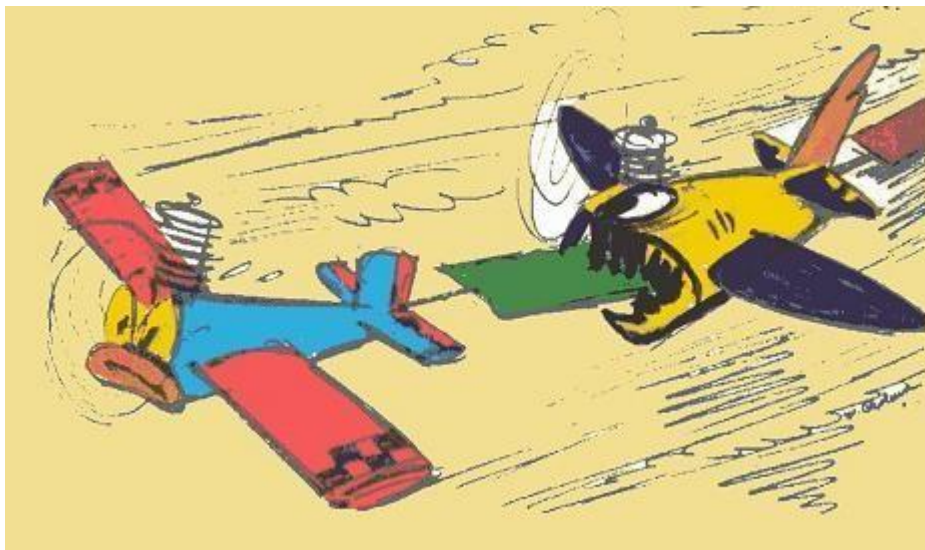


Combat in the U.K.

The Golden Years Part 2

1975 - 1978

A Compilation of Articles and
Contest Reports from
Aeromodeller Magazines
by Mick Lewis



1975 Articles



KIT REVIEW by Jim Carolan who appraises the latest design for C/L fans

MICK TIERNAN'S **ANDURIL**

FOR A KIT of this nature to sell well, it is necessary for it to appeal to both sport fliers and the competition-minded alike. An obvious example which springs to mind is the **Pegasus Models Warlord** kit, which has sold very well to all sections of the modelling world. A new challenger for this sector of the market was announced recently by Mick Tiernan, who has produced a kit of his very successful *Anduril* FAI combat model. This design has been developed over a period of five years, and in its current form represents a good compromise between strength and manoeuvrability,

combined in a model which is very easy to fly and yet is competitive at any level.

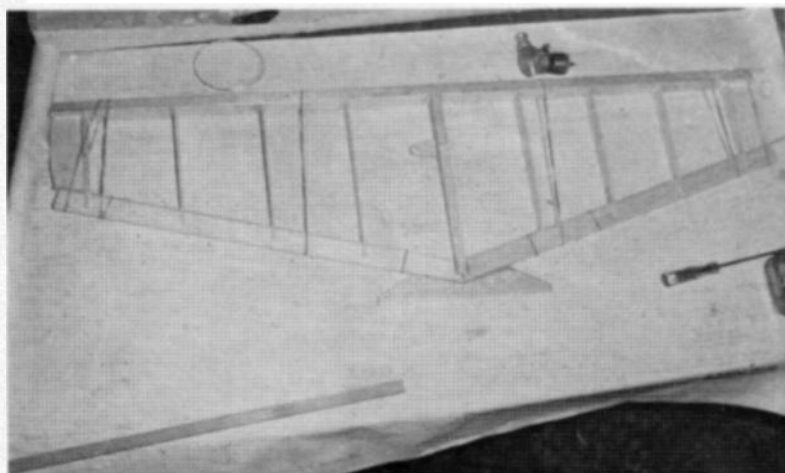
Contents

On opening the box, most people would be surprised by seeing just how little there is in a modern combat model. All parts, however, are pre-shaped, ribs pre-cut, gussets supplied and all the necessary hardware enclosed, and there is no 'surplus' wood enclosed to confuse the novice. The fits of items such as wing tips and gussets were found to be good, as one would expect in any modern kit, but which is so rarely the case.

No covering material was supplied, although mention of two alternative methods of covering was made in the comprehensive building instructions. A 'mustard-tin' tank kit with its own instructions is provided, and a point worth making here is that the bearers were beech and not the soft rubbish which I have grown to expect from recent kits. A half-size plan is included with rib spacings marked in full size.

Construction

I am not going to bore the reader with details of how each part was glued together, but I had the model complete and ready to cover after only three nights' work—i.e. a total of nine hours – although I have no doubt that most people would build it even quicker. Instructions are clear and explicit, written in 'everyday English', suggesting which types of adhesives to use at each stage, and generally taking care of all eventualities. The most difficult part I found was the construction of the pod; I prefer to fit the bearers direct to the centre rib, although the method suggested in the instructions is that used by most currently successful fliers. Tank assembly is the area which will give inexperienced modelers the most problems, but as long as the constructor remembers the basic golden rules of soldering – namely, the right size soldering iron (large!), the correct flux, cleanliness and patience – a good light tank will



be produced. However, if the beginner finds tank construction as much of a chore as I once did, I assume that he will be able to find a reasonable stunt tank in his local model shop instead.

Covering

I elected to cover my model using nylon at the centre section and with Solarfilm wings, as I think this gives the correct compromise between strength and performance. I would suggest that those who do not regularly fly competition combat should cover the model entirely in nylon. I used the recommended amount of dope and fuelproofed with two coats of PU15 polyurethane.

Flying

I flew Mick Tiernan's 1974 Nationals winning model just after the final and frankly was not impressed, finding that it lacked line tension and 'feel'. I therefore expected this to fly similarly, and was pleasantly surprised to find that subsequent development has produced a model which pulls evenly through all

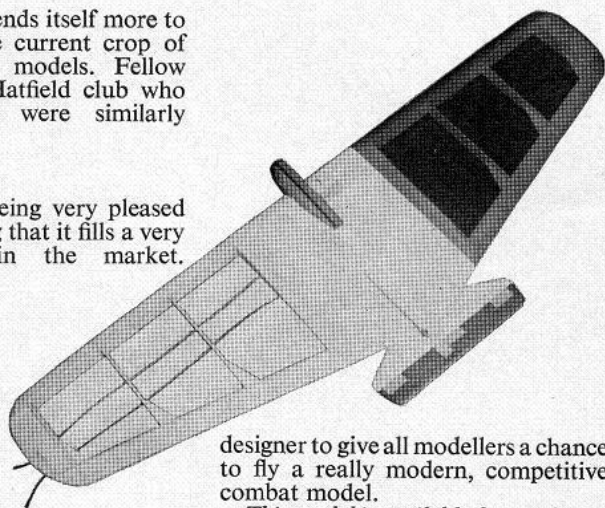
manoeuvres, and lends itself more to whipping than the current crop of large competition models. Fellow members of the Hatfield club who tried my model were similarly impressed.

Conclusion

I must admit to being very pleased with the kit, feeling that it fills a very important gap in the market.

Two thirds covered, just the inboard panel to do. Jim follows current combat practice by covering centre panel with nylon, tips with Solarfilm. Minimum structure results in minimum weight.

Obviously, there were faults: a full-size plan would be nice, but cost considerations preclude this; the grain direction in the gussets was wrong; and the leading edge was a little heavy. However, the kit represents a brave (and successful) attempt by a leading combat model



designer to give all modellers a chance to fly a really modern, competitive combat model.

This model is available from selected model shops or direct from Mick Tiernan at 41 Myrtle Avenue, Birstall, Leicester. Price is £3.49 (supplied post free if ordered direct). Please note that the kit supplied for review was a pre-production item, and thus the box, etc. may be slightly different to that now available.

COMBAT HINTS



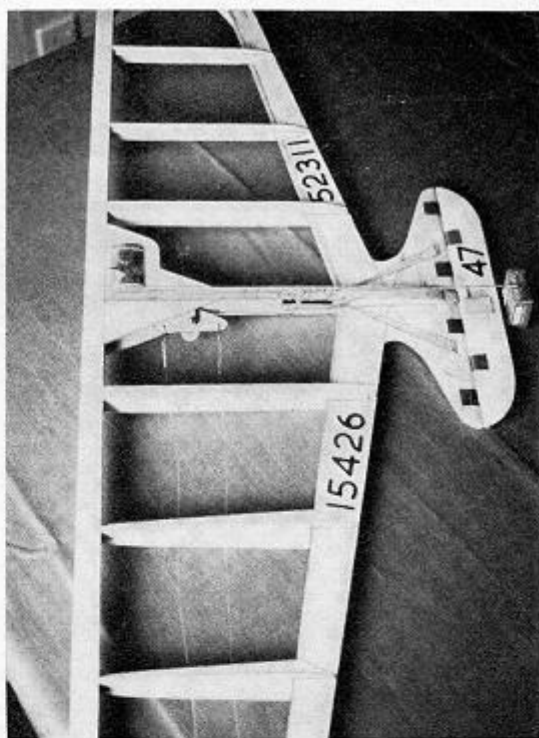
by Frank Smart

Build it strong, but build it light — that's the message

MY CHIEF observation of the currently fashionable, 'swept-forward trailing edge plus separate tail', models — as typified by the *Titan* — seen at competitions last year was the need for some positive method of keeping the tails on; most all-balsa fuselages break on ground impact, especially the Solarfilm covered models which are now quite common.

Previously, I had used a veneer or ply sandwich fuselage as on the *Hornet* design, but with the longer moment arm designs it was not suitable. While redesigning the fuselage I also considered some other important construction problems which cropped up with this type of model; these — together with my solutions — are detailed as follows:

Author's 'Firefly' design shows how his practical advice has been incorporated. Note too lettering applied before covering in transparent Solarfilm.



(a) Fuselage

Fit the $\frac{1}{4}$ in. balsa fuselage rib in the normal way but keeping the section fairly even in profile. Mark out 1mm thick plywood capping strips in pencil, the lower one $\frac{1}{4}$ in. wide but the other incorporating the push-rod guide plate and slot as indicated. Make this slot about $1\frac{1}{2}$ in. long — drill two $\frac{1}{8}$ in. dia. holes at extreme ends to achieve a neat outlet. Location of the push-rod slot should be clear of any gussets or the trailing edge. The plywood cappings should run full length of centre rib for maximum strength, from leading edge to hinge point on the tail.

I found it best to bend the push-rod first, then making the top capping strip over-length at each end, threaded the already bent push-rod onto the ply after coating with a smear of 5 minute epoxy. Pins are used to hold it in the required position until dry. Use a small Bulldog clip at extreme tail, then trim off surplus ply. Repeat for other side. When set, to complete the job tape or bandage the tailends of ply together to prevent parting on impact (on no account should the plywood stop at the bearers, they must go under the bearers right up to the leading edge).

This method of construction is used for maximum strength and

minimum weight — so select a *light* piece of balsa for the fuselage rib.

(b) Tail strength

Despite the reinforced fuselage, the tail is still fairly vulnerable from an opponent's attacking model, and even without that worry, it is rather too flexible.

Basically, my solution is to use the same principle as described for the fuselage; strips of 1mm plywood top and bottom of the tail and spreading out fanwise prevent tail twist. Sand the plywood down at the elevator hinging end for neatness and easy covering. Glue top pieces on first, then when dry, put pins down on one side of the ply protruding, through to the underside to enable the bottom ply pieces to be located directly in line (on no account should one side have the ply omitted). I have also tried the sandwich method, with one piece of ply strip, but this had little or no strength value, and was too complicated. Use fast setting epoxy glue for speedy construction.

(c) Pushrod aperture

As described in (a), but note that when covering (whether you use Solarfilm or nylon) make sure that you start by sticking down the material onto the centre rib and around the push-rod exit first. Ensure that it is secure, before pulling the material spanwise.



"Glum? I'll say. Built his combat model so light that it hooked a thermal, but even worse, they disqualified him from the free-flight fly-off for having an over-run!"

(d) Elevator horn fixing

This again was a development to overcome damage resulting from the all-too-often vertical dive into the ground. What normally happens is that the model stops abruptly, and usually, due to the 'up' line being forward and the pilot being higher than the model on impact, the push-rod shoots forward resulting in ripping the push-rod exit, pulling the elevator to full up, then pulling the horn out of the elevator or snapping off the tail, particularly if lead weight has been added to the tail. I often wonder why so many people put lead on an elevator as this only increases the swing action and almost certainly causes the horn to be ripped out, especially on Solarfilm covered models. If the ply-capped fuselage is adopted, lead can be added to the extreme fuselage end and bolted securely through the ply, also helping to hold the ply together at the same time.

Back to the horn fixing; with the use of $\frac{1}{4}$ in. sheet tailplane it is much more efficient to use an airfoiled $\frac{3}{8}$ in. or $\frac{1}{2}$ in. elevator, which also gives a better connection to the tail.

Using a Solarfilmed elevator has its problems; again lack of strength compared with nylon, plus that of

when using a 'thick' elevator it is difficult to know when to stop tightening up the 8BA nuts and bolts – one normally ends up with a squashed elevator and horn leaning over to one side! Solution?

(i) Firstly check where the horn is to be located, then insert a $1\frac{1}{2}$ in. length of $\frac{3}{8}$ in. \times $\frac{1}{4}$ in. spruce vertically in the elevator about central to the fuselage; this gives equal leverage to the elevator.

(ii) Epoxy the 1mm plywood plates top and bottom – sand down at the rear.

(iii) At this point I usually tape the elevator to the tail with nylon hinges then cover the whole elevator in Solarfilm, including the ply plates for best fuel proofing.

(iv) Drill the plywood to take the horn, making sure that the holes are each side of the spruce insert. The horn should then be drilled out to suit the push-rod before fitting it to the model – it's much easier!

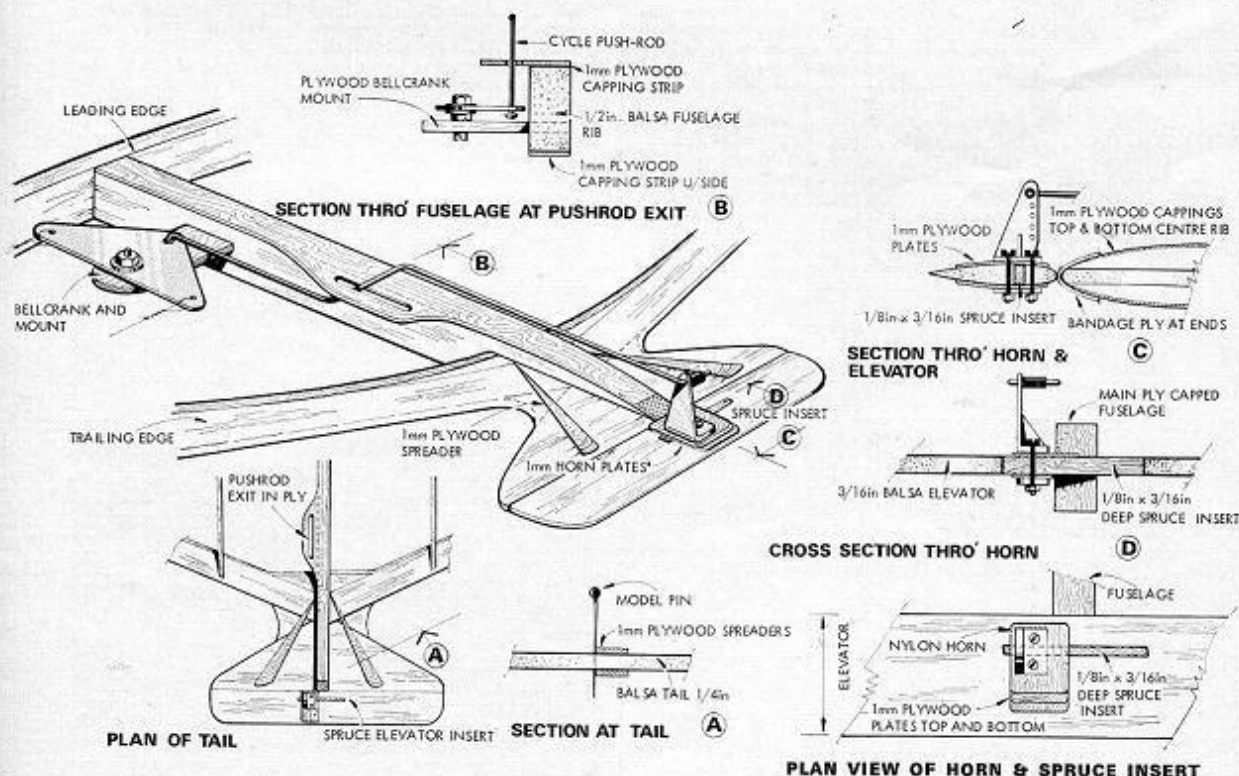
(v) For obtaining a fuelproof hinged elevator, I add the balsa elevator with nylon hinges, then cover the wing, taking the Solarfilm over the tail on to the elevator by $\frac{1}{4}$ in. but you must make sure, before tacking the film down to the elevator, that the elevator is pivoted to its

maximum away from the side that is being covered, and repeat this when covering the other side. I have in fact covered a model both sides in two separate pieces, but it is more economical to use up the odd bits on the elevator by covering the elevator separately.

The task of lettering or applying numbers etc. onto Solarfilm is not easy as it tends to come off. Fortunately, transparent Solarfilm is available – and it looks good too! So I tried Letraset direct to the wood but again this is not easy, so I have adopted the method employing a stencil, but use a cellulose based felt pen to fill in the main letter after drawing the outline in ball point pen onto the balsa.

Make sure also that you stencil trailing edges before ribs are inserted, and mark rib positions on the TE first! Another method is to stencil numerals, etc. onto white Modelspan tissue and then paste onto the balsa airframe when finally completed.

If an ordinary felt pen is used, water seepage can spoil a nice model in no time – so use a waterproof felt pen. Ordinary ink out of a bottle is no good, it spreads like blotting paper on balsa.





KIT REVIEW

Deco Models

SHO-GUN

a proven, contest-winning,
FAI class combat model
reviewed by
Ian Hutchinson

Our reviewer finished the Sho-Gun to his usual high standard - looks too good for combat use! Model would be an ideal introduction to combat for the inexperienced - it is plenty strong enough to withstand severe abuse.

QUITE A FEW combat kits are now available on the market, so a new one has to be a bit 'different' in order to sell well. As the photos show, the *Sho-Gun* is quite conventional in appearance looking very similar to the APS *Ironmonger*. However at £4.32 it is one of the cheapest combat kits around, and certainly must have about the simplest structure. This cheapness and simplicity make the *Sho-Gun* ideal as a 'first' combat model, and it is from the viewpoint of the inexperienced flyer and builder that I have reviewed this model.

Actually in the hands of its designer Dave Wiseman, *Sho-Gun* has a respectable contest record - in 1973 it won at Cranfield and was second at the Nationals. Not as comprehensive as the Pegasus *Warlord* for example, but showing nevertheless that it has the potential to be used at top levels of competition with some prospects of success.

The Kit

This is the only combat kit to be sold in a plastic bag rather than a cardboard box. Besides helping towards the highly competitive price, in my view this unusual method of packaging has quite a few advantages for both retailer and purchaser, perhaps the greatest being that the contents can be checked for quality, completeness etc, without having to open the package. No problems with bits falling out of the box during examination or when taking it home on the bus! Also previous prospective purchasers, when examining the kit, will not have covered the contents in finger and/or nail marks. Of course

the plastic bag does not protect the contents from crushing type damage, so the retailer will have to exercise a bit of care about storage and display, but the purchaser can at least see if the contents have been damaged before money changes hands.

The kit is fairly complete, containing most parts pre-shaped for easy construction; no die-cutting is employed, all pre-cut parts appearing to have been band sawed. Whilst this does not look quite as 'clean cut' as the best die-cutting can give, the cutting quality given by band-sawing is very consistent with none of the crushing that can result from die-cutting. The full-size plan is simple and uncomplicated. I found it easy to follow and especially appreciated the isometric presentation of the centre rib and bellcrank mounting area. Building instructions are separate from the plan, in tabulated form. My only criticism of the plan is that it assumes that only motors 1½ in. wide between the mounting lugs will be used. Whilst the Oliver Tiger is the obvious choice of motor to fit in the *Sho-Gun*, many builders may want to use a cheaper motor such as the PAW 249 with its narrower lug spacing. It would therefore have been nice to see some advice on how to accommodate different motors.

Construction

The leading edge is from a solid, pre-shaped balsa section (the one in my kit was a little on the heavy side), to which is glued the central spruce reinforcing strip. Because this spruce strip is the key for locating the ribs to the leading edge, it is vital that it is located very accurately and glued

securely - but the instructions did not emphasise the importance of this.

The trailing edge is provided in five pre-cut parts - a full span main piece, a full span spruce reinforcer, a trailing edge extension and two extension gussets. All of these parts fitted together well and were easy to assemble; I particularly liked the accurate pre-cutting of the extension gussets and the attention paid to maintaining correct grain directions. I always sand the top and bottom of glued-up trailing edges like this one so that the glue-lines do not interfere with the ribs during assembly and feel that the building instructions could have mentioned this point.

The pod is assembled onto a pre-cut ⅛ in. ply core. On one side is the balsa side-cheek (nicely pre-cut from ½ in. sheet), on the other goes a pre-cut ½ in. sheet balsa nose block and ½ in. x ⅝ in. beech bearers. Whilst these bearers were cut to length, they did not have the profile pre-shaped and were of nominal size; a bit of a disappointment in an otherwise comprehensively pre-shaped kit.

The centre rib is assembled from two pieces of ½ in. x ⅝ in. balsa sandwiching a suitable length of ½ in. ¼ in. spruce. I liked this spruce down the centre of the rib - obviously a design feature resulting from contest experience. This is one centre rib that is most unlikely to fail even after repeated vertical crashes of the model into the ground. Two pieces of ⅛ in. ply going into notches on the top and bottom of the centre-rib provide the bellcrank mounting. The other ribs (5 of ½ in. sheet and 3 of ¼ in. sheet) are pre-cut as is the ¼ in. sheet elevator.

The centre rib went together very easily; the isometric drawing on the plan being very clear to follow on this point.

The assembly of ribs to the trailing edge, and then glueing of the leading edge to the ribs was easy because all of the parts fitted well. However the instructions were a bit bare and the inexperienced could end up with misaligned ribs if following the normal 'off the board' assembly practice. A few words on how to mark the leading and trailing edges before glueing to the ribs to ease alignment would have helped. However, I stress again that the *Sho-Gun* does have a very simple structure and goes together very easily, I certainly had no problems and expect that, provided this is not your first control-line model, any builder should find assembly as easy as I did.

To finish the model, I decided to use nylon covering, preferring in this instance strength and longevity to lightness. In fact nylon covering only involves a weight penalty of less than 1oz. when compared with plastic film covering. Therefore, except for

contest use where weight is critical (to get the best flying characteristics possible), nylon covering is preferable for 'sports' flyers and for the new-comer to combat. With my usual complex paint finish (my models have got to look good even if they don't fly good!) and the nylon covering, my *Sho-Gun* came out at 17oz. including my Oliver Tiger and a *Tornado* 8 x 6in. nylon prop. Not bad really, because the *Sho-Gun* has perhaps more wing area than most of the FAI combat kits currently available. Given lighter wood and plastic film covering, I would not be surprised to find a 14oz. all-up weight.

Criticism

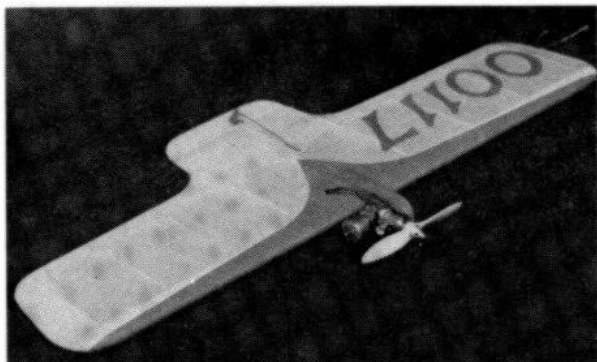
Maybe I have pushed my 'beginners' glasses on a bit hard, but I did feel that the inexperienced beginner might find the building instructions a bit bare. Whilst all necessary are given, very little attention is paid to explaining why doing some things are vital e.g. dowelling the pod through the centre-rib after assembly. Not a major criticism, but a significant one. Too many beginners skim important,

even vital, details because they have not yet gained the bitter experience that forces attention to detail. Perhaps there is no substitute for such bitter experience, but in my view building instructions should always try to help as much as possible. The *Sho-Gun* building details are far from unique in being merely instructions with inadequate explanations; indeed I have yet to come across an adequate set of building instructions. However, this does not excuse this deficiency. Otherwise I have no complaints, indeed the *Sho-Gun* is an excellent kit and certainly builds up in a minimum of time into a highly practical model which has an excellent performance.

Flying

I put the 'criticism' bit before the flying report because I liked the way my *Sho-Gun* flies! It has more line tension than most modern designs and is very stable and easy to fly. You cannot have it all ways, i.e. stability plus sensitivity. Obviously my *Sho-Gun*'s 17oz. all-up weight pushes it towards stability rather than ability to 'jump' at the slightest movement. However it is as manoeuvrable as any of the combat models currently kitted and no doubt trimmed with the centre of gravity at the recommended 1½in. back from the leading edge position and a few ounces lighter, it could 'wobble' with the best of them. For the beginner though, the stability would be a godsend. A thoroughly recommended kit.

The *Sho-Gun* has only been available for a short time so if your retailer does not yet carry a stock, ask him to contact the distributors: Jarvis Manufacturing Co, 42 Lower Hillgate, Stockport, and order some.



Covered in nylon in the interests of durability and with a relatively heavy finish the completed model weighs 17oz. - which bearing in mind the relatively large wing, is not bad for a commercial product. Plastic film wing would provide a useful weight saving for contest types.



BETWEEN THE LINES

with Dave Clarkson

Rob Olyve launches for fellow Dutchman Ed Meyer at the Derby Combat International, organised by the Alfreton and District MAC in near ideal settings. The only 'complaints' regarded the ground, which was like tarmac, due to the hot, dry weather. Several motors suffered broken crankcases over the weekend.

AN END TO ERA? - REFLECTIONS ON THE '75 NATS
THINGS HAVE CHANGED quite dramatically in many of our beloved events since the '74 Nats. Not one event is now immune from the injection of professionalism that seems to result from a foreign 'invasion'. What happens can be seen from looking at FAI team race since the first big invasion of '73. Besides this (or in addition), technical progress has hit us, too. Are the changes good or bad? I don't know; maybe trying to analyse them will help, so here I go.

Combat - I cannot do better than quote Charlie Johnson, the best writer on combat in the world:

'Last year, the droning diesel was king, as it had been since (British) combat was invented. Most of the planes were strong and heavy, but most of all dependable. Glows weren't looked upon as much of a threat, because no one had gotten it all together and won. Tradition. A half-dozen diesel ships might last you the entire season, because the attrition rate was low. Heavy wood, lots of glue and nylon covering did wonders for prolonging the life expectancy of a model.'

'And now, 1975. Glow and diesel men alike are building light models. The glow boys have always had lighter models, and the diesel guys first built theirs lighter for an advantage against other diesels; but for 1975 it would be a last-ditch effort to stave off the glow advance. No longer would it be 121 diesels against seven glows at the Nats; this year there were 25, and next year possibly half-and-half. The iron triangle (Evans-Hunt-Tieman) was beginning to crack; none of them made it near the semi-finals at the Nats.'

'Future. In the past, it was possible to pick the winner of most any meet from the top three previously-mentioned flyers; once in a while, a winner slipped in from the next dozen or so expert flyers (Wood, Hammersley, Morgan, etc.), but rarely were there any real

upsets. A pilot was in control of his match, because almost all luck had been eliminated. Now, with faster and more fragile planes, we back-off from the 100 per cent control and start adding small portions of luck. Increase your speed, and guess what happens to your ability to guide your plane for those cuts? And the forgiving ground now becomes your enemy. The expert is no longer safe from the kamikaze, who will take away any chance to win. The expert glow flyers (spelt OUTLAWS) have a real advantage over the "Ollie" men, not only because of superior equipment, but because they have the teamwork to eliminate a greater portion of the luck. My prediction: FAI Combat will move in the direction of AMA Fast, with a lot more destruction of equipment (get to lose TWO planes per bout in FAI!) and a lot more winners by 'upset'. I guess FAI Combat was an innocent event until brute horsepower was introduced. There's no substitute for it, as we say here in America. Some of the British are for a minimum-weight rule to keep everyone from building such flimsy models - or, should I say, to allow people to build strong models without giving away an advantage. Also the banning of mylar covering was suggested, but not too seriously. Well, good or bad, I remember the way it was.'

Not everyone will agree with Charlie, but no one will express his view quite so beautifully. Thanks, Charlie, for showing me how I should write! I suspect Charlie is right. Irvine Engines received recently a shipment of Rossi FI diesels with 'FOR COMBAT' stamped upon every box.

Goodyear - Good-bye nice, friendly Goodyear. Hello angry, howling Goodyear. The day of the Rossi is upon us. No more need be said. Go buy a Rossi, young man - and struggle is all we have left to do. There is a lot more of the story to unwind yet, when the 60-nitro-drinking piped-one-flick-start Rossi appear, as it inevitably will, Goodyear (that 'introduction to racing, for novices really' event)

Below is John Hammersley (left) who won the Burns-Brown combat rally after an all-glow final with club-mate Richard Wilkins. John's Tee-shirt, inscribed with 'I'd rather eat worms than use a diesel', has sparked off many witticisms from 'worm-eaters'. At right are the victors from the Derby Internats - Messrs. Strudwick, Hunt, De Ridder and Halfpenny. No, winner Vernon Hunt has not suddenly grown 6in. - the winner's 'podium' is just out of view.



BLASTA DEVELOPMENT

Richard Wilkens describes the reasoning behind his highly successful combat design — and his 'new' approach to building techniques.

When Richard returned to combat flying after a seven year break he brought a refreshingly new approach to the subject. When his first (relatively) huge models appeared he transformed the combat scene with their speed, manoeuvrability and his own aggressive flying style.

I GAVE UP combat flying seven years ago because I was fed up with losing and building models the old way, which involved lots of carving and sanding the structure before the nylon and dope covering was applied. In those days the Oliver Tiger was the only motor to use for combat, so all models flew at about the same speed and struggled to out-turn each other. No one had a noticeable margin of aerial superiority for very long as good designs were copied and improved upon. I remember, for instance, someone once copied a *Dominator* and added booms to it to improve its turning performance. I won't mention his name, but he was good looking!

I decided to take up this exciting sport again in 1974, by which time Mylar covering was universal, and 5-minute epoxy speeded construction considerably; models were larger and

turning tighter but were still very slow, weighing 14-15oz. The Olivers were still droning on, the waiting list for one of these being about 18 months and they cost around £20 after George Copeman had fed the worms. The thought of having to develop a model powered by one of these motors, when it eventually arrived, deterred me from placing an order and an alternative had to be found. Seeing the *Outlaw's* models at Cranfield 1974 convinced me that glow power was here to stay; the Super Tigre G20/15s were giving wild model performance, and it was that team I wanted to join as they, led by John Hammersley, were the most experienced and exciting to watch, and fun to fly with.

Being lazy, and wanting a short cut to success, I listed what I wanted from the models and how much effort I was prepared to put into making them.

'Our hero' watches while pit-man John Hammersley attends to the Super Tigre G20/15 in the pre-Blasta models. These models which gave 'Wilkie' many victories, featured several polystyrene parts in their construction.

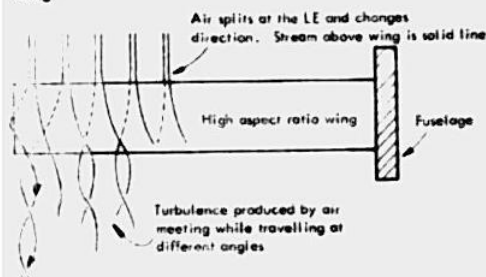


Here is the list:

1. Zero effort in building, plus as little mess and smell as possible in the modelling room. No carving and sanding. No doped covering.
2. Very fast and cheap model construction. The number of components and precision fits had therefore to be kept to a minimum. Where a precision fit was essential, it had to be very simple to construct.
3. Highest possible aerial performance to give a real as well as a psychological advantage during the combat match. Performance criterion, in order of importance: (a) *Stearability* the model must go where you want it to, if it doesn't it is useless, no matter how tight in turns. (b) *Manoeuvrability* must turn tighter than the best opposition. (c) *As fast as possible* but a high rate of turn is much more important than a



Figure 1 - induced drag with high aspect ratio wing.



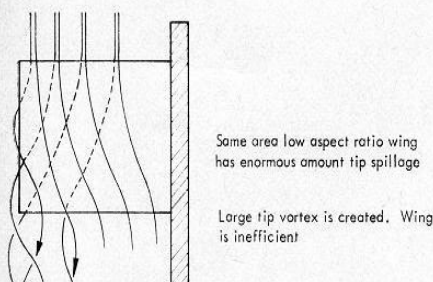


Figure 2 – induced drag with low aspect ratio wing.

high mph figure. Measure model's performance in eights per minute, or time 10 consecutive loops and 10 bunts. (d) *Strength* usually means weight, weight means poor aerial performance so all strength other than that required to resist aerodynamic forces was forsaken.

4. I did not want to experiment with alternative wing sections as this model was designed to outfly other flat section wing models and simply thickening the wing would improve its lift generating capability.
5. Smallest amount of test flying. Once one model has been test flown and its CG and elevator movement noted, it must be possible for an exact duplicate to be built with a similar weight distribution and control system.

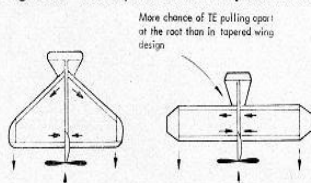
There are a few aerodynamic facts worth mentioning that improve this type of model's performance. Most of the drag of the wing is skin friction, and a great deal of the total drag is of course produced by the lines. There is little one can do to reduce either of these, so the induced drag of the wing is the one to work on.

To keep induced drag to a minimum you must use a high aspect ratio wing and reduce the models weight.

What is induced drag?

During a loop the difference in air pressure above and below the wing is even greater than in level flight, and the air always tries to equalise this pressure difference. The only way it can do, or try to do, this is for it to spill round the wing tip. All the air below the wing tends to move out towards the tip as it travels from the leading edge to the trailing edge, and all the air

Figure 3 – model planform and impact stresses.



above the wing does the opposite and tends to move inward. See Figures 1 & 2. The heavier the model the more the wing 'pushes itself downwards into the airstream', likewise the lower the aspect ratio the more tip chord there is for the air to spill over (this is why sailplanes and seagulls have long thin wings – tip spillage is reduced). When the air divided by the leading edge reaches the trailing edge, the two airstreams which are now moving (when viewed from above) in slightly different directions, meet at different angles and produce turbulence which slows the model down. The greater the wing loading, model inertia and angle of attack of the wing, the more this drag induced by the wing becomes, and the more the model slows down round corners.

Tip spillage creates a tip vortex which is visible in some flight situations. Watch for jet fighters doing tight turns at air shows in damp air or rain where the vortex is visible in the form of a long thin 'tube' of extremely low pressure air in which the temperature drops and forms what is in fact a cloud.

The maximum aerobatic wing thickness in common use is 18% of the chord and many stunt models have their wings this thick. However for combat models, where speed has to be considered 12-15% is perhaps more suitable. Many British 1974 models had 1in thick tapering wings with root and tip chords of about 12in and 7in respectively, which correspond to thicknesses of 14.3% at the tip and 8.3% at the root which is very inefficient. The 1½in thick *Blasta* wing with a 9in chord is 13.9% thick and this makes it more efficient than its counterparts. By tapering the wing tip spillage is reduced but this is offset by the poor root efficiency.

How strong should it be?

It is worth at this stage to consider the importance of increasing the combat model's tight-turning capability. If a model hits the ground it is possibly due to pilot error, either he calculates that a certain manoeuvre is possible, then finds out that it wasn't, or he becomes mentally confused for a short period and fails to steer it away from the ground. Either way, it runs out of airspace or alternative flight paths in that small hemisphere of sky it was flying in. To make that hemisphere appear bigger to the pilot the model must fly smaller radius manoeuvres. At this stage already there are two ways of solving the problem, a negative thinking pessimistic one and a positive thinking optimistic one! The first is to assume that the model will hit the ground –

and therefore beef-up the structure in an attempt to make it crash proof. The other is to assume the model will not hit the ground, and therefore throw out every bit of unwanted weight (spruce trailing edge reinforcement, gussets, nylon covered centre sections etc). This latter answer produces a model that is even less likely to hit the ground, because being lighter it has a superior aerial performance and will not be forced to fly risky attack and evasive manoeuvres during a combat match. After all, gussets and spruce trailing edge reinforcement are only of use on *some* occasions when the model is actually decelerating while in the process of hitting the ground. The remainder of

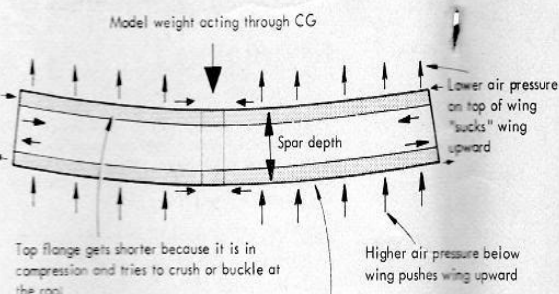


Figure 4 – greatly exaggerated view of spar under stress in loop.

the time they get a 'free ride' in the model, to the detriment of its ultimate aerial performance.

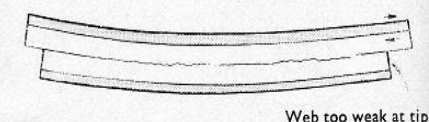
No existing wing structure seemed ideal, or entirely logical, so a new structural system had to be developed. I could not help thinking how silly it seems to cut down South American trees, then slice them up into little strips only to stick them together



Figure 5 – showing how flanges distort flexible tip webs.

again when the age of plastic and alloys is upon us. However balsa (and spruce) are the materials that are stocked in model shops, so that's what is generally used. Typical 1974 models were tapered wing designs with 1in thick sections – their leading edges

Figure 6 – effect of using weak web at tip.





Forming the leading edges from expanded polystyrene is very quick and easy, the only tools necessary being those that you can make yourself. A car battery is used to supply the heat for the hot-wire cutter - how to do it will be described in the May issue.

were built from 3 separate strips and then hand carved. It is difficult to produce two of the same shape and weight and they are also expensive, messy and require precise construction in order that they may fit the ribs. They have a two part job. One is to act as a spar and stop the wing from folding in half during a loop, and the other is to separate the airflow above and below the wing. It has a constant spanwise section and therefore is not an efficient spar *ie* it ought to be thick at the root and thin at the tip.

Ribs that slot into the leading edge require 10 cuts to produce, and if the ribs are all of different lengths, they have to be positioned precisely to produce a good fit. Trailing edges are expensive and time consuming to build, requiring an accurate root joint and if cut from a 36in sheet, the leading edge has to be shorter than 36in between tip ribs, thus limiting the final span somewhat which goes against the high aspect ratio rule, resulting in a reduction in wing efficiency. If you decide to build models from 48in sheet balsa it becomes even more expensive, and there is usually a smaller selection of this length wood in the model shops. Should the elevator be mounted on or near the trailing edge, the rear part of the wing is pushed downwards by the elevator reaction when the model performs a loop, and thus acts against the rest of the wing lift. Only the front part of the wing is lifting upwards efficiently. The 1 metre lengths of plastic film covering currently popular tend to restrict the span to about 38in, so a new tip system had to be evolved to enable the span to be increased. The conventional balsa plate tip is aerodynamically incorrect, having too sharp a cross section and it produces little lift for its area. A more rounded section tip is

better, so polystyrene tips were developed which are cut out with a hot wire 'cheese cutter' in a few seconds.

One good point about tapered wing structures is that the large centre chord spaces the LE and TE more at the root, so that when the model hits the ground (negative pessimistic thinking) the tensile and compressive forces that suddenly occur in the LE and TE are more easily resisted. That is the end of the good points, and any way we are not going to hit the ground, are we? See Figure 3.



Figure 7 - tensile failure.



Figure 8 - compressive failure.

The alternative LE is the spindle moulded variety which again have a constant spanwise section (bad spar). Their weight varies and are very expensive with a difficult rib to LE joint. You have a limited choice of section, if you don't like what is supplied by the manufacturers, hard luck!

Spar design consideration

The *Blasta* spar is situated right behind the polystyrene LE and is built up with a balsa web and two spruce flanges so it looks something like an iron girder. The flanges resist the tensile and compressive stresses that occur in the spar when the model is manoeuvring while the web resists the shear stresses imposed on the spar by the flanges. The deeper the spar is, the greater its resistance to bending is, and the lighter it can be because less material is required in the web and

flanges to resist all the stresses.

When the model does a loop the spar always bends a little bit and providing the web does not split, fracture, shatter, or come unstuck from the flanges, the top flange will get a bit shorter and the bottom flange will get a bit longer as shown in Figure 4 (greatly exaggerated), and the spar will resist the G-loading which tries to make the wings 'clap hands'.

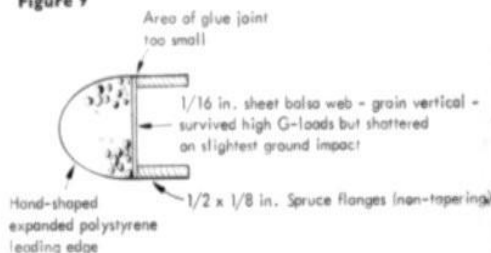
Notice at the tips the web is being pulled one way by the bottom flange, and pushed the other way by the top flange. This is shown in Figure 5 where for demonstration purposes we will assume the webs at the tips are made of soft rubber, so that the action of the flanges may be investigated. In this situation the flanges do not change length - they distort the rubber instead. The arrows in Figure 4 on the web at the tips show the direction of the forces that the web exerts on the flanges, making them change length. Note it is the web at the tips that forces the flanges to change length. If, however, the web is too weak, the flanges will make the web shear as shown in Figure 6.

The job of the web is to keep the flanges in their correct positions relative to one another, so that the tensile and compressive forces may be resisted. Once the web fails there is nothing to stop the flanges bending and the wing snapping in half. In this case extra web material is required at the tips where this shear force is greatest and may be in the form of a sheet balsa plate between the two tip ribs in each wing.

Provided the web does not fail, the only way the spar can snap, is for one of the flanges to fail at the root, causing either a tensile failure (Figure 8) or a compressive failure (Figure 7). Should it snap you just beef up the flanges on the next model, and try again. If your models never break in the air you may be carrying too much around to the detriment of the model's overall performance.

To sum up, we need extra web material at the tips where the shear forces are the greatest, and extra flange material at the root where the tensile and compressive forces in the

Figure 9



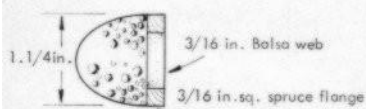


Figure 10

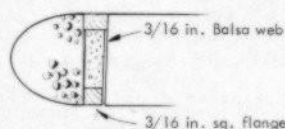


Figure 11

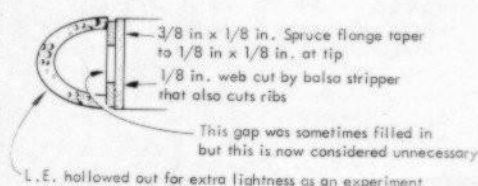


Figure 12

spar are the greatest.

Only with this spar arrangement are you able to design, by trial and error, a minimum weight spar that will resist all the G-loading and that is easy to fit to the ribs and enables you to employ a custom made leading edge of your own design. It leaves no mess on the floor of your modelling room and is extremely cheap and simple to make, especially if mass produced.

The web of the *Blasta* spar is made with an $\frac{1}{8}$ in or $\frac{3}{16}$ in balsa sheet and is not therefore the lightest. A $\frac{1}{32}$ in or $\frac{1}{16}$ in web may be used if extra sheet is laminated at the tips.

Some taper wing models were built with $\frac{1}{8}$ in sections and hand carved expanded polystyrene leading edges and tips, backed up by a spruce and balsa spar whose cross section was similar to a steel channel girder, as seen in Figure 9.

It was found that the wing held up under high G-loads with this spar, but the web was too thin and did not resist the shocks imposed on landing. The glue joint was too small, and sometimes failed, and the spruce flanges were too large and in that position the ribs had to be notched. It was difficult therefore (or time consuming) to taper the flanges as the rib notches would have to be of different sizes. The polystyrene weighed next to nothing and protected the wood frame from minor shocks, but its strength was so low that for design purposes it may be disregarded. Because of this only a very small amount of glue is required to hold it in position and stop it from falling off when the model is airborne.

The Super Tigre glow powered model was *too* fast to follow diesel powered models because it overtook them too often, so the wing was thickened to produce extra drag and extra lift was obtained as a bonus. The next series of spars had heavy $\frac{3}{16}$ in square spruce flanges and a $\frac{3}{16}$ in balsa web infill. These were very much tougher – as drawn in Figure 10.

Two problems were yet to be solved, one of dimensional co-ordination and constructional accuracy, and the other was how to taper the flanges without notching the ribs or tapering the web.

The first problem, which is quite a mouthful, was simply that $\frac{3}{16}$ in square spruce is never *exactly* $\frac{3}{16}$ in square, and when glueing them to the web it was difficult to get a good rib fit quickly and to end up with a $1\frac{1}{4}$ in deep spar every time (Figure 11).

The next series of spars (Figure 12) are the ones still in use. The flanges are set very slightly in from the edge of the full depth web so that a precision fit is not required. They taper towards the tip, and the taper need not be accurately cut to produce a good looking job. The web is cut by balsa stripper (described later) being very easy to make and fits exactly to the same depth rib, also cut by the stripper, and a set square. The plastic leading edge is cut with a hot wire made from 3 strand Laystrate C/L wire and a 12v car battery which need not be removed from the car. All very simple and ultra cheap. A jig is used so that every LE is the same shape, while white woodworking glue (PVA) employed to fix the LE, which is held in position with tape while the glue dries.

The hinged piece

To create an efficient moment arm, the elevator must be situated at some distance from the trailing edge. Delta tails, which are extremely economical and easy to make, were chosen in favour of the more complicated American twin boom method – which consists of two accurately made booms plus a thick elevator carved and sanded to an airfoil section. They then use two wire hinges

fixed to the elevator which pass through two bushed holes in the booms. You can almost make a complete *Blasta* frame in the same time as it takes to put this lot together!

The tail has a very good stabilising effect during flight, and thus the model is very 'steerable' (it goes where you want it to) and you should find that the model will flick into rock steady level flight after a tight turn.

Cutting the plastic bits

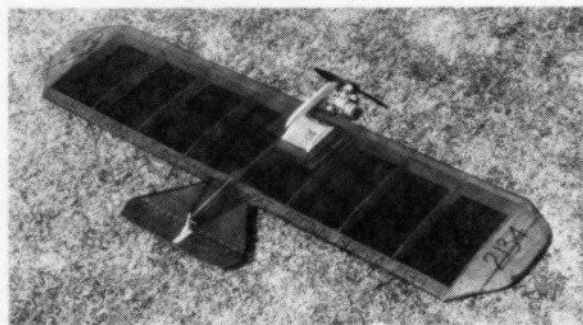
Twelve volt car batteries have six 2v cells which are connected to each other by lead strips that are situated just below the top surface of the battery casing. If you examine the top of the battery you may find drilling points marked which are used by battery dealers who drill down to the lead strips enabling them to test the individual 2v cells. Should you not be able to find those marks, consult a dealer as to where to drill. After drilling holes and inserting screws into the lead strips you may tap off 2, 4, 6, 8, 10, as well as 12 volts for the hot wire by the use of crocodile clips fitted to the hot wire leads. Smear plenty of Vasalene round the screws to prevent corrosion.

You may find the commercially available hot wire cutters better but they are much more expensive, and all the plastic cutting I have done up to now has been done with this simple arrangement.

Using a jig you can produce very quickly one-piece crushable (shock absorbing), cheap, accurate and aerodynamically correct tips and leading edges that are very easy to fit to the model and to cover.

Having by now described the 'raison d'être' behind the *Blasta* design, the reader is no doubt left with the impression that this is a truly different combat ship – and that the author is a really idle so-and-so! Its all true folks! Read next months thrilling instalment, in which we detail the plans for rapid building jigs and constructional details – not forgetting of course flying and operating advice to help such people as Bob Morgan, Richard Evans *et al*.

It might not look so very different, but the construction and thought behind the design certainly is out of the rut. See next month's (May) issue for *Blasta* plan – and details of mass production techniques necessary to keep ahead of the competition.





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 Olivers). 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! Shock! 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,

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

A SECOND COMBAT CLASS?

After the 'Outlaws Combat Rally' on 28th March this year quite a few were muttering about the necessity for a second Combat class. The problem, as reported to me, is that FAI models have become too fast and fragile for the 'average' or 'novice' pilot and that model destruction rates may discourage the many newcomers that seem to be entering Combat at the moment. Therefore some say that newcomers should have the opportunity of competing in a less carnage-prone event with slower, tougher models giving the less experienced more time to correct errors in the air and reduced likelihood of uncorrected errors resulting in 'confetti'.

Personally I am not convinced about the necessity for a second Combat class – one windy weather contest is not enough to judge by. After all there is *always* additional carnage in wind, and there is nothing like wind for exposing the inexperienced. Before saying that today's FAI Combat models are too hairy for newcomers maybe we should look at quite a few contests in all conditions and then make a judgment. I suspect that very many of the new faces seen at the Outlaws 'do' have come into Combat because they find today's fast and manoeuvrable models so much more exciting than the old fashioned variety. If we did have a second Combat class requiring 'old fashioned' models, would many actually fly it competitively? I suspect not, the appeal of the 'real thing' would prove too enticing.

My other reason for being cool on the introduction of another class is that of rule proliferation. We have too many control-line categories already as the Nationals show every time, and yet whenever a new class is introduced it gets added to the Nats programme, causing extra congestion etc. It is one thing for the SMAE to promulgate 'advisory' rules for the use of clubs in running

club and local contests; it is quite another thing to pass full rules and organise events for them at the important contests. In my own opinion, 'Mini-Goodyear' and 'Junior Stunt' should never have been formulated as official SMAE events, the correct place for such events is on the club field not in the middle of a congested airfield miles away from anywhere. If people do want a less hairy second Combat class, let us realise that the place for such contests is, as with 'Mini-Goodyear' and 'Junior Stunt', at the local level, not the National level. After all, the vast majority of Combat models are flown down on the club field, and are of the 'second class' variety i.e. slow and tough. By all means, if rules for a second Combat class are necessary, let the SMAE formulate *advisory* rules for use on a local level (and at the same time re-classify the 'Mini-Goodyear' and 'Junior Stunt' rules as 'advisory to clubs'), but do not congest our overstuffed calendar with it as well. People do not want to see the 'learners' performing at our Nationals, they want the real thing – you don't go to Brands Hatch to watch 'L-drivers' passing the driving test do you?

After all of this philosophical rambling, let us consider some possibilities for second Combat class rules as alternatives.

1. Suction Fuel Feed?

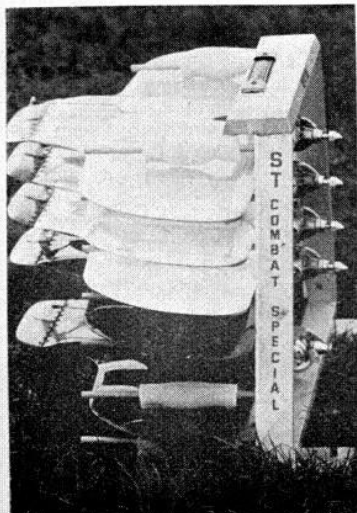
Yes, makes everything easy and simple but *not* necessarily slower – Rossi diesels work on suction!

2. 10in. wing leading edge to elevator hinge limitation?

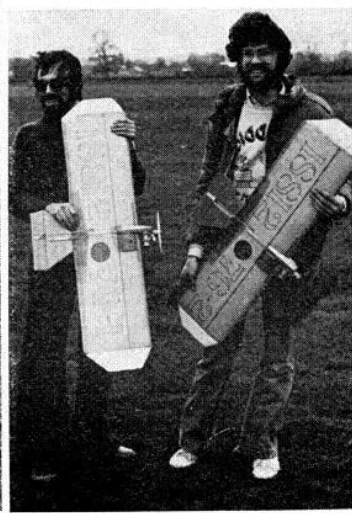
Yes, eliminates fancy models and encourages tough, heavy construction so get the CG right. However, half the kits currently available would be illegal!

3. Nylon covering?

Not on really, we are in the 'plastic film' era now. Many newcomers



Pictures from the Outlaws Combat Rally, held courtesy of farmer Alan Sarll at Standlake, Oxon – a meeting eventually won by Paul Strudwick, and dominated by 'plastic' glow powered models. At left is Cosmo's neat method of transporting sufficient models for one day's contest flying... Below, Mick Tribe launches for brother Peter – one of the few using a diesel engine on this very windy day. At right is a certain R. Wilkens with Martyn Cowley of Biggles. Biggles? Yes the F/F club... and he placed 3rd.



start off with the stuff and forcing them to use nylon would not be popular.

4. 8in. dia. props only?

A good way of killing the 'hot doggies' and easily enforced. Still allows variety in motors, but speeds will be reduced to a pretty uniform level.

5. One model per bout?

Halves maximum carnage rate, and favours tough, survival type models. Emphasises good team-work.

6. Mufflers?

Got to be really, since it is the club field we are looking at and most clubs have silencer rules. Another 'hot doggie' killer.

You can see from this that I favour as performance limiters the last three since the first three all have flaws. However, not being either a club field or big-contest active Combat pilot, I may have gone a bit off the beam. So your views are welcome.



Now that you have built a new style combat model (or rather a small 'stock') from the plans published in the June issue, Richard Wilkens passes on those invaluable, practical tips in this concluding feature.

Repairs

These models break when they hit the ground because it is almost impossible to design a 13oz, 360sq.in., simple to construct wing out of conventional materials that holds up under a 90 mph crash. It is possible however to encourage the wing to break where it *suits* you; that is where it is easy to repair. The model therefore features spruce centre section strengthening strips to stop very abruptly along the wing half way between the ribs, and the LE and TE are supposed to snap fairly cleanly at these points. You may even like to encourage a clean break by notching the LE web and TE at these positions. Repairing the TE is simply a matter of adding a $\frac{1}{2} \times \frac{3}{4} \times 2$ in. ply plate top and bottom of the TE and clamping with a bulldog clip which will force the TE to remain straight while the epoxy sets. Sometimes the LE and tips get crushed in a heavy landing and to eliminate the wrinkles simply add a mylar or 'clingfilm' patch to the damaged area. Streamer string will cut through the LE to the spar, and these cuts should be patched in the same way before the next match.

Test flying

Take some steam generating equipment, like a stove and kettle, to the flying field to remove warps. This is the glow motor/pacifier operation for those new to it:

Open the needle $1\frac{1}{2}$ turns. Fill the pacifier, using a full squeeze bottle of fuel. Clamp the tube with a bulldog clip and connect to motor. Prime the motor through the venturi and turn it over a few times. Prime it through the exhaust port, then connect the glo clip and check the ammeter; remove the bulldog clip and squeeze the tube by hand. Turn the motor over until it 'bumps', then hit the prop forwards and backwards – when the motor starts count to one and release the tube. Needle setting is very critical and by experiment you must find the running limits. It will either run O.K., stop lean, stop rich or run backwards.

A 'lean' stop is where the motor peaks and dies, sometimes several times before it stops altogether. Open the needle $\frac{1}{8}$ turn and try again. A 'rich' stop is where it peaks then 4 strokes for a second or two after releasing the fuel tube before stop-

ping. Squeezing the tube for a second every 2 seconds will keep the motor running while you tweak the needle $\frac{1}{16}$ of a turn between pipe squeezes. If it runs backwards the crankcase is flooded – do not release the tube until it runs forward. The correct setting for launch is as rich as possible, but not 4 stroking. This can be checked by a $\frac{1}{2}$ second squeeze of the tube where the motor will run slightly faster for a second or two, before resuming an off-peak 2 stroke.

"Griptight Soothers" (what a lovely name!) are the best pacifiers to use but in very cold weather even they do not fully deflate, and warming the fuel is the only answer we have come up with so far. Boil a saucepan of water and stand the fuel in it for a while to achieve this.

Do not ever stand with your face alongside the rotating propeller; if the prop throws a blade, it may cut or blind you.

7in x 4in. Tornado nylon props boiled in water for 10 minutes are the safest to use. Most other nylon props of this size are dangerous on Super Tigres, or any other engines, running at these rpm's.

Engine fires are rare but sometimes occur when priming through the exhaust port with the glo clip connected. If a fire occurs, squeeze the tube and blow the fire out. Do not panic and drop the model because the pacifier tube could disconnect and squirt flaming fuel anything up to 10 feet.

Fly the model level and look to see if the wings are level. You should not be able to see the outboard wingtip above or below the inboard tip. If you can, then the wing is warped and you should land and remove it before doing any manoeuvres. If it looks OK, fly a wide wing-over to inverted and check again. If the line tension is different now or the outboard wing tip is visible, you missed removing the warp. Land and remove it before flying any tight turns, otherwise the model may crash. Never ditch one of these models when test flying as it will probably break; land it gently when the motor stops. When all warps have been removed fly wide consecutive loops downwind, progressively tight-

And away! Another 'Blasta' takes the air – or does it? In fact this is an all-foam version with hollowed out cores and known as 'Super Star II', plans of which are available direct from the designer – see Classifieds for details. Meanwhile, those who prefer the more conventional 'Blasta' should send £1.10 to AeroModeller Plans Service, quoting Plan No. CL 1284. A thick and thin-winged version are drawn on the same sheet, with full details for mass producing these highly successful machines. End of commercials!



ening them until you are holding on full up elevator. Note whether or not the outboard wing suddenly drops and flies wider loops than the inboard wing, together with an immediate 10-20 per cent reduction in the model's airspeed. If all this happens the wing has stalled because there is too much elevator movement.

Before landing, fly outside loops and try the same procedure. If the model drops a wing in one loop direction only, bend the pushrod next to the elevator horn to reduce the elevator movement in the stalling direction and re-fly. Move the pushrod into a higher horn hole if the model still stalls. You will need more elevator movement on windy days.

Test fly until no stalling occurs, then if you are not satisfied with the turning radius add tail weights (solder wrapped round the elevator horn) until you are, but make sure you can steer the model accurately and that you can fly it rock steady level.

It takes many hours to become accustomed to the higher speed of a glow-powered model and flying really is a matter of learning what flick of the wrist produces which flight pattern that fits into whatever gap is between the model and the ground. You may find the following helpful. From a wingover fly a standard 'wiggle' (Figure 1) a dozen times and check the gap (I hope there is a gap) then aim to reduce it to a foot or so by starting the same pattern a bit lower each time. Try wiggling up and down an axis of 45° (Figure 2) and then fly 5, 4, 3-sided and round loops in quick consecutive succession to learn which wrist flick is required to produce which directional change. Then do it with eights. Square vertical eights and horizontal hour-glasses are a bit of a joke.

Do not fly wide downwind loops on windy days as the motor may overspeed and shaft run after throwing

the prop blades. If the pitch of the motor noise quickly fluctuates and the motor sounds like two motors running at slightly different speeds, then the prop is loose.

Contest flying

If you have just 'converted' to glow flying, you will need to form a well organised team as glow motor operation is not so straightforward as the more reliable diesel, but it is a lot more fun when things are going right.

If you are part of a team, aim to standardise everything: use the same lines, handles, props, motors, pacifiers, streamer hooks, engine plates and fuel as everybody else and the whole outfit will work much more smoothly than one where every member of the team uses personal items. The only thing that should be personal is the model, or if you are very lucky, just the model colour. Plugs, lines, props and pacifiers are items that need constant replacement and a system needs to be worked out whereby members constantly check and replenish the stock. The *Outlaws* last year had a line box, an equipment box and a pit box that everybody used. This year, model leadout lengths and handle sizes will be standardised so that lines are fully interchangeable and odd lines salvaged from a line tangle will be reusable.

Before each match make sure that the pit box contains two separate accumulator systems with ammeters and best quality glow plug clips (not the push on type) four new and tested plugs, four new pacifiers, three bulldog clips, two full fuel bottles, one syringe full of fuel connected to a pacifier, four new and sanded 7x4in. nylon props, two plug spanners, pliers, wire cutters, screwdriver, nut driver for motor nuts, prop nut and washer, spray bar assembly and streamer clips.

On the edge of the circle you need the team's equipment box, from which the pit box is replenished and extra items suitable for cleaning motors and repairing models during the match should be kept, as well as the line box containing spare lines and handles. A spare pit box for practice flying is useful, as is a spare accumulator, should either of those in the pit box run down.

There are two problems with flying the Super Tigre glow powered *Blasta*: one is that '100%' Oliver reliability we are so used to no longer exists, the other is that of speed difference between the *Blasta* and its diesel powered equivalent is still quite a problem, especially on windy days when the speeds of both models



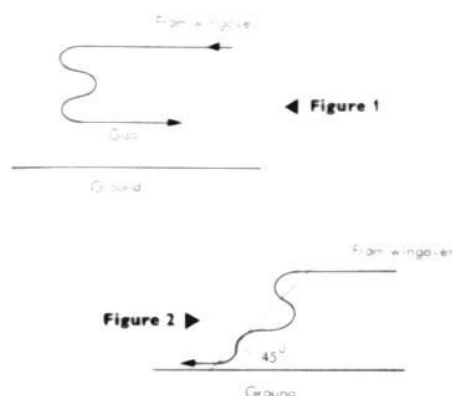
You do not have to have rubber legs to succeed, but if you can vary your height from dwarf to giant in one easy manoeuvre, then it helps!

increase by about 20 per cent. Learning not to follow slower models takes time and new techniques have to be mastered.

Surprisingly perhaps, flying against the Rossi diesel is easier as the speed difference between models is reduced to about 5 mph, in the Super Tigre glow's favour, and flying against last year's American models which were faster than the *Blasta* in level flight (which is unimportant) became a straightforward conventional following exercise.

The lower the prevailing wind speed, the more chance you have of success as the model which is really only a precision streamer cutting tool becomes more useful and manageable, and there is less chance of overshooting the streamer and cutting the string, especially when trying to follow wiggles. This year, however, more of the opposition will be flying faster so the problem should not be so great.

Surprisingly, hitting the ground is quite a rare occurrence because once having made the decision to fly destructable models you develop very quickly a sixth sense which prevents you from flying risky attack and evasive manoeuvres, and most *Blastas* have been destroyed in mid air collision. Providing you are an optimist, you should find that using *Blastas* in competition is considerably more exciting than the usual heavier diesel powered efforts, because everything happens much more quickly. There are some clever champions around that fly slower models, and still win contests, so do not expect instant success, but do expect instant fun!



Can anyone believe this arrived the very month I was compiling this book?

Even Richard did not know I was doing it!

From: STEFANO BASSALTI <bassalti@yahoo.com>

Date: 16 December 2010 10:53:24 GMT

To: vickyrich@btinternet.com

Subject: Regards

Goodmorning mr, Evans

My name is Stefano Bassalti , i am 47 and i am living in Milano, Italy.

Some years ago (too many) i was a child and i began making combat models in a club close to my home in 1976.

I have been in Italian combat world until 1984 and then i stopped.

In the beginnings we were discussing how to make models and English magazine like Aeromodeller were our guides.

We were looking to pictures and trying to make new models.

One name was above all the others : Evans.

A close friend of mine, had a picture of you with a model.

He made a drawing calculating possible dimensions, angle of the picture and at the end of the day he drafted a model he called M&C 2000 a.k.a. Evans.

It was a fantastic model but with a too short life.

The year after the Wilkens Superstar ended the balsa model era.

It was forgotten but i liked it too much (as a 13 y.o. boy can do, i suppose you can imagin it).

So i bought a couple of them made by this friend of mine (they are really beatiful).

One of them is in my attic, pretty new today, never used.

The other i have flown many years ago, in my laboratory, waiting for overhauling.

This year my son, 10 y.o. decided to give up with radio control models and start with control line.

Strange, but he did.

I have bought a MVVS diesel and i have cleaned mi Rossi 0.15 (run like a violin)

I have overhauled many old models i have and the MEC 2000 also.

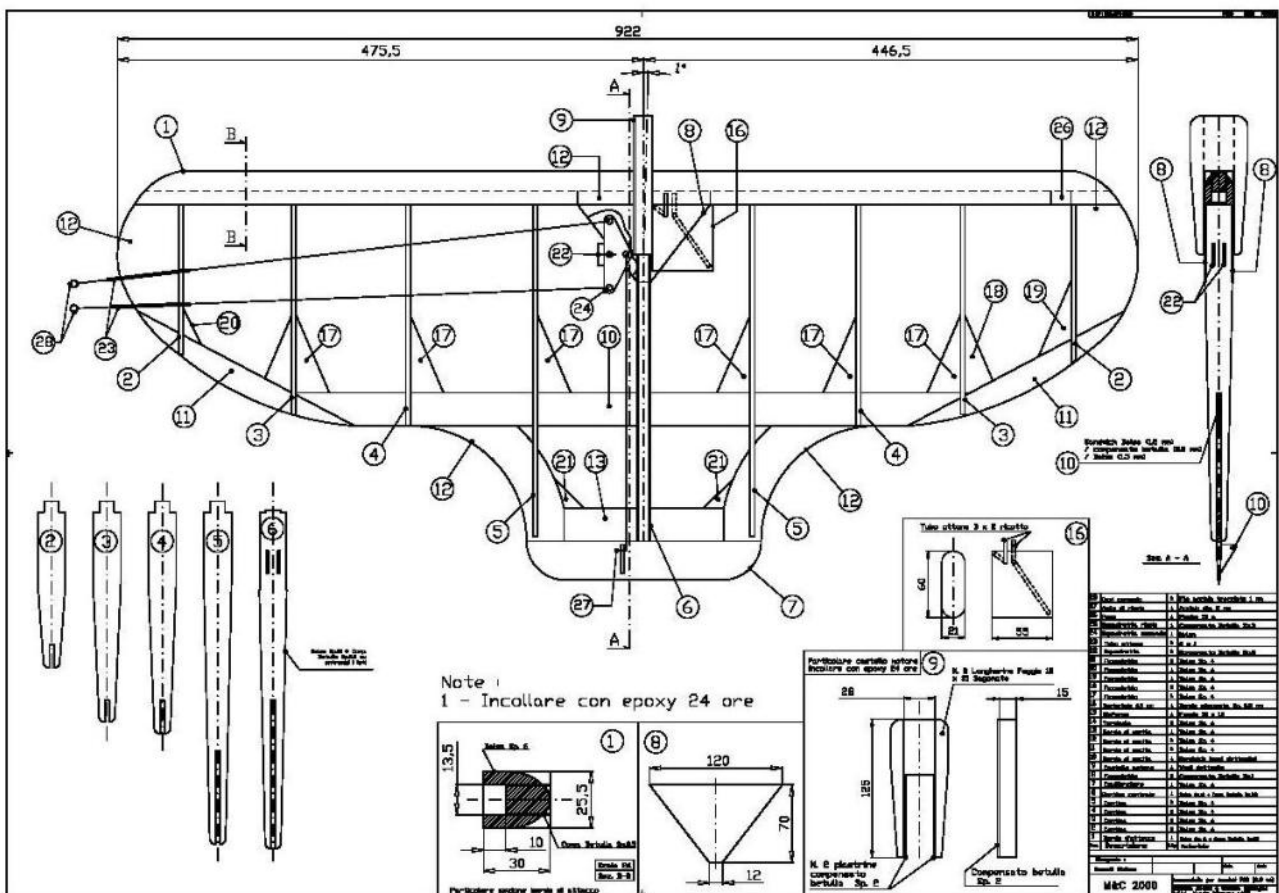
I have flown it 2 weeks ago and it flies superbly.

Now the reasons why i am writing to you.

First to contact you : as a child you were a myth as you can imagine.

Second we never knew the real name of the model, please could you help me ?

I have re - draft this model, and i am sending you a pdf copy, right to end the



1977 Articles



'Before and After!' The kit, which we learn is now packaged in a strong polythene bag (see before you buy?) with the foam cores still within their protective 'blanks', contain few parts – which is why the construction is so rapid. The only extra material needed is that for covering and of course adhesives – everything else is provided, including nylon reinforcement for the trailing edge and centre section – most important. Various alternative covering methods and materials are suggested, but we chose the most popular – gift wrap paper, which is cheap and decorative – hence the roses. They sort of grow on you. . . . Tips and tailplane were covered in white Solarfilm.

IN THE CONTEST world, it is rare for any one design to be completely different *and* superior to its contemporaries – and even more rare for it to be commercially available in kit form. True, in some countries kit models are regular contest winners, but this tends to be because the modellers have 'taken the easy way out' and flown these models not because they are better, but because they are readily available. Design stagnation such as this is a pity, but it does happen.

Just one short season was necessary for competitive combat flying to change completely – and that was almost entirely to the efforts of Richard Wilkens. In 1975 his *Blasta* design was 'the tops', but over the winter he produced the same model with all polystyrene wings and simplified tips, named it *Superstar I* – and had an instant winner. This, he then improved upon by reverting to the larger wing tips of the original *Blasta*, hollowed out the core of the wings – and presto the *Superstar II* was born. And every combat flyer knows how successful that was – and still is!

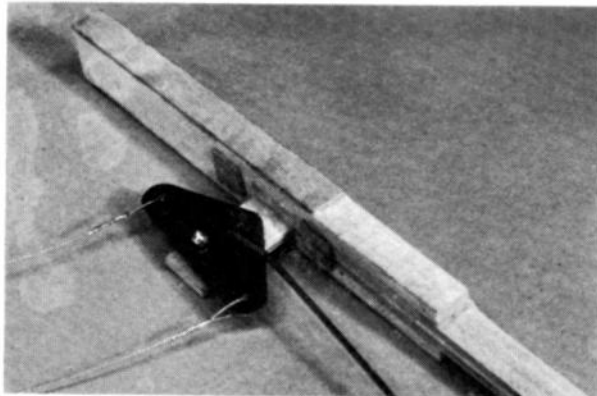
It was thus with more than a little interest that the *Superstar I* kit was examined, and what a contrast to the 'traditional' kit it proved to be. For a start, there was no 'box' as such – the foam blank from which the cores were cut serving to contain all the bits and pieces, as well as protecting the wings themselves. Clever. All parts were provided – including a metal tank kit – but nothing was die

cut, nor in fact needed die-cutting. Examination of the very clear instructions (both written and sketches) plus the informative 'notes' sheet made it very clear that here was a very simple, yet cleverly thought out design.

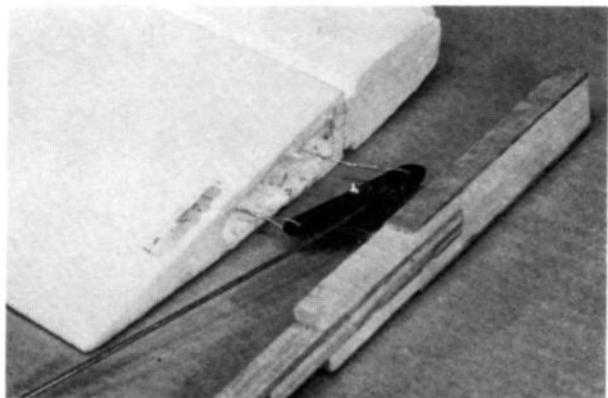
To say that 'construction got under way' would be a lie – assembly would be a more accurate description. In essence, the model consists of a central ply/balsa/spruce rib which is the heart of the model – the wings being glued on either side, the tailplane slotting into its rear, and the engine pod slides over the front. Such an important item must be made accurately, but as it consists solely of several flat strips, this is no problem – indeed it must be virtually impossible to assemble *any* part of the model incorrectly. The instructions are not only precise – they are a wealth of information, make every stage abundantly clear, and should be a model for virtually every other manufacturer to emulate. For once the builder is rewarded with the feeling that the designer has actually made a model from a kit himself.

As there are so few parts to assemble, a description of the building sequence is unnecessary – the photographs reveal all. The only surprising omission was the fact that while a tinplate tank kit was provided for diesel engine operators, there were no parts supplied for a pacifier pod for a glow engine installation

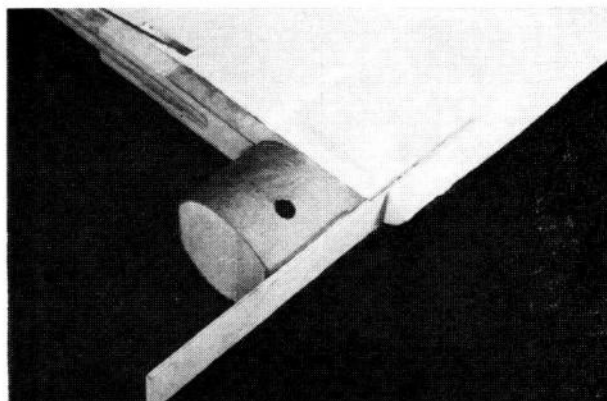
Key to the construction of the whole model is this central rib – built up from strips of balsa, ply and spruce. Note the detail point such as the plywood bellcrank 'stops'. The tailplane unit slots between the two spruce strips seen in the bottom right hand corner of the picture.



In order to provide clearance for the bellcrank movement, some of the foam must be removed. This was easily achieved with a warm soldering iron – the foam melts at a rapid rate, but the operation is easy and far from critical. Note how the bellcrank mount passes through the centre rib for extra strength.



Although a metal tank kit is provided – ideal for use with a diesel engine – we chose to use a glow engine/pacifier set up. Whilst parts for the pacifier pod were not provided, details were. The pod shown here consists of $\frac{1}{4}$ in balsa sheet sides with thin cardboard wrapped around and fuel proofed by swilling Tufkote around the interior and pouring out the excess. We understand that future kits will have these parts supplied. The $\frac{1}{4}$ in plywood full depth joiner fits into slots formed in the pre-shaped foam blanks.

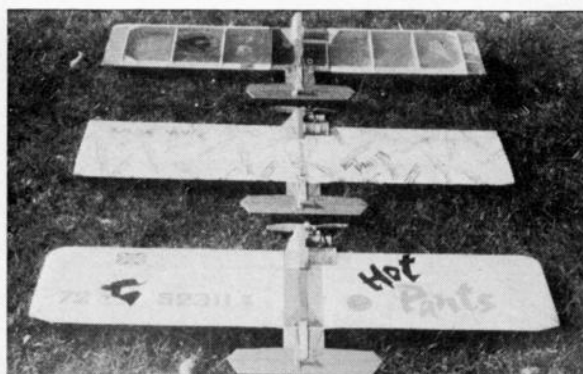


Bill Burkinshaw editor of the SMAE's 'Model Flying' newsletter performs the re-fuelling operation via a large capacity plastic syringe purchased from Michaels Models of Finchley at £1.25. It proved ideal for inflating the pacifier fuel tank.

FRANK SMART'S
F.A.I. GLOW - DIESEL
HOT PANTS
COMBAT DESIGN DOUBLE IN FOAM OR BALSA



Really cheap and quick to make from Polystyrene Ceiling Tiles.



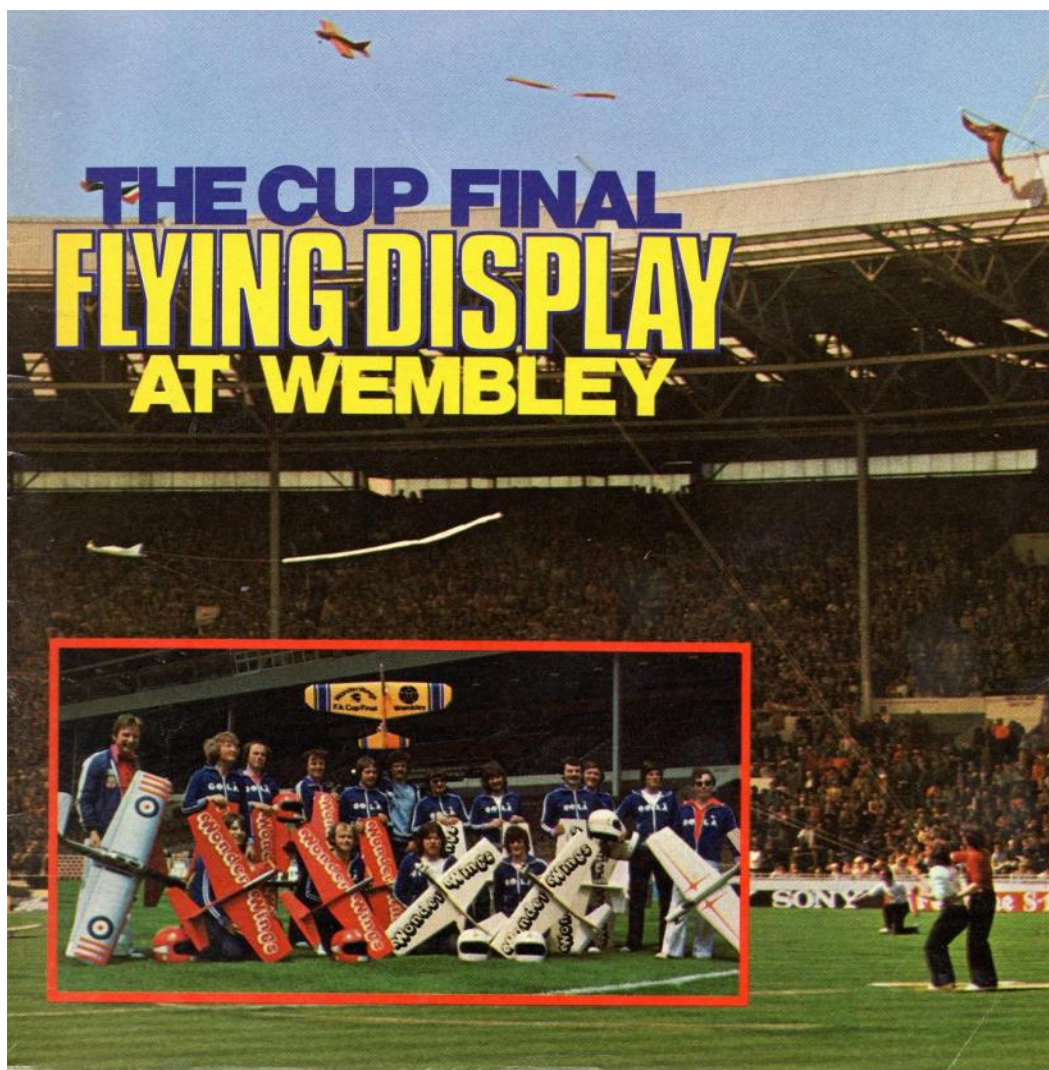
Three of the Hot Pants designs featured on the plan drawn below. In the foreground is HP4 – the hot performing contest version with polystyrene tile construction. Next is HP3 – the polystyrene trainer variant, covered with 'The Modellers Den' wrapping paper incidentally, and lastly is HP2 the conventionally structured, nylon covered contest model with $1\frac{1}{4}$ in. wing section.

36A4T" SPAN C/L COMBAT MODELS 40H 2 511. 75000 engines APM CODE G.A.A.

YCU

I've seen a few complicated plans from Frank but this has to be the ultimate?

O.K. so its not FAI but surely worthy of inclusion.



The lad himself with just one of a whole fleet of special models to be flown at - yes, you guessed it - Wembley, prior to the big footy match. Wings are foam (naturally!) and engines courtesy of Duke Fox - namely '36's.

The final line up of the Display Team was as follows:

<i>Aerobatic Pilots</i>	Pete Tindal & John Newnham
<i>Combat Pilots</i>	Mick Lewis & Richard Evans; Richard Wilkens & John Hammersley
<i>Engine Starters</i>	Dave Wood & Bill Gipton
<i>Launchers</i>	Dave Clarkson & Bob Morgan; Bill College & Jim Carolan
<i>Model Servicing</i>	Trevor Sayor & John Berry
<i>Retrievers</i>	Steve Marriott & Chris Wellington
<i>Centre Marshall & Pilot</i>	Martyn Cowley
<i>Commentators</i>	Richard Walker & Alan Bowley
<i>PRO & SMAE Rep.</i>	Shirley Tate & Ian Dowsett

1978 Articles

COMBAT

by Frank Smart

The winter months are always the off season for combat flyers, too cold for practice and too few contests. But now the contest calendar reminds us of the year ahead no doubt many are turning their thoughts to getting some models together for the coming onslaught. Here then are a few hints and tips to be incorporated in this year's fleets of combat ships.

PACIFIER PODS

For those intending to use thin card, I found that instead of taping the joint, it is best to overlap the card at the back which gives double strength as well.

Alternatively use two separate bits of card and overlap at front and back giving a rigid support to the sides; plus it does eliminate errors of trying to make four accurate folds.

Instead of fuel proofing the end plates, I find that in the long run it is quicker to Solarfilm a sheet of $\frac{1}{8}$ in. balsa before cutting out the end, same with the card or use a greaseproof card facing the inside, use of 'impact' glue allows all these surfaces to be glued satisfactorily. The Solarfilm also holds the balsa together better in a collision, to be recycled in a new model.

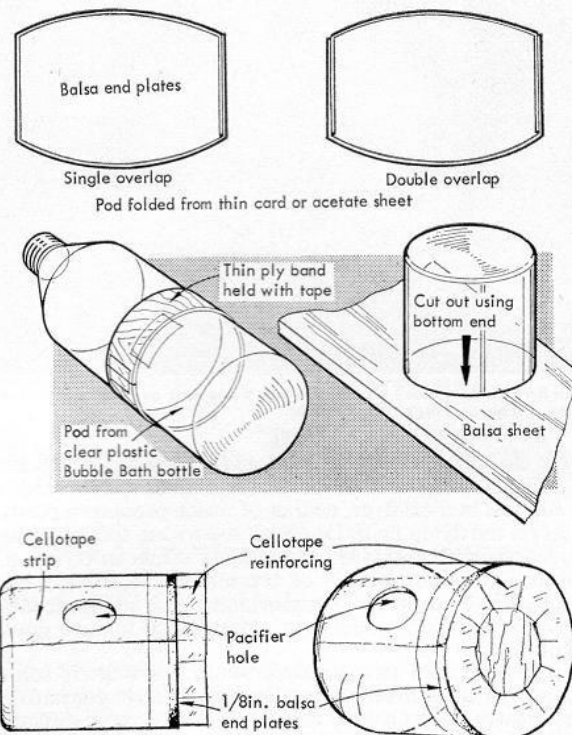
After using Acetate sheet for clear tanks to facilitate filling observations etc, I found that they were OK for a while, but the fuel not only obscured the clarity, they became brittle and splintered, puncturing the pacifier. After making one out of a fairy liquid bottle which is still going strong after two models, I feel that I had only solved half the problem, then I spied a clear plastic Radox bottle, so here we have a clear tank which is exactly the right diameter. It is fairly easy to make two tanks from one bottle, hunt around the stores as there are many cheap foam baths using the same bottle.

First make a simple 1mm ply ring taped together around the bottle with the grain of the ply crossways for easy handling. Then mark the tank width of $2\frac{1}{2}$ in. and slide the ply ring up to the mark and with masking tape secure the ring to the bottle. Now score (not cut) the plastic right round, then push a sharp blade through and use the ply as a guide for cutting, the whole operation is quick once mastered.

Put the one half with the top to one side and using the bottom half press open end on to $\frac{1}{8}$ in. balsa sheet, like a pastry cutter, to mark. Do this twice more as you will need two ends for the other half when you have cut the top off. Sand perimeter of end to a slight bevel which facilitates fitting. Now lightly sand an $\frac{1}{8}$ in. band inside the tube and apply impact glue to both balsa and tube, allow to dry.

While waiting for this to dry fit end into the other half before cutting off the top in the same manner as previously described.

I pierce a hole with a pin then, using a woodworker's hole cutting tool, offer in the threaded twist bit end and score with the cutting tool, or use school dividers. Now use a balsa knife blade to cut the hole, twisting out from the centre hole and finally using a dowel sanding stick or similar, smooth the surface edge, as this is where



the tank splits from. The diameter of the hole is to suit a rubber car grommet to retain the pacifier in a fixed position, without the use of a metal washer which rattles. The strength of the pod can be improved considerably by reinforcing the edge joint between tube and end plate with cellotape.

Push fit into the model and once in place glue with Epoxy round the perimeter. Use a clean or transparent colour mylar covering over the tank to prevent splitting, then seal and fuel proof.

The hole is cut in the tank before fitting to the model, as it is easy to trim the hole without fighting a 40in. span model, plus the fact that the tank being circular, the hole can be positioned before the final gluing.

SELF ADHESIVE HORNPLATES

Use a 1in. wide double sided tape on 1in. wide strips of 1mm plywood. I make my plates 1in. square because, as you will note in most horn packs they are handed left and right and as I secure the plates in exactly the same location on every model it does not matter which hand is eventually used. If you like you can pre-drill for both types to allow a new horn to be fitted without taking off the broken stump.

Firstly make all the 1in. square hornplates that you will need

Unwind a strip of double sided tape and then lay down all the horn plates close together. Leave on the strip for storing to prevent loss and cut them off with a knife blade when needed. Then simply peel off the backing and press into position, making sure that top and bottom line up.

SELLOTAPE

Self adhesive tape is increasingly being used in combat wings not only to hold parts together while glue is setting, but in the actual construction, because of its lightness and strength. It can be used to strengthen the rear of ribs at the TE on open frame models and also to hinge the elevator to the tail before covering in Mylar.

Here are a few more tips worth considering which have all been tried out with good results.

With open frame models, in a ground impact, the ribs on the inboard wing can be crushed giving a wrinkle in the covering, (what an understatement!), this is due to the lead out holes, no matter how small, weakening the ribs. This can be overcome by putting Sellotape on each side of the ribs in the form of patches, before piercing the holes.

Another use is when making the holes in balsa tips for lead outs, especially if the tips are very wide. First mark in pencil the line of the lead outs across the tips, then tape over these lines, over the edge and back underneath. You can now pierce the balsa with a cycle spoke or drill and widen with a rat tail file. The tape prevents the piercing tool coming out of the balsa before it reaches the other side and splitting the balsa at the edge.

Sellotape can also reinforce the forward part of the trailing edge at rib junctions, this combined with the tape round the ribs forms great strength, without putting much extra weight on the model.

Iron-on Mylar is also very useful for reinforcing sheet balsa before using in model construction, to prevent the wood splitting down the grain under stress. Iron on to both sides of the sheet before cutting out the parts. Especially useful for wing ribs gussets and sheet parts around centre section and tank bay.

IMPACT GLUE

The best adhesive for a superquick job is 'impact glue' especially if you are mass producing, it also provides a flexible joint, resulting in less damage in mid air and ground impact.

It works well for the following: laminating, leading edge and trailing edge spars, sheet doublers for tails, front edge of ribs to leading edge. These are glued, then fitted into the model leaving the TE joint to be glued with PVA thinned down and run round the joint, once the wing is squared up. Ply fuselage cap strips which form tail box. All gussets and sheeted parts around the tank etc. It is however best not used for the centre fuselage rib and bearers which is the heart of any model.

STREAMER HOOKS

Here is a new stype of streamer clip well suited to the thicker string which is currently being used for streamers. It is made from a nylon curtain hook, which has the long leg cut off leaving the hook part to be screwed to the bearers or centre section.

The streamers can just have a knot on the end or can be looped for easy removal, the hook being flexible allows most thick threads and string to be retained firmly. Making this type of hook is far easier and quicker than soldering and bending the wire type normally adopted, there is also less damage to other models when packed for transport when scuffing occurs.

REPAIRS

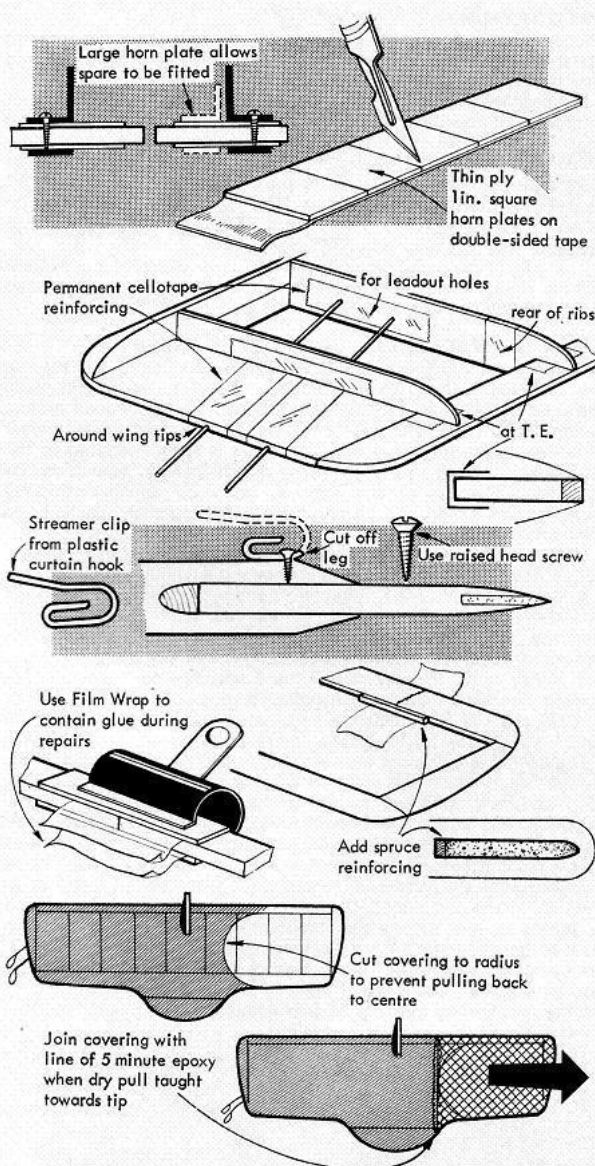
When I do a repair job on a trailing edge, I do as most people would do and use two straight bits of ply either side and sandwich the broken TE cramping with small 'G' clamps, or stationers' Bulldog clips. Unfortunately Epoxy sticks everything together, so I use a protective layer of 'Cling Film Wrap', which is a thin film of Polythene which is used for wrapping sandwiches etc. Once the glue is set everything comes apart cleanly. I have yet to try it but there is also a strong possibility that it can be used for over-small holes on Solarfilm as an instant field repair.

If two straight bits of ply are employed they can be used to align the TE dead straight. Once set, for extra reinforcement, use 1in. or 2in. medical bandage and rub in balsa cement and smooth over joint.

RE-COVERING

Most people use dope and pins to hold the nylon overlap in place, when repairing models, this takes some while to dry before the nylon can be pulled spanwise. Sometimes balsa glue can be used but with large areas the balsa glue dries too quickly. So I had a go with Epoxy 5 minute glue and had immediate success, covering one side at a time, the time of covering ready for doping was greatly reduced and it is much neater without all those pin holes.

Where the nylon is to overlap, the old fuel proofer is scraped off and lightly sanded, then starting on the underside the nylon is



stretched chordwise across the model and pinned at LE and TE. 5 min Epoxy is rubbed through the nylon in a strip about 1/4in. wide. The remaining perimeter can be covered in the normal fashion, but the great thing is the amount you can pull the nylon out to the tip to give you the original overall tightness on the model. After underside has been covered repeat treatment topside and then overlap as required.

Finally the comments will be of course, it is all very expensive these days to build open framed models, but you are always going to have the people who prefer to build this way even though polystyrene is here to stay. No doubt the next stage of development will be replaceable foam plastic wings, on a re-usable centre fuselage combining the slot for replaceable tails. All the ground work has been done on various other models and it is now only a matter of seeing this done in practice.

With plastic models so cheap and quick to make I do not foresee at the moment wings being changed in a bout or even replaced between bouts as most people make enough models to get by. But being able to change a wing on the field may become a useful way of topping up the stock of flying models during an event.

However, with all the discussions these days, of an 'alternative combat class' and the current upsurge of interest in 1/4A combat perhaps these traditional construction techniques will find a new lease of life. We might even end up with a Vintage combat class, say at Old Warden, for combats senior citizens.

Frank saw it coming!

Aero Modeller

DECEMBER 1978 40p

U.S.A. & Canada \$1.75



HOBBY
MAGAZINE



WORLD COMBAT CHAMPION'S MODELS

COMBAT!

World Champs Details

An interesting moment during the 3rd round match between Tourne Belgium, and Tomelleri Italy. Did they get out of it? Well actually no.

MICK TIERNAN'S ANDURIL

The winning Combat model of Britain's New World Champion was a very simple but sophisticated structure underneath that deceptively ordinary covering of giftwrap. Mick first expounded the virtues of his highly original structural philosophy in his article on Combat Design published in *Control Line Aeromodeller Special* (price 95p from MAP). Mick analysed the potential weak points of typical foam Combat models and went on to outline his solution, utilising a $\frac{1}{8}$ ply veneered LE plus Nylon strips to take the tensile loads of a prang. It is this design construction that he developed to the present world beating model, *Anduril*.

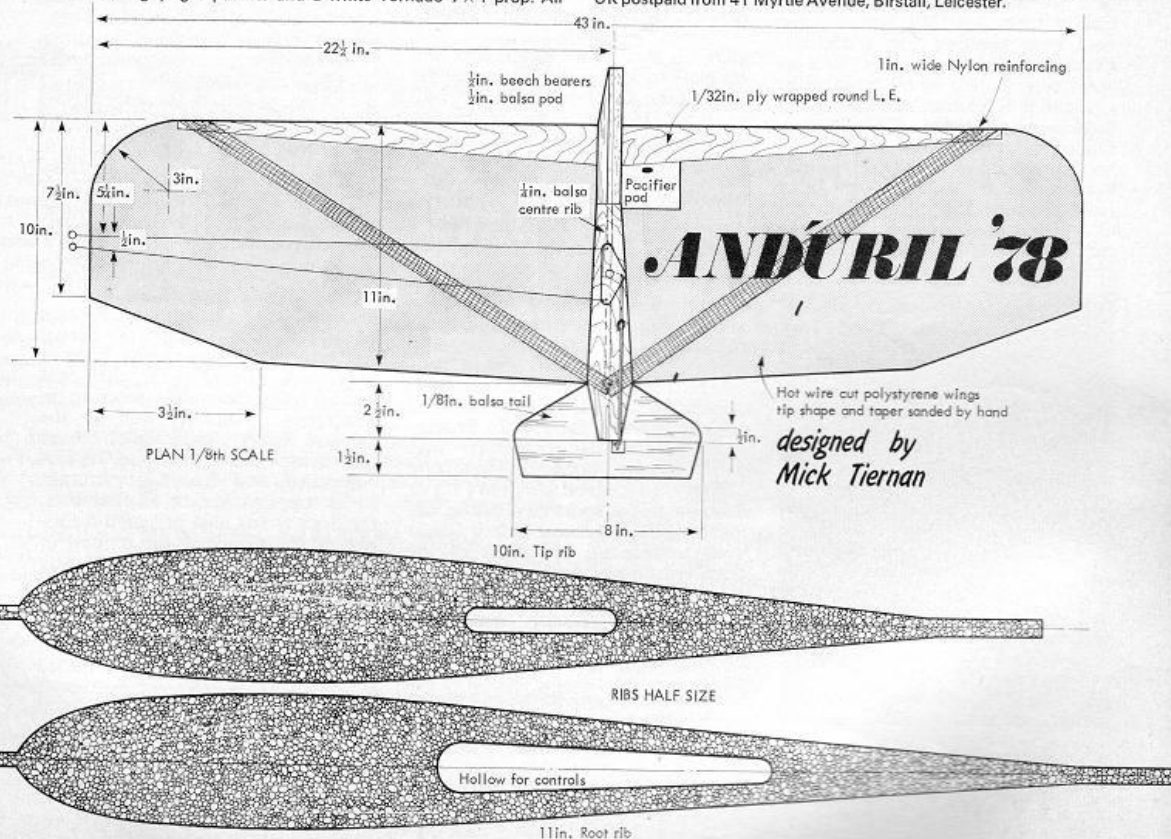
Earlier in the year, at the World Champ Trials, Mick had been unhappy with the turning ability of his models, however he still topped the results to gain his team place. He felt that the model, a 44 x 12 in wing with a 12 in tail, was too stable and consequently lacked turning performance. Reasoning that the opposition at the Champs would fly fast and wide, he reduced wing area and used a smaller tail to introduce some *instability* for tighter turns. A thinner section reduced from 1 $\frac{1}{2}$ to 1 $\frac{1}{8}$ in completed the transformation.

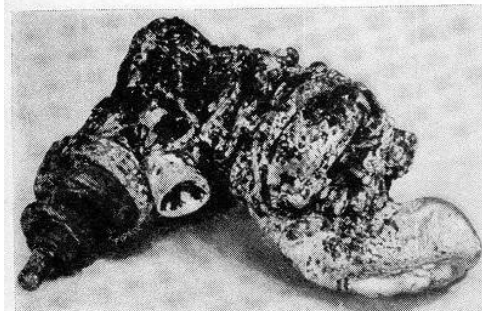
The design and motor combination was conceived for utmost reliability. The Super Tigre uses a standard peripheral jet with the carb drilled out to 6mm, running on Model Technics G400E 10% Nitro fuel, a griptight pacifier and a white Tornado 7 x 4 prop. All

out performance was rejected to avoid the inevitable hang ups they would include. Consistency wins the day was his motto.

Constructionally the model is straightforward, tapered foam wings are hot wire cut and hollowed, with tips rounded and bevelled quickly by hand sandpapering. A $\frac{1}{4}$ in balsa centre rib is slotted for the bellcrank and wide cap strips of $\frac{1}{32}$ ply, which support the pivot, run chord wise back over the tail to wing joint. The original style LE is formed from $\frac{1}{8}$ in plywood well soaked, then dried left wrapped round a broom handle, to obtain a curved shape before glueing in place with Copydex. The ply is simply given a slight feather edge where it meets the foam airfoil though this is not important. 1 in wide strips of nylon stuck on with PVA are used to reinforce the wing diagonally. Nylon is also used to reinforce the balsa and beech engine pod and to keep the pacifier pod in place. Gift wrap is wall-paper pasted on, in traditional manner. Balance point works out about right with the rear silencer lug removed from a standard Super Tigre, mounting it back against the LE. Dead easy really, isn't it? All you've got to do then is learn to fly like a World Champion. Well done Mick, Britain's first World Combat Champ.

Incidentally for those who don't like flying five inch span FAI models, Mick will sell you a full size plan with instructions for £1.50 UK postpaid from 41 Myrtle Avenue, Birstall, Leicester.





Vernon Hunt still manages to raise a smile after his unlucky run up to the World Champs. A great pity he was unable to display his exceptional aggressive style of combat with this new design which he says out-performs any model he's ever flown. Coming from Vernon that's some endorsement. Left, if you think Vernon's Fox 15 looks in poor shape, you should see the Whitney Straight Trophy!

from the plastic era, an attempt to get one step ahead, with performance being the total objective and cost to some degree being irrelevant. This may sound a little extreme but the World champs was the motivation to produce the ultimate combat model.

The Superstar II was a successful model for me in the 1977 season but presented me with two major problems both attributed to the parallel wing, one precise controllability especially in windy conditions and secondly lack of crash resistance. It was possible to keep the model together with reinforcements but performance was impaired.

Like a lot of other people I was impressed with 'Boomerang' design, the model flown by Jean Michel Fraisse but I got the impression again that controllability was a problem. This observation was borne out by closer observation which revealed the root chord was small by today's standards at around 13" and the turnability was obtained with a rearward CG by having the motor inside the leading edge. However this was a step further than I had been in 1975/76 when trying various flying wing models which had proved to be nothing to write home about.

The first couple of attempts were entirely foam construction but to get a stable aeroplane the motor was too far forward to give anything more than average manoeuvrability. At the same time the model weight left something to be desired. Even in the Superstar days 16ozs was average, anything lighter which meant hollowing the foam which could result in models that sometimes would 'explode' in the first couple of flights.

The only answer to the problem was to re-distribute the weight in the model, that way I could get the motor back towards the pivot point but retain a model that was very stable. It was realised cost might go up if there was an inclusion of balsa wood even on a part construction basis; however the model had to be stronger. Foam offered the advantage of quick construction for curved sections.

My solution therefore was to use foam to the peak of the section, a full depth spar and what I call a half rib construction, which succeeded in removing at least an ounce from the rear of the model. I had tried to use a full depth spar of 3/16" sheet balsa but when the outboard wing fell off four times (successfully glued back on every time) the balsa was reduced to 1/8" sheet with 1/4" x 1/8" spruce spars top and bottom. Elliptical wings have always produced a more controllable model in manoeuvres. The only drawback with an open frame is in the use of mylar film which besides its cost, adds no strength; the use of 'fascal' may help cure this.

Building a "one-off" model can be time consuming but after deciding on a quantity, John Whittle contributed a simple jig. The trailing edge will go together without any water soaking but it is necessary to create the finished curve by using two strips balsa glued to the building board to form a slot where the trailing edge can dry to shape, or by pinning down to shape. The best way of construction we have found is to make up the 'balsa wing' on the building board including trailing edge extension and then add the foam

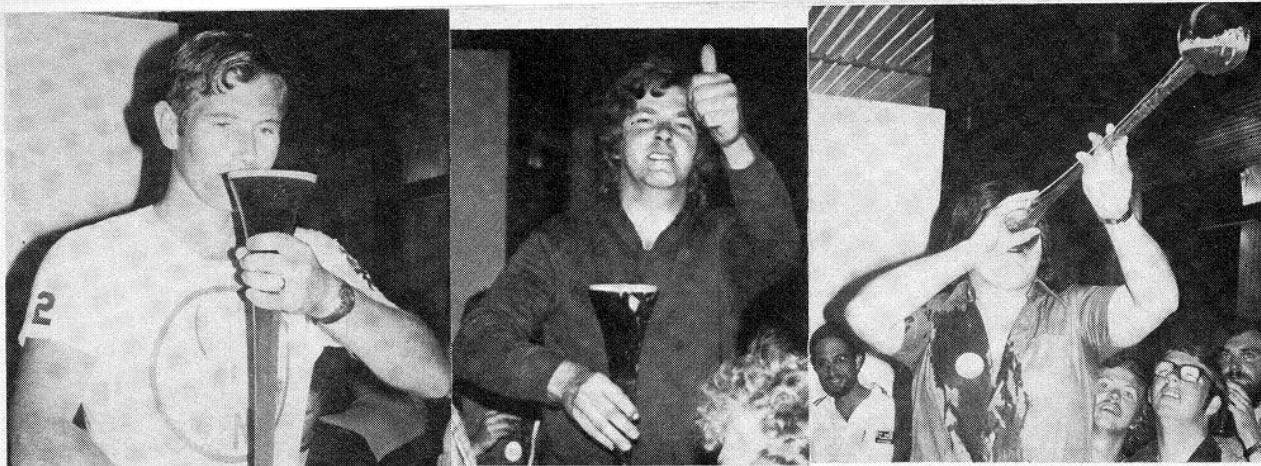
continued.....

Well done the lads!!



**CONGRATULATIONS TO
MICK TIERNAN and DAVE WOOD**

**1st AND 2nd IN THE FIRST EVER
COMBAT WORLD CHAMPIONSHIPS**



Practising their pitstops! Paul Smith (MACA) during intensive refuelling session. Centre: The Maestro Dick Miles, a whole tank full in 17 secs plus far right Outlaw Bill Gripton, who had spent all day training eating dry biscuits.

leading edge after along with tips and pacifier pod.

The last operation must be to add the motor mount and position the motor. The CG is fairly critical but the model will fly successfully with either Super Tigre G20 or Rossi 15, although with a good Rossi bionic reactions would be useful. The main advantage of this type of construction is that repairs are quite easy on part damaged models. So far only two have been written off this year although I can assure you they burn rather well!

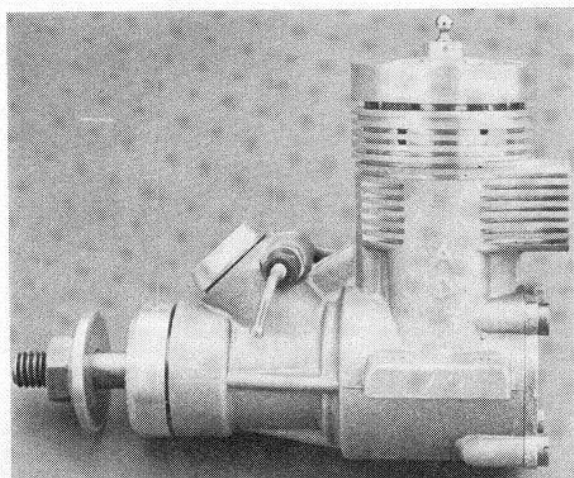
The only common factor on choice of power plants was that almost without exception they were all glows. One or two diesels were in evidence notably with the Germans using MVVS and Rossi motors, and they were unquestionably a little slower. Any advantage for quick restarts is outweighed by the current rules allowing one minute warm up launching with the motor running, by which time even the most tricky glow motors should be raring to go. Should being the operative word as many inexperienced teams were left at the start with red faces. No excuse for that chaps. Some teams chose to start their motors on a prime with the needle valve fully closed, re-opening the needle as it fired. No wonder they wasted precious time adjusting for the correct running setting. Teams using bulldog clips, clothes pegs or even surgical forceps to withhold fuel pressure while the motor was started, with the needle valve waiting at running setting, were naturally airborne first. The other rule, which allows the motor in the second model to also remain running for the duration of the bout, dealt the final death blow to the dirty diesel. The argument, no doubt, being that this gives the pilot more chance to display his flying skills rather than hanging around waiting for his pitmen to do their stuff. At world level, for the present at least, it appears that diesels are a NoNo.

So to the big news story of the meeting, the appearance of the AD15 used by only one competitor, top Italian flyer Tomelleri. This motor is the work of ex-World F/F Power Champion (1965) Alberto Dall'Oglio and owes much of its outward styling to the Rossi except for its rear facing finned exhaust outlet. (The Combat version has a shortened exhaust stub compared with the F/F version.) Internally the motor has less liner taper than a Rossi but has a much beefier 12mm shaft and is generally more robust weighing in at 165g. Standard Rossi heads are used and its impressive speed was achieved on straight 80/20 no nitro fuel! These motors are very limited in number as they are but a part time venture for Alberto; however several British lads are now in possession so watch for results.

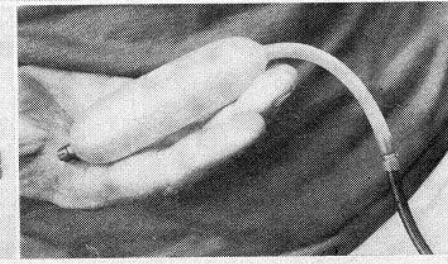
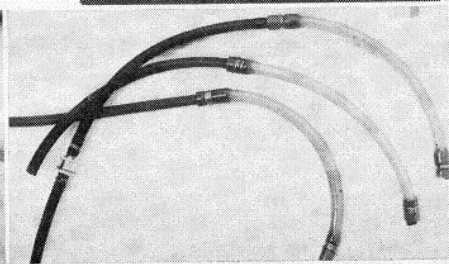
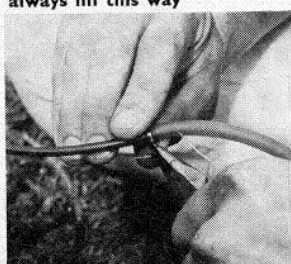
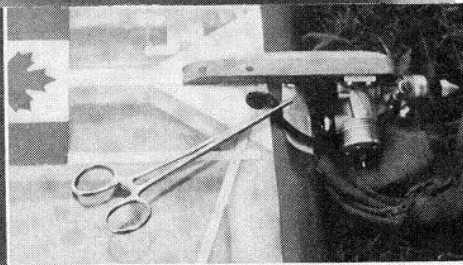
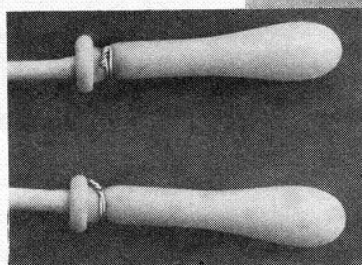
Of the glow motors, the Rossi 15 has to be top choice, on paper for brake horsepower. Obviously the flyers haven't been reading

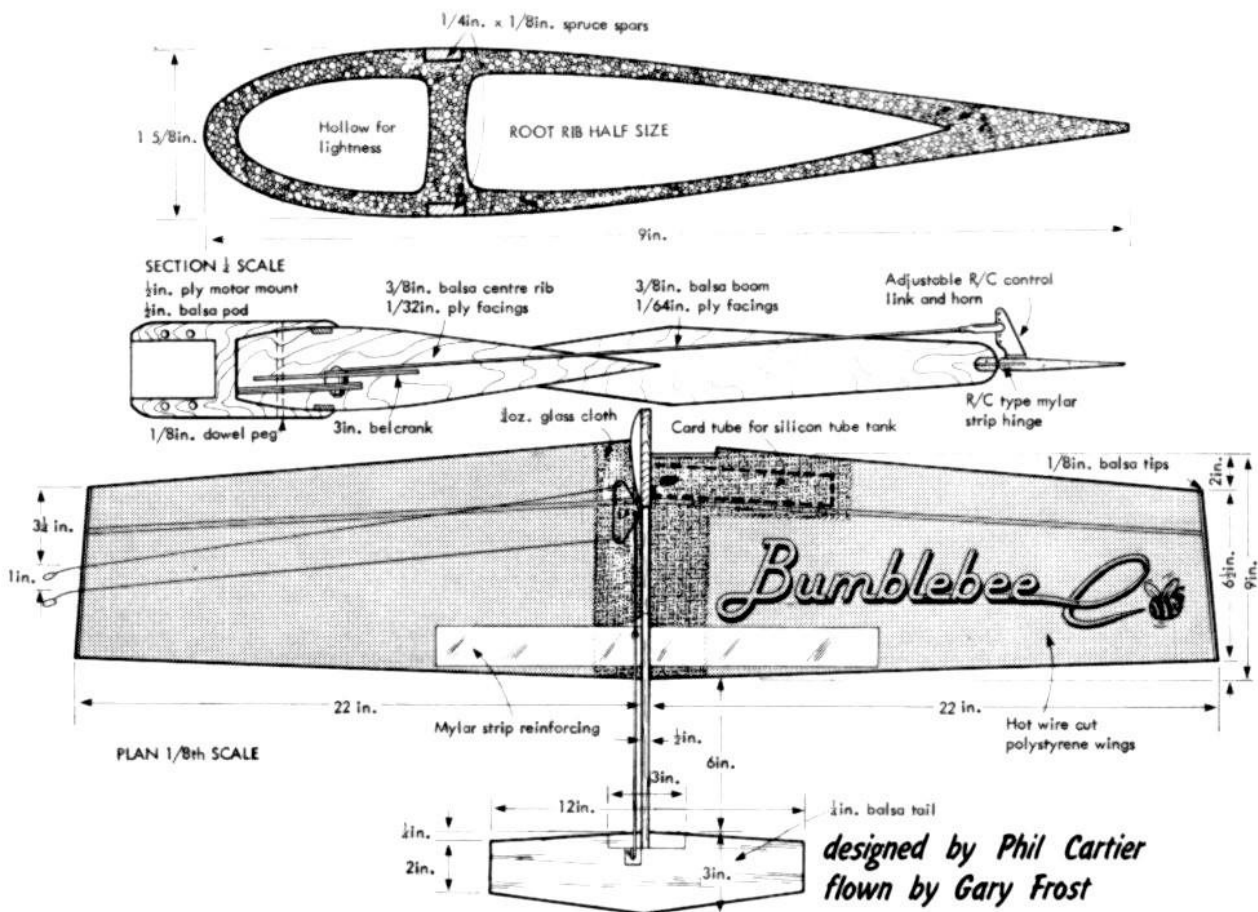
their test reports, as Rossi's were far from dominant. To be objective there was little to choose in airspeed between half a dozen different types of motors all running on approximately the same types of commercial plastic propellers (see chart p. 563 October Aeromodeller for exact details). Super Tigre G20/15 or the F1 version were the most popular numerically and it was this motor that was used by both finalists Tiernan and Wood. As for tuning no-one knows exactly what goes on inside another's motor. Most claimed to use standard motors, Mick Tiernan's only secret, being a southpaw, is that he opens the box with his left hand! His only modification being an inch length of soft rubber pipe slipped over the carb, which folds back in a prang, closing the intake and preventing blockage with mud. (Standard British technology!)

Frenchman Jean Michel Fraisse is a known tuner, and his Rossi powered Boomerangs were very impressive. The Fox 15s present were also well above what we have come to expect as being standard for this unit. The entire American and Mexican teams were equipped with Fox 15s which differed from the early schneury Foxes seen here in UK in that they were fitted with integral glow buttons, similar to Rossis, instead of the traditional glow plug. The improved accurate



A.D. 15 the new FAI motor shown top right the F/F version with longer exhaust. Right: Industrial balloons used by Mexicans. Far right: Clive Gibson. Canada used surgical forceps to restrain his pacifiers. Below Paul Smith shows us how to make fuel filled frankfurters, from the left twisting the soft copper wire whipping tight with pliers; centre: that's what they look like, top one fitted with filter; far right: 'training' to start expanding from the closed end first; once stretched they will always fill this way





shape of the area around the filament has long been recognised for its improvement in power, although it reduces the chances of a quick plug change mid-bout as it required the top of the motor to be removed. These new Fox 15s referred to as "Combat Specials" could prove useful although running them on expensive 50% nitro as the Yanks did, will require deep pockets.

The Irish team had an unusual choice of motor with the 2.5cc Taipan distinguished by its gold anodised cylinder head fins. They certainly flew fast enough for Stoo Holland in his classic bout with Mick Tiernan. Clive Gibson was as fast as anyone using the rear exhaust Cox 15 fitted with the new green glass fibre Kelly props, apparently a good combination.

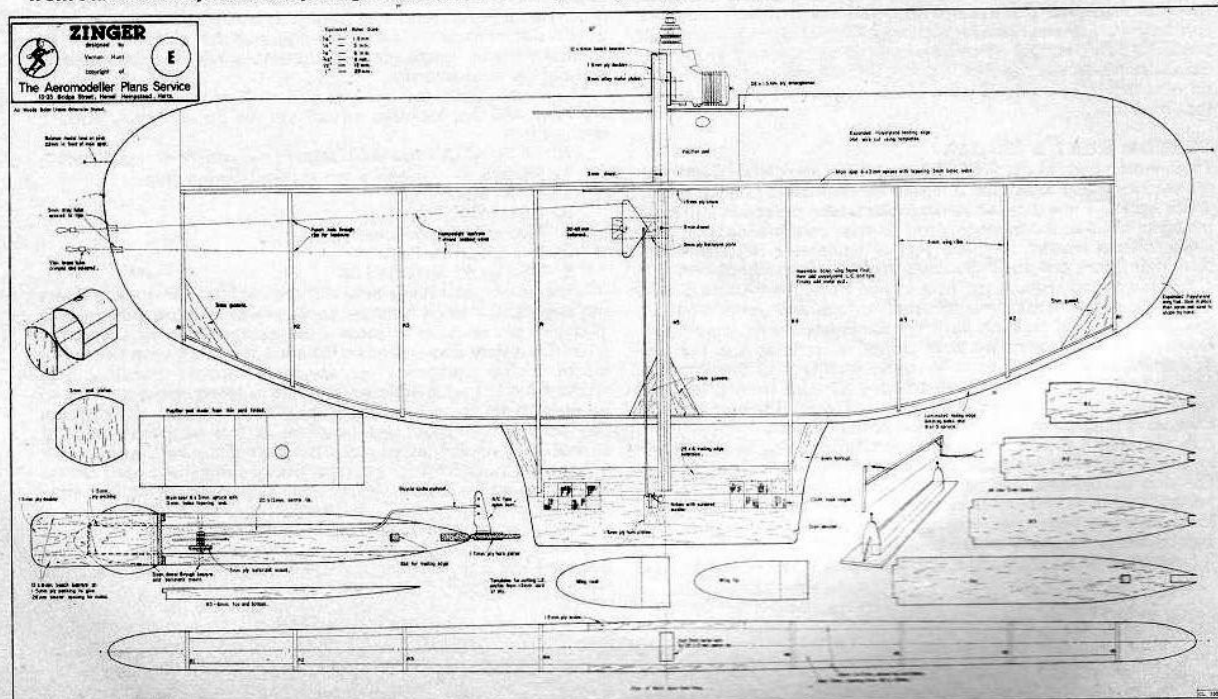
Fuel systems showed many variations world wide, most preferring the expanding balloon type. Tomelleri was one who used a conventional tinplate tank run on crankcase pressure which makes it definitely easier to start and set the engine. Disadvantages are the empty weight of the metal tank of at least one ounce, plus the chance of fuel frothing and air bubbles entering the feed pipe, but separate miniature fuel hoppers can help overcome this problem. Some balloons were literally party balloons as used by the Brazilians, restrained externally in recesses in the wing by patches of netting. The Mexicans used very nice 1 1/2 litre industrial balloons, little larger than the British dummy type. Once again the Americans were unique with their surgical tube tanks which they blew up inside cardboard rocket tubes running spanwise inside the leading edge. Being almost one inch in diameter these fuel filled frankfurters have the advantage of fitting completely inside a normal wing aerofoil section thus avoiding the unsightly, and drag producing, British pacifier pod. These sausages have to be trained to start expanding from the far end first, so that they creep inside the tube towards the outlet while being filled. Working the other way about they can get stuck, fail to expand properly or even shrink during a run pulling the pipe off the motor. Special thick wall large bore silicon tubes is marketed by midwest in the US called "Bladder Fuel Tank" although similar products are available in UK. The dead end is whipped with soft copper wire, round a .22 cartridge case to block the tube and the feed end round a short length of brass tube or a hollow rivet with the normal fuel pipe already fitted. The system certainly did not work for Gary Frost who was let down with innumerable wings full of fuel. He had failed to line the wing with a rocket tube (similar to the centre rolls off turkey foil or shrink wrap) and so the sausage burst on the rough interior left after hot wire cutting. Thanks Gary, now we all know how not to do it!

COMBAT RULES NOT OK. One thing that soon became apparent at Woodvale was the global dissatisfaction with the current FAI rules. Most of the countries present voiced the opinion that some changes should be made.

There is currently a conflict between the ideal principles and practical enforcement of combat rules. Safety considerations such as flying level and not letting go the handle are obviously necessary but when they are misused to penalise flyers for not following the letter of the law, then such rules are being abused. Merely not flying level cannot be construed as dangerous flying anymore than letting go the handle as the model glides slowly to land. Flying level inches over the opponents pit crew for example can be even more dangerous yet legal. The centre circle is there to prevent pilots blatantly running away from their opposition not to penalise them for incorrect foot work. Most countries agreed more emphasis should be given to scoring flying ability and less to penalties from abstract regulations.

At the December FAI meeting there are bound to be many new proposals. Holland for example have been discussing a reduction in engine capacity to 1.5cc. How would you want your British FAI delegate to vote in a case like that or indeed, what proposals would you like him to make on behalf of British Combat flyers? Write and let us know and we will pass on your views.

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Mick Tiernan takes a look at the problems associated with modern FAI Class combat flying and proposes a second class with more appeal to the 'average' flyer

COMBAT flying in England is on the decline – due entirely to the introduction of the glow motor to this side of the sport.

This is bad enough at the moment, but the situation will get much worse when, as is inevitable, the Rossi and Cox Conquest 15 replace the Super-Tigre G20/15 as the 'standard' motor to use.

Evidence to back up this statement can be found in the number of entries in recent combat events; the British Nationals in 1974 had around 120 entries but by 1977 this had dropped to 60.

At a recent well publicised rally in the Midlands area, six people

turned up! There are three main reasons for this, the first of which is expense.

The Super-Tigre G20/15 is not an expensive motor to buy, but if you touch the ground with a modern combat model the 7x4in. prop has to be replaced. If you have a lean run, then you replace the plug, and if you hit the ground hard you replace the prop, the pacifier and the model! Glow motors on pacifiers and small propellers use twice as much fuel as slower revving, suction-fed motors, while the ancillary equipment required (accumulators, glow clips, syringes, ammeters etc.) all add to the initial outlay.

The Cosmo Club in action at the Nationals with Chris Snitter launching Peter Tribe's all-foam device, and Dave Willis looking round for the spare. Certainly FAI combat today is fast and furious - but can it ever be as popular as just a few years ago, when the diesel reigned supreme?

The second reason is the high rate of carnage. Large, light models travelling at 85-90mph break much more easily than smaller models moving at 75mph.

Foam models covered in wrapping paper may be inexpensive and quick to build, but if you have to make four times as many as were necessary three years ago, then where is the saving in time and energy? It does seem a pity that all that ingenuity should go to waste.

The third reason is noise. The *Ironmongers* and *Warlords* of a few years ago could be flown on countless small fields all over the country. The motors in use at that time, with

exhaust collectors fitted, made less noise than a silenced R/C motor, so newcomers to the sport (and experienced fliers who needed the practice) could get together within easy cycling distance of home for a Sunday afternoon flying session.

I now have to travel 50 miles to a barren piece of moorland to fly my unsilenced FAI models, so what chance does a beginner stand? Most practising seems to be done at contests, and it shows in the standard of flying.

The answer to this problem seems to me to be the creation of a new class of combat, similar in principle to the Goodyear racing class which was originally designed to allow beginners to start in racing events, and which is now probably more popular than FAI team racing.

The following three restrictions on the current FAI rules would solve the majority of the problems outlined above:

1. Minimum propeller diameter to be 7½ in. (i.e. standard 8 in. dia. with ½ in. allowed for wear). This must be a standard commercial nylon propeller. Glass reinforced nylon not allowed.

2. Suction feed only.

3. Only motors included in the following list will be allowed.

Diesels

P.A.W. 2.49/PAW.19
Oliver Tiger 2.5cc
MVVS D7 2.5cc
Super Tigre G20/15D 2.5cc
ZOM 2.1cc
Shokol 2.5cc
Webra 2.49D
E.D. Racer/Super Racer 2.5cc

Glow

Cox Medallion .15
OS15/.20
Fox .15 Std.
Fox .15 Plain Bearing Schnuerle
Fox .19
Enya .15
Enya .19 Plain Bearing
Enya .19 B.B.
Thunder-Tiger .15 glow
Fuji .15
Fuji .19
(Fuji .19 Mk III B.B. not allowed)
Super Tigre G20/15 glow

Rule 1 will slow down motors and make it possible to ditch a model without damage if, for instance, the motor setting is not right, or the streamer has fallen off, or if the bout has finished. Combined with **Rule 2** this should create a real saving in fuel, plugs, propellers, building time, and give more actual flying time in a combat bout by

reducing time spent replacing damaged equipment on the ground. Combat is an event for pilots, not pitmen. **Rule 3** will simply prevent the use of high powered expensive motors, such as the Rossi diesel, which if they were allowed would only give an extra 2 or 3mph, but everybody would have to have one, doubling the initial cash outlay and maintenance costs without benefiting the event.

The motors on the list have been chosen on the basis of price and availability, from the stock list of a well known London model shop.

As an example, the PAW19 is available off the shelf in most model shops, for just over £9.00 (about the cost of a Rossi rebore!) and is faster than the Oliver Tiger.

If anyone can name a motor which is not on this list and fulfills the requirements above, i.e. easily available and costing under £20 (not including silencer) then please let me know, and I will include it.

Top picture shows more combat action, with a light-weight but non-foam model providing the 'bait'. Structures like that are essential to be competitive in modern FAI, but they cannot withstand ground contact. At right is Vernon Hunt, winner of the 1977 British Nationals. The Superstar model he flies is certainly quick and cheap to produce - but half a dozen such models were consumed during his fight to the top.



These three restrictions combined will also reduce the noise to an almost acceptable level - a maximum exhaust area rule, or even a full silencer rule could be included at a later date. At least this is a step in the right direction.

I would welcome any suggestions on, or constructive criticism of the above, and I would be grateful to hear from any club or organisation who could provide space to run such a contest in 1978 either along with their own rally or separately, and of course, any prizes or spare trophies would be most useful! In fact, if any club is sufficiently interested to take over the whole organisation of this class, I would be very happy to hear from them. I can undertake to provide streamers, etc., and to recruit scorers and timekeepers, from those flying in the contest. Interested? Then write to M. Tiernan, 41 Myrtle Avenue, Birstall, Leicester. Phone Leicester 674922 - and let's have some action!

1975 Contest Reports



Richard Wilkins made a return to combat flying at the Rissing-ton 'do' – and won convincingly with his huge model – powered by an ex-Kevin Lindsey G20 glow motor.



The combat team will consist of those well-known names (left to right) Vernon Hunt, Richard Evans and Mick Tiernan – and just look at the variety in model designs! One thing they all have in common is light weight and plenty of square inches!

TRADITIONALLY held at the end of the previous season, this year's Trials differed in several major ways. Due to unfortunate circumstances, beyond the control of the organisers, the meeting was held at the very start of the season, which naturally meant that competitors had been unable to prepare their models to proper 'contest tune' – especially after the miserable weather experienced in the early part of the year. These comments do not, of course, apply to the aerobatics team, which was decided last November when Messrs Blake, Mannall and Newnham qualified. However, the most important (and controversial) new features were the adaption of different procedures to select the teams concerned.

Combat

For the first time, a combat team was to be selected – and this highly competitive event naturally caused the SMAE's control-line sub-committee much head scratching to produce a representative team. Their solution was neat – and worked very well. Twenty

people were invited to attend, being chosen from their performances over the previous year. These 20 individuals then each flew five opponents – those who scored the most victories being the chosen team.

Eventually, two names remained 'unscathed' with five victories each – Richard Evans flying a *Vertigo* (a much enlarged version of his *Ironmonger* design, now spanning 38in. with a 12in. root chord and weighing 15oz.) and Mick Tiernan with his recently kitted *Anduril* design. Close behind, however, were Vernon Hunt and Steve Bingham with four wins apiece – the deciding fly-off being in Vernon's favour. He flew a huge (390sq.in.) low-aspect ratio design which weighs in the region of 13–14oz., and has a very good Oliver Tiger for power.

What was, perhaps, a little surprising was the absence of glow motors – these very big models need a really well-tuned diesel to be competitive, and a glow motor would appear to be the easy way out. No doubt, time will prove their superiority,

especially when pit-crews get used to their intricacies. Main glow motor propagandist John Hammersly was in attendance, but in an organising capacity only.

It is interesting to note the result of the current trend of large area, minimum weight models – they are very fragile. Vernon Hunt 'totalled' six machines, while Mick Tiernan damaged a similar number; Richard Evans, however, escaped unscathed. Will this carnage discourage would-be combaters? Let's hope not – perhaps a minimum wing loading, or even minimum weight ruling, will have to be introduced some day?

In all, a well-planned and organised Trials, with plenty of keen competition – and with a very strong team emerging

TEAM TRIALS

for the 1975
European
Championships

The Nationals



Go! Richard Wilkins, now a member of Outlaws, releases the streamer while another pit crew-member launches John Hammersley's Super Tigre G20/15 powered combat model. John became first glow-motor operator to reach the Nationals' finals for many years.

CONTROL LINE

COMBAT

Contrary to popular belief, combat is (and certainly was this year) one of the events most affected by high winds. Added to this, the very bright sun during the latter stages of the competition made precision combat difficult, if not impossible.

Entry this year was a healthy 115 including three of our American cousins. Full FAI rules were employed including the losers re-fly which necessitated commencement of flying on the Saturday, and from the outset it was apparent that some well known fliers were only too pleased to make use of this extra 'life'. Competent pilots often only needed to stay airborne for four minutes in order to win their bouts in these early stages.

On the second day it was obvious that many lesser known first round losers were not interested in taking advantage of the re-fly system and were subsequently disqualified for not appearing on time. The question must now be asked if some

modification of this system should be employed in future, as much time could have been saved.

First notable head to roll was that of British team member Vernon 'Rat' Hunt, who was beaten by an on-form Ray Sibbald, who had previously defeated Mick Tiernan on the first day. Vernon was flying his new large area, as yet un-named design, which certainly shows promise.

One of the earliest bouts to produce any accurate cut-taking was that between Collis and Evans, with Richard winning four cuts to nil. Two rounds later, however, he lost narrowly to Stu Holland of Eire, over for his annual pilgrimage to the Nats.

The Americans obviously found the diesel opposition tougher than expected, their Super Tigre lightweight models not as fast or manoeuvrable as our glow fraternity now produce. There are now rumours of an American order for Oliver Tigers! Gary Frost, president and founder member of MACA (Miniature Aircraft Combat Assoc.) battled his way through only to lose in a

very close-tought bout in the fourth round.

Despite his early season promise, a hard practising and very impressive Richard Wilkins (now of Outlaws) lost to Bob Morgan. Richard, using his unorthodox technique, took a two-foot cut on the cross after which his motor gave trouble. Bob retaliated with two fine cuts to clinch the bout convincingly.

In an excellent quarter-final, Bob also disposed of Mick Tiernan, the defending champion, by two cuts to one.

Of the other quarter-finals Hammersley and Wood fought a dour battle resulting in a re-fly, in which John snatched a two-cuts-to-one victory, removing the final two inches of streamer without the knot.

Lewis defeated Malone and Holland beat Rose in the other quarters.

In the first semi-final, Mick Lewis flew John Hammersley. John's Super Tigre G20/15 glow powered tailplane-model was able to stay up wind for long periods, thus avoiding Mick's close following tactics and eventually ran out winner having again taken the final small snippet of streamer.

Upwind flying tactics were once more employed in the other semi by Stu Holland who lost narrowly to Bob Morgan; during this bout Stu's model paid a short visit to the speed circles one hundred yards downwind after having both lines cut. . . .

In the fly-off for third place, Stu Holland lost ground time at the beginning of the bout due to crashing on take off and having trouble with his spare model. When he finally got into the air, Mick Lewis had little trouble in defeating him, three cuts to one.

For the first time in nearly a decade, a glow powered model was to appear in the Nationals Combat Final! Both were away at the whistle, although Morgan initially suffered a bad run with his Copeman Oliver. However, this soon came on song and Bob then suffered the finalists nightmare of taking the whole streamer at one go. This is often the death knoll, but on this occasion John Hammersley was unable to outfly Bob's slower, but more manoeuvrable, model. The result was thus decided on ground time which was significantly in Bob's favour.

Both finalists had flown well throughout the competition but Bob had been exceptional in overcoming the adverse weather conditions and was a truly deserving winner.



Bob Morgan was a well deserved winner



Two visitors came all the way from the USA just to fly in combat. At right is Charlie Johnson who came in '74 and enjoyed it so much that he brought Gary Frost with him on this occasion. Gary is wearing his MACA tee-shirt – quite appropriate as he is President and founder-member of the 'Miniature Aircraft Combat Association'.

ADMAC Combat '75 – 5th and 6th July

Congratulations to Alfreton & District Model Aircraft Club! The combat International which they organised at the Derby Sports Ground was a magnificent achievement from all aspects. The site itself could hardly be faulted, consisting of an athletics track complete with camping facilities, showers, cafeteria and adjacent swimming-pool. Add two days of superb weather, a good foreign 'invasion', plus first-class organisation, and you have the makings of a first-class contest. And so it proved to be – the only disappointment being the lack of British participation. Of the 52 entries, just 37 were from this country, and yet last year 49 Britons travelled to Holland! Why? The £5 entry fee included camping, free evening meal, and a chance to compete for more than £200 worth of prizes – the winner also collecting a fine trophy plus £50 cash. And yet the Nationals attract 120 plus each year. . . .

Main interest centered around the motors being used – the Outlaws were there in force, of course, with their Super Tigre glows, but the real eye-openers as far as speed was concerned came from some diesels present. Mick Tiernan had a borrowed Rossi 15D in

an *Anduril*, and promptly frightened himself with the power available! On a 7x6 Topflite nylon prop., it was turning at around 18,300rpm – sufficient for around 95mph. His *Anduril* has never gone so well!

Equally impressive were the diesel-converted Super Tigre G15's used by the Archers Club, turning 7x4in. Tornado nylon props. at

between 18,000 and 19,000rpm! What a noise – they still sounded like glows, but they had trouble getting a good setting, despite running a crankcase pressure. Nonetheless, a very interesting pointer – all credit to Dave Williams for the original idea. Only drawback seemed to be a lengthy warming-up period required.

Other 'different' motors seen were Johnny Dubell's Moki TR7, plus several MVVS diesels used by many continental flyers.

By the second day it seemed that the Outlaws were going to dominate the results, but their challenge fizzled out in the quarter finals and only Strudwick survived the quarter finals – helped, incidentally, by mammoth repair sessions carried out by Frank Smart, who struggled valiantly to piece together wrecked models in order to have sufficient spares to carry his team to a potential victory.

Best continental flyer proved to be 'Jacco' De Ridder, who ousted Mick Tiernan (flying his normal Oliver model) in the quarter finals by a clear margin, but lost out to an on-form 'Struddie' in the semi-finals. He subsequently lost to Alfreton Club member in the third-place fly-off, but is obviously a strong challenge, aided by an efficient pit crew.

The final itself brought Vernon Hunt, who had battled his way to the top despite being decidedly 'below par' in the earlier bouts, against Strudwick, and this time victory again eluded the glow motor, despite incredible pitwork by John Hammersley and Richard Wilkins – and Vernon Hunt emerged the winner, a fitting result as he had been deeply involved in the organisation of the event itself.

Once again, thanks to Alfreton for a superb contest, supported by an equally superb prize list (prizes being given down to around 30th place, as well as team prizes, and including such 'attractions' as good cash prizes, very original trophies, a pair of Oliver Tigers, plus a generously donated set of limited-edition lager glass presented by Mr. Meijer, father of arch-Dutch enthusiasts, Ed and Fred).

RESULTS:

1. V. Hunt (ADMAC)
2. P. Strudwick (Outlaws)

3. P. Halfpenny (ADMAC)
3. J. De Ridder (EMC)

The Archers club fielded a strong team at Derby—in particular Rod Bamford and Martin Fox (in the centre) did well with their diesel-converted G15 glow motors.



The Team that never was!

Combat (reported by Headley Walker)

Rossimania. All the dedicated dieselites seem to have caught it. Richard Evans, Mick Lewis and Vernon Hunt, who finished 1st, 2nd and 4th respectively used Rossi 15Ds to fight their way through into the team to represent this country, in the as yet unaccepted World Combat Champs. Only Richard Wilkens, 3rd with his Super Tigre – *Blasta* combination was the exception.

The fine calm day called for skill as well as extra mph and it is worth noting that the only Oliver Tigers to get through to the last six were used by Steve Malone who finished 5th.

Scores were high, and narrow margins the order of the day with Richard Evans scoring an average of 578 while the highest score of the day went to Vernon Hunt with 809 (six cuts).

Worthy of mention was 14-year-old Peter Degg of ADMAC who won his first three bouts by beating Nationals winner Bob Morgan and runner-up John Hammersley (both of whom only recorded one win) and Dave Wood who only won two of his five bouts. An off-form Mick Tiernan, 1975 Criterium team member also only recorded two wins.

Late afternoon saw Evans and Lewis clear with five wins each, so with Hunt, Malone and Wilkens four wins apiece it meant a fly-off. Sadly, Steve Malone had to withdraw through lack of flyable models and the resulting bout for 3rd and 4th places ended when Vernon Hunt conceded to Richard Wilkens, three cuts and two models down after two minutes.

All things considered a good competition with thanks due to the non-competing members of ADMAC who organised the event.



Full reports from
the meeting hosted
by Belgium, from
9 - 13th July at
Verviers - Wegnez

An aerial view of the contest site shows
the stunt circle in the foreground with
the speed/team race circle beyond.
Combat was flown in the corner of an
adjoining field – over the letter 'a' in
'Champs', in fact.

Combat *reported by John Hammersley*

This was the one event in which we expected a British victory – and while this was achieved, it was by no means a convincing 1–2–3 that many of our flyers expected. Combat, whilst being a highly skilled sport, is also the one competitive branch of aeromodelling that *can* be largely influenced by luck. Perhaps we had the wrong variety . . . but that is not the whole story. Basically, with combat flying being so competitive in the UK the models have become very highly developed to suit tight flying styles and close-following manoeuvres. Not so on the Continent, where it seems a lot of attention has been paid to speed at the expense of manoeuvrability – and the Rossi 15 combat diesel certainly showed that it was capable of producing the former.

Not that all overseas flyers have this attitude, as several – particularly the Dutch, Spanish and Germans – had models that would not have been out of place in any UK event. Diesels still predominated the event, the MVVS and Rossi being decidedly quick.

It was interesting to see the Russian models, and somewhat disappointing as two of their team members used models which appeared almost identical to the ones seen at Namur in '69. Obviously, Russian advancement in this category has not developed at anything like the rate that team-racing has in that country. They used glow motors exclusively – Russian copies of the Super Tigre G15 and a home-made unit (by Knjozev).

The two Namur-style models used were small flying wings: tissue-covered lightweights, with motors running on crankcase



pressure and featuring engine shut-offs. These were actuated by a spring-loaded bellcrank — a sharp tug on the lines pulling the unit forward and releasing the pressure line. Novel, but not really necessary and very vulnerable in the event of a 'line job'. The third Russian used a box-fuselaged 'conventional' type model with flaps and elevators, and was quite manoeuvrable.

It was this latter machine which put out Vernon Hunt in the first round — Vernon removed the whole streamer by means of a string cut in the first thirty seconds, and then had a cut scored against him. A blow to our moral, especially as the Russian pilot seemed incapable of flying inverted; but fortunately Vernon won his bout in the losers' fly-off, thus 'living' to fight again.

Castellani of Italy flew a very fast machine, consisting of an upright-mounted Rossi 15 in a swept leading-edge wing equipped with an elevator mounted on three booms — but again manoeuvrability was suspect.

As a spectator event, the whole contest was a disappointment. So often there were long delays between bouts, only to be followed by less than a minute's flying before a line tangle or crash resulted. Few teams seemed to have efficient pit crews, and there were frequent arguments concerning rule infringements (real and imagined) between team managers and officials.

Many were the penalty points awarded against pilots who stepped out of the centre circle, and several bouts were won or lost on the 50-point loss that such an offence occurred. As the centre

circle was poorly defined (and the Circuit Marshal refused to stay in the centre, as is common practice in the UK), this, too, resulted in arguments — as witnessed by the fact that it took nearly three full days to finish the contest with only 28 competitors. . . .

Richard Evans saved the day for the UK in combat by emerging the winner after a series of relatively untroubled bouts. Mick Lewis (left) and Bob Horwood (right) took care of the very important pitting duties.

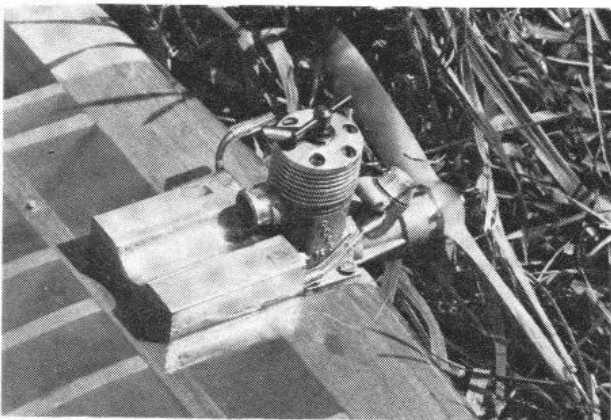
COMBAT

		Engine
1. Evans	UK	Oliver
2. Morelle	France	MVVS D
3. De Ridder	Holland	Oliver+
		MVVS D
4. Buys	Holland	Oliver
5. Huss	Sweden	MVVS D
6. Hunt	UK	Oliver
7. Karma	Finland	—
8. Mittler	Belgium	MVVS
9. Tiernan	UK	Oliver
10. Cuccolo	Italy	Rossi D
11. Knjazev	USSR	O/D
12. Van Mechelen	Belgium	Oliver+
		STG 20 D
13. Larson	Sweden	MVVS
14. Nebouvaglo	USSR	Russian
15. Stop	W. Germany	Oliver+
		MVVS
16. Castellani	Italy	Rossi D
17. Niskanen	Finland	—
18. Meyer	Holland	Oliver
19. Segrelles	Spain	Oliver
20. Jedamzik	W. Germany	—
21. Matrenin	USSR	Russian
22. Tommeleri	Italy	MVVS D
23. Dubell	W. Germany	MVVS
24. Lienard	France	—
25. Duran	Spain	Oliver
26. Marconcini	France	MVVS
27. Latorre	Spain	Oliver
28. Mohimont	Belgium	—

Vernon Hunt was the victim of what could be considered a blatant disregard for the Rule Book when the Circuit Marshal penalised him by 50 points for stepping out of the centre circle, when his opponent had obviously pushed him out! Formal protests to the FAI jury were pointless, as they did not even watch the bout, and insisted that the Circuit Marshal's decision would be final. As the score was one cut each, this caused the demise of poor Vernon, who's confidence must have increased enormously after his Derby International success the previous weekend following an 'off-peak' form period.

Mick Tiernan was right out of luck, being eliminated in the third round; he obviously found the hardship of being 10–20mph slower than his rivals to be a great strain, leaving just two British flyers in the quarter finals.

Richard Evans' fortunes, however, were more favourable, as he had no trouble with disposing of any of the opposition until he met J. B. Morrell of France in the final. After an uninspiring start, both pilots completely removed their opponent's streamer — and when it

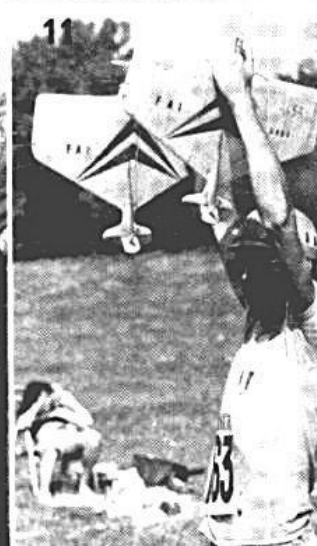


seemed a re-fly would be inevitable, Morrell's models exploded in the air, thus losing him valuable ground time and hence giving the victor's place to Evans. The two Dutch pilots, De Ridder and Buys, took third and fourth place, and they were the only other countries that seemed to have developed along the competitive English style of combat flying.

It would seem that if success is to be assured when flying in this type of contest, then British flyers will have to revert to 'old style' models, i.e. of the *Liquidator* or *Ironmonger* era. Modern, large-area, fragile models are fine for really hot flying techniques, but not against the standards witnessed at Verviers. Perhaps it would have helped all concerned if the host nation had placed a little more emphasis on the organisation of the flying at the expense of the (excellent) social side. This undoubtedly would have raised the standard of the meeting considerably – as it was, very few flyers actually 'settled down' to the flying. A special vote of thanks must go from our combat lads to Gordon Isles, who put in so much effort on their behalf in his position as team manager, in addition to his normal duties of organising and protecting the interests of all British team members.



6. Yuri Knjazev from USSR with his lightweight combat design, powered by O D motor. 7. Flapped Russian combat design with box-fuselage—quite 'snappy'. 8. Jacco de Ridder of Holland placed third with Oliver powered design, featuring recessed LE to accept cylinder head. 9. Vernon Hunt (right) flying against Buys of Holland. Can you see edge of pilot's circle? Poorly defined. 10. Erik Huss of Sweden used 'Super-monger' plus an own-design 'Super-Vim'. (foreground). 11. Italy's Tomerelli with a pair of nylon-covered taper wing designs.



1976 Contest Reports

MAJOR COMBAT event of 1976 will surely be the Dutch International to be organised by the *Daedalus* and *de Vleermuizen* clubs. Deprived of the opportunity to host the first Combat World Championships event despite

their experience of running four highly successful Internationals – these clubs aim to make this years event as much like a 'proper' Championships as possible but with one exception: namely, the event is an 'open' meeting, not restricted to National teams.

By holding the event on 3rd-4th July, a week before the Utrecht C/L World Championships, they hope that competitors and spectators alike will attend both meetings. However the problem with an 'Open' meeting is that there maybe more entries than can be handled in a weekend – 128.

Thus it may well be that entries received after June 1st will not be accepted. The venue at Rotterdam will be the same as used in '75, with the same excellent field facilities, but with much better accommodation.

Those planning on either entering or just spectating should write to Ron Kaptijn at Schoonboomstraat 391 Amsterdam 1018, Holland for information and entry forms. Quite a feast of top quality flying in a single week for C/L fans.

Provisional World Championships

As these championships were not official two of the selected G.B. team Richard Evans and Mick Lewis were unable to attend as their employers would not release them.

Combat

Firstly, a few words of explanation. This was not a World Championship contest, even though Combat is now an 'official', FAI-recognised category, and the Dutch modellers wanted to incorporate such a contest with the remaining classes. Internal politics reared its head again, and the Dutch Aero Club refused to permit such a competition, on the grounds that they did not have the necessary manpower. However, those who were to supply that manpower thought otherwise, and drawing on the experience of four previous (successful) Internationals, staged their 'Preliminary World Championships' event at Rotterdam, on the weekend prior to the 'World Champs proper' – 3rd-4th July. In order to make the contest financially viable, it was run as an Open International – i.e. any country could send as many entrants as it liked. Considering the meeting was a great success and that the local *De Vleermuizen* and *Daedalus* clubs handled the 96 entries with ease, running all bouts strictly to time, their argument seems pretty sound (remember a World Champs event would probably have had an entry of no more than 45 competitors, due to restricted entries).

The Boszoon Sports Complex provided a first class site, with room for two contest and two practice circles together with a club house/bar where one could receive refreshment both internally and externally – most welcome in the 34°C heat and almost windless conditions.

First days of combat are pretty much the same wherever they are held, with a (relatively) low standard of flying as the wheat is separated from the chaff, and the 'top dogs' get into their contest grooves. Initial impression gained was of the number of glow motors present: probably around 60%, with Super Tigres being the most popular choice by far, normally operated on pacifier or surgical tube tank systems. Obviously the British are not alone in their 'go glow' trend. Diesels were chiefly represented by Rossi (mainly being fed via crankcase pressurised metal fuel tanks), although there were several MVVS and even a few Olivers to be seen. A real turn around of fashion.

Models too have changed, with the majority following the British trend of large models, though not many have gone to our full extremes – except, that is, a few of the Dutch fliers who produced the biggest of all – even bigger than *Blastas*. Most seem content with taper wing designs of around 36in. span and of approximately *Titan* wing area. The Americans proved the exception, producing some designs with what appeared to be as little as 200sq.in. wing – and correspondingly poor performance. The remainder of their models were *Firefly's* as published in *AeroModeller*, and subsequently kitted by *Midwest*. The five US teams used a variety of engines: K & B 15s, Taipans, Super Tigres and the new Cox 15s. All eyes were on the latter motors to see how they compared, but they were not really given a chance. Despite feeling very 'stiff' and new, they were being run on 30% nitro fuel and 7 x 6in. props, and consequently did not show their (assumed) full potential. With the exception of Charlie Johnson, who flew all-foam models with a good deal of success, only one other American flier (Reese) reached the fourth round, and they did not provide as strong a challenge as expected.

All foam models are obviously on the way in. Apart from the Outlaws contingent, the Northern fliers and Vernon Hunt were campaigning 'plastic planes' for the UK, as were Dutch fliers De Ridder, Meyer and Van Zyp.

As the day wore on, it became clear that the very hot weather was not too suited to the high performance, pressure-fed diesel engines – many cooking up after a few minutes, or even refusing to start within the allotted time. The Swedes adopted FAI team race practice by using copper contra pistons in their Rossis, claiming that although this necessitated a longer warm-up period, the reward was a more consistent run.

Main problem for the glow (and Rossi diesel) operators concerned propellers. The popular Tornado nylon 7 x 4in., which is strong enough to withstand 'contact' with the ground, just could not take the high rpm of modern contest motors in those temperatures – many blades stretched by up to ½ in. – before flying off. The alternative was to fit a glass-filled nylon Taipan prop and feel fairly confident that the blades would hold together in the air, but with the certain knowledge that they would snap off if the ground was hit – even when on the glide. In other words risk a prop shedding a blade in mid-air or on touching the ground. Either carried a potential penalty of losing the bout.

As to the flying itself, the standard has certainly risen, and the days of automatic British domination are now merely memories – gone are the days when you can afford to fly a poor model in the opening rounds, saving the best for the quarter finals onwards. Admittedly, in Round 5 nine of the 16 qualifiers were British, but then we did account for 25% of the total entry. If anything, our fliers succeeded due to superior pit work with glow engines, John Hammersley leading the Outlaws entourage, whilst Dave Clarkson with Charlie Johnson plus various Stockport club members saved the day for many would-be champions. Glow motor flying is problem-free when you are properly organised – but a disaster if you are not.

Despite the modern trend of distinctly breakable models, the carnage rate was quite low, several fliers reaching the quarter finals with only a couple of models 'consumed'. A glance at the accompanying results show how the top fliers progressed, but does not always give a true picture. All too often a bout was virtually over within a couple of minutes when a competitor took all the streamer – or worse still a string cut – in one pass, and fast following action became the exception rather than the rule.

Throughout the whole contest, Richard Wilkens had been very much on form, aided particularly by John Hammersley and Bill Gipton, plus faithful Frank Smart who managed to keep the whole Outlaws team airborne by patching and rebuilding models as they broke. He had plenty of practice. Wilkie's match against Fraisse – a very promising young French flier – in the semi-finals was a classic. He soon took all his opponent's streamer, bar some 6in., only to have all of his removed. He then proceeded to get a 3in. cut, and for the remainder of the bout harried the Frenchman's tail for the last remaining piece. Superb flying, rewarded by a 2:1 plus time victory.

Meanwhile John Berry had been steadily notching up points – and wins – until he faced Jacko De Ridder in the second semi-final. The Dutchman took two quick cuts, but crashed in a line tangle. Changing to his second Rossi diesel powered *Blasta*, Jacko lost considerable ground time and John equalised on cuts. Another line tangle resulted in De Ridder losing his engine pod, and the extra time loss gave John another win.

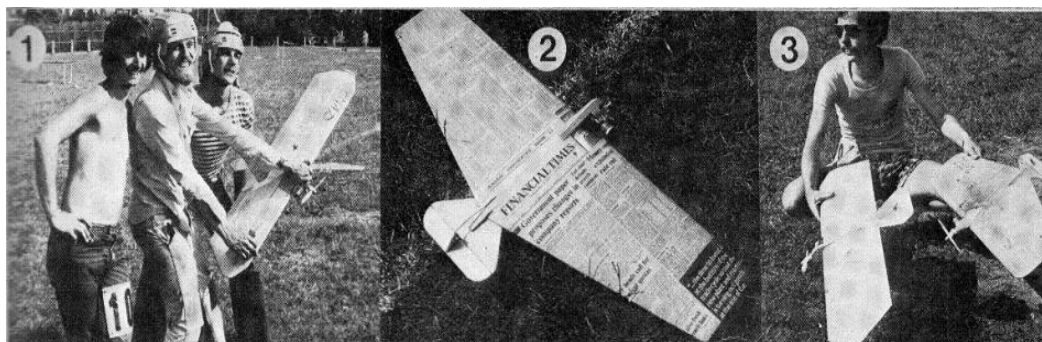
The losers fly-off had to be re flown after an initial draw, but eventually De Ridder claimed 3rd place by beating Fraisse three cuts

to two after a very good bout, remarkable for its lack of line tangles.

Thus John Berry and Richard Wilkens met for an all-British, all glow engine final, but what a mixture of elation and disappointment it proved to be for each of the competitors. The match itself provided plenty of good flying – not to mention really hot pitting by Messrs Clarkson and Johnson for Berry, and the Outlaws for Wilkens, but with over a minute of the bout to go, and with the score equal (1 cut each) and only string apparently left, Berry's Super Tigre stopped dead in flight. Cause proved to be a broken ball race, caused by excess vibration when his prop suffered a $\frac{1}{2}$ in. stretch. Dismay for John, jubilation for Richard, who thus seemed the winner. However, when

Wilkins landed to the cheers of the crowd, one of the judges noted that there was a trace of streamer still attached to the string on the model. Clearly, everyone had (wrongly) assumed that Berry's last attack had brought a string cut. It had not, the cut was legal and it was John's turn for joy, with a 2:1 cut victory, and only 8 secs. lost.

And just one final question – who is John Berry? Well although he has not hit the limelight with his combat flying, he was invited to fly at the '75 team trials. His principal interest now is FAI racing and Goodyear flying, and the Rotterdam event was merely a diversion for him whilst on the way to Utrecht . . . Thus are (preliminary) World Champions made!





An all-British final resulted in a win for John Berry (right) with Richard Wilkens, forced into second place due to a fated knot cut. It was an all glow final too...

COMBAT RESULTS

1.	J. Berry	Great Britain
2.	R. Wilkens	Great Britain
3.	J. de Ridder	Netherlands
4.	Fraisse	France
Equal 5.	V. Hunt	Great Britain
	J. Hammersley	Great Britain
	C. Morgan	Great Britain
	Rasmussen	Denmark
Equal 9.	v. d. Berg	Netherlands
	C. Johnson	USA
	Klein	Netherlands
	Reese	USA
	Vernier	France
	J. Segrelles	Spain
	D. Lesser	Great Britain
	D. Wood	Great Britain

XX

THE DERBY COMBAT INTERNATIONAL – 24th and 25th July 1976

Belper Sports Centre, a few miles north of Derby in Derbyshire, hosted this year's Derby Combat International. With a bar, restaurant, showers, a camping area and sufficient grass for two contest circles and numerous test flying circles, the site proved ideal. Coupled with warm, calm and sunny weather, and efficient and well-mannered organisation by the Alfreton and District MAC, few if any of the SI competitors, including combat friends from Ireland, Holland and Sweden, could say that they did not thoroughly enjoy this contest.

The 'glow-and-foam' trend continued with at least half of the entry using foam models (mostly Wilkens *Wonder Wings Superstar II*'s) and about three-quarters of the entry using glow motors. Now that combat equipment seems to be settling down back into uniformity and most pilots have now got used to the extra manoeuvrability and speed available, old-style minutes-long continuous manoeuvring following battles are becoming the norm again. But now we see these at least 20 mph higher airspeed and with considerably tighter models than in the old 'Oliver' days – great stuff for spectators and participants alike.

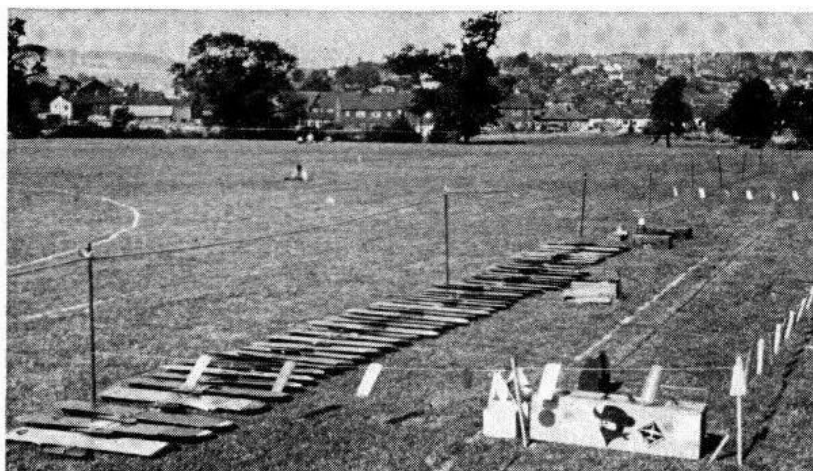
The Saturday saw the first round and the losers' fly-off. The usual 'sorting out the chaff' stuff except for a notable battle between John Hammersley and Stoo Holland – a high speed following classic with Stoo coming out the winner. John found his way back into the contest via the losers' round, but early drawing of 'favourites' together became a feature of this contest as the Sunday saw. Sunday opened with a series of eliminators to get the numbers in the second round down to 32 thereby allowing a straightforward triangular knock-out to the final. Notable matches in the eliminators were Hunt v Morgan (the winner to meet Richard Wilkens in the second round!). So Vernon Hunt had to beat both Bob Morgan and Richard Wilkens to keep in the contest and showing great determination he did so but the required effort coming so early in the contest seemed to drain him for it was a lack-lustre Vernon who lost clearly to Mick Lewis in the third round. Dave Wiseman adopted old-fashioned 'hard flying' tactics to get through his obstacle course; but, after getting his third consecutive victory over Richard Evans and having to re-fly against John Hammersley following an in-bout streamer confusion, he got himself disqualified for the non-rule book offence of 'deliberate line tangling' a peculiar decision for it takes two to make a line tangle.

After this early drama with much of the meat having dropped out of the contest, flying proceeded mildly to the semi's where Bill Collidge (Outlaws) beat Mick Lewis (Posse) and Fred Meijer (Holland) beat Dave Wood (Posse). Posse? Yes, a new combo consisting of Richard Evans, Mick Lewis, Bob Morgan and Dave Wood whose aim in life is to round-up the Outlaws (go on, *laugh*! Well I thought it was worthy of a giggle at least). In the final Fred Meijer clearly won aided by good pitwork from Ron van Zypp and Vernon Hunt – not easy to do with Rossi diesels on crankcase pressure. Fred flew his unusual foam models very well and deserved his win and £50 first prize. Bill Collidge seemed happy with his £25 second prize as did the other 35 prize-winners including Mark Thomason (Ireland) who raised a laugh by selecting a bundle of ladies' tights from the goodies table as his prize – '*won't fit over your Wallies*', a comment in broad 'Brummie' improved the merriment. And so another Derby Combat International ended with a foreigner taking home Britain's biggest combat prize for the very first time.

That's not fair! Fred Meijer (right) really upset the applecart when he popped across from Holland and won the Derby Combat International. Don't these foreigners know the rules? The British are supposed to dominate combat, and we have proved the point, winning all the major events so far held - then these Dutch flyers came and beat us on our own ground. Definitely not cricket. Anyway, congratulations Fred - just don't make a habit of it! At left is the winning model (Rossi diesel powered) which uses a foam wing and has lightening holes cut with the aid of a hot mustard tin. Er, let's rephrase that - a tin which was designed to contain mustard, and which has been heated so as to melt foam.



Quite an impressive line-up really - for just one club! When the Outlaws go out on a 'raid', they reckon that there is safety in numbers! Alternatively, you could say that once you are into 'foamy' models, there is no stopping you . . .



The Nationals



Action, modern combat style, as Richard Evans releases a Super Tigre G20/15 powered 'Super Star II' (what else?) and Bob Morgan sprints towards the spare

CONTROL LINE

FAI COMBAT

Run by Outlaws MAC, combat saw its lowest number of entries for at least a decade, with somewhat less than the pre-entry total of 71 actually flying. Speeds

were much higher than in previous years, with Oliver diesels being the exception rather than the rule. There was a fair variation in motors used (Super Tigre, Rossi, MVVS, Oliver) but the majority of flyers are now using large polystyrene models, or very light balsa structures with some polystyrene components. The standard of flying appeared to be very mixed, with a lot of entrants not being able to cope with their 90 mph plus models – in some cases it seemed as if the models had minds of their own, and a lot of the bouts were one-minute bursts of unleashed power, followed by three minutes of untangling lines and keeping pit crews fit. Continental teams were well represented with crews from Holland, France and Belgium.

So, to the contest itself. With all the fast machinery about, it was noticeable that the majority of flyers were formed into well organised teams. The newly formed *Posse* team of Richard Evans, Dave Wood, Mick Lewis and Bob Morgan seemed very well prepared, whilst the re-formed *ACE* team, now comprising of Vernon Hunt and Dave Wiseman (with more old names promising to come out of retirement) were doing a lot of practice, until they decided to fly Super Tigre glows instead of their Rossi diesels. Other teams going well on the first day were *Cosmo*, *Archers*, *Outlaws* and the majority of the foreign competitors.

The second day's flying proved to be more interesting, with the wind having picked up a little, and also with the remaining competitors being eager to do battle. By the second round some familiar names were reduced to the sidelines: John Hammersley being beaten by a very on-form Pete Tribe in the elimination round, and Dave Wood losing to M. Loughlin after three re-flies, also Rod Bamford losing to Mittler, and Frank Smart being another Pete Tribe victim.

By round 3 just 16 pilots remained and with many of the bouts being reflown due to flyaways (models being cut off the lines) it was becoming a laborious task to get through each bout. This round saw Richard Wilkens (of Outlaws *Superstar* fame) lose to Holland's Ron Kaptain and also the eventual finalists Mick Lewis and Pete Tribe disposing of Alec Herring and Dave Williams respectively.

Thus the quarter finals found Mick Lewis against van der Gaag (Holland), Ron Kaptain versus Mick Tiernan, Bob Morgan



William van der Gaag prepares another 'whatsit' for fellow Dutch combat flyers. Never before has combat been dominated by so many teams using near identical equipment.

versus Vernon Hunt and Pete Tribe versus Richard Evans. All of these bouts (with the exception of Tribe/Evans) had to be re flown to get a result, Mick Lewis coming out on top over van der Gaag, Tiernan beating Kaptain and Hunt narrowly overcoming Morgan (after a very closely fought match) and Pete Tribe disposing of Richard Evans.

The semis saw Mick Tiernan and Mick Lewis doing battle (*Posse* chasing the

Outlaws, or was it the other way round?) but eventually the *Posse* triumphed, and then Pete Tribe beat Vernon Hunt. With both the losing semi-finalists out of models, third place was decided on the highest number of points scored.

The final saw Mick Lewis and Pete Tribe demonstrating just how *Combat* should be flown, with both competitors very eager to become the new British National Champion.

Lewis got in quickly and took two cuts, which was soon reduced to a one-cut lead by Tribe. Another couple of minutes' flying saw both competitors on the floor, and the *Posse* team working very hard to get their pilot airborne, whilst Cosmo had theirs back in the air. Mick Lewis's crew worked hard, but failed to get him airborne, but by his one cut lead and only a small amount of ground time against him, he became the victor.

J.H.



7. Dave Sallows 'consumed' three models in Round I of *Combat*. Uses G20/15s.



11. *Combat* winner Mick Lewis insists that the model is an own-designed 'Rocket Ship'—not a 'Super Star' hiding behind that covering paper.

Team Trials for 1977 Eurochamps

Just about the strongest combat team possible was selected at the Trials - namely Richards Wilkens and Evans plus Mick Lewis. Near identical equipment used (must say that, Mick insists that his model is not a Super Star. The tail is certainly different - and that's what breaks most often!).



F2D - *Combat*

Using the placings achieved in the 1976 SMAE Centralised contests plus the Nationals, the 16 most successful pilots had qualified for this 5 flight fly-off. Martin Kissel had withdrawn from the 16 and had been replaced by 1st reserve Peter Degg. However Bob Morgan, Peter Tribe and Rod Bamford turned up late due to various reasons (including not being notified of the correct venue) so flying could not start until 12.30pm, therefore time precluded all fifth flights, making for an awkward result. Not one pilot recorded four wins, and no less than seven recorded three wins! An unprecedented

result, which took six hours to achieve. With the end of the day at hand, the decision was taken to select the team from the top seven on the basis of their match scores with the result:

1. Richard Evans - ST G20 G/*Super Star II*
2. Richard Wilkens - ST G20 G/*Super Star II*
3. Mick Lewis - ST G20 G/*Rocket Ship*
4. Dave Wood - ST G20 G/*Super Titan*

Comprising as it does the reigning European Champion, the reigning British Nationals winner and the runner-up from this year's Preliminary World Championship, the selected team must be the strongest possible one. Of considerable assistance in retaining the *Combat* Individual and National Championships is the fact that all three team members use virtually identical equipment, the only differences I could see were minor constructional details and the pilot's handles! The addition of one top class motor man with a fully equipped pitting box should ensure the complete show.

1977 Contest Reports

COMBAT

by Richard Wilkens



STOCKPORT COMBAT RALLY

FREE BOOZE was available to entrants at the fifth annual event, on 29th May. The competition began at 11am with a total of 26 entries – a very low entry considering there was about £100 in prizes as well as the plonk. Free beer! Where was Mick Tiernan? The weather was warm with a slight breeze, which certainly helped the ale to be consumed quicker than was anticipated: in fact by 2pm 72 pints had been consumed . . .

Most of the models were *Superstar II*'s, with *Super Tigre G20/15*'s up front. There was nothing new in model design; speed appeared to be the main concern, with a few competitors experimenting with *STX15 ABC*'s and *Cox 15*'s – although the *G20/15*'s appeared to be just as fast and were certainly more reliable and consistent.

The morning saw the first round and losers fly-off, with no real surprises. However, Junior A. Tyson beat Dave Wiseman in the second round when Dave had excessive ground time, due to engine

problems. Another big upset was British National Champion, Mick Lewis, losing to Frank Dowling by 2 cuts to 1. One of the most spectacular bouts of the day was between Dave Wood and Steve Malone. Dave got 2 cuts and had 14 seconds ground time, whilst Steve also made 2 cuts and lost 16 seconds ground time. The re-flight proved that Dave was on top form as he managed to win 4 cuts to 2.

In the semi finals, Woody put out Frank Dowling by a 2-0 victory and Bob Morgan beat Finchley club mate Tothill on ground time, who did very well considering this was only his second contest (must have been the booze!). Third and fourth place was decided between Frank Dowling and Tothill, Frank being the eventual winner. The final brought Bob Morgan and Dave Wood together, which was certainly the climax of the day's events. Both flew extremely well, the final score being 2-2, with Dave winning on ground time. In fact this is the third consecutive year Dave has won the *Mainstream Combat Trophy*, soon to be renamed the 'Woody Wonder Pot'!

Dave Woods retains his grasp on the Mainstream Combat Trophy for the third consecutive year, having beaten Bob Morgan (complete with patriotic model) in the final. No truth in the rumour that they removed the motors to save weight – or is the state of their models one-up for the anti-noise brigade?



PEPINSTER



EUROPEAN C/L CHAMPIONSHIPS

Combat reported by John Hammersley

Prior experience at this event gave rise to concern for the expertise of the interpretation of the rules by the organising body. Two years previously the whole combat competition had suffered due to lack of organisational experience at this level, several very able pilots losing heats due to dubious decisions. However, with a few notable exceptions, this year's contest was a real improvement, with only the cut counting method in contention. This appeared to be due to the use of scorers who had never previously been called upon to count cuts from high speed combat models.

Allotted the last official practice session the British team (Mick Lewis, Richard Wilkens and Dave Wood, plus Richard Evans, reigning European Champion) were able to observe the opposition. As expected the Dutch seemed quietly confident, using equipment in the best British tradition, most other nations flying glow motors or high revving diesels, with polystyrene models prevalent. The real eye openers were the Russians, who two years previously had been the poor relations. Quick to learn, as always, they had developed exceptionally lightweight, fast and consistent glow motors with a definite advantage over any other motor seen so far. Two of their team used models obviously developed from the Richard Evans' *Vertigo*, the turning radius being better than the best polystyrene models seen to date. However the controllability was questionable from the onset, but they caused concern to all competitors.

As usual the first round saw few notable conflicts and the whole British team remained intact. Fred Meyer (N'lands) however lost to Doroshenko (USSR), after being plagued with bad runs from his Rossi diesel, but managed to overcome his problems in the losers' re-fly.

It was an interesting draw for the Elimination Round (to bring the numbers to 16) with three of the four British team involved, two of whom flew against the Russian team. The first of these bouts (Wilkins versus Doroshenko) proved that the Russian models were as controllable as first suspected - Richard was unable to adopt his normal approach and was narrowly defeated. There were several mid-air collisions, mostly due to Doroshenko's lack of combat experience, during which both of his models became un-flyable. In an attempt to gain air time his over-zealous pit crew violated the rules by vertically launching a model which was incapable of being controlled, and thus the Russian was disqualified allowing 'Wilkey' through to the next round.

The next bout was Mick Lewis versus Kisslov (USSR) - by far the most impressive Russian pilot. Adopting his normal cool techniques, Mick was able to defeat the Russian in a fast and furious bout - many other pilots breathed a sigh of relief at Kisslov's exit from the contest. Dave Wood took four cuts from Beauval of Belgium and easily emerged winner, thus keeping our team intact for Round 3.

However, this round saw the demise of the first British team member. In an excellent bout Dave Wood underestimated the capabilities of Belgium's very capable Olivier Mittler and with four cuts each, Dave was defeated on ground time. Mick Lewis won against Tomelleri of Italy as did Richard Evans against fellow Italian Benincasa. Wilkins also beat Willmer (West Germany) although allowing two cuts to be taken from him.

The Quarters, Semis and Final were saved for the last day and with three out of four bouts in the Quarters containing British flyers, John Hammersley - the sole British pit man - looked like being overworked! As usual Mick Lewis disposed of his Finnish opponent without difficulty, and Richard Evans scored decisively against his German opposition.

The Richard Wilkins versus Fred Meyer bout was undoubtedly the highlight of the whole contest, Fred now having forsaken the diesels in favour of Super Tigre glows. With nothing between the models, everything was down to pilot ability. At the commencement, Fred was able to follow Wilkie's amazingly unpredictable flight pattern and took two large cuts. Wilkie fell for the original 'S' evasive tactics and 'tent pegged' one model. At this stage, teams and crowd alike thought Wilkie incapable of overcoming the deficit. With little time left, and in true Wilkins tradition, he retaliated with two fine cuts and then the knot convincing the majority of onlookers of his victory. The scorers, however, were not in agreement, giving two cuts each, but such was the quality of this bout that the result seemed superfluous. Richard thus lost on time penalties.

In the first semi final, Fred Meyer again featured in another epic battle - this time against Richard Evans. In contrast to the Meyer/Wilkins bout Richard had the better model and was able to follow Fred for much of the four minutes. Fred took advantage of every opportunity and was able to level the score at two cuts all. In the final seconds a mid-air collision occurred and the scorers awarded the Dutchman the knot cut, thus assuring him of a place in the final. The other Semi saw Mick Lewis yet again coolly removing pieces of his opponent's streamer and easily emerging winner.

The third and fourth fly-off took place before a large crowd. In the opening skirmishes it was apparent that the Swede. Sandstrom,

had the edge on model manoeuvrability, but was lacking in following ability. Richard Evans was able to keep him at bay and emerge a 2-1 victor after four minutes of close combat.

For the final, Fred Meyer unfortunately (for him) had to revert to Rossi diesels with resulting lack of consistent airspeed. At this stage Mick Lewis decided to forsake his first round models and use ones specially constructed for the contest! With everything in his favour, the one minute countdown commenced and both motors were fired up. Shortly after, all British hearts missed a beat as Mick's motor died due to a burst pacifier (build bigger dummy pods next time Mick!). With all matters under control, Hammersley speedily changed to the spare and Mick managed to get airborne without loss of airtime. Having obvious motor supremacy, the British National Champion was able to follow Meyer at his leisure and easily emerge the winner. Throughout the entire contest, Mick remained his usual calm and cool self. In fact the only point at which he displayed any nerves was on the winners' rostrum.

In assisting the British Combat success, many thanks must go to Dave Rudd (team manager) for his fine and decisive work.



Contrasting all-foam combat models from Italy seen in pictures 1 and 2 – use Rossi power. 3. Small Russian design with tapered glass fibre boom fuselage, radial mount engine. 4. Kisslev flew large area model, based on 'Vertigo'. 5. Richard Evans beat young Swedish flier Sandstrom into 3rd place. 6. Kondratiev used small area design – but very manoeuvrable. 7. Classic bout between Fred Meyer and Richard Wilkens.

The Nationals

FAI Combat

Although the entry of sixty was the lowest for many years, competitors from France Holland, Ireland and Scotland brought a really international flavour to the proceedings.

The contest began promptly at 9.30am on the Saturday morning in strong winds and heavy rain. Carefully prepared-wet weather streamers made bouts a possibility, although few actually took place due to the non-arrival of many competitors. By lunch time the rain had ceased and the event was running smoothly, although few (if any) bouts were noteworthy. As the weather remained dry, flying continued until 7pm with this final bout of the day producing an excellent match between Wallace of Solent and Fraisse, the strongly fancied French pilot.

Fraisse had the better of the early exchanges but took all the crepe streamer apart from the knot. Wallace replied by removing his opponent's streamer, but was it in one or two pieces? Two, said the scorers, so despite taking a second cut in the dying seconds, Fraisse was out – Wallace having much less ground time.

Sunday morning saw a complete change in the weather, sunny and calm. Shocks came thick and fast, with Bob Morgan losing to Thomas of Wanstead in a closely fought opening bout, and then less than an hour later, John Hammersley was to go the same way against Stoo Holland, taking the string while trying to talk Stoo out of a line tangle!

The fourth round began with a bout between Vernon Hunt and Richard Wilkens. On paper this looked a stunner, but Vernon took two early cuts, hit the deck and was unable to re-start his motor; he thus progressed to the quarter final to face the winner of the bout between Richard Evans and Stoo Holland.

With Richard Evans now looking 'in the groove' with glow models, he was strongly fancied to go through to the final. However Stoo must have had the 'little people' on his side because Richard removed his streamer completely within the first few seconds, leaving Stoo all the time in the world to get the necessary two cuts. The luck of the Irish?

Well known heads continued to roll in this round as Mick Lewis lost to the youngster, Landels from Penrith and Dave Wood went out to Thomas of Wanstead.

The quarter final round began at 11am on Monday morning, with the bout between Vernon Hunt and Stoo Holland. The wind was strong and good combat almost impossible, but these two experienced flyers gave a fine display. Vernon took two cuts within a minute without reply. Following a line tangle and 'prang', Vernon tried

desperately to restart his motor but all to no avail – however by virtue of his two cuts he became the first semi finalist.

Meanwhile Pete Tribe had been quietly creeping up on everyone almost unnoticed, and in the second quarter final he defeated Mick Loughlin in a very close contest. Landels and Malone became the other semi-finalists by virtue of their victories over Thomas and Faro respectively.

The first semi-final between Vernon Hunt and Pete Tribe turned out to be a real shambles. A massive line tangle just after the start saw the pilots agree to take their spare models. In his rush to be first in the air, Pete took off with tangled lines and after the resulting crash he was unable to get a model in the air. Thus Vernon won a bout in which neither pilot had taken a cut. In the other semi final, Steve Malone had a close bout with Landels, Steve winning by just a few seconds. We could be hearing much more of Mr Landels in the future as he and his Penrith team mates seem to be really getting things together.

At 5.30pm the crowds gathered to watch the fly-off for third place. Pete Tribe was really on form in this one, and took three nice cuts without reply to place third at the 1977 Nationals.

With this bout as an excellent warm up the crowd were expecting great things from the two finalists, Steve Malone and Vernon Hunt. It was immediately obvious to the trained eye that Vernon's model was superior in the turn, but Steve had more speed from his Rossi. Things began to warm up as Vernon cut a corner and removed half of Steve's streamer; within seconds he had removed the remaining part at the string. A line tangle followed bringing both models down. Steve was soon in the air with his spare, but Vernon's spare lines were all bound up with those on his crashed model. With just half a minute to go Vernon cleared his lines and came up

with his spare. Roles were now reversed as Steve went into the attack! Just as everyone thought Steve was about to take a cut, Vernon crashed uncharacteristically on a bunt; the final whistle followed within seconds. Congratulations to Vernon on this, his third British Championship win.

ML



4. Irish visitor Stoo Holland (right) was impressive as ever – so were his models.



8. Bill Gipton waves goodbye to a 'Blasta'!



Vernon Hunt with half his best model and hastily repaired reserve used to win FAI combat.

1978 Contest Reports

COMBAT

by Ian Hutchinson

MAINSTREAM TROPHY – April 23rd

Sunny clear skies and a low wind set the scene for the first major Combat competition of the 1978 season. On the agenda was the Mainstream Trophy for FAI and for the first time a ½A Combat event was also held.

The site itself was the playing fields adjacent to the noisy sports centre at Wigan, separated from housing by a trading estate. The grass, though slightly soft underfoot, was mown to a perfect length and area, and there was no shortage of space for practice. Competitors started arriving at 9.00a.m. – travelling from as far afield as Norwich, London, Windsor, Leicester and even Dorset.

The Mainstream Cup, first prize for FA Combat, was supplemented with six smaller cups donated by North West Model Supplies, three each for FAI and ½A. Trade prizes of gallons of fuel, lines, kits, engines, printed tee shirts, vouchers and a year's subscription to *AeroModeller* completed a very worthwhile prize list. Stockport Club wishes to thank the Manchester Model Shop, Michaels Models, Powermax and the *AeroModeller*.

This was the first event run to the new FAI Combat scoring system and the radical effect that the increased penalty of ground time had on the results of each bout soon became apparent. Very few bouts resulted in close scores with one third of the bouts having victories by a margin well in excess of 300 points. The importance of remaining airborne really was highlighted, and from the number of flyers returning hefty minus scores, this certainly is an area needing a lot of polishing up in the coming competitions. Highest winning margin of the day was Steve Malone's 1st round win of 510 points.

A line check was done for every competitor, a rule not always observed at competitions. Very worthwhile, however, as three bell-cranks pulled out and two sets of lines broke during the pull test. As a result of this precaution no model suffered a fly-away throughout the entire contest.

The event attracted thirty entries for FAI and a losers round was flown to bring the numbers up for the second round. Good news at least for Dave Wood, three times winner of the Mainstream, who got back into the contest after a 1st round defeat by Stewart Sparkes.

The expected unveiling of super combat models from those selected to fly at the team trials on 6th May failed to materialise. Although this was to be the only contest in 1978 prior to the Trials itself it appeared that most potential team members wanted to keep the secret wraps over their latest developments. Only novelty of the day was Mike Fitzgerald's entry with an Oliver Tiger nylon covered model; how times have changed.

The Semis produced a major win for Steve Malone with another massive 454 point victory over R. Stitson to meet Dave Wood in the final. Dave narrowly missed making it his fourth consecutive winning of the Mainstream Trophy when he lost by 46 points to Steve. Consolation prize however was a special cup presented for his previous three years wins.

Alan Tyson of Penrith Club who came third over Richard Stitson with his Super Star III powered by S.T G20/15. Right: Andrew Hellawell plus girl friend from the Halifax Club with his P.A.W. powered own designed ½A model.



Left: Winner of FAI Steve Malone with pitcrew (centre) Paul Landels and (right) Mick Tiernan. Middle left: Stewart Sparkes of Bournemouth Club winning over Dave Wood of Stockport Club during 1st round. Middle right: Pete Tribe of Cosmos winning over Trevor Sayer.

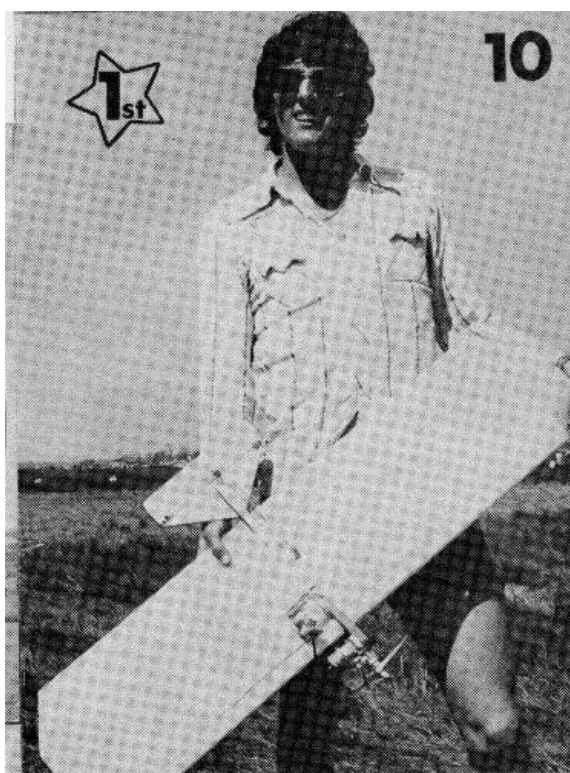
The Nationals

FAI COMBAT *by Chris Snitter*

The competition was very open this year with very few of the recognised top pilots flying; this made the bouts very even with the onus very much on the pit crews, especially with the two points lost for every second on the ground rule being introduced this year.

The third round brought quite a surprise with reigning European Champ Mick Lewis losing in fine

style to Dave Harrison. In the fourth round we saw one of the best bouts of the weekend with Pete Tribe and Mick Tiernan both on form; the bout ended with three cuts each and even on ground time, so a re-fly took place which Pete Tribe won when Mick took all the streamer. Biggest surprise of the weekend was Alan Wyke, a newcomer, getting through to the semis only to lose to an on-form Bob Morgan. And so the final arrived, with Pete Tribe and Bob Morgan the contenders. It promised to be a good bout but Pete took the streamer all too quickly and spent the next two minutes running away only to have his engine cut prematurely giving him ground time; in the air again and Bob got the cut he needed and it was all over for another year. Alan Wyke met Alec Herring in the third place fly off with Alec winning in good style. A good end to a glorious weekend. All that remains is to thank Mick Lewis, John Hammersley, Bob Morgan and the members of my club 'COSMO AC' who helped with the organisation.



Team Trials for First Ever Combat World Championships

F2D Combat

The Trials set out to test flyers in many different ways, not the least of which is the ability to make the superhuman effort required in Combat these days to prepare a whole fleet of models and equipment for FAI flying. Notable absences from those invited to fly were Richard Evans and Richard Wilkens who find they can no longer maintain this commitment, whilst several other flyers present were also clearly unable to afford the building time to come properly equipped. Combat is no longer solely about flying skills, many of our top flyers being handicapped by insufficient preparation.

The new ground rules are proving very unpopular, further throwing the emphasis away from pilot skills. Many bouts were won in the air by superior pilot skills only to be lost by excessive ground penalties. Bob Morgan was certainly an early victim of this new styled scoring. Is Combat destined to become team racing with streamers, dominated by athletic pitmen with hot gloves, where a first flick restart is worth as much as a cut?

The contest itself was 'seeded' into A & B groups of six, each pilot to fly all the other groups, giving everyone six bouts. Following form, the expectation being that the top six in the 'A' group should win all their bouts over the 'B' group but Combat is not that predictable. Such seeding was naturally open to debate as Group 'A' pilots had the advantage of generally easier bouts over the 'B' group pilots.

An important bout came when Mick Lewis, Group 'A' met Dave Willis, top flyer in Group 'B', each having won three bouts. Mick won but his total of four wins still proved insufficient for a chance of a team place.

With such an elite gathering the standard of combat was naturally high but the skills of the individual bouts was overshadowed by the drama of the outcome. At the end of the day four pilots were equal with five wins each, to fly off for the three team places. Steve Malone, Vernon Hunt, Mick Tiernan and Dave Wood were to fly two bouts with a losers' re-fly. The Malone/Hunt bout produced brilliant top class combat, two cuts each; Malone having two less ground points was declared the winner, that's one second differential! However when the watches were checked, not allowing for rounding off the seconds, the actual difference was 3/10th of a second. The organisers considered this was too close and ordered a re-fly.

Meanwhile Wood v Tiernan produced the first team place for Mick Tiernan. The Malone/Hunt re-fly started badly for Steve, being left on the ground at the start and finally losing the bout to Vernon Hunt, producing the second team member. The fly-off for third between Wood and Malone was to be a sudden death affair with only one team place left. However the result was pre-empted with a dramatic retirement from Steve Malone disenchanted by the number of models he was consuming and the way his luck was running with the scorers.

So an inconclusive result to the day's proceedings especially considering that the SMAE is not necessarily bound to nominate the top three flyers from the Trials for the actual team.

The consensus of opinion as the first World Combat Championships draws near is that the rules are still far from ideal. FAI rules have complicated the event and the scorer's job. Split seconds can decide the outcome, limits that are finer than the scorers are able to accurately record, and had the Trials been run strictly to the rule book, many would-be winners could have been disqualified for minor rule infringements. All of which points to an exciting and eventful World Champs for Combat.



Our highest hopes of a World Champion rest with our Combat Team, Mick Tiernan, Dave Wood and Vernon Hunt in this event so long dominated internationally by British flyers.

RESULTS

F2D Combat

V. Hunt 6 wins from 7; M. Tiernan 6 wins from 7; D. Wood 6 wins from 8; S. Malone 5 wins from 8.



Dave Willis with his Rossi powered Boomerang models, glass cloth centre covering made them really tough, used vac-formed pacifier pods soon to be commercially available.



WORLD CONTROL LINE CHAMPIONSHIPS RAF WOODVALE 1978

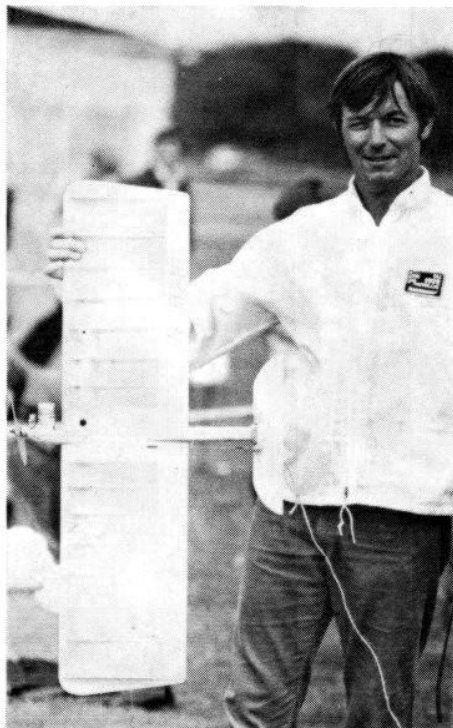


Moment of launch in excellent Holland vs Tiernan bout.

THE first world combat championships has been a long awaited event. Unlike other stopwatch events, no comparisons between competitors scoring potential is possible until they compete together. Dependant upon the intuitive reaction of one flyer against another during the excitement of a bout, it was not until an Austrian flew against an American, Brazilian flew Norwegian or Swiss flew Mexican that comparison and judgements in the skill and art of flying, so long awaited could be determined.

Combat is currently a most unique and exciting event going through, as it is, massive "growing pains" with a wealth of

Charlie Johnson over with the U.S. team shows typical mylar covered all balsa mono boom american layout, surgical tube tank goes inside rocket tube.



new ideas, models, designs, and flying styles that makes it unrecognisable, though not necessarily better than even a few short years ago.

The approach to FAI Combat is greatly diversified, although glow motors dominate, the choice of power plant, propeller or fuel system is varied, none proving to be dominant in use. As to the models themselves, there is a clear definition between each side of the Atlantic. Europeans prefer large area "Foamies" based on the parallel chord triangular tail *Superstar*, the taper wing *Titan* or the French *Boomerang* with many methods of hollowing, lightening or strengthening. Models from the American continents varied, from the Canadian Balsa frame model reminiscent of designs from the early 1970's to the US and Mexican twin or mono-boom flying elevator models, all lovingly crafted from balsa wood, unbelievably time-consuming in man hours.

National flying styles also varied as did ability, despite the "world" status of the event. Many early losers lacked aggression or the competence to follow and merely manoeuvred in their own airspace presumably hoping for a combat to 'occur' if the opponents flight path overlapped. In general the European style was to chase continuously tight and low, restricted to the downwind quadrant whilst the generally quicker American models flew wide and fast using the full circle, with the Australians flying high swooping down for quick striking attacks.

The 'rule book' became the ogre of the meeting, with the ludicrous penalties concerning pit crews and conduct often dominating the performance of the flier. Combat is not a team event nor should it be, only one person gets on the winner's rostrum. It should be an event to find the best pilot irrespective of how many pit crew members, how fast they can run or the exact position of feet relative to arbitrary lines marked on the ground. At times, scoring was more relevant to 'Come Dancing' than combat. Imagine the nonsense of Gary Frost disqualified for letting his handle go momentarily before the model landed after gliding down from a 3 cut to 0 victory; or Montagna disqualified when his pitmen launched his model one second early – to what advantage? or Fred Meijer dis-

qualified when his handle was ripped from his hand during a mid-air collision; or Tomelleri knocked out by his pitmen accumulating meaningless penalties for not entering the circle perpendicularly; or Dave Wood disputed to be attacking the opponents model by simply chasing it when only the string remained – what a precedent that might have set! What else can a pilot do? Clearly the meeting proved the rules to be useless and in need of immediate modification, let's hope all countries present, will now pressure the FAI for change.

Winning performances of British fliers at previous international events made them favourites for the championship yet there was a growing awareness that improved standards world-wide had certainly narrowed the gap. In fact, the opening bout of the first round proved to be one of the sensations of the meeting with the defeat of Vernon Hunt. A disastrous build up to the championships for Vernon, which in itself would fill a report, included destruction of all his models and equipment after a fire. After months of development on new models, he was left with only days to replace his fleet and borrow engines. His run of bad luck continued with tough draws; Fraisse of France, in round one and Cleveland of the USA in the re-fly. Two messy bouts gave him no chance to show his flying ability and Britain lost its favourite for the title.

Other first round losers included all the Swiss, Mexican and Irish teams including Stoo Holland plus America's Cleveland Frost, Dane Edslev and Canada's Gibson, all of whom were to win their re-flies and show good ability later. At the close of the round, individual scores were as follows: First: Mittler, 640 points, second: Montagna 604 points and third: Holland, 540 points.

The second round saw the defeat of all three Australians – Stivey, Holmes and Adler. Cleveland from USA and experienced Dutch flyers Wakkerman and Van Zip also made an exit. End of second round individual scores placed Wilmer on top with 540 points and Frost with 513 points followed by Holland – 503, Edslev – 452 and Meijer 440 points. Tiernan was sixth with Wood tenth. West Germany led the team prize with all three remaining in the last sixteen, followed by USA with Belgium, France and England equal third.

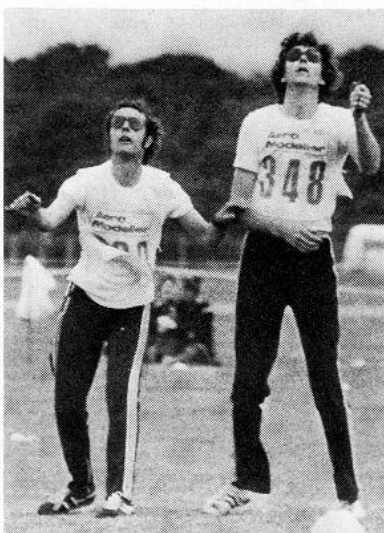
The opening bout of the third round should have been a classic, Meijer v. Wood, but after 10 seconds it was all over for Fred, after his handle was ripped from his grasp during a mid-air collision. There was nothing he could have done except wear a wrist strap, and as a result he was disqualified. The second bout, Reichle vs. Tiernan started with the German pit crew, which included Frau Reichle starting the Rossi's, unfortunately unable to get the motors running, becoming a walkover due to excessive ground time. The third bout, Henry vs. Gibson, was a very fast bout with the Canadians setting the pace fast and wide with his glass-fibre propped Cox powered models. Gibson proved repeatedly that the pilot himself is now a valuable member of the pitcrew – retrieving his own models, saving valuable seconds and of course always running out perpendicular to the circle. The fourth bout, a classic match between Frost and Holland represented flying styles from each side of the Atlantic. Frost was soon two cuts up, flying well; but problems during

pitting with burst fuel bladders (a recurrent problem for the US team) slowed the action. Back in the air, Holland chased the fuel soaked model of Frost to win back cuts and take the bout with some superb flying. The fifth bout was Mittler vs. Wilmer, whose motor had a strange attachment which proved to be a compression screw, being the only diesel in the remaining sixteen. Mittler with superior air speed dominated the flying, sizing up his opponent, chasing continuously, staying out of trouble, not rushing things, to easily to take two cuts towards the end of the bout, cool tactics. The sixth bout saw Fraisse vs. Grothe, probably Germany's top flyer unfortunately let down by poor ground work. Fraisse at one time two cuts down lacked aggression but eventually concentrated sufficiently to take a cut and win the bout. The seventh bout was Tourne vs. Tomelleri who used the new Italian AD15, a very fast combination with his flat aerofoil taper wing models. Superior models and piloting left the Belgian outclassed and defeated. The eighth bout brought together Edslev the Danish Champion and Rudner, the sole remaining American. Another great Euro-American combination. A flurry of cuts reduced each to towing strings which in turn produced some of the finest flying as Edslev, aware of an impending belcranking, having taken an early lead, showed brilliant following ability with some of the tightest manoeuvres witnessed. A victory for the Dane, a pilot to be respected, and a farewell to the US team.

Quarter Finals

The first bout, Edslev vs. Wood, both great pilots in tight chasing manoeuvres with Dave having the superior model for speed and stability. Edslev started well, but took all except for the knot. Wood shook off all attacks by out-running his opponent inverted or level to then snap quick turns in behind Edslev and eventually flying him into the ground. Back in the air, Wood then cut back also leaving only the knot which he took after an inspired chase.

The second bout Gibson vs. Mittler, the more experienced pilot, however the well equipped Canadian provided a tough opponent. Mittler lost valuable points after



Big Mike Tiernan battling it out against Ireland's Stoo Holland.

crashing both models and losing a pacifier in a mid-air collision. The third bout, Tiernan vs. Holland, one of the best combinations, showed a fine display of flying. Again super tactics from Mike chasing tight for some quick cuts then running wide and fast to avoid trouble. Stoo Holland flew well but lost the initiative and eventually lost the bout. The fourth bout was Tomelleri vs. Fraisse two of Europe's top flyers. Fraisse almost handicapped with superior turning models seemed at times unable to control their potential. By contrast Tomelleri flew smoothly to take the cuts yet surprisingly kept crashing soon after pit-stops. Nerves or tactics – who could tell? At the end of the bout Tomelleri was chaired shoulder high from the circle only to find his pitcrew had made numerous penalties which added to his ground time gave the bout to Fraisse.

Semi Finals

First bout – Wood vs. Mittler. Wood flying

in great style took all of the streamer with two cuts before a mid-air, putting Mittler down. Two new models and fabulous flying from Mittler gaining one cut which stopped his motor. Wood was now in danger and still towing lots of streamer trying to evade Mittler. Confusion reigned as orange solar film fluffed off Woods model another mid-air took the streamer and cut Wood's model free to end the bout with Mittler losing on ground time. The second semi-final pitted Tiernan against Fraisse. Immaculate pitting from the French team matched by the English team made this truly a pilots' bout. However, all too quickly Mick had two cut and Fraisse took all the streamer to rob the crowd of a longer bout.

Finals

The third place fly-off. Fraisse vs. Mittler. Fraisse quickly took all of the streamer with two cuts before an incredible mid-air. Both contestants relaunched simultaneously with Mittler taking a cut before another amazing mid-air imbedding his model into Fraisse's wing, which continued to tow the locked models, the result a win for Fraisse. At last the moment combat fans have waited twenty years or more for to witness the first ever final to decide the world champion, and true to form in an all British Contest. Extra pitmen were requisitioned to create two crews and at the start Wood was left grounded with a dead motor. Such a delay may have made the pilots over anxious as both Mike and Dave had soon removed all of the others streamer with only one cut each to require no further manoeuvres and make Mike Tiernan the Combat World Champion, with Britain also taking the team prize.

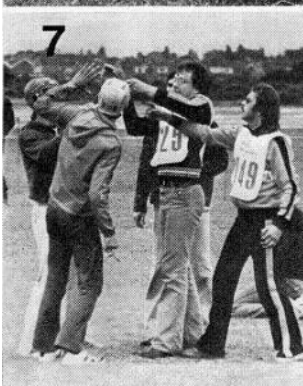
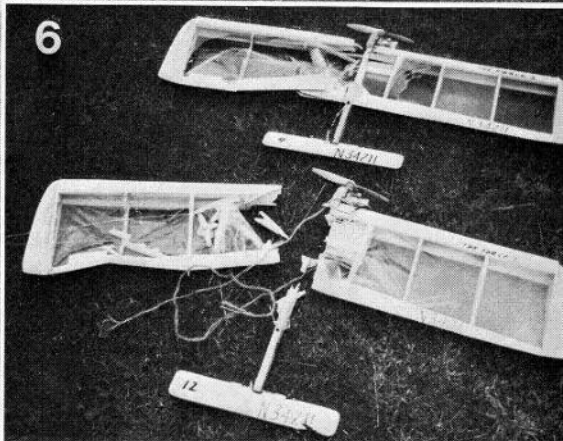
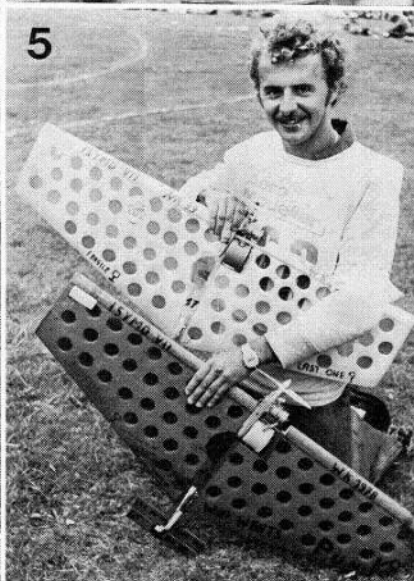
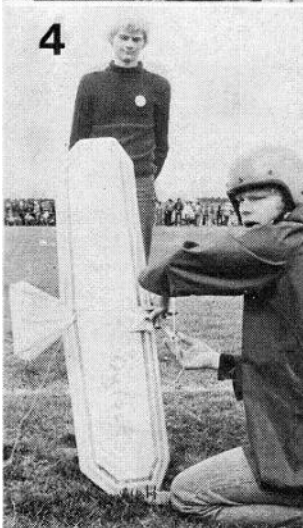
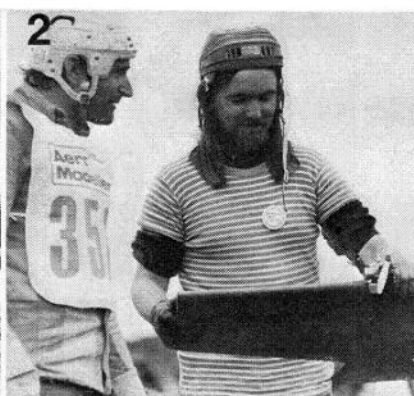
Never have two world champions been so disappointed at not producing a good bout for the crowd, so much so that fresh streamers were fitted and soon the combat continued in an exhibition to demonstrate what might have been. They were joined by Fraisse, Tomelleri, Rudner, Hammersly, Bingham and others in a tribute to the sport of combat and the global camaraderie of combat flying.

It is the very nature of combat requiring excellence on the day that some of the best fliers never appear at the top of the result sheet, so what of the Pilots themselves. Naturally the top four were brilliant, but Edslev the Danish champion or Stoo Holland could well have matched their skills on a good day. Italy's Tomelleri and Holland's Meijer must also be rated world class. Who knows what might have been for America's Chuck Rudner and Gary Frost, but for burst fuel bladders; Germany's Wilmer but for his slower diesels or Grothe but for having drawn tough opponents too early and of course our own Vernon Hunt but for his overwhelming misfortune. No doubt in two years time all will have improved, hopefully the rules changed and the stage set for another great championships.

Organization, judging and scoring under the leadership of John Hammersly was impeccable, comprising of a pool of dedicated experienced pilots, any of whom could have given a good performance in the event itself. Duplicate sets of judges, not actually required by the FAI, simultaneously scoring each bout independently, allowing a double check of scores thus minimising human error. Results were rarely more than seconds apart, none of which affected a single result!

The Champions Dave Wood runner-up and Mike Tiernan who together with Vernon Hunt also took top team prize for U.K.





1. Tomelleri chaired from circle after bout with Fraisse. 2. Reichle beaten by Tiernan W. German Team placed 2nd. 3. Stu Holland with Irish pitcrew lost to Tiernan. 4. Edslev, Denmark showed superb ability lost to Wood. 5 Mittler Belgium highest individual scorer in two rounds. 6. Cleveland's models after losing to Edslev. 7. Fred Meijer untangles lines as Wood continues flying. 8. Combats first World Champion Mike Tiernan with Pitmen Mike Lewis and Steve Bingham. 9. Fraisse with foam Boomerang one of the best designs. 10. US Team Pitmen Rudner (twin) & Smith standing Strieter, Gary Frost and Chuck Rudner, other flyer Cleveland left early for Skytrain. 11. Gibson and Canadian crew flew well until matched with Mittler. 12. Rafael Vargas top placing Mexican.

