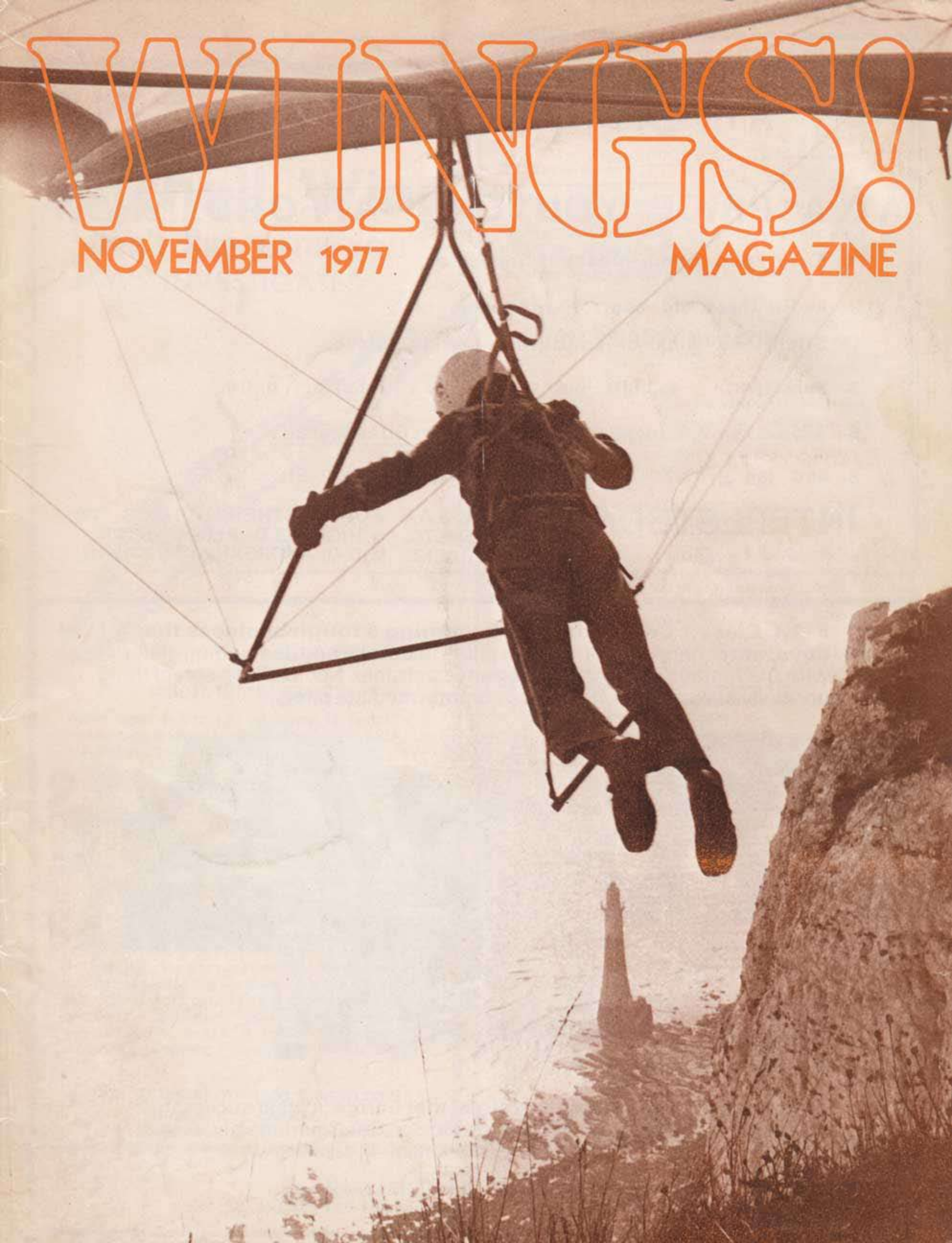


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NOVEMBER 1977

MAGAZINE



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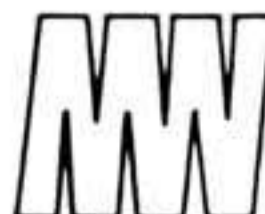
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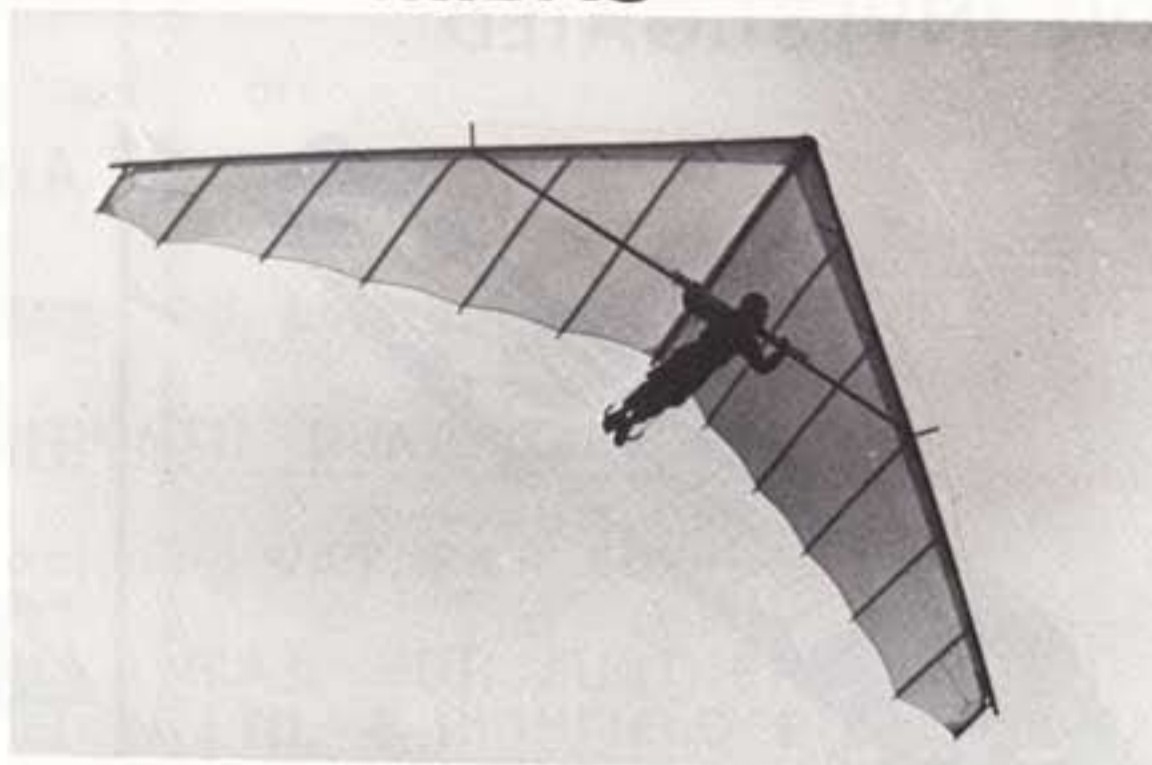
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AGENTS

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WINGS!

The official magazine of the BHGA

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Editor: David Worth; **Commercial Editor:** Lesley Bridges, Yard House,
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Ireland, Roy Hammond.

Cover: Mike Maher steps into space on his Falcon IV,
a 500ft. sheer edge take-off at Beachy Head Cliffs. Photo: Dave Worth.

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CHAIRMAN'S LETTER

Since my last letter a number of important developments have taken place.

Council has agreed and steps have now been taken to lease office premises in Taunton from which to operate the BHGA administrative activities. When this office is established Chris Corston shall be taking up the reins again as our Association Secretary.

The first BHGA Instructor Training Course has now taken place at White Hall, Buxton. You will remember that this was a direct proposal from the Training Conference earlier this year, and is an important step toward establishing a full BHGA Instructor training and rating program.

The schools registration system now encompasses some 16 registered hang gliding schools in this country. This scheme helps to ensure that beginners receive good, safe training from registered instructors with proven skill and accepted abilities. This costs an awful lot of money, it costs us, the BHGA in terms of Training Officer salary and expenses; the printing, three or four times a year, of the BHGA Registered Schools list which goes out to every enquirer and of course the Instructors training program mentioned earlier.

It will be asked "and what about the schools, what's the cost to them?" Well, those schools who have made the effort to comply with BHGA Registration requirements have had to pay out too, for new and better equipment like radios, more instructors to keep up with new techniques such as tethered flight and of course to maintain the agreed six to one student to instructor ratio. In some circumstances courses are cancelled by schools who are unable to meet that last requirement. We have come a long way since Alvin Russel's first report and I personally thank the HIA and schools registered with us for their cooperation.

We know where all this leads us, better flyers and safer elementary pilots on our hills and, most important,

fewer accidents because new pilots are better trained.

You, the flier on the hill can help too, by guiding new fliers into flying your hill safely instead of just letting the so called "nonk" go off to bend his glider, or himself, just for the sake of a little help from more experienced pilots. There is another way too, if you know or meet any one casually who is considering taking up hang gliding, then do your best to see that they get a fair and safe deal by recommending that they go to a BHGA Registered School and *no other*. Any unregistered school is nothing more or less than a "pain in the butt," to us, and more than likely, to the beginner, who not knowing any better is, in modern parlance, often the victim of a "rip off" of the worst kind.

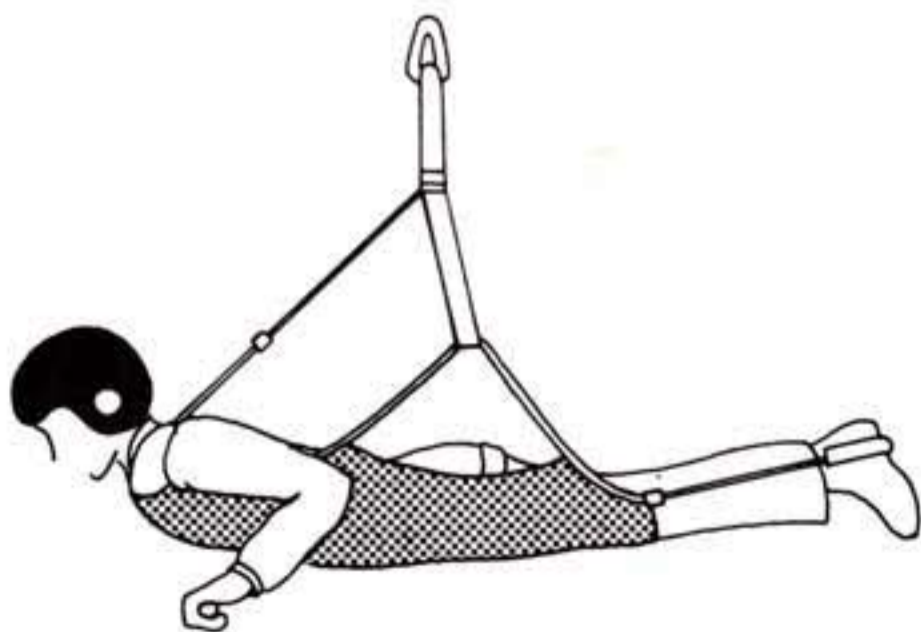
This year has seen quite a number of airmisses with military aircraft. Most of these have not been reported officially. If you have an "airmiss" then fill in a BHGA accident/incident report form, we've all had them in *Wings* or at the very least see your Club secretary and get him to help you. *But send those reports in please*, you may help avert a serious accident.

Hang gliders have been reported in controlled air space in various parts of U.K. My advice is, get yourself an altimeter and the 1:500,000 aeronautical map covering your area, find out where controlled airspace is and then use your head — stay out of there! An altimeter, even a wrist type, will tell you when you're near the base of an airway; set the instrument to 1013 millibars and your altitude reading can be taken as a "flight level" which applies to airway base height. If you enter an airway you must cease circling and fly in a straight line to cross the airway at right angles until you are out and well clear of the base or side before recommencing any thermalling manoeuvres. What a grand situation to find yourself in, "hanging in there" but best of all — doing it right."

Pat King.

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AT THE END OF A RAINBOW

Dear Sir, First, congratulations on the new *Wings!* Secondly I feel it may be of some interest to home builders to hear of my home-built glider. I call it the Rainbow. It is a big wing for pilots 11—16st. I enjoyed building it and also enjoyed flying it and I must express my thanks to Paul Maratos for making the beautiful sail. Also John Hudson for supplying me with fittings and alloy tubes. Also to Graham Hobson for being brave enough to fly it for the first time and also to my good friend Allen Langer for helping on the construction side. Anybody interested could get in touch with me for a little conversation, or to exchange some information.

Frank Grzezinski
203 Hill Top Drive
Kirkholt, Rochdale

Ed: We presume there was something left for you to do!

LAUGHING ALL THE WAY TO THE BANK

Dear Editor, I agree with some of the comments by name supplied of Gatwick about size and content of *Wings!* but I think we should have more funnies.

Thank you for the cheque for £150 for my last two cartoons.

Bill Lehan
Beckenham

DIR EDITER

Dear Toni Fewell and Daavid Wirth, I was never Anne before *Wings!* came along.

Ann Welch

*Ed: Sorry Ann. I have taken note for future *Wings!**

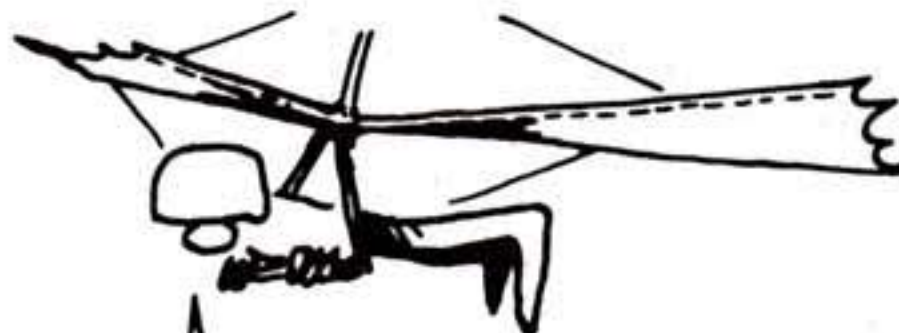
STALL WARNINGS

Dear Sir, When I left school (in 1934) I tended to ignore instructions and advice unless I was given a full scientific explanation.

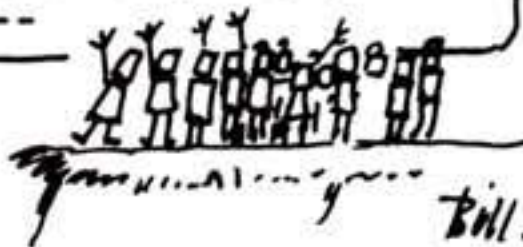
I fairly soon learned that people often forget the reason for a rule — sometimes they never knew the reason, but the rule may still be fairly sound.

Having been told that I should never take off unless the wind is at 90° to the face I was very cautious in my first attempts to take off with wind at 70° or 80° to the face. I found that while this presents problems these can be overcome.

In June this year I took off from a



---and thanks also to Mum and Dad, brother Jack and sister Eileen, Uncle Sam, Aunty Rose and Aunt Edna, John and Ruth and all at 44 Railway Terrace, Stan the foreman and all the lads in the sheet metal shop, Dereck my tortoise, Ginge, Ern and Nobby ---



AIRMAIL

NW face, when the wind was WNW, then turned left to fly along the face. Then I tried the 150° turn required for reciprocal track. To my amazement I lost control completely and collided with the grassy slope.

Fortunately Graham Hobson was able to answer my bewildered "Where did I go wrong?" He assured me that I had stalled and I admitted I was trying to suppress my tendency to fly too fast. He also warned me that I must not attempt to soar unless the wind is 90° to the face.

I accepted his advice but it has taken me some months to fully understand why:- If the wind is at 70° at the top of the face it may well be nearly parallel to the face, half way down the 'cliff'. I am well aware of the hazards of flying downwind and know that the most expert have stalled while doing so.

I was VERY lucky — no bruises, no damage to kite but I am well aware that I could have been killed — not by a freak gust or unpredictable hazard but by my own stupidity.

As always, this letter is far longer than I hoped but if it saves just one life it will justify the space in *Wings!*

Tony Newell
Lancs

EUROREGULATIONS

Dear Sir, Like many others, I am concerned about the loss of some sites. While on holiday at Rhossili during mid-September this year, a number of bottom landings were made on the slope above the beach. There were one or two continental pilots about, some who may not have been able to speak or read English. How about linguistic members drafting out site rules for at

least coastal sites in their respective second tongue.

Congratulations on the best issue of *Wings!* yet.

Sid Evans
Streetly

THE GREEN GRASS OF WALES

Dear Sir, Concerning last month's excellent cover photo (my copy of which had unfortunately turned green with fright). Surely Mike Robertson is flying at Llandinam, and that is the beautiful Montgomeryshire countryside below.

I have heard they are short of flying sites in England, but this is ridiculous!

Rod Lees
Aberystwyth

PRESS DRAMATISM

Dear Sir, I would like to reply to Tony Fuell's letter in September *Wings!* to clarify a few points.

Firstly, as I said on Radio One Newsbeat the day of the Daily Mail publication, Michael only flies with me when conditions are absolutely perfect, and I have flown the site and tested the conditions. He does not fly regularly and I discourage the general practice.

Secondly, if the photograph accompanying the letter is inspected carefully, it can be seen that Michael is, in fact, beside me in a full harness.

Thirdly, Michael's crash helmet, far from being too large for him was specially made for him. The inset photograph shows him pulling a face with his helmet tilted back on his head.

As an ex-PRO, Tony Fuell should realise the press's flair for dramatism

and the technique of holding back a feature until an appropriate news item comes in.

I was going to add a comment about there being 'nerks' all over the country but I think I've made my point.

Tony Meacham
Cheshire

VIKING VIEW OF MERE

Class 3? What's that? Who are those nuts flying those stupid machines? Why bother about them? This is how Arne Lindstol and I felt Class 3 was considered in the British Open Championships in Mere last August. No one bothered about Class 3!

Anyway, first of all we want to say that we had a really good time in Mere. Even if the site was pretty useless and the flying not too good it was great for us to meet all you English lads (and girls) and to see the new gliders, but we must admit that we were very disappointed coming all the way from Norway for a single competition flight. We know that everything would have been very different if wind conditions had not been bad on the first two days, but on the last day when it was flyable it should have been possible to run the 6 class 3 pilots before half past six in the evening and not just let us walk upon that hill all day long waiting for our competition to start.

This is what happened: At the briefing at nine o'clock we were told that we were going to fly within one and a half hours so we'd better carry our gliders to the take-off area, rig and be ready when Class 2 had finished their first round. When all the class 2 pilots had one flight, Class 1 was ran and then Class 2's second round was started. Several times we went to the control-caravan and asked when we were going to fly and every time we were told to wait another hour. As both the take-off areas and both the landing areas were still occupied by Class 2, we had to go way over to the left of the hill and fly straight ahead as far as we could down the field so we should not be in the way of the "exciting" competition going on. So the six of us had our private little competition. It did not show very much skill though, as Arne said: "I could have put a piece of timber in my harness, pushed the glider off the hill and that would not have made much difference." Anyway, I was very pleased to win a bottle of whisky which I shared with Arne.

Well, we did feel that we were treated a bit badly. It should have been possible to run six pilots in between the rounds and if not we should have been told.

Maybe I have spoken a bit hard but I indeed hope that no one will take it personally. If I have been unpolite please excuse me, I'm a Viking. We are used to bite. And, don't worry we will cross the North Sea to compete again, because we really had a good time in Mere and in the following week travelling around the South of England. **Per Gunnar Norway**



John Hudson

JAH: We've all read articles about cross-country flying telling us that when in a thermal we should 360 in it and then set off. However, there is not much information given as to when you should start to 360 and when you should decide to go for it on distance.

For instance, at the Tony Jones League competition, you, Bob, had a good number of thermals which you didn't use. You waited, trying them out, discarding them, and eventually right at the end of the day you got one which took you sixteen miles. How did you know that was a good one?

Bob C: Well, the truth is, all the ones I tried out I lost. I lost a good one about 1200ft. above the top, and had the choice of looking for it downwind, or waiting for a better one, so I waited.

JAH: Yes, but what is the key? When do you go for it?

Bob C: If I had been able to stay in it, I would have gone with it.

JAH: In other words, you lost it before you got high enough above the ridge to do anything with it.

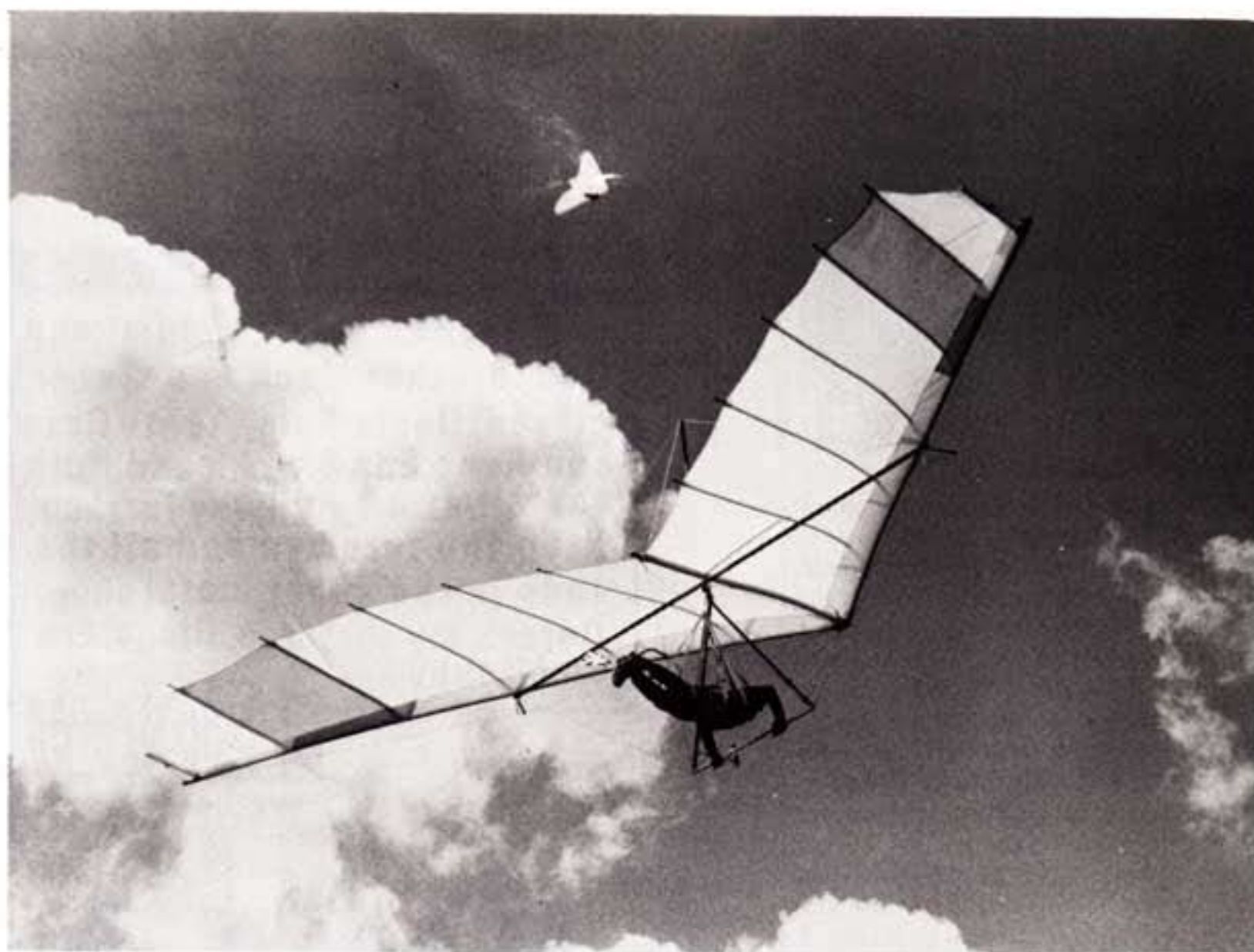
Bob C: Yes, that's right. If, for instance, the wind is 16-18mph. and I'm reading 6-8 up on the vario, that's my 'commit' reading, and I know how far I can go, and still make it back to the ridge. If I get only 4-6 up, then I can't go so far back before deciding. In stronger winds you need a greater climb rate.

Robert B: A lot depends on the site you're flying. If you have a large flat area behind, then you can go with more or less anything, and chances are that it's going to get better. If the site falls away steeply, like at Llandidnam, then you can feel out the size of the thermal by wandering around, varying your 360's and finding out the extent of the lift. This is where a vario comes in. It gives you a picture of the air you're flying in.

JAH: Going straight into varios, Bob, you fly on visual, whilst you, Robert, prefer the audio.

Robert B: Yes, as soon as I got my vario at Christmas I started using it on the cliffs just to get to know it. I got used to registering on the sound; so now when I hear it warble, I just instinctively turn. It just becomes a part of you.

JAH: Bob, you told me once that you check



INTERVIEW

During the rain at the second Birdman League Competition Robert Bailey, Graham Hobson and Bob Calvert took shelter in John Hudson's car. John took the opportunity to talk to these experienced pilots on the art of thermal flying.

out the thermal by following the readings. Getting a reading of 2 up, then 3, then 4 and 5, followed by another 4 would indicate you had flown through the lift and a turn back into it was needed. Is this how you check out a thermal?

Bob C: That was a technique I used for a long time. I flew through it, until it started to drop off, then I turned round and went to find it, but if you're flying on a little ridge it's very difficult to do that.

I've developed a lot better technique now, where once I'm into good lift, I latch on to it and circle, working on the principle of tightening the turn as the lift decreases and slackening it as it increases. This has the effect of centring you into the core.

JAH: Graham, how do you find the core of a thermal?

Graham: I've found that most thermals in this country have more than one core.

Robert B: Yes, that day at Llandidnam when we were all thermalling, I found myself in a large bubble of rising air, but it seemed to have many other cores coming up out of it. A couple of times I tried to centre on what I thought was the core, but by the time I was in it, it had gone as though it was a small piece of fast-rising air.

Bob C: I remember a day on Nonts when you were circling with me in a thermal, but below and to one side. You flew across to my core and then we both went up together.

Graham: I have definite evidence of more than one core because one day I was circling in

a thermal off Mam Tor, reading 3 up, when Keith Cockroft, who was 200ft. below me suddenly started to rocket up and I had to get out of his way. He circled on up and way past me.

Bob C: I reckon he had a better min sink.

Graham: No Way! — at least not to that extent.

Robert B: Yes, I agree. I think it was the same thermal but with different pieces of lift in it. You know, every thermal is different, isn't it. You more or less have to check out early, and find out what the day's thermals are going to be like. I remember an occasion when the thermal was travelling slower than the wind speed. I'd be in the core, 6-8 up, circle around and suddenly, where the Hell did it go to . . . a four-second pause into wind and I was in it again.

Graham: The point is, unless you are absolutely certain of maintaining a constant turn rate, then you are going to overtake the thermal and leave it behind.

JAH: Perhaps an area of land is generating the thermal and it slopes off downwind, but does not break away, rather like smoke from a chimney.

Robert B: Maybe. On my fourteen-miler recently, I found that the thermal was massive and staying in it was fairly easy.

Graham: From the sound of it, that was a classic thermal.

Robert B: Yes, it was a very light wind and it



Robert Bailey



Graham Hobson



Bob Calvert

almost dropped off completely. Just before I got into it I was really scratching around. I suddenly got in and my ground speed increased rapidly. The vario went off the scale and I left the ridge at about 100ft. I pictured the air and knew this was it. From then on it was a joy ride; it was so big and smooth.

JAH: That raises another point. It's often said that the wind dropping off the ridge, heralds a thermal and one should scratch away and hold on because a big one will be coming in.

Robert B: That seems to be classic. When a thermal comes in, it always seems to go scratchy. Everything seems to be sucked into it.

Graham: The thermal has a nulling effect on the ridge lift because the wind is being sucked in from all around.

Bob C: You can also get the situation where the ridge lift disappears, but it's still blowing a hooley. Suddenly there's no lift. That's caused by the sink on the edge of the thermal.

Graham: Yes, that sink is enough to null the effect of the vertical component in the ridge lift. You think the wind speed has increased, but there's no lift.

Bob C: That's the time to hang about, because you know there's something good coming in.

Robert B: That's why you should go with the thermal, because if you wait too long, you'll get all the choppy air filling up the back. You find that the first 360's are always a bit choppy until you get higher up.

Bob C: Sometimes you can pick thermals up straight off the ridge, whilst at other times you can't get in for love nor money. At these times it may be best to head off crosswind, or straight out over the fields, in the hope of picking something up directly. Perhaps the thermals are being broken up by ridge lift.

JAH: Going off from the ridge in search of a thermal, how do you make sure you don't fly straight through them? When do you decide to 360?

Robert B: As soon as the vario starts to taper off.

The best bit has gone so you follow it round.

JAH: So as soon as you get an indication of lift, you stay with it until it starts to decrease, and then you turn.

Robert B: You watch your vario, maybe you'll get 6 up, so stay with this until it gets to maybe 2, and then . . .

Graham: No! that's too late! You go well before then.

Bob C: As soon as it drops off at all I go round immediately.

JAH: O.K. So you're in it, but lose it. Sail-plane pilots have a set procedure for finding the centre again. What do you do?

Bob C: Well, set off down wind to look for it, hang about, and hopefully you'll pick it up again.

Graham: Usually, if you lose it, it generally means forget it.

Robert B: It's a hell of a long way between thermals, isn't it?

Graham: Yes, the best days are those with lots of small puffy cumulus close together.

Robert B: A slight inversion helps, because it keeps the clouds small and they can't gain too much height. If they get too high, they get too big, dragging in all the surrounding air, killing off other smaller thermals. You get a few large ones with big gaps between.

JAH: How do you know when to give up and leave your thermal in search of a better one?

Bob C: Well the way I figure it, is to stay with it until the maximum, because time in the air is the critical thing. On a cross-country, the longer you spend in the wind, the further you are going to travel. I stay with a thermal into zero, or until I get pronounced sink all around. If the cloud is decaying and ragged around the edges, then that's it. If there's no lift at all, then I'll go. If you go when you have, say, 2 up, then because there is lift, there will also be strong sink, whereas if you wait for zero, then the sink is also likely to be zero.

JAH: That's a very good point.

Graham: A point to remember also, is that once the vario drops to zero, you are still not coming down, you're holding your own and as long as you can keep there you're drifting downwind without losing height. This is the mistake I made at Llandidnam. I left when it was still reading 0 to 2 up.

Robert B: Yes — me too. It's almost a game of Patience isn't it? You get up there in 6-8 up and you really have to tell yourself to hold on. You learn by your mistakes. When you're at

the top of a thermal you can hang around in those 1's and 2's up and this is where an altimeter comes in, because you can check out what's happening. It's a good averaging instrument is an altimeter . . .

Graham: Yes, that's right, because you can't calculate the 1's and 2's up, with the zeros and 1's and 2's down.

Robert B: Right, if you're at 2500ft. it's the only way to tell how much you've gained or lost over a few minutes. If after two or three minutes you haven't lost anything then it's worth staying with it until you really start to lose height. Once you leave it, it can be very difficult to pick anything else up.

Graham: At Llandidnam I spent 3,000ft. flying downwind and didn't pick up a thing.

Bob C: You can be down in two minutes from that height.

Robert B: Another thing, you don't know how fast to fly. You can't tell your speed at that height. Again, you have to be patient and resist the temptation to pull in too far.

Bob C: Right — if you're flying downwind, I find the optimum speed is Min. Sink. You're in the air longer and since the wind is blowing you along, you'll travel further.

Graham: Wait a minute, flying slowly is O.K. if you know you're not going to get any more lift but . . .

Bob C: If you travel further, if there is any lift, you'll reach it with more height.

Robert B: No — you won't travel further . . .

Graham: Flying at Min. Sink is O.K. but if there's a chance of more lift downwind then you want to get there as quickly as you can, without losing too much height, and max. glide is the best speed to go at.

Bob C: That's only if you want to get there quickly. You want to arrive with maximum height obviously. I reckon it may be O.K. to go at max. glide in a very light tailwind, but if . . .

Graham: I think this depends on the characteristics of your glider. I mean if you have a glider which flies fast at Min. Sink, then what you are saying is true, but if you have a glider which just ambles along at an incredibly slow speed at Min. Sink then pulling a bit of speed would be necessary.

Robert B: No — I think definitely max. glide

when you're going anywhere, whether the wind blows you along or not. I think a lot of people make the mistake of pulling too much for max. glide though.

Bob C: Right, there's not a lot in it, is there?

JAH: *Leaving that for a minute, Robert, what about locating the core of a thermal, what tips can you give?*

Robert B: Yes, I'd like to say a bit more about picking one up, because a lot of people tend to centre too soon and 360 too quickly I think you should make a few varying 360's before deciding to commit yourself to a particular place. You might be a bit nervous, near to the round and going downwind — maybe surging your 360's, getting a false reading. You shouldn't go for it all at once, you should really try to suss out the air properly, so that when you find the core, it really is the core.

JAH: *In other words, people may be blowing cross-country chances because they are mistaking flying errors as sink, speeding up too much on the downwind leg, not turning smoothly, etc.*

Graham: The key to it is smooth flying.

Bob C: If you're using the technique of increasing and decreasing bank according to your vario readings, then you'll naturally find yourself continually self-centring.

Another thing people may not realise, is, if you're travelling downwind in say 8 down — and this happened to me — a sudden pick up to only 4 down is strong lift. When I was in this situation, I stood it on a wing tip and got 4 down, 3 down, 2 down and soon all the way up to 4 up which took me up to 500ft. when I got 6-8 and away I went. That reading of 4 down was probably at least 4 up, but because I was sinking in 8 down, it took a lot to overcome the movement and the lift just showed itself as reduced sink.

Bob C: Another thing people may not realise is that it is possible to fall out of the bottom of a thermal.

JAH: *Yes, how many times have we all been in the situation where a guy above you is really skying out and no matter what you do, or where you fly, you just can't get up with him. It's as though the bubble of lift is rising and beneath it there's nothing.*

Bob C: Right — If you've centred, flying around in 6-8 up and suddenly your reading drops to zero and 1 up, etc. then it's a good chance that you've dropped out of the bottom. If you suddenly find yourself going from 6-8 up into 6-8 down, then you've popped out of the side, right into the sink, which is all around the lift. This is a bad time to leave and it's worth hanging around looking for it again, even at the risk of losing a few hundred feet. If you've popped out of the bottom, there is very little chance of you getting back up into it. I have spent many a fruitless hour going around the bottom of a cloud looking for something that isn't there!

JAH: *That's a damned good point. Moving on now, what about turbulence. We've all read about massive thermal turbulence, but how bad have you found it? Have you ever found turbulence where you are literally fighting for your life.*

Graham: I have. One day at Mam Tor I had a

combination of rotor and thermal behind the ridge. I was 200 to 300ft. above the top going over the back, when one wing lifted. The nose dropped and I was instantly put into a vertical spiral dive. I did a full vertical 360 before the air smoothed and I pulled out.

Bob C: Yes, one day on Nonts I pulled out from lift about 500ft. below the cloud and got the most horrific turbulence. It was so bad that I had to trap my feet between the fin and keel wires, with both arms wrapped around the control frame, just to stop myself from being thrown all over the place. The vario was going off the clock in both directions.

Robert B: I've not had it so bad. I've been 'over the falls' as they say, but that's not too bad. You just hold on and it quickly pulls out. You just have to grit your teeth, and turn back in, because that which spat you out was a juicy piece of lift, so you go back in and grab hold of it, so to speak.

Two hours later we were all still talking. The tape ran out after an hour, and about 30 minutes' worth is written here.

I asked the question as to what pilots should

do through the winter in preparing themselves for next year's thermals and cross-country.

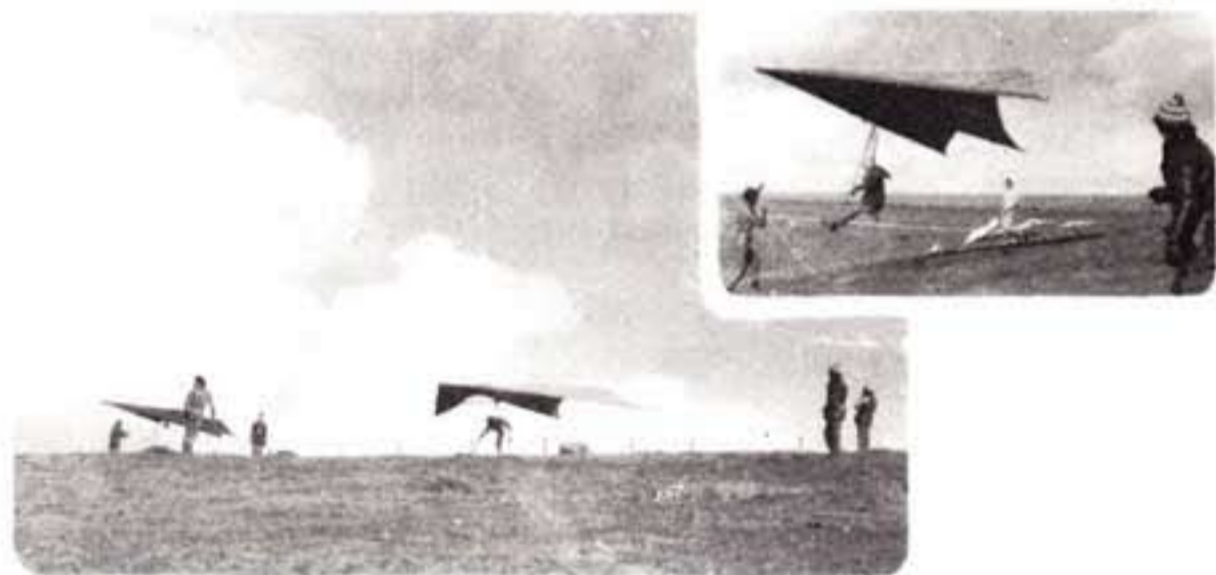
Bob Calvert said "Why wait 'til next year? Spend the winter chasing wave!" All agreed with this, but Graham said "Fly as much as you can, make every flight a practice flight, and practise 360 after 360, perfecting smooth and even flying". Robert said to spend all those dark winter evenings studying maps of all the possible cross-country flights you might make. Get totally familiar with the maps, so that once you're up, you know the terrain intimately, know all the valleys, bumps and ridges, know all the places there lift is generated and all the places you're not supposed to fly over.

All very sound advice, but let us not forget that there are many people who have been there before.

There are libraries full of books on thermal flying in gliders. A lot of information is useless, but remember, we're catching up fast and what may have been considered inapplicable yesterday, may be essential tomorrow.

A bit of winter homework will certainly pay off next year. ☺

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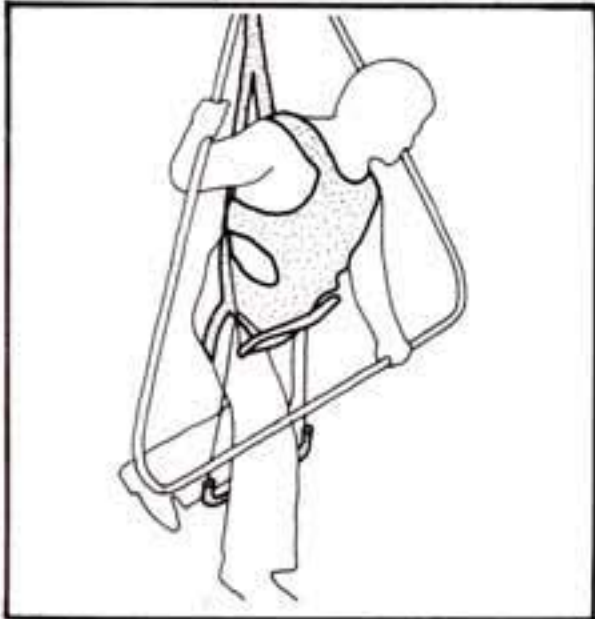
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BHGA Registered, using CAA approved radios, Static and Gliding tether, Keel assist, Dual soaring; and running two-day and four-day courses for novices to Elementary certificate/Pilot 2. One-Three day soaring and top landing courses to Pilot Badge/3 level - reduced rates for glider owners. Refresher courses at all levels available at special rates. We are 8 miles from M4 / Exit 15.

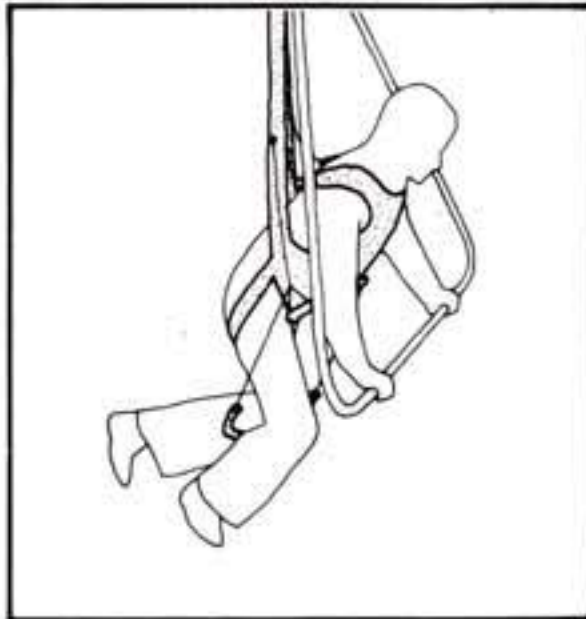


OPEN 7 DAYS A WEEK

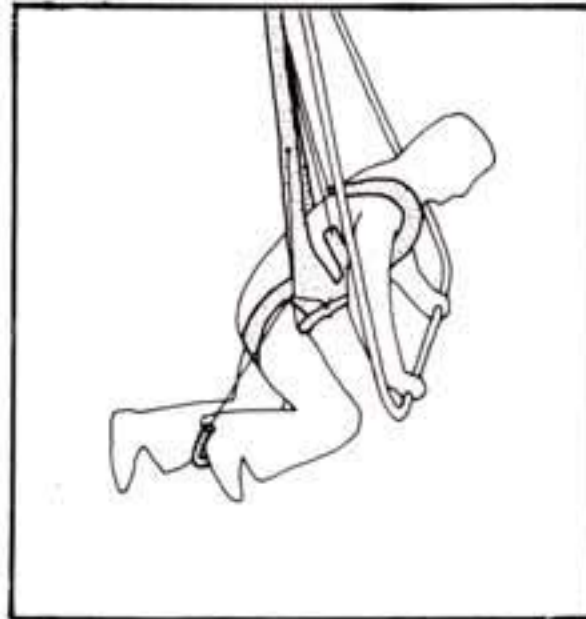
WING TIPS



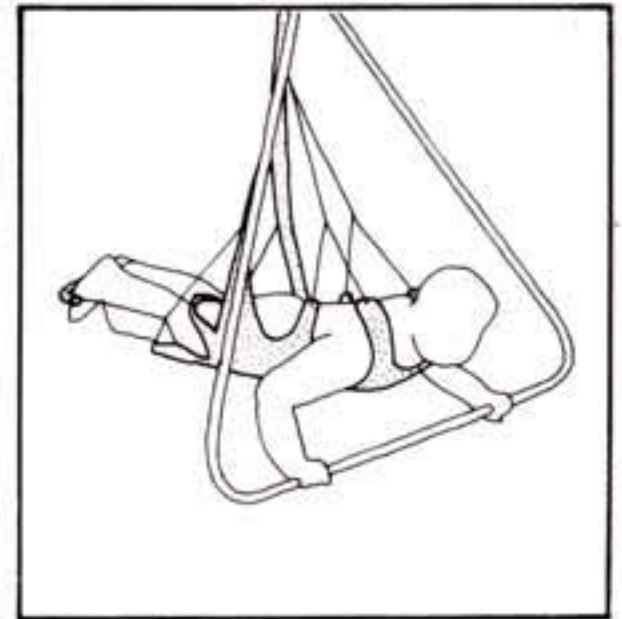
Still on the ground, stirrup between legs, straps light and running.



Airborne now. Eyes looking ahead, hands on bottom bar and stirrup falling neatly between the legs.



When fully ready, simply lift the forward leg.



... and stamp yourself prone.

In the beginning there was the knee hanger harness which hoisted its wearer, usually by the tender parts, into the semi-prone position leaving the coughing pilot to pull his chest towards the bottom bar to assume the fully prone position. This was followed in time by the stirrup harness, a much more comfortable but complicated looking piece of apparatus which was left to the 'experts' who managed in the following months to invent and mess up many ways of entering this type of harness on take-off. Hence for sometime the newcomer to prone was advised to become orientated using the knee hanger and to convert at a later date to the stirrup harness.

I feel that this mode of thinking is now out of date and that the newcomer to prone flying should, with correct advice, find it easier and certainly more comfortable to learn using the stirrup harness. In the following paragraphs I have laid down some of the main points on how to enter the fully prone position when learning to fly prone with this type of harness.

It is necessary to have footwear with an instep and heel to allow the sole to locate on the stirrup. If possible set the harness up so the line of the body is about 10 degrees head up from horizontal. Get a friend to do this whilst

FINDING YOUR STIRRUP by GEOFF SHINE

For all those who fly the stirrup and occasionally do themselves up proper, like a silk worm — read on..

hanging in the garage, as this to you, will feel like horizontal. This avoids a disconcerting head down feeling on the first flights. Also ensure you are not set up with a bow in your back or bent down like a hair pin and that you have correct advice on moving your body weight practising this in the garage.

At this point you will hear all sorts of opinions as to the best way to collect that bleeding stirrup, some methods include stirrup in front of both feet, behind both feet, holding in teeth, velcroed to harness front and holding in one hand to place on feet. My advice, forget them all. In my opinion there is only one way to learn and that is with the stirrup in between the legs. This is the method I use all the time.

Suspend your self from a convenient point with the stirrup between the legs and take your feet off the ground. Now bend the knee of the leg in front up towards your chest as far as is comfortably possible and then slide that foot back down the side of your

rear leg until you make contact with the stirrup. Having done this push slightly and place your rear foot on the stirrup, swing both legs up slightly and push into prone. At all times remain looking forward and do not look at what your feet are doing. It is more difficult to enter the prone position whilst hanging in the static state than when on a glider, so if the are is mastered in the garage very little trouble should be encountered when you fly.

After this preparation and studying others who fly prone all the time, you are now ready for your first attempts. It is most important at this stage to remember one thing above all else, you must not worry about collecting the stirrup, you must first gain sufficient airspeed to remain airborne and second, gain height from the ground and do not under any circumstances do anything with the stirrup until these have been achieved.

When taking off, the straps of the harness to glider must be kept taut as

with all harnesses, hold one upright and the bottom bar. As you run and the glider takes your weight you will naturally tip forward. Keep running until treading air whilst transferring your hand from upright to bottom bar and at the appropriate time collect stirrup and push into prone.

Remember, it is not necessary to collect or use that stirrup at all. If any difficult is had, land as normal and try again.

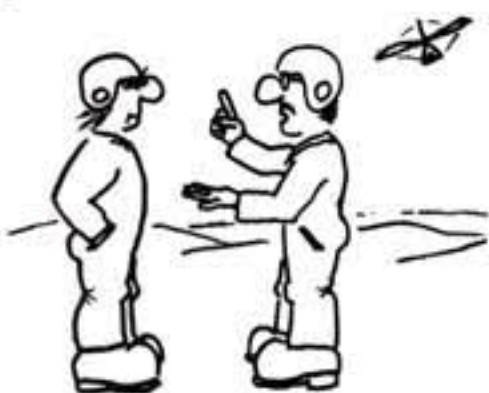
Some common faults are:-

- 1 looking down whilst trying to collect stirrup. **Do not do it** as you will become disorientated, always look where you're going.
- 2 failing to gain or maintain airspeed, keep that glider flying before all else.
- 3 trying to enter the stirrup too soon, too near the ground, concentrate on flying until you have some height.
- 4 trying to learn to fly prone with a new on an unfamiliar site. This is a recipe for disaster.

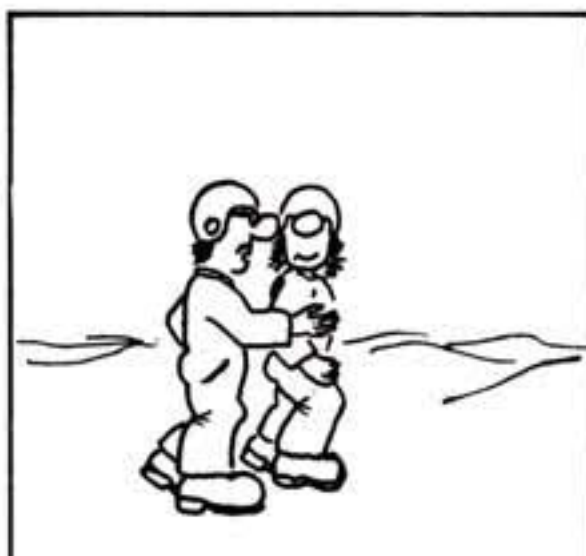
Finally when making any changes of harness or glider always fly on a site with a forgiving take-off area and easy landing area, i.e. leave those cliffs with a 2ft. wide beach at the bottom well alone until you are competent.

As always if you are careful you'll be reasonably safe.

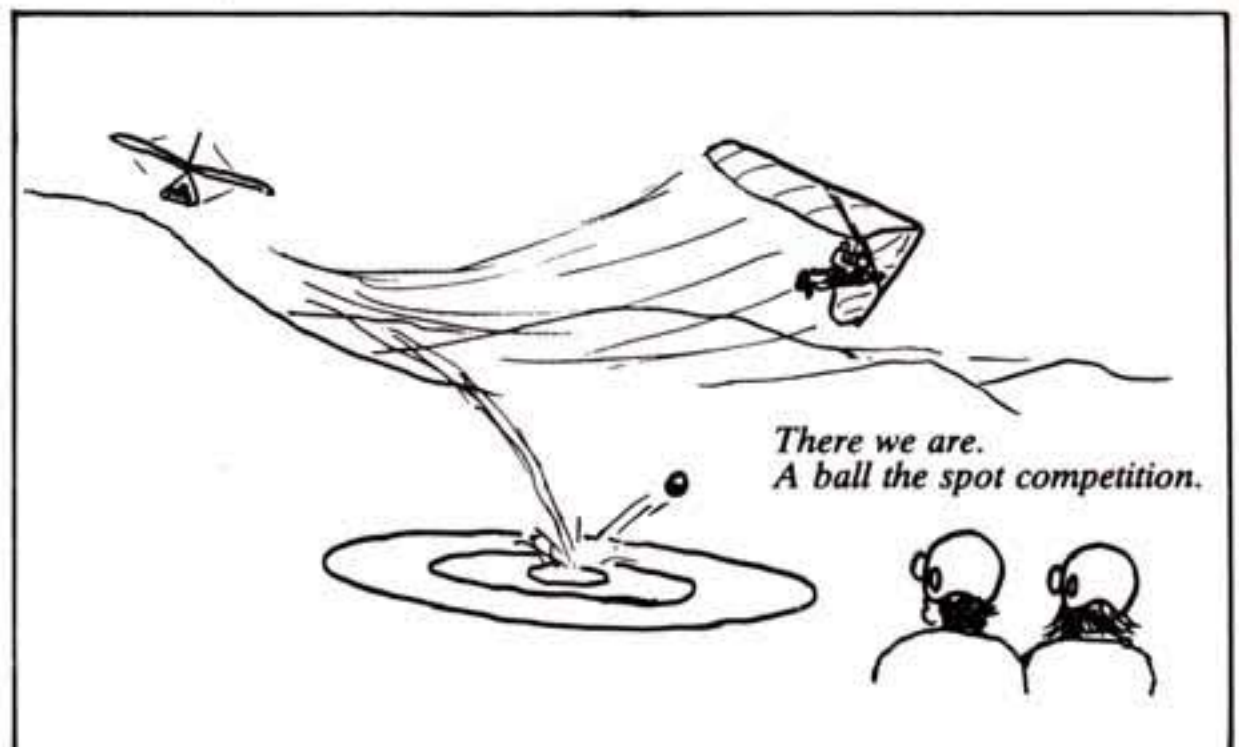
SUPERNONK by Bill Newton



... and with our new competition we have modified a popular task from another sport...



... which combines the old spot landing with the accuracy of precision bombing. We're try it now.



SORRY, this article is not concerned with black mesh stockings, wigs and falsies;. We're concerned here with examining the effects and amounts of drag produced by a flexible wing hang glider.

As our wings have improved in performance, the drag producing structural members of those wings have changed little, yet they are now a far greater proportion of the total drag than they were on our old standards. Other things have changed too; wing shapes, battens, and billow have all altered dramatically, and it is high time we took a closer look at reducing drag effectively, and where it counts most. This means looking at drag quantitatively, and to do this we took a modern high performance production glider, and found out what was happening on paper, due to drag.

The following analysis refers to a Midas E, partly because it is a glider which we are familiar with, and partly because the figures look better on a fast kite. The numbers will be broadly similar for most of the other high performance wings on the market in this country, and what works for the Midas E, will certainly apply to those gliders too.

How the figures were figured

The drag acting on a wing can be split into two types — induced drag and profile (or form) drag. Induced drag is generated by vortices produced at the wing tips from the higher pressure air beneath the wing, meeting with the lower pressure air above it. The extent of the vortices, and hence the induced drag, depends upon the pressure difference at that point and airspeed. As airspeed increases the induced drag drops.

Profile drag is that drag produced by the **shape** of the body moving through air; a flat plate moving perpendicular to the fluid produces a lot of drag. What's more, this profile drag increases with the square of the airspeed.

Manufacturers are notoriously quiet when it comes to supplying useful and interesting data, such as best lift/drag speed, best minimum sink speed, and glide angle. Our figures are based on known wing loading, estimated best lift/drag speed (8.5:1), and theoretically induced drag from the wing plan, sweep and taper ratio and washout.

Firstly, profile drag was calculated from the geometry of the wing, and a plot was made of this drag versus airspeed. Then, induced drag was plotted from the formula:

$$C_{D1} = \frac{kCl^2}{\pi AR}$$

where Cl = coefficient of lift $\frac{L}{\frac{1}{2}\rho V^2 S}$
 AR = aspect ratio

k = a fiddle factor determined by lift distribution on the wing.

π = Pi (steak and kidney job)

L = all up weight (assumed in this case = 205 lbs.)

GETTING INTO DRAG

Brian Wood, Tony Beresford, Bob Calvert and many other top pilots fly with their toes gracefully pointed on the stirrup. This flying style not only looks more efficient but also removes 0.7lbs. of unwanted drag. Dave Simpson and Clive Smith look into induced and profile drag and what can be done to reduce it.

Photo: Mark Junak



A bit about k, OK.

An ideal lift distribution as far as induced drag is concerned, is an elliptical one. ie. if we could use a straight, untwisted wing of constant section, its shape in plan would be ideally that shown in figure 1a and in this case $k = 1$.

Unfortunately, for structural, stability, and production reasons, we can't use that shape on hang glider sails, but the shape shown in figure 1(b) approaches that ideal very closely for an untwisted wing. Several factors now worsen k , ie. increase it, as we move towards a practical design. These are:-

(a) Washout or wing twist

(b) Reflex. This 'trim' drag as it may be called, is necessary for stability purposes, yet produces little lift; in fact to compensate for this, we have to raise our angle of attack a little higher than it would otherwise be, thus increasing the effect due to (c).

(c) The effect of incidence on profile drag; profile drag is increased by extra incidence.

(d) Planform and sweep.

From theory we can make a reasonable guesstimate at 1.3 for k due to the above factors.

As an aside, if we were to design our wing in such a way that washout and reflex could be combined, we would have eliminated one of the trim drags above. We can in fact do this by using a swept tapered wing, whose tips are far enough behind the mean aerodynamic centre, to give us a positive pitching moment when we put washout into them, ie. when we reduce their angle of attack. This is what goes on to a large extent in the Midas and similar shaped wings. Conventional reflex on the short keel of these machines does very little!

So we've arrived at a value for k and we can now plot $CD1$ against airspeed using $k=1.3$. This is shown in figure 2, and is the classic graph of variations of induced drag and profile drag, against airspeed applied to the Midas.

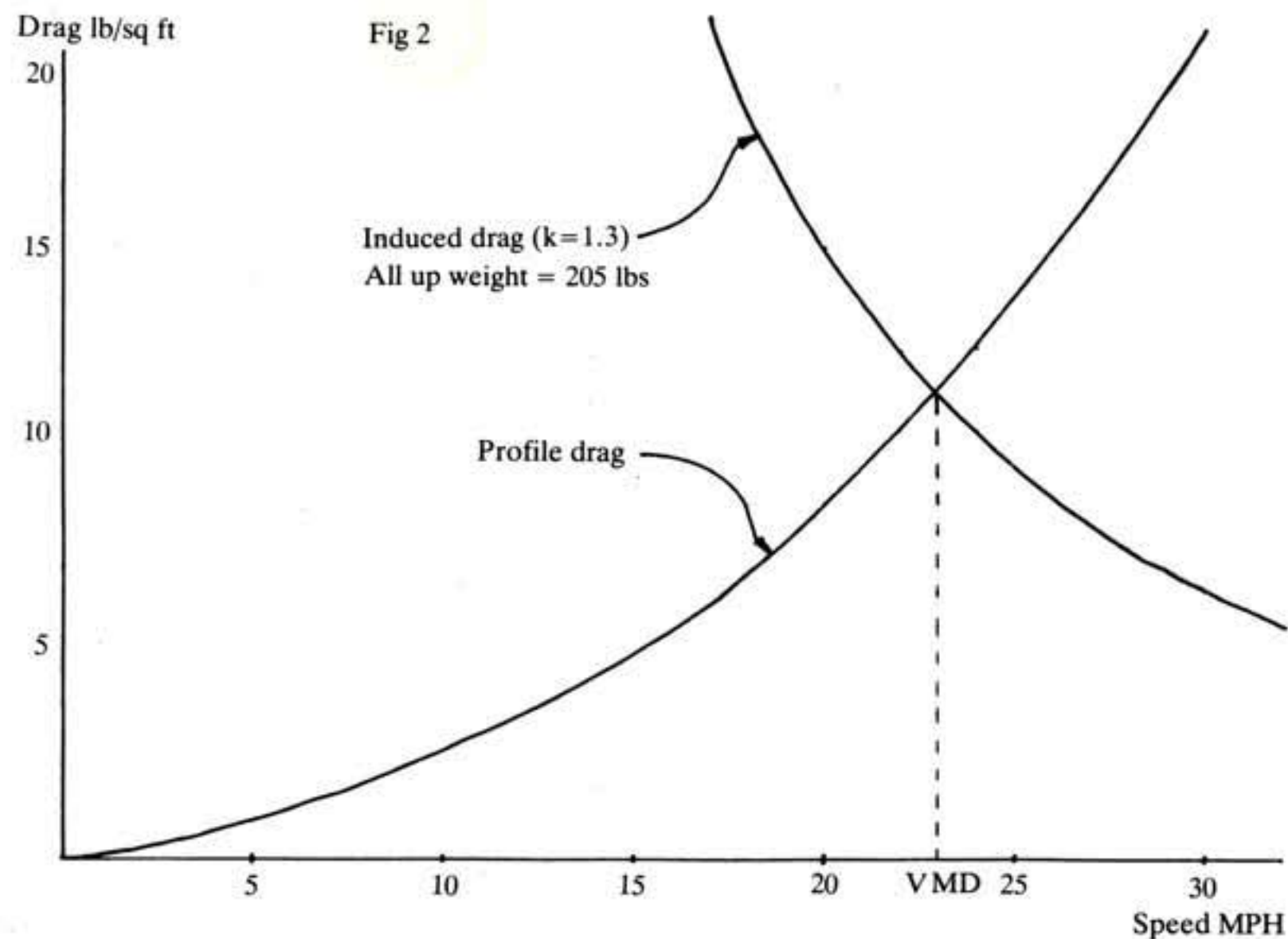


Fig 1a Elliptical tips

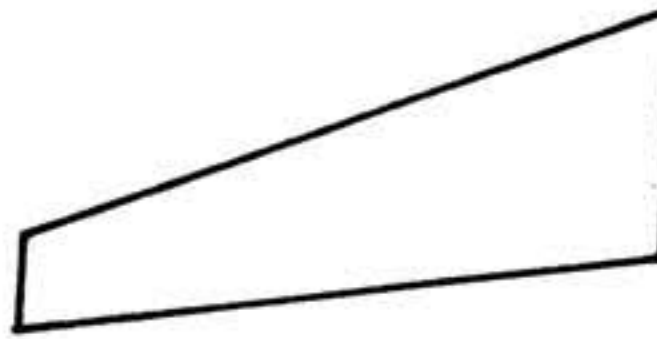
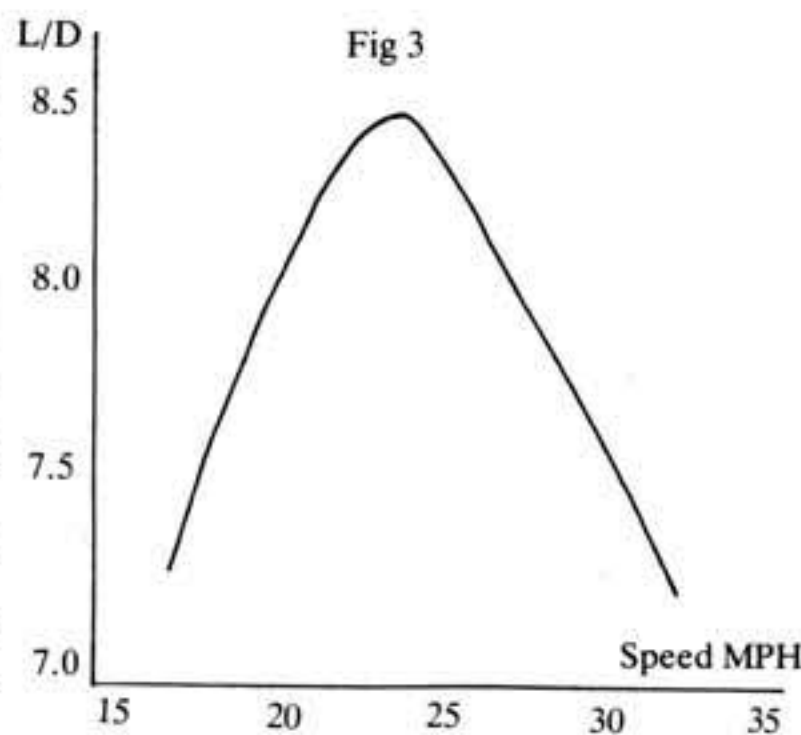


Fig 1b Swept and tapered wing

The minimum value for the total of the two drags occurs where the lines cross, in this case at 23mph. (Hereafter we will call this VMD for velocity at minimum drag). From figure 2, a rather interesting curve can be plotted, and that is the variation of total drag with airspeed. In other words how fast can we fly, and still maintain a reasonable glide angle? Figure 3 shows how fast.



The sort of wing shape we use determines how steeply induced drag drops off with speed; thin tapered wings have an induced drag falling off steeply with speed, wings with a large root chord don't. Wings having a lot of billow, hence camber and washout, don't either. The more the billow, the worse it gets.

To induce you to think.

Induced drag is then very much defined at the kites design stage; tuning can reduce it but often at the expense of stability, and by and large the pilot is stuck with what he has bought. Here are a few thoughts though, which although we can't use them to produce bolt on goodies, might point the way to future design improvements.

1) An increase in span and aspect ratio is very effective, although large span gliders controlled only by weight shift, will always have inertial difficulties. (A 1lb weight at the end of a 2ft. pole, is *four* times harder to swing than a 1lb weight on a 1ft pole).

2) End plates, or properly designed 'winglets', (shown in figures 4(a) and 4(b) can be made to unwind the wing tip vortices, put the air back the way it was, and greatly reduce induced drag. Winglets can quite dramatically improve effective AR without the inertia of extra span, but PLEASE DON'T RUN OFF AND SCREW BITS OF HARD BOARD TO YOUR TRUNCS; IT COULD SCREW YOU OUT OF THE SKY IF IT IS NOT DONE PROPERLY!

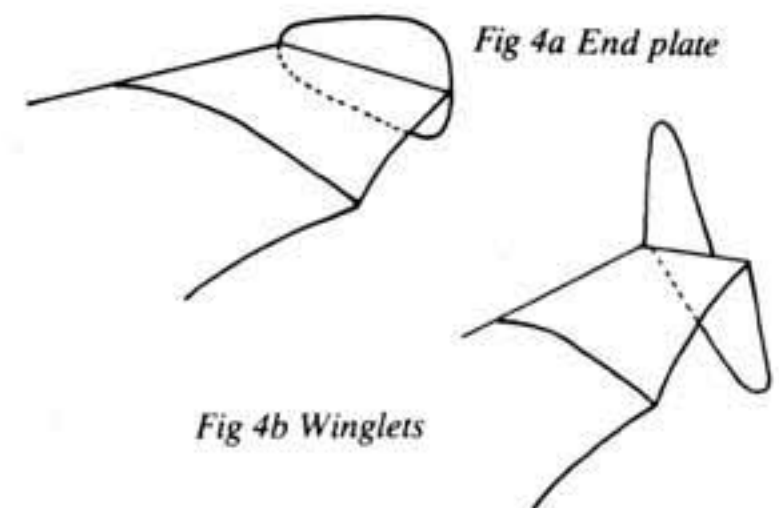


Fig 4a End plate

Fig 4b Winglets

(3) Diffusor tips (shown in figure 5) can improve lift distribution without the danger of reduced washout. A very interesting article appears in July/September 1974 Ground Skimmer, concerning diffusor tips, written by Richard Miller. He quotes results of experiments yielding 13.9:1 L/D for a wing with an aspect ration of 5.5 — 50% higher than the theoretical expected value.

So, there is not a great deal that the pilot can do about induced drag, except tune; don't despair though, induced drag is only half the total, and there is quite a lot we can do about the rest.

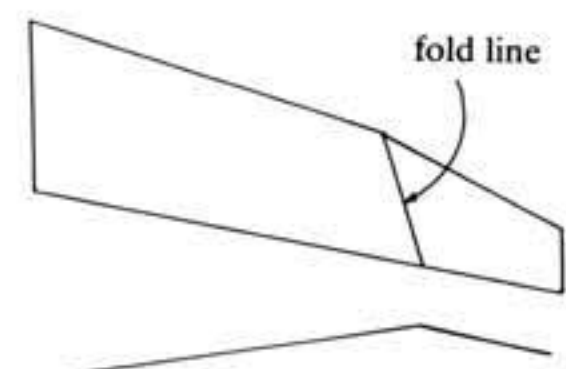


Fig 5 Diffusor tips

Keeping a Low Profile

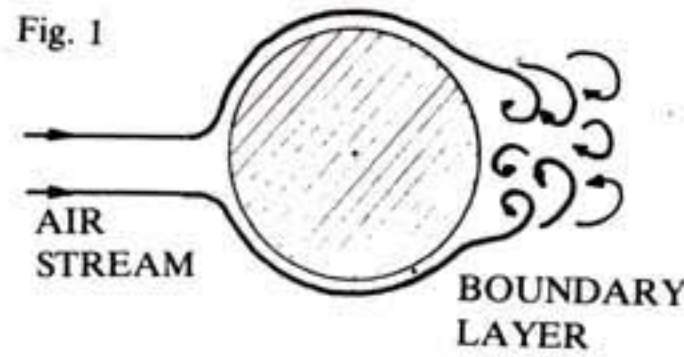
We saw how induced drag made up one half of the total drag at VMD and what affected this drag. We will now show how profile drag is comprised, together with some ways of reducing it.

A very large proportion (50%) of the profile drag on a hang glider is produced by circular sections; figure 1 shows what happens. The big culprit is the turbulence produced at the rear of the section where the boundary layer suddenly breaks away. A simple fairing can easily reduce that drag by a half, (figure 2). A properly designed fairing with a thickness to chord ratio of perhaps 0.2 can reduce it to 10% of its unfaired value. Yes, 10%! The sort of fairing we are looking for should be light and be designed as far as possible to be independent of angle of attack. One possible avenue of experiment may even be a floating fairing which would self-locate in the air stream.

One point worth mentioning — if we dislodge or trip the boundary layer at the front of larger diameter sections, it does not then break away so dramatically later on, and our turbulent region behind the boom creates less drag. This tripping is done on golf balls by dimpling them. Before you get the hammer out on your cross boom, you should know that this technique is only effective on tubes of 3 inches diameter or more at the sort of speeds we're flying at present.

Figure 3(a) shows the profile drag breakdown for a Midas E flying at a constant 23mph in smooth air. (In rough air the boundary layers break away in unpredictable ways and a realistic drag figure is difficult to calculate) Examining each component in turn: **Sail and Leading Edges (3.7 lbs).**

Leading edge pockets should be good and deep, with a chord at least four times the diameter of the leading edges and continuing that way, as far as possible to the tip. Once you



have bought the glider there is not a lot that you can do about the sail. Creases, dirt, poor stitching or damage to the sail all worsen the situation, but not by very much; the major contributor here is skin friction drag, perhaps a coat of polythene . . . ?

Pilot and Harness (2.2 lbs).

Most important and most obvious, fly prone. A seated pilot creates up to five times the drag of a prone one. It is difficult to put theoretical figures on the drag produced by loose clothing, its form changes constantly. I met a guy in France who always flew in an electric blue, skin tight catsuit; looked like a ballet dancer, but he was streamlined alright. Keep your clothing tight especially around the sleeves which are perpendicular to the air flow. A one-piece ski suit with zipped sleeves is ideal. Throw away the bell bottomed Levis and find something tight about the legs. If you fly in boots with a heel you can point your toes on the stirrup and lose about 0.7lbs of drag.

Your prone harness is important too; support webbing should be confined to one loop around the middle, rope creates far less drag than webbing held at right angles to the

air flow. Once the harness is set up, cut off or tie down those fluttering loose ends. Harnesses with no seats or integrated seats are an advantage too.

Control Frame (1.8lbs).

Fairing the tube can reduce the drag to 10%, unfortunately we still have to hold the damned thing so we can't go all the way on this one. If you anticipate fairing the bottom bar (at 0.6lbs it's worth it). Remember it's going to get a lot of hammer, the fairing has to be tough.

Cross Boom (2.0lbs).

Calculations were carried out assuming free stream air: in practice, parts of the cross boom lie within the boundary layer beneath the sail, and actual airspeed which the cross boom sees is correspondingly reduced.

The fairing on this member should, like the other, be designed at a thickness to chord ratio of about 0.2. Thus a 1 3/4 inch cross boom would carry a fairing around 9 inch chord; with higher aspect ratio gliders, it is important that the air flow from the fairing, particularly at high angles of attack, doesn't interfere with the working of the main wing. Also remember that the air flow beneath the wing does not make a constant angle with the keel as we move outwards spanwise. In other words our ideal fairing should be twisted slightly.

King Post (0.8lbs) and Rigging (1.3lbs).

The King post is worth fairing again. American pilots are experimenting with wing struts, faired of course, and throwing away the entire top rigging. The glider certainly looks clean, but overall paper improvement (assuming 1/8 inch thickness struts) is only a few percent; there's a weight penalty too.

Contingency (0.5lbs).

This includes such things as rigging tangs, nuts and bolts, nose plate, deflexors and deflexor wires. Sometimes its easy to clean these up; the ASG 21 for example, has sleeves which slip over the trunks and leading edge tips. Remember when looking at the kite generally, the aim is to put the air back as it was with the minimum of disruption, this usually means looking at trailing parts just as carefully as leading parts.

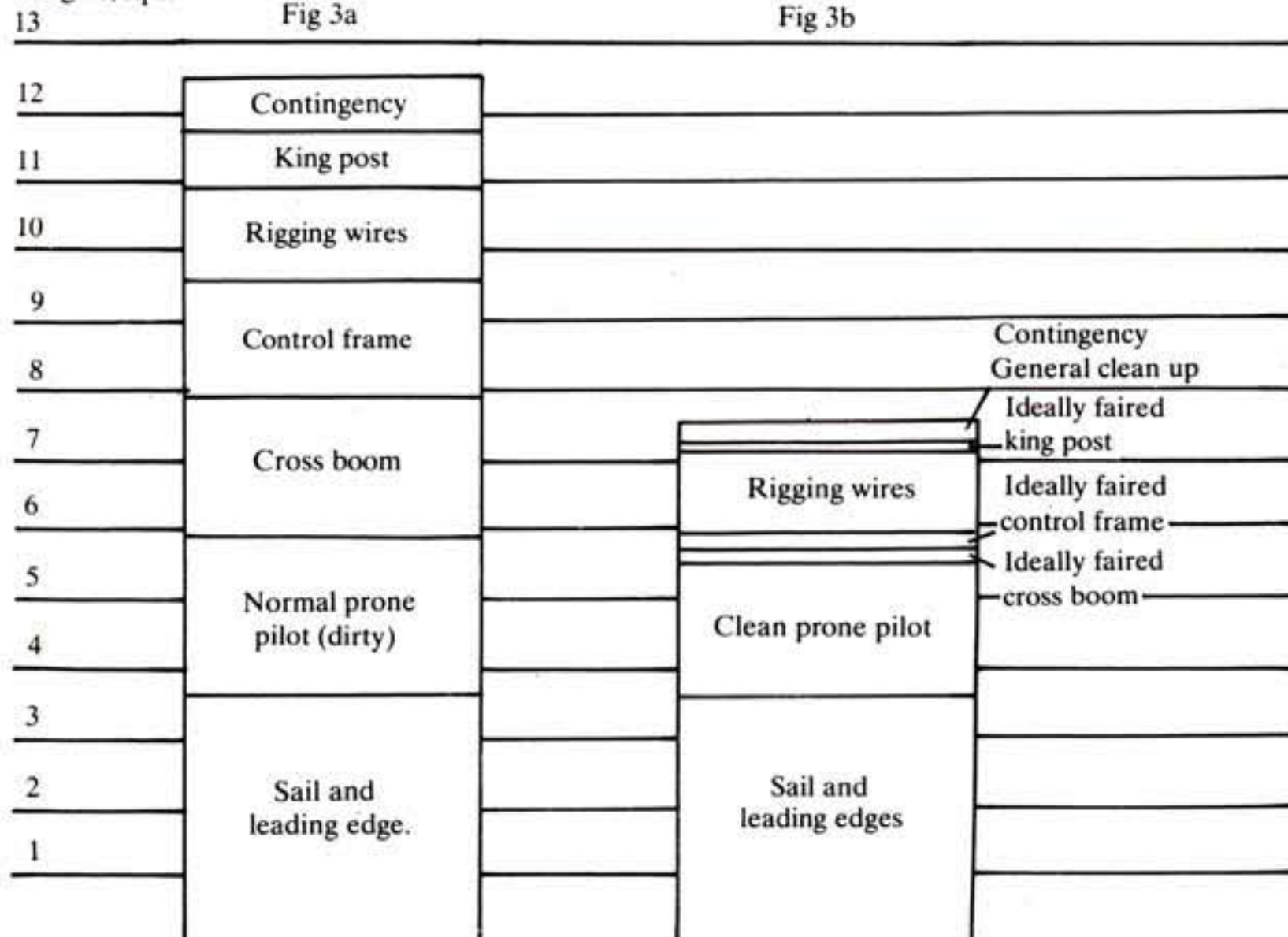
If we carry out all these modifications, Figure 3(b) shows what we might hope to expect. Profile drag has been reduced to 7.5lbs against the original 12.3lbs. This now yields a L/D at 23mph of 10.4. Very nice, you may say, but something even better has happened. Take a look at Figure 2 in Part 1 and see what occurs when we flatten the profile drag curve; the point of intersection on the speed axis (VMD) has increased. i.e. We are not only flying flatter but the speed at which we are flying flattest has increased in our example to 26mph.

To conclude then, if we were to fit fairings and take the precautions to reduce drag that are outlined above, we can expect our high performance glider to improve even further in the following respects:-

- (1) Better L/D; even with the basics, you can reasonably expect 8:1 to increase to 9:1.
- (2) Higher top speed.
- (3) Higher VMD.

Worth a few bob I would have thought!

Drag lb/sq ft



NEWS ROUNDUP



Phoenix 6 after take-off.



80lbs of thrust is enough to support Jerzy at 45°

POWERED FLYING IN STOCKHOLM

After two years' experiments with powered flex wing gliders Polish born Jerzy Kolecki has perfected flying with a standard rogallo and back power pack. He uses Rockwell and

McCulloch engines of 15HP. and a selection of six props. Jerzy tested his first powered glider and by April 1977 had perfected his flying technique, even with a 'standard'. Jerzy says that

there is very little literature available on small propellers, but being an aviation engineer, this presents little problem. His current power unit will develop 80lbs. of thrust.

ALVIN RUSSELL TROPHY

This superb work of art has just been won by Brian Wood, the 1977 League Champion. It cost £250 but we managed to collect only £122.57 from the membership. We can draw on some of the small balance left over from the 1977 League flyers' money but before doing so, are there any more out there who would like to be represented in this tribute to Alvin? Final donations to me, Derek Evans, Treasurer, 2 Lynch Down, Funtington, Near Chichester, West Sussex.

CHRIS CORSTON APPEAL

This appeal has now drawn to a close and some 460 members have contributed £3,050 to help Chris make ends meet. All being well, he will be re-employed as our Secretary in Taunton this month and I am sure all his friends will join in wishing him the very best on his return.

RAY SKIES THE "BIG DOUBLE"

The 20 mile Pandy-Hay-Pandy run, long the dream of distance freaks (and some competition organisers), has finally been conquered by Ray Willis of the Avon Club with some superb flying on his Mk.2 Phoenix 8 Junior.

Following a Saturday of strong non-thermic NE ridge lift, Sunday 18th September saw the Pandy-Hay ridge system speckled with the tiny shadows of more than a dozen Avon and Malvern fliers as they skied out among a rash of unseasonably meaty thermals.

Despite the promise of morning skies, this mob invaded Pandy after some frantic rubber burning to find conditions looking markedly over-developed, and surprised themselves by finding an abundance of thermals.

Early fliers fared best, Ray launching at 1.15 p.m. from the common, followed closely by Bob England also on an 8. Both pilots quickly located the best lift way out in mid-valley, where they rode a stiff and thermic Nor-Easterly straight and high towards Hay Bluff, 11 miles away. Some latecomers wasted their day trying to follow in decaying thermals, but most others foot slogged a weary two miles to the big NE Bowl where, short of breath but assured of success, they freaked out going up and nowhere in particular. Eventually five Avon adventurers followed towards Hay and the chance of fame.

Six miles from T/O lurked an obstacle that was to stop all but Ray —

a huge kink in the ridge system involving an upwind gap of a mile between two huge ridges of equal height. The only way across was to thermal for over a mile into a 25mph. headwind without loss of altitude en-route!

Ray got it together on his first attempt, though he reached the forward ridge so low that all seemed lost, and he was actually out of prone and setting up a landing when some faint lift carried him on and enabled a slow close scrape back up the ridge face and onwards to the Bluff, where he arrived with all the height in the world — at cloudbase in fact!

Safe now, and knowing that the return trip would be easy, Ray was obliged to land and obtain witnesses' signatures to prove his flight. He top landed near a likely flier, who naively displayed ZERO interest in Ray's flight from Pandy, and was concerned only that Ray help him move his own glider!!

Duly 'signed up', Ray took off and headed back to Pandy, soon so high that he could afford to ignore the forked ridge which had so nearly ruined his day earlier. Other pilots making one-way trips have crossed this gap downwind with less altitude and suffered truly memorable turbulence, but Ray felt nothing and was soon back at Pandy for a rest, a sandwich, and some envious back slapping from those less fortunate or less able than himself.



Ray on his Phoenix 8 Junior Mk II. Photo: Peter Smith

Later he flew to the gap again, but weakening thermals made a second crossing impossible and he returned to complete a total of 32 miles flying from just two flights. (20 & 12).

Of the six who followed Ray, several made repeated assaults on the gap, but each attempt ended in an undignified downwind scramble back to the parent

ridge when the thermals gave out. It can be assumed that as flying experience and glider performance improves, nasties like the Hay gap will be flown with impunity when the big blobs return next spring. If not, it won't be for want of trying!

Bob Wishart

1500FT AND 4½ MILES FROM 50FT.

On Friday 2nd September Geoff Ball flew 4½ miles from a 50ft. ridge. Geoff was on his way to a Pennine site called Rawtenstall when he passed a small ridge about 400 yards long with a 45° slope of around 50ft. The land in front rose about 250ft. in half a mile. Considering it might be flyable, Geoff approached the farmer who owned half the ridge and the surrounding land. Permission to fly was given and on take-off Geoff gained a respectable 150ft. before the first thermal came through hoisting him another 100ft. up. After two hours of flying and one top landing the big one came through. Geoff flew out into the lift and 360'd several times to keep in the lift. As he drifted over the ridge, Geoff had 600ft. to spare and continued to climb to 1500ft. over the neighbouring valley. Thinking he could glide to his original destination, Rawtenstall, Geoff set off downwind. Unfortunately Geoff hit bad sink and came down well short, narrowly missing a sewerage farm and landing on the fourth fairway of a golf course in front of four amazed golfers. Geoff wrapped up his Scorpion 'B' and retired to the club house for a free pint. Not bad for a 50ft. ridge!



PRODUCT NOTE

SOS Talisman Co. Ltd. produce a range of 'jewellery' which enables the wearer to carry his full personal and medical particulars in a handy, heat and water resistant, capsule. The capsules come in the form of a bracelet, watch strap attachment and pendant. The wearers details, such as blood group, allergies, home address, etc. are written on a non-soluble strip, which folds up into the screw-up capsule. It is definitely a sensible idea for pilots to carry their medical details around with them. This little device costs between £5.00 and £10.00 and is available from chemists, gift shops, department stores and jewellers.

BRITISH HANG GLIDING LEAGUE 1977

The British Hang Gliding League 1977 finished as it began — with Brian Wood the winner. In an incredibly close finish, Brian Wood scraped home by a mere 14 points as overall league champion. Johnny Carr, who is seemingly always entrenched in second place, was of course second, but by a narrow margin of 27 points. During the whole league Brian confirmed his reputation as the ultimate

league pilot. Give him an inch and he will take 5 miles. Brian's philosophy for winning was simple. Take each task as it comes, study the course and score the highest possible points. It certainly seems to work for him.

Hopefully the disputes which have arisen this year will be ironed out in the new handbook on competitions which is being compiled by the Competitions Committee. Any competitions pilots

with constructive suggestions should send their ideas to Brian Milton, who is collating all the suggestions for consideration.

By the time this magazine has reached you, league entrants for 1978 will have been chosen at the league entry competition in Wensleydale. 20 new pilots will be accepted bringing the total up to 60.

FINAL RESULTS: BRITISH HANG GLIDING LEAGUE 1977 after 5 Competitions

	1	2	3	4	5	TOTAL	GLIDER	
1	B Wood	500	433.99	160.71	229.06	500	1663.05	SST/Moyes
2	J Carr	430.50	254.09	430.91	434.16	353.21	1649.18	Gryphon II
3	B Calvert	315.62	404.41	500	368.49	348.35	1621.25	Scorpion
4	B Bailey	269.27	416.21	218.21	500	369.01	1554.49	SST/XC
5	G Slater	160	500	371.55	157.72	414.63	1446.18	SST/Midas
6	R England	233.36	382.72	119.05	424.66	389.31	1430.05	Phoenix 8
7	G Hobson	327	—	426.23	320.42	340.63	1414.28	Sunspot
8	T Beresford	304.15	433.22	337.16	331.12	302.01	1405.65	Wasp F4
9	L Cruse	—	325.32	314.29	329.94	395.95	1365.50	F4/Gryphon II
10	M Evans	324.92	360.44	157.95	352.10	314.10	1351.56	Wasp F4
11	M Atkinson	215.89	386.63	367	298.20	298.92	1350.75	Wasp F4
12	D Weedon	331.44	325.16	285.71	196.95	360.75	1303.06	Moonraker
13	N Millhouse	118.52	387.74	231.48	331.93	298.84	1249.99	McBroom Harrier
14	John Fack	323.49	225.22	202.89	353.56	323.96	1226.23	Phoenix 8
15	K Messenger	350.16	243.73	82.09	233.78	326.87	1154.54	Moonraker
16	C Johnson	80	326.37	239.73	269.18	299.13	1133.41	Scorpion
17	P Day	—	280.07	160.71	284.12	382.43	1107.13	Cirrus 3
18	R Middleton	22.65	—	214.54	304.12	341.50	1082.81	SST
19	F Taryjanyi	112.42	383.14	—	296.05	266.10	1057.71	Wasp F4/Scorpion
20	R. Black	121.57	302.35	261.29	263.99	228.60	1056.23	Wasp F3/4
21	A Doubtfire	209.79	289.94	273.93	196.87	279.92	1053.58	Moonraker
22	M Maher	64.06	221.78	225.84	289.34	300.90	1037.86	Wasp F4
23	J Hudson	281.72	—	2.89	390.93	342.32	1027.86	Vector
24	P Baker	57.86	219.03	—	343.78	396.90	1017.57	Phoenix 8
25	B Milton	301.99	295.85	162.57	239.90	179.29	1017.03	PX6B/Moonraker
26	D Clothier	90	341.03	214.28	239.52	220.26	1015.09	Scorpion
27	Jmy Fack	224.18	454.93	116.07	—	208.72	1003.90	KSG 21
28	R Wates	190.26	351.31	165.87	136.56	286.06	993.50	Wasp F4
29	M Southall	99.70	268.02	255.73	163.67	303.23	990.65	Moonraker
30	J Thomas	181.15	334.55	107.43	139.79	332.70	987.19	Scorpion
31	D Worth	148.76	281.35	—	239.82	273.32	943.25	Cloudbase/Scorpion
32	T Fuell	—	250.47	153.82	218.28	283.11	905.688	Scorpion
33	G Leason	81.84	209.71	113.52	145.05	293.95	762.24	Moonraker
34	D Lyne	66.22	253.76	—	210.79	191.86	722.53	Wasp F4
35	M Robertson	182.80	298.63	112.46	—	55.34	649.23	Scorpion
36	R Ware	169.07	349.22	—	106.40	—	615.69	Midas
37	M Handley	260.07	316.93	—	—	30.71	607.71	Gryphon II
38	D Goepel	220.18	345.45	—	—	32.20	597.83	Scorpion
39	S Wootton	—	308.66	—	283.88	—	592.54	Midas
40	C Coleman	58.38	136.26	—	—	236.80	431.44	Homebuilt
41	R Sigrist	—	415.52	—	—	—	415.52	Scorpion
42	G Headon	99.99	173.83	—	—	—	266.82	Wasp F4
43	P Maritos	—	—	292.12	—	—	292.12	Vector
44	M Roberts	43.91	26.34	107.14	—	—	194.64	Phoenix 6
45	P Robinson	176.19	—	—	—	—	176.19	Scorpion
46	S Goad	—	—	89.29	—	—	89.29	Wasp F4
47	M Leader	61.50	—	—	—	—	61.50	Scorpion
48	G Driscoll	—	38.04	—	—	—	38.04	Phoenix 8

Entered the League, but did not fly:

Steve Hunt, Eric Short, Malcolm Hawkesworth, Terry Dibden, Henry Heggie, Don Spratt

DOWN SOUTH With Ratfink

Any suggestion that the South might be 'losing its grip' was quickly disposed of at the end of the 1977 League competitions. Brian Wood's first place and Johnny Carr's second showed that crowded sites, and small hills notwithstanding, SHGC can still turn it on when necessary.

Congratulations to:

Johnny Carr (again) for yet another Miles Wing/Wasp first - the Seaford to Beachy Head run. In very strong SW winds, the trip took about 20 minutes and involved crossing the half-mile wide Cuckmere estuary, fortunately at low tide.

also to:-
Tony Maclaren and John Ievers for concluding negotiations with Eastbourne Council which will place the use of Beachy Head on a regular (hopefull, permanent, basis). Until the agreement is finally signed, everyone is warned to be very careful about flying there. Tony and John hope to conclude the year by getting Firlie back for the SHGC — this will work wonders for our thermalling capabilities next year.

Congratulations also to Geoff Shine — architect of SHGC's new Air Traffic Control system. Next time you see a crowded SHGC site, the odds are there'll be somebody rushing around on the ground organising the take-off and landing areas. Already achieving a

great deal of support from the locals, this scheme is expected to pay dividends to the Club — better site control is in everybody's interests.

Commiserations to:

ADUR DISTRICT COUNCIL — their bungling attempts to interfere with the Sport of Gentlemen by banning us from Mill Hill still haven't prevented a few hardy souls taking advantage of the current confusion over just how far the prohibited zone extends. How long it will be before the geriatric Council actually prosecutes somebody is anyone's guess — even the aeromodellers seem pretty fed up with things at the moment.

Commiserations as well, to Barrie Annette. Attempting to explain the precise reason why it was morally wrong for him to pay a landing fee to a farmer in whose field he had alighted, our loquacious friend forgot that where reason fails, force is apt to move in. Having refused to pay the hardy peasant his due, Barrie watched in horror as the yokel drove his muckspreader around his SST where it lay awaiting derigging. Around, and around, and around . . . Wherever he goes now, he is banished to the downwind end of the hill! However, it's not all bad. Give all that compost a month or two, and it'll start generating its own thermals . . .

DAYMER BAY COMPETITION

On the 1st and 2nd October the second Kernow Hang Gliding Association competition was held near Polzeath, Cornwall. The first day proved unsuitable due to a high wind, but the lads made the best use of the conditions by giving tethered flights to the wives of competitors on the beach. None of them had flown before on a hang glider and they were all delighted. Thanks are due to John Humphries and Dave Lyne who lent the gliders to take the lady folks aloft.

The second day saw a moderate to fresh NW wind which proved ideal. Thirty-five competitors took part in two tasks, a slalom and spot and distance event. Two flights were allowed for the slalom but time was short and only one run each at the distance could be made. Everyone enjoyed themselves and with no work for the St. John's Ambulance crew, it was felt that the event had been successful. The winners were presented with cups by Mrs. Vivienne Westcott, wife of the Chairman of the host club.

Results were as follows:-

Slalom and Spot

Class I. Pat Turner, North Devon Sailwing Club. Class II. Roger Black Western Counties H.G. Club

Distance
Class I. Robin Smither, North Devon Sailwing Club. Class

II. Julian Edgecumbe, North Devon Sailwing Club.
Overall winner
Roger Full, Kernow Hang Gliding Association.



The 'Throne' seated harness — a must for endurance flights.

THE SECOND LONG MYND LEAGUE COMPETITION

Contrary to its name the whole of this league competition was held at Middletown on a ridge which faced the foggy south easterly breeze. On the first day, the fog, which persisted for all three days, cleared about three o'clock allowing a time in the air, three sixty and spot event. Early contestants found good thermal lift and the point was hammered home by Brian Wood who wound in 14 360's with a time in the air of 5 minutes. Conditions gradually worsened with tail enders taking off through cloud. (Cloud thickness was continually monitored from the valley floor by walkie talkie). The luckless end-pilots suffered substantial sink which evened times out to around 2½ minutes with 2 or 3 360's.

Weather conditions on the second day were a repeat of the first. A heavy fog shrouded the valley eventually clearing in the afternoon. This time the task was a speed task over a measured course with the option of 360's after passing the line followed by a spot. In the running of the task it became apparent scoring favoured those who flew fastest, so most pilots went for the title of 'flying brick'. Peter Day won hands down with an incredibly fast plummet of 55 secs, when pilots were averaging around the 1 min 10 sec mark. When it comes to speed and glide angle, Peter Day on his Cirrus III always takes some

beating.

On the last day the foggy conditions improved earlier and it was possible to hold two tasks for an excellent finish to the 1977 League Championship. The first task was to fly to three fields which were marked 10, 30, 60 points. The pilot flew to the field of his choice and completed as many 360's as he could for 10 points each. Poor lift conditions meant that most flyers reached the second field with just enough height to complete a very low level 360. Roger Black became the first and only league casualty when the wing tip of his falcon touched the ground half way round. That's how close pilots were pushing themselves. Roger cracked a couple of ribs in his fairly heavy landing. Johnny Carr won that task by managing to reach the third field on his Gryphon. The only pilot to do so. Everybody was rushed back to the top of the ridge for a complicated slalom and spot task. Pilots had to cross three sets of kite bags both ways. The difficult part was the rows of kite bags were in different fields and the direction of entry of the gate was stipulated in advance. This meant a series of tight reversals whilst maintaining maximum height. Only two pilots managed to max the course. There was a rather sour end to the competition when Johnny Carr disputed a Marshall's decision. For

some reason the marshall's decision was not taken as final (as had been stressed at all the previous league meets) and Johnny was awarded his slalom points. This meant that Bob Calvert was pushed into third overall league place. Bob appealed but the appeal was rejected on the grounds that, without proper optical instruments it could not be stated either way that Johnny had missed the marker or not and therefore he must be given the

benefit of the doubt. At least a precedent was set for better system of marshalling in future leagues.

Brian Wood had done well in all the tasks and emerged as winner of the competition and the whole league. Paul Baker came second and Lester Cruse third. In a fitting close to the league, Ken Messenger very generously distributed free beers to all the pilots who were already busily talking about next year's league.



Brian Wood admires the Alvin Russell Trophy. Photo: Dave Worth.

CARLTON BANK TO SWINTON

Bob Bailey describes his 24 mile record breaking flight, possibly the last big cross-country flight of 1977. Illustration by Bill Lehan.



Pilot: Bob Bailey, 6ft. 3ins, 14st.

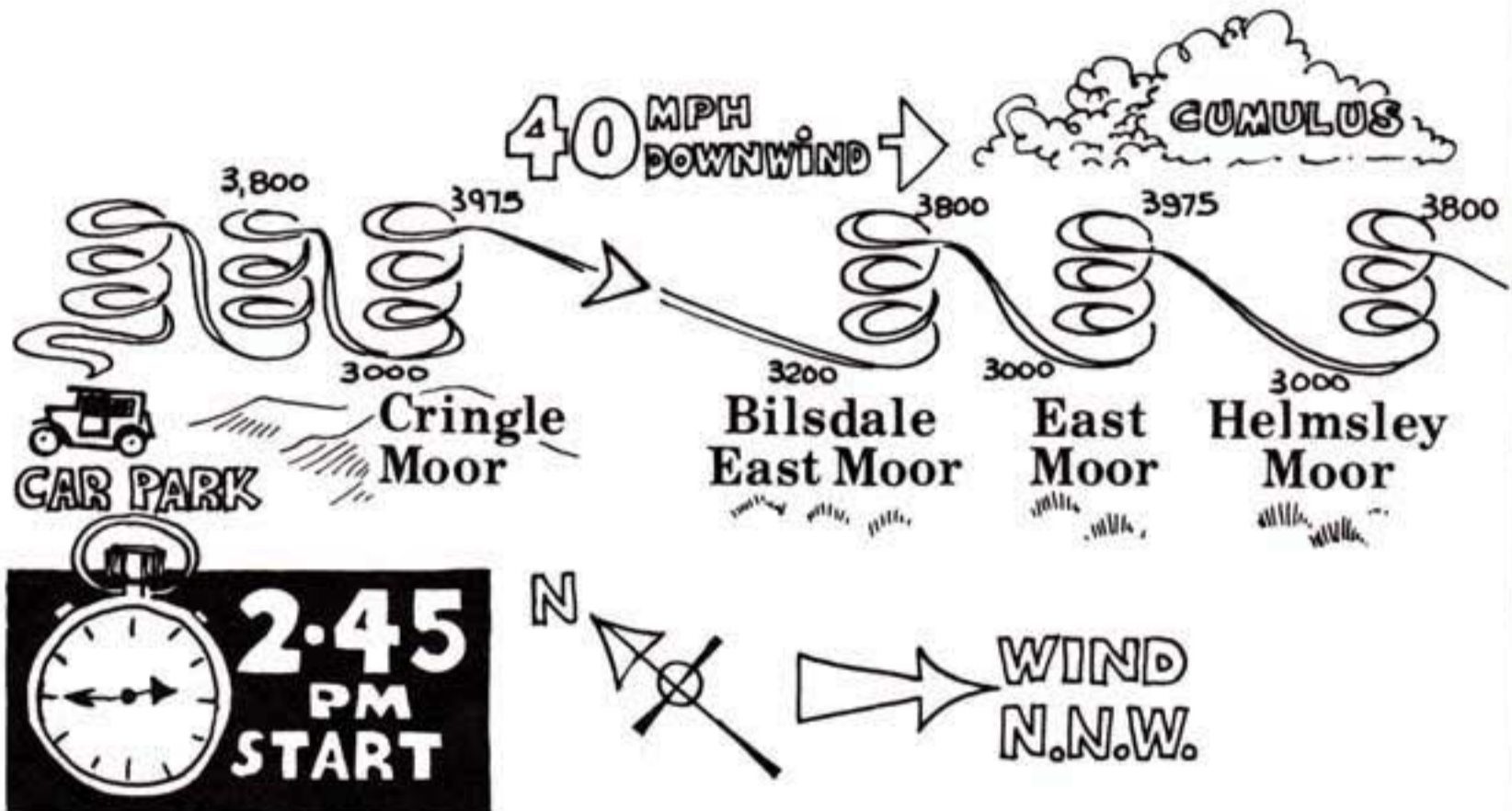
Kite: Wills Wing XC (Large)

Instruments: Colver vario, Ex aircraft altimeter, Omega stop watch, wrist compass.

Other equipment: BUS parachute

Pilot History: Yorkshireman, flying four years, 1977 Scottish Open Champion, 1st Birdman League Trophy, 4th British Hang Gliding League 1977.

Site: Carlton Bank 975ft. ASL.



TAKE off time was 2.45 p.m. with a NNW wind varying between 10 and 20mph as moderate strength thermals passed through. I had already had several good thermal flights in the morning to 3000ft. and decided that this was the day for a record attempt. I arranged a back up crew and told them my predetermined destination — the A64, near Malton.

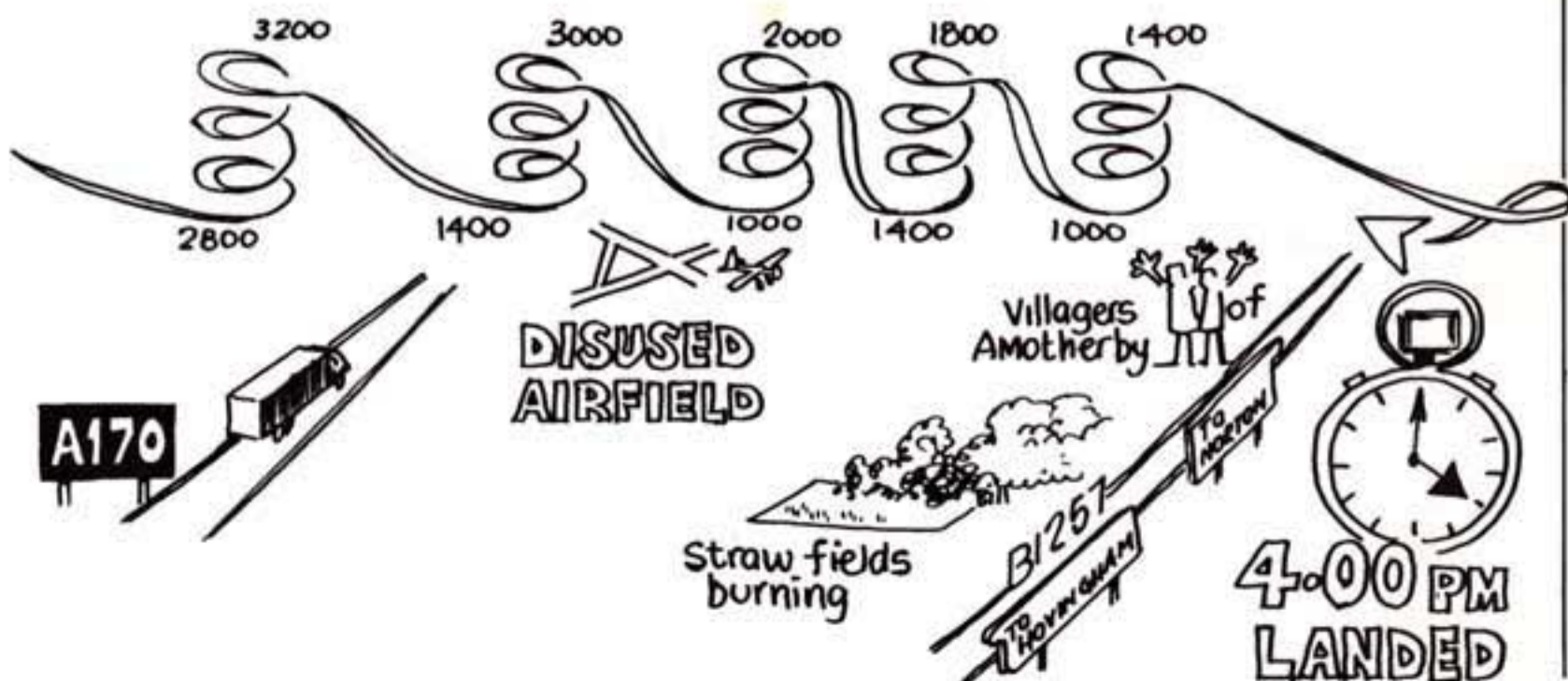
Taking off, I was soon into a good thermal of 600 fpm. and drifting back over Carlton Bank, I reached Chop Gate at 3975ft. ASL. four miles down wind. I was on the sunny side of the cloud base which was a good 200-300ft. higher than the shadowed side. I entered the cloud several times, but did not stay in it long, side slipping out. Making a straight glide downwind from cloudbase, I picked up another thermal at 2000ft. gradually working my way back to cloud base again. All the time I was completely relaxed and enjoying the flight of a life time. The view from cloudbase was tremendous. I could see the East Coast, the Yorkshire Dales and the Yorkshire Wolds to the South, where I was heading.

The closest I came to blowing it was over Wombledon Airfield (disused) when I was down to 800ft. However, I soon connected with a very smooth 300 fpm. thermal, which took me back to 3000ft. I set off again on a straight glide and could see farmers burning straw in the fields. This gave me a good indication of the wind direction at ground level. I worked several weak thermals and passed over the small villages on the rivers Riccal and Rye. By now, I was down to 2000ft.

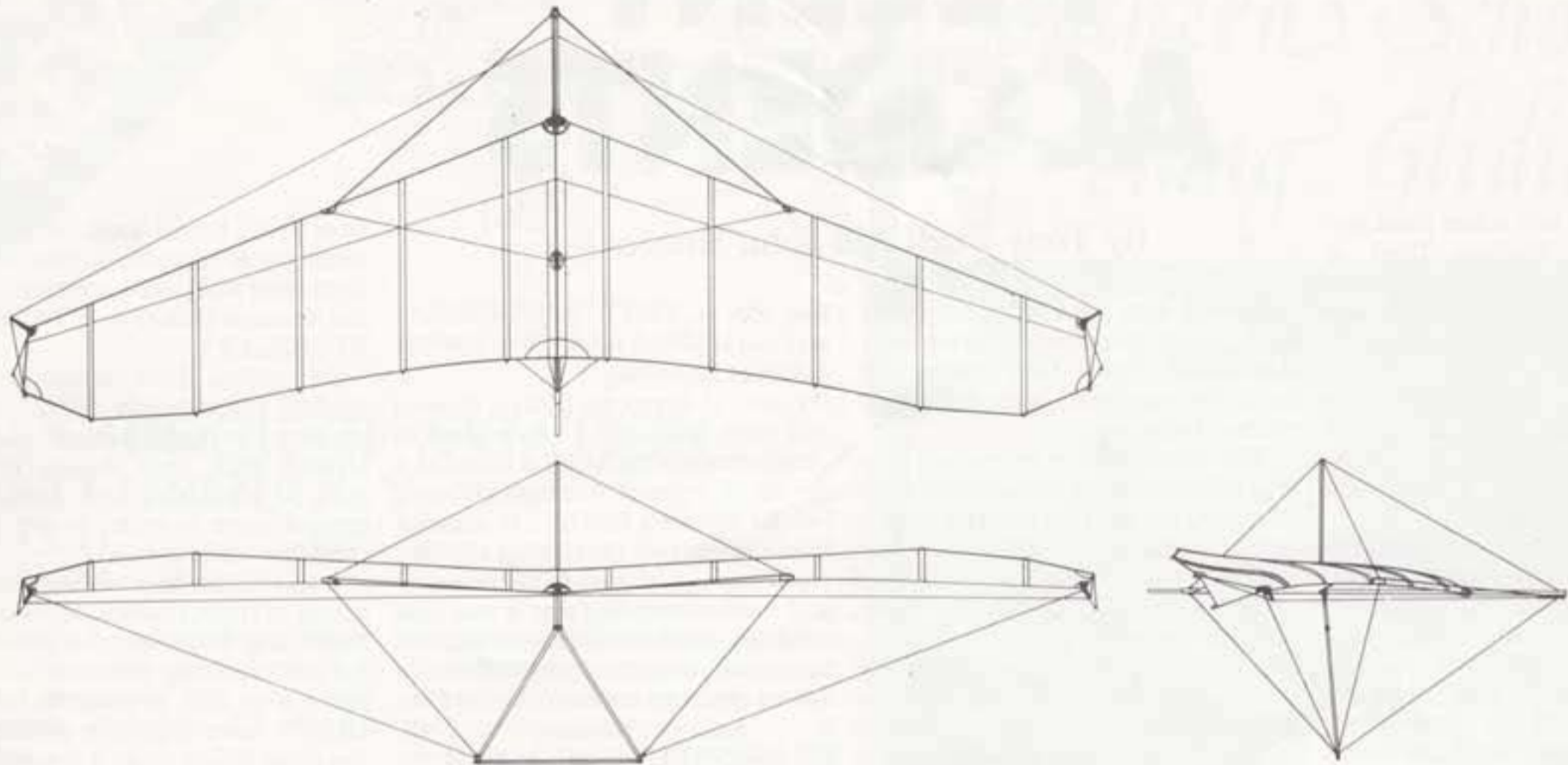
and the sky ahead did not look too promising, with masses of decaying cumuli. This decided me to head off crosswind (easterly) to an area of four or five dry looking ploughed fields. As I arrived the vario flickered from 4 down to 1 up then 0 then 1 up again. It was not much but I stuck to it and climbed from 1000 to 1200ft. where it started to smooth out to 1-2 up all the way round my min. sink 360's. I was just beginning to feel content and thinking about my next move when the lift became patchy, so off down wind once more. I had stopped looking to the sky for likely looking clouds and instead, my eyes were glued to the ground, which was slowly passing beneath. I tried flying over some more good looking thermal producing areas but did not even register a blip on the vario.

As I approached Malton, I was in steadily sinking air, 5-6 down, and it became apparent that I was not going to make it to the A64. I passed over Swinton with 400-500ft. of altitude and then decided it was time to be working out a landing approach. I picked a suitably flat looking freshly cut corn field with a gate to the main B1257 Haveringham-Malton road. After a quick glance at my wrist compass, I gently turned into wind and touched down at 4 p.m. to be greeted by a farmer with the comment, "That was a nice flight lad", — and how!

One funny point — after phoning in to state my position, I arrived back to find a policeman with my helmet and harness in his hands. "We've got your gear lad, but we can't find your horse". I had a good laugh and then pointed out my rigged glider behind the hedge.



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RECENT ACCIDENTS

by Tony Fuell and John Hunter

The Inquest has now taken place into the death of Stephen Doel at Bossington on July 27th. The expected verdict of 'accidental death' was recorded. As to the reasons behind the accident, nothing has emerged from either the investigation, or statements made by witnesses which would tend to change the view that the cause of the impact with the hill was a 'downwind stall' resulting from pilot error.

The hang glider was very thoroughly looked at — it was intact, rigged correctly and for once we actually had a photograph available of the pilot on the flight which resulted in the fatal crash, we could see that when the aircraft took off, it was flying normally. However wind conditions

were a bit high for a lightweight pilot flying a high-performance machine in the seated mode, and the stalled condition may have been difficult to recover from.

The only lesson to be learned from this sad occurrence is that, once again someone has paid the ultimate penalty for confusing airspeed with groundspeed — **MAKE SURE THAT YOU DON'T! ALWAYS PULL SPEED** when going downwind, whatever you do. Frequently you see people who are in a downwind, or crosswind situation, push out to try to maintain a level attitude. Remember

that this is **VERY DANGEROUS**, and can lead to a total loss of control.

Accident Reporting

By now, (I hope) the BHGA Council will have instituted a new system of accident reporting which is based on a system of regional Accident Officers. For far too long BHGA has suffered from the fact that the existing accident reporting system was so cumbersome and indiscriminating that it was little used. On the new system, all that will be needed is for anyone who sees or knows about an accident to telephone a local number (well, **REASONABLY** local), and give the

facts as he knows them. It won't be necessary to complete a very detailed form, that will be the responsibility of the Accident Officer — **IF THINKS IT NECESSARY**.

So a system of discrimination will be applied, and hopefully, BHGA's hard-pressed investigation team won't be wasting their time wading through piles of reports of bent uprights or ground-loops in order to get to the ones that really matter.

It should also help to ensure that the centre (BHGA Council) knows what's happening. So no-one has any excuse for not reporting accidents — we've made it as easy as possible for you. **DON'T** leave reporting accidents to the other fellow — do it yourself!

PRELIMINARY REPORT ON MARK SOUTHALL'S ACCIDENT IN NORWAY ON SUNDAY 2ND OCTOBER

This report has been prepared by Birdman Sports Ltd. from eye witness accounts gathered on the scene by Jim Bowyer and the subsequent examination of the glider wreckage at the Birdman factory. It is felt that a rapid first report is in order as requested by the 'Norsk Aero Klubb' but it is in no way meant to pre-empt the report to follow by the B.H.G.A.'s accident investigator Jon Hunter with whom arrangements have been made to inspect the glider.

1 The site is situated approximately 40 miles from Oslo near VIKERSND. Approximately 1800ft. high.

2 The weather conditions were very low, windspeeds not more than 5 knots. Thermal activity was minimal.

3 The pilot, Mark Southall is an experienced pilot who has flown a lot of hours. He has had two previous accidents, one at Kossen in 1975 and the other on Hay Bluff with his U.P. Dragonfly. Whilst a good pilot, he is, in my opinion, inclined to rush things and controls the glider in an on/off fashion, by that I mean he doesn't feed inputs in progressively but tends to move from one extreme to the other. On this occasion he was extremely lucky to survive, with the minimal injuries sustained, which were a dislocated shoulder, sprained ankle, and a black eye caused by a blow to the head. Mark can't actually remember anything about what happened and has been unable to help in our investigation.

4 The glider was not a standard production Moonraker.

Approximately two months' ago we increased the amount of camber in the Moonraker sail gaining a considerably improved sink rate at a small loss of upper range speed. To accommodate this change to the sail it was necessary to alter the glider frame in several ways but basically the CG point was moved back 3 1/8 inches and the cross spar was effectively slightly longer. Mark is on the lower end of the 190sq. ft. gliders weight range and prefers the less highly cambered sail and so fitted the older pattern sail to the new type framework. To trim the glider out it was necessary to camber the leading edges to an excessive amount and also to pull much harder than normal on the horizontal wires. All these alterations would result in a glider with a very flat sail and minimal washout capable of higher than normal speed and very unforgiving flying characteristics.

Result of our examination of the glider wreckage

The glider had broken both its leading edges immediately behind the end of the external sleeve near the wing bolt position. It is clear from the damage on the tubes that the breakage occurred whilst the glider was **inverted**. Both negative wire posts were bent inwards whilst the other two posts were undamaged. Other damage occurred during the landing and is verified by marks on the sail and tree bark and earth on the tubes.

Conclusion

From the witnesses reports and the evidence obtained from the glider

itself, the following is our estimate of the sequence of events:-

Mark took off and began to perform a series of fairly radical wingovers and whip stalls. It is not clear exactly from which manoeuvre it came, but he was pushed fully out and the glider pitched violently nose up. Whether Mark corrected or not is unknown but the glider went right over onto its back. Both the leading edges broke whilst inverted. Again it is not certain whether the glider continued on over the loop or came back the other way but he was next seen out of prone holding the sides of the control bar parachuting down right way up and what is estimated at a little over normal parachute speed. He contacted

a tree which broke the leading edge on landing. Altitude at the time of the breakage was 300-400ft.

The above is a fair assessment of the accident carried out by ourselves but is by no means meant to detract in any way from the official report which will follow in due course. We happen to be in a position to quickly get a preliminary report done and consider that speed is important in the communication of accident information. It is my opinion that stunt flying is totally unnecessary and should be actively discouraged by all clubs and the B.H.G.A. at least for the time being until gliders especially built for that purpose are available.

Ken Messenger, Birdman Sports Ltd.

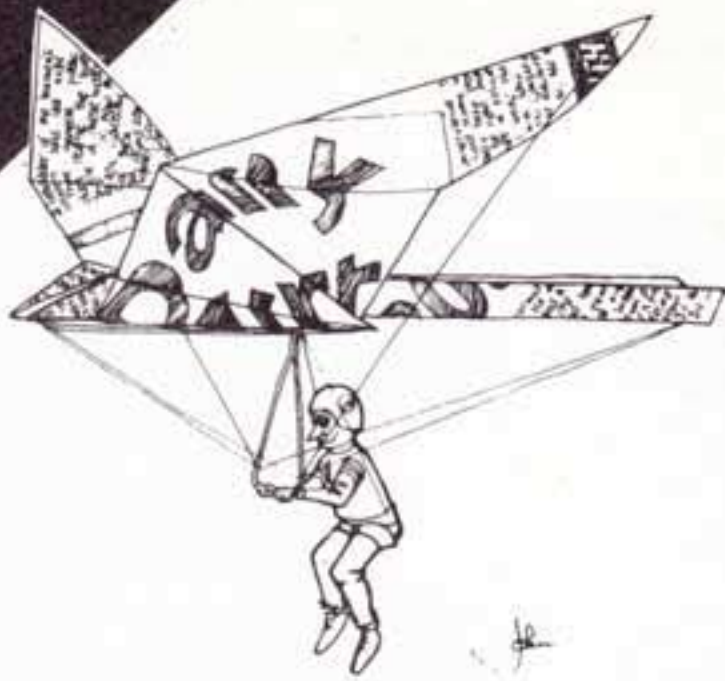


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BOOK REVIEW



HANDBOOK OF AVIATION METEOROLOGY

H.M.S.O. 1971
£2.10 in 1976 — 404 pages

Most of this book is irrelevant to hang gliding but it has got the answers to many questions I've not seen explained elsewhere. I'll mention three:-

Why does the wind drop at night?

The wind is less near the ground because it's slowed by surface friction. On sunny days, thermal activity produces mixing between high and low level winds which tends to even out the speed differential. In the evening thermals stop. The winds 2000ft up stay the same but they slow down near the ground as the mixing stops.

Why, with the same windspeed and direction, is the lift better on some days than others?

Thermals are one factor. Another is the humidity of the air. When dry air is forced up the slope it cools, the pressure drops and the whole rising process continues. This is an 'unstable' air mass. When wet air is forced up the slope it too cools. Cold air can't hold so much water so some condenses. Latent heat is released in the process of condensation, so the air

temperature doesn't drop much and thus the pressure doesn't drop much either. The pressure gradient is slight and you don't get much lift.

Why do you get more lift on coastal sites?

The land surface slows the air down more than the sea surface does. So when the sea air meets the slower moving air as it reaches the land, the only way to go is up, even if the land is quite flat.

Perhaps you knew all that but there's plenty more. It does get technical but no prior knowledge of physics is needed. There is also plenty to boost your hang-gliding daydreams if they're getting stale (and you probably spend a hundred times more time on flights of fancy than you do in the air). For the advanced daydreamer, how about a flight involving jet streams (Ch.10) waterspouts (Ch.17) and pack snow (Ch.8)? Just working out what to wear should keep you going for a few traffic queues.

Tim Gilbert

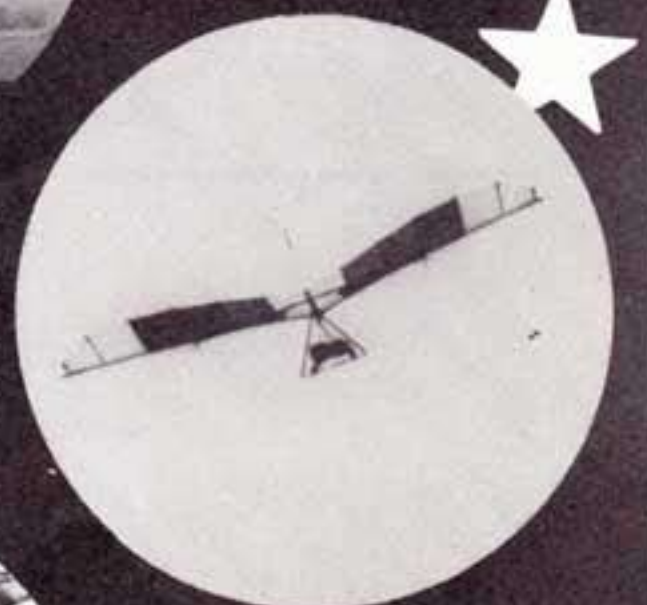


Southern School of Hang Gliding



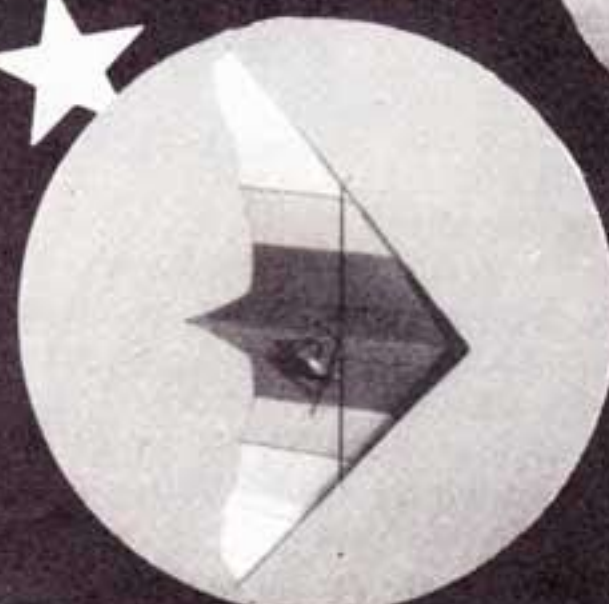
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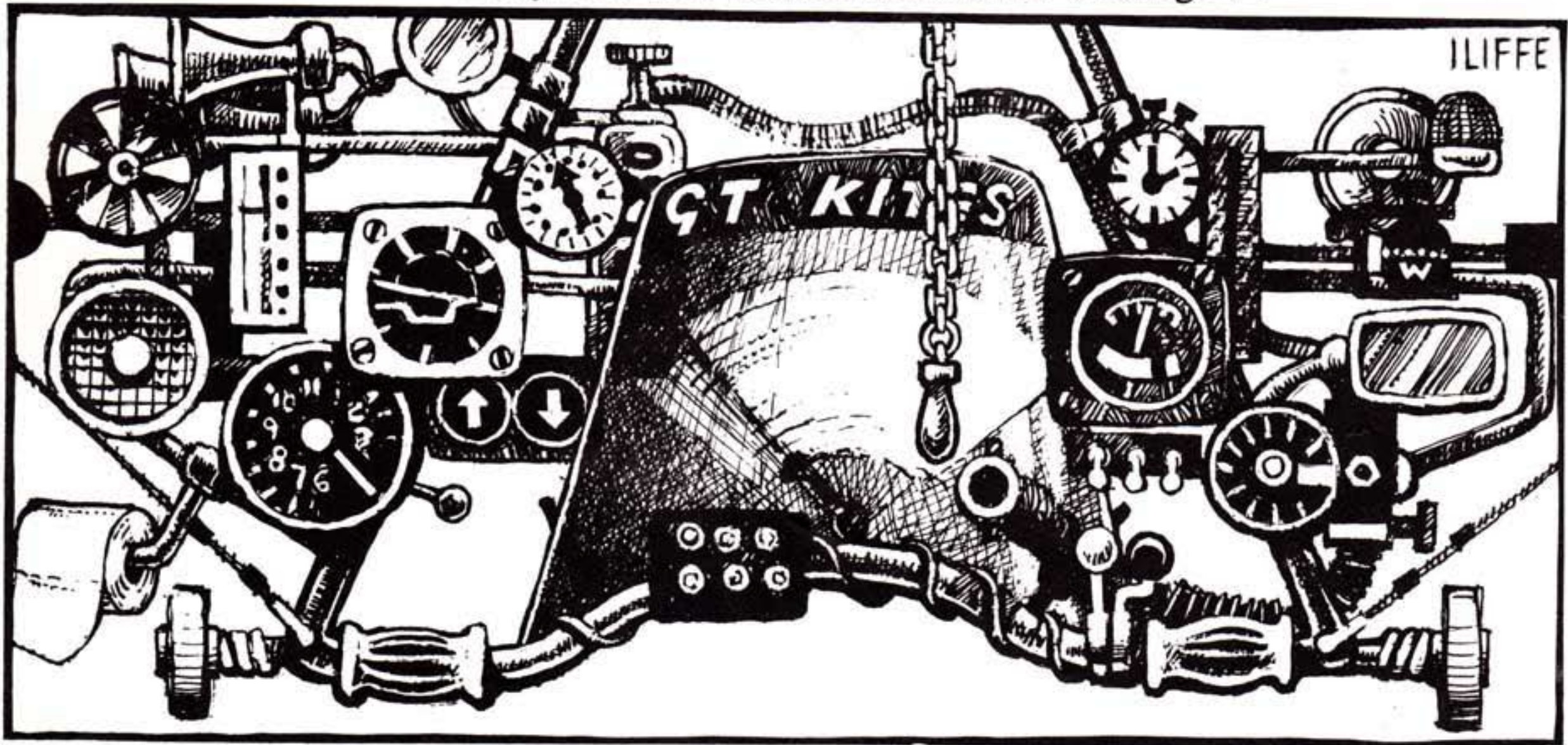
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What this year's well dressed A frame is wearing . . .



INSTRUMENTS ON A BUDGET

With spiralling costs of hang gliding equipment, Dave Weeks looks at instruments on a budget.

THERE I was with 800 up, 1000ft. above take-off, flying at 23mph."

So goes the modern hang gliding conversation in the Pub. But how can Mr. Average afford all these lovely goodies advertised in *Wings!* And other unmentionable magazines from across the Atlantic.

I first copied the idea of using a Ventimeter (cost about £6.00) as an air speed indicator. Now before you all rush to point out that it will not give you an accurate reading mounted on the A frame, I must explain that this does not matter so long as you know at what indicated speed you will stall or have minimum sink, etc. You can, and in fact, will have to recalibrate it as you can't see the figures from the side anyway. The use of a ventimeter like this is a great help when transferring from seated to prone when wind references are all different.

Next I wrote to America and bought a Styrene Soaring Variometer (now available in this country). This is not the sophisticated howling electronic wonder, but it works well for the price of about £14.00 and will do me until someone buys me a better one for Christmas (Hint, Hint). With these you need two quart vacuum flasks, but I used two alloy bottles with rubber bungs. The bottles were first covered with alloy foil, then 1/4 inch foam, then alloy foil again and this seems to work well and is just about indestructible, strapped



to the crosstube.

Having got this far, an altimeter was now required. The best I could find through Exchange and Mart was a 3 1/2 inch diameter ex RAF one for £25.00. A good altimeter should read 1000ft. every revolution — hopefully up to 35000ft.!

Your pocket calculator will now show an expenditure of £45.00, for three useful necessary items for half the price of the cheapest electronic Vario.

As all good hang glider pilots should know, it's illegal to drop things from the air, other

than ballast of sand or water, so we had better fix these items with something better than binder twine.

I wanted a bracket which was easily detachable, in a position of easy viewing, and would fold back if impacted. The following is the end-product of several experiments which I now find ideal for prone flying.

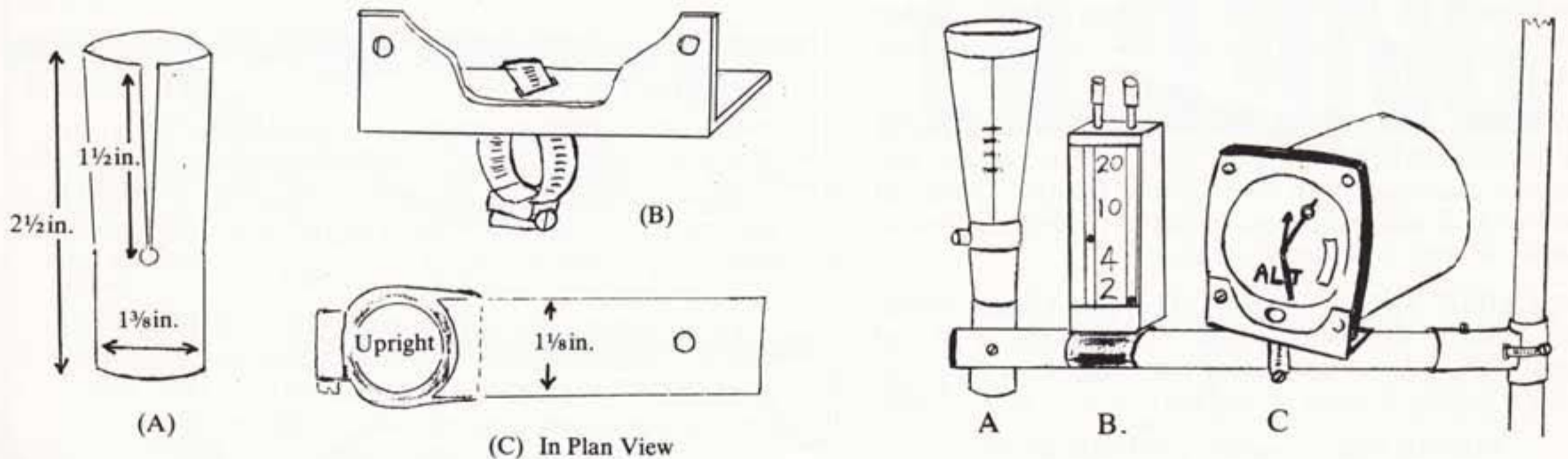
First I cut a 2 1/2 inch length of 1 1/8 inch tube filing one end half round and then cut a slot through both sides of the tube about 3/4 inch from the end so that a hose clip would pass through. (Fig.C.) 1 inch from the other end I drilled a three-sixteenth hole on the top (see later why). The hose clip was now threaded through and round the A frame upright which had a section of thick plastic tube around it.

Next the instrument bar was made out of 1 inch tubing. If this is carefully filed down at one end, it will fit into the 1 1/8 inch tubing. I used bars of different lengths, but have settled for one of 18 inches.

The Ventimeter comes on the front in the 'clean' air. A bracket was made as follows:- Take 2 1/2 inches of 1 3/8 inch tube (as used per inserts inside 1 1/2 inch tube). Drill a 1/4 inch hole 1 inch from the bottom (Fig.A). Cut a slot from the top down to the centre of the hole and using a screwdriver open out the cut until the top of the tube is a taper which will grip the handle of the ventimeter. The further it is pushed in the tighter it will grip. Now bolt this bracket to the end of the bar at right angles.



Mike Collis keeps his eye on his home developed instrument arm. Photo: T.W. White.



You can file a groove in the bracket so it can't turn against the bar when bolted up. Having done this, put it all together and rig your kite. The bar will now point to the nose and be at right angles to the upright of the control frame. Now turn the instrument bar until the Ventimeter is perpendicular to the control bar (at right angles to the round). Mark the lynch tube through that hole in the 1 1/8 inch stub. Take the bar out and drill a hole where marked. Using a spring clip button, as used on some A frames and obtainable from any good

camping shop, for use with tent poles, you now have a lock and locator which allows for easy removal yet stays tight in flight.

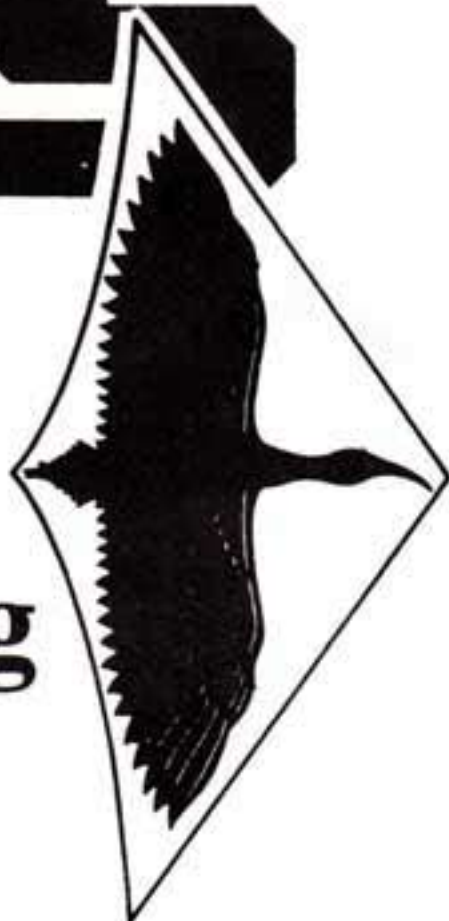
All the other gadgets can be clipped on in tandem. I use a 'spring clip' made from plastic tubing for the light vario but the Altimeter is fixed using an alloy bracket made from a piece of channel, cut down, and a hose clip. I mounted mine facing slightly forward for ease of reading (Fig.B).

The clip on the A frame upright should be tight enough to rip yet still allowing the

instrument bar to move round with same effect in case of impact or before the A frame is folded down. The other end of the instrument bar should be clear of the front rigging wire and a plastic bung put in the end. For prone flying the instruments are level with your eyes so all you do is glance sideways and not back, and to date I have not found the bar to get in the way, even in severe turbulence. A seated pilot would need a shorter bar. ☘

IBIS

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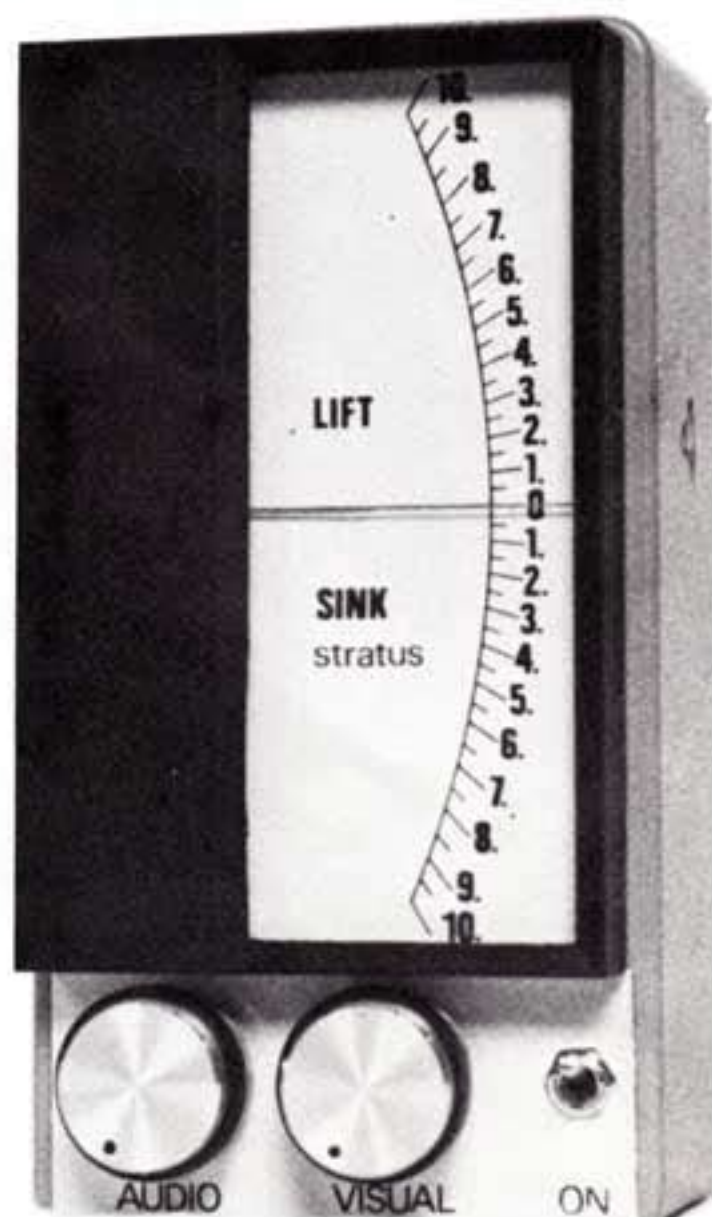
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INFORMATION



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Martin Hunt and David Hunn

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Pelham Books

NORTH WALES SITES

We have recently experienced visiting fliers from other areas using our sites without contacting us first.

Whilst we welcome visitors we feel that liaison between visitors and locals is essential to preserve good relations with landowners, etc. regarding the do's and don'ts at various places.

Visitors wishing to fly sites in North Wales kindly contact this Club first in order to avoid, possibly through ignorance, jeopardising the use of these sites.

The numbers to ring are either:- Ray Hanlon (Sec) 051-652 5918 or John Evans (Site Officer) 051-336 2681

21	Dick Heffer	Birdman
22	Roy Richards	Chargus
23	Dale Clothier	Hiway
24	Bob Wisely	Wills
25	R. Lewis Evans	Birdman
26	Jim Pedruza	Miles Wing
27	Chris Johnson	Hiway
28	Tom Knight	Skyhook
29	Dave Weede	Birdman
30	Steve Hunt	Hiway
31	Tony Beresford	Wasp
32	Jan Ketelaar	Birdman

NEW SECRETARIES

Avon Hang Gliding Club: Tony Tate, 37 Sheephouse Caravan Park, Pill, Bristol BS20 ONL.

WELSH KO TROPHY DRAW

The following draw has been made for the Welsh KO Distance Event to be held on December 10th/11th at Rhossili.

Round 1	Glider	
1	Lester Cruse	Wasp
2	Paddy Munro	Hiway
3	Mark Southall	Birdman
4	Kevin Cowie	Hiway
5	Ian Grayland	Hiway
6	Keith Reynolds	Miles Wing
7	Ashley Doubtfire	Birdman
8	Mick Evans	Wasp
9	Brian Harrison	Hiway
10	Len Gabriels	Skyhooks
11	Ken Messenger	Birdman
12	Mike Robertson	Wills
13	Miles Handley	Miles Wing
14	Rob Goodwin	Chargus
15	Jo. Binns	Chargus
16	Bob Calvert	Hiway
17	Simon Wooton	Chargus
18	Brian Wood	Moyes
19	Johnny Carr	Miles Wing
20	Steve Goad	Wasp

LOST AT MERE

There are still several unclaimed articles which were found during the Long John Championship. If you lost anything at Mere, send a description of the article to: Derek Evans, 2 Lynch Down, Funtington, Chichester, Sussex.

MEMBERSHIP

Members with numbers 5529 — 5691 are due for renewal on the 1st December 1977.

MERE RESULTS

Paul Winteringham of the Mercian Hang Gliding Club was unfortunately left out of the Long John National Championship results table in the October *Wings!* Paul should have been included as equal 7th with Dave Weedon, Lester Cruse, James McSweeney and Mike Ashton. Sorry Paul!

small ads

For your own safety, if you are purchasing a second hand glider, check that it is a registered BHGA model, see it test flown, test fly it, and inspect it thoroughly for damage or wear to critical parts. If in doubt seek advice from an experienced pilot.

Icarus II. New ribs, needs re-covering. #100. Full details from J. Bond, Havant. Tel. 6391 extension 389 (business hours).

Manta Fledgling B. 33ft. span, twist grip controls, very good condition, reasonable offer secures, a bargain. Tel. Bosham (Sussex) 573175 after 7 p.m.

Simpli-Flyer. 18in. span Indoor Flying Model Hang Glider Kits. Easily made and repaired. Instructive and highly entertaining. 40p each or 75p for two including postage. A. Keddie, 18 Belleisle Road, Kircaldy, KY2 6JF, Scotland.

The Welsh Hang Gliding Centre require three competent flyers to train over winter as full time instructors. Good knowledge of theory an advantage. Write giving full particulars to: Gerry Breen, Welsh Hang Gliding Centre, New Road, Crickhowell, South Wales.

McBroom Lynx. 5 months old in perfect condition. White sail with two red panels. £365 o.n.o. Tel. Russell Dyer on Woking 63755 evenings.

For Sale. Falcon 3 with harness. In excellent condition. £365. Tel: 01-692 9767

Variometer Indicator Essential for thermalling, helpful for slope-soaring. US plastic, ball-type. Full instructions provided. Very sensitive. Tested and recommended by Mike Collis. Send £15 to: Ann Collis, 90 Oval Gardens, Gosport, Hants PO12 2RD. Tel. Gosport 21961. Immediate delivery unless sold out!

Cloudbase 20ft. radial. excellent. Complete with prone and seated harnesses and bag. Possibly the best intermediate. £240. Skyhook standard, variable geometry wings. Absolutely as new, with seat and bag. £150. Scarborough 0723 582108.

Phoenix 8. Immaculate condition. With bag. £375. Tel: Graham Driscoll on Telford 55216

Skyhook 3A in excellent condition, professionally built Aug. 76. Red, yellow and black sail. C/W seated harness and bag. £185 ono. Tel: Alan Kempster, 061-437 9291

Lost at Mere Kodak Instamatic camera. Could anybody who found an instamatic camera at the Long John International contact Mrs. Pam White, 8 Shepherds Hill, Buckthorn Weston, Gillingham, Dorset.

Windskite class land yacht, unused. Comes with sail bag, mast top, wheel and adjustable steering. £195 ono. Apply: Mr. D.E. Garwood, 48 Lambert Road, Sprowston, Norwich NR7 8AA

Flexiform Spirit 22ft. Multicolour sail, 4 months' old, perfect condition, £260. Telephone: Workington 3503 (Cumbria)

McBroom Argus 18ft. Sail blue, flies very well for standard kite, soars in fair wind, very solid Excellent learners kite, £85 with bag, ring Dave at Byfleet 52334

Midas C. Excellent condition with E kingpost sleeve and c of g strop. Delivery considered £330 ono. Tel: John Long, Isle of Brewers 537.

Anybody with plans for Mitchell Wing please contact Simon Murphy, Luppitt (Devon) 685

Hiway 200 for sale. Seated with harness and bag, will suit 7-11st. person. Nice flyer and soarer. £160. Contact Mike Gibbings, 398 Pinewood Park, Farnborough, Hants. Tel: Farnborough 513489 after 6 p.m.

Series B Falcon IV almost new — only slightly used, £390. Contact Nick Lawler, Arborfield Cross (0734) 760645 anytime.

For sale: Hi Way 220, large A frame, new keel and cross boom, £120 ono. Tel: 01-946 9007 and ask for Rick.

For Sale: Hi Way Cloudbase Deluxe 21ft. Black Sail. One year old. Immaculate condition. First £250 for quick sale. Tel: Brian Birch, Wolverhampton 754964.

Birdman Grasshopper, four colour nylon sail, airworthy, £50. Phone Dave on Cheltenham 59529

Cloudbase 20ft. in excellent condition. No crashes. With zip up bag. Will teach competent beginner if necessary. £240 ono. 031-663 6278

Wanted SST 100B or Midas E. Must be in good condition. I don't mind travelling if it is a good one. 031-663 6278

Falcon III excellent condition, fully tuned, a real peachy performer. Blue and white sail complete with carrying bag. £300. Also High School, Styrene vario, good nick, £20. Telephone: Howard Rockliffe, Maidenhead 34538.

Sunspot. Very good condition. Red/white sail, £350. Also 20ft. radial Cloudbase, good condition £240 ono. Tel: Scarborough 0723 67905

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Kestrel 'Windover' standard with seated harness and bag. Reason for sale, Wasp Falcon IV required. £100 ono. Tel: Lytchett Minster 3945, Mike Wills.

Wasp 229 B3, orange and blue sail, large A frame. Ideal beginner's kite, £80. Tel: R. Twamley, Coventry 612640.

Breen 19ft. Hi Fli IB. Red anodised kingpost/A Frame. Yellow orange and tan coloured sail. Can be flown prone, seated or dual. £185. Please 'phone Graham Drinkell, Colchester 44422 (work) or 71353 (evenings)

For sale: Hi Way 260 with small frame and bag. Good condition, price £80. Hi Way Cloudbase 21ft. Good condition, price £210. Tel: Charles Viner 0243-512 310 during working hours.

SST 100B. 12 months' old. Excellent condition, no accidents. Recently checked by Hawksworth. Seated harness and bag. £375. Mike Haworth, 273 Haslingden Old Road, Rawtenstall, Lancs. Tel: Rawtenstall (07062) 5808 evenings, 4635 days.

For sale: SST 100C in dark blue/ light blue and white, complete with spare control frame sides and outriggers. Must be seen. Bargain at £400. E. Gibson, 7 South Row, Isabella Coll, Blyth, Northumberland. Tel: Cramlington 712220

Phoenix VI in excellent condition. This kite has never been pranged, although it has done some exceptionally good ridge soaring and thermalling. A real bargain at £300. 'Phone Paul Bridges, Linley (Shropshire) 322.

Modified Gulp 130B. Goes very well. Supine harness included. Any trial. £200 ono. Must sell. Telephone: Mervyn, Crediton 3262 (Office hours).

Hi Way 240. Red and White sail, seated harness, zip bag. Good condition, a very stable machine. 'Phone Sid Evans, Sutton Coldfield (021 353) 8042

BIRDMAN FIREBIRD Mk II 19 x 16. Excellent condition. Sail colours Brown, orange and yellow. 4 battens, adjustable keel camber and detlexor wires. Complete with bag and harness. £245. ono. 'Phone Colchester 79548

Cobra 188. 1 year old. Red and white sail, seated harness, in good condition. £150 ono. 'Phone Graeme Baird, 0480 6882

Beautiful maintained Falcon 3, less than one year old, with black Wasp prone harness. Contact Duggie Short on 0946-830-830255. (Cumbria).

Small ads must be limited to 35 words. Non BHGA members or commercial small ads will be accepted at a cost of 5p per word. Send (a minimum of 20 words) to the commercial editor together with a cheque or postal order for the correct amount crossed and made payable to the British Hang Gliding Association. Copy date: 18th of month preceding publication.

If you want genuine performance with effortless and forgiving handling try flying Dave Roberts' record setting, pulley special, Phoenix 8 Jnr. For sale only because he's overweight for this exceptional glider. Ideal for 9-11 stone pilot. £500. Tel. 079-78 416.

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"HANG GLIDING" — by Bob Mackay. An informative book mainly for those who have just entered the sport (Plus P. & P. if only ordering this item)	50p
Log Book	£1.00
The BHGA leaflet "An introduction to Hang Gliding" (including a list of major clubs)	Free to Members
List of British Hang Glider Manufacturers	Free to Members
List of Schools on Current Register	Free to Members
(Send s.a.e. if only ordering free items)	

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