential items are:–

1. Pliers – engineers combination 6 in.
2. Pliers – round nose 6 in.
3. Smooth file – for cutting and removing burrs.
4. Vice
5. Scraps of round steel, brass or aluminium rod for bending mandrels.
6. Piece of hardwood for making jigs, in addition 5 in. gimp-nosed pliers might well be useful as would 5 in. side and end cutting pliers, but these are luxury items that could be purchased later.

Using these tools is quite often a matter of sheer strength, it is quite possible to bend tight coils in 12 and 14 swg wire with round nose pliers as long as you have reasonable biceps, but younger modellers will find that a vice is a necessity for anything thicker than 16 swg. Before starting to bend any wire it is as well to be aware of two pitfalls; both of them are associated with a phenomenon known as fatigue. Quite simply this difficulty crops up when you attempt to bend the wire through too tight a radius or have too many attempts at bending a piece of wire, straightening the wire out in between times. The former is only usually a problem with the gauges from about 16 upwards but this is because you do not usually try to bend thick stuff into sharp bends, but the latter will affect any gauge. What happens is that the tiny particles which make up the wire are stretched out on the outside of the curve to such an extent that eventually they give up holding together, and the wire breaks. Even if it does not break as you bend it, the corner can become permanently weakened and liable to break at any time. It is advisable then to bend the thicker gauges over a suitably rounded former and not to attempt to straighten out a mis-bent wire but replace it with a fresh length and endeavour not to make the same mistake twice.

When bending piano wire I find it a distinct advantage to work with a full (36 in.) length for as long as possible before cutting off the completed component. It not only gives some latitude for errors in estimation of amount required, but also gives you something to grip when trying to bend the thicker gauges.

## Bending Angles

This is the most straightforward of wire bending operations and should present little difficulty providing the aforementioned points on fatigue are borne in mind. It is useful to have a light alloy vice for bending hefty wire because the corners can be rounded off the jaws easily in a suitable place and angle bends can then be attempted without worrying over fatigue. As often as possible the wire should be supported with a piece of hardwood whilst it is being bent over so that the portions either side of the bend remain straight. As I have already said small loops in thin gauges can be bent with round nosed pliers but if larger radii are required, or thick gauges are to be used, the wire should be bent round a mandrel. The mandrel can be steel, aluminium or brass – even hardwood will do, but it should be slightly smaller than the finished inside diameter of the loop required as the wire will spring somewhat when the bending tension is released, to assume a larger finished size than the mandrel. The mandrel can be gripped in the vice or can be made up into a bending fixture such as that illustrated. This is made from hardwood with steel pegs – the peg could be a bolt double nutted with the nuts sunken into the top surface of the wood and then the heads cut off or just pressed tight into a hole with the heads on the back. The end of the wire is restrained simply by bending over at right angles and then placing in a hole in the wood. When using this method for 8 swg wire a fair degree of muscle is required not only to pull the wire round but to keep it firmly in contact with the mandrel by attempting to keep the wire in tension and keep the coils pulled down to one another. A single large loop is not so difficult however as a little judicious tweaking can usually get it to lie flat. Multiple coils in thin wire for springs etc. are quite easily made with the aid of a drill brace. A suitable size mandrel i.e. a piece of ¼ in. dowel 6 in. long is gripped in the drill chuck and the drill gripped in the vice. A hand drill not a power drill. The wire is bent at right angles for about ¼ in. and is hooked into the gap between two of the drill chuck jaws. Then, holding the free end of the wire with pliers, commence to turn the drill – meanwhile keeping a tension on the wire. When sufficient turns of spring have been completed, let go of the drill handle which will then whirl round backwards a few times. Do not let go of the wire or this will flail round and possibly cause an injury. The spring is then ready for converting into compression or tension type as required. Finally here are a few pointers on the bending of commonly required shapes for model use.

(a) Control line attachments

For each of these three types of bend the same method can be adopted. Start with the bend marked * and work back towards the straight part of this leadout. Not only is this the easiest way to do the bending but will prevent inaccuracies in bending from causing different length leadouts on your next model. Be careful not to make the bends in 3 – my favourite, it's the easiest – too acute, both these bends can be made by starting off with a right angle and then squeezing it up with pliers until the correct shape is achieved if snipe-nosed pliers are not available. Small round-nosed pliers could also be used.

(b) Undercarriages

Start off with plenty of wire and work out from the middle to achieve symmetry marking the centre and all subsequent bends with felt-tip pen before starting to bend. If you are using a vice make sure you hold the same side of the opposite bends e.g. for A1, and A2 grip portions X for bending legs down otherwise one leg could end up the thickness of the wire longer than the other. Before fixing the completed U/C check from top and side to make sure no twist has crept in. The most firmly fixed U/C can be moved if you try to torsionally twist 10 swg wire against its fixings. See Figure 5.

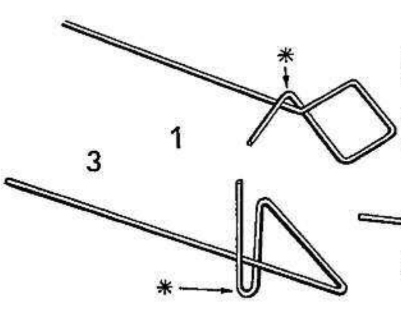



**Figure 4 Typical control line attachments**

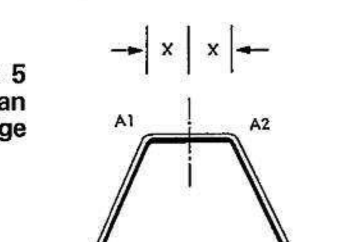
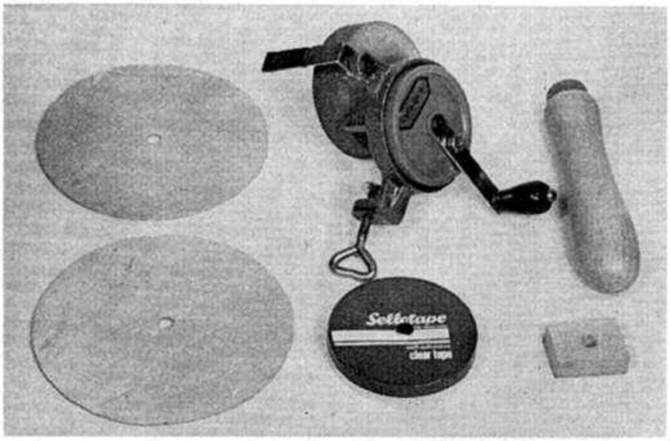



**Figure 5 Bending up an undercarriage**




# Back to . . . SQUARE ONE!

**Describing the construction of a winch suitable for use with the gliders previously detailed in this beginners' feature**

The basic components needed to make the winch are very few – just two plywood discs, a small bench grinder, a small tin, a file handle plus a block of scrap wood to fit inside the tin.

WITH THE SECOND glider of the series now completed, it would seem a good time to improve that very necessary piece of equipment, the towline itself. By now you will have realised the snag of not having a proper winch – a spool or old fishing reel is all right as a temporary measure to get the model aloft, but when it is time to go home, isn't it a long job winding up all that nylon line, not to mention the inevitable line tangles!

The advantages of a winch are many: as soon as the towline has been released from the model the line may be wound in again immediately; in fact, with the normal gearing employed, the line may often be fully wound up before the end even touches the ground! This avoids snags caused by catching in long grass, searching for the line after every flight, and makes it impossible to get your own feet tangled up in it!

Glider winches are, of course, available commercially, but the one we made cost less than half the normal price (and we bought all our items new, you may be able to 'scrounge' some parts) and took very little time to assemble.

Heart of the system is a small hand-grinder, the type that is meant to clamp onto a bench. Our local ironmongers supplied a *Ceka-Genko* grinder with a 4 in. diameter grinding wheel at a cost of £1.10, and while any similar grinder can be used, the comments which follow apply to this machine only – others may vary slightly in design and so you may need to use a little imagination in adapting them. While at the ironmongers, purchase a wooden file handle – ours was 6 in. long and cost just 10p.


Remove the work guide and grinding wheel by undoing the retaining nuts – the grinding wheel is not needed at all, although of course you can always use the finished winch as a grinder if you wish!

The first problem is thus how to form a drum to wind the line onto – the instructions in the *Asteroid* kit suggest two plastic plates bolted back to back. Fine – but at this time of year none of our local shops stocked such items! We therefore improvised, and the solution is even cheaper! For the centre part of the drum we used a discarded *Sellotape* tin, but any slim, round tin of approximately 3 in. diameter would do, while the side discs were cut from $\frac{3}{16}$ in. plywood – we made these 5 in. diameter to provide a deep flange. Cut these out carefully with a fretsaw and sand smooth.

Drill through the exact centre of the ply discs, tin lid and base with a $\frac{1}{8}$ in. diameter drill, followed by a drill to match the shaft ($\frac{5}{16}$ in. in this case). A scrap piece of wood the same thickness as (or *slightly* less than) the tin should likewise be drilled – this will fit inside the tin and prevent it from being crushed when the shaft nut is finally tightened. Place one ply disc plus the assembled tin (with the wood packing piece) on the shaft and turn the handle. If you did not drill through the exact centre of the tin this will be shown up as the tin runs out-of-true. If necessary, use a round file to enlarge the hole and reposition the tin. Draw around the tin to mark its position on the ply disc and drill or punch a small (approx. $\frac{3}{16}$ in.) hole in the edge of the bottom half of the tin.

Dismantle, and remove the paint from the edges

At left, one of the ply discs in place on the grinder shaft together with half of the tin and wooden spacer. Below shows the panel pin in the top of the handle, its housing slot cut in the base of the grinder, and the tapered end of the cut-down clamp screw.

The winch now painted and completed is then separated to attach the fishing line – in this case the line was fed through a hole in the edge of the tin and tied to a small piece of wood as an anchor. Remember to feed line through the guide first!

of the tin with glasspaper, then apply 'five minute' epoxy around this perimeter and re-assemble the drum complete – this will prevent the nylon line from slipping between the rim and centre. Before the glue sets make sure that the tin is correctly positioned and will 'run true' when the handle is turned. *Do not glue the tin halves together.* When the glue has dried remove once more, then give the plywood parts three coats of dope, followed by a couple of coats of colour paint. We painted ours bright yellow so that it could be easily spotted if left lying in the middle of the field . . . we know what it's like to spend half the afternoon searching for lost equipment.

While the paint is drying, it is time to fix the handle. Firstly, using a hacksaw, cut-off the end of the clamp screw and taper the threaded end with a file – this will enable you to unscrew the clamp screw completely. Holding the grinder in a vice, use the hacksaw to make a cut in the base some $\frac{3}{16}$ in. deep, then widen this with a thin file so that a 1 in. headless panel pin can be slotted in.

Clean off grease from the thread of the screw clamp with cellulose thinner and clean up the base with a file until the area is bright metal, then partly screw the clamp back into the base.

Take the file handle and hammer the panel pin into the top leaving $\frac{3}{8}$ in. standing proud so that when the handle is pushed over the end of the clamp screw, the panel pin fits into the slot in the base to prevent it from turning. Remove the handle once more, mix up some epoxy glue and apply to the thread of the clamp screw before tightening it fully down onto the base. Apply more epoxy to the projecting clamp screw and the underside of the base, then add the handle once more. Coat all around the joint with epoxy and leave to set, making sure that the handle is square to the grinder.

Now we just need a line guide. Our grinder was supplied with a work support, so we simply hammered this flat, re-bent it to suit the new drum size and drilled a hole in the end over the centre line of the drum. Alternatively, a piece of 18 s.w.g. piano wire could have had a loop made in one end, bent to shape and bolted to a part of the grinder.

The towline of 8-10 lb. nylon fishing line must then be attached. Remove the outer ply disc/tin lid, then feed the line through the guide and through the small hole in the tin's rim and attach an 'anchor' such as a small piece of wood; even a button would do! Re-assemble the drum for the last time, bolt in place and wind away – 50 metres of line may be wound on very quickly indeed!

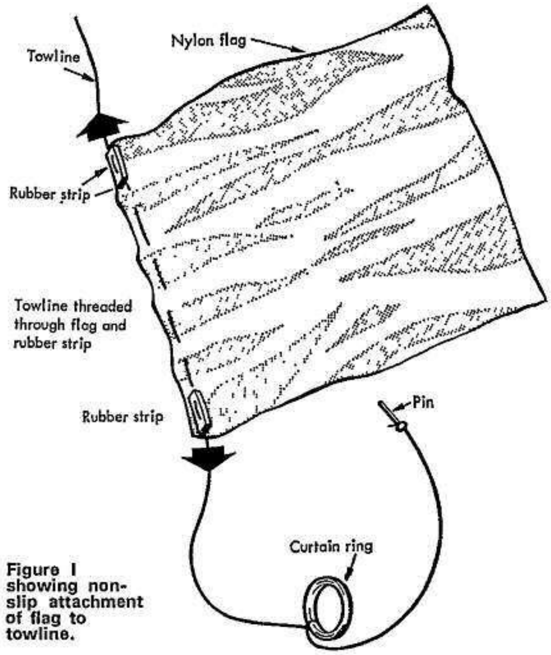



Figure 1 showing non-slip attachment of flag to towline.

That, therefore, completes the mechanics of the winch, but we still need to complete the 'glider end'.

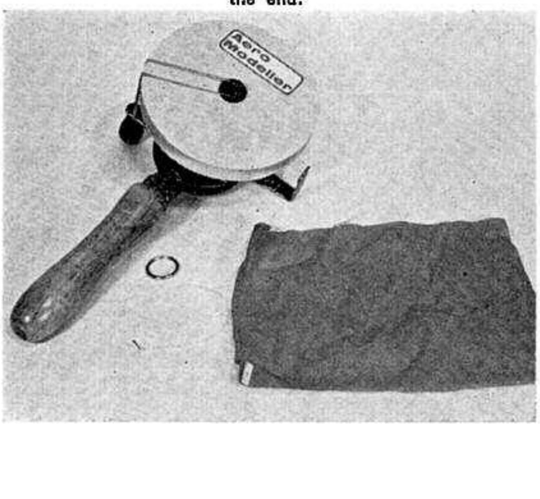
Competition rules say that the towline must carry a pennant of at least 39 sq. in. – this being so that the timekeepers can easily see when the model is released. As this is obviously a 'sensible' size, we cut a piece of nylon 6 in. x 7 in. to act as the pennant.

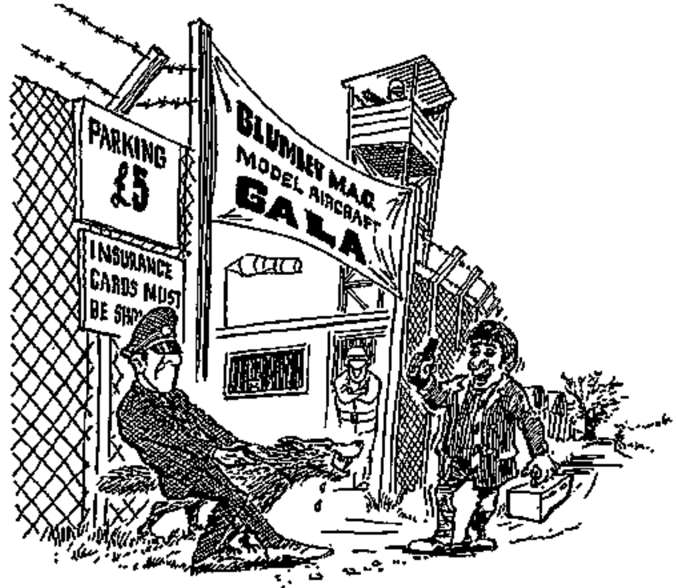
How to attach it? Well, you could just knot it to the line, but we preferred the idea presented in a previous *Gadget Review* – and as reproduced in figure 1. The towline is stitched to the flag, but passes through two small pieces of rubber as shown which act as friction stops and prevent it from sliding up and down the line. We used a couple of slices off a pencil rubber for this material – and it works too!

A brass curtain ring makes a perfect tow ring, so this was tied to the towline, and a cut-down pin was tied to a loop of the towline a further 4 in. away – this being to activate the auto rudder and dethermaliser detailed last month. A drop of epoxy glue on the pin-head will act as extra security.

With the model and the equipment now completed we now have to put it all to the test, which we hope to do by next month, petrol and weather permitting of course.

The completed winch – note the elastic band stretched over the end of the nut retaining the drum, and around the handle – this effectively prevents the drum from unwinding during transport to the flying field. The line guide seen is simply the original work-guide re-bent to shape and with a hole drilled in the end.






# topical twists

by 'Pylonius'

illustrated by Sherry

★ ★ ★

## Tall Story

The Americans might be economising on fuel, but not, apparently, on those huge skyscraper trophies they hand, or rather heave out, for prowess on the flying field. The vast trailers they tow along to the contests are not just for model stowage and living accommodation; their ample proportions are also needed to tote back the great chunks of hardware.

The tradition is an old one. My earliest memories of the American model mags are of photos of happy winners (' . . . *Erle Hackenburger with his sleek ship* . . .') holding miniscule models against a towering background of solid trophies, most of which seemed to have derived their artistic inspiration from the Empire State Building, all crying out for King Kong and the pursuit ships at their summits.

*'How'*, I asked, *'could one small model earn all that grandiose loot?'* A read of the small print revealed the answer: one lucky thermal flight.

But why should the Americans go in for all that heavy hardware, so liberally bestowed, when we, in this country settle for one small plaque for the most prodigious of modelling feats? It might be because the Americans are a nation of winners, whereas we are a nation of participators. An American meet will run to as many events as there are entrants, thus to ensure that everyone becomes a winner. It is what is called good therapy, helping to keep the citizens off the already over-crowded psychiatric couches. One way to give a trophy to everyone is to call everyone under the age of 25 a Junior; so that getting down to basics we get *H. L. Glider Senior* and *H. L. Glider Junior*. A fascinating reversal of jargon is that we call it 'Chuck Glider' and they 'Hand Launched Glider'.

Other nations express their competitive urges in other ways. We in this country discarded all those tiresome old record lists along with bamboo undercarts, but some people, concerned for the greater glory of the fatherland, still take them seriously. The feats of endurance, might, or might not, get a mention in the Guinnesski book of records but seem so pointless to us Westerners who thankfully gave up all that superflying when D/T's were invented.

Which brings us to another topical item. We hear of a famous racing motorist who has taken up aeromodelling, bringing a quick eye and tuned reflexes to the piloting of his new model helicopter. When he wins his first model event, as no doubt he will, the outcome might not be laurel wreaths, magnums of champagne and hugs of pretty girls, but someone saying, *'Hey, just a minute'*, and handing him a miniscule plaque or a beginner's glider kit.

## Bang Bang Rubber

All things being equal in Wakefield flying – and many of the models are equal to the point of indistinguishability – success depends very much on the quality of the pared-to-a-minimum rubber motor. But however good or otherwise the rubber may be, whether it has been left to cure for ten years in a coffee tin, or weeded out by torque tests from huge factory fresh batches, it perforce has to be wound up to the point of explodability. This is why so many self-wind gadgets were to be seen at the World Champs; holders-on are given to convulsive reactions when full turns plus one are applied and are likely to subject frail tail-end structures to a destructive spasm.

One way to get over the exploding motor syndrome is for the organisers to supply standard rubber motors from the same batch to each competitor, together with a winder that locks on at a given number of turns. This would ensure against motor gamesmanship and cut down on the need for tranquillisers. I am now working on a theory for a similar hand-out of internal combustion engines for Power events.

## Scaling the Heights

The beginner who is not attracted to the somewhat skeletal austerities of the model-aeroplane type model aeroplane, and who prefers, like so many of his breed, the real thing look, comes in for a tough initiation into the world of model flying. This fact was brought home to me on reading a review of small scale, which seem to be the beginner's alternative to expensive, daren't-think-of-it-crashing radio flying. The lead in via the gleaming illustrations of metallic supercraft on the box lids are encouraging but the nitty gritty of balsa sticks and coloured tissue beneath is hardly likely to fire the imagination. What is more, models that look like the real thing rarely fly like the real thing.

*'Oh no,'* I heard a Scale expert say, *'it wouldn't fly without the pendulum control. Of course, I could fit radio, but you wouldn't get the same sort of realistic flight.'*

Scale flying is an exciting, but tough way of life, and best approached through a series of very unscale models.


**AIRCRAFT DESCRIBED Number 224**

# Bücker Bü 131B Jungmann

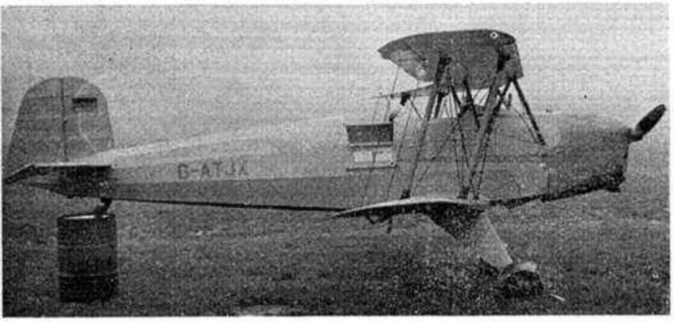
## CLASSIC AEROBATIC BIPLANE APPROACHES ITS 40th YEAR

CARL CLEMENS BUCKER, an ex-pilot from the air services of the Imperial German Navy during the First World War and with subsequently many years experience of the aviation industry in Sweden where he was employed by *Svenska Aero AB* until 1932; launched his own company at Berlin – Johannisthal in October 1933. With the aid of his Swedish engineer Anders J. Andersson, his *Bücker-Flugzenbau GmbH* company produced their first prototype ready for test flying on 27th April, 1934 – the same year in which the Nazi party, under Chancellor Adolf Hitler, came into power.

This prototype, registered as D-3150 and powered by an 80 h.p. Hirth HM60R inverted in-line four cylinder aircooled motor was a 'winner' from that very first flight. It proved to have inherently good flying characteristics making it an ideal trainer. The design, virtually unchanged, was immediately put into production as the Bü 131A for the *Deutscher Luftsport-Verband*, the German air-sports union which had been established to train pilots for the *Luftwaffe* of the future. In this category the Jungmann proved ideal, the two seater being both relatively cheap to manufacture and to maintain, while the performance made it perfect as an *ab initio* trainer as well as providing groundwork for aerobatic flying. In 1935 the company moved to larger premises at Rangdorf near Berlin and all subsequent Bü 131s were made at this plant.

1936 saw the Bü 131B, powered by the 105 h.p. Hirth HM504 motor introduced, and with the extra

**Heading: Swiss Dornier-Werke A.G. Bü 131B, bright yellow, and red fin band, black fuselage cheat lines. Left: the oldest Jungmann is G-ASLI, the 20th made in 1935, seen here at Old Warden when operated by Dennis Reay, finished white and blue.**



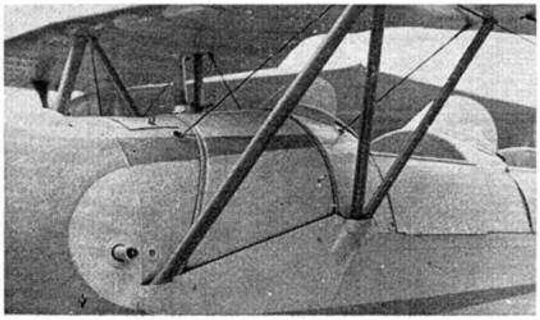

Ron Fautley's Swiss made Jungmann G-ATJX on its air strip at Jenkins Farm, Essex where it was tracked down for measurement. It was previously HB-AFE and D-EDMI as well as A-88 in the Swiss Air Force. Note German fin insignia, since replaced.

power available the already fine performance of the Jungmann became superb. The powerful ailerons (the upper and lower wings were interchangeable, thus the aircraft had ailerons on all four wing panels) and elevators promoted excellent aerobatic qualities and the inverted fuel system allowed the 'book' to be flown.

Over 3,000 Bü 131B's were produced by Bucker, before production ceased in 1941, to be replaced on the production line by the low wing Bü 181 *Bestmann.* The Bü 131B was supplied to several countries before the war including Yugoslavia, Bulgaria, Rumania, South Africa and to South America. In addition the Bü 131B was licence-built in Czechoslovakia, Spain, Japan and Switzerland. In this latter country they were constructed at the Altenrhein factory of *Dornier - Werke A.G.* The Swiss Air Force standardised on the Jungmann as its primary trainer; receiving the last of some 84 machines built by Dornier in 1944. It is this production batch which has now found its way into the civil registers of several nations, including some in the U.K.

The factory fitted aircooled Hirth HM504 engine provided a maximum speed of 114 m.p.h., landing speed being 51 m.p.h. and a climb to 6,500 feet taking 12 minutes. There was a service ceiling of 14,100 feet and a range of 405 miles.

Tricky cabane detail of staggered 'N' struts to support centre section has the fuel tank between fixing points.

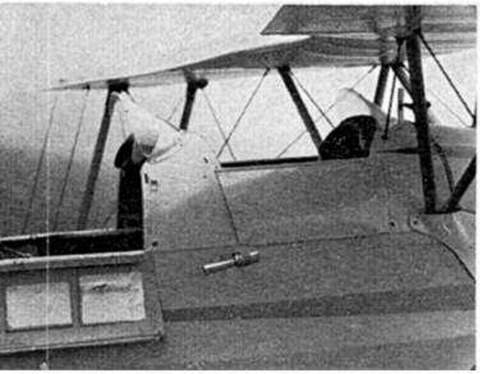


Various engines were fitted to these licence-built aircraft. The Czechoslovakian-built Aero C104 used the 105 h.p. Walter Minor 4-111 which gave a virtually identical performance to the Bucker's factory product. The Japanese fitted Hitachi (Ha-47)11 to their Ki-86A designated version and this engine (producing another 5 h.p.) gave another 8 m.p.h. at the cost of some thirty miles range. The Spanish fitted a 125 E.N.M.A. Tigre G-IV-A which gave a maximum of 124 m.p.h. with the range reduced to 311 miles. Private owners seeking more power for aerobatic use, and also suffering from lack of spares for the original engines, fitted 180 h.p. Avco Lycomings which gave a top speed of 140 m.p.h. and raised the cruising speed to 127 m.p.h.

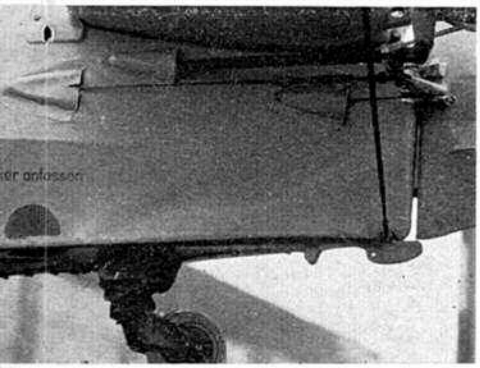
A few Jungmanns saw front line service but the great majority were utilised purely to a training role. However, a few were used in conjunction with combat units in communication or liaison capacities, while others served with the *Luftdienst* (Air Service) units in varying duties, including target towing.

With its desirable aerobatic qualities the Jungmann naturally became much sought after by the private flyer after the war. A large number of the licence-built machines found their way on to the civil registers of Europe and the U.S.A., after they were retired from military service. However, it seems that virtually all the Jungmanns remaining in Germany at the cessation of hostilities were either no longer airworthy or were destroyed by the Allies. None were taken-on-charge by the Royal Air Force although a couple were flown in R.A.F. markings (but without serial numbers) at Berlin-Gratow for a short period.

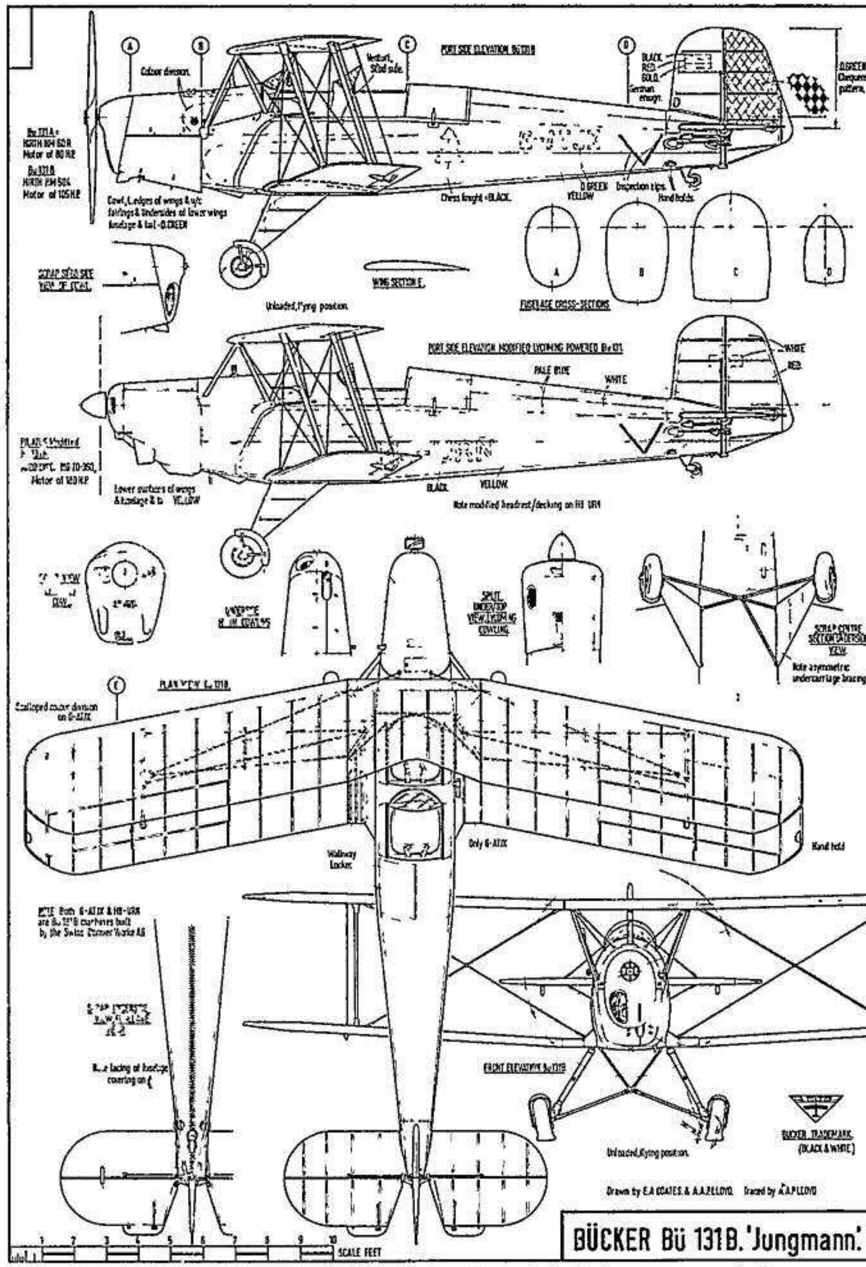
As for construction, the fuselage consisted of welded chrome-molybdenum steel tube with light alloy panels at the nose and on the top decking of the cockpits – the remainder being fabric covered. The undercarriage, a sturdy divided affair, with shock absorbers and steel springs plus oil dampening were hinged to the sides of the fuselage, while the axles were hinged to a pyramidal structure beneath. Low pressure balloon typed wheels with light alloy mudguards were fitted. Welded chrome-molybdenum was likewise used for the tailplane, the whole being covered with fabric and wire braced. Divided elevators had trimming flaps in the trailing edges. Wings were single bay with fully interchangeable upper and lower mainplanes thus if a lower wing were damaged a spare top wing could replace it provided the linkages for the interplane struts were changed. Twin wooden 'I' section spars were employed with wooden ribs, plywood leading edge sheeting forward of the front spar and conventional drag bracing; the whole being fabric covered. Interplane struts were made of steel. Upper wings had 2.5 degree dihedral being rigged at –1 degree incidence, while lower wings had 3.5 degree dihedral and were set at 0 degree incidence, and had 11 degree sweepback. The whole aircraft could be rigged in just half an hour, a feature which adds to the attraction of this desirable sporting biplane.



**Dropside cockpits for access are typical for the period.**

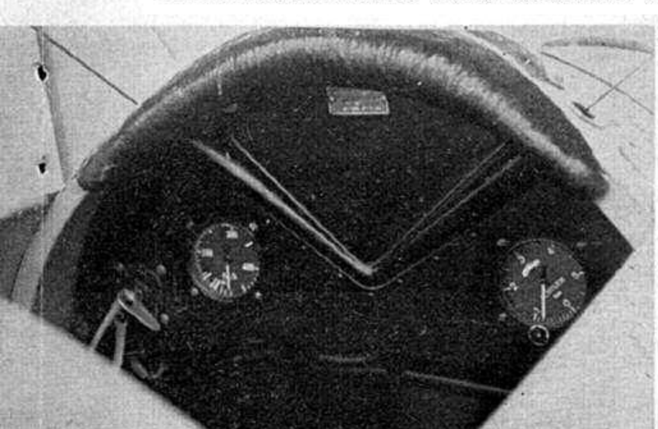


**Above, tailwheel and elevator pushrod detail plus rudder cable. Below, the characteristic mudguards on stilty undercarriage.**




**Front cockpit (below) has ignition switch, air speed indicator, altimeter and the fuel tank immediately ahead in G-ATJX which has dark blue trim on overall yellow finish.**

**Rear cockpit (below) has airspeed indicator, compass, fuel pressure at top of panel; ignition switch, altimeter turn and bank indicator, engine r.p.m. along base. Throttle is out of view to left.**



# 1974 F.A.I. International Contest Calendar

### World Championships

| | | |
|---|---|---|
| 1st-7th July | **U.S.A.**<br>Lakehurst, N. J. | *Scale:* (F4B, F4C) and *Indoor:* (F1D) (See also open International events.) |
| 24th-29th July | **Czechoslovakia**<br>Hradec Kralove | *Control Line.* |
| 4th-9th September | **Czechoslovakia**<br>Dubnica N. Vahom | *Space Models.* |

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### Continental Championships

| | | |
|---|---|---|
| 11th-12th May | **W. Germany**<br>Himmelberg, Nr. Reutlingen | European Championships – F1E *Magnet Glider.* |
| 2nd-4th August | **Yugoslavia**<br>Octocac | 16th European Championships – F1C *Free-Flight Power.* |
| 12th-16th September | **W. Germany**<br>Homburg/Saar | Free-Flight European Championships – F1A, F1B + Europa Cup F1A, F1B, F1C *Free-Flight.* |

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### Open International Events

| | | |
|---|---|---|
| 24th February | **Finland**<br>Helsinki | 'VLK Winter Contest' – F1A, F1B, F1C *Free-Flight.* |
| 10th-12th May | **Rumania**<br>Slahic-Prahova | *Indoor 74* – F1D. |
| 11th-12th May or 18th-19th May | **Czechoslovakia**<br>Rana (Louny) | F1E *Magnet Glider.* |
| 18th-19th May | **Netherlands** | Coupe d'Amsterdam Cup – F1A, F1B, F1C *Free-Flight.* |
| 23rd-26th May | **Austria**<br>Wiener Neustadt | Coupe 'Hans Kratky' Cup – F1A, F1B, F1C *Free-Flight.* |
| 1st-2nd June | **Italy**<br>Vizzola Ticino, Caproni Airport | 'Coupe Caproni' di Taliedo Cup – F3B *R/C Glider.* |
| 1st-2nd-3rd June | **France**<br>Aerodrome St-Andre-de l'Eure | 'Challenge Eole '74' – F3B *R/C Glider.* |
| 1st-3rd June | **Austria**<br>Koblach | 'Rhine Cup' – *R/C Glider* and F3A *Aerobatics.* |
| 1st-4th June | **Bulgaria**<br>Jambol | 'Diana Cup' – *Space Models.* |
| 13th-16th June | **Austria**<br>Kraiwiesen | 'Int. Fesselflug Kriterium' – *C/L Team Racing, Speed, Combat* F2A, F2B, F2D. |
| 15th-16th June | **W. Germany**<br>Drover Heide | F1A, F1B, F1C *Free-Flight.* |
| 15th-16th June | **W. Germany**<br>Dortmund | 'Int. Fesselflugwettbewerb Dortmund' – F2D *C/L Combat.* |
| 16th June | **Italy**<br>Biella | '3° Avioraduno R/C'. |
| 21st-23rd June or 28/30th June | **Czechoslovakia**<br>Karlovy Vary | *Scale Free-Flight.* |
| 22nd-30th June | **Norway**<br>Lillehammer | 'Scandinavian Soaring Together' – F3B *R/C Glider.* |
| 29th-30th June | **Italy**<br>Rieti | 'IV° Coppa Europa Aviomodelli' – F3B *R/C Glider.* |
| 29th-30th June or 22/23rd June | **Italy**<br>Bergamo | XI° Graupner Meeting – F3B *R/C Glider and Unorthodox.* |
| 1st-7th July | **U.S.A.**<br>Lakehurst, N. Jersey | *R/C Pylon* (F3D) and *Thermal Soaring R/C, Glider* (F3B) + *Old Timer.* |
| 6th-7th July | **W. Germany**<br>Munich, Frotmaninger Heide | F1A, F1B, F1C *Free-Flight.* |
| 6th-7th July | **Hungary**<br>Pecs | 'Mecsek Cup' – F2A, F2B, F2C *C/L Speed, Team Race, Aerobatics.* |
| 19th-22nd July | **Spain**<br>Alicante | 'Concurso Int. de Vuelo Libre Garcia Morato' – *A2 Glider, Wakefield.* |
| 7th-11th August | **Canada**<br>Centralia Ontario | 'Canadian National Championships' – F1A, F1B, F1C *Free-Flight.* |
| 15th-18th August | **Austria**<br>Kraiwiesen | '10° Int. Igo Etrich Wanderpokalfliegen' – *R/C Glider* F3A. |
| 23rd-25th August or 16/18th August | **Czechoslovakia**<br>Poprad | *R/C Aerobatics* F3A. |
| 24th-25th August | **France**<br>Marigny-le-Grand | F1A, F1B, F1C *Free-Flight.* |
| 28th Aug.-2nd Sept. | **Poland**<br>Lubin | *R/C Aerobatics* F3A. |
| 30th-31st August-1st September | **Great Britain**<br>R.A.F. Henlow, Beds. (Provisional venue) | 'International Thermal Soaring' – *R/C Glider.* F3B |
| 31st Aug. 1st Sept. | **France**<br>Longuyon-Villette | 1974 – 'Europa Cup' – *Sporting Combat* F2D. |
| 1st September | **Italy**<br>Varese-Schiranna | 'Coppa Europa Idro' – F3A *Hydro R/C.* |
| 1st-3rd September or 13th-15th September | **Bulgaria**<br>Sofia | 'Sofia Cup' – F2A, F2B, F2C, F2D *C/L All Classes.* |
| 7th-8th September | **W. Germany**<br>Dortmund | 'Ludwig-Kramer-Pokal '74' – F1A, F1B, F1C *Free-Flight.* |
| 7th-8th September | **W. Germany**<br>Dortmund | *R/C Glider* F3B. |
| 13th-15th September | **Yugoslavia**<br>Lesce | 7th Bled Cup – F3A *R/C Aerobatics.* |
| 13th-16th September | **Rumania**<br>Constanta | 'Inter-Aero '74' – F2A, F2B, F2C, F2D *C/L All Classes.* |
| 14th-15th September | **W. Germany**<br>Bochum | F2A, F2B, F2C *C/L Speed Team Race and Aerobatcs.* |
| 14th-15th September | **France**<br>Wittenheim | East Int. Criterium – F2A, F2B, F2C *C/L Speed, Team Race, Aerobatics.* |
| 14th-15th September | **Hungary**<br>Pecs | 'Mecsek Cup' – F3A *R/C Aerobatics.* |
| 15th September | **Italy**<br>Lugo di Romagna | 'Coppa d'Oro F.A.' – F2C *Team Racing.* |
| 21st-22nd September | **Belgium**<br>Verviers | *Team Racing, Speed, Aerobatics C/L* F2A, F2B, F2C. |
| 28th-29th September | **Hungary**<br>Per | 'Raba Cup' – F1B *Wakefield.* |
| 4th-6th October | **Hungary**<br>Nyiregy-haza | 'Nyirseg Cup' – F2A, F2C, F3A, F3B, F3D *C/L Speed, Team Race R/C Aerobatics, Glider, Pylon.* |
| 5th-6th October | **Netherlands**<br>Utrecht | 'Criterium Midden Nedar Land VI' – F2A, F2B, F2C *C/L Speed, Team Race, Aerobatics.* |
| 21st-22nd September | **Liechtenstein**<br>Bendern | 'Int. Freundschaftsfliegen' – F3A *R/C Aerobatics.* |

Do you have access to a computer, or know a 'tame' programmer?
If so, use the 'electronic brain' to do your donkey work and produce

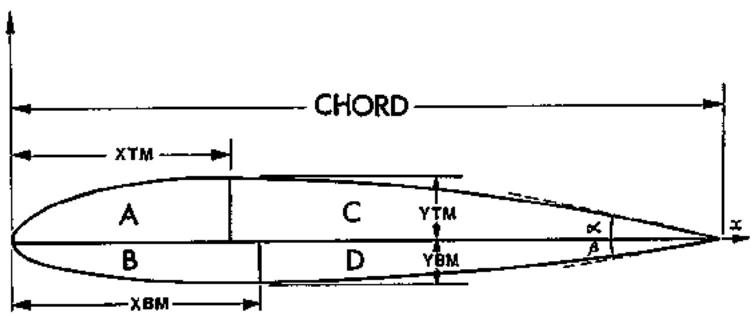
# COMPUTER DESIGNED AIRFOILS

CHRISTOPHER PINN explains how and provides the practical results he has obtained from 'man's best friend'.

THERE SEEMS to be a fairly strong consensus of opinion at the moment that airfoil sections for model aircraft may not be such an exact science after all. The main reason why so little is known about the low end of the Reynolds number scale is probably financial and nothing else. There is obviously a lot to be gained commercially from wringing the last knot of cruising speed out of the Concorde, but when it comes to you, I and our toys, nobody wants to know.

The whole idea was sparked off by that excellent article *Drawing Airfoil Sections by Computer* by N. Kadmon, in the 1972-73 *Aeromodeller Annual.* Being able to write computer programmes, and having access to a plotter, it seemed the answer to my prayers. . . . I quickly drew up a Clark Y section on graph paper, using my trusty Flexicurve, digitised the points and ran the programme. The result was nothing short of disappointing. Although I had been careful in reading off the points, all the errors were magnified and the whole thing was rough and bumpy. It was obvious that with a decent set of co-ordinates I would have got a decent plot, but that was not the way I really wanted to do it! The best way to go, it seemed, would be to somehow specify the broad parameters of the airfoil, such as how thick it was, and how far back the point of maximum thickness occurred, and then get the computer to 'fudge in' the French curve/flexicurve/sole of your shoe bit. The big advantage then would be that the point of maximum thickness could be made to occur where you wanted the spars, so that section changes across the span could be easily accommodated. I felt that it was not worthwhile to consider flat-bottomed airfoils, as these are so easy to fake-up anyway, but symmetrical and under-cambered, seemed definitely worthwhile.

## FIGURE 1 – Dividing the airfoil into four portions A, B, C & D




Although the ideas have been written into a fully working computer programme, I do not intend to provide a listing, after all, we all have our own ideas and it's not that difficult for someone of even limited experience (it's not my full-time job).

The airfoil is divided into four portions, A, B, C and D about vertical lines through to points of maximum thickness of the top and bottom, and about a horizontal datum line (see Fig. 1). If we set arbitrary axes through the leading edge and examine portions A and B, we find that we know a lot about them:

*For A*

At $x = 0,\ y = 0,\ \dfrac{dy}{dx} = \infty$

At $x = XTM,\ y = YTM,\ \dfrac{dy}{dx} = 0$

*For. B*

At $x = 0,\ y = 0,\ \dfrac{dy}{dx} = -\infty$

## FIGURE 2 – List of typical input parameters

| | PMTTOP | PMTBTM | PCTTOP | PCTBTM | SLPTOP | SLPBTM |
|---|---|---|---|---|---|---|
| 1 | 30.556 | 30.556 | 7.6384 | 7.6384 | 14.7 | 14.7 |
| 2 | As 1 but with details added | | | | | |
| 3 | 41.9 | 13.0 | 9.9 | 2.5 | 15.6 | -5.92 |
| 4 | 33.333 | 33.333 | 9.0 | 9.0 | 12.4 | 12.4 |
| 5 | 40.0 | 40.0 | 6.0 | 6.0 | 10.0 | 10.0 |
| 6 | 30.964 | 30.964 | 9.0 | 6.0 | 12.51 | 8.73 |
| 7 | As 6 but with details added | | | | | |

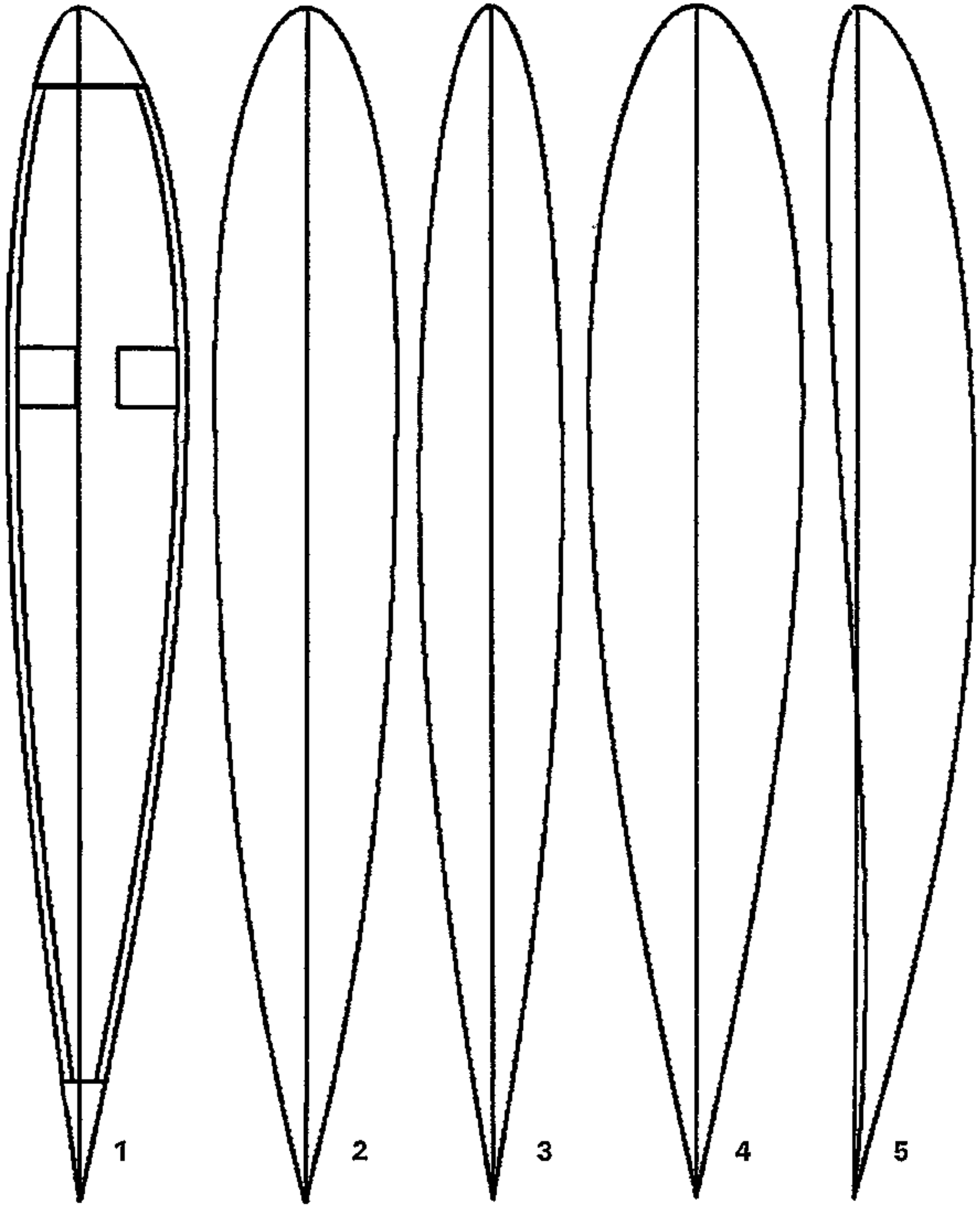
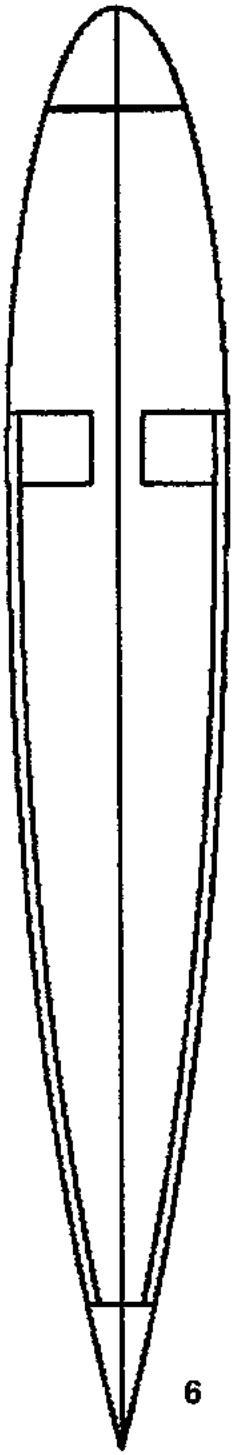



**FIGURE 3 – Showing actual size computer plotted airfoils**



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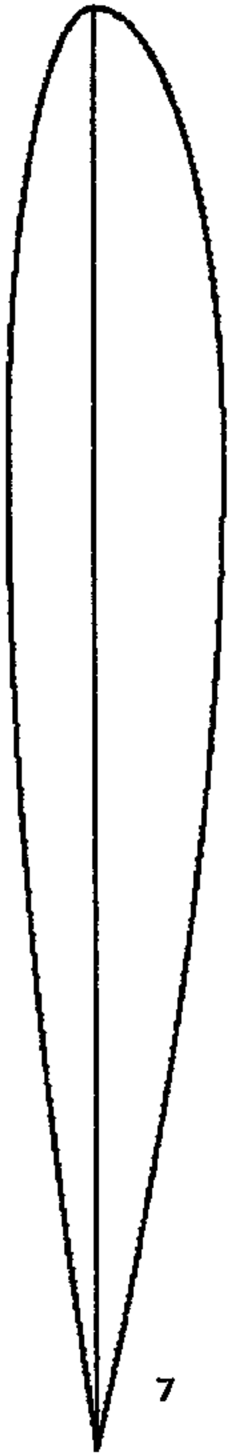

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At $x = XBM$, $y = -YBM$, $\frac{dy}{dx} = o$

It is, therefore, readily apparent that one of the geometric curves which would suit these conditions would be the ellipse with, for A, a major axis of XTM and a minor axis of YTM, for B, a major axis of XBM and a minor axis of –YBM. Thus, in the programme, we read in:

PMTTOP – Percentage at which maximum thickness occurs on the top surface.
PMTBTM – Percentage at which maximum thickness occurs on the bottom surface.
PCTTOP – Percentage thickness of top surface.
PCTBTM – Percentage thickness of bottom surface.

So that:

$XTM = PMTTOP \times \frac{CHORD}{100}$ etc.

Hence, by 'inching' along the x axis in steps of, say, $\frac{XTM}{1000}$ the computer will calculate the y co-ordinates of portions A and B, e.g.:

*For A*

$$y = YTM \left[ 1 - \frac{(X - XTM)^2}{XTM^2} \right]^{\frac{1}{2}}$$

The co-ordinates are fed straight to the plotter for plotting.

So far, so good, with the front half of the airfoil complete. Looking at portions C and D we find that we know less than we did for A and B:

*For C*

At $x = XTM$, $y = YTM$, $\frac{dy}{dx} = o$

At $x = CHORD$, $y = o$

*For D*

At $x = XTM$, $y = -YBM$, $\frac{dy}{dx} = o$

At $x = CHORD$, $y = o$

The best way to overcome the lack of parameters is to introduce another, namely the slopes of the trailing edge at point $x = CHORD$, these are $\propto$ and $\beta$ respectively for C and D in Figure 1. We can, therefore, set up a cubic to describe C and D:

$$ax^3 + bx^2 + cx + d = y$$

Using the above parameters plus

*For C*

$\frac{dy}{dx}$ (at $x = CHORD$) $= \tan(180 - \propto)$

*For D*

$\frac{dy}{dx}$ (at $x = CHORD$) $= -\tan(180 - \beta)$

we can solve for y.

It is probably a little easier to reset the origin at $x = XTM$. The four simultaneous equations resulting will then be, for C:

*At the new origin*

$$a(o)^3 + b(o)^2 + c(o) + d = YTM$$
$$3a(o)^2 + 2b(o) + c = o$$

*At the trailing edge*

$a(CHORD - XTM)^3 + b(CHORD - XTM)^2 + c(CHORD - XTM) + d = o$

$3a(CHORD - XTM)^2 + 2b(CHORD - XTM) + c = \tan(180 - \propto)$

Similarly for D.

The solution will be of the form:

$$y = \left( \frac{2YTM}{(CHORD - XTM)^3} + \frac{\tan(180 - \propto)}{(CHORD - XTM)^2} \right) r^3 - \left( \frac{3YTM}{(CHORD - XTM)^2} + \frac{\tan(180 - \propto)}{(CHORD - XTM)} \right) x^2 + YTM$$

Again, by inching along the axis in small increments, the y co-ordinates are calculated and fed directly to the plotter.

So where has this got us? Let us call $\propto$ and $\beta$ SLPTOP and SLPBTM respectively. We're now ready to input the data and by the cunning trick of making SLPBTM a *negative* angle we fool the computer into drawing nice, undercamber airfoils for us. And with a few extra steps in the programme we can get the machine to put in the L.E., T.E., spars and sheeting.

Let's see what sort of output we get for a range of parameters. Figure 2 shows a list of typical input parameters with Figure 3 the output plots.

Do they work? Well, I've got faith in them and my buddy, Keith Jones, has a type 1 for a Ken Willard *Underdawg* and a type 6 for his *Super-Galahad* (trying to make Australia this time Keith? Must be the Japanese gear you've got, Banzai!) He appears at my desk in the morning with a grubby sketch of an airfoil. Ten minutes later the cards are punched and in for a run. If we do not like what we see, a little change here and there until it's right. After work sees the plot well and truly 'nailed' to a piece of ply with P.V.A. and our Keith on my bandsaw producing ribs like there's no tomorrow. It's as easy as that and so it should be.

Just as for the E-S airfoil templates presented with the June 1972 *Aeromodeller,* I could not claim that these airfoils will be any better than 'normal' sections, but they certainly make life a lot easier. They can't be that bad . . . they *look* pretty good!

# Golden Wings Club page

The Federation Aeronautique Internationale is the most important organisation in aviation and it has great concern for youth education in air matters. Chairman of the aeromodelling committee education section is M.Ali Chiati of Egypt (left) and Chairman of the Free Flight Tech. committee is Dr. Luigi Bovo (right). They are examining the prototype 'Starstream', winner of the 1973 Standard A/1 glider design contest in the F.A.I. H.Q. at Paris. One-sixth scale plans below give details of all sheet construction.

THE SOCIETY of Model Aeronautical Engineers (S.M.A.E.) is the body officially delegated by the *Royal Aero Club* to administer aeromodelling within the U.K. In the last year or so, S.M.A.E. officials have been very conscious that insufficient juniors have been attracted to aeromodelling – or perhaps more accurately, the S.M.A.E. has been unable to detect much junior activity and has a low number of juniors in its ranks.

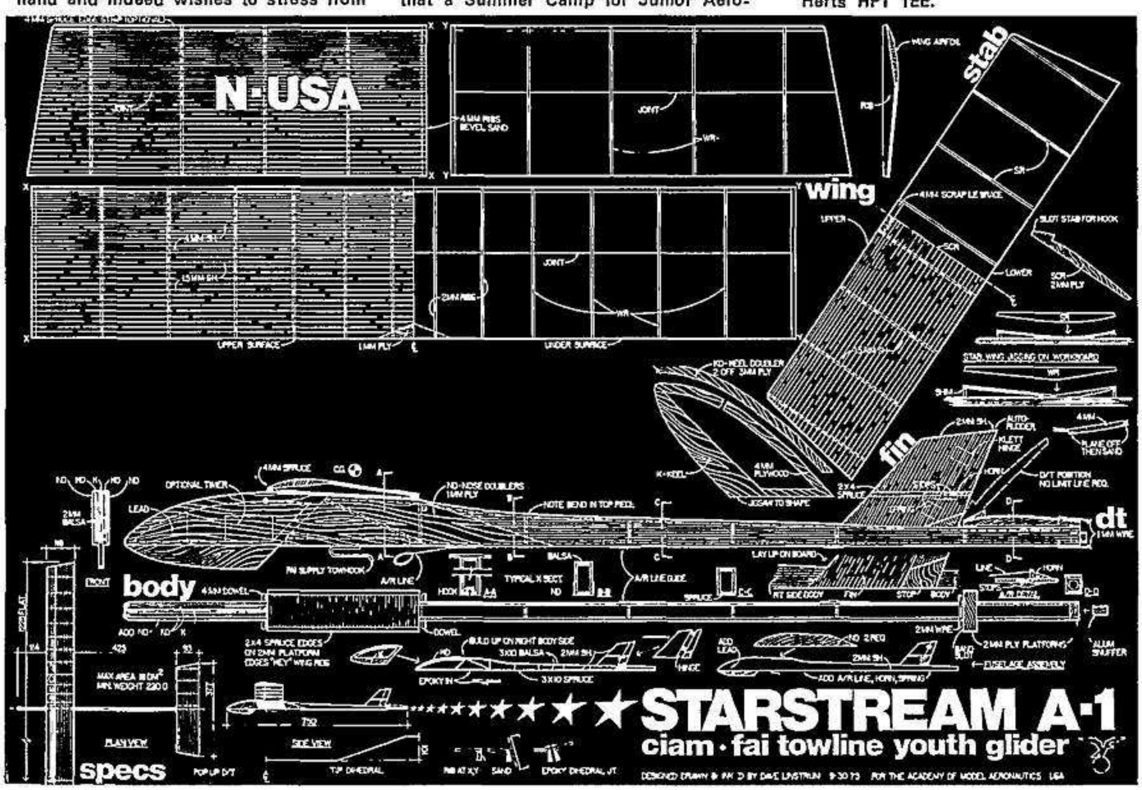
Due to a number of factors – not in the least some previous correspondence in Golden Wings – the S.M.A.E. has set up a *Junior Activity* Sub-Committee whose aim is to establish active liaison between the Society and Juniors with the hope that a successful introduction to aeromodelling can be made through expert guidance.

This Sub-Committee has a pretty free hand and indeed wishes to stress from the start that it is not seeking S.M.A.E. members. Its prime task is to contact *juniors somehow* and then produce guidance for them. All good stuff on paper! The difficult first task is to establish contacts and this leads us to the point of this article. The Society feel that an ideal place for learning about aeromodelling is in a school or youth group, and it is aware that many schools do run aeromodelling clubs and/or encourage or permit aeromodelling as part of the 'handicrafts' subjects. If contact could be made with such schools or youth clubs, then the S.M.A.E. could produce advice and guidance material of various forms and in general terms act as a focal point for Junior aeromodelling activity. A long-term view is essential and no-one expects results overnight – but, for instance, the Sub-Committee predicts that a Summer Camp for Junior Aeromodellers is not an unreasonable aim.

The Golden Wings column is happy to assist this programme to get going and even to be used as a regular notice board to supplement any other contacts made.

As a start, the S.M.A.E. are requesting all schools, youth groups, etc., with an actual or potential interest in aeromodelling to drop a line to the following address, giving the name of your school or organisation and what the scope of the interest is, and indicating whether guidance material, advice, or a focal point seems like a good idea. If you are a pupil or a member of the staff at such a school, then please write in as soon as you can to:

S.M.A.E. Junior Activity Programme,
P.O. Box 35, Bridge Street,
Hemel Hempstead,
Herts HP1 1EE.



Right, the range of Sterling 'E' series scale kits currently available in the U.K. via Ripmax agents, all of which are said to be 'Six Way' kits i.e. suitable for six different applications. The packaging of the 87in. span 'Cirrus' glider in the same sized box as that for the 28in. span 'Curtiss P40 Warhawk' is a masterpiece of kit-engineering!


**ERIC COATES casts a critical eye over some of the latest scale kits to reach the British market, and reveals details of a bomb-dropping mechanism for free-flight models**

# FLYING SCALE COLUMN

THE LATEST kit reviews are by now becoming quite a regular feature of this column. Yet again the products are American and once more I am sorry to say I cannot see true scale enthusiasts jumping over the moon about them, but as they are not aimed at the true scale enthusiast, they must be reviewed in a different light.

The subjects under review are the *Sterling* 'E' series marketed in this country by *Ripmax Ltd.* There are seven models in this range as follows:

| | | |
|---|---|---|
| E1 | *Curtiss Jenny* | 32¾in. span |
| E2 | *Fokker Triplane* | 23½in. span |
| E3 | *Diamont Sailplane* | 74in. span |
| E4 | *P.40 Warhawk* | 28in. span |
| E5 | *Citabria* | 33½in. span |
| E6 | *Piper Super Cruiser* | 35½in. span |
| E7 | *Cirrus Sailplane* | 87 5/16in. span |

All are claimed to be 'Six Way' kits suitable for: Rubber Power, F/F Gas or $CO_2$ power, C/L, R/C, Non Flying, to quote the 'blurb' on the colourful kit box. This is, I think, the major failing of these models as they are not suitable for all these things: no one kit ever could be.

Let us consider each claim in turn:

(1) *Rubber powered* This, of course, does not refer to the two gliders but would be possible with the *Jenny, P40, Citabria* and *Piper.* A 7in. plastic 'rubber' prop and a loop of ¼in. x 1/24in. rubber is provided – these are hardly suitable for any sort of duration other than an extended glide. With a paddle prop and more rubber I think though that these four models would fly in a limited manner. I see no hope of getting the C.G. anywhere near far enough forward on the *Fokker Triplane* to fly at all under rubber.

(2) *Free-Flight* The 'Tripe' has virtually no lateral stability and I think the *P40* would be marginal. The other three propeller driven machines should be reasonably stable. Of course, the gliders should fly quite well off a tow line.

(3) *Gas or $CO_2$* All the models are too large and heavy to fly under Brown Junior $CO_2$ power and I know of no other recent unit. 'Gas,' I assume, means small diesel or glow engines, and I think these are the only sensible power units for any form of flying with these models.

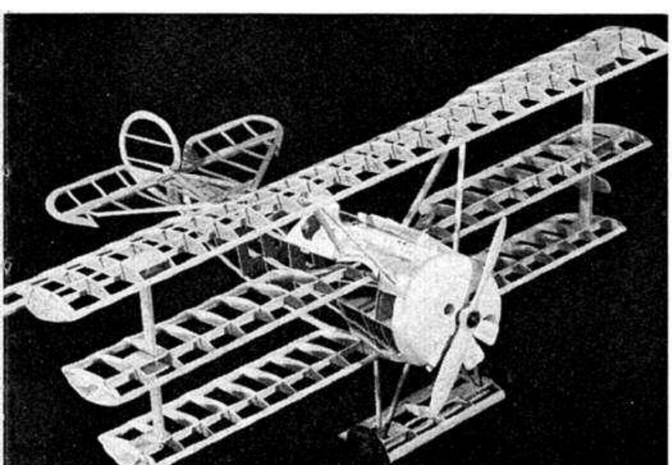
(4) *Control Line* This is probably the only way the *Triplane* will be made to fly satisfactorily. The *P40* is best fitted to wires also. The other three will, of course, fly C/L but I think are more fitted to free-flight.

(5) *Radio Control* This I do not think is really possible. Only *really* lightweight single channel can be squeezed into any of the models, and not one of them is basically strong enough for the rough and tumble which this form of flying entails.

(6) *Non-Flying* This, of course, is the easiest solution of all. My views on this class of model are well known so I will not comment . . . !

**Quality of the Kits**

In all cases this is good. A very clear plan is included with step by step illustrated instructions, together with a very accurate scale drawing of the prototype. In the case of the *Jenny* and *Tripe*, these are quite superb but they also cruelly highlight the



The Sterling Fokker Triplane built up as a control line version powered by a Cox Babe Bee by Ted Smales – the only really practical way of flying this particular design. The lift generated by the three wings plus the under-carriage fairing made the model fly in a rather nose-up attitude! Engine is hidden behind the pre-formed cowl and dummy engine.

Peter Collins displays his nicely decorated version of the Sterling Curtiss Jenny which flies quite well as a free-flight model, although he has not incorporated the 'knock-off' wing modification that our columnist recommends. This seems one of the most suitable subjects for a free-flight version.

discrepancies of the kit model such as the very non-scale wing section and lack of ribs. The wood is generally quite good, if a little heavy in places, while die cutting is reasonably accurate, clean, and all parts are number stamped. Nose-end parts and cowlings are provided in vacuum formed plastics, which are rather crude, lacking the sharp edges so necessary for dummy engines, etc., but acceptable for the cowls themselves. Non-scale, and very heavy, wood and rubber wheels are provided where appropriate. A light alloy bellcrank and control horn for making the control line versions is provided in all appropriate kits, while a plastic prop, preformed shaft and loop of rubber is provided for rubber versions. Excellent quality white Silkspan tissue is supplied, common to all kits, and superb sets of transfers, appropriate to each model, completes a very well presented range.

**Structure**

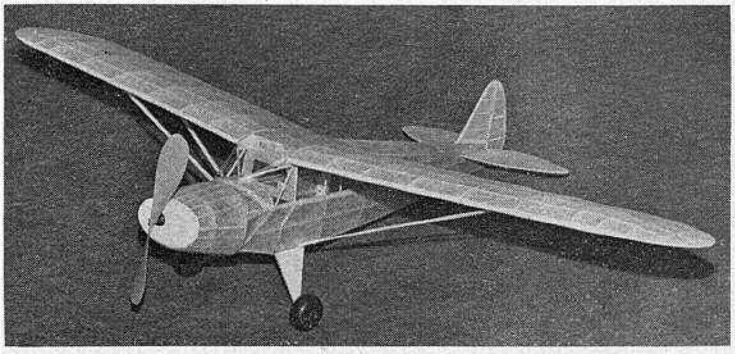
Construction is reasonably easy, if a little tedious, particularly as there seems to be a lot of unnecessary wood in some models. The *Jenny* fuselage, for instance, has a centre spine plus inner crutch. All unnecessary for a simple slab-sider with a turtle deck. This results in an over-weight model with a corresponding reduction of flight performance. Apart from the *Tripe*, which is very near scale in structure, most of the models are sadly lacking in ribs on all flying surfaces.

The worst fault of all, to my mind, is the fact that all the models build up into a solid piece. This is fine for a small model up to about 20in. span and weighing an ounce or so, but these models are too big and heavy to hope to get through the trimming stage without ripping the wings off. It is a simple job to make the wings knock-offable on the *Citabria* and *Piper* – just locate them with stub dowels against the cabin sides and let the wing struts do all the work. The *Jenny* wings can be built up as girders by permanently joining each upper and lower wing together with the interplane struts. Stub dowels in the lower fuselage and centre section locating in the end ribs will hold the wings in place and allow them to knock off together in a prang. The gliders and the *P40* will need more extensive modifications; possibly using tongues and boxes. There is nothing that can be done with the *Tripe* but as one is unlikely to try and fly it free-flight anyway, it does not matter.

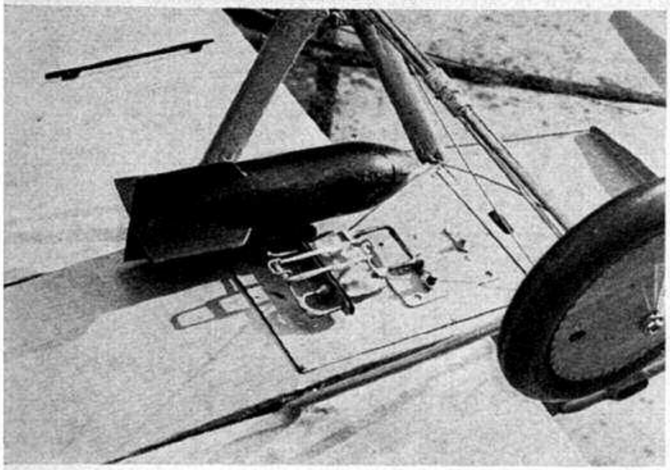
I am indebted to Ted Smales of the Blackburn Aircraft Club who built up the *Tripe* as a C/L version, using the Cox Babe Bee, as recommended to the power unit. When ballasted the model weighed 9 oz. (see what I mean regarding free-flight and/or rubber power!) Even so, Ted reported that it was impossible to keep the nose below an angle of 30° when flying straight and level (if that can be the correct term) on 20ft. lines. Such is the lift generated by the 3½ wings!

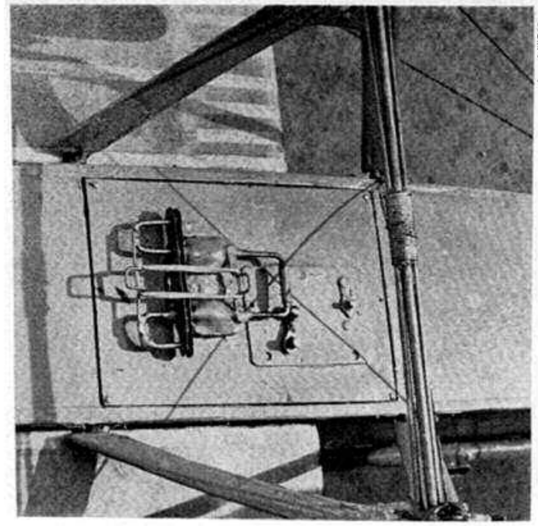
That prolific builder of scale models knocked up the *Piper Super Cruiser*, during an odd evening or so, built as a basic rubber powered, F/F version. Weight 5oz. No news to date on the flying performance – this will follow. I put out the *Jenny* to another of my regular review builders – 14-year-old Mark Hudson. He is building this as a F/F power version for the Cox Babe Bee but unfortunately due to studies, etc., has not completed it yet. He is fitting the knock-off wing modification I described above, and when it is finished I hope to give a report on its flying capabilities. I did, however, see a version flying quite reasonably, built by Pete Collins of Coventry, at the Rissington Scale Meeting back in August.

To sum up, if each kit had been engineered to suit the particular form of flight it was best intended for, instead of being a compromise between everything, they would have been a lot better! They could also have been marketed a little cheaper – at £4.25 in the U.K. they cannot be regarded as cheap. Nevertheless each should provide an interesting building exercise, with a good looking model at the end of it.



Ted Smales also made this Sterling Piper Super Cruiser, which took only a relatively few evenings to construct. This version is for rubber power, but as yet flight trials have not been undertaken. With its high wing layout it should prove stable enough, although a 'paddle' propeller will probably give better performance. Cowl is plastic moulding provided in the kit.



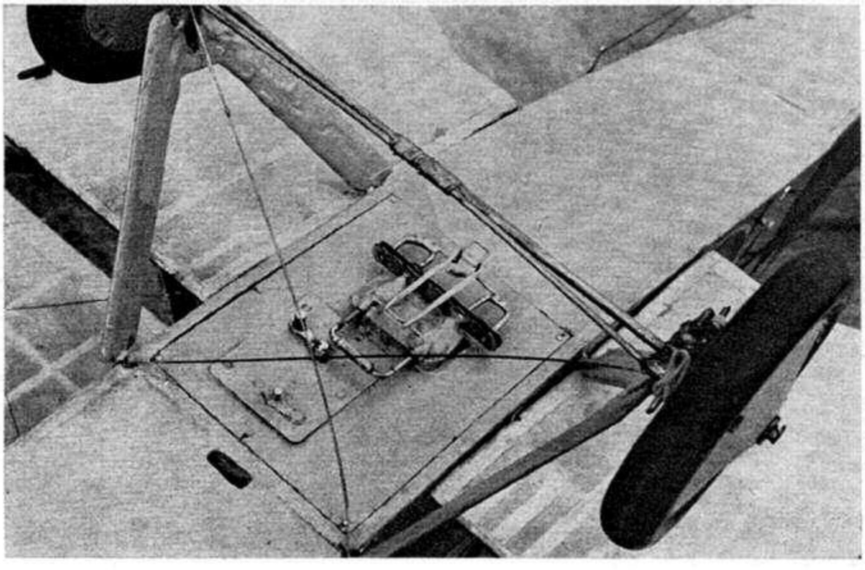


**Two views of the underside of Eric Coate's D.H. 9a reveal the bomb dropping release mechanism, with above one of the 250lb bombs 'loaded'. Text explains construction.**

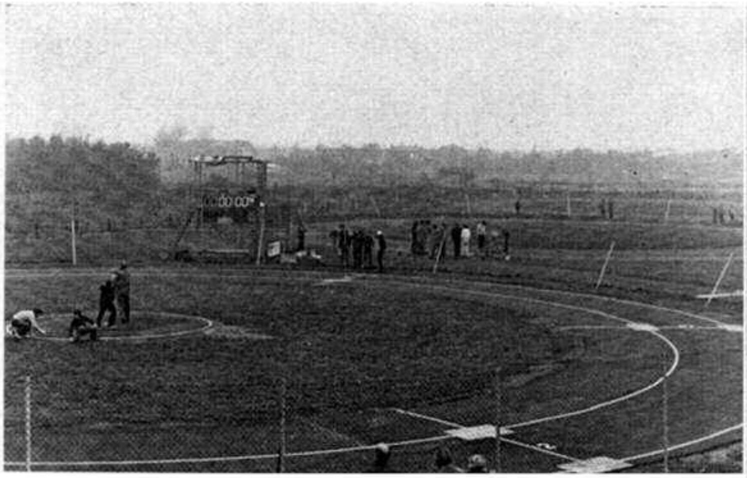
Now for a correction. When reading in the December edition my own description of the *Puss Moth,* I was aghast to see that I had credited the present ownership and restoration of G-AEOA to the prolific restorer Vivian Bellamy. I must have had a mental block when I wrote it as I know, as well as the many aerophiles who have pointed out the error, that this work was done by the owner Dr. J. Urmston who is the G.P. of Botley. Sorry Dr. Urmston!

* * *

Finally, this month as promised, details of the D.H.9a bomb dropping mechanism. This is very simple really and is almost self explanatory from the accompanying photos. A standard power duration clockwork engine timer is utilised but the shut-off valve is removed and the timer arm arranged to strike the forward end of the combined double release pin. This is bent from a single piece of 18 swg wire enclosing two pieces of 18 swg brass tube, about ¾in. long: which form the slider bearings. Two brass plates (around 24 swg) are soldered to the ends of the brass tubes about 1/16in. apart. These plates have four 3/32in. holes drilled in them, in line. The two inner holes allow the brass tubes to enter while the two outer holes allow the bomb release pins to pass through. A stop, to allow the release pins to enter only about 1/16in. is soldered to one of the main sliders; to butt up against the rearmost brass plate in the 'bombs engaged' position. Two 22 swg hooks, one soldered to the slider bearing tubes and the other to the aft end of the slider, allow a rubber band to tension the release mechanism to the engaged position. The two slider bearing tubes are soldered to a brass plate. The whole mechanism must be checked for free movement and is then epoxied to a ⅛in. ply spacer and that in turn to a 1/16in. ply fuselage bottom. The timer is let into the fuselage bottom to allow the arm to strike the release pin at the end of its travel; pushing it back about 3/16 in. The bombs each have 20 swg wire hoops fitted to locate between the brass plates and allow the release pins to pass through them. When the pins are pushed back the bombs fall away. Very simple, although not very scale-like when viewed close up, but very effective in practice – I have never had a hang up yet. I usually set the timer to just about its maximum of 25 secs. which allows the 9a to take off and turn through about 180° to drop the bombs from about 50ft., almost at your feet.



**Further details of the bomb dropping mechanics. The fuel shut-off valve on a Tatone engine timer (in foreground) is removed, and instead the operating arm is made to push the forward end of the double release pin. This release pin mechanism is spring-loaded with the aid of an elastic band as shown to prevent the 'bombs' from falling off prematurely.**



# CONTROL LINE NEWS

## Utrecht 1973

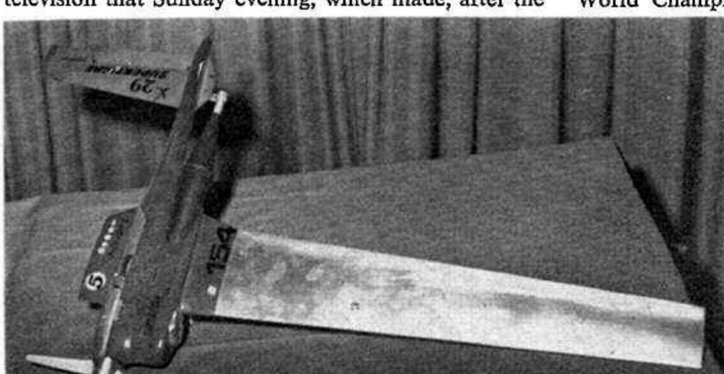
From Paul Tupker we receive news of the Dutch C/L International:–

'Under perfect weather conditions, the Dutch Minister of Recreation, Culture and Social work opened the first control line and R/C car racing accommodation in Utrecht on 6-7th October. The facilities consist of a big permanent club house, annex-restaurant and workshop with sanitary facilities plus two fenced circles for team race and speed (the latter also being suited for R/C car racing) as well as a stunt circle; all fully suited to the current F.A.I. requirements. Between the team race and speed circle a control tower is situated with full electronic lap counting and timing equipment for team race events. A telephone connection between this tower and the office in the clubhouse enables results to be quickly tabulated.

The realisation of this accommodation was made possible through funds supplied by the Dutch Sporting Federation (Football Toto), Governmental recreation funds, donations by industry and the Royal Dutch Aero Club and, of course, very hard and tenacious actions by enthusiastic members of the Utrecht Club. A report of the opening ceremony and the following International contest was featured on television that Sunday evening, which made, after the Combat International at Spaardndam, the second TV-appearance of aeromodelling this year! Good promotion for our (fast growing!) hobby. The opening festival consisted of demonstrations of planes, R/C cars and helicopters in the circles, followed by precision parachutist drops from a *Pilatus Porter,* exactly in the centre of the three circles. After that an Air Force *Allouette* helicopter made demonstrations, landing several times in the stunt circle, with as an extra, winching up an over-enthusiastic Minister, who returned later on, happy and unharmed in the same circle! At four o'clock the contest finally started, which continued right through the entire following day. The *Turtle* flyers Rob and Bert Metkemeyer had an easy team-race win with a 4:26.7 semi and 9:01.8 final using an old model Super-Tigre powered and without a motor cut-off. In the final they were joined by Christine and Joost Kant (10:11.8), the best team race marriage in the world, and V.d. Wiel – V.d. Voort (10:15.4) with their Bugl powered entries. Emil Rumpel won F.A.I. speed with 235.3 km/hr. I think the fastest time of this season. Stunt was a clear win for Louis van Den Hout with his now familiar *Spider* design.

In all, a well supported, keenly contested competition, and a more than fitting 'christening' for this new venue, which incidentally, will host the 1976 World Championships.'

Heading picture shows the team-race circle at the recently opened Utrecht site – electronic lap counters and safety fences make this a really good set-up. At right is seen the Dutch Minister of Recreation, Culture and Social Work being lowered from a helicopter onto the stunt circle during part of the opening ceremony.




Model at left is Renzo Grandesso's 5 c.c. speed ship with which he has recorded 257 km/hr. to become Italian champion. The engine was a stock Super Tigre X-29 – running on straight fuel as per Italian rules.

## What capacity has a 7 c.c. tank?

At the recent C.I.A.M. meeting, the Russians once more put forward their proposal for a 4 c.c. tank in F.A.I. team racing, but to the relief of the majority of racing enthusiasts, it was rejected. Only the Russians seem capable of efficiently handling such a small amount of fuel – there still seems plenty of scope for improvement in performances with the existing tank size for the rest of the world!

Dr. Helmut Ziegler a member of the F.A.I.'s control-line sub-committee, was mostly concerned with the impossibility of accurately measuring such a small capacity (a slight inaccuracy would be even more crucial with a 4 c.c. tank) so he undertook an investigation into the thermal expansion ratio of a standard 'diesel fuel', his comments being as follows:

'In order to find how much of an inaccuracy might come into the tank-checking of team racers I undertook the following experiment: A standard fuel was mixed from thermostated ingredients in a 100 ml calibrated glass cylinder with stopcock.

| | |
|---|---|
| White Spirit | 50.00 ml |
| Paraffin oil 300 | 20.00 ml |
| Aethylether | 30.00 ml |
| | 100.00 ml |

All vessels and ingredients were thermostated at 20 deg. Centigrade in an electrical waterbath to ± 0.2 deg. C. The calibrated cylinder was filled accurately to 70.00 ml at 20 deg C and sealed. The cylinder was first put into a refrigerator, cooled to minus 10 deg. C, then gradually warmed up and the temperature read, after having stayed at the same temperature for one hour in the thermostat.

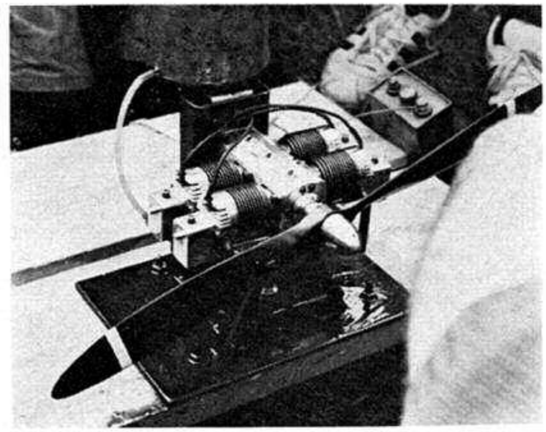
*Table of results*:

| | | | | | |
|---|---|---|---|---|---|
| *Temperature in °C.* | −10 | +10 | +20 | +30 | +40 |
| *Volume read* | 68 | 69.3 | 70 | 71 | 72 |
| *% deviation* | −2.85 | 1.0 | 0 | 1.45 | 2.85 |

This shows that we must at least allow 3 per cent difference if one fills the tank of a team race model, still warm from racing (about 40 deg. C.) when filled with fuel taken from a cool place and pipette (15 deg. C) resulting in an inaccuracy of the checking of 0.21 ml for 70.0 ml.

The results for castor oil as lubricant ingredient might even be higher but should not differ much.'

From the above results, it would seem that as well as allowing a 3 per cent margin when measuring tanks, there would be a strong case for insisting on a 'standard' liquid for determining the volume. Doubtless the ether is the most temperature-sensitive constituent in the fuel, so why not specify that fuel tanks should be checked with paraffin (a readily available, consistent quality fuel) or better still an even more temperature-stable liquid? In the meantime, who's for packing their tanks in dry-ice . . .

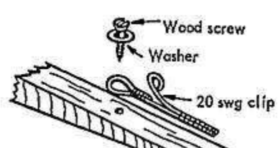


Interesting Dutch four-cylinder, four-stroke engine, photographed by Paul Tupker, swings a useful-sized prop!

## Streamer Clips

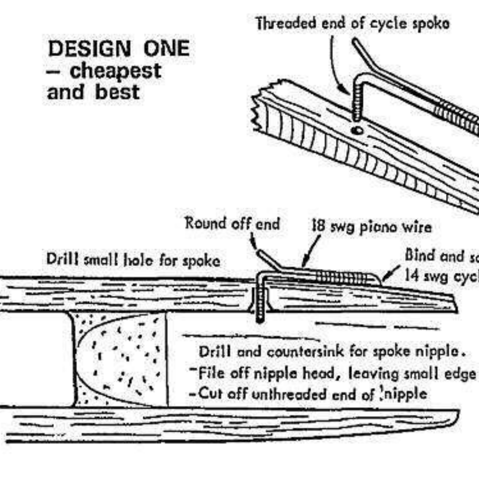
Always one for neat, practical solutions, and with an eye for attention to detail, Frank Smart sent us details of the clips he is now using on his combat models. The problems he found with the usual wire clips were that they tended to damage the surfaces of other models when carried in bags, especially when Solarfilm covering is employed, so he used to unscrew them while in transit but frequently lost the screws, while the holes in the bearers worked larger,

**Old-type of attachment**

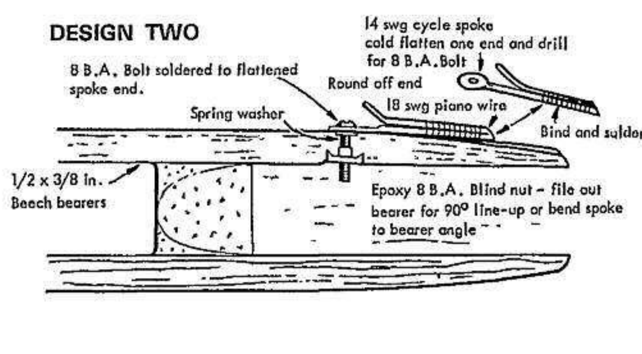



so the screws eventually pulled out. Also, their manufacture tended to be a 'fiddling' job with all that wire bending and now that thicker streamer string is being used, the fuse wire was not man-enough for the job – sometimes the wire bent backwards after a string cut made by an attacking model, or when the pit crew changed streamers. The methods sketched below show his current methods which have proved quite satisfactory and are quickly, and safely, detachable.

**DESIGN ONE – cheapest and best**




**DESIGN TWO**



# CLUB NEWS

The Glevum club's combat team had a good year contest-wise, with wins or places at National and International events. Here we see (left to right) Mick Lewis, Dave Cox, Mick Taylor, Derek Dowdeswell, Tim Court and Frank Smart.

ALL THE FINGER freezing signs so far indicate that this winter is not going to be like the last one, with one calm, mild weekend following another. And we may well have to put up with certain fuel restrictions, to make us wonder how much longer the carefree state of flinging the models into the car and off to the flying field is likely to last. It may be that a visit to our now distant flying fields may require a degree of car sharing or perhaps the acquiring of a club bus. In such times one cannot but recall those stoical days when model flyers motor-biked to Fairlop and Chobham with huge model boxes strapped to their backs – and even that was the height of convenience compared with the previous era of bike, bus or train.

We start off this month with another instalment of the continuing saga of the **Nottingham M.A.C.** We touch this time upon the contest side of things, wherein the premier award of the year is the *Grain Trophy*. Qualifying points are gained by placing in the first four of a number of F/F and C/L events throughout the year. Perhaps the most popular of these is that for 40 in. glider. The span restriction gives scope to the smaller kit and plan models as opposed to the inevitable A/2. Even so the result was a triumph for expert adaptability: Ken Oliver winning with a modified *Dab*. There is also an Open Glider event, and, uncommonly, a contest for combined Power and Rubber. The latter was won by Bill Draper with his all sheet Power model; the Rubber opposition being blown into ignominy by the strong wind. The most popular C/L event was Stunt, which traditionally, is used as a prover for the Nats *Gold Trophy*. Won by versatile Bill Draper who also featured in Combat (1st), 'A' Rat Race (2nd) and 'B'. Rat Race (2nd). Need I say who won the coveted *Grain Trophy*?

Model flyers who have it made are the 'gentlemen farmers out on a spree'. And it is quite a spree when you own your own flying field as the farmer members of the **North Norfolk Aeromodellers** apparently do. Lucky, too, the non-Ambridge type members who. undoubtedly, have a share in the good fortune, together with the option of two large, ex-airfields – one with a 10,000 ft. concrete runway. The information about this happily situated club of 70 strong comes from the P.R.O., Tony Nelson. He further informs us that the main interests are C/L Scale and Combat and R/C Scale, with four of the models in the last category twin engined. Just the gear, of course, for the snappy display, of which the club has mounted no less than 14 during 1973. Most memorable was one shared with the Hurricane and Spitfire of the *R.A.F. Historic Flight* from R.A.F. Coltishall. Altogether a lot of organising involved, and thanks are due to Hon. Sec. Alan Jordan for his quite professional touch. The club meets on the third Thursday of every month at the White Lion Hotel, Holt, for a full winter programme of films, talks and social evenings.

Our last report on the activities of the **Sittingbourne & D.M.A.C.**, has 'bourne' fruit; the club has acquired a new member as a result. We are told of this in a letter from Mr. J. Weeks which accompanied the latest issues of the *Bourne Flyer*. Trouble, though, in getting the *Flyer* off the ground – result, it was late to press. Winter on the club field could be the subject of an epic called 'Middlemarsh', although considering the exceptionally dry Autumn and early Winter we have had, I put down the editorial comments on overflowing dykes as a bit of hyperbolic fun. But quite serious is a Junior status claim by a new member with 25 years to his credit. He is, apparently, undergoing teacher training thus qualifying him for the lower student club fees. Back to fun again for the Grand Chopper Comp., held in the clubroom. Presumably it was on those ingenuity exercises involving a few square inches of balsa and a rubber band. Alas, the favourite, *The Golden Ball Thrasher* failed to carry out its threat of violence to the clubroom centrepiece, but did stay aloft for a marathon 3.7 seconds to win the event.

Helicopting of a more serious kind is referred to in the **Watford Wayfarers** Newsletter. The club genius in the rotatory field is Peter Valentine. His own-designed O.S.10 powered *Lark* is said to perform superbly. He also has a large, 60 powered machine and a device called a gyrocopter. Also to be seen on the flying field is a fine scale *Chipmunk* by D. Purnell. Flew well on test. Not to be seen is John Sharman's C.A.P., *Mosquito*. He wrote it off, but has a *Mustang* doing very well.

Winter club comps in the **Leicester M.A.C.**, are, by tradition, flown at the edge of dusk. No exception was the 4th November Open Power and A/1 Glider meeting flown at Wymeswold. Lift was minimal, but sufficient to carry off John Braisby's D/T deficient glider into the engulfing murk. He should have won

both events, but had to be content with Power alone. Della Player, the club lady flyer, took a useful third place in Glider and persevered in Power – even starting her own engine. She has been warned to watch her flying hair. Some danger, presumably, of a Geronimo style trim. Gerry Ferer's second place in Glider clinched for him the Club Championship, and a fourth place in the same event put Andrew Barnett at the top of the Junior class. The winter building competition is now well under way, with the judging of the first stage (uncovered) to be held at the Community Centre on the 11th February.

A warning given in the editorial of the **Buckaneers M.C.'s** *Scimitar* comes in the form of the old fighter pilot maxim, *'there is no substitute for height'*. In other words, keep that radio model at a safe height. Low flying, we are reminded, should only be undertaken parallel to the take-off strip and on the 'empty' side. Good autumn weather has attracted the flyers to the operational side of the hobby, and there was a good turn out for the Aerobatic Comp on the 29th October. Six flyers took part, and it was Chairman, Mike Parrott, who demonstrated his polymath talents by taking the honours over such opposition as Pete Smoothy and Derek Giles. Success in the wider contest field came to Steve Blake when, on the day after he was married, he secured third place in the 1974 C/L Stunt Trials for the British Team. Top man, need we say, was Jim Mannall. Looking forward to another aspect of the coming season, there is the Buckaneers Display Team preparing to do its crowd pulling stuff. Pete Smoothy says he prefers Display flying to contest work, particularly since it provides a better day out for the family, with things other than model flying to divert wives and children.

The great Autumn event in the **Three Kings Aeromodellers'** calendar was that which entailed the services of an unwieldy device called *Flycatcher*. This is the famous landing deck so essential to the smash and grab antics of carrier flying. What always seems to accompany *Flycatcher* on its outings is a protective high wind to keep the models well off target. But wind or no wind, out trotted the '3K' stalwarts to emulate the feats of Midway. Mike Sexton got nearest to the target, chipping lumps out of the flight deck in the process. He was flying Vic Wilson's *Seamew*. Also engaged was Bert Moore's *Guardian*. Good fun for the few patients and staff at the R.A.F. Rehabilitation Centre. They also enjoyed a fulsome C/L display of Stunt models and wings. A particular showpiece was Geoff Burkett's 'Class 10 Scale' semi-Fokker type monoplane. Nine people in the middle shared the piloting; the handle being passed from one to the other. The end came when three blanket-swathed wives joined in – the model suspiring from what must have been a squaw loop. Dave Morbin has some interesting comments to make on Class I and Class II scale models. No flying model, he says, can be truly scale except in superficial appearance, and flying-wise you can handicap yourself no end by adhering to true scale outline – just think of the tiddly elevators. But true scale or not, Wal Cordwell's *Heston Phoenix* makes a fine sight. Green, with silver wings, it features full cockpit equipment.

Whatever gives rise to 'Scotch Mist' it is certainly not a surfeit of calm weather; so that it was against the run of the usual climatic form that the **Scottish A.A.**, held its *Paisley Trophy* and other F/F events in weather so calm that it ran the feet off the glider towers. In such dead air, results depended on a good rate of sink rather than a soaring trim, and it was Don Simey who held off longest against the swiftly ticking clock with his version of *Lively Lady*. Much the same story with the Power and Rubber models in the *Paisley Trophy* – no thermals but a good height and slow rate of sink bringing success to T. Laurie's O.S. Max 15 *Eureka*. Good support for C/L at the Kirkcaldy and East Kilbride events, 13 entries in Combat at Kirkcaldy and six in Goodyear. Alan Pegg's 2.49 cut the opposition to ribbons in Combat, but was beaten into second place in Goodyear by Peter Knox. Just a sample of the many events reported on in the newsletter, giving a generally healthy picture of flying over the border.

**Clubman**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