

# Aero Modeller

INCORPORATING  
MODEL AIRCRAFT



HOBBY MAGAZINE

May 1976

30p

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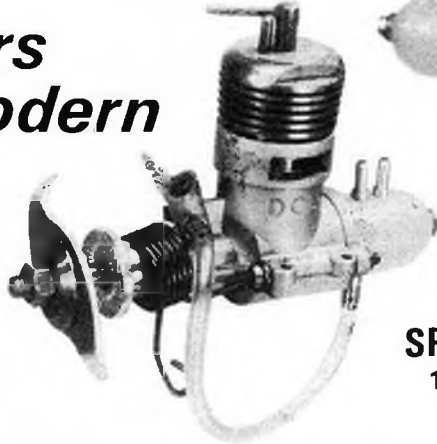
**WASP**  
.8 c.c.



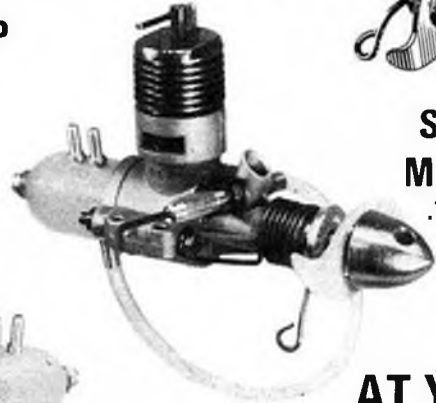
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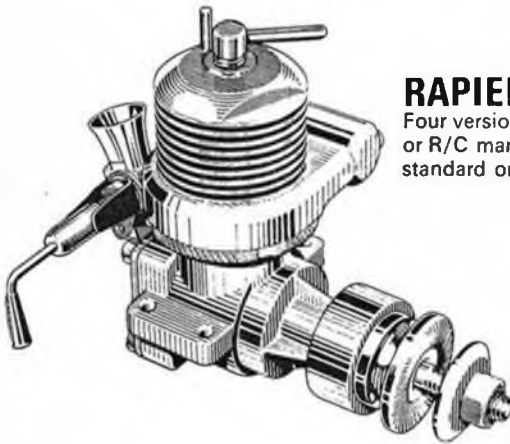


**SPITFIRE**  
1.0 c.c.

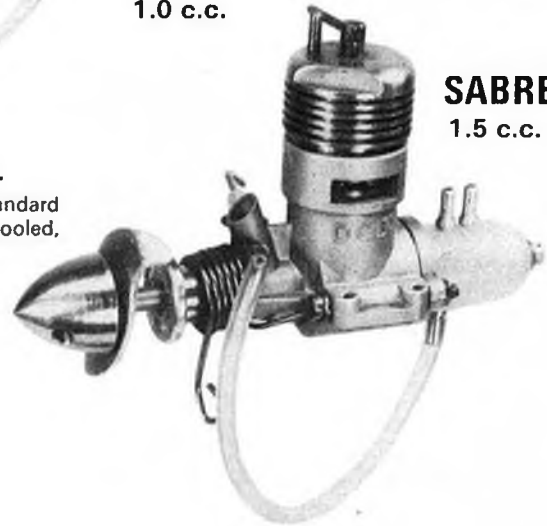


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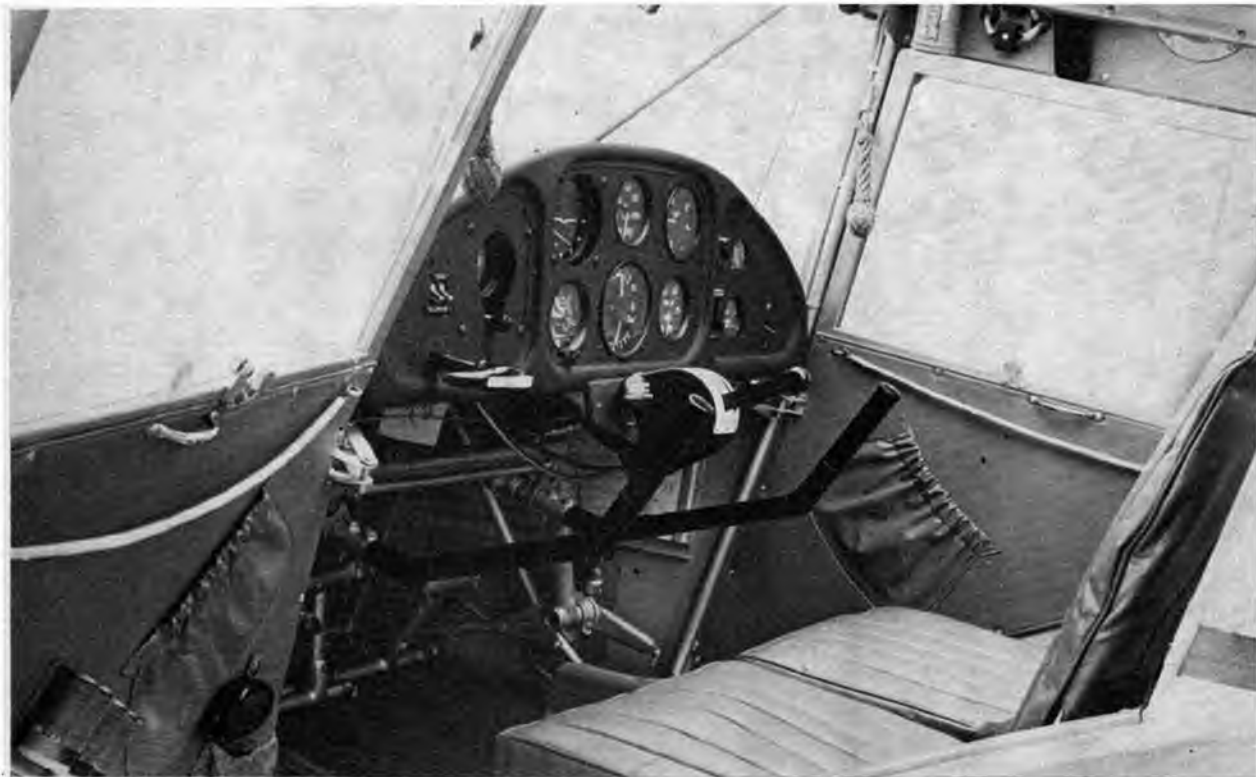
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# Aero Modeller

INCORPORATING  
**MODEL AIRCRAFT**

**May 1976**

Volume XLI No. 484

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## Comment

Aeromodelling administration suffered two heavy knocks this month, and we're not so sure that it has the strength to withstand the blows. Cancellation of the 'Nats' is a disaster that reflects poorly on the SMAE and its liaison with the RAFMAA. We have asked for explanation and it appears in 'Hangar Doors' this issue; but as SMAE members will know through their area newsletters and delegates' reports, the full story goes much further. Rumour and counter-rumour have festered in this unhappy situation. We've been told that the Elvington Nats site we announced last month was unacceptable as it was 'too far for the Southerners to travel' and we've also heard the sectarian interests each blaming C/L, F/F or R/C in turn as being the blot on the horizon, causing so much social nuisance that the Nats become classified as a Pop festival with consequent unacceptability. Never was the need for proper lines of communication more evident. Our optimistic hope was that an offer of Sculthorpe in the East Anglian area would have proved negotiable to salvage a Spring Holiday Nats in May as originally planned. Better to have a last moment announcement in Stop Press than to lose the most important event of the year we thought. But believe it or not, the SMAE Council turned the opportunity down on 27th March - on the basis that it was too late to organise at a new venue!

Second blow came when it became evident that the effect of the Control of Pollution Act had not been interpreted with due regard. The SMAE response to a request for a recommended Code of Practice appears to have been conducted with such secrecy and at so slow a pace that it ill becomes the body responsible for organised aeromodelling in the UK.

This critical Act contains implications that will place severe emphasis on silencing and times of flying. Action is being taken by the Model Hobby Trade Federation, and a special meeting of the SMAE has taken place. The Act comes into force this month. One is left to hope that opportunity remains for aeromodelling to present its case to authority for a Code of Practice to be agreed, as already done by other sporting activities.

## on the cover

Modeller Eric Clutton's **FRED** (*Flying Runabout Experimental Design*) seems to be breaking a few records for longevity as well as changes of engine and colours. Seen at the 1975 PFA Rally, Sywell, Fred has adopted a WW1 German camouflage scheme complete with a DV VIII (*Deviate - get it?*) work No. Eric has distributed quite a few plan sets so we should see more Freds around soon.

## next month

Concluding part of the Blasta combat model feature, detailing trimming and contest procedures; experiences of flying a first EZB indoor model; reviews, news and information on control line, free flight, scale and engine topics plus other *useful* articles in the June *AeroModeller*, on sale May 21st.



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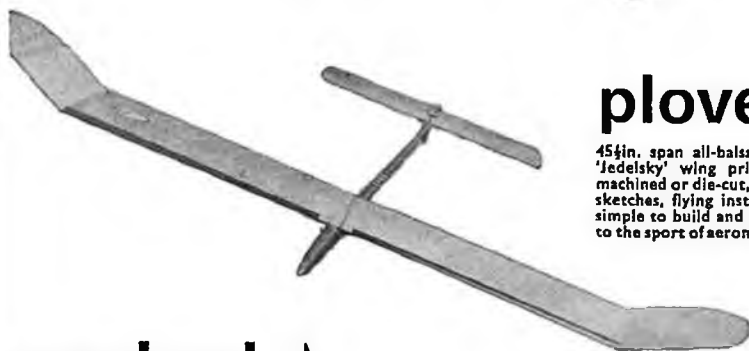
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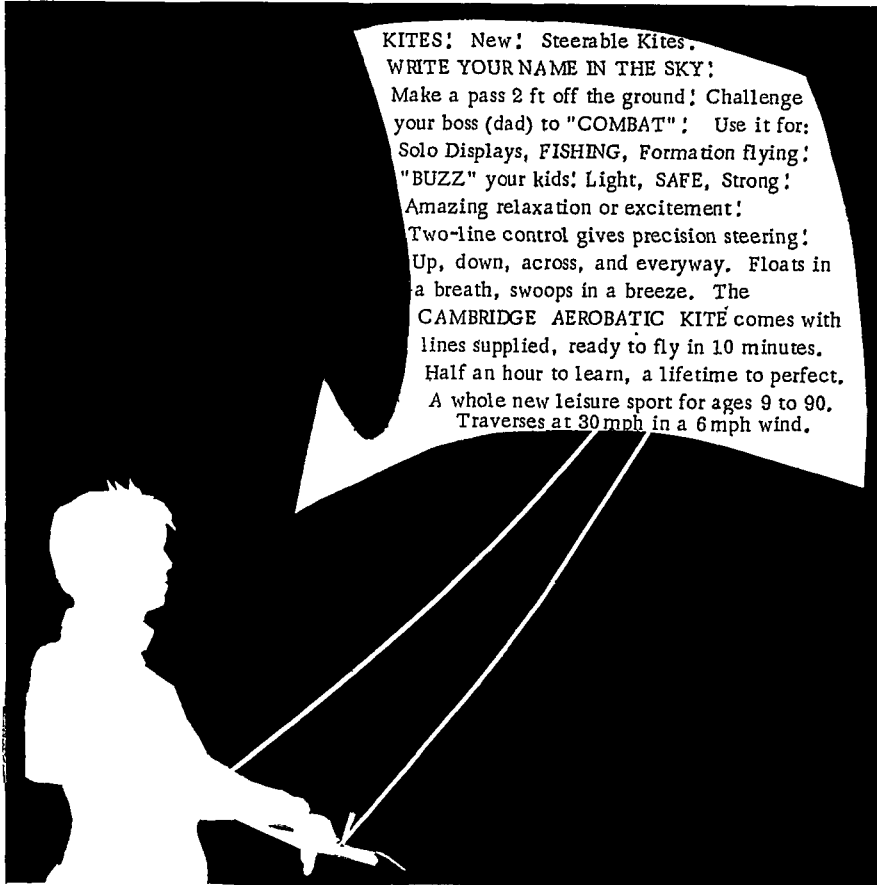
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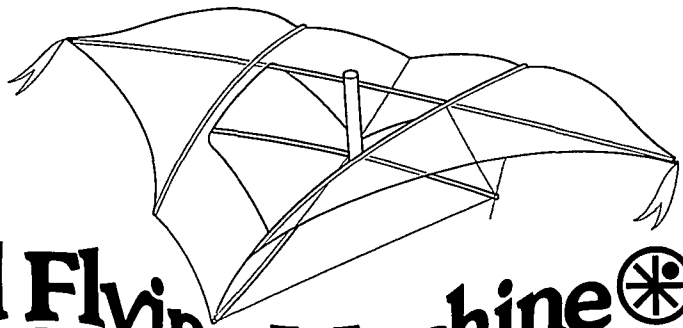
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4" 18p	8" 35p	6" 55p
6" Dia x 3" 20p	9" Dia x 4" 45p	8" 55p
4" 20p	6" 45p	12" Dia x 4" 80p
7" Dia x 4" 28p	7" 45p	5" 80p
6" 28p	8" 45p	6" 80p

#### TORNADO NYLON 2-BLADE PUSHER (yellow)

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6" Dia x 3" 20p	9" Dia x 6" 55p
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7" Dia x 8" 45p	6" 80p

#### TORNADO NYLON 3-BLADE PUSHER

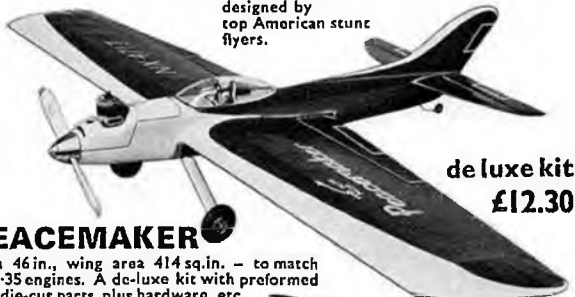
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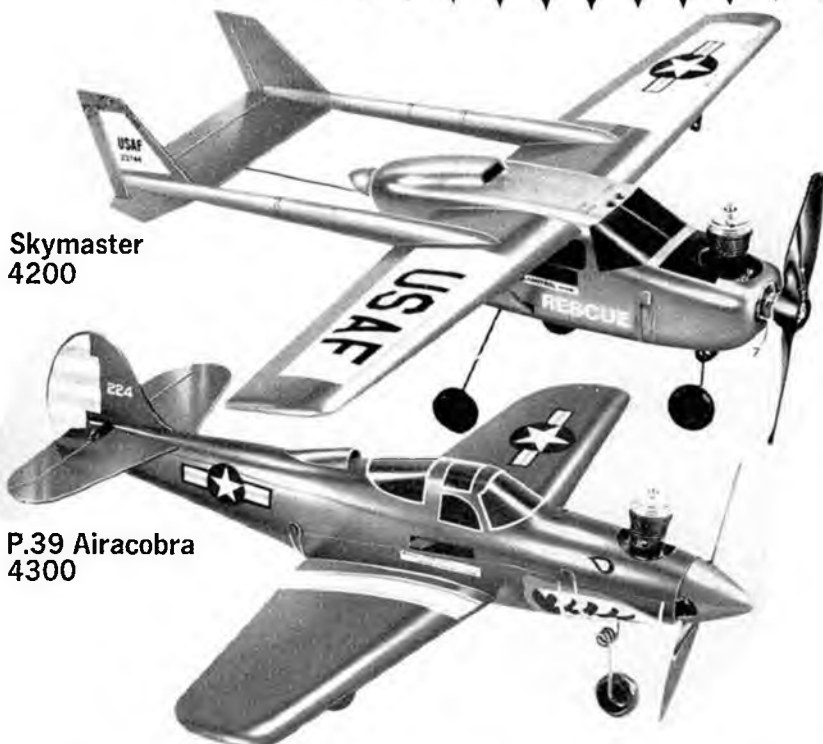
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## Heard at the HANGAR DOORS

**MAN POWERED** Flight enthusiasts have been missing a treat if they have not been following the Open University television series running on Saturdays and Tuesdays. It is quite a pleasant surprise to find an erudite programme on light aircraft structures at 7.30 am in the morning on BBC 1 – that is what happened in Part Two of a series on 23rd March. Prominent personalities in the Man Powered Aircraft world discussed their approaches to structural design in such a way that it is almost tragic that we have not been able to advise aeromodellers in advance. Most of the material has an equal application to aeromodelling, and in any case, it involves balsa construction and plastic covering.

The series is part of the Open University 3rd level course R351 'Material Under Stress' and is likely to be repeated.

**MORE INFORMATION** on the 1976 Dutch Combat International, to be held on 3rd-4th July. Firstly, it is confirmed that the venue will be the same as last year, i.e. Rotterdam, but in addition a separate practice field will be made available. We have also been asked to announce a safety rule which will be enforced, even though

Remember the 'Sail Me' glider mentioned previously on this page? Seems they were also produced in the USA – as Bill Hannan's photo shows. Given away with Butter-Nut brand bread, it came in a waxed paper bag, presumably as protection against the bread – or vice versa!

it is not in the FAI rule book, namely: spinners (or prop nuts) with sharply pointed ends will not be permitted. AMA style safety-nuts or similar domed nuts will be required.

Meanwhile all competitors, supporters or spectators should write to Ron Kaptijn at Schoonboomstraat 39<sup>1</sup>, Amsterdam 1018, Holland, for information and entry forms.

**THREE PIONEERS** of Aviation died within a few weeks of each other early this year. Each was responsible for developments which have far reaching influence. Dietrich Kuchemann's contribution included the slender delta of which Concorde is the most noteworthy example. Grover Loening gave us the amphibian, and Alexander Lippisch the ornithopter



as well as the surface skimmer. Of the three, it was Lippisch who gave most to aeromodelling. His designs in *Modellflug* included Germany's first microfilm covered indoor models, flapping wing propulsion in a power model, delta shapes and man-powered aircraft. He was also responsible for much of the Me 163, and subsequent American delta aircraft. In later years, the slow speed surface transport attracted his attention and some remarkable prototypes have been made to 'fly' on an air cushion (see Sept 73 issue). Lippisch was a great believer in testing through models, and a few talented model designers in Germany and the USA have been privileged to be his protégés.

## BRITISH NATIONAL CHAMPIONSHIPS 1976

**UNFORTUNATELY**, just 48 hours after our announcement of the date and venue for this event had gone to press for the April issue, we received a telephone call from SMAE Chairman, Jack Hartley, informing us that the meeting was CANCELLED.

Naturally, when an event as large, and important as the Nationals is cancelled (particularly when it would have been the 30th consecutive Annual 'Nats') an explanation is more than deserved – it is essential.

Shortly after the 1975 event, steps were taken to obtain a suitable venue for the next Nationals, but it was soon found that economies being made in the National Defence Budget were resulting in the closure of many airfields. Rapidly, the list of airfields potentially suitable for a meeting of this size and reputation shrank. RAF Cosford is a typical example of an inadequate site, despite the enthusiastic nature of its Station Commander. There is just one short runway, and very little hardstanding for C/L events. In addition, most of the grassed area is given over to agriculture, the Southern half houses the Station's pig farm, while along the other boundary – across the prevailing wind direction – is a railway embankment.

Eventually, it looked as if RAF Little Rissington would be the venue once again, and a verbal agreement to this effect was reached with the co-operative Station Commander. At a meeting held a fortnight later, the CO unhappily gave the news that just 24 hours beforehand he had received a directive from the Ministry of Defence to the effect that the airfield was to be let for haymaking between 1st March and 31st July. The date was by now 5th February.

Enquiries were made by the SMAE as to the likely cost of the hay crop, to judge as to whether it would be economical to purchase or compensate for it – but the figure mentioned was around £5,000 – plus more than £1,000 for cutting, baling and selling the crop.

The RAFMAA suggested other airfields – of which only Elvington, near York, was able to give a definite 'yes'. At the same time, RNAS Yeovilton and Merryfield had been approached, but they gave a Naval negative.

SMAE executive officers then visited the Yorkshire airfield, well aware of the limitation of its sole long, concrete runway – although not appreciating quite how wooded was the surrounding area. However, their brief – given by the Nationals Planning meeting – was to secure the use of the airfield if it was definitely available.

It was, and the meeting was 'on' (hence our publication of details, following SMAE advice to do so). But subsequently, the Officers were advised by the Northern Area of the Local Authorities' objections to the use of the airfield for a three day meeting. These objections were due mainly to noise complaints created by drag and sprint race meetings, *not* model flying we hasten to add.

Discussion with the Local Councils confirmed the situation, and rather than prejudice the future of model flying at this venue on other occasions, the SMAE had no alternative but to cross this airfield from their lists. It is much to the credit of the Northern Area that by careful negotiation they have retained limited use of Elvington.

As a last desperate measure, the non-Service airfield at Cranfield was approached, but this was neither available, nor economically possible despite considerable sympathy for the situation.

By this late stage (10th March) there was no alternative but to abandon hope of holding a National Championship meeting at the traditional Spring Bank Holiday date in 1976 – and indeed with the MOD directive concerning letting airfields for hay making, a later-than-normal date may have to be accepted in future years.

The list of airfields approached either by the RAFMAA or SMAE executive officers is as follows –

(1) Abingdon; (2) Little Rissington; (3) Elvington; (4) Church Fenton; (5) Cosford; (6) Thorney Island; (7) Yeovilton; (8) Kemble; (9) Hullavington; (10) Colerne; (11) Syerston; (12) Driffild; (13) Rufforth; (14) Halton; (15) Cranwell; (16) Swinderby; (17) Benson; (18) Cottesmore; (19) Funningley; (20) Lindholme; (21) Cranfield.



# BLASTA FA1

continuing the feature on the modern approach to competitive FA1 combat with plans for two versions of this epoch making design by RICHARD WILKENS

The designer with his polystyrene foam/balsa constructed Blasta, as described on these pages. As always weight is critical - total weight of model ready to fly should be around 14oz, preferably less.

IN THE APRIL issue, I described the reasoning behind my combat design, explaining that the main pre-occupation was to produce a *more* than competitive model which would be really quick to make, as well as easily and accurately reproducible. This is achieved by using a few easily made jigs to aid mass production - it should be emphasised that the *Blasta* is not intended as a 'one-off' model. A 'batch' should be made in order to justify the (slight) time involved in making these special tools - so before attempting construction, take note of the following items. Incidentally, while full details are already incorporated on the drawing, they are reproduced on these pages in order that those who prefer an 'own-design' can adopt these techniques for themselves. There, that's a generous gesture!

### Balsa stripper

This is used to strip down sheet wood for the trailing edges, leading edge web and ribs. If you do not want to spend around £1.25 on an all-adjustable commercial unit, then a few bits of scrap wood and a new knife blade, arranged as in *Figure 1*, will do the job - and cost less than 10p.

### Engine bearer drilling jig

This eliminates drilling errors, and if accurately made, will align the motor correctly in the model every time. The plan shows how to make drilling ultra simple and very quick.

### Motor mount assembly jig

Used to ensure that all glue joints are held firmly together while the glue sets, and greatly speeds motor mount manufacturing and accuracy. The bearer assembly is placed between the top and bottom jigs which are pressed together in a vice or with a 'Carver Snap Clamp' or G-clamp until the epoxy sets. Solarfilm backing (polythene) is used to stop the assembly from sticking to the jigs. See *Figure 2*.

### It's plastic time

Expanded polystyrene is available from insulation contractors and building suppliers, who may be located by referring to the yellow pages in the telephone directory. Ask for 2in. thick 8ft. x 4ft. sheets or smaller off-cuts if they have any.

The polystyrene is 'cut' (or more accurately melted) by means of a tensioned hot wire held in a bow - such as is seen in *Figure 3* - the rubber strip between the 'ears' of the cutter keep the cutting wire nice and taut. The cutter is then connected to the car battery, which may be tapped-off in 2 volt stages, as described in the April issue, via approximately six feet of bell wire and crocodile clips. Keep it simple (who said crude?) you see! Practise using the cutter on off-cuts until you get the feel of the thing.

Now cut the 2in. thick plastic sheet into 18in. wide strips (20½in. wide strips if you intend to use sheet balsa wing tips) and feed them between the

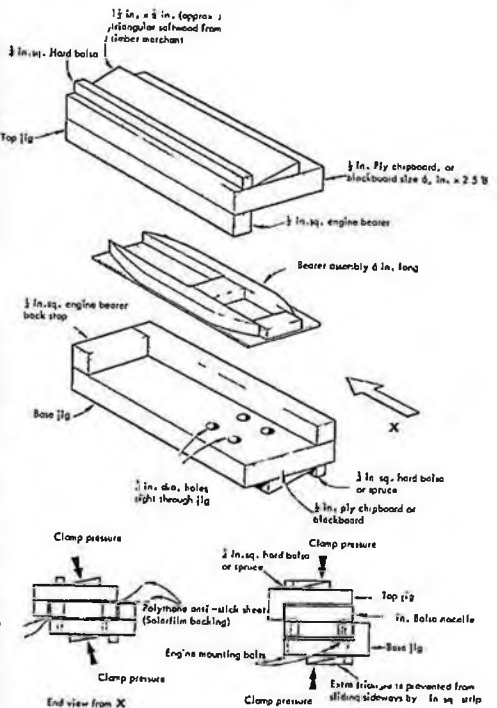


Figure 2 - Motor mount jig

templates on the leading edge cutting jig, shown in *Figure 3*.

Tap off 8 or 10 volts from the car battery and you are in business. Moving the hot wire too fast round the templates results in the wrong section being cut half way between the templates because the centre of the wire drags in the plastic. If you go too slow, or stop, the wire melts a groove, but it won't cost you much time or money before you get the hang of it. I find that it is best to cut

Figure 4 - Cutting leading edge

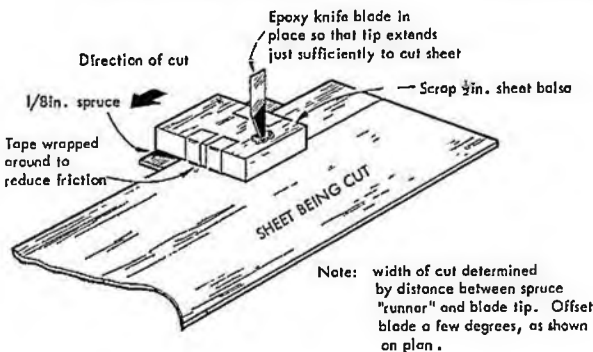
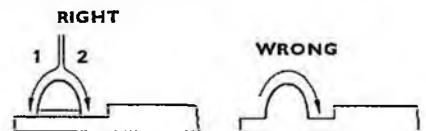
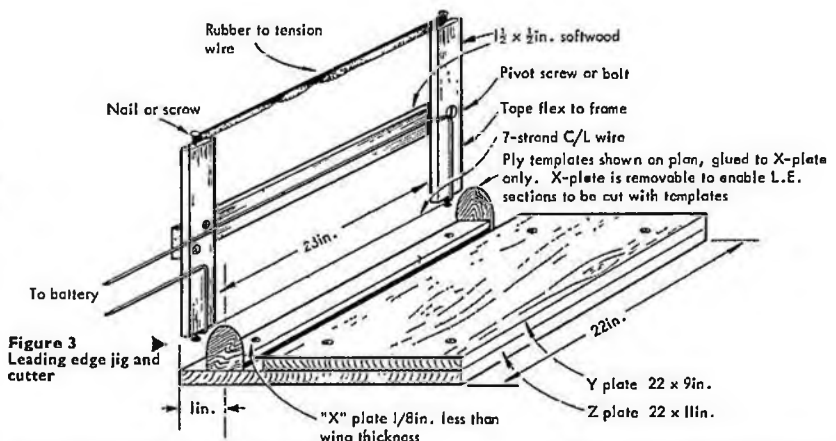


Figure 1 Balsa stripper



**Figure 3**  
Leading edge jig and cutter

Left: Making the first cut when forming the leading edge from a block of polystyrene. Richard now uses a different, simplified cutting bow - as shown here. Instead of using rubber to tension the cutting wire it is attached to a pivoted lever, so pressure from his thumb regulates tension. Other end of wire is firmly attached. Otherwise, details are as drawn above.

two strokes downward instead of one up and over. (See Figure 4).

Now for the tips. First assemble the tip jig cutter shown in Figure 5. Next, tap off 6 or 8 volts from the battery and starting with the cold wire at position 1 (Figure 6) and plastic in place against the jig section, switch power on, pull the wire taut, raise to point 2 and without hesitating or stopping move the wire at a constant slow speed right round the jig to point 3. Just as the wire gets to point 4, move the plastic forward about 1/4 in. to point 5 then drop the wire to point 6, and lift the plastic up off the jig free of the wire. Switch off power. The tip will fall out of the plastic sheet and is ready to stick on to the model. The jig must be smooth,

otherwise the wire will stop and melt grooves in the tip, which doesn't matter at all except round the leading edge, where it will effect the airfoil. Plastic film will cover a groove on the flat tapering parts.

**Putting it all together**

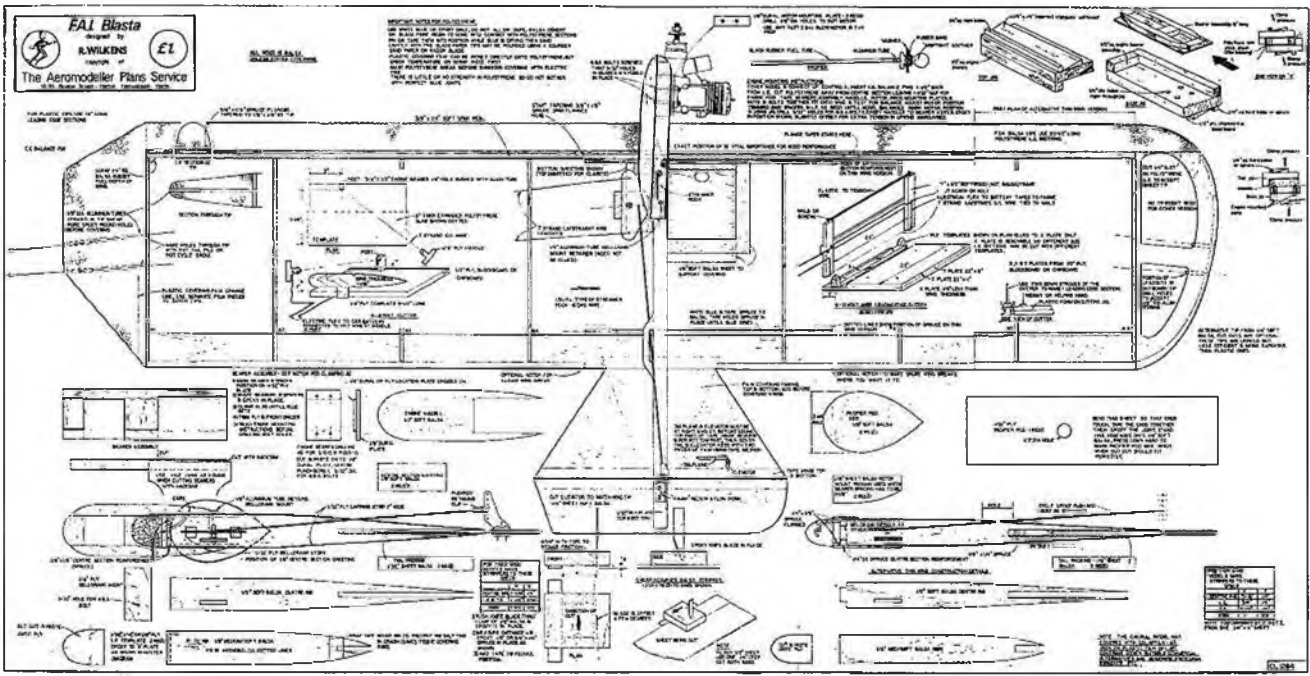
Visit your local model shop and annoy the owner by selecting the lightest wood available. With all the jigs built, clear up the room to make an orderly workspace and before starting work make a nice big sign saying "the model I am now taking hours to build may only last 10 seconds in combat". Now make another (bigger) sign saying "when this model is flying at 90mph, 52ft away and engaged in combat, I will not notice

the effect of this extra work". Pin these to the wall in front of you to remind you *not* to spend valuable time fiddling about with silly details (unless you like the building, that is). This way you end up with more time to do important things like eliminating warps after test flying and getting the CG in the right place. You may even end up with time to build an extra model to use in the final!

This is how you go about building six models for the coming season.

Mark rib positions on all of the 3/8 x 4 in. sheets and using the stripper slice them all into 1/4 in. wide strips. Select the 6 heaviest for the TE's. Mark and plane the chamfer on each TE, then write your name and address and any other numbers etc with a felt tip pen. Remember if the flying lines are cut the motor will run for 4 minutes in any attitude on a pacifier feed system, and the model could easily fly away.

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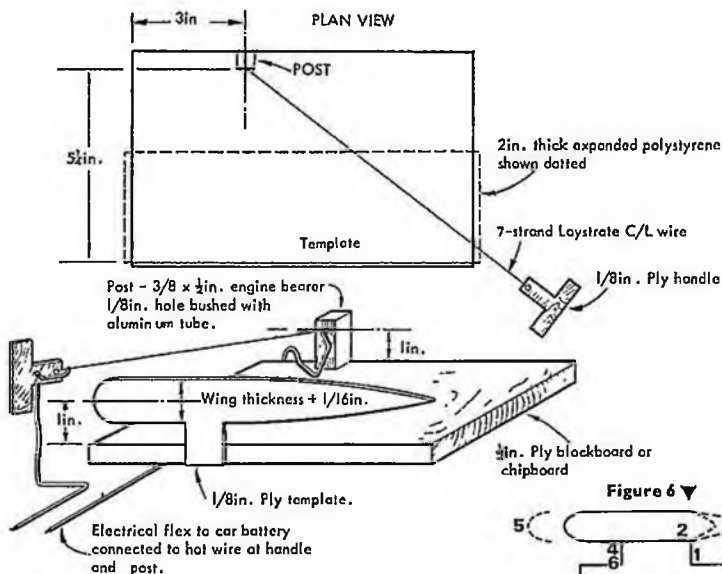


Figure 5 - Wing tip jig and cutter ▲

Glue the centre section reinforcing  $\frac{3}{8}$ in. sq. spruce strips with white glue and use tape to hold these in place while the glue dries. Do not remove the tape, read those signs instead! You already have the LE webs cut out and marked. The  $\frac{3}{8} \times \frac{1}{4}$ in. spruce flanges are tapered to  $\frac{1}{4}$ in. square at the tips; mark the tapers and hack away with a knife or razor plane and roughly sandpaper them, then fix them to the webs with white glue and about 10 clothes pegs for each flange until the glue dries. If the flanges are straight and smooth, set them level with the web tops, and slightly below the web tops if they are rough cut (read the signs!). Add spruce centre section reinforcement.

Cut 4 soft  $\frac{1}{4} \times 4$ in. sheets up into  $1\frac{1}{2}$ in. wide rib strips with the stripper and make a rib template by cutting the rib shape out from the plan and pasting it onto the end of the rib strip, or just pin-prick the template shape with the balsa under the plan. Cut round it when it is dry, and use it to cut the back taper and TE notches for the rest of the ribs. Use the template to mark the length of the ribs, remove it and cut the front of the rib with a set square. Modify all R5 ribs to accept centre section reinforcement. The ribs will be exactly the same depth as the spar web and should fit perfectly. Strip the  $\frac{1}{2}$ in. centre ribs using the rib stripper to cut  $\frac{1}{4}$ in. deep each side. Shape the centre rib and cut the bell crank mounting plate slot. You may like to cut the rear slot  $\frac{1}{4}$ in. for the tailplane and  $\frac{1}{8}$ in. for the TE to save making the tailplane packing pieces, but I think it takes longer this way. Cut the centre rib ply capping strips (try it with scissors), the top one to incorporate the push rod hole. Stick these onto the centre rib using white glue and tape. Cut the leadout holes in ribs and number the ribs so that you don't get them mixed up in the

panic which is about to follow.

If you are in a real hurry, like it is half an hour to opening time or Miss World is coming up on 'the box', or it's Friday night and the contest is on Sunday, it is worth investing in some *Hot Stuff* glue which cures in 10 seconds, less time than it takes to pick up a pin and push it through a wet glue joint! What fun! Slot and glue all ribs onto the TEs over the plan including the centre ribs, then with the spars flat on the building board, webs uppermost, up end the rib/TE assembly, drop them into position and glue them to the spar webs. Cross-pin, or if using *Hot Stuff* hold each rib in position for 10 seconds, while the glue sets.

Build all 6 control systems on a production line. Drill the  $\frac{1}{4}$ in. ply bell crank mounts  $\frac{1}{8}$ in. dia. for the 6 BA pivot bolts, then holding the bolts in the chuck of a hand drill 'drill' them through the holes. This method is very fast and especially useful for inserting motor mounting bolts through bearers. Bind and solder the 7 strand Laystrate leadouts to the bellcranks with fuse wire. Use the more expensive but very handy Nylock nuts that don't vibrate loose for the bellcrank pivot assemblies, and mount the bellcranks using the sequence of nuts and washers shown on the plan. Insert all pushrods through bellcranks and pushrod slots in the ply capping strips, and epoxy all bell crank mounts in place. Add the  $\frac{3}{8}$ in. ply bellcrank stops and  $\frac{1}{4}$ in. soft centre section sheeting, using what's left over from the rib strips. Cut 5 delta tails from the lightest  $\frac{1}{4} \times 4$ in. sheet that you have, and one tail and 6 elevators from another. Round off the flying edges, fit the tape hinges making sure to hold the

With the second downwards cut completed (as in Figure 4) the scrap material is removed and a perfectly formed leading edge remains. Whole operation takes a matter of seconds, once the simple jigs have been made.

elevator and tail at right angles to each other (over the edge of a table) while the tape is being applied to one side. Reverse and repeat. Cover the tail/elevator assemblies with plastic film (mylar) such as *Solarfilm*, *Flightspan*, *Monokote*, *Kwikcote* etc. Remove some plastic film covering to expose the wood and add  $\frac{1}{8}$ in. balsa tail packing pieces and  $\frac{1}{8}$ in. ply elevator horn plates on the elevator. Drill the horn mounting holes and glue tails in place on wing frames and add  $\frac{1}{4} \times \frac{1}{4}$ in. triangular full depth balsa tip rib gussets, ( $\frac{1}{8} \times \frac{1}{8}$ in. will do). You should have spent 6 to 8 hours reaching this stage - excluding making the jigs. If you have taken longer, what have you been doing? Sanding the bellcrank mounts? Cutting neat leadout holes in the ribs? Did you spend more than 30 seconds sanding a tailplane and elevator? Read the signs again and *don't worry* about perfect glue joints for the tailplane and ribs because the mylar acts as a huge gusset that holds everything in place after covering. It holds all joints together when it shrinks.

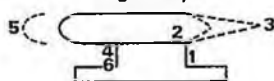
Decide what tips you are going to use! Plastic ones are cheap, easy to fit and cover and fun to make. Balsa ones are lighter, less efficient and expensive. I use  $\frac{1}{4}$ in. sheet for tips as I find them easier to cover than  $\frac{1}{8}$ in. sheet ones because they have more 'sticking area' for the mylar. The choice of tip determines the length of LE section required - 20 $\frac{1}{2}$ in. lengths notched at the ends or take the  $\frac{1}{4}$ in. balsa tips, or 18in. lengths with plastic tips.

Glue them in place on the spar with white glue and hold them in place with tape until the glue dries. Make the leadout guide holes through the tip with a rat tail file, or melt a hole with a hot bike spoke (practise first on a scrap piece of plastic). Fit the  $\frac{1}{4}$ in. dia. aluminium leadout guides with epoxy and smear epoxy round the local area to strengthen the assembly (don't use much epoxy). Bind and solder the leadouts.

To make the pacifier pods, cut the  $\frac{3}{8}$ in. ply teardrop sheet to shape,



Figure 6 ▼







Large foam tips are light, aerodynamically more efficient than most currently employed - and easily cut out. Here the hot cutter wire (drawn in Figure 5) is being taken around the template.



After cutting wire has reached point '6' (Figure 6) the same scrap piece is lifted away and the formed tip will fold away free. Save all scrap material for making these tips.

make the  $\frac{1}{2}$  in. dia. hole for the pacifier, then sand the edges of the hole smooth. Bend the sheet so that the ends touch (make sure the main wood grain runs spanwise or it won't bend) tape and epoxy the joint. Place the ply on its edge on a soft  $\frac{1}{4}$  in. balsa sheet so that the balsa grain is vertical, and squeeze downwards hard to mark the  $\frac{1}{4}$  in. sheet. Cut out the marked shape which will fit the ply exactly, and glue with any adhesive. Glue the pod to the wing frame and add the  $\frac{1}{4}$  in. balsa plastic film support sheeting. Spend a minute or two sanding each frame. Add the filmed tail fairing pieces, then plastic-film cover the model using two separate pieces for the upper and lower wing surfaces and different pieces for the tips if these are plastic. Use cardboard templates when cutting 'film', which should have the pacifier pod and pushrod holes pre-cut before application.

**DO NOT LET DOPE, BALSA CEMENT, GLASS FIBRE RESIN or 'HOT STUFF' GLUE COME INTO CONTACT WITH THE PLASTIC; IT MELTS IT.**

This means you cannot use nylon covering for the centre section unless you first apply a layer of paper applied with diluted white glue 50/50 glue/water, over the plastic LE under the proposed nylon areas. I have never done this but it is a recognised method of finishing polystyrene wings in the USA. Try double layers of mylar instead of nylon covering; pin prick the lower film layer before applying the upper layer to exclude air bubbles. I have never done this, but it should work!

Using the plastic film backing as an anti-stick layer, cut out, epoxy and clamp the  $\frac{1}{2} \times \frac{3}{4}$  in. bearers, bearer spacers (vertical grain  $\frac{1}{2}$  in. sheet) and  $\frac{3}{4}$  in. ply motor mount plate in the motor mount assembly jig. Remove after 5 min. trim off excess glue.

#### CG position

The CG position on the fore and aft axis is very important as a nose heavy or tail heavy model will have to

have weights added to achieve balance, to the detriment of its ultimate possible performance so the position of the motor is adjusted and the bearers drilled before they are glued to the model using the following procedure. Connect up the controls with a slight amount ( $5^\circ$ ) of extra down elevator - this allows for adjustment later by bending the pushrod right next to the horn.

Cut a  $1\frac{1}{2}$  in. wide portion of the polystyrene LE away to expose the front of the spar. The LE does not pass through the motor mount! Tape the  $\frac{1}{4}$  in. balsa motor mount nacelle to the bearer assembly along with the motor, motor mounting plates, prop, nuts and bolts - then slide this assembly into position on the model and test for CG with pins inserted into the tips  $1\frac{1}{2}$  in. back from the LE. Adjust the motor position to obtain the CG, trimming the rear bearer spacer and the LE if necessary (recover the LE if polystyrene is exposed). Remove the assembly, drill bearers using the drilling jig shown on the plan, insert 6BA bolts through the  $\frac{3}{8}$  in. dia. holes by holding the bolts in the jaws of a twist drill chuck and 'drilling' them in with one washer under each bolt head, then epoxy the nacelle in place making sure epoxy is covering the blind bolt heads before clamping the whole assembly in the motor mount clamping jig. Carve and sand the motor mount to shape then epoxy it to the model with a slight offset as shown on the plan for extra line tension during upwind manoeuvres. Drill an  $\frac{1}{4}$  in. dia. hole through the bearers and bellcrank mounting plate and insert the  $\frac{1}{4}$  in. dia. aluminium tube (no glue required unless it is a loose fit).

Run a fillet of epoxy round the motor mount/film joint with a wet finger to prevent fuel seeping under the covering, then give the mount two coats of dope and one of fuel proofer or just one of fuel proofer if you are in the car on the way to the contest. Use fuel tubing to cover the bolt threads while doping is in pro-

gress. Pour fuel proofer into the pacifier pod and after a quick swish round, tip it out again and leave the model which is now ready to test fly in a position where the excess fuel proofer may drain out through the pacifier hole.

Pacifiers only occasionally break when the model hits the ground at full speed, so fuel proofing the pod interior is optional, I don't do it, because if one of these models hits the ground, a wet pacifier pod is the least of your problems.

#### Thin winged version

This has a tougher LE and TE that should hold up under a shallow angle crash, i.e. one where the model nearly pulled out of a manoeuvre. The model will not turn quite so well as the lightweight thick-winged version, but should fly faster on the level. The bearers need not be pre-shaped to fit on the centre rib and depending on bearer spacing for the motor you are using, packing pieces of hard  $\frac{1}{4}$  in. balsa may be required as shown on the plan. You do not need them for PAW engines. The construction sequence is similar to that of the thick winged model except that you can get two LE webs and two TEs from one  $4 \times \frac{1}{4}$  in. sheet and probably the most economical way of building these models is in pairs. Note that the pushrod hole in the top centre rib cap strip is further forward as shown on the section. The plan shows part of the thin wing construction on the outboard wing. Rib positioning is exactly the same as for the thick winged version and the position of the spruce centre section strengthening strips are indicated by dotted lines. The model will weigh about  $15\frac{1}{2}$  ozs when finished, depending on how light your wood is.

*Next month this three-part series will be completed by providing advice on repairing and trimming this design, plus details on how to become competitive at the flying field. 'Blastas' are good - very good - but they still need a competent pilot and pit crew for success! Meanwhile start building your first half dozen or so models in preparation . . .*



Are you between 10 and 16 years of age? Then don't delay, join today

# JUNIOR C/L EVENTS PLANNED FOR 1976

AT A RECENT meeting of the SMAE control line sub-committee, the question of the Junior Stunt contests was discussed. Until now, these events aimed at providing a contest for younger or less experienced modellers, have not been 'official' - that is the SMAE has provided neither rules nor prizes. However, this is to change, and the following set of rules was drawn up based on those used by several clubs throughout the country who have held Junior events at their own rallies. Rather than have a contest solely for youngsters, it was also decided to provide a competition for inexperienced aerobic flyers, so as to encourage them to improve their flying style, and to get them used to contest flying without being 'put to shame' by the experts. Thus a 'Novice' contest will be held at the same time as a Junior event, before the same judges, but with a different results list.

The following rules are *provisional* only for 1976, as they may be found to need amending next year in the light of experience -

**Juniors:** any person under 17 years old on 1st January on the year of the contest.

**Novice:** any person who has not scored more than 650 points in an FAI schedule flight in an SMAE aerobic contest. If a person obtains more than 350 points in the new schedule in two separate Novice competitions then they are promoted out of the class.

All manoeuvres are from the FAI Schedule but are scored differently and the reverse wing over is moved to midway through the schedule in order to help flyer confidence. Models which crash may be re-started, if possible, and continue up to the normal 7 minute time limit.

A feature of the scoring system is that groups of manoeuvres (eg *three loops* or *two eights*) will be marked as a whole out of 10 and then multiplied by the K (or difficulty) factor. Also any manoeuvre not attempted will score minus 5 times K factor *unless* the competitor has previously notified the judge that he intends to omit certain items. Pull test to be 10 times model weight.

Now for the schedule itself -

- 1 **Starting** within 1 minute - 10 points after 1 minute - 0 points.
- 2 **Take off** (K factor 2)
- 3 **Inside loops** - 3 off (K factor 3)
- 4 **Inverted flight** - 2 laps (K factor 2)
- 5 **Outside loops** - 3 off (K factor 3)
- 6 **Reverse wing over** - 1 off (K factor 8)
- 7 **Square loops** - 2 off (K factor 6)
- 8 **Horizontal eights** - 2 off (K factor 4)
- 9 **Vertical eights** - 2 off (K factor 6)
- 10 **Overhead eights** - 2 off (K factor 6)
- 11 **Landing** - with undercarriage 5 points without undercarriage 2 points

Entrants under 14 years of age on 1st January on the year of the contest will receive an extra 10% of their final score.

The Judges will award appearance points for construction and finish marked out of 10. These points will carry a K factor according to the type of model as follows:

- (a) Flying wing combat type model (K factor 1)
- (b) Profile model with definite wing/fuselage/tailplane (K factor 2)
- (c) As (b) but with undercarriage and minimum fuselage width of 35mm (K factor 3)
- (d) As for (c) but with cowled engine and semi-scale appearance

\* \* \* \*

There will be a novice class at the three SMAE C/L meetings (first on 18th April at RAF Cottesmore, on the B668 off the A1) - see *Contest Calendar* for details. Also on 6th June, by courtesy of South Midland Area, CLAPA will be running a Junior/Novice event at Stopsley sports ground at Luton as well as a stunt fly-in. So if you want advice on stunt models or help with your flying technique etc, come along and talk to the experts.

**Note**

For all events held on RAF property and organised by the SMAE, competitors will have to be SMAE members subscription details from the Membership Secretary, 54 Belgrave Road, Wanstead, London E11 3QW). However, for contests run to these rules on private flying sites, then this would not be essential - although SMAE membership is certainly most worthwhile in any case.

Dear John,  
I want to start and fly control line model aeroplanes. I do not want to start without some good advice. What sort of model would you recommend for a starter? I have seen models which are made from polypropylene, and I want to know if these are a good model and are easily breakable? These models are complete with starting and flying accessories. If I got a balsa model would I have to get control lines and engine separately? Thank you.  
Newry, Co Down Sean McDonald

*for control-line flying. However, some are better than others - and even some models from the same manufacturer fly much better than others from the same range. We have tried some plastic models that were very good - and some that were awful! The problem lies in the fact that a plastic aeroplane is a (relatively) heavy aeroplane - and plastic is somewhat brittle. If the model hits the ground, the plastic can certainly break - although some designs deliberately 'fall apart' on landing to absorb shock. This means that a few minutes spent re-assembling the machine results in more flying. With other designs, flying is halted until a replacement part is received from the distributor - very few model shops stock spare parts. However, it must be agreed that a 'plastic' aeroplane can be a good*

*choice and being sold as a 'complete' package, is very convenient.*

*If you decide to build your own balsa model from a kit, then you will need to buy an engine, propeller, control lines/handle plus finishing materials such as glue, dope and fuel proofer - and possibly other accessories such as a fuel tank. Quite possibly, a balsa kit model will cost a little more in the first place, but there are several advantages - not the least being the satisfaction of having built your own model. Among these 'bonus' points are the fact that the model will probably fly better - and that means it will be easier to fly - and the engine can easily be transferred to other models at a later date. This is not always the case with ready-to-fly models, and with some it is virtually impossible. If (when) you crash a balsa model, it will not hit the ground so hard as it is lighter, but if it should break, then it is usually quite easily repaired.*

*My advice would be to visit your local model shop, and select a profile fuselaged trainer model, plus an engine (your local model shop owner should be able to advise you on the most suitable items) if you intend to make aeromodelling your hobby. However, if you just want a 'toy', and have no real interest in model aircraft, then a ready-to-fly plastic model would probably be best suited to your needs.*

*We are frequently asked which is the better choice of model for the beginner; plastic or balsa. Unfortunately there is no easy answer. There are many ready-to-fly plastic aeroplanes on the market, designed*

Dear John Bridge,  
I am between 10 and 16 years of age and would like to become a member of the 'Golden Wings Club'. With this application I enclose postal order (International Money Order) for 25p to cover cost of enamel club badge, two coloured transfers and membership card.

NAME IN FULL.....  
ADDRESS.....  
.....  
YEAR OF BIRTH..... SCHOOL.....  
NAME OF ANY OTHER CLUB OR CLUBS TO WHICH I BELONG (if any).....

Send to: GOLDEN WINGS CLUB, AEROMODELLER, P.O. BOX 35, BRIDGE STREET, HEMEL HEMPSTEAD, HERTS HP1 1EE.

5/76 15p in the £1 Rebate plan purchase coupon for Golden Wing Members G.W. No. ....



## THE FRENCH CONNECTION

or how to spend an exhausting Continental weekend

Left is eventual winner George Matherat who comfortably outflow his opponents in the fly-off. At right is the classic Alain Landeau pose – there should be a statue in the Louvre!



**CONFUSION!** Following no less than thirty successive Coupe d'Hiver International events in France under the instigation of its patron and originator, Maurice Bayet – no such meeting was scheduled for 1975. Instead, *AeroModeller* picked up the gauntlet, and ran the event at RAF Halton in November of that year (see January 1976 issue) so as to maintain the happy connection that this magazine has fostered with its then French counterpart, *Model Reduit d'Avion*. However, to everyone's surprise, a '31st Coupe d'Hiver du MRA Anglo-French Challenge' was subsequently announced – regrettably too late for publicity to be given via this magazine. Organisers proved to be the Eera Club, venue being Gatinais, near Montargis, and Ian Dowsett volunteered to make the trip. Here's his story . . .

"Despite numerous phone calls, I could not find a fellow enthusiast to accompany me at such short notice, so I became the lone pilgrim to this 'Mecca' of Coupe d'Hiver meetings. Being met by 'our man' in Paris – Brian Cox – was an enormous help and we were soon heading down the auto route to Montargis, eventually spotting Alain Landeau's car in front. Naturally, the natives knew the way, so we stayed on his tail – what a mistake! Alain had as little idea of the location of the flying field as ourselves, thus we were about the last to arrive – though to a warm welcome for the 'British Contingent'.

"By starting time, all the French were well

"Steady with that winder Ian, you've had enough broken motors to last the year already!" Sole British flyer Ian Dowsett prepares for flight. At right is Pierre Chaussebourg demonstrating the classic French interpretation of an ROG launch.



prepared, with rows of self-winding jigs plus attendant poles for Mylar streamers. There was a crystal clear sky and very light wind – hence the streamers were lazily floating in the breeze, and indicating some good air.

"However, actually flying in good air was not as easy as it appeared. With the help of Pierre Chaussebourg's thermister, plus a wary eye on the Mylar strips, I started my first round – flying both Canadian Stuart Savage's model by proxy, as well as my own. Despite numerous maxes in this round, the best I achieved was 91 seconds with Stuart's model. And then it was time to stop for lunch – but *only* for 1½ hours this year!

"Back to the flying – and two maxes for me in this round despite (or perhaps because of?) adopting the French scheme of sitting down to ROG launch. When in France, do as the French do . . . Georges (Matherat) also maxed, but Luis DuPuis dropped a flight.

"Round 3 was definitely the hardest – it was so difficult to find good air that would last long enough to be of real use. Fortunately, I managed a second max with my number 2 model, resulting in 44 seconds short of a 'full house' – sufficient for 18th place, which considering that there were 86 entries, including the cream of Europe's C d'H flyers, does not seem too bad upon reflection.

"Now for the fly-off. Georges Matherat, Robert Champion, Andre Meritte all

launched together – but after just half a minute it was clear that there was going to be a decisive winner. George Matherat's model seemed to sniff what little bit of good air there was, and following a lovely climb, it easily out-flew the rest. Thus ended a tough, keenly fought contest – but as enjoyable as ever.

"To say that the atmosphere was friendly is an understatement – it was really nice to have Louis DuPuis retrieving my models, and to be able to borrow Pierre Chaussebourg's equipment – including his skis! (?). What great friends!

"Continuing the tradition of these always being an 'incident' attending these French meetings, we nearly missed the 'plane home – but a 25 mile drive in 16 minutes cured that – only to have the 'luggage' refused at this last minute, to be sent on the next day."

Thanks, Ian, for a true modeller's view of a weekend in France – what else could one possibly go there for?

### Results

1 G. Matherat (Grenoble)	360+180
2 R. Champion (Tours)	360+115
3 A. Meritte (Cheminots)	360+110
4 P. Gerard (Mandres)	355 (Jnr)
5 F. Rabin (Bourges)	352
6 C. Mangin (Cheminots)	350
7 J. L. Garrigou (Trebod)	346
8 B. Boutillier (Bourges)	346
9 B. Boutillier (Bourges)	345
10 P. Jomarien (Mandres)	340

(86 entries, including 4 American, 2 British, 1 Canadian, 1 German).





## FLYING SCALE COLUMN

BY ERIC COATES

MARCH 5TH this year marked the 40th anniversary of the first flight of that great interceptor fighter, the *Spitfire*. It hardly seems possible that 40 years have passed since those beautiful elliptical wings first took to the air – I was a mere child at the time and the significance of the great occasion did not register then. Forty years on though, the significance is very apparent. If Mitchell's creation had not been a success on that day then almost certainly World Affairs would have taken a very different course from that which finally transpired.

To honour the great occasion, the Southampton Branch of the RAEs organised a *Mitchell Memorial Symposium and Dinner* on 6th March. I considered myself to be honoured to be amongst the 500 or so who attended in the company of so many great figures connected with the *Spitfire* in the 30's and 40's. Alas, many who were in at the birth are no longer with us. R.J.M. himself died at the early age of 42, only a year after the first flight of his creation. Joe Smith, two years his junior, who succeeded him as Chief Designer at Supermarines, died 20 years ago. I think the achievements of this man are not truly appreciated outside Supermarine circles: Joe and his team developed the *Spitfire Mk 1*, with a maximum speed of some 350 mph, powered by the Merlin II developing 1030 hp and weighing 6,200 lb to the Mk 20 series, capable of 450 mph when powered by the Griffon 64 developing 2,375 hp and weighing over 12,000lb, fully laden. Although both were called 'Spitfire' and superficially looking similar the airframes of these two machines had

Superb Albatross D11 by Anthony Alferi of Brno, who won both the Czechoslovakian Peanut contests (Junior section). Model weighs 13 grammes, and provides a flight duration of around 75 seconds.

nothing in common. One could compare their performance development with the contemporary *Hurricane* and *Tempest* by that other great designer, Sidney Camm. He missed out many of the intermediate steps as he realised the development potential just was not in the *Hurricane* as it was in the Spit. 'Mutt' Summers who made the first flight also died in the 50's.

Happily, many still survive and were present. Such people as Jeffrey Quill who test flew every Mark, Alan Clifton who succeeded Joe Smith as Chief Designer at Supermarines and those famous exponents of the machine, Douglas Bader and Standford Tuck.

It is impossible to recount, nor is it the place in this Column, the many adjuncts regarding this immortal machine, but perhaps one or two new to me are worth recounting.

Jeffrey Quill's lecture was by far the most technically interesting and it was most illuminating to hear him comparing the *Spitfire* and its American contemporary, the *Mustang*. Ever since the war the relative performances have been compared by pilots and historians. In level flight the later Marks of these machines had similar maximum speeds, but according to a comparative report issued by the RAE in 1944 the 'Spit' certainly possessed by far the cleanest airframe. When dived to Mach .8 the *Cd* for the *Mustang* was .04, whereas at the same speed the *Cd* for the *Spitfire* was only .028. The maximum speed ever recorded by a *Spitfire* was 620 mph by a Mk XIX. The 'Spit' also had a reputation for being a very strong aero-

Our contributor Lubomir Koutny's own Peanut - and senior class winner - a 7 gramme Nieuport monoplane. Subsequently, it was given to Ryszard Czechowski, so perhaps it will become a pioneer 'Peanut' in Poland.





Above is junior Czech flyer Anthony Alferl with another of his designs - in this case a 6 gramme/50 second Avia BH5. Above right is Lubomir himself with his D H Hornet, completed just a few hours before the contest at Trnava. Its second flight time was 55 seconds - not bad for an 80 gramme model - and its first contest flight! At right is the Spitfire Mk IX made by junior Oswald Janisch for the 1:20 scale class.

plane which allowed liberties to be taken with it in combat unlike its early adversary, the BF109, which had the unenviable reputation of breaking up if pushed too hard. Quill raised a few eyebrows when he stated that to his knowledge 25 Spitfires had been 'pulled apart' in the air by brutal piloting!

Of the many slides shown, perhaps the most amusing was that of a Mk IX in flight with a couple of beer barrels hanging from the wing racks - evidently just after 'D Day' a considerable amount of beer was ferried across the channel by means of these high speed drays.

Most touching comment was made by Monsieur Breguet who travelled from France for the occasion. He stated, in broken English, that he considered Mitchell had designed the finest aeroplane of all time in the *Spitfire*. Unanimously seconded by all present.

Many airworthy *Spitfires* survive to this day in various parts of the world. No less than 9 of these live in the UK and three of these machines performed for the benefit of the assembly at Hamble during the lunch break. All were Merlin powered. The Mk IIa, from the RAF Battle of Britain Flight, Doug Arnold's Mk XVI and finest performance of all from Adrian Swire's Mk IX; superbly flown by Neil Williams.

The *Spitfire* has always been a popular prototype with scale modellers and not because of its suitability as a scale subject - far from it - purely because of its reputation as a warplane and its beautiful lines. In fact, I should say that it is the most 'modelled' aeroplane subject of all and regrettably it certainly must have the highest failure rate in terms of model flight performance. Thousands, probably millions, of small rubber models of this machine must have been commenced, probably only 10 per cent finished and if -1 per cent of these achieve a flight of 10 seconds, I should be surprised. Strangely, or perhaps not so when one relates the choice of machine because of its



Battle of Britain connections, the early Marks are nearly always modelled. Even as an R/C model things are against it; as a F/F subject the obstacles are almost insuperable. Short nose, small tail areas, little dihedral and complex shapes making for a heavy structure.

The later Marks, which are rarely modelled, although not easy subjects are a better proposition. The Griffon engine bestowed a longer nose and this factor, plus the extra power, called for much larger fins and, in the final Marks, larger tailplanes also. This factor seems to have been appreciated by those long established exponents of the rubber powered scale model, the Czechs. Each year I receive a report of the previous season's activities of this group of enthusiasts, accompanied by the most magnificent pictures, from Lubomir Koutny in Brno. This year's offering arrived on the day of the Spitfire Symposium and lo and behold the first picture I looked at was of a Mk XIV Griffon powered Spitfire, bestowed with many of the features I have just described! This was built by Oswald Janisch from plans published by Mr Koutny himself. This model, like most of the Czech scale models, was built to 1/20th scale and was flown in a series of competitions held throughout the summer. A contest of WWII subjects was held last year at Trnava in idyllic conditions

*continued on page 72*

Twin-engined rubber-powered scale models are performing very well in the hands of the Czech modellers - food for thought perhaps! In this picture can be seen Jiri Merta's monster, 150 gramme Heinkel He 219 B3 NHW in the foreground, with Alferl's Hodek Hk 101, which spans 400mm and weighs just 16 grammes. Two superb aircraft - and really first class photography by Lubomir Koutny, we should add.





KIT REVIEW by Peter Miller

# STERLING SPITFIRE

## 52in. span C/L stunter



THE STERLING SPITFIRE stunter is a fairly recent addition to the range of C/L aerobatic kits now available in the UK, so I jumped at the chance of building this review item. I especially like semi stunt models, finding them appreciated more at displays, and they do provide a little more realism for general sport flying. While the Sterling kit is obviously semi scale, there is some doubt as to what 'Mark' it is supposed to be, the serial number provided on the decal sheet is for a Mk 22, and the side view photos of the full size 'Spit' on the plans show this particular machine. However, the wing shape is wrong as it is the full elliptical shape while the Mk 22 had clipped wings, the nearest 'mark' that I could find was the Mk 16, but by minor modifications one could produce any variant that one wanted. The suggested colour scheme is a bit doubtful (I have never heard of a Spitfire with yellow bands round the fuselage) but these are minor points, and do not affect the kit in any serious way.

### The 'goodies' in the box

On lifting the lid one is confronted with masses of die cut sheets, each part being clearly identified, while the wood proved to be of good quality, though a little on the hard side. It was easy to remove the parts, though the thicker parts needed some knife work. A useful tip given on the plan, which could apply to any other kits, is to sand the back of the die cut sheets where the cut has not gone completely through the sheet – after which the parts will push out easily. This, however, did not work on the thicker sheets. The fuselage top is one long spindle moulded block, no mention of hollowing out is made, but I did so to save some weight. This block could be cut at the rear of the cockpit and raised to make an earlier Mark of Spitfire.

The cockpit cover is a poor moulding and is too flat and small for the model. The transfer sheet provides roundels for the fuselage and top of the wing, but the latter are incorrect having a thin white line between the blue and the red. Fin flashes, codes in yellow and serial numbers are also included. There is adequate sheet and strip wood in the kit, but none of the control parts; not even leadouts, are provided. Undercarriage legs are pre bent while mounting bolts and clips are included. The bearers seem a most peculiar shape, but are correct and allow for the cross sectional taper of the fuselage.

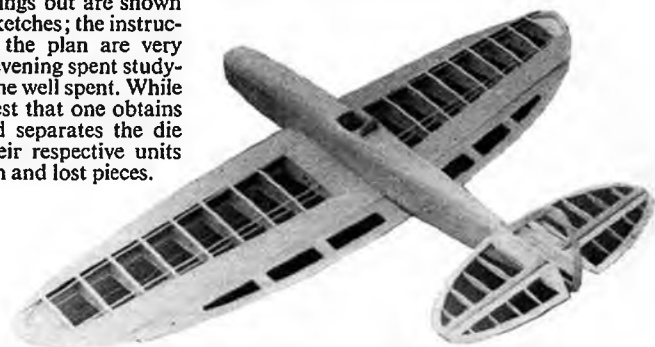
The plan gives full size drawings of the wing, tailplane and fin but only perspective sketches of the fuselage assembly. Parts are not identified on the full size drawings but are shown on the assembly sketches; the instructions printed on the plan are very complete and an evening spent studying the plans is time well spent. While doing this I suggest that one obtains several boxes and separates the die cut parts into their respective units to avoid confusion and lost pieces.

### Assembling the jigsaw

Construction of this model is very complicated at first sight, due to the large number of parts. For example, each fuselage side is assembled from no less than seven pieces (including two-part doublers), and the fin consists of fourteen separate pieces. It is at this point that one realises that the evening spent studying the plan was not wasted! If anything, this kit can

be criticised for the unusual fault of being *over* engineered, but on the other hand one really feels that the price is fully justified.

The wing is very unconventional in its method of construction, the centre section wing ribs are threaded onto the undercarriage spar, which has the undercarriage already mounted (though I believe that the undercarriage could be mounted at a later stage which might help) then pre-assembled leading and trailing edges are fitted to these ribs. These are followed by the rest of the ribs, the  $\frac{1}{2}$ in. square spars and the  $\frac{1}{2}$ in. square leading edge set diamond fashion against the  $\frac{1}{2}$ in. sheet LE – all this is supposed to be done in one operation to avoid warps. Not only can it be done but in spite of my misgivings it works! The ply bellcrank mount is then fitted, followed by the tips and then by the leading edge and trailing edge sheeting. The LE sheeting only



touches the spars at the centre section, for the rest of the way to the tips it is only supported by the ribs at the rear edge – to a person used to gluing the sheet to the spar this method *seems* 'horrible', but again, it works and the resulting wing is adequately stiff and warp free. Analysing the method of construction shows that Sterling have evolved one of the easiest and most effective methods of duplicating the Spitfire wing.

The controls are the next to be fitted, and this is where I refused to

follow the plan. The plan calls for the flap horn to be bent to conform to the swept forward TE but what happens when it is operated does not bear thinking about, and as one has to make (or buy) the horns I suggest using the type sold for strip ailerons with a 'Y' shaped pushrod. Take one pushrod to the inner horn from the bellcrank with the second part joined to it, then take the elevator pushrod from the horn which is connected directly to the bellcrank. I also added throttle control using the Mick Reeves system, but this was later locked in the open position as my gearing affected the controls. Final job on the wing at this stage is the fitting of the centre section sheeting and cap strips. I did not hinge the flaps until the model had been painted - the hinges are provided, and consist of Mylar strips, and there are more than enough in the kit.

The fuselage construction follows conventional methods; once the sides have been assembled from the various parts, the cross section is tapered towards the bottom and the engine bearers are not square but a parallelo-

tail and controls have been fitted to the fuselage the tail wheel is installed: the method used here is to drill a hole through a small block of hardwood, push the tailwheel leg through and bend over the end giving a fully castoring tailwheel, this is an excellent and very simple system but unless you are flying over tarmac the block is a bit on the small side ( $\frac{3}{4}$  sq. in. x  $\frac{1}{2}$  in.) and I would recommend using a short piece of scrap engine bearer of a larger size.

All that remains to be done now is fit the bottom sheeting, the top block, and cover and finish. Tissue is provided for the wings and tail but not the fuselage. Actually the plan recommends covering the wing and tail before assembling these units to the fuselage but I do not like this method as I feel that tissue in a highly stressed joint could be a weakness and there is more chance of poking a hole through the covering while working on the model. After covering, the guns

and very right about the fin area. The model being what I would class as medium to heavy could benefit from a little more elevator area; it had a heavy pull on the lines except at the top of tight manoeuvres when it would persist in coming in on the lines and going free flight across the circle. This did have one advantage(!) in that it proved the structural integrity (nice phrase, that) of the model; the bellcrank did not pull out and on one occasion both lines snapped - new seven strand at that - and the model crashed in a flat spin under full power. The only damage was to the fin; some five minute epoxy and the model was as good as new. As I am a fan of lighter models, I felt that to be really fair to the model it should be flown by someone else, so it was lent to clubmate Peter Stammers who fitted a taller fin with an offset rudder. This cured the tendency for the model to come in on the lines but did increase the line tension in level flight. The throttle was used on the first few flights but was locked open as it was found that the gearing of the bellcranks affected the trim too much, and because at that stage it was felt that the third line might be the cause of the loss of line tension, but this was



gram to allow maximum glueing area. The instructions say that the engine bolt holes should be drilled before fitting the bearers to the fuselage, but I feel that this is courting disaster and there is no reason why they cannot be drilled after assembly; care must be taken to avoid breaking through the sloping sides of the bearers. The fuel tank is a permanent fixture but from personal experience this should be altered so that the tank may be removed for trimming or repairs (no tank is supplied). Cowling construction involves two plywood formers and nine pieces of balsa, the bottom sheet has the hole cut for the cylinder head but the grain runs the wrong way for the curve and saw cuts were needed to get the required shape. Cowling attachment is by an elastic band between two hooks right behind the cylinder head, while the location of the forward end relies on the needle valve. I think the old cycle spoke method would be safer.

The tailplane and fin should present no problems, but again study of the plan before starting pays off. There is no rudder offset, but the fin has an airfoil section - I shall deal with this further when discussing the flying of the model. Once the wing,

and radiators are fitted; the guns are made from  $\frac{1}{8}$  in. dowel provided, but I did not fit them as I have had similar guns torn out on long grass or in transit to the flying field.

I sprayed the model with Hols Duplicolour: two shades of grey and a dark green. It is surprising how many colours can be matched with these paints, a classic example being Triumph Olive which is a perfect match for American Olive Drab as compared with official ANA colour chips and actual pieces of aircraft skin found at local crash sites, but I digress.

All up weight of the model with a Fox 36 R/C and the extra parts for the throttle control was 3lbs, which is reasonable considering the amount of wood in the model. Construction took half as long again as most other equivalent kits, and this was due to the many sub assemblies that had to be made up, but could not be classed as really hard.

#### Air test

Before I flew the model I felt that it looked low on both elevator and fin area; after flying it I realised that I was partially right about the elevator

not so. Flight characteristics were very good, the model being rock steady both upright and inverted with a quick response to controls, though the squares could be better.

What I mean to say is . . .

Summing the model up I feel that it is a kit that gives good value for money. It is definitely a builder's model; the appearance could be improved upon easily if desired, though it is very realistic in flight built as standard. Construction is different enough to be interesting, and the model is extremely robust. From the flying point of view it is an ideal club stunter, though the contest types might want to save some weight. The model is ideal for display flying where an easily recognisable aircraft performing stunts is always a crowd pleaser. Definitely a worthwhile addition to the growing range of big stunt kits in this country.

*The Sterling Spitfire is imported into the UK by Ripmax Ltd, and may be obtained from any of their stockists. If in difficulties write to Ripmax Ltd at Ripmax Corner, Green Street, Enfield EN3 7SJ for details of your nearest dealer. Retail price is £15.65.*

## ELECTRIC RTP CONTEST

some interesting designs  
seen at the meeting hosted  
by the Avon Cosmetics  
model flying club

At right a contrast in both age and speed obtained in the contest. At left is Kevin Bradford from the Long Eaton club who won the speed event with a twin-engined profile scale *Islander* at nearly 43 mph whilst at right Northampton's Howard Boys flew an *Autogyro* to record the evening's slowest flight of 14.7mph!



IN MANY RESPECTS, any 'new' branch of aeromodelling only becomes really firmly established when contests are specially organised. Thus it might be said that electric RTP has 'come of age' in 1976 – following the success of the events at the *Model Engineer Exhibition*, and now the meeting organised by the model section of the *Avon Cosmetics Social Club*.

Considering that the meeting was held mid-week (evening of 20th January) the attendance was remarkably good – no doubt the superb venue and good organisation of the Avon club helped attract those who had been before. Two classes were catered for: scale and speed, with judging being performed by Harry Butler, Peter Bullivant and Peter Richardson.

The Speed class, which attracted seventeen entries, was rather an unknown quantity as no one appeared to have had previous experience. Most entered profile-scale models and the twins certainly had the edge on performance – best trim was with sufficient down elevator to permit the model to climb no more than a foot or so off the ground under full power. Eventually the winner proved to be a Long Eaton MAC junior, Kevin Bradford, whose profile-scale *Islander* recorded a best speed of 42.8mph on the 15 foot radius

lines, using a pair of Mabuchi 26D motors with Harry Butler red plastic props.

In scale, eight entries came forward, and of these half were profile-scale only – although for sheer spectacle the John Ellis/Robert Millinship joint entry could not have been bettered! Their machine was a *Mistel II* composite – consisting of a *Junker Ju 88* with a *Focke Wulf 190-AB* carried on top. The combination had never flown before, but by utilising both sets of pole heads, they had a successful in-flight separation to a round of applause by the many spectators.

Others were less fortunate – Coventry's Pete Collins brought along his nicely built *Messerschmitt Me 163*, complete with drop-off dolly undercarriage, but it failed to get airborne. His second entry, an own-designed *Hurricane* did eventually get into the air, but the DC 5 x 3in. three-bladed prop seemed a little too much for the Rikowhip motor.

Winner, it almost goes without saying, was Pete Lindridge, also of the Coventry club, with his retract-equipped *Spitfire* which won the ME scale event. A superb model, but as Pete ruefully admitted, he will need some 'glimmicks' next year to keep ahead of the opposition. What gave him that idea? Could have been the *Mistel* or possibly Kit Spackman of LEMAC, and his profile-scale (1:36) *Boeing B47 Stratojet*.

So what's spectacular about that? Well, apart from the size – and the fact that the two Mabuchi motors made the huge wing sag – Kit had installed a couple of 'extras'. Like a huge stand-off atomic bomb (released in flight via an electro magnet) and as a final *piece de resistance*, a drag chute popped out on landing, thanks to a trip wire, cunningly arranged to prevent premature release.

At left is Pete Lindridge from Coventry with novel ducted fan D H Vampire which he entered in Speed but did not fly. As compensation, he won the Scale section with his faithful retract U/C-equipped *Spitfire*. Below left is the *Mistel II* composite entered by John Ellis and Bob Millinship. Separated in flight too! Below is Kit Spackman's very impressive B47 with operating bomb and parachute. Profile scale is obviously growing rapidly.





# THOSE EARLY DAYS

Part 4

by "Magpie" with  
photographs from  
Alwyn Greenhalgh's  
collection

Alex Houlberg and Stan Rushbrooke are the timekeepers at this contest in the early '60s for an entrant using a diesel engine and parachute de-thermaliser (just visible furled along right hand side of fuselage).

IN THIS CONCLUDING article your poor chronicler will have to cram in thirty years of development, with its many highlights and changes. It will be clear that only the tops of the waves will bear scrutiny, while we all know that the fish swim in the invisible depths. Another point is that we are dealing only with Free Flight, Second of threesome *Zombie*, *Banshee* and *Zoomer*, Leon Shulman's (USA) 1941 power design became very popular during the late forties. Fast spiral climb and flat glide. Built in various sizes and versions; some had sub-fins on large tailplane single wheel landing gear. Airfoil was a 'thinned' NACA 6409 foreshadowing modern trend but rib-spacing was still fairly large and dihedral might now be regarded as excessive.



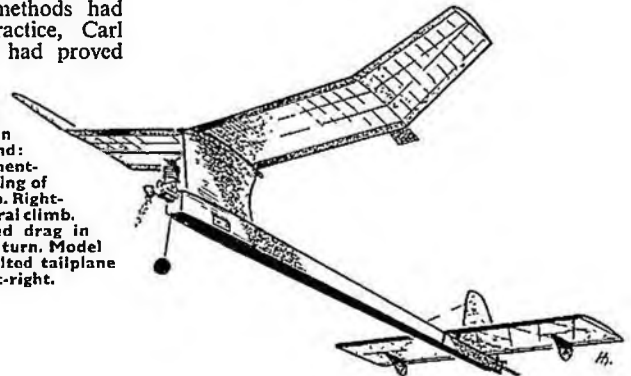
and that implies that we cannot deal with Radio Control, nor with the many fascinating disciplines which have evolved from the invention by that unforgettable character Jim Walker - Control Line. Maybe a more expert pen will take up the subjects in due course.

Aeromodelling had not lain entirely dormant during the War. In spite of a shortage of materials and bans on flying, its devotees persisted with substitutes and shadow organisations in occupied countries. When communications were possible once again, it was seen that glider develop-

ment on the Continent - and notably in Scandinavia - had taken a great swing upward. Great Britain and the USA, essentially power-minded nations, had not taken the glider seriously, and it took them some time to catch up, but the same applied to the others where power was concerned. Here we would like to list some of the main problems which faced aeromodelling in the immediate post-war years - tied up with these came some remarkable developments which have put their stamp on the technique ever since.

Judging contests on the basis of duration, either that of the best flight or the average or total of three, as already accepted before the war, clearly proved to be unsatisfactory. Soaring in thermals was all very well, but a potential winner could disregard the remaining rounds when he scored an exceptional first flight, and that happened only too often. But setting a time limit would clearly penalise the man who had a fly-away, so some pre-arranged means to get the model down was essential. Fortunately, such a means was already there. After various methods had been evaluated in practice, Carl Goldberg's tip-up tail had proved

*Swiss Miss*, British early fifties design by Silvio Lanfranchi and Arthur Collinson continued American trend: large tailplane on long moment-arm and pylon-mounted wing of moderate (7.8) aspect-ratio. Right-handed almost vertical spiral climb. Hinged wing-tab produced drag in glide and caused left hand turn. Model was also trimmed with tilted tailplane (no tab!) when it flew right-right.



highly superior to all the airbrakes, parachutes, spiralling descent and other fantastic devices. So the time was ripe for the introduction of a maximum duration which allowed a certain bonus for staying in a thermal. It also greatly speeded up the running of the contest by freeing the timekeepers for the next man. Models were retrieved more quickly and competitors did not have to travel great distances with a fleet of spare models; a factor which favoured the home team. The de-thermaliser was operated by a fuse, a somewhat crude method, which led to more reliable custom-built mechanical timers. These were desirable anyway, because the current modified phototimers, and rather unreliable vacuum timers, were not sufficiently accurate to stop the engine within the stipulated time. Here John Tatone came to the rescue with his excellent products, later copied and developed by others. Maximum accountable flight duration was initially fixed at five minutes, but later reduced to three. It seemed that the problem was



Left: Col. C. E. Bowden donor of the Bowden Trophy chatting with foreign visitors at the first post-war meeting in 1948. Many models had attractive semi-scale lines and had that 'vintage' look which is regaining favour today.

Right: George Court's diesel motor built in 1946. The design was sold to Lines Bros and became the Frog 100 diesel. Sadly the true originator of this motor is rarely properly credited.



properly the revs were increased by adjusting the compression. It demanded a certain dexterity to bring the engine to concert pitch by manipulating throttle and compression, but this was soon acquired. The Americans favoured the 'Glow-Plug' as the engine was called, whereas Europe – Great Britain included – was in favour of the 'Diesel', although it really was a compression-ignition type. Germany, Britain and Italy went into large-scale production; British engine-makers for long producing the leading marques. One still thinks with affection of the wonderful Mills, Albons, Amco's, Elfins, ED's and other exquisite products. Much later the Japanese joined in. Although the 'diesel' was superior in power to the glow-plug in the smaller category, it could become a dangerous beast beyond 2.5–3cc and this greatly hampered its popularity. To the author the small, simple and reliable diesel still seems the ideal engine for the beginner, although American practice does not support this view.

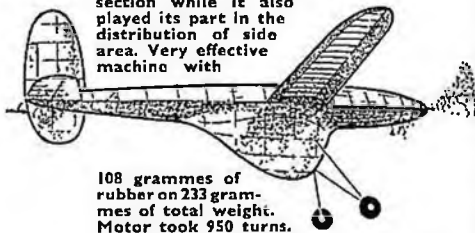
A major factor contributing to the improvement in performance of all free-flight designs was a better understanding of the nature of the airflow around a model wing. There had

At right: the Belgian 'Super Bak' design, also known as the 'Flanders Flyer' (plans still available as PET 354X price 75p). Below is a Northern Heights club member with contest glider, circa 1950.



solved at last, but improvement in performance led to massed fly-offs, with the result that extended duration and the eagle eye of the time-keeper once more started to play a part. An attempt was made to exclude the influence of thermals by flying in the very early morning and late afternoon but it was soon discovered that the supposed 'still-air' conditions could not always be relied upon after the first round or so and the thermals were let off their leash again. In Power it was possible to reduce the engine run. Shorter towlines for gliders?

There were at least two brave attempts to create a new basis for comparison in power. Bowden had donated a trophy before the war, but it was not until 1948 that the contest became really international. The rules stipulated "three unassisted ROG flights of 40-60 seconds duration with loss of points for duration above or below this range. Failure to start the engine within three minutes of the competitor's name being called involved disqualification in that round." The rules were clearly intended to stimulate reliable and accurate flying, but in practice the slightest waft of rising air could – and did – upset the best-laid schemes and the result was 1948 was a highlight in British model aviation for the late Roy Chesterton brought back the Wakefield Cup from the States with the *Jaguar*, designed by Northampton clubmate Ted Evans. Very light ingenious structure with belly-fin to make up the minimum area of fuselage cross-section while it also played its part in the distribution of side area. Very effective machine with



108 grammes of rubber on 233 grammes of total weight. Motor took 950 turns.

not wholly satisfactory. Much depended on the reliability of the timer to stop the engine and – as already mentioned – timers in those days were somewhat temperamental. Still, the meetings were most enjoyable

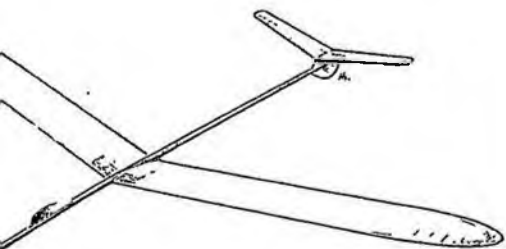
affairs with models very much like those of the pre-war era; realistic, big and good-looking. The 1948 meeting was closely connected with the immense popularity of the famous Eaton Bray establishment, a grand effort by that wonderful character D. A. Russell, founder of this Journal. Himself a great aeromodeller, Russell set up a complete holiday camp with all amenities on a field that was for model flyers only. Those who have enjoyed the privilege of staying there may remember how, at any hour of the night one could find aeromodellers in the workshop, repairing or building and then turning out at sunrise to do a spot of testing. Sleep was the only thing which was in short supply; there was far too much to see and do. Unfortunately this wonderful place could not earn its keep and had to close down. So many modellers being at Eaton Bray, they took the opportunity to take part in the Bowden Trophy contest, but interest declined in later years.

Another attempt to introduce a new yardstick for performance was based on the ratio between the total duration of flight divided by the duration of the engine run. Although quite popular at first, thermals played havoc with the ratios, which might lie between 10 and 30 and so did not reward aerodynamical superiority any more than pure duration.

Two basically new inventions were to influence all power flying after the war. Ray Arden in the USA replaced the electrical ignition system by a 'plug' containing a platinum spiral which was made to glow initially by means of a ground battery. Once the plug had ignited the fuel, whose main component was methanol, the spiral continued to glow and kept the engine running. It was a great breakthrough, but not the only one. The Swiss had developed a quite distinct type, the Dyno, in which a different fuel was used: ether, paraffin and a lubricating oil being the chief ingredients. By compressing the fuel-air mixture sufficiently by means of an adjustable contra-piston, it became self-igniting and once the engine was running



been a suspicion that airfoils tested for use in fullsize aircraft might not be the most suitable for model work and a form more like that of the soaring birds would be more likely to improve performance. This idea was confirmed by the extensive and beautifully presented experiments carried out by the late F. W. Schmitz in Germany. His book *Aerodynamik des Flugmodells* (Aerodynamics of the Model Aeroplane) explains how it is that our model wings require a turbulent boundary layer to ensure optimum performance and clearly indicated how this could be achieved. His theory ended at one blow the useful life of our great and famous airfoils such as RAF 32, Clark Y, Eiffel 400 and Göttingen 497, to name a few. In their place have come much thinner airfoils and credit is



Rudolf Lindner's Spinne (Spider) which gave W. Germany the 1954 A/2 victory. Abolition of the 'fuselage formula' meant only a slim rod to carry wing and tail was needed.



due to Sigurd Isaacson and Dr Georges Benedek for designing a series of airfoils which were aimed at meeting the conditions for an efficient airflow. It should not be forgotten, however, relatively thin and highly cambered airfoils had already been used by Goldberg, Marquardt and Davis in the United States.

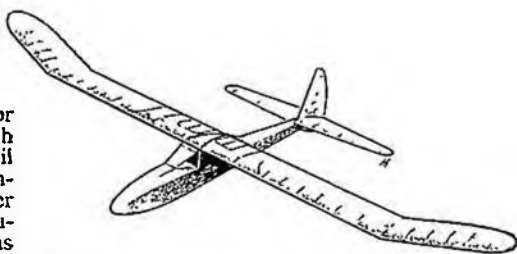
Indoor modellers had soon found that the best performance was obtained with single-surfaced cambered airfoils, such as those used by McBride. Many still design by eye, basing

the shape on a successful ancestor and they may be right. Even with close rib-spacing, the 'average' airfoil departs considerably from the contour chosen when the wing is paper or silk-covered. It was most unfortunate that Schmitz died before he was able to follow up his basic research with tests on the more commonly used airfoils.

With the knowledge gained and the abolition of the rule fixing the minimum cross sectional area of the fuselage, a completely new generation of models appeared. Tailplanes with an area hardly more than half the once accepted value of 33 per cent of the wing were used with a moment arm of some 5 to 7 times the mean chord of the wing. Gliders were also designed with the lifting tail set-up, shifting the CG from 25 to 50 or 60 per cent from the leading edge. The first radically new trend was undoubtedly Oscar Czepa's famous 'Toothpick', but this model still had to comply with a minimum fuselage area rule. It was a stroke of genius on Czepa's part to fit a small nacelle at the tail end. His victory in the 1951 A/2 Glider Championships proved that it all worked admirably. In 1954 Rudolf Lindner won that contest with his *Spinne* (Spider) stick-fuselage design, but with a higher aspect-ratio wing, shorter fuselage nose and generally more attractive lines. In 1955 he won with an even better looking model.

Schmitz had also pointed out that a thin thread, shirring elastic, for instance, placed a small distance before the nose of the wing, could generate a turbulent airflow and might even make an unsuitable airfoil with a very rounded nose into a much better proposition. Opinions appear to be divided on the improvement these turbulators may offer, but it is significant that so many leading designers put their faith in them. In the Vienna group of Oscar Czepa, Erich Jedelsky evolved the now famous Jedelsky type of wing construction which not only met the conditions for the creation of a turbulent boundary layer, but offered a structure which ensured faithful reproduction of the airfoil over the entire span. It met with general approval and is still widely used.

The 'fifties saw a considerable increase in tail-moment arm for both rubber and power models. The Wakefield had its motor weight reduced from unlimited rubber to 80 and finally (?) 40 grammes and still scored its five maximums. Power models had to make do with a mere 2.5cc and did the same. Towline length of gliders went down from 100 to 50 metres and total times of the



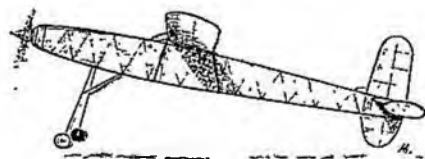
Bob Gosling designed his Ivory Gull II in 1942 and followed it up with the IIb in 1944. With a span of 52.5in. and wing area of 251 sq. ins. it was more highly loaded than most models, but this made it a perfect allround model as well as excellent for slope-soaring.

leaders still stands at 900 seconds. After uttering Cassandra-like cries of impending disaster, aeromodellers everywhere pulled themselves together to beat the rule-makers and that is how it should be. Strange innovations turned up, like the variable incidence tailplane on power models, a completely logical development, but during our search for tasty morsels of info., we came across an item in the *AeroModeller Annual* for 1955-56 (page 96) which described a pendulum controlled elevator which in effect reduced the angular difference between wing and tailplane during the power run, no down thrust was required. How the transition took place we do not know, but Max Byrd of the Loughborough College Club used a model with this device in the 1952 World Championships.

Now we have the Circular Tow technique, which, if we remember rightly, Lindner demonstrated quite ably at Odense in 1954, using a quite traditional type of tow-hook. If you can also find some whirling Dervishes to scare the thermals up off the ground, you are set up in business. Who knows where that may lead to?

Like all competitive sports, aeromodelling has required rules. From a few basic points these have developed into quite an extensive book, covering all possible contingencies. In 1937 it was felt that co-ordination of the various national interpretations was most desirable and the first meeting, chaired by Dr A. P. Thurston, was held in London. This was the first of yearly international exchanges which soon took place under the flag of the FAI and finally became a fully fledged aeromodelling committee, now known as the CIAM. Although the many representatives all share in the praise the present sporting code may deserve, the greatest name in that international

Aarne Eililä of Finland scored second Wakefield win in 1950, having first won at Cranfield in '49 with ten year old model. This developed design still had return gears at rear of fuselage, 145 grammes of rubber and total weight of 255 grammes.





A Ted Evans designed Wakefield, built by C. S. Rushbrooke in 1947. Several of this designer's plans are available from The Model Shop, 230 Wellingborough Road, Northampton - proprietor being the son of the late Ted Evans.

assembly is undoubtedly that of the erstwhile Chairman, A. F. Houlberg, who for many years, tirelessly and tactfully, led many often difficult and tumultuous meetings with thorough technical insight and psychological understanding.

Here we must leave this survey, incomplete as it is. There are still so many interesting models to discuss, so many outstanding events worth recalling. We have only seen the tip of the iceberg and so much lies hidden below the surface. There has been so much effort that has not met with the success it deserved. With our eyes so close to the subject, aeromodelling may sometimes appear a haphazard and contradictory business. So many new branches have sprouted from the stick-and-string tree that inter-communications and understanding has become difficult. Can a specialist in A/2 understand the problems of a control line speed man? It is not the

same if we talked about an ice-hockey player and a footballer. It is all model aircraft. If you are Free Flight, how can you advise a boy in Team-Race? We all specialise. But it is the young chap we have always needed or there will be no tomorrow. A club or group which does not recruit young talent will be no more than an exploding star in the end. How are we training the young to take our place? Do mass exercises in thousands building a very simple model, yield the kind of crop we want? The Americans seem to think so and Frank Ehling's *Delta Dart* has certainly been effective. But we always feel that the beginner who cannot find the support a club can – and should – give him, gets a raw deal. Apart from some excellent kits, there are many sold to beginners which may quench that small spark of enthusiasm. They cannot always find the wise advice to start simply which they would get in the good

mode lshop. They should be allowed to make their mistakes or they will learn nothing, but they should not be wandering around helplessly. What is a good beginner's model? We all have our own ideas, but it should be neither too difficult, nor too simple. Duration is not so important; the beginner is satisfied when he can adjust it and see it fly. A beginner's model may sometimes be more important than a World Championship design. Do we really look after the aeromodeller who flies for fun and does not want to reach the top? Yacht builders have catered for the man who likes to play around in a small, cheap sailing dinghy but would not think of going in for races. Maybe we should do the same. When we introduce a new, simple class, it soon becomes sophisticated and scares off the tyro. Look at A/1, Penny Plane and Coupe d'Hiver, they were all thought to fill the slot in the market. The problem is not new, but it is still with us. You might have an answer.

#### Author's Footnote

*This series of articles may well prove controversial: there are bound to be some glaring blunders in it, or people will think there are! However, the aim was to provide recollections, and not an historical account, but even so I have been involved in a lot of research – and the text was 'vetted' before publication. One reason that I have written under the nom de plume of 'Magpie' is that I did not want readers to pin the articles down to a particular writer, but now the series is complete, it might only be fair to reveal my identity.*

Juste van Hattum

## FLYING SCALE COLUMN

continued from page 265

reports Mr Koutny. Perhaps the Spitfire's greatest adversary was the *FW190*. The long nosed 'D' version, as modelled by Mr Ludvik, is an ideal subject for rubber power. Although flights of up to 200 secs are reported in practice (must have good thermals in that part of the world) rubber problems in the contest reduced it to 4th place. Great interest this last year was shown in twin engined machines and, in fact, joint winners of the competition were Mr Koutny's *DH Hornet* and Jiří Merta's *He219*. Certain liberties regarding scale seem to have been taken by these gentlemen with regards to engine cowlings with the object no doubt of packing in more rubber and, in the case of the *He219*, dihedral too, but this seems to have been repaid in terms of duration and stability as flights approaching 60 secs were recorded.

Peanut seems to have penetrated across to Eastern Europe. Mr Koutny also describes two peanut competitions held last year in Prague, Poland. The hall used had a ceiling of 14m allowing for a fair performance. He reports that most of the Polish models were built from American drawings, but the Brno club, with 10 years of 1/20th scale behind it, designed their own machines to good effect it seems. Overall junior winner of both competitions was Anthony Alferi, flying an *Albatross D11*. Weight is 13g and it is claimed that flights of circa 75 secs are attained. How do you manage it Mr Alferi? Two

wings and bracing wires at that! I have yet to see a flight of this duration achieved with a low aspect ratio monoplane Peanut at Cardington, with a ceiling height five times greater. Not content with winning, this brilliant youngster came second with a *KI 84* with a 50 sec flight. He also entered an *Avia BH5* and an *ME 109*.

Mr Koutny himself won the senior event with a *Nieuport* monoplane, 7g weight – best flight 55 secs. He also flew a *P51* and an *F4U* in the event. Both these models it is claimed turned in flights around the minute mark.

How nice it is to see interesting difficult subjects being tackled for Peanut competitions. What a contrast to the unending stream of low aspect ratio high wing machines that dominate the UK and US Peanut scene of late.

Let us hope for a more varied crop of models at the SMAE Indoor Scale Nationals this year. These will be held at Cardington on 2nd May. Not 9th May as advertised elsewhere. Three contests will be featured: Peanut, Open Rubber Scale and CO<sub>2</sub>/Electric Scale. Entry to the shed restricted to SMAE members only.

Preparations for the Scale World Championships are well in hand by the SMFF in Sweden. Accommodation, for spectators and competitors alike, will be in the headquarters hotel in the town of Borlange. The flying will take place at the nearby Dala airport. In addition to the R/C and C/L World Champs Classes there will be a Stand Off R/C Scale and R/C Helicopter competition. In all, a week of competitions from 18th–25th June. Anyone interested in going as a spectator should write to the SMFF Sandbergsgatan 5, Box 10022, 600 10 Norrköping, Sweden. The cost of the week's accommodation is 850 Kr.



Comment,  
information and  
details on all  
control line  
matters

#### COMBAT 1976 – ANYTHING NEW?

Chatting to Dave Wood and Mick Tiernan about motors turned me on to thinking what we may see new in Combat this year. Model-wise I don't expect to see much except more and more people following the lead given by Richard Wilkens' *Blasta* construction in the use of expanded polystyrene foam. Compared with developments in the USA concerning the use of EPS foam wings in combat models typified by Phil Cartier's *Bumble Bee* and Gary James' *Shrika*, Wilky's *Blasta* is a sort of half-way house. Some people here are bound to follow Phil and Gary in using all-foam wings because this must be the fastest *and* cheapest way of making wings.

My own view of how the all-foam wing model will look, is based on the use of a strong built-up and re-usable centre-section, plus full-span full depth spar to which the motor, tank, controls and tail are all attached. The model is completed by adding cut-foam sections which are considered disposable and therefore finished either with a couple of coats of Polyurethane paint or a covering of plastic film applied using a heat-gun. To get the weight acceptable (remembering that the volume of a modern combat model wing is about 280cu.ins.), I suspect that hollow foam sections will have to be used. It has taken the Americans a couple of seasons to sort out the all-foam winged model to be fully competitive, so it may take a similar time here.

The main area of continual change in 1976 must be in the motors used. I am sure that the swing to glow motors will accelerate, with the majority of contests won using them. This may well be helped by the lack of availability of suitable diesels if we accept that, despite excellent handling and reliability the Oliver Tiger just is not powerful enough any more (a fact seemingly proven by the World Champs Trials in late 1975 where none of the top finishers used Oliver's). Only the Rossi FI 'Combat' diesel seems sufficiently powerful now, although some people do seem to be able to get dieselised ST G15 FI's and MVVS D7's quick enough (but not reliable enough?) Furthermore, the MVVS D7 may well be phased out this year in

favour of the new rear induction Schnuerle ported rear exhaust MVVS scheduled for this year.

The glow motor scene is much healthier. Besides the venerable and cheap ST G20/15 G which John Hammersley and Richard Wilkens proved during 1975 to be ideal for Combat, there is still the even cheaper MVVS G7. However, both may be discontinued this year – the last two hundred ST G20/15 G's having arrived at World Engines during March. These are old motors in design terms, as is the ST G15 FI which is according to World Engines due to have internal changes introduced very soon now to change its porting system to a side exhaust Schnuerle arrangement. It will be good to see such a famous motor continue in such a modern form; let us hope that whilst revising the porting, Super Tigre also beef up the shaft and con-rod a bit and also change the head design so that it will take to nitro gulping a bit more readily. There are now three rear-exhaust, front induction, Schnuerle ported glows: the Cox, Rossi and Taipan 15's. Shock I Shock I a Cox 15? Yes, 200 prototypes have been circulating for some months, mostly in the USA where it has been proved more than equal to the Rossi, and now on 1st April in the USA sales started at a reasonable price, of \$55.95. Both the Rossi and the Taipan need new heads to work on the typical 10% nitro combat brew, and my Taipan needed a new needle valve to act consistently too. I hope the Cox is more suitable 'out of the box' than either of its competitors are at the moment, for my experience indicates that both the Taipan and the Rossi are not perfect for combat (maybe the 'Maple Models' Rossi glow Combat Special is the exception). One side issue about the Cox is that it has the biggest diameter of any 2.5cc motor made; at 11.0mm dia. it is significantly bigger than either the Rossi or Taipan.

That is it for motors really, if you want honking power then the motors are or will be available soon to make last year's stuff seem pathetic. If you want a cheap and reliable glow that will see off most diesels then get a ST G20/15 G or MVVS G7 whilst they remain available. And if you want a nice, friendly, easy starting,



Go Go Go! Heading picture shows typical American 'Fast Combat' action. At left is the reason we don't fly combat over tarmac (part I).



Right: Why we don't fly combat over tarmac (part II). This was the sad, expensive and inevitable result of flying combat at the Buckeye Regionals, Arizona, USA.



At left is American Charlie Johnson with K & B 40 F powered 'Nemesis II' AMA 'Fast Combat' plane. Seems he likes another Charlie's glow plug according to the legend inscribed on the trailing edge!



Right: Yes it does exist - a real live Cox 15 about to see 'em all off in Goodyear at the Buckeye Regionals.

easy handling, super consistent diesel - NO WAY unless you like being hammered.

Of course the big change this year is in the rules. These are detailed below and to my eyes seem sensible, except for the fact that they will increase organisers' difficulties and the amount of argument about bias, 'fiddling' etc, I can just see all those circles being marked out on a typical wet, grassy combat site - another bunch of rule changes that will get ignored at all but the top contests.

**FAI TEAM RACE - RULE CHANGES**

At the 1976 CIAM meeting, four rule changes were approved for class F2C - FAI Team Racing - to become effective on 1st January 1976. As in all previous cases of reporting rule changes passed by the CIAM, this Column has received the information not from the SMAE but from the USA. This time (again) the AMA *Competition Newsletter* contained in the March 1976 edition of the AMA's *Model Aviation*. (As a side point *Model Aviation* seems to be becoming the American magazine for control-line enthusiasts, the March edition containing excellent columns by noted American competitors Wynn Paul, Phil Bussell and Charlie Johnson on Stunt, Speed and Combat respectively and a highly informative article on glow fuels by John Kilsdonk - all very good indeed and definitely worth reading). I hate bitching each time we get rule changes passed for the FAI events that the necessary information has had to come from foreign sources; maybe the SMAE doesn't want anyone to know about them!

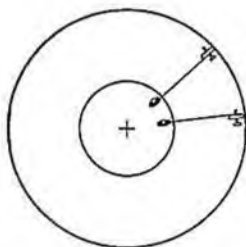
Back to the FAI rule changes. There are just four. The first (new rule 6.d) clarifies the pitting station selection order for the final:

*For the final, the choice of the starting points should be according to the results in the semi-finals. The team with the fastest time chooses next. In case of a tie, the team with the second fastest times in the semi-finals will decide the order of choice.*

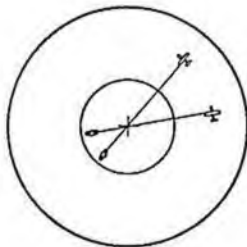
Clear enough up to the last sentence *but* would someone explain to me just what the last sentence means PLEASE!

The second (added to rule 7.g) is supposed to clarify the procedure for doing a legal overtake:

*The pilot should find himself on an imaginary line between the centre-spot and the model (see sketch below).*



RIGHT



WRONG

Hmm! We have to walk sideways or have the lines at 90s to the direction of walking. In other words become crabs or whip like mad. I know which one I am going to do, *but* did the CIAM intend this? I am glad I am not on the UK team for the 1976 World Championships for this new rule is going to cause terrible trouble. Is this rule a device to collect a world record sum in protest fees at the World Championships?

The third change adds another warning offence and is added to rule 14.b. A warning is now given as before plus: *or continuously keeps the centre spot between himself and the model.*

The final change alters an offence under 7.k and 1 in the rules from a warning to disqualification. These rules cover moving from one pitting segment to another, why an offence now has to result in disqualification, I do not know!

I have had occasion to criticise FAI rule changes made by the CIAM before; this lot seem just as bad as the rest. Does anyone there actually understand Team Racing. Have any of them flown it?

**IMPORTANT FAI COMBAT RULE CHANGES**

Agreed at the December 1975 CIAM meeting in Paris, and received via MACA (that excellent Combat flyer's organisation centred in the USA) are the following FAI Combat rule changes. The changes are presented in summary form concentrating on the important changes; it is the SMAE's job to inform its members of the details. I trust they will do so, for no less than 16 changes have been made.

**Shew/Pardue with typical inverted motor Californian rat racer. Background shows conditions at Buckeye - perfect for combat!**





A trio of Sig control line semi-scale stunt kits stocked by Henry J. Nicholls & Son Ltd all very reasonably priced at £12.55 each, and all suited to 0.29-0.40cu.in. Both the Super Chipmunk (above) and Zilin Akrobat (above right) feature cleanly die cut cut ply and balsa parts, hardware etc, while the Mustang (right) has foam wing cores and many moulded plastic parts. You must know Henry's address by now, but if not, try 308 Holloway Road London N7 6NP.

#### Scoring of cuts

The string cut rule now reads - 'If a remaining portion of the streamer is cut at the same time with the last portion of the string, the cut and 100 points is allowed.

#### Conduct

The two new rules, firstly one on line tangles - 'After a line tangle, resulting in one or both models landing, when neither competitor can be said to be at fault, the pilot (and mechanics) must clear his lines before he may re-launch his model or launch his reserve model.' Secondly conduct whilst one of the models is on the ground - 'At any time during which only one model is airborne, that model must maintain level flight in an anti-clockwise direction.'

#### Flyaways

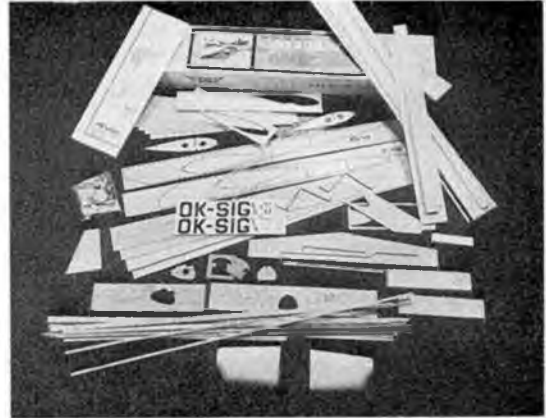
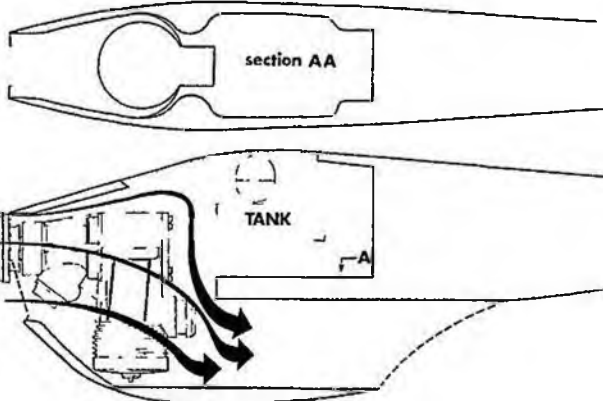
Self explanatory: s this one - 'In the event of a model flyaway in which the airplane and streamer may not be retrievable due to the distance flown, the affected pilot/pit crew may elect to use a new full-length streamer instead. The new streamer shall be immediately available from the circle marshal or judge.'

#### Safety

A lot of rule re-writing has been done to eliminate, as far as possible, the possibility of a pit-crew strike whilst one model is being pitted during the bout. Essentially the combat site now consists of 3 concentric circles of radii 3m, 6m and 22m. Whilst flying, pilots must remain inside the 3m circle and can only go to the 6m circle to have the model serviced or pick up the handle of the spare model; leaving the 3m circle for any other reason during a bout means a 50 point penalty. The 22m circle is the pitting circle to which models must be withdrawn by pit-crews for servicing. Failure to withdraw to the 22m circle for pitting means a 50 point penalty. Finally 'combat may begin after a re-start by a signal from the circle marshal. This signal shall be given as soon as the circle marshal is satisfied that there is at least 1/4 lap separation between the two models.'

Quite a package. Serious combat flyers are strongly recommended to get hold of the full list of rule changes and learn them, especially those safety pitting rules - a bit of pitcrew discipline to be learnt. It

Figure 1 - Team race cooling system



strikes me that these rule changes are very much in line with those sought by MACA. Although they look to me good constructive rules mostly in line with what most British Combat flyers would have wanted, just how many British Combat flyers were consulted prior to the 1975 CIAM meeting to determine our attitude to these changes. One? None? Isn't it about time a British equivalent of MACA was organised to co-operate, and act as a pressure group, with the SMAE in the same way as MACA does so well with the AMA?

#### LARSSON/RYLIN COOLING SYSTEM FOR TEAM RACERS

One of the more significant occurrences during 1975 in FAI team racing was the performance of the top Swedish team Larsson/Rylin at the European Championships. Not only did they have a very simple model (plans to be published soon) and a not far from standard motor, but, until their disaster in the final, they looked very likely to win. Obviously highly competitive piloting and pitwork plus a very carefully assembled motor from selected parts was to a large degree responsible for this performance. However it is my belief that their unique cooling system also helped to give extraordinary speed and range. I regard their cooling system invention to be the most significant model improvement made by anyone during 1975.

The problem with the conventional cooling arrangements employed by the vast majority of team racers is that they do not give even cooling of the motor. With an air inlet directly in front of the motor fins, the cold air is directed smack onto the front of the cylinder barrel. As the air moves round the fins to the back of the cylinder barrel, this air warms up so its cooling capability reduces. The actual reduction is almost impossible to calculate or measure, but experience has shown that the effects are most significant. With a rear exhaust motor, where the presence of the exhaust port at the rear of the cylinder barrel makes this the hottest part of the motor anyway, this unevenness of cooling becomes serious, causing differential thermal expansion of the fin barrel as the motor warms up. Overheating the motor gives a physical bend to the cylinder, and a motor seize is the inevitable result. I learnt this when





trying to make an MVVS work years ago for team racing and many Rossi diesel operators now know the symptoms well – compression/needle very difficult to set; just as the motor is really 'on', it cooks solid. Thus the Samoilenko front exhaust motor (put the heat where the cooling is), but the Larsson/Rylin solution of putting the cooling where the heat is is a much simpler solution and, as my own bitter experience has shown, a much better solution. Our own front exhaust Rossi was a pain in engineering terms and a great disappointment performance wise. A recent experiment with a Rossi FI in a Larsson/Rylin 'hack' model has proved an enormous eye opener. I hope Figure 1 shows how the Larsson/Rylin system concentrates the cooling air where it is needed i.e. at the back of the motor, firstly by depriving the front of the head of air and secondly by squirting cool air from over the case down onto the exhaust duct on the motor.

Some illustrious people have tried the Larsson/Rylin system and have found it works. Reports indicate that when the Metkemeijer's had a try, it worked so well that, when the compression stuck on their Rossi FI, the motor got so hot that the liner turned blue! But the motor DID NOT SEIZE. There can be no better illustration of the evenness of cooling given.

**NOT 1000 MILES FROM HERE, RACING IS ALIVE AND WELL**

A couple of months ago whilst reviewing the 'Horty Charts' for 1975, I commented that from the contest results tabulated by John Horton, control-line racing appeared to be dead in Scotland, Ireland and Wales. NOT SO say a couple of letters I received.

Alan Pegg of Hamilton MFC in Scotland informs me that the Scottish Aeromodellers Association (a body affiliated to the SMAE) annually runs 5 racing meetings and 6 Combat do's. In 1975 Hamilton MFC ran off with all of the SAA Control-line pots and is a strong club with the use of no less than 2 tarmac and 2 grass flying sites. Lots of Rossi's to be seen in Goodyear too!

Bertie Wright of Belfast MFC in Northern Ireland reports that 1975 was a poor year for control-line racing in Ireland with few new models appearing and some scheduled contests not happening due to lack of interest. However, the first of the Rossi's have appeared and interest is increasing again.

Sorry I boomed lads! Let's hear a lot more from you this year, and I hope you can get to some of our English contests.

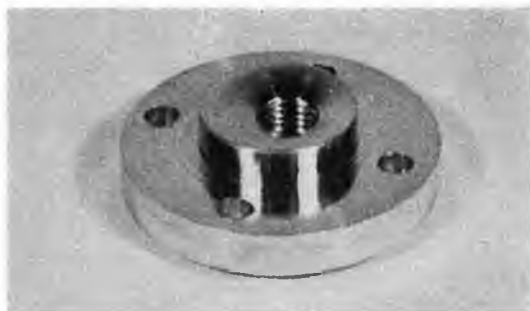
**AVAILABILITY OF SUPER TIGRE MOTORS AND SPARES**

I have had my ears more than a bit bent by Mick Wilshere of World Engines concerning the comment I made about the availability of Super Tigre motors and spares in the February edition of this Column. From the figures supplied by World Engines, it would appear that my comment was misplaced, if not totally mistaken. At their last stock-taking, no less than 4,000 separate spare parts were stocked by World Engines and their sales records indicate that, to their knowledge, no modeller should be short of essential spare parts and that all firm orders made for engines have been met. The only long standing back orders left on file are for G20/15 glows and this situation has been rectified following the arrival of 200 such motors.

World Engines would like to point out that the following engines are now discontinued:

G20/15 glow; G15 FI Goodyear; G15 RV glow; G21/29 RV ABC; G21/29 FI.

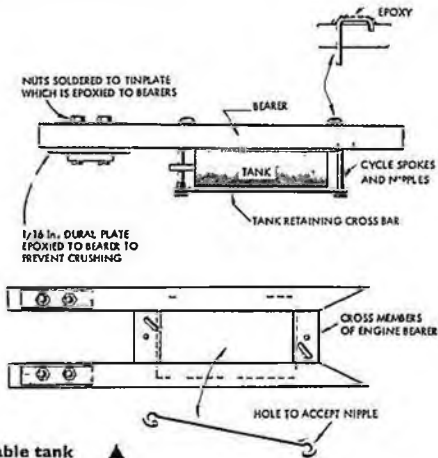
This means that once the present batch of 200 G20/15 glows mentioned above and an expected last batch of 50 G15 FI Goodyears have been sold, there will be no more.



More useful goodies: at left are self-explanatory items from Irvine Engines. The leadout wire is very strong yet flexible, while the line connectors are guaranteed not to separate in use – good safety items. Above is latest speciality item from Maple Models – a head for Super Tigre X15 converted to take conventional glow plugs.

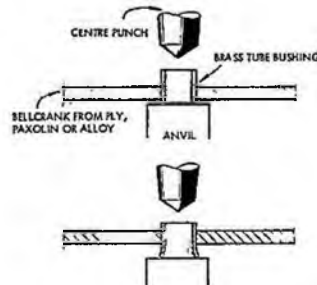
Now for the good news. Firstly a new side exhaust Schnuerle 15, the X15 FI, will become available towards the end of this year to replace both the G20/15 glow and the G15 FI Goodyear. Secondly World Engines have, and will continue to make-up where possible, engines from spares where no suitable design is available from the factory – an example quoted by Mick is a G21/29 FI ABC for B Team Race. Finally, where only the R/C version of a motor is available from stock, World Engines are prepared to continue their practice of removing the R/C carb and selling the motor with a normal venturi and needle at the standard motor price.

With these clarifications made by World Engines, no one should have had in the past, nor should have in the future, any problems with the supply of Super Tigre spares or motors for reasons over which World Engines have any control. Obviously anyone with a problem should contact World Engines directly and expect satisfaction.

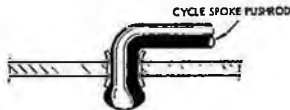


Removable tank for stunt models

**GOOD IDEAS DEPT.**



Bushing a bellcrank



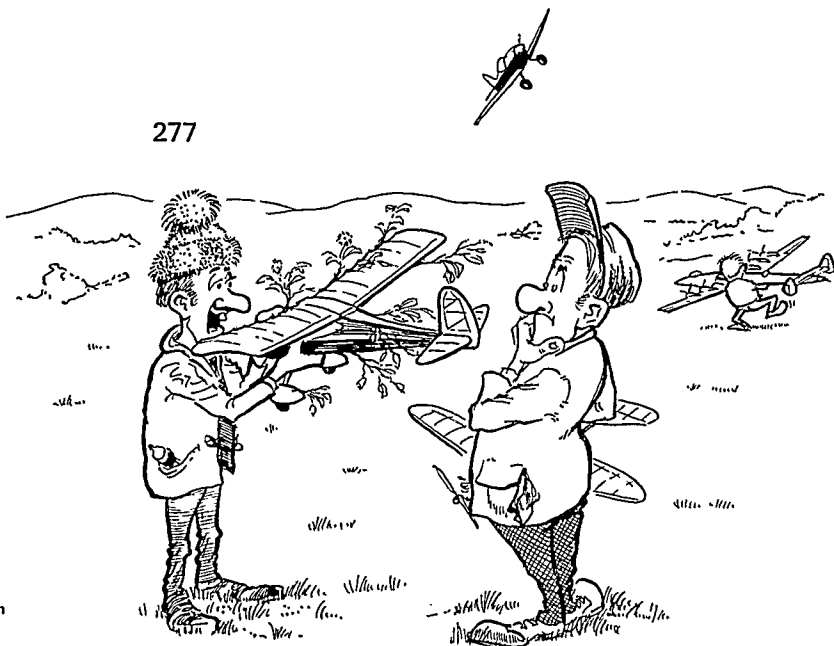
CYCLE SPOKE PUSHROD

# topical twists

by 'Pylonius'

illustrated  
by Sherry

"I think they're in too much of a hurry with these balsa substitutes".



## Sell Out

I GAVE A warning the other month on the threat to our precious balsawood. I based my foreknowledge of doom not on any inside information, rumblings from the lumber regions, or Equador to door canvassing, but on the good old pessimistic belief that nothing good ever lasts; certainly not anything wholesome and natural in our ersatz, plasticised age. Already the dreary substitutes, grey or garish, are taking up threatening attitudes, and the difficulties of supply being gloomily enumerated. But why it should be more difficult to transport the pap from swamp to warehouse in these sophisticated times than it was in the days when all you had was a native and a tow rope, only the befuddling bureaucrat knows. Anyway, apart from the fact that the natives are grubbing up the balsa plantations to grow country style corn and jungle fresh peanuts you may be sure there are more and more people sitting in empty offices thinking up more and more miserable and uninspiring uses for balsa wood so that a shortage to the model trade might be officially declared.

I am troubled by a thought, though. Am I too advanced in years and too fixed in my model making ways to come to terms with the wonder substitutes? What of Dhupi, with which, we are told, the teeming millions of India are already desperately grappling, or mysterious, yet to be produced Alisa? Ominously, this latter substitute is expected to be to balsa as butter is to marge. An unfortunate analogy, I would say, considering the sort of stuff we see in the model shop racks these days.

## Girl Talk

It is a sign of these more permissive times that the customary advert in the model press for a pen friend has been replaced by agency offers of introductions to the opposite sex. It is also symptomatic of the wider interests of the liberated modeller of today that he is actually aware that there is an opposite sex. It is this sort of knowledge, born of our more open society, that I think is so detrimental to the integrity of the hobby today. What hope is there of the young enthusiast becoming a truly committed aeromodeller when he is got at in this way at such a tender age?

By contrast the old time model flyer lived in happy ignorance of the fate of lesser mortals. If he were aware of anything so unlikely as an opposite sex he was apt to view it as a hostile alien force, menacing his life style with marriage, courtship and other diabolical forms of domestication. We shall not see his innocent like again. Nowadays everyone is so worldly and sophisticated, regarding their

hobby not as the be all and end all of existence but as a take it or leave it pastime. Gone for ever is that old fanaticism that set the modeller apart from his fellows (and girls). Going to that near empty flying field you learn that old so-and-so is painting his house, young what's-it has taken his girl to Southend and the rest have gone their opposite sex motivated ways. It's a sad world.

But is it so sad? I was heartened to read of the sort of commitment required for top Indoor honours. It seems to involve a complete domestic take-over in ways threatening and detrimental to the home beautiful. It is amazing how the resourceful dedicatee can take a generally useless thing like a semi-detached and turn it into a model making factory with so little disturbance – just the occasional bout of hysterics from the little woman. Then we are encouraged by those who carry on the good fight against telly style domestication in converted loft and garden shed, in spite of severe attacks of hypothermia and balsadustosis. The flag flutters feebly, but it is still flying.

## Bubble Reputation

Watching those thermal indicating soap bubbles doing their aerodynamic, or rather meteorological, bit over the flying field, it occurred to me that, in these days of advanced tactical flying, the competing model is of less importance than its well rounded, fully inflated pilot of a bubble. Why not then discard the models completely and just leave it to the bubble machines to battle it out? It would save all that tiresome model building, but, of course, you would have the bubble machine to construct, although these could be produced commercially by – well, Sud Aviation.

And who do you think would be the first to put up seven three minute bubble stream maxes? 0 0 0 0 0. Winnall?

## Equal Pay

In happier days when M/s stood for motor strip and not for the new equalised and more than better half woman, the ladies who joined the movement did so not out of any aeromodelling zeal but in a defeatist spirit of 'If you can't beat 'em . . .' They were content just to cheer from the sidelines, and to take part in the Ladies Competition after being suitably instructed, between giggles, on which end of the model to point forwards, but now the M/s's are militantly demanding equal status, with the Ladies' sign altered to Laddies and all half way concessions removed.

Still, a full male sized, 1976 club fee should send the M/s's scuttling back to the knitting circle.

# THE FREE FLIGHT SCENE

## This month : Martin Dilly

Our columnist-of-the-month with his version of Krejciriks Vega A/2 at Epsom Downs. Original placed second at 1973 World Championships.

IN CASE YOU are this month's new reader, this may be a good time to mention what the *Free Flight Scene* columns are all about.

Competition free-flight is a challenge; if you have got the impression that F/F contestants are a cut-throat mob of fanatics who stop at nothing to win, and have skills far beyond the capabilities of the average *AeroModeller* reader, forget it — you cannot believe everything you read! Most people bitten by the free-flight bug will tell you that it is one of the most satisfying, interesting, challenging and just plain enjoyable activities either inside or outside the sport of model flying. And, incidentally, we are all 'fly-for-fun' people; if free-flight was anything else but fun we would soon give it up. The fact that you do not need a small private income to be competitive may also be an added attraction to what is surely the purest form of model flying — free-flight.

*Free-Flight Scene* is a two-way operation; we need your input of ideas, systems, techniques and problems as well as our own. This month Leicester A/2 flyer Ian Fairgrieve provides that input. concerning the perennial problem of introducing young people to free-flight. Ian works with the Scout movement and produced some basic prefabricated hand-launched glider kits for use at a summer camp. The cost worked out at half the wholesale price of the cheapest kit. Ian had left the boys to do the glueing and assembly themselves, but had profiled the wings and cut out all the parts, so the true costing of his time would have put the price up considerably.

As Ian tells it: "In June, at the district camp, 130 boys arrived. This mass was divided into mixed patrols of 11 and I was allocated half hour sessions throughout the day, with two models produced every session. During the hectic day 'we' produced 32 models. When I left at 7.30 pm the field behind the camp site was full of small boys and a swarm of models, and I hope that the interest generated may result in bigger things this winter . . . The actual Scout badge has other modelling categories such as boats and slot cars which do not concern me. The aeromodelling section requires the construction of a model aeroplane (kits allowed) with a minimum flight performance of: Hand Launched Gliders — 25 secs; Towline (50 metre) — 45 secs; Rubber — 30 secs; Power (15 sec run) — 45 secs; and control-line — 3 taps level flight, climb, dive and land. A general knowledge of the basic principles of flight are also required.

So I am hopeful that something positive will begin with the young Scouts in this area, perhaps encouraging the best flyers to enter the Junior Nationals."

The plans of Ian's HLG, *Lincoln Imp*, appear here. I would certainly suggest that anyone else thinking about a Junior programme should standardise on it, instead of wasting their time trying to re-invent the wheel by developing a similar design of their own.

### SITES FOR FREE-FLIGHT

All free-flighters are seriously concerned at the dwindling number of suitable sites for flying their aircraft. To be strictly accurate, the number of sites is actually remaining roughly constant, but in the present atmosphere of complaints and threats free-flight stands the grave risk of being severely restricted or swept away in the wake of the appalling image that some engine-powered models and some of their flyers are creating. To the public we all fly 'model aircraft', and to many of them today's 'model aircraft' appear noisy and dangerous.

Perhaps understandably, local authorities left to themselves do not appreciate that there are different types of model, largely because free-flight aircraft give so little cause for complaint that they are not even known to exist by many. Flyers of control-line and powered R/C aircraft are lucky. The space they need for flying is (relatively)

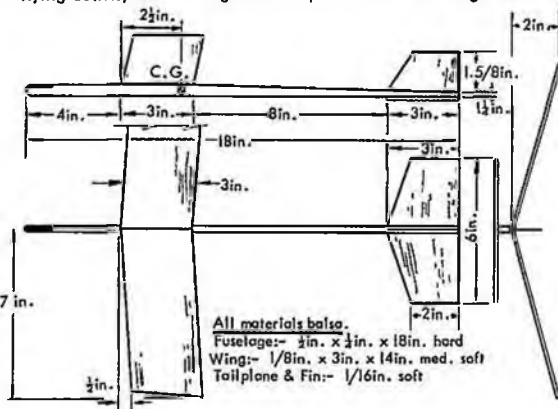


small; many urban parks and playing fields are adequate and some R/C clubs rent a farmer's field clear of residential areas. But in free-flight large areas are essential, not necessarily with a smooth surface, as users of Chobham Common, Sutton Park or Rozendaalse Heide will agree, but nevertheless we must have half a mile or so clear downwind even for quite limited trimming. Free-flight aircraft, both powered and unpowered, have been flown on areas like these for 30 years or more, with few objections from the non-flying public.

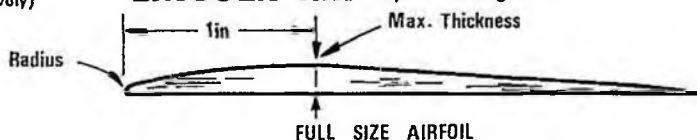
Even with the nonmuffled engines that must be used in F/F (either because of the run timing problem or because exhaust extensions are prohibited internationally for FAI classes) complaints of noise are virtually unknown. We in free-flight are lucky here because we employ the best means of all to limit noise complaints — very short engine runs. Fast rates of climb and maximum engine runs of 7 or 10 seconds, with most motors being under 2½cc means that by the time most people have realised that there is an engine running at all, the perceived noise level on the ground has decreased sharply and within seconds stopped altogether.

So, as I mentioned, we in free-flight are lucky from the noise viewpoint. Where the future of F/F is at risk is at the larger, traditionally F/F sites. Flyers of powered aircraft, many of them inexperienced and professing disinterest in any sort of competitive activity that could quickly improve their flying skills, are using these sites more and more.

What is the solution? For a start, make sure your local SMAE Area committee knows all the sites where F/F is feasible. Ensure that all local Borough Councils are aware that there are three different types of model aircraft (C/L, R/C and F/F) and that each has a very different environmental effect. Quote facts: a few typical speeds and weights. The size of a model (or bullet or toy balloon) is irrelevant to its possible danger: only kinetic energy affects this, and that is a product of the object's weight multiplied by the square of its velocity. Do not leave the negotiating to the other chap. Sometimes he may not be aware of the facts of free-flight; at other times it may even be in his interest to prevent objective facts from being revealed, in case they show up his own particular model flying activity in a bad light in comparison with free-flight. Instead



### LINCOLN IMP by Ian Fairgrieve





% CHORD	0	1.25	2.5	5	10	20	30	40	50	60	70	80	90	100
UPPER	1.2	2.5	3.2	4.2	5.6	7.5	8.5	9.0	9.0	8.7	8.1	6.9	4.8	0.6
LOWER	1.2	0.6	0.2	0	0	0	0	0.8	3.1	4.4	4.8	3.7	2.6	0

Figure 1 - Ritz 6-60 98

of taking a defensive position, ask for more facilities for F/F, stressing the fact that the aircraft we fly spend either all their flying time or about 95 per cent of it gliding slowly and silently.

To those of you who, like me, have no wish to get involved in factional politics I make no apology; remember we have nothing to lose but our flying fields.

#### RAZOR BLADES

At last! A modelling use for stainless steel razor blades. You have probably discovered that they are next to useless for actually cutting balsa because their edges curl over under light pressure, and their extreme flexibility makes accurate cutting impossible. However they can be easily cut with sharp scissors and, once the anti-friction coating has been cleaned off with fine wet-or-dry paper, can be epoxied or cyano-acrylated in places subject to local wear. I have used this method under tailplanes where the incidence adjusting screw bears, and on fins to prevent the turn adjuster digging into the light balsa. The thin material can be bent into quite tight right angles, can be drilled using a hardwood backing block and a sharp drill, and can even be used as a light leaf spring, for instance on rowhooks as an anti-drop-off tow ring retainer.

But, as a heartfelt *cri de coeur*, does anyone know of a source of carbon steel double edged razor blades? Somewhere out in the wilds there must be a chemist or a barbershop with a cobwebby drawer full of blades that nobody but a modeller wants. All replies c/o *Modeler* will be treated in strictest confidence if so desired...

#### SCATTER

One of the best International free-flight journals is *SCATTER*, edited by Bill Harthill and published in California by the Southern California Aero Team (SCAT). Devoted entirely to FAI free-flight, two recent issues have contained long features by Bill Gieskieng on variable camber F1C aircraft, with extensive details of flap actuators and stab pull down systems. A back issue service is planned for the near future, so if you need some flapper ideas *SCATTER* can probably help; subscription rate is \$5 for a year's supply of six issues, and the address to write to is: Craig Cusick, 20134 Gresham Street, Canoga Park, CA.91306, USA.

#### RITZ 6-60-98 AIRFOIL

This stabiliser section is one in which several people have shown an interest. I have used it on A/2s and, while the thin rear portion does need careful construction, models using it do seem to have a useful stall recovery, tending to bounce upwards in flat-topped steps when they hit turbulence. In Gerry Ritz's original explanation when the ordinates appeared in *Model Airplane News* (in the dear, dead days before 'Expanded R/C Coverage') some fifteen years ago, he suggested that in steady, level flight conditions the airflow on the lower surface of the tailplane is 'set' by the time it reaches

the 30% chord point; however, if a nose-up pitch occurs, the undercambered rear portion becomes more effective, and applies a restoring couple to the aircraft. As I mentioned earlier, you don't *have* to believe everything you read in magazines, but here the ordinates are shown in *Figure 1* if you want to try the airfoil.

#### RAY PAVELEY'S WAKEFIELD

The Wakefield drawings we publish this month originally appeared in *East Anglian News*, a very professionally produced newsletter that deals with all branches of the sport as well as free-flight.

A neat feature of Ray's aircraft is the combined Montreal stop and hold pin, fixed permanently in the propeller hub itself, as is the drive pin which transmits the motor torque to the prop. The hub, of dural, is free to slide fore and after on a length of brass tube fitted over the prop shaft, which ends in a right angle drive arm at its forward end, to bear against the drive pin on the hub. A coil spring over the brass tube forces the whole hub backwards as the torque of the motor declines, until the stop pin locks into the hole drilled in the face of the machined alloy nose block. The thrust washer at the rear of the brass tube takes the full tension of the wound motor; I would suggest silver soldering it to the brass tube, since any joint failure here could be disastrous.

#### SAPER 13

Since I reviewed the Czechoslovak kit of 1971 World Champion Pavel Dvořák's Saper 13 A/2 in the February Free Flight Scene, Bert Kroon has written from the Netherlands to say he can supply the kits at 29 guilders each, plus 4.25 post and packing. At a current rate of about 5.3 guilders to the pound sterling that makes the Saper a very good buy for anyone wanting a contest-proven A/2 to fly. Bert's address is: Keurvorstlaan 14, Arnhem, The Netherlands.

#### CROOKHAM GALA Bassingbourn, 22nd February

Entries at the Crookham Gala suffered somewhat for lack of advance publicity, due partly to recent publication delays with *Free Flight News*, but with a total of 82 entries it was still a reasonably well-attended contest.

With a southerly wind the drift was across the airfield rather than along it; lack of convenient paved areas made bicycle retrieving all but impossible, and led to some heavy panting as searchers headed downwind through the grass and weeds. Luckily the drift varied from moderate to light, and circle towing was much in evidence among the glider flyers. Lift was present but not easily found; only Pete Stewart from the host club, Crookham, managed three maxes in Open Glider, hard pressed by Biggles junior Jonathan Ashby, who missed forcing a fly-off by only three seconds, flying a modified *Rolling Stone* with a thinned wing airfoil.

Second place in Open Rubber at Crookham Gala went to Anglia's Roy Paveley, here winding for the fly-off with clubmate Bob Wells holding.



Junior A/2 flyer Jonathan Ashby missed a full house by only three seconds and took second place in Crookham Open Glider event.



Several flyers took the opportunity of trimming out new models in competition conditions and a number of new tapered-wing A/2s were in action. Steve Marriott's sported an immaculate red and white tissue trim job, effectively resulting in a double covered wing, first covered overall with light white Modelspan and then having large areas of light red laid over it. Using the Ekhtenko airfoil, the six foot span wing has an 8in. chord 28in. span centre section, long tapered outer panels, undercambered tailplane airfoil and an offset 'twang hook'.

Mike Woodhouse was also flying a tapered wing model, radically different from his *Wichita* series; gone are the curved tips, replaced now by long wingtip panels with both leading edge and trailing edges tapered, and using the Benedek 8356/b section. With one of Elton Drew's Maxaid circle towhooks installed, Whiffler is covered with a new heavyweight Japanese tissue that Mike is importing in several colours and two weights.

In Open Power there was a four way fly-off, St Albans' Pete Buskell squeezing into third place with his .15 powered model, between the other three all flying .40s. Russell Peers took first place, only 12 seconds ahead of Pete Harris's Max .40R model. Ray Monks spent much of the 15 minute fly-off round trying to cure a fuel pressurisation problem, which finally beat him by cutting his K & B .40R at 4½ seconds, for a 1:44 total, the v.i.t. finally saving the model from its attempts to glide on the power settings at about a hundred feet altitude.

Top two places in Combined FAI were close, Roy Collins flying his F1C model to max out and take the cup from Pete Stewart, who decided that one Crookham trophy was enough in a day, and dropped four seconds in the five flights, flying an A/2.

**Open Rubber (12 flew):** 1. R. Elliott (Croydon) M+5:24; 2. R. Pavely (Anglia) M+4:22; 3. C. Batty (Bristol & West) M+2:55: **Open Glider (34 flew):** 1. P. Stewart (Crookham) M; 2. J. Ashby (Jnr) (Biggles) 8:57; 3. J. Cooper (Biggles). **Open Power (15 flew):** 1. R. Peers (Falcons) M+4:43; 2. P. Harris (Birmingham)

M+4:31; 3. P. Buskell (St Albans) M+3:32. **Combined FAI (21 flew):** 1. R. Collins (Anglia) 15:00; 2. P. Stewart (Crookham) 14:56; 3. M. Gregorie (St Albans) 13:49.

**SMAE MINI CONTESTS Driffield 15th February 1976**

Report by John O'Donnell

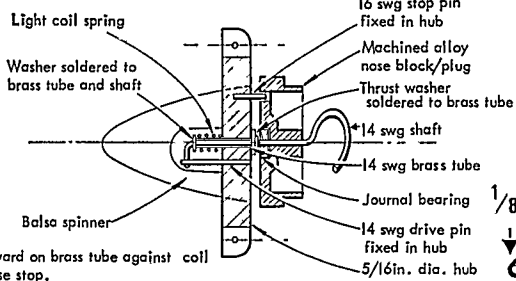
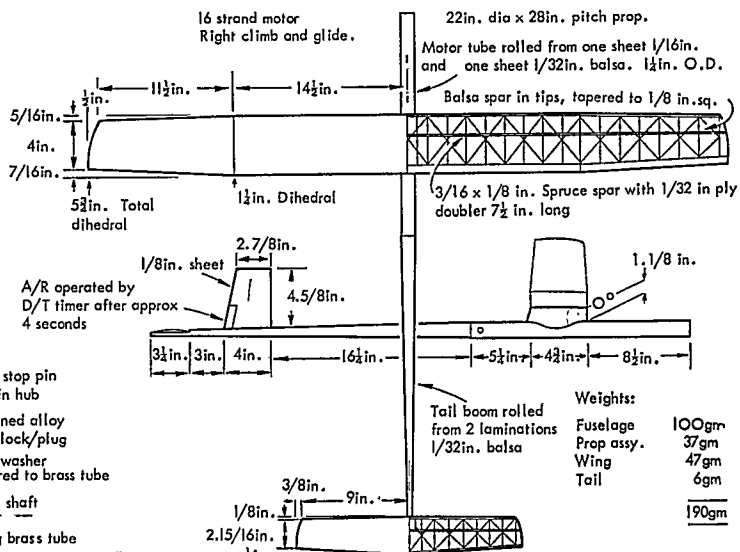
The 1976 SMAE contest programme got off to an inauspicious start with its centralised Mini event. Indeed, it would be difficult to list a wider variety of administrative problems than those that beset this meeting.

First the venue was in doubt, being provisionally announced as Elvington and subsequently changed without publicity. Then the contest organisation fell by default onto the Northern Area after the SMAE free-flight sub-committee (still less any actual officers) decided not to attend the meeting. No one officially told the Northern Area to run the contests, never mind how, so they were left to make their own decisions regarding flying times, fees and the like.

Lack of information from the SMAE regarding the issue of contest licences posed special problems. The Northern Area decided to charge everyone at the new 50p rate, and recommended that those who subsequently applied for licences should be allowed a rebate. This scheme failed to cater for the two 'professionals' who had managed to discover the secret procedure and sent off their money for licences prior to the event!

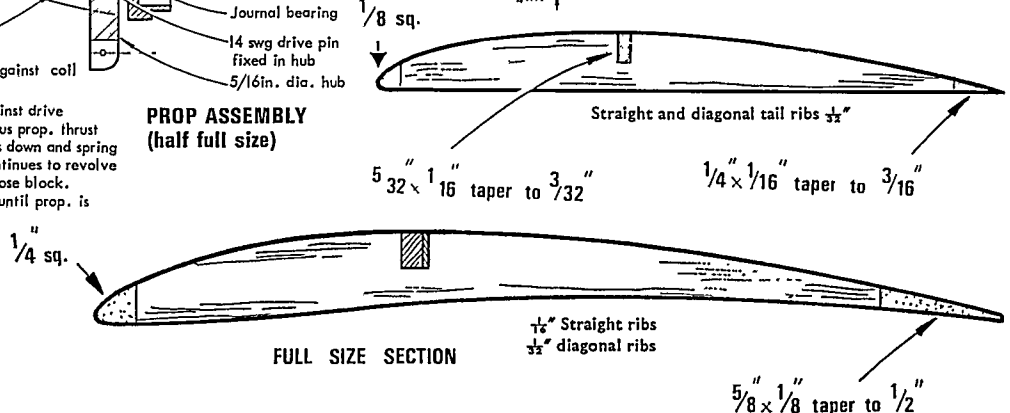
Naturally enough, attendance at Driffield was sparse, consisting mainly of local modellers, plus a handful from the NW and East Midlands. Others may have been deterred by the pessimistic weather forecast and/or the threat of snow on the actual morning. In fact flying conditions were good, even if bitterly cold. There was but a gentle breeze and generally buoyant air for much of the day. The poor visibility and overcast sky were of no consequence with two minute maxes in force.

**1975 WAKEFIELD**  
by Ray Pavely  
scale 1:16



**PROP ASSEMBLY (half full size)**

Hub slides forward on brass tube against coil spring to release stop.  
Wound motor forces shaft end against drive pin. Friction between the two plus prop. thrust holds hub forward until motor runs down and spring pushes hub back. Prop. then continues to revolve until stop pin locates in hole in nose block.  
Note that stop acts as a hold pin until prop. is pulled forward.



**FULL SIZE SECTION**





Above, Henry Tubbs shows off Cd'H flown at Driffield – note un-British shaped fuselage. Above right is John Billam looking happy despite troubles in Cd'H – uses the fashionable tripla fin layout. Anthony Billam (right) had a fly-over in chuck glider – but still made all nine flights – the worst being over 30 seconds! Used the model held in his left hand. Plenty of choice.



Best supported of the events was A/1 glider with 16 entries. Final winner, with the day's only perfect score, was John Godden flying a standard kit *Asteroid* – originally built for a club one model contest. Close behind was his clubmate, Jack Kay, just a few seconds short on two flights. Both flew very early, motivated more by consideration of 'opening hours' than by superior weather predictions. Third was Brian Worthington (now flying for Morley) who 'dropped' one flight with his *Humperdink*.

The  $\frac{1}{2}$ A power contest was also closely fought – thanks to Russell Peers recording one flight of well under a minute when his scaled-down *Woodpecker* spiralled in from the top of its climb. This put Ron Dawson and Keith Proctor within striking distance – but neither managed to oust Russell from the premier position. All used TD 049s and had operating troubles in the cold!

In comparison neither of the other events was a contest. I started off with four quick maxes in Coupe d'Hiver, and it was only a question of whether or not I would need a fifth flight with my delayed prop release model. Roy Hoff did, in fact, make it necessary, but only by a few seconds. Chuck glider was a flyover for 14 year old Anthony Billam, who recorded a very creditable 4:19 total.

Being a SMAE event, there could be no prizegiving, but the meeting ended with the announcement of results. Doubts were expressed regarding the Society's reaction to the paucity of entries – precedent indicates that the contests will be valid, but that the awards will be curtailed. This policy smacks of penny-pinching, since the standard SMAE plaques only cost about a pound each – 'chicken feed' compared with the expenses of competitors in attending! Russell Peers and I logged well over 1,000 miles between us to attend this winter's two Mini events. The scheduling of a National event surely implies some responsibility from the SMAE towards those who attend – but this was hardly evident at Driffield.

**A/1 Glider (16 entries, 5 x 2mins):** 1. J. Godden (Leeds) 10:00; 2. J. Kay (Leeds) 9:46; 3. B. Worthington (Morely) 9:32. **Coupe d'Hiver (4 entries, 5 x 2mins):** 1. J. O'Donnell (Whitefield) 9:38; 2. R. Hoff (Vulcans) 8:09; 3. H. Tubbs (Leeds) 6:51.  **$\frac{1}{2}$ A Power (5 entries, 5 x 2mins):** 1. B. R. Peers (Falcons) 8:48; 2. R. Dawson (York) 8:40; 3. K. Proctor (York) 7:55. **Chuck Glider (1 entry, 5 from 9):** 1. A. J. Billam (Grantham) 4:19.

#### CARTER-PEERS GALA Chetwynd, 29th February 1976

Report by John O'Donnell

Leap year's extra day seemed an ideal opportunity for another model contest – at least to Falcons club members. John Carter and Russell Peers. They decided to underwrite a 'private venture' meeting at Chetwynd, in the expectation that flyers would welcome a warm-up a month before the season really opened.

Publicity in this magazine, guaranteed prizes, and bright sunny weather the day before, all combined to produce a fair turn out – even if precious few liked the 8am start! Since the day itself was bright, if a little breezy, most of those who arrived entered and flew. They soon discovered a surprising amount of drift at altitude, and there was a noticeable fall-out rate when the wind freshened in mid-afternoon.

For much of the day, lift was plentiful and the R/G/P events all needed fly-offs. Rubber had just 8 entries (a reflection on the current quality and availability of Pirelli/Filati, and alternatives?) of whom only Joe Barnes and Russell Peers managed a treble. In the

fly off Russell launched first, only to see his model do a peculiar wingover prior to entangling itself in the lines of one of the new-fangled steerable kites strategically positioned downwind. This left Joe able to take first place with an under-wound nominal flight from his single-blade featherer model. Third prize was taken by John Carter, who stuck together a very mangled wing with cyanoacrylate, only to find the trim was way-out on his last flight.

Power had a 'new' name in first place. Ray Moore of Biggles qualified for his first-ever fly-off, and made no mistake about it. He launched his TD 09 model early into very good air for a 4:24 decider which was sufficient to cause Ray Monks to settle for second place and ensure an easy recovery by an early D/T. His model used outdated FAI wings and a G15 from the same era. Pete Harris did a mediocre fly-off to come third after a very trying day, with one re-entry and two damaged models.

The glider fly off was a 'game of nerves' between Tony Cordes and myself, in that I reckoned he would not try for the limit of visibility with a long D/T. So I let him fly first, only to see him launch into obviously good air. What I found looked even better at first, but the lift soon decayed to become turbulent sink – and my model was on the ground at two minutes exactly. Tony's square-tipped model had also 'fallen-out' prior to D/Ting low down for 2:37. Both Tony and third placed John Hanson successfully utilised the re-entry facility to reach the prize list.

Chuck glider had a large entry of eleven, the same as power, and close high scores. Winner by just two seconds was Stephen Philpott at the cost of losing two *Sweepettes* in lift. Runner-up, Julian Hopper, used D/Ts but still lost one model, despite seeing it down.

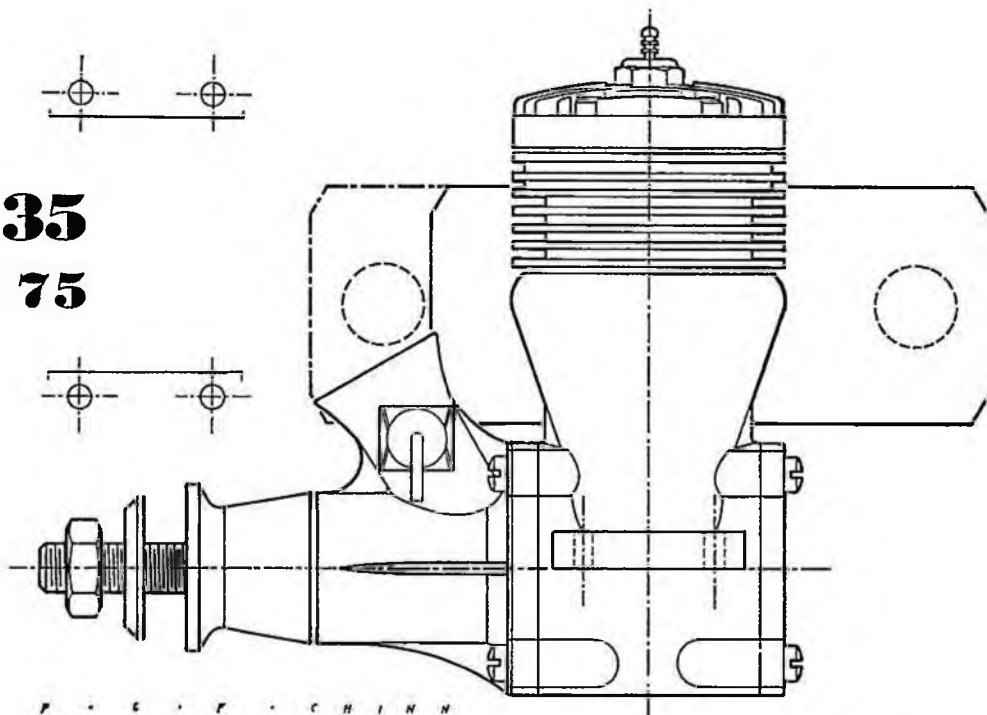
Even with the modest entry fee of 30p, the 'takings' were sufficient to meet the guaranteed figures for the first and second prizes, extend to third, pay out top junior (Alan Godden) and leave a considerable profit to be carried-over to 'next time'.

**Open Glider (37 entries):** 1. A. Cordes (Whitefield) M+2:37; 2. J. O'Donnell (Whitefield) 8:30; 3. J. Hanson (Liverpool) 8:30. **Open Rubber (8 entries):** 1. J. Barnes (Liverpool) M+1:55; 2. B. R. Peers (Falcons) M+0:05; 3. J. E. Carter (Falcons) 8:30. **Open Power (11 entries):** 1. R. Moore (Biggles) M+4:24; 2. R. Monks (Birmingham) M+3:20; 3. P. Harris (Birmingham) M+2:19. **Chuck Glider (11 entries):** 1. S. Philpott (Walsall) 5:35; 2. J. Hopper (Stanstead) 5:33; 3. D. Barber (Layland) 5:21. **Top Junior (8 entries):** 1. A. Godden (Morley) 6:40.

# K & B 35 SERIES 75

## ENGINE TEST

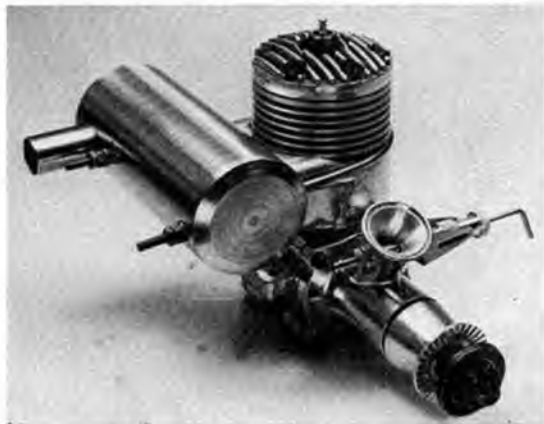
by  
Peter Chinn



THIS NEW .35cu.in. (5.78cc) motor from the American K&B company fills the gap left by the disappearance of a number of earlier K&B35 engines, including the low-priced, plain-bearing, lapped piston 'Stallion 35' model and the earlier 'Torpedo Series 64' ball-bearing unit on which, some ten years ago, the first of the famous 'Torpedo 40' models was based.

The 35 'Series 75' is a plain (bronze-bushed) bearing engine like the Stallion 35 but, apart from this, it bears little resemblance to the Stallion and is, in fact, much more closely related to the more expensive ball-bearing Torpedo 29, 35 and 40 models. It has, for example, a similar main casting with detachable front and rear ends and a drop-in cylinder liner. Like the Torpedo 40 models, it also has a Dykes-ringed aluminium piston, rather than a lapped cast-iron one and the cylinder ports are suitably bridged to deal with the ringed piston, the transfer being divided into four, and the exhaust into five, rectangular ports. Respective port periods, as measured on our test engine, were 126 deg transfer and 140 deg exhaust. Induction is via a crankshaft rotary-valve, the shaft port being rectangular and the bearing aperture circular and timed approximately 33 deg ABDC to 48 deg ATDC.

The K&B 35 'Series 75' is intended for both control-line and free-flight use. As supplied, it is equipped with a small i.d. venturi choke suitable for stunt and general C/L flying. To liberate more power for contest free-flight, or for faster, non-aerobatic C/L models, the venturi insert



### SPECIFICATION

**Type:** Single-cylinder, aircooled, glowplug-ignition two-stroke with crankshaft rotary valve and bronze bushed main bearing.

**Bore:** 0.790in. (20.07mm).

**Stroke:** 0.720in. (18.29mm).

**Swopt Volume:** 0.3529cu.in. (5.783cc).

**Stroke/Bore Ratio:** 0.911:1.

**Measured Nominal Compression Ratio:** 10:1.

**Checked Weights:** 257 grammes – 9.1oz. (less silencer).  
306 grammes – 10.8oz. (with Irvine silencer).

### GENERAL STRUCTURAL DATA

Pressure diecast aluminium alloy *crankcase/cylinder-casing* with drop-in cylinder liner. Pressure diecast aluminium alloy *front housing* with cast-in phosphor-bronze *main bearing* and secured to crankcase with four screws. Counterbalanced *crankshaft* with  $\frac{1}{2}$ in. o.d. journal,  $\frac{3}{16}$ in. (8.7mm) i.d. gas passage,  $\frac{1}{2}$ in. long rectangular valve port and pressed-in  $\frac{1}{16}$ in. o.d. *crankpin*. Front-end of shaft reduced to  $\frac{3}{16}$ in. od. for prop driver. Separate screw-in  $\frac{1}{4}$ -UNF propshaft *stud*. Machined aluminium alloy *piston* with flat crown, straight baffle and single Dykes type low-pressure *piston ring*. Fully floating 0.179in. o.d. tubular *gudgeon-pin* with PTFE pads. Forged aluminium alloy *connecting-rod* with bronze bush at big end and oil slits at both ends. Pressure diecast aluminium alloy finned *cylinder-head* fitted to cylinder with 10 thou. soft copper gasket and secured with six head screws. Pressure diecast aluminium alloy *backplate* secured to crankcase with four screws, one of which may be replaced by pressure nipple for use with pressurised fuel system. Machined aluminium alloy *prop driver* mounted on crankshaft by means of steel split taper collet. Steel *thrust washer* of 5 thou. shim steel installed between prop driver and front housing for pusher-prop or starter end-loading. Machined aluminium 6.7mm i.d. carburettor venturi insert retained by brass spraybar assembly.

### TEST CONDITIONS

**Running time prior to test:** Approx. 1 hour.

**Fuels used:** (i) 25 per cent Newton R castor-oil and 75 per cent methanol (running-in). (ii) 25 per cent Newton R castor oil, 5 per cent nitro-methane, 70 per cent methanol (tests).

**Glowplugs used:** K&B KB-1L long-reach, platinum filament.

**Air temperature:** 9°C (48°F).

**Barometer:** 1009 mb (29.8in. Hg).

**Silencer:** Irvine expansion chamber type. 65sq.mm outlet area.

can be removed and the engine operated on a pressurised fuel system.

The K&B company do not at present make a silencer for the 35, but Irvine Engines, the UK distributors for K&B, offer a machined cylindrical expansion box muffler that satisfies the rules, while absorbing very little power and one of these was used for part of our tests.

### Performance

Our K&B 35 Series 75 was received direct from the manufacturer in the US but was an absolutely stock engine and had not been run-in. We used our standard running-in procedure, beginning with a series of short rich runs on straight methanol and castor oil, with cooling off periods between runs.

We have always found the Dykes-ringed K&B 40 engines extremely easy to hand start. The 35's response to prop flicking was not quite so rapid, although this improved a little as the ring became bedded in. Starting was instantaneous when using an electric starter.

In general, handling qualities were good. The needle-valve was easy to adjust and the engine's response was just right, i.e. positive yet giving the operator plenty of time to make a readjustment before cutting out if run too weak or too rich.

For the purpose of this report, test data was gathered with the K&B in three different stages of tune. First, the engine was tested in stock condition as supplied by the factory, i.e. with the carburettor venturi insert in place and with open exhaust. The curves plotted from the test data obtained in this condition are marked 'A' on the performance graph. A repeat series of tests was then made with the Irvine silencer added and the curves so obtained are marked 'B'. Thirdly, both the venturi insert and silencer were removed to enable the motor to be checked out in a totally unrestricted condition and the quite dramatic results shown in the curves marked 'C'.

The venturi insert fitted to this engine has an i.d. of 0.265in. or approximately 6.7mm which, after allowing for the spraybar, gives an effective choke area of only 10sq.mm. This creates excellent fuel suction which should be of particular value when the engine is used in an aerobatic model.

An effective choke area of 10sq.mm, however, is small even by 'stunt 35' standards. Maximum torque, delivered at approximately 8,500 rpm, was held to 44oz.in. on test and although the peak power output indicated of 0.50 bhp at 14,000 rpm is, under the circumstances, very good, it was clear that a bigger choke area would liberate more power. It was also quite obvious that removal of the venturi insert, which increases the intake bore to 9.6mm and more than trebles the effective choke area to approxi-

mately 35sq.mm, could be expected to raise output very considerably. In fact, as the curves show, maximum bhp was increased by something like 48 per cent, reaching a peak of 0.74 at nearly 16,000 rpm. Maximum torque, up by nearly 25 per cent, was realised at higher rpm than before (i.e. at between 10,000 and 11,000) falling off slightly when the engine was loaded for lower speeds due, probably, to the less complete fuel atomisation provided by the large choke area at low intake velocities.

Supplied with the engine (but not fitted) is a nipple which enables crankcase pressure to be used to pressurise a sealed fuel tank and force feed fuel to the carburettor when the venturi insert is removed and fuel suction is inadequate. This nipple replaces the upper left backplate screw.

The Irvine silencer was found to cause only slight power loss when used with the engine in stock trim. The combination of an expansion chamber opening directly from the engine's short exhaust duct, plus a generous 65sq.mm outlet area, creates very little back pressure and, as a result, maximum torque remained unaltered. A slightly more rapid falling off of torque began to be discernible as load was reduced to raise revolutions above 10,000 rpm, as a result of which the power curve flattened out earlier with a peak of 0.46 bhp at approximately 13,000 rpm.

Typical prop revs on 5% nitro fuel, with the venturi insert and Irvine silencer, included 9,500 rpm on an 11 x 6 Power Prop maple, 10,100 rpm on a 10 x 6 Top Flite maple, 10,600 on a 10 x 6 Taipan nylon-glassfibre, 11,300 on a 9 x 6 Top Flite maple, 12,100 on a 9 x 6 Taipan nylon glassfibre and 12,500 on a 10 x 4 Taipan nylon glassfibre.

At the other end of the scale - i.e. less venturi insert and silencer, but still using 5 per cent nitro fuel, we obtained 10,750 on the 11 x 6 Power Prop maple, 11,250 on an 11 x 5 Power Prop standard, 11,650 on the 10 x 6 Top Flite maple, 12,600 on the 10 x 6 Taipan, 13,400 on the 9 x 6 Top Flite maple, 14,000 on the 9 x 6 Taipan and 14,500 on the 10 x 4 Taipan.

The K&B's general running qualities were good. There was a slight power loss on warming up from cold on the larger prop sizes, but this diminished as loads were reduced and disappeared completely when the engine was allowed to run at speeds approaching the bhp peak. Vibration levels were moderate.

### Power/Weight Ratio (as tested):

0.68 bhp/lb (with venturi insert and Irvine silencer)

0.88 bhp/lb (with venturi insert, less silencer)

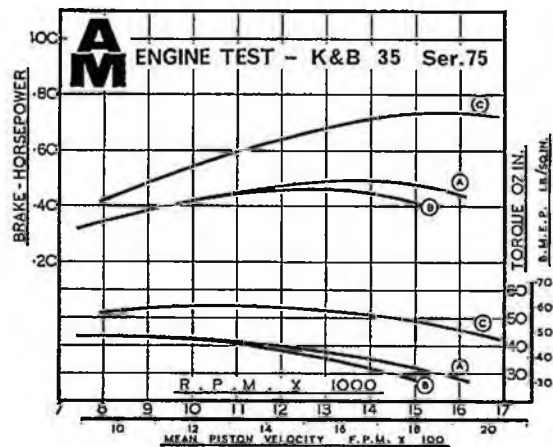
1.31 bhp/lb (less venturi insert, less silencer)

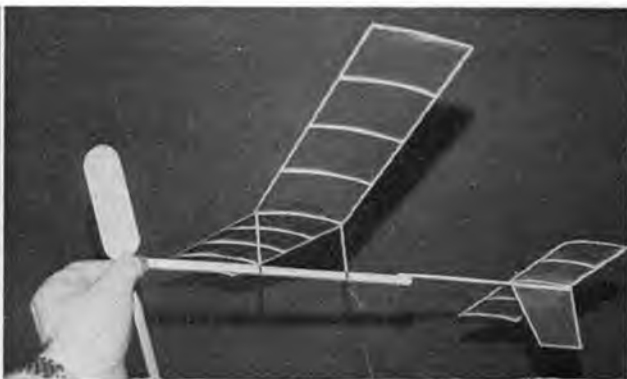
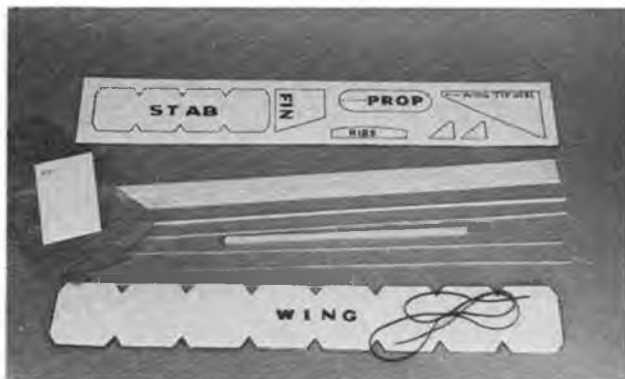
### Specific Output (as tested):

79 bhp/litre (with venturi insert and Irvine silencer)

86 bhp/litre (with venturi insert, less silencer)

128 bhp/litre (less venturi insert, less silencer)





## EASY B—JUST HOW EASY?

I MUST CONFESS to being a 'dabbler' — one of the try-anything-once brigade. Another of my failings is being easily enthused on any particular subject after only a few minutes conversation, thus attending a lecture given by Laurie Barr on the delights of indoor flying, presented at the Avon Model Club, was pure dynamite to my spare time! "Leap right in — the water's deep but at least it's warm" seemed to be Mr Micro X — UK's — message and it certainly did seem pretty straightforward as he nonchalantly produced microfilm in a polythene tank, bent balsa wood at ridiculous angles, and flew his flimsy devices with great aplomb.

Inevitably, I was 'hooked' — only a modicum of common sense dictated that Easy B was the class to choose, and what better way for this definitely non-expert modeller starting such a project, than a kit? As only one kit is available — the Micro X 'EZB' — the choice was not difficult.

A few days later, and £1.50 (plus 30p postage) lighter, I received a kit — but what a shock to one accustomed to opening 'normal' kits. Just a few sticks of wood, two sheets of printed cardboard, rubber strip, nose bearing, teflon washer, 2in. of piano wire plus condenser tissue. And a sheet of instructions — more of which anon.

The whole looked very simple, and so construction commenced — albeit after making a new building board. It was clear that much pinning down of parts would be necessary, and that hammering pins home into a hard base was not quite *de rigueur* with this type of machine, so a piece of blockboard was faced with cork tiles glued in place, then thick paper was glued to these tiles with wall-paper paste. Easily removed when 'tatty', and the cork grips the pins very firmly whilst they need little pressure to insert them.

To work. Card templates supplied were cut out, then the wing 'ribs' were produced by cutting around the appropriate template, leaving them  $\frac{1}{4}$ in. deep to suit the leading and trailing edge dimen-

First stage was to simply cut out the cardboard templates with a sharp balsa knife. Ribs are then sliced  $\frac{1}{4}$ in. thick by running a knife blade around the appropriate template laid over the  $\frac{1}{4}$ in. sheet balsa. Same ribs are used for tailplane, but cropped at rear to suit the chord.



sions. Tailplane ribs were produced from the same template, cutting off the rear to suit the shortened chord.

Both wing and tail are produced around the appropriate templates — and very easy it proved too. The leading and trailing edge materials are laid alongside the template and clamped in place by scrap wood pinned to the building board. Ribs are then laid between the notches in the template and glued in place. Laurie informed me that regular balsa cement *can* be used, but in fact I used Micro X cement which is much thinner and does not shrink too much. No doubt Zap or Hot Stuff could also be employed. The glue can be applied either by a hypodermic syringe (glass/metal type *only*) or for beginners, via a stick of balsa.

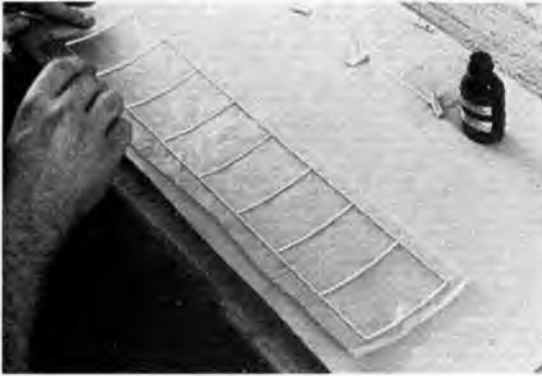
While the cement dried, the fin was made in the same fashion — care being taken not to glue it permanently to the template — then the pre-formed thrust bearing and motor hook were lightly epoxied to the motor stick. Fine. No trouble. All straightforward.

At this stage the instructions deserted me! The statement "... and cover with condenser paper using condenser paper cement ..." is a little bald to the beginner. True, these kits are *not* for the beginner to aeromodelling, but to the first time indoor flyer more explanation is required, and time and again they proved inadequate. Solution was a 'phone call to Laurie Barr who passed on many valuable tips, but I feel that this should not have been necessary. Frequently I felt as though the question I was asking was foolish, but when hearing Laurie's answers, they proved worthwhile. Perhaps the fact that this exercise was for publication made me over-cautious (the information has to be — hopefully! — correct).

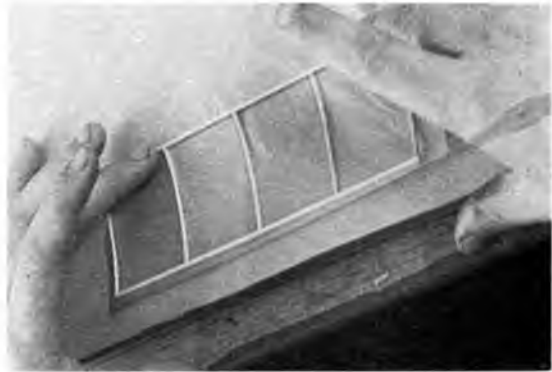
Back to the covering job. The tail was in fact quite easy. Firstly the somewhat crumpled tissue was ironed, at a low temperature in order to obviate future heat warps. Then the entire top surface of the wing was 'painted' with cement applied by brush to all ribs

Wing and tail feature identical construction. First templates are pinned to board, then leading and trailing edges ( $\frac{1}{4}$ in. sq.) are 'clamped' to the edges using pins pushed through scrap balsa. Be careful not to dent the balsa, but if this does happen 'paint' with a drop of water to swell the grain once more.





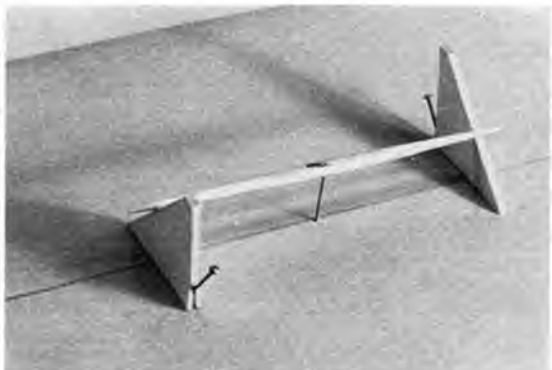
Applying the condenser tissue is not at all difficult. Adhesive used was Micro X product - which smelled identical to ordinary Shellac, and had same properties . . . Tissue was ironed with a warm iron, then placed on edge of board. Before, though, top surface of the framework had been coated all over with adhesive, including all ribs.



Next, framework was laid on tissue and gently rolled to adhere it to the tissue. Reversing the covered work, a finger was then lightly rubbed over all the wood to ensure that the covering was in full contact. After covering, structure was repinned to board overnight.



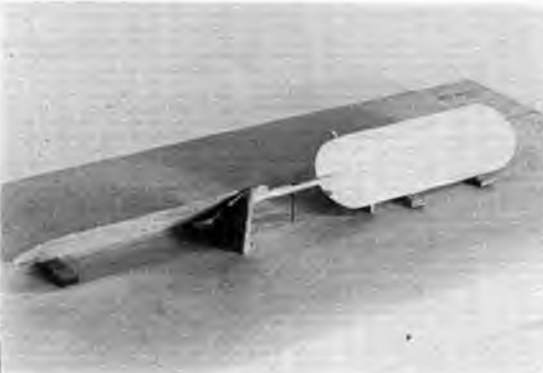
In some places, the tissue cement had dried before the covering was applied, so the offending areas were 'painted' with methylated spirits. This softened the adhesive, so as to permit the covering to stick properly. Later, a new razor blade was used to trim off all surplus tissue.



The last inch of each prop spar end was sanded to a circular section and tapered - this is not mentioned in instructions. A pin was used to form a truly vertical hole in the board to accept the prop shaft. Thus when blades are added (using the 45° templates as shown) they have identical pitch.

Each prop blade has a narrow 'V' cut in the root to accept the ends of the prop spar, and each blade was lightly sanded to radius edges and thin blades towards the tip. Care was taken to align blades in a straight line and to ensure that they were flush with templates before applying glue.

Until this stage, wing has been left flat. Now it was cracked at the centre, point, glue applied, and the dihedral put in using the template supplied. Tail and fin were glued to rear boom, and this was offset when joining to motor stick to provide left turn. Fuselage is inverted in picture!





plus LE and TE, then with the tissue cut oversize, and still just warm, it was laid on a flat surface and the wing 'rolled' on top of it, just as one would use an old-fashioned blotting pad. A finger was then lightly run over all woodwork to ensure that the tissue was stuck down.

As the condenser cement had caused the wing to bow upwards it was re-pinned to the board overnight, and has remained flat ever since. Wrinkles in the covering remain, but Laurie Barr confirmed this is OK - in a damp atmosphere the tissue tautens, but 'takes up slack' via the wrinkles rather than distorts the framework.

A sharp razor blade quickly removed surplus tissue, but it was found that in some areas the tissue had not stuck to the framework - apparently caused by the cement drying out before the tissue was applied. A useful hint here is to apply methylated spirits via a brush to the affected areas - the meths softens the cement and a light rub over with a finger results in 'stiction' once more.

The propeller was attacked next - and again the instructions proved inadequate; the following procedure being adapted from the maestro's recommendations. Firstly, a 1/4in. block of balsa was taken and a thin pin pushed into its centre taking great care to keep it vertical as it was pressed 'home'. Remove, and the result is a small diameter vertical hole just right to accept the prop shaft. Next, the prop spar was tapered and rounded at the tips, and the prop shaft bent and inserted at the mid point. This was glued in place, ensuring that it was at 90° to the spar.

The aligning jigs were cut from card, as was the blade template. Two blades were cut from the 1/4in. sheet and lightly sanded to a taper at the tips, then a shallow 'V' notch was cut in each to accept the prop spar.

Placing the prop shaft in the hole in the balsa block (thus keeping it vertical), and supporting the spar ends in the aligning jig ensured that the prop blades would provide identical pitch to one another - all quite easy when you know how. Prop blades were then added and glued, as shown in the photographs, taking care that they were properly aligned.

On the finishing straight now! The tail boom received its appendages of tail and fin, and was then glued to the motor stick - offset some quarter inch to the left (instructions state "... with a little left turn ...". What is a little? 1/8in. or 1/4in.?)

Now to attach the wings to the fuselage - but first the fuselage was balanced with prop and rubber attached. With the CG established, that is the mid point of the wing - so the position of the

wing posts sockets was marked.

The paper tube sockets are quite easy to make. A piece of 1/4in. dia. piano wire (or use an appropriate size drill) was polished with emery cloth, then the Micro X balsa cement was painted onto a 1in. square piece of Jap tissue supplied. Rolling this tissue around the wire tightly and then using one's finger nails to pull it off without squeezing it out of shape, results in a strong, light tube of the correct bore . . . and waterproof fingers.

A taper on the ends of the wing posts was formed by twirling in a fold of glass paper and they were then glued to the wing, and the job was done.

Well, how easy was the exercise? Answer - really much easier than anticipated but it was invaluable having Laurie Barr's expertise 'on tap'. Instructions cost very little to prepare, and frankly the beginner's life could have been made *much* easier by the addition of a few extra lines of information. Hopefully, by the time the Reader has scanned these words, then he should experience no trouble at all. Wood sizes are all quite huge by indoor sizes (just 1/4 and 1/2in. square and 1/2in. sheet) although the resulting model is sufficiently delicate to impress upon the learner that he has (a) achieved something and (b) can undoubtedly produce a better model next time. It is certainly a great confidence maker, and I look forward to my next project. Incidentally, the wings on my machine seem rather far back, which either indicate a super-light prop (unlikely) or an over-heavy tail caused by too much glue (more than likely!).

Laurie stresses that this is a beginner's model in all aspects - it cannot be expected to perform like a contest machine, but will provide adequate flights for the tyro, and should be most helpful in understanding trimming techniques. By the next issue we (hopefully) will be able to report on the flying side. PSR

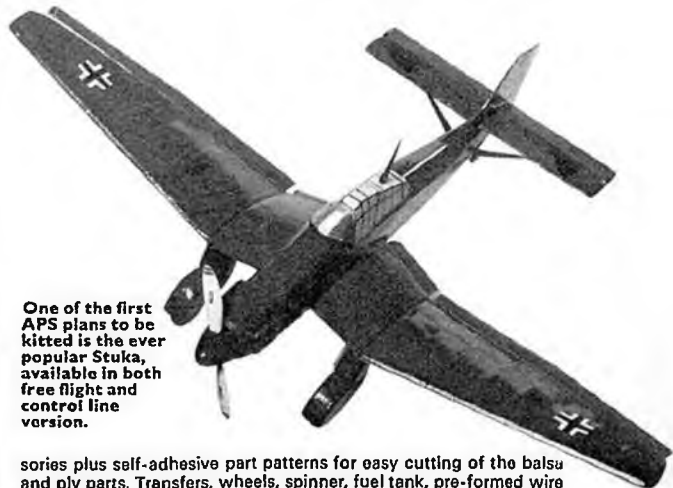
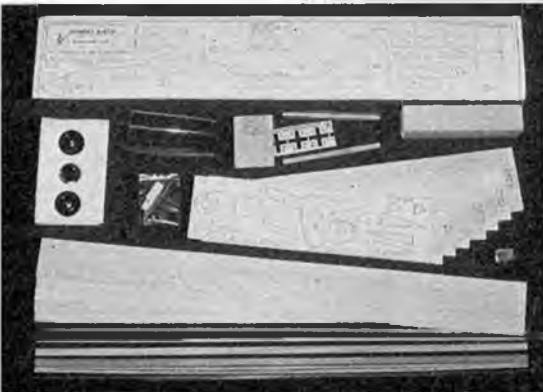
Costs:		£
Micro X Easy B Kit	.. .. .	1.50
Micro X Wood Cement	.. .. .	0.42*
Micro X Condenser Paper Cement	.. .. .	0.42*
Postage and packing charges: UK orders add 20%. Orders from Europe add 50p. For Air Mail outside Europe add £2.		
*Bottles contain sufficient adhesive for literally dozens of models.		

A full range of Micro X indoor materials is available from Laurie Barr at 4 Hastings Close, Bray, Berks.

## NEW KIT RANGE

AEROMODELLER Plans Service designs have for years provided an enormous selection of models that can be built from exact size drawings. They are specially prepared to suit the freelance modeller who likes to purchase sheet and strip wood. Pre-fabrication is not required, and simplicity is the keynote of construction. With over a thousand flying models to choose from, it is inevitable that some favourites emerge over the years. The perennial *Tiger Moth* was absolutely unbeatable until recently when the *Stuku*, *SE5a* and *Cessna 172* took over as league leaders for plan sales. Top of the non-scale designs, is Ed Kazmirski's incomparable *Tauri*, the Radio Control trainer that never fails.

Now a kit service is announced for these popular models. It comes from a new company, Chadpalm Ltd of Bacup, Lancs who are boxing all the materials to make the design, and adding acces-



One of the first APS plans to be kitted is the ever popular Stuka, available in both free flight and control line versions.

sories plus self-adhesive part patterns for easy cutting of the balsa and ply parts. Transfers, wheels, spinner, fuel tank, pre-formed wire parts for landing gear, wing pegs etc, plus beech engine bearers, selected Solarbo and Modelspan for covering, right down to a packet of nuts and bolts. Only the adhesives and dops seem to be needed to complete the model.

We emphasise that (as we did with *Complete-a-Pac*) this is NOT an MAP operation. We have authorised Chadpalm to supply kits for these designs, the first of which will be shown at the R/C Expo at Sywell over Easter. They are for the *Junkers Ju87 Stuka* (34in.) Free Flight or Control Line versions, *SE5a* (27in.) Free Flight, suitable for R/C, *Cessna 172 Skyhawk* (72in.) R/C multi and the *Tauri* (57in.) R/C multi. Kit prices are to be in the region of £20. Enquiries to Chadpalm Ltd, 2 Astcliffe House, off Dale Street, Bacup, Lancs OL13 8BA.

# CLUB NEWS

AN EXPANDING hobby/sport like aeromodelling has no dearth of newcomers to savour its delights and excitements, but how to make a start, and what to build? Well, the options are so many and the approaches so diverse that it is impossible to be too categoric. The simple, easy to build model may be just the thing for the young or not too confident newcomer, but the highly practical person may look for something more demanding; and here even a multi radio model is in no way unrealistic, providing the builder has well briefed himself on the availability of flying sites and flight tuition. Generally, though, I would suggest something that is light and robust, that will absorb a fair amount of learner punishment and is not violently expensive.

Our first letter comes from Mr A. Terry of 72 Schofield Avenue, Witney, Oxon OXB 5JW. He informs us that a group of modellers have just re-formed the Witney & DMAC, and asks that we spread the good word. All the necessary arrangements for establishing a solidly based club are in hand: application for club insurance, the possibility of SMAE affiliation and the re-establishing of the old club sites. At present interest centres mainly on the R/C side of things, but all sorts and conditions of aeromodeller welcome to the new group. Just drop a line to Mr Terry at the above address.

We are reminded by the Leicester MAC bulletin that what goes up needs a lot of energy to put it there, whether you motorise it, wind it up or pull it up. Well, engines can be noisy and messy, winder arms willing but weak, and legs and lungs ditto, but there seems hope for a quiet, sedentary existence using the new-fangled electric power. It works a treat, we are told, and is not over expensive. One snag, though: power output is rather on the meagre side, calling for the sort of light, functional model we see on the published plan by George Chamberlain. Seems to me a good way of utilising some of those old Jetex designs. Coming down an ounce or two to the real lightweight stuff, the club held an Indoor meeting at Wycliffe School. Two events, chuck glider – well supported, and Open rubber – three entries. Flying in small halls is a tricky business, and Dick Whybray's flight of 2 mins 35 secs deservedly set a new club record. But outdoors or indoors your modelling ventures often need research of one kind or another, like the right sort of airfoil or prop pitch, and to this end Graham Crofts is trying to establish a club library of books, magazines and plans.

*Wave Rings*, the newsletter of the Waveney MFC, carries a thoughtful survey of the prospects facing the club in 1976. One cheering factor is the new flying site at Ellough Airfield. This, it is hoped, will have a unifying effect on club members, and help to build up the club in general. Increasing costs and lack of flying facilities have hit the C/L section most of all, a section with a good past record of display and flying activity. There are also plans to liven up the club meetings with more action and less chat, leaving discussion of everyday club business to the committee. Coming back to the club field, there seems to be one snag: it is used by full size helicopters, and members have to be on their toes in order not to obstruct them in any way – otherwise it can mean the chop, in more ways

than one. Seems, though, the C/L boys will not be using Ellough – it's just for Radio. But Norman Hewitt is hoping for something of a revival in this form of flying – to which many are attached (?) – with plenty of scale stuff doing attractive things on the Common. On quite another topic, Slope Soaring, we are reminded by Ivan Rudd of the special delights of this exciting activity. Thermal Soaring may get the headlines these days, but the slope is where you get the thrills.

Clive Booth is the new editor of St Albans MAC's *The Thermal*. He expresses no wild optimism about contributions from members, but hopes to get out a nice gen-filled edition every two or three months. Like most clubs today, St Albans is highly diversified, and if the club mag is to be in any way comprehensive the editor must have communication feelers out to the various factions. It is not like the old all F/F days when you could get all the information at one fell swoop at the club field. And still on the subject of F/F, the club continues to make a very real contribution to the London Area scene. It's latest enterprise, the Winter Gala at Bassingbourn, was put on at short notice, but the grapevine worked overtime to notify enough contest zealots to make the meeting a reasonable success. Weather is described as grey and windy, with little lift. In fact, it was quite fair and mild for a winter day, and I certainly enjoyed the outing. I think the club deserves a spot of congratulation, too, on the tenacious way it has clung to their small but handy flying patch at Nomansland over the years. Just now it is doing valiant service for both Power Radio and Thermal Soaring. It also provides a means of trimming out that F/F model or doing a spot of sport flying.

I am suddenly overwhelmed with copies of *Flysheet*, the newsletter of the Worcester MAC, but thankful to Mr I. R. Nicholls, the PRO, for sending them along, together with his apologies for the pile up. One issue has a nice outline drawing of a Coupe d'Hiver on its cover, with the caption: 'The purest form of flight?' Well, there's still a lot of science in free flying. After all, the model must climb, glide and generally do its thing no hands, as it were. It's the flying that counts, not the mechanics. And still on about the mag cover, someone has the novel idea of featuring any new model to rise up from Perdiswell's hallowed turf on the front cover of the magazine. Look out, then, for Andrew Hink's Veron *Stunter*, complete with throttle control, and, perhaps, Clive Fisher's *Shuco T.45*. Again, this is a club which harmoniously covers the ever widening model spectrum, from Indoor to Multi Radio, and events for R/C, F/F and C/L feature in the 1976 contest schedule. The club meets every Wednesday evening at the Cavalier public house – winter season only.

Mr D. J. Chambers, PRO, of the Elliotts MAC, writes to tell us that membership is not just restricted to Elliott employees, but is open to any C/L flyers. Newcomers to the hobby might be interested to know that the club theme for 1976 is one of helping and encouraging the novice. To this end two new trophies have been made available for novice competitions.

From Mr D. R. Pears, the Secretary of the Melton & District Model Club, comes news of a recent move into a new clubroom at Warwick Lodge, Melton Mowbray. This much larger room has boosted interest in rtp, making for a pleasant way to spend the club evenings. Soon, though, the lengthening evenings will see a resumption of the Wednesday fly-ins, and there is a club Exhibition to look forward to in the autumn. Meantime, any would-be member is welcome to come along to the clubroom between 7.30 and 10.30 on any Wednesday evening.

One thing common to most clubs in this inflationary year of 1976 is a sharp upswing in club fees, and the Wolves MAC is no exception. Again, in keeping with many other clubs, the subscription fee has been kept

artificially low by the many fund raising subsidies, but even this type of income cannot keep up with modern costs, and so the fee has necessarily gone up to a point which may frighten some but is in no way exceptional in these high price days. Certainly one piece of money's worth members get is a very complete set of annual trophies for C/L and F/F — nothing listed, though, for R/C. Anyway, W. A. Hatfield was both C/L and F/F champion, and Joe Myszka the overall Champion. And you can have a night on the tiles. That is a clubnight contest for gliders made out of 12in. polystyrene tiles. Floated from a height of 6ft. they are judged on duration/distance achieved — not ceiling performance.

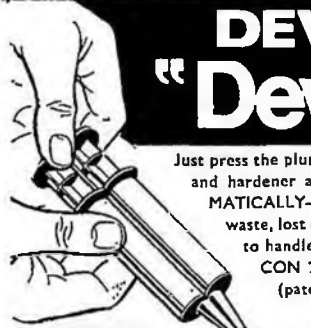
We have to hand the annual report of the Northern Ireland Association of Aeromodellers. Nicely produced in booklet form, it informs us that there are now five clubs in the Association, including the recently formed Banbridge club. As we mentioned a month or two back, Thermal Soaring features very largely on the Ulster scene, and this fact is underlined by the number of events for this now popular form of silent flight on the 1976 Calendar. To encourage the younger generation the *Satellite* event for boys and girls of 15 years and under is to be staged again this year. Last year the event attracted eight entries, and was won by the youngest entrant with what appears to be an extremely well built version of this sturdy, 48in. span glider.

Members of the Concorde AMC are under less pressure now that the old droop snoop bird has got its certification, and we can look forward to more regular newsletters. We are reminded by Mr R. F. Morton, the Hon Sec, what a marvellous model flying year we had in 1975, and, hopeful for a repetition, the 1976 models are already being paraded. They include a spate of R/C models and a number of rebuilt control liners. Pete Reeves has aired his beautiful Webra powered *Spitfire VB*, having at last cured his CG problem, something you all too often get with scale models. In WW2 opposition there is Martin Jackson's *FW190*, almost completed, and to be powered with a PAW149.

A brief note from Ron Tribe assures us that the Cosmo Club is still very much in existence with a membership of around 40. Interest is mainly C/L, but ten or so members fly R/C. Flying site is Danson Park, every Sunday morning

## 5-minute or 2-ton

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Clubman

## Contest Calendar . . . .

April 18th	<b>SMAE C/L MEETING.</b> Speed, combat, Class B, Rat and FAI team race. Stunt plus Novice/Junior stunt. Venue: RAF Cottesmore, Leics. SMAE members only. <b>SMAE EUROPEAN CHAMPIONSHIP TRIALS.</b> FAI, R/G/P. Venue: TBA.
April 25th	<b>BUCKANEERS C/L STUNT GALA</b> at Bronham Hospital, Nr Bedford. Details — J. Mannall, 27 Kestrel Road, Bedford. Telephone: Bedford 52960. <b>SMAE R/C AEROBATICS &amp; THERMAL SOARING.</b> Venue: RAF Swinderby. <b>*SMAE INDOOR MEETING.</b> Easy B. Venue: RAF Cardington, Beds. <b>LONDON AREA C/L CHAMPIONSHIP.</b> Goodyear, FAI team race, Combat. Venue: Charville Lane, Hayes. <b>*SMAE INDOOR SCALE NATIONALS.</b> Open rubber, Peanut, CO <sub>2</sub> /Electric. Venue: RAF Cardington.
May 2nd	<b>K &amp; MAA AND VINTAGE C/L DAY.</b> All types of kites and vintage C/L models welcome. Informal day event. Swap shop for old engines, kits etc. Prizes for most original kites, plus 'Fireball' trophy for C/L. Venue: Old Warden, Nr Biggleswade, Beds. <b>SMAE 2ND AREA F/F CENT MEETING.</b> FAI Power, Open R/G. Area venues.
May 23rd	<b>N. AREA SMAE R/C CLASS II SCALE.</b> Pre-entry to A. M. Barker, 1 Bramley Garth, Appletree Village, York YO3 0NQ. SMAE members only.
May 29th	<b>*SMAE INDOOR MEETING.</b> 35mm Microfilm class. Venue: RAF Cardington, Beds.

May 9th

**N. AREA (SMAE) C/L MEETING.** Racing practice and Novice stunt competition. Venue: RAF Elvington, Yorkshire. SMAE members only.

**YORK R/C THERMAL SOARING.** 50p pre-entry (with alternative freq.) & SAE to A. M. Barker, 1 Bramley Garth, Appletree Village, York YO3 0NQ. Venue: Melbourn, Near York.

**VULCANS F/F GROUP RALLY.** Open R/G/P, HLG, Mini (with 'K' factor), 100gm Cd'H. Local rules (listed in programme) plus SMAE General Rules apply. SMAE members only. Venue: Elvington, Near York.

**E. ANGLIAN AREA (SMAE) GALA.** C/L: Combat, stunt, G/year, Mini G/year, "B" rat. F/F: Open R/P/G, combined FAI. R/C: FAI aerobatics, Class II scale. Pre-entry (£1) R/C only to J Langbridge, 56A Bridge Street, Downham Market, Norfolk. Venue: RAF Wyton, Near Huntingdon. 10am start. SMAE members only.

May 23rd

**\*SMAE INDOOR MEETING.** FAI microfilm. Venue: RAF Cardington, Beds.

June 6th

**\*SMAE INDOOR MEETING.** FAI microfilm, contest plus Team Practice. Venue: RAF Cardington, Beds.  
**FINCHLEY C/L GALA.** Stunt and combat at Glebe-lands, Summers Lane, Finchley. Pre-entry (50p) to J. F. Goodwin, 77 Gallants Farm Road, East Barnet, Herts. Telephone: 01-361 0085.

June 13th

**AEROMODELLER ALL SCALE RALLY.** All types — R/C, F/F, C/L — Scale models welcome. Informal day with many prizes. Bring the family! Venue: Old Warden, Near Biggleswade, Beds.

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22 PLUMBE STREET  
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**LEIGH** Tel. 77152  
LEIGH MODEL CENTRE ★  
4 QUEEN STREET  
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**LONDON** Tel. 01-607 4272  
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## LONDON SOUTH

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GALAXY MODELS ★  
107 WADDINGTON STREET  
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Fri. 10am-8pm, Sat. 9am-6pm

**MANCHESTER** Tel. 061-794-1949/793-8078  
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28 EAST LANCAS ROAD, WORSLEY  
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44D STATION ROAD  
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**LONDON** Tel. 01-228 6319  
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closing Wed. 1pm

**NORTHAMPTON** Tel. 31223  
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## MIDDLESEX

**HARLINGTON** Tel. 01-897 2326  
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**HARROW** Tel. 01-427 0387  
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18 BLENHEIM STREET  
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Open 9am-5.30pm. Half day Thurs.

**ISLEWORTH** Tel. 01-560 0473  
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**NOTTINGHAM** Tel. 50273  
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Closed all day Mon.

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HOBBIES AND MODELS  
217/219 STREATFIELD ROAD  
QUEENSBURY CIRCLE  
Open 9am-6pm. Thurs. 9am-8pm  
Closed all day Wed.

## NOTTINGHAMSHIRE

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RUSSELL MODELS ★  
MODEL CENTRE, RYTON STREET  
Closed all day Thursday

## OXFORDSHIRE

**ABINGDON** Tel. 21927  
F. KNIGHT & SON ★  
44 BATH STREET  
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Fri. 6pm. Closed all day Thurs.

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HOWES MODEL SHOP ★  
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OASIS MODELS ★  
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## STAFFORDSHIRE

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9am-5.30pm. Closed all day Wed.

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9am-5.30pm. Closed all day Thurs.

**STOKE-ON-TRENT** Tel. 85856  
PLEASURE TREASURES LTD. ★  
4 SWAN SQUARE, BURSLEM  
9.30am-6pm. Half day Thurs.

**WALSALL** Tel. 23984  
AEROMODEL'S (WALSALL)  
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**WOLVERHAMPTON** Tel. 26709  
WOLVERHAMPTON MODELS &  
HOBBIES ★  
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9am-5.30pm Mon.-Sat. Early Closing Thursday

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BOWMANS OF IPSWICH ★  
37/39 UPPER ORWELL STREET  
Open 9am-5.30pm Mon.-Sat.  
Early closing Wed.

## SURREY

**ADDESTONE** Tel. Weybridge 45440  
ADDESTONE MODELS LTD. ★  
63 STATION ROAD  
Open 9am-6pm. Closed all day Wednesday.  
Late night Friday 6.30pm

**FARNHAM** Tel. 26128  
FARNHAM MODELS  
57A DOWNING STREET  
Tues, Thurs, Fri, Sat, 10am-5pm. Sun 9.30am-  
11.30am

**KINGSTON on THAMES** Tel. 01-546 4488  
MICK CHARLES MODELS ★  
180 LONDON ROAD  
Mon., Tues., Thurs., 9.30am-6.30pm  
Wed. 9.30am-1pm, Fri., Sat. 9.30am-9pm

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

**CHICHESTER** Tel. 83592  
PLANET MODELS & HANDICRAFTS  
108 THE HORNET  
Open 9am-1pm and 2pm-6pm. Closed Thurs.

**HORSHAM** Tel. 61533  
MODEL CORNER ★  
30 NORTH STREET  
Open 9am-5.30pm Mon.-Sat. Closed Thursday  
afternoons

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

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BUD MORGAN ★  
22 CASTLE ARCADE  
SOUTH GLAMORGAN CFI 2BW  
Open 9am-5.30pm. Half day Wed.

**CARDIFF** Tel. 31367  
RYALL & WALTERS RADIO MODELS  
34 LLANDAFF ROAD  
Open 9am-12.30pm/1.30pm-5.30pm Monday  
8pm. Closed Wed.

**CWMBRAN** Tel. 66727  
THE HOBBIES SHOP ★  
32 THE PARADE (on the balcony), GWENT  
9.30am-5.30pm. Half day Wed.  
Open late Fri., 7pm

**FLINT** Tel. 3123  
FLINT MODELS ★  
5-9 CHURCH STREET  
Open six days 9a.m.-5.30pm. Half day Wed.

**NEWPORT** Tel. Newport 65061  
MODELS & HOBBIES  
(J. & J. W. MARTIN & SON)  
112 COMMERCIAL STREET, GWENT  
Mon.-Sat. 9am-5.30pm

**SWANSEA** Tel. (0792) 52877  
SWANSEA MODELS & HOBBIES ★  
11 SHOPPERS WALK, OXFORD STREET  
GLAMORGAN  
Mon., Tues., Wed., 9.30am-5.30pm  
Fri. and Sat. 9.30am-6pm. Closed Thurs.

## WARWICKSHIRE

**BIRMINGHAM 10** Tel. 021-772 4917  
BOB'S MODELS ★  
520-522 COVENTRY ROAD, SMALL HEATH  
Open 9.45am-6.30pm. Early Closing Wed.  
1.30pm

**BIRMINGHAM 8** Tel: 021-327 0872  
POWELL'S MODEL CENTRE  
769 ALUM ROCK ROAD  
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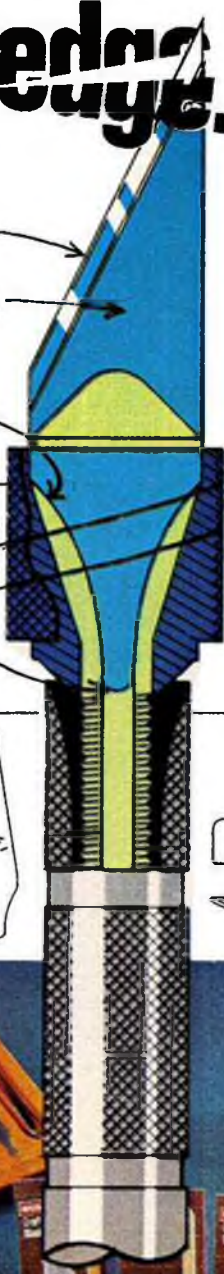
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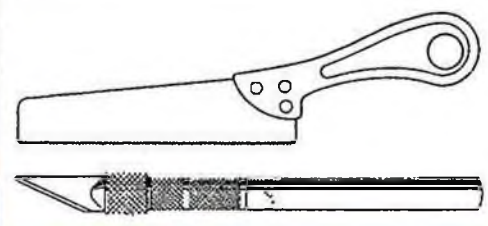
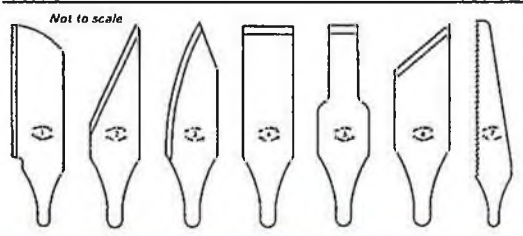
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