

Sticks & Tissue No 3 February 2007



I'd like to thank the following contributors without whom this newsletter would not be possible, Peter Michel, Tony Tomlin, David Kinsella, Roger Cooper, Alan Holmes, Peter Mason (Transfers), Dave Day, and Ted Horne.



If you can contribute any articles, wish to make your point of view known etc please send to james.iparry@tiscali.co.uk or phone 01202 625825. Should you email me an article please don't use "Reply" as it may be circulated to all recipients of the newsletter.

This is essentially an electronic newsletter and will contain many photos. Some photos I haven't compressed as the detail is required therefore if anyone does not wish to receive a large file each month e.g. 5mb, as they are on dial up please let me know



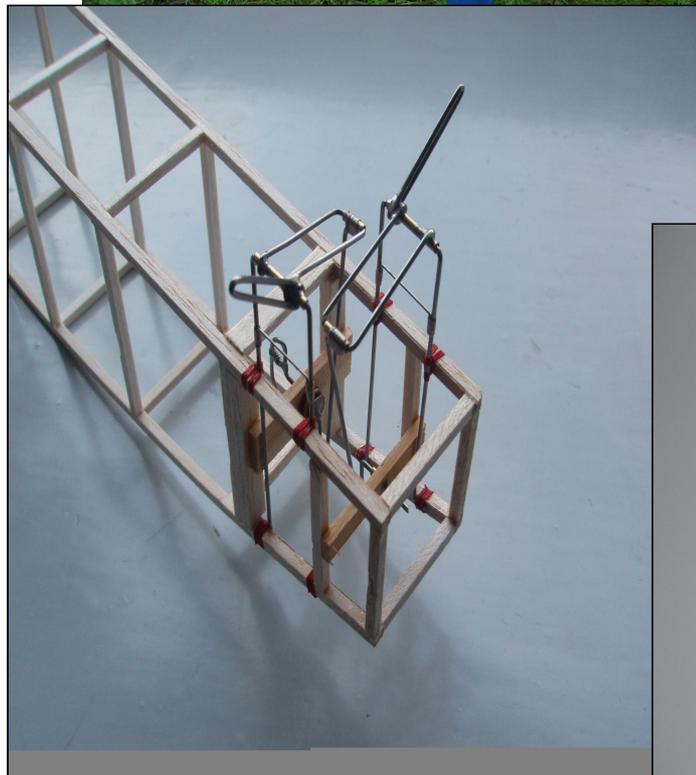
Comment by Ian Russell regarding Ornithopter

Of course, it's no way an Ornithopter, it's a fixed wing aeroplane deriving its motive power from a couple of flapping appendages! Could we call them hinged reversing rotation propellers?
Cheers, Ian R.

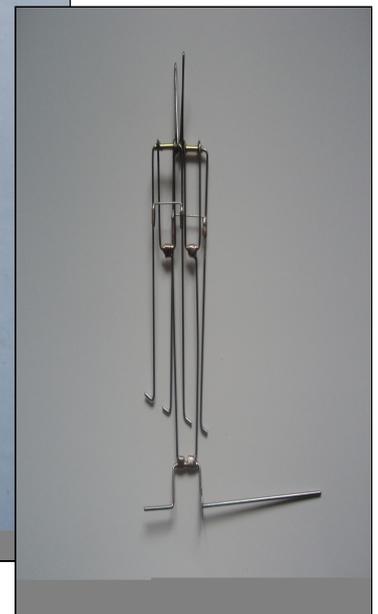
Part two of the Lippisch design by Peter Michel

READY TO GO: In Sticks and Tissue, issue No 2, I pledged myself to building the Lippisch semi-ornithopter. Well, the model is now complete and awaiting a spell of warm, calm weather for its initial outing. Here it is. I can tell you that the build has not been without its problems. Strangely enough though, the complicated flapping mechanism, all from 18swg wire and brass tubing, went smoothly and the result was most satisfying.

Herr Lippisch's dimensioned drawing proved to be 100 per cent accurate and the challenge here was to reproduce such accuracy in bent wire and soldered joints. Easier said than done! But then, I've always liked wire-bending.



The Lippisch flapper and its engine room. Don't tackle it if you hate wire-bending and soldering...



The pictures here show the works before and after installation in the fuselage.

When it came to the construction of the airframe there was nothing for it but to construct a special building board for the wings. Past experience with a large gull-winged vintage



rubber model called the Golden Eagle reminded me that you just couldn't build structures such as this without one. The necessary board was quickly knocked up using 1 in.-thick insulation board. This wing is a very light structure indeed. With the spar set into the bottom of the ribs I just knew that it would immediately bow up with the tension of the covering – a thing that I truly hate in a model. So I cheated up to a certain extent by placing the spar just high enough in the rib to avoid it touching the tissue on the top surface, which would be a crime under SAM law.

But will it fly? See the next issue of Sticks and Tissue....

I can only marvel at the semi-ornithopter built by Peter and if anyone can get it to fly he will. I can't wait to see it fly hopefully Peter will take it to Middle Wallop? Next issue will continue the story with more detail and photos.- JP

Racer Remembered by David Kinsella

Forty years ago I was a car enthusiast, lavishing hours and hours on my Allard, attending race meetings and enjoying cheap trips to Germany and Italy for the same reason. And it was so cheap and easy! Page 39 of SAM 35's magazine brought it all back to when I saw the side view of that most fantastic racing floatplane, the MC72, in the January issue. Like mighty Daimler-Benz, Fiat's giant engineering spread made it the natural choice for Italy's Schneider Trophy engines, and it was in Fiat's magnificent museum in Turin that I was introduced to the stunning V24 (!) that powered the MC72 to 441 mph in 1934. This floatplane record still stands. As a measure the super clean (no floats) Mk22 Spitfire of a later year was only 8mph faster. The MC72 was strictly pre war stuff.

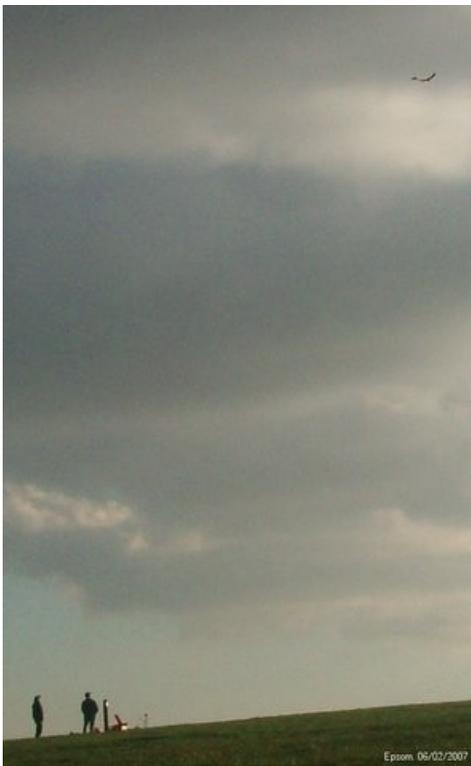
Years elapsed before I fully appreciated what I saw in Turin, but even then this mighty motor drew a gasp or two. Its great length (it was, in fact, two V12's in tandem) with a Merlin-like supercharger location was accentuated by a top mounted inlet trunking – which gave problems. A set of paddle-like contra props cancelled torque. Big league like the V16 BRM!

Rodwell Banks was the top fuels expert during the Schneider Trophy period, and I was lucky to meet him in 1975 during a flyers gathering at London's Commonwealth Institute. He advised Rolls-Royce with the 'R' engine but, as an independent, he was called in to assist with the V24, which was plagued with explosions in the lengthy inlet system. 'Rod' Banks solved this problem and others too, and recalled to me standing with the King of Italy on a rooftop as the Schneider racers roared overhead. These machines were often a handful and skittish, fatalities occurred, and sometimes a speedboat's wake was vital in kicking those huge floats into a planning mode. Britain won the day, as we know, but all who took part were heroes.

And now a quick plug for a magnificent magazine. We are all enthusiasts of a truly wonderful hobby. Worldwide yet very English too, the Vintage element being particularly strong and active, several I know are already enjoying 'Best of British' (monthly, 72 pages, £3.30, less on a subscription). Packed with colour and topics – aviation, railways, books, music, history, art, events, adverts, letters – a call to 01778 342814 or an order at your newsagent will soon bring hours and hours of enjoyment. It's super stuff!

This month covering National Service and the Attacker jet fighter not to mention a Lancaster spread by Robert Taylor, very senior RAF officer Banks would have loved. By the way, do read his book 'I kept no diary'.

Evocative photo and caption from Peter Michel



DREAM FLIGHT: Tom Thompson, left and Ted Horne gaze in awe at Ted's power model at the top of a perfect climb-out. A perfect flight on a perfect day. [Feb 6, 2007.]

Snippets from Roger Cooper (Roger has been prolific with his writings and much more to follow over the next few months)

Further to my last missive with photos, your readers may be interested and possibly amused to learn that the first job I ever had as the inevitable callow 16 year old was with a company called Aeronautical, Electronic and Engineering, in Alperton. Ring any bells? Scruffy old place in a couple of wartime huts. For those not in the know they did a lot of small jobbing engineering but the main interest from our

point of view is that they have bought the Amco engine manufacturing rights and tooling. Amco used to be in Chester if I remember correctly until the guy who started the company sold out and went to Canada. The engine assembly side was managed by no less than Dennis Allen of Allen Mercury fame - well before his Allen Mercury days - ably assisted by Len (Stoo) Steward. Both of them well known in model circles in those early 1950's days.

Apart from fetching the fish and chips at lunchtime, and making the tea etc. I did several machining jobs on the Amco BB and PB 3.5's. If you ever come across one which you can date to around 1953 and it has a tiny notch below each of the exhaust ports chances are I was the one who had the totally boring and mind numbing job of milling those ports out one at a time. The notch was down to the shape of the tool and I can only assume that when it was set up in the machine for me to run it was just cutting a few thou deeper than on a previous occasion and the arbor of the milling cutter was catching the cylinder. I also turned crankshafts on an old Southwark capstan lathe which had seen better days and the box tool we used to turn the bar stock down to crankshaft diameter seldom gave us anything other than a wavy cut. Very frustrating and furthermore it always looked as though it was down to me because the old lathe was long past running on auto feed - it just locked up and had to be dismantled if you tried.

When you think about it, it is a wonder we ever managed to make such wonderful engines. I recall also the time both Dennis and Len were away and there were some engine rebuilds required. Somehow the works manager - a Mr. Barrett I think - found out about my interest and asked me to have a go at these jobs. Sadly I was not up to scratch and when Dennis came back he quietly told me I'd made a b---s of it and the repairs had all come back. There you are! Just another little snippet from the archive
Cheers Roger



AMCO 3.5BB
(Sorry about the naff picture it was all I could get- JP)

CLAPA 50th. ANNIVERSARY BOB PALMER CELEBRATION EVENT by Ian Russell

As stated previously, in 1957 the American Bob Palmer, best known for his THUNDERBIRD design, visited England and gave a demonstration of Control Line Stunt Flying at the Duke of Bedford's estate, Woburn Abbey. In fact, this demonstration was what inspired Bill Morley, leading to the birth of the famous Merco engines.

In 2007, to celebrate the 50th. Anniversary, on Fri. 17, Sat. 18, and Sun. 19th. August, by courtesy of the Duke and Duchess of Bedford and the Trustees of the Bedford Estates, CLAPA, (The Control Line Aerobatic Pilots Association), in association with Milton Keynes Modellers, will be running a C/L Stunt event at the same venue. Although the event will be judged and winners announced, it is intended to be more of a relaxed celebration of Bob's contribution to our hobby than a cut-throat competition.

For aeronautical and mechanical enthusiasts the weekend will be a veritable feast, as our event will coincide with the DeHavilland Moth Club's annual Fly-In, which will be held at Woburn on 18/19 Aug. 2007. Over 100 Moths of all types attend. There is also a strong presence by the Vintage Sports Car Club.

Fri. 17th. will be a practice/fun fly day available for all participants. Separate contests will be run on Sat. 18 and Sun. 19, with separate winners being declared each day. This is so as not to disadvantage those who can attend only one day. There will be three classes, viz. "Palmer Designs", "Classic", both flown to British Classic rules, (rules available on the BMFA site, www.bmfa.org) and "F2B". No person will be allowed to enter both days, or more than one class, but if spare slots are available on either day, it will be possible to fly as a "Guest Flyer" in any class. Depending on the number of entries, a minimum of two flights will be possible.

British entries will need to show a valid membership card of their National Body, the BMFA.

Non-British entrants will need to show a valid F.A.I. Licence.

These are most important, as these documents confirm the entrant carries valid appropriate insurance. We must have these to satisfy the needs of the Woburn Estate, and there can be NO exceptions.

Handle safety thongs and pull tests before each flight are also mandatory. Again, there can be NO exceptions.

The event will be pre-entry only, and all entries **must** be received by Fri. 6th. July. The entry fee is £15. This will give free entry to the Estate for participants and their immediate families, and one helper, on all 3 days. All names must be declared on the entry forms.

Spectators will pay the normal Woburn admission fees, details being found on their website, www.discoverwoburn.co.uk . For spectators there are substantial advantages in advance booking by their website.

At some convenient point during the weekend there will be a presentation, when the actual model flown by Bob Palmer in 1957 will be donated to Woburn Abbey for permanent display in due course.

When he flew at Woburn in 1957, we were all astounded to see Bob flying consecutive sq. horz. 8's "blind", looking 180deg. away from the model. There will be a prize for the flyer who best repeats this 50 year old manoeuvre, never seen since!!!!

For further information contact Ian Russell, 98 Elers Rd., London W.13. 9QE. ph.020 8932 6783 (Int'nl - 044 208 932 6783). rustler@aero.fslife.co.uk . For a full information pack containing details of local accommodation, camping, and caravan sites, nearby attractions, and entry forms, send either 90p in stamps (GB) or 3 International Reply Coupons (IRC) (Europe) or 6 IRC's (USA and elsewhere), also to Ian Russell. Sorry about the postal costs, but the info. pack weighs 500gm, - over 1lb.! For entry form only send 32p stamps (GB), 1 IRC for all other destinations.

HELP - Please see separate item in this issue canvassing volunteers to help staff this event.

Remember, by volunteering to help you get free entry for all 3 days. If I get enough volunteers I will be able to schedule at least one free day, possibly two, for you to take in the rest of the attractions.

Fred Guest anecdote by Alan Holmes

Fred Guest was one of the leading control line speed flyers of the late 1940's and 1950's and was a competitor in both glow and pulse jet classes. If you look in your old APS plans handbook you will see his Lindy design. He can be seen flying speed models in some of the old Pathe News clips of the model aircraft meetings. When Fred was in his speed C/L heyday I was at primary school and yet to start aeromodelling, however our paths were to cross in the mid 1960's. By now I was well into my aeromodelling career and had moved on to R/C aerobatics. I flew a lot with C/L aerobatic flyer turned R/C aerobatic champ Mike Birch. Mike had known Fred for many years and introduced us; Fred was no

longer active in C/L speed but did a bit of sport R/C flying with an old model of Mike's. Fred was always interesting to chat to and had many tales from the early competition era, one sticks in my mind in particular. When chatting about pulse jets I mentioned that you need a pit crew to assist with the styrup pump and the trembler coil and he recounted a way he had come up with to fly pulse jets single-handed. With the model on its take off dolly, jet pipe prime with petrol and ready to go he laid a trail of petrol from the jet pipe to the centre of the circle as he walked out to pick up the C/L handle. When he was happy he lit the petrol trail with his lighter, the flame rushed back to the pulse jet exploding the petrol vapour in the tail pipe and triggering the jet into life. I wonder what today's health and safety conscious BMFA would think of such a technique?

Batteries by Tony Tomlin

Dear Editor,

Having read the very informative article on battery cycling by Dave Day in the last Sticks and Tissue, I thought I would add a few words to the subject.

Like Dave I would never advocate cycling of Nicads or Nickel Metal Hydride batteries simply as a way to [hopefully] increase capacity. I have used routine cyclic analysing for a little over three years with great success [and no battery associated crashes!].

The equipment I am using is manufactured by Mainlink Systems who are based at Moggerhanger in Bedfordshire. The unit I use is the Digiliser 2000, this is a rugged mains operated unit that can handle 1 to 16 cells from 100mAH to 5Ah capacity. It has a very easy to understand LCD screen that guides you through the setting up procedure for charge/discharge cycles for all differing size batteries, and at the end of the test gives a cell capacity readout. A normal two discharge/charge cycle takes approx. 7hrs. Incidentally Mainlink Systems also sell a very cheap little book [called the Battery Book], which explains in a very straightforward and entertaining way all you need to know about batteries.

Looking back through my test records, which cover a total of 153 tests [i.e. both TX and RX packs] I find that I had 5 battery packs that I replaced after they displayed low capacity. In one case a transmitter pack that was in use recorded 30mA capacity and still worked!!, I later discovered that this pack was 12 years old. Another good reason to monitor your batteries.

As an aside, I and several other flying friends have discovered that some packs never reach the capacity marked on the pack. Metal Hydride appear to be slightly worse than Nicads and also it has often proved to be the more well known and expensive batteries that are the worst.

Tomboy plans

I have a few copies of the plan should anyone require at cost plus postage but certainly should be less than £4.00. Contact me should you require - James Parry

Archive aeromodelling

The Pathe DVD's have been a success, despite it poor quality, and certainly promoted the Pathe website. I'm extremely encouraged that BMFA will take it a stage forward, chats I've had strongly suggest this, and the ultimate of a perfect copy on properly produced DVD with perhaps notes seems quite possible. We'll have to wait and see though. In the meantime anyone with first hand information/anecdotes/tales etc on any of the clips please will you let me have the details/write up, which will when ready be sent to

BMFA. At present I don't think they are geared up for such information, although that will change, but I'm willing to be a temporary deposit/library, unless anyone has a better idea. Anyone with strong feelings on the subject also please let me know and those feelings will be included in the next newsletter. I've limited myself deliberately to the number of DVD's I'm willing to send out for appraisal however there are a couple left should anyone want one send me your details and I will forward. First come first served. By the way they are free I'm not charging anything for them, they are an insight into the archive only and poor quality. However if, which is unlikely BMFA decide not to move forward I may well ask all to lobby the association, so its best you know what is at stake.

A few of the many photos sent in and captioned by Roger Cooper – many more over the next few issues



Challenger

Anyone remember the Challenger? - a readymade (RTF in today's terminology) moulded plastic C/L trainer for ED Bee. It would fly quite well on 20ft lines (nothing longer) but power/weight ratio was such that it would stall if forced too high. Still, I flew it to bits - must have done 100's and 100's of laps. This one was shot in 1951 so must have been my 1950 Christmas present. I don't think the shot is good enough to reproduce in S & T. The shortcomings of the Ensign Selfix 20 camera is its inability to close focus.



Coquette

Now that is a beautiful example of Vic Smeed's artistry. This one looks a bit solid because I sheeted the fuselage and planked the curved deck behind the upper wing. Quite tough it was too. It once flew right

through a thorn hedge, shedding all the detachable bits on the way but was still flyable once recovered and re-assembled! Not bad eh?

The Cal Smith 'Sportwagon' - fact or fantasy? By Dave Day



Ask anyone who was around in the 1950's about the Cal Smith 'Sportwagon' and they will probably say something like, "Pretty model, always wanted/intended to build one." Add me to that group. Quite a while ago, I saw a model hanging on Ben Buckle's stand at one of the numerous shows that he attended and asked him what it was. Yes, it was a 'Sportwagon' and I was surprised because it didn't look like one. I apologise now for thinking that Ben had got it wrong. I asked Ben how it flew and he said that he had never got around to flying it.

I have made a habit of building models of models. For instance a three tenths scale 'Scram' (Moorhouse kit), a three-quarter scale 'Southerner Mite' (Ben Buckle plan) and a half size 'Jersey Javelin'. All these were powered by Telco CO2 motors (the 'Scram' now has a Gasparin) and all fly well. When I acquired a Brown 'B100' I looked for something suitable and settled on a half size 'Sportwagon'.

I knew that Gordon Council had built one a long time back. When I asked him how that one flew, all he would say was, "Don't fly it to the left!"

The model was published in the UK in the 'Model Planes Annual 1949' - part of the Ian Allen Model Aviation series. There was a credit to 'Flying Models' so it, presumably, appeared there earlier. (Flying Models is still going and well worth a subscription - www.flying-models.com).

There was a whole lot of technical stuff in the article dealing with the design of the model, which, although it looked like a cabin sports model, was actually a power duration model. You have to build one to discover this, along with the fact that it doesn't have a CG! Those technical diagrams all talk about a CG, but they don't tell you where it is. Neither does the plan.

It doesn't take too long to discover that the pictures accompanying the article are all carefully posed to disguise the true shape. The wings are pushed out in front of the normal position with a large leading edge cut-out to allow this, while the enormous tail is pushed out behind where you might expect it to be. In other words, the fuselage is much smaller than it should be for the wing and tail. It has a lot of dihedral and a small fin, intended for a spiral climb.

If we look at the various details here, the original model was 54" span and the weight was given as 36 ounces. A half size model has one quarter the wing area. One quarter of 36 gives us 9 ounces, mine weighed under 3. Well it sounded very promising.

Looking at the force diagram and guessing the CG position, I came up with 40%. Placing the complete Brown installation, including the tank, in front of the firewall brought this out just about right. Early

flights gave a nice gentle climb - to the right - but with a very steep (like 30 - 40 degrees!) glide. Packing the tail to give some negative simply made the glide less steep and produced a dutch roll in the climb. Adding more wing incidence just made things more so.

The obvious cure was to move the CG back. Moving the tank back into the cabin didn't make a lot of difference, so it was moved to the back of the cabin and a small amount of tail weight added to bring the CG to 60% (you have to read Mr Warring's various works to see where that figure came from). The glide was still steeper than I would have wished and the power part was getting very marginal with very little climb.

So, grasp the nettle and add a lot more tail weight (CG at 80%). Almost a reasonable glide but the power phase was just a nose-high mush with lots of dutch roll. I tried adding positive incidence to the tail, but bang went the glide again. It is still in that state and I am currently contemplating whether to move the CG back to the trailing edge or convert it to an electric R/C model.

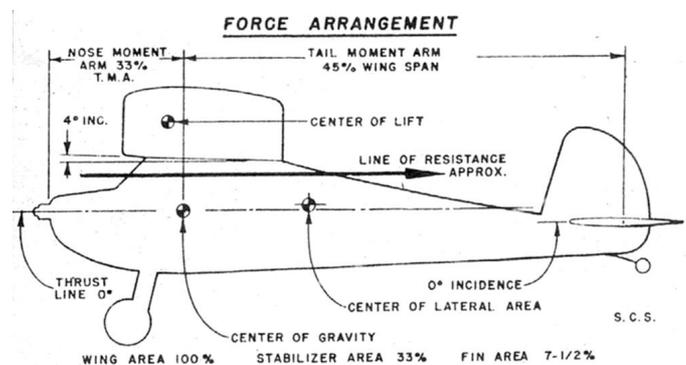
Obviously, a lot more power would yank the model up in the steep spiral that it was designed for, but a diesel conversion doesn't appeal. Likewise an electric F/F version would require some form of timer to limit the run. An R/C conversion would need a new tail.

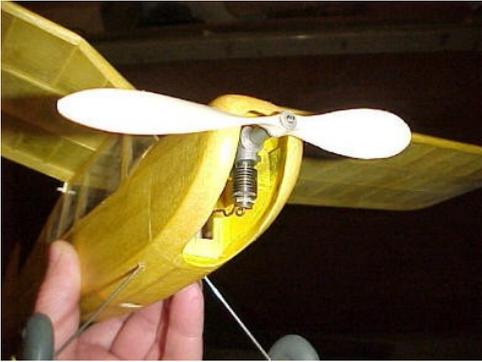
The model is covered with original lightweight 'Modelspan' with a minimum of thin dope, giving a slightly porous finish. This works well on the three models mentioned above, but at least one person has commented that it can give strange effects. There must be someone in our readership who has ideas. I already have a box of matches!

You have to conclude here that the original model probably never flew prior to publication. If some form of radical CG position was needed it should have been apparent. Another clue here is that the wing fixing shown on the plan needs a key on the bottom of the wing to stop it sliding back too far under pressure from the wing bands. It is all too clear now why you don't see lots of them around, though it's strange that no-one seems to have tried an R/C version. I must ask Colin Buckle how many kits he has sold.

Of course, we could always start a contest for 'Sportwagon 3s'. James could print the rules 2 or 3 times in each issue.

Note from JP - Please let me know if anyone would like to build a model and enter a contest with it. If there were a few of you who would then organising will commence.





PROPELLERS, RUBBER, PITCH & DIAMETER by Ted Horne

When I first started Aeromodelling many years ago, when I was just an impecunious youth, I built aeroplanes that had a piece of wood on the front that went round and round, that was supposed to drag my masterpiece through the air. In reality they rarely flew, and destroyed themselves very quickly. The unfinished propeller that came with the kit looked as if had come from a piece of wood cut from an oak tree, it was so hard. It had to be finished, but there were no instructions to tell you how to do it. As for drilling the hole for the bush, how do you get it straight, in the right position with no tools?, that is a good question. I am only surprised that my enthusiasm for model aircraft was not killed off totally after the first half dozen spectacular disasters. In my teens I learnt that by buying a plan, the range of aeroplanes that could be built increased dramatically, but there were drawbacks, even if the size of all the components, including details of the propeller were given. Sometimes the dimensions of the block for the prop were given, and how to cut the block prior to carving. Other times two figures were given, such as 16 x 20. The 16 bit was easy, this referred to the diameter, but what was the other figure? It was not until I met other people who built toy aeroplanes, that I learnt that it related to the angle at which the blade was set relative to the plane about which the propeller revolved, even so it did not mean too much to me at the time.

It was only when a Mills 1.3cc was bought for me that I started to be aware of the significance of what 8 in. pitch meant. Going to a model shop and asking for a prop for a Mills 1.3 was rather like going to a shop and asking for a piece of balsa wood. In essence the more the pitch the greater the pull on the air, but more power is needed to maintain the same R.P.M. and conversely, less pitch means less pull on the

air but less power is needed to maintain the same R.P.M. The secret is to find a propeller that is able to utilise the maximum power available in the most efficient way.

Over the years people, have asked me a variety of questions about rubber power, maximum turns, propeller pitch, diameter etc. Where I did not know the answer I tried to find out. In many cases the answers went into so much technical detail, that I decided it was not worth trying to calculate the answer, but to rely upon the experience of others, who had reasonable success with their designs, done all the theoretical calculations, and copy what they had done. I still think this is the best route to follow. Change things if you must, see if your idea is better than the original, if not go back to the original.

Recently I was told that I should write an article on what I knew, which might just help someone who knew even less than I do.

With I. C. engines it is possible to determine at what R.P.M. the maximum power is obtained, hence in theory, it is possible to calculate a propeller to give maximum performance, speed or time to complete 1 lap, for a control line model. Pitch for I.C. engines is generally equal to or less than the diameter in inches.

Sometime ago I read an article about the time it took for an F2 B model to complete one lap. The author then explained that based upon the diameter of the circle the engine speed, the pitch of the propeller, the actual time to complete one lap, was less than calculated time. The explanation proffered was that the aerofoil section of the blade created "lift", and it was this that was responsible for the dramatic increase in air speed. I am yet to be convinced that this was the case, and that it was not a calculation error somewhere.

When it comes to rubber power, the problem is rather different. Pitch in general is usually equal to or greater than the propeller diameter. For modern contest classes the amount of rubber is normally specified, so there lies the first question. What motor length do I use, and how many turns do I apply? A short motor giving a powerful burst of power over a 30 / 40 second period is normal for a modern Wakefield or Coupe d'Hiver. Longer motors give a lower but longer power output with many more turns, and are generally used for sport and vintage models.

In the 1966-67 Aeromodeller annual there is a very good article, which goes into great detail about maximum torque and turns for rubber motors. The figures given are based on, I assume Pirelli rubber, and not Tan 1 & 2. Another article gave a formula for maximum turns as "loop length in inches raised to the power of 1.5, multiplied by 28 (for Pirelli) or 31 (for Tan 1), then divided by square root of the weight of rubber in grams. These K factors (28 and 31) were no good for Tan 2, so I conducted a series of tests on 12 inch loops of Tan 2 rubber and wound them up until they broke. I then put the figures into the formula to work the K factor for Tan 2, which turned out to be "43". I have used this formula many times to calculate maximum turns for any rubber motor, and have found it to be fairly accurate when a torque meter is not available.

So here is a formula, which can be used by anybody, to calculate the maximum turns a rubber motor will take, on the assumption that you are using Tan 2. I have not carried any tests on Tan Super Sport, but it appears to be similar to Tan 2, but softer, without the same ability to recover after a hard wind. If anyone has done any tests, and worked out a formula, please let me know.

For a propeller blade to generate maximum motion in a forward direction, it is essential that each part of the blade does the same amount of work as its neighbour. Every part of the blade working out from the hub, rotates at a different speed, therefore the angle of pitch of the blade has to vary through its length. If this is not done, one part of the blade will be trying to push the air backward at one rate, whereas, its neighbour will be trying to do it at a different rate. The consequence of this is that some parts of the blade are not working efficiently, with the resultant loss of pulling power. There are people who will disagree with the above, and will say that the blade twists along their length, hence giving more pitch towards the tips as they push the air backwards. Others will say that centrifugal force pushes the air

towards the tips, so the air does not travel backwards across the blade exactly in line with direction of motion of the shaft. If someone can confirm or deny the above suppositions, I should be grateful, again, if someone can tell me how to create the perfect prop, I should be very pleased.

It is not difficult to establish whether a propeller has a uniform pitch distribution or not. By using 2 school set squares (1-45degree, and 1 - 30/60 degree), and a block of wood with a vertical hole drilled in it.

With a piece of wire through the propeller bush and through the hole in the block of wood, allow the trailing edge of the propeller to come to rest on the block, and tack it into position. With the 60 degree set square, place it under the blade in such a position that it touches both the leading and trailing edges of the propeller. Measure the distance from the wire through the bush to the 60 degree set square. Make a note of this dimension. Using the 45 degree set square do a similar exercise, again noting the distance out from the bush. Next take a third reading using the 30 degree set square. A typical set of figures for a supposed 16''x 16'' Coupe d'Hiver propeller might be :-

At the 60 degree station.	Distance from bush in the propeller	2	inches
At the 45 degree station	Distance from bush in the propeller	3	inches
At the 30 degree station	Distance from bush in the propeller	4.25	inches

The formula for the pitch at any given radii is :- $2 \times \text{radius} \times \tan$ of angle at each station.

At the 2 inch station:	- pitch = $2 \times 3.142 \times 2 \times 1.732$	(tan 60 degrees) = 21.76 inches
At the 3 inch station:	- pitch = $3 \times 3.142 \times 2 \times 1.0$	(tan 45 degrees) = 18.8 inches
At the 4 inch station:	- pitch = $4.25 \times 3.142 \times 2 \times 0.577$	(tan 30 degrees) = 15.4 inches

As can be seen the pitch distribution of this prop is not very good for maximum efficiency, hence performance will not be as good as it could be. But just think, perhaps this blade is perfect. Because the blade is very thin and flexible, as it is driven through the air by the torque of the motor unwinding, perhaps the blade is being forced to twist, and increase in pitch, the further away the section is from the shaft. Food for thought?

Two years ago I built my first Coupe d'Hiver model, and decided that in order to make a good propeller, I constructed a form/mould/block, where I thought the pitch was exactly 16inches, and uniform throughout its diameter, and moulded the blades. The performance was reasonable. Later on in the year I was given a pair of blades that were made by someone, who knows how to make blades, and fitted them to the original hub. The performance of these two was much better. On measuring the pitch angle I discovered that the pitch gradually increased at each pitch station rather than staying the same. There were differences between my blade shape and that produced by the expert, also the amount of undercamber on each of the blades. What conclusions I draw from this I am not sure. My latest sets of blades have been made from two sheets of 1/32'' 8lb. balsa, with carbon tissue between, stuck together with wallpaper paste, and moulded onto a 16'' pitch professionally carved block, then covered with the lightest glass cloth I could find. These are the best blades I have ever made. What I now have to do is to make an airframe to match the blades.

I think that the lessons I have learnt over the years, are, that if you follow what the acknowledged experts have done, and you copy them accurately, you will achieve reasonable/good results. Experiment by all means, but do not be disappointed if your results do not live up to your expectations.

Further to Dave's article I took this off of the Ben Buckle website

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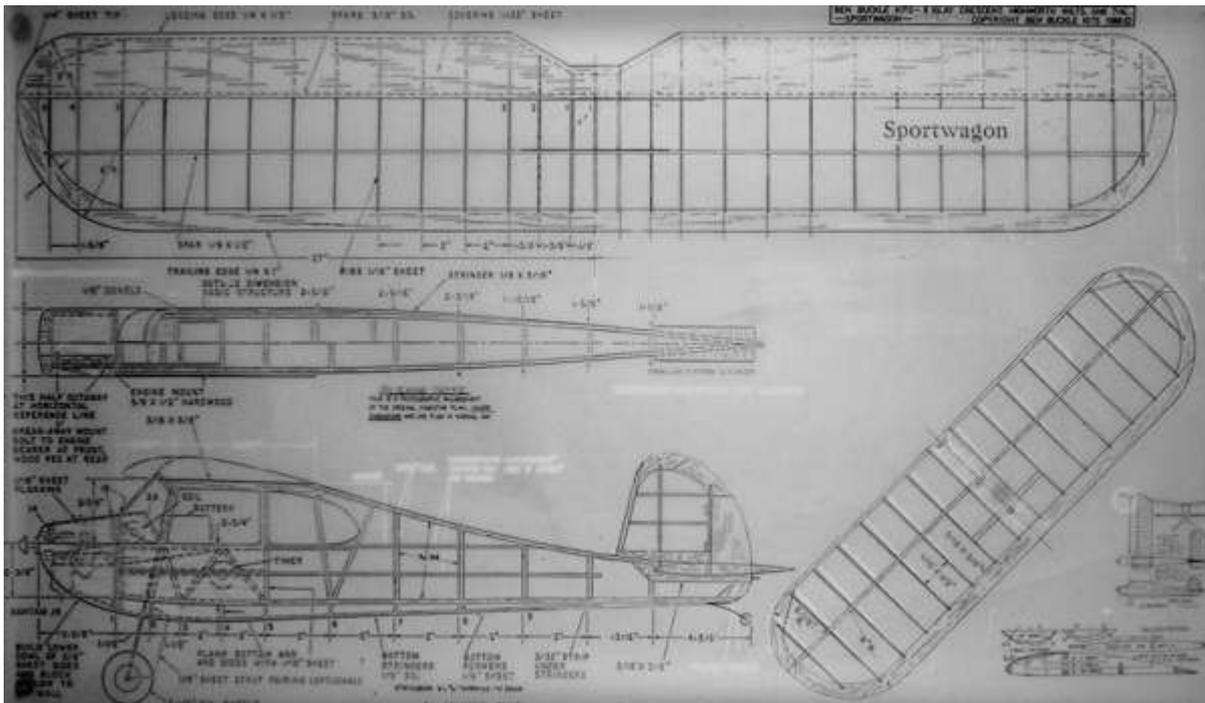
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March Issue

Please let me have any articles etc by Monday March 26 - 19.00, as I would like to email to everyone on the Tuesday 27 March.

Pathe clips again

Sorry all of you who are getting bored of the subject. I have been compiling a list of what is on the Pathe website and currently there are over 130 clips with aeromodelling interest. I'm happy to email to anyone who wants it. The only thing I would say is that I know there are one or two items missing and I suspect there are more to trace and add but it does make interesting reading. Unfortunately a lot cannot be previewed on the website.