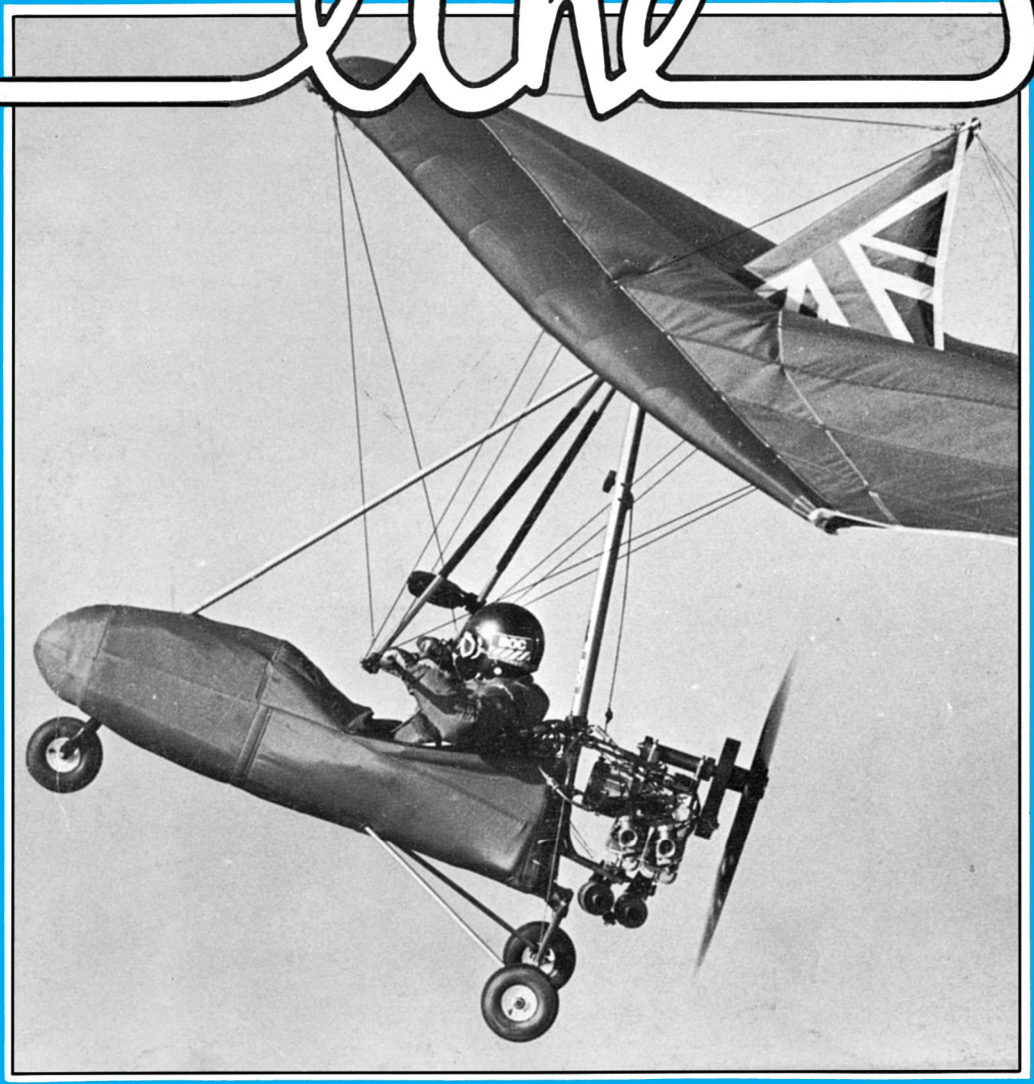
FLIGHT line

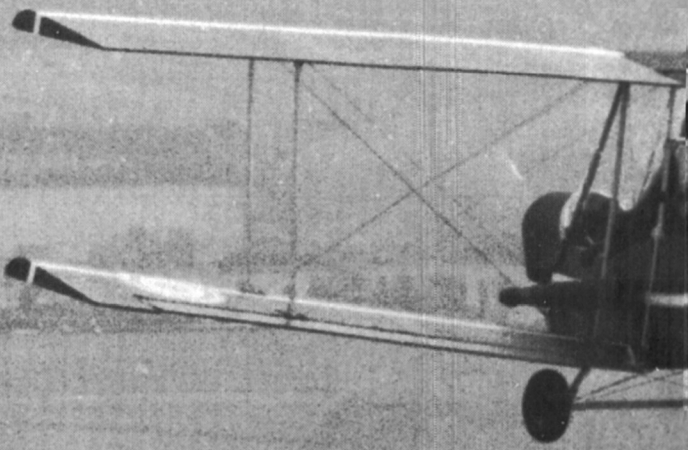


Magazine of the BMAA

1 April 1983

MICRO BIPLANE AVIATION

Tiger Cub 440



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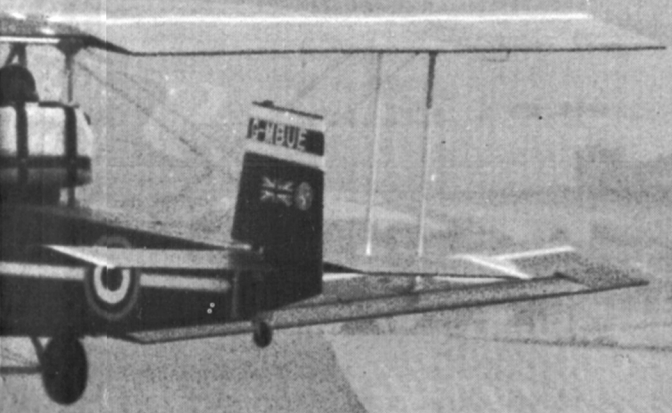

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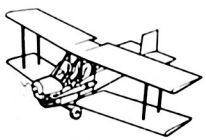

FLIGHTline

Published by the BMAA

1 April 1983

COVER: Bob Calvert setting off on his record-breaking flight to over 19,000ft (5800m). He's not been having things all his own way though, as you can read on p20.

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Chairman's airwaves

By Graham Andrews

Airworthiness Announced

On 9 March (the day that these airwaves were written) the CAA published its code of airworthiness for microlights. The code will form section S of the British Civil Airworthiness Requirements (BCARs). The Technical Committee have been closely involved with the production of these new regulations and there has been basic agreement over their content and timing – we all felt that some code must be published as soon as possible to help prevent accidents like the series last year.

We are in the throes of setting up a BMAA system of inspecting and testing which will enable us to recommend to CAA that a Permit to Fly can be issued or renewed. (The Certificate of Airworthiness level has not yet been decided and is only necessary when flying for hire and reward). To do this CAA has funded our full budget of £30,000 and Dick Stratton has agreed to start the ball rolling for us.

There will be much more detail given in the next issue and all manufacturers and importers will be given information direct. However we can pass on the timescale for implementation:

1 Jul 83 – All new types of aircraft subsequent to this date will need to obtain a Permit to Fly before being sold.
1 Jan 84 – All new aircraft of types existing before 1 Jul 83 will also need to obtain a Permit to Fly.
1 Jul 84 – All microlight aircraft will need a Permit to Fly.

There is one exception to all the above: aircraft under 70kg remain exempt from airworthiness regulations.

Clubbing Together

We are beginning to see more microlight clubs coming into existence. With all the pressures on us it does make sense for those in a reasonable catchment area to club together. Collectively you can do so much more than as a scattering of individuals. Let me give you some examples: flying sites can be sought and used on a rotational basis so that there is never too much nuisance; instruction can be obtained much more readily; deals can often be arranged over insurance; one member of a club may be able to offer hangarage; the club can appoint officers to look after the little chores that the individual will often neglect; cowboys can be identified and pressure applied – the club will be much more aware of what is to be lost by irresponsible behaviour.

Judging by reports the easiest way to start a club (there are of course many already) is to advertise a meeting of microlight enthusiasts at a local hostelry, apply to BMAA for the starter pack and off you go!

Happy Landings.

Post Haste!

Bob Schofield and Bob Bailey have concluded the first major sponsorship deal for a British microlight event.

The *Yorkshire Post* newspaper is putting up at least £1000 prize money for a Leeds-Bridlington microlight rally, provisionally scheduled for 7 August. Full details of the event have still to be worked out, but it is likely that there will be three solo classes for weight-shift, hybrid and three axis machines, plus a separate class for two-seaters.

The event will start from Templenewsam House, a stately home near Leeds, and then proceed to York Racecourse. The next stop will be at Castle Howard near Malton, followed by Sledmere House at Sledmere near Driffield — another stately home. The final leg will take pilots from there into Bridlington, to a site yet to be arranged.

Bob Schofield, who works for the *Yorkshire Post,* says that only a modest entry fee will be charged, and that the emphasis will be on good piloting and efficient flying, rather than pure speed. The formula has not yet been finalised, but is likely to include elements such as spot landings and fuel consumption per hp.

A maximum of 50 entries will be permitted, and anyone interested should write to: Bob Schofield, Yorkshire Post, Wellington Street, Leeds LS1 1RF.

Whistles in

The Event of the Year!

The Lands End to John O'Groats rally is now a reality. The date has been fixed as 12 – 18 June and clubs en route are being contacted by BMAA to help with landing sites and other local facilities.

Because of the Manchester-Liverpool TMA and the fact that microlights are banned from the low level corridor under it, the rally will use an east coast route. It will be run in four classes — solo and dual seat weight-shift, and solo and dual seat three-axis — and will carry substantial prize money. There will be no entrance fee, but to qualify for entry each competitor must be able to produce promises of sponsorship of 10p per mile completed, all proceeds to go to a charity yet to be named.

The event is likely to attract machines of widely varying speed potential, so to avoid the first plane arriving days before the last, the rally will be run in daily legs, with pilots starting off at 1min intervals on the morning of each day. This system also maximises press coverage, because all the machines will be at a given point within a few hours of each other, and minimises any nuisance to the public.

For full details please send an SAE to John Wincott at 162 Leicester Road, Narborough, Leicester LE9 5BE (tel 0533 863310).

Airworthiness Regs Announced

As *Flightline* was going to press the CAA issued the text of its airworthiness requirements, plus a proposed timetable for implementation. The timetable is explained in *Chairman's airwaves*; a technical appraisal will appear in the next issue.

Hiway, Soleair Cease Trading

The past winter has been an especially tough one for the microlight industry, with the usual seasonal downturn combining with public worries about safety, buyers' worries about airworthiness requirements and the general slow-down brought about by the introduction of licensing.

Two casualties of these problems have been Hiway and Soleair. Hiway's 125 Hiro engined trike proved out of step with the trend to larger engines, while Soleair's Phoenix failed to find any buyers.

Of the two companies, Hiway was the larger and its loss will have the greater impact, particularly as it was one of Britain's longest established manufacturers. Its Valmet-engined Skytrike was the forerunner of dozens of other trike designs and laid the foundations of the industry in this country. Hiway boss John levers was not available for comment as *Flightline* went to press, but it is certain that the trend to larger engines and the less than rapturous reception given to Hiway's new Explorer hang-glider were major factors contributing to the firm's demise.

the wires

New Scottish Airway

A new airway linking the Scottish Terminal Area, which contains Edinburgh and Glasgow airports, with Aberdeen airport, was introduced by National Air Traffic Services on 17 March. Details are available from the CAA at CAA House, 45/49 Kingsway, London WC2B 6TE (tel 01-379 7311).

Grand Prix Pilots Wanted

At the time of going to press there were still places available for British pilots in the Grand Prix de France, including three as works pilots for French machines whose manufacturers find the French entries already oversubscribed. Anyone interested should contact Bernard or Patricia Lamy at the address in *Contact*.

The Buzz at Hornet . . .

There are persistent rumours emanating from Hornet that the Bradford-based company will shortly introduce a radical new all-enclosed trike, to supplement its existing range of machines. Sounds like just the thing for Yorkshire winters!

Licensing Improvements

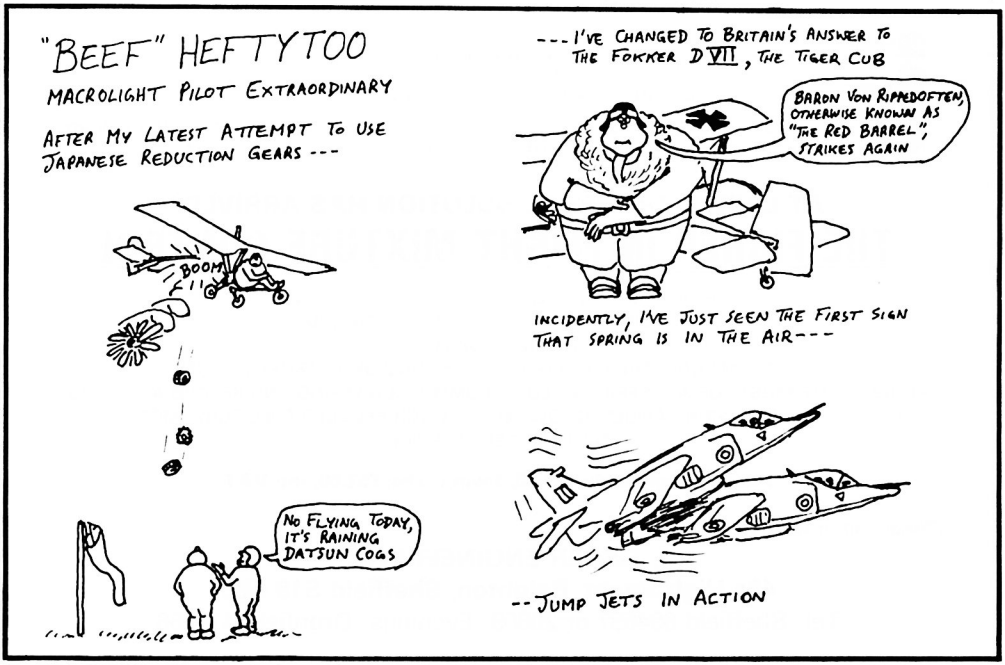
BMAA has negotiated important improvements in the examinations for the Group D licence. For full details turn to p62.

Norman Burr

Berent sets off: *As previewed in the last issue, Philip Berent has now set off on his journey to Zimbabwe by Pathfinder: progress report next issue.*

Biggin Hill Confirmed

Biggin Hill has been confirmed as the starting point for the 1983 London-Paris, but that will not be the year's first showing for microlights in the area, because the organisers of the Biggin Hill air fair on 14 – 15 May are working with BMAA to organise a 'microlight flying circus' spot in the show. Anyone interested in participating in this should contact Gerry Breen on 060872 413 or Ron Bott on 065477 235.



Letters

The Great Debate 1

Sir, As one of the very few manufacturers who has resisted the temptation to go for more and more power, I read *Is it all getting away from us?* with a great deal of interest.

I have always felt that the ability of some microlight pilots would not be good enough to allow the uncontrolled use of power, in excess of that which would give a modest performance. I would *not* agree, however, that it is only the designers and developers who are at fault.

Competition between manufacturers, especially in these very thin times, made it inevitable that someone would bring out a more powerful trike.

In the absence of any manufacturers' organisation, if one ignores MAMTA as one must (in any case the problem started before MAMTA existed), there is nothing to prevent this happening. Others *have* to follow for sheer survival. Manufacturers who try to be responsible can go out of business whilst the less responsible may prosper. (I am in the slightly advantageous position that my survival does not depend on selling umpteen trikes a week. If it did I might have to join the rat-race).

It has been obvious for a very long time that this would happen. Who could, or should, have pre-

CAA — pilots galore!

By Peter Lovegrove

Alec O'Connor, who is director-general of the Operations Division of the CAA, has written to rebuke me for saying that the CAA lacked practising pilots. To me, this is a 'bad news, good news' letter: 'bad news' in that he has metaphorically belted me smartly across the knuckles, and I would therefore prefer to keep quiet about his letter! But 'good news' in that it shows just how very active is the CAA's interest in our BMAA movement, with its staff flying microlights (and sundry other less interesting airborne hardware!) and even its D-G (Operations) taking a keen interest in us.

So when you hear people say that the CAA is not really concerned with us, except to lumber us with legislation, you will know how untrue that bald statement is. Alec's letter reads, in part, as follows: —

To put the record straight, here are some facts. Firstly, we have some 60 inspectors and flight examiners in this division who are required to hold current licences and type ratings (on anything from the B747 to the Cessna 150) in order to do their job. Most of them don't get involved professionally with microlights but one, John Murphy, has flown five different types already. *Getting down to the rest of us, I'm sure that Dick Nesbitt-Dufort could put you right about his colleagues in Airworthiness Division. At least 35 of them are active pilots, including the chief surveyor (H A C 'Tommy' Thompson) who instructs on light aeroplanes in his spare time, Dick Nesbitt-Dufort, current British Precision Flying Champion, and John Chaplin, the director-general.*

In my Operations Division, the people with whom the BMAA have been dealing are in the Flight-Crew Licensing Directorate. There, the director, Mike Langman, has only recently decided not to continue flying after a career of 42 years since his first solo in 1941. His deputy, Terry Gill, is an experienced test-pilot who instructs at a club in his own time (because he enjoys it). Sean Hennessy, the head of the Private Licensing Section, has been involved so long in private flying that he can produce a Royal Aero Club Observer's Certificate (the equivalent of today's PPL Examiner's authorisation) dating back to 1957, as well as a current PPL, while Rufus Heald and Glyn Morgan-Davies in the section are both current light-aeroplane flying instructors. I'm sure I needn't continue the list, if only because I could cover several more pages, but I should perhaps remind you that when I got involved in licensing gyroplane pilots in 1972 I went to Campbell's to do the course, so that I knew what the problems were. (Alec did indeed do this and I greatly respected him for his approach to his job — PCL). *The same spirit still prevails and I'll finish the catalogue with Mike Kemp, one of our licence examination people, who is a former UK Precision-Flying Champion (and top UK contender in the World Championships in 1979) and Derek Whitehead of our Operations Planning Directorate, once Blackburn's chief test pilot who, off his own bat, has completed the course at Breen Aviation and sampled several different microlight types.*

I hope you'll now agree that we are not entirely without flying expertise. (Point emphatically taken! — PCL). *You may well say that if that's so, we ought to see entirely eye-to-eye with the BMAA, which is undoubtedly a voice of experience in the microlight world. I would be the first to admit that one doesn't necessarily get everything right at the beginning but we are looking at ways of developing the licensing system.*

Without making too sharp a point of it, I would say that any development needed in regulation is dwarfed by what ought to be done by the people who have been building microlights, at least if our experience is anything to go by. On two separate first flights, one of our people experienced a propellor drive failure (and on the same day witnessed an engine failure) while another had an engine failure. When one bears in mind that the average private pilot can expect to go through his whole life without experiencing either of these events one can feel some real concern about the amount of care and expertise which has been put into some of the designs.

vented it? Probably the BMAA. Certainly, no body existed, except the CAA, which could have laid down the law. And I for one would not wish to encourage the CAA to impose yet more regulations upon us.

Two years ago, I asked BMAA to give a ruling or guidance on what sort of horsepower should be allowed to what grade of pilot as two-seaters were about to hit the market. We had one which, with 28hp max, gave an adequate dual performance and I was worried that these sort of machines would eventually find their way into the hands of totally unqualified people, who could then start to take their friends or wives up. I was pestered by people who wanted to do just that, even before they could fly. Needless to say, I sold none to those sort of people but the second-hand market eventually defeats all manufacturers' attempts to regulate who shall have what, just as it has always done in hang-gliding.

The situation now is much worse than I dreamed of. Now, 45hp engines are being supplied on brand-new trikes already fitted with dual seats, and I am fairly certain that some of these are being sold directly to relatively inexperienced pilots without any attempt to control their use. *(This is undoubtedly true, and indicates that, whilst the BMAA may make strong suggestions, it cannot really enforce them, even today — PCL).*

Power packs of that size are also being sold to Tom, Dick or Harry to let them update their older trike.

I feel that to say that the problem is created solely by manufacturers, etc, and that the BMAA is blameless *(I certainly don't feel the BMAA is blameless, but it isn't solely at fault — PCL)* is a bit like saying that the government of a country without laws or courts is not responsible for any crime wave and that burglars should regulate themselves.

Whilst the BMAA is not *forcing* development along unsatisfactory lines, it is not yet *controlling* it very much, either. Until it does, everything will develop in every possible direction.

It may be too late. It would be a brave committee which ruled that all the overpowered machines now in use should no longer be used.

Whilst it may be perfectly alright for manufacturers to be allowed to experiment with all sorts of things, it must be the BMAA's or the CAA's responsibility eventually to decide if any restrictions should be put on the use of the end product.

Some trikes now have enough thrust — nearly 300 lb (136kg) — to support the weight of trike and pilot in a deep-stalled attitude, probably 60° nose-up, and sustain it, more so with a light pilot with weak arms.

What happens: (a) If the pilot does manage to get the nose down with the power on, or (b) the engine dies! I reckon, in both cases, it will rotate quickly enough to tumble. If a tail-slide started after an engine cut, even for a very short distance, the resulting 'flick' as it goes nose-down would certainly tumble it.

For Heaven's sake, let's stop it now, before some clown starts selling even bigger engines, then making it necessary to put limits on the amount of power an experienced pilot can have.

Otherwise, it will certainly get away from us permanently.

Finally, I ought to make it clear that my experience is with trikes and weight-shift control. My remarks do not necessarily apply to three-axis machines. They *may* apply but that is for the three-axis experts to say.

Len Gabriels
Skyhook Sailwings

The Great Debate 2

Sir, I have recently become a member of the BMAA and having read the January issue of *Flightline* am astounded at the progress of your magazine and the microlight scene as a whole in the last six months. Congratulations! This brings me to Peter Lovegrove's article *Is it all getting away from us?* There is surely no need to be saddened, for progress in the form of power, speed and efficiency is not only inevitable but essential, and if the sport had remained confined to the 'intrepid few' there would be no BMAA. Neither would there be the support for new businesses, clubs and schools.

My own ambition is to own a slow flying, safe and easily handled machine such as the Eagle, and this type of microlight will always have appeal no matter how fast others become. We need the innovation and technological advance associated with progress to improve all types of craft. One only has to look at motorcycles to realise that today's incredibly efficient and well designed mopeds are a product of R&D invested in monstrous beasts such as the Honda CBX, Yamaha 1300 XS (appropriately named) and others. Having seen horrors such as control cable sheath 'located' on tubing with a hose clamp (the well known Scorpion), whose sting incidentally, was in the performance *and* the price for not a few, we are very much in need of continued R&D spending at the frontline. I at any rate will be first in the queue for the well conceived, safe and slow airborne moped.

So, Mr Lovegrove, as Technical Editor of our blossoming organ, please concentrate on where we are going and not so much where we have been!

John Cooper
99 Oakhill Road
Sevenoaks, Kent

The Great Debate 3

Sir, Regarding Peter Lovegrove's recent article *Is it all getting away from us?* — here is one member, at any rate, who entirely agrees with him, so much so that I have just sold my Pterodactyl (at an awful

depreciation!) and am going to switch to a trike of one kind or another. For one thing, the rigging time and lugging around that engine weight finished up taking all the joy out of it. I found that to hold a 430cc Cuyuna in mid-air, whilst trying to slip retaining bolts home, just about wrecked my 63-year old back every time I tried it. *(If you go for a trike, you should go for a modestly powered single-seater then — PCL).*

The way the macro-lights are going, *any* kind of microlight competition or race becomes a farce. How long, I wonder, before someone fits a mini-turbojet to one? *(It's already been tried in the States with a small pulse-jet! — PCL).*

A suggestion: How about a free BMAA car sticker sent out with the magazine? It could be worded so as to entice new members, something like 'I'm a Microlight pilot; come and join us' printed round the central BMAA logo.

Donald Gurrey
Costers Mill, West Lavington
Midhurst, W Sussex

No Power Please

Sir, I have been asked to write to you on behalf of the committee of the Southern Hang Gliding Club, to explain our local relationships between motorised and free-flight on the South Downs.

This arose out of our feelings that there are probably many microlight pilots now flying who have come into the sport without any prior contact with our pure free-flying. As such they are unlikely to be aware of all our flying sites and even less so of the delicate arrangements with land-owners and local authorities on some of them.

Basically we have an arrangement with local pilots that no microlight will be flown from or in close vicinity to any hang gliding sites. This is so as not to antagonise local residents, farmers (and their stock), land-owners and authorities who on some sites live with us under protest. Whilst we depend on our hill sites, microlights don't. If we upset any of the above parties we could lose the use of a site, because lay-people tend to lump us all together as far as organisations go.

Perhaps, through your magazine, your members will appreciate the above and help us all protect our mutual interests.

For your guidance the sites involved along the South Downs are:

Mill Hill, near Shoreham
Devils Dyke
Ditchling Beacon
Firle
Newhaven Cliffs (unlikely any of you would want to fly there!)
Beachy Head (very delicate at present)
Mount Caburn, near Lewes
Beddingham
High and Over, near Alfriston

Happy landings.

Adrian Whitmarsh, SHGC
1 Maple Close
Horsham
W Sussex

Airworthiness Not Another Expensive Caper

Sir, My name is Tony Hughes and I am now in my fifth year as an active pilot. I have been a hang gliding school proprietor for two years and a micro-light school proprietor for six months.

Having previously flown fixed wing in the ATC and RAF I feel that I have a good standpoint to comment on the state of our organisation as it stands.

I feel we have allowed the CAA too much leeway and have not formulated ideas and attitudes in a concrete way. Naively expecting the CAA to give us power has been another mistake. Generally speaking, power is something that you take. This is done by taking the initiative.

So let us please formulate a policy on airworthiness as soon as possible. I would suggest the following format.

Most responsible pilots like to know how many hours their aircraft has flown. They also should have a servicing schedule to follow for minor servicing. This could take the form of a plastic card with a number of headings to be ticked off at regular intervals. The card could be inserted into the new pilot log book. I say new because the present one is inadequate in that it is too small and does not have enough information inside.

For trikes one would need one card for the wing and one for the trike. These would be produced by the manufacturers instead of their present rigging instructions, which could be included on the back. These cards should be plastic coated so as to be taken out to the aircraft without getting worn out.

As far as C of A is concerned, this should be carried out by an appointed knowledgeable inspector after a certain number of hours have been completed, say 200h, and certainly not on a yearly basis.

At the same time the log book can be stamped and the inspector can follow a more detailed check list supplied by the BMAA airworthiness officer.

The main aim of airworthiness is air safety. It does nothing to further microlighting to have an elaborate scheme for the amusement of the CAA and at our expense.

Wiltshire Hang Gliding Centre
170 High Street, Burbage
Marlborough, Wilts

Yet More About Tubes!

Sir, Re the item *Handy Hint No 4* in the January issue, may I set the record straight? The paper method for marking holes in tubes was first invented by Paul Maratos, who was the founder of Flexiform Sky Sails. All the original Spirit and Vector hang-

glider kits, as well as all our own trike kits, have had this method explained in order to help builders. It does work very well indeed!

John Hudson
Mainair Sports

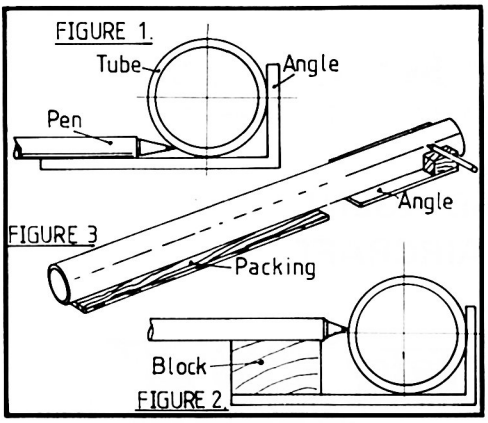
Peter Lovegrove writes: Excellent! If that information comes with the kit, then the latter is even better.

Incidentally, Dave Simpson has suggested yet another way to mark tubes prior to drilling, using a length of angle. One flange of this angle should be taller than the radius of the tube to be marked whilst ideally, the other flange should be considerably larger (Fig 1).

The tube is placed in the angle and a pen or pencil is drawn along the angle to mark it. Do not *use a scriber. For greater accuracy of marking — ie a sharper, less wobbly line — the pen should be held on a small block (Fig 2).*

Since such an angle may not be cheap, you may only have a short length available. If so, support the tube on pieces of wood of the same thickness as the flanges of the angle, to prevent the tube bowing (Fig 3). Then move the angle along, being careful to start the next section of line exactly where the previous one finished.

If you want to put a line on diametrically opposite to the first one, or at 90° to it, use the paper method to locate the second line, then draw it in with the angle again.



Unidentified Flying Objects

Recent talk about strange lights in the Morecambe night sky has made me think of just how like a UFO a microlight would seem if viewed at night from the ground!

With this in mind I was prompted to look into the legality of night flying and I came up with some interesting results.

As you know the criteria for determining whether flight is conducted on VFR or IFR are visibility and separation from cloud. If these criteria become less than certain values (as laid down in *Cap 85*) then flight must switch from VFR to IFR.

Until recently it was felt that you couldn't fly on IFR without either an IMC rating or an instrument rating but this I have discovered is not correct. Provided that you can stay in sight of the surface and clear of cloud you can continue to fly on IFR without either of the above ratings. At night these criteria are just the same ie visibility — if you can see the lights of obstacles or other aircraft; and separation from cloud — clear of cloud, in sight of the surface (town lights).

So what it boils down to is that to fly at night you must fly on IFR. Therefore:

(a) You *cannot* fly at night in controlled airspace without an instrument rating.

(b) You *can* fly at night outside controlled airspace below 3000ft amsl (920m) *provided* you stay in sight of the surface and clear of cloud.

(c) You *can* fly at night outside controlled airspace above 3000ft amsl *provided* you remain clear of cloud, in sight of the surface with a minimum visibility of 1nm (1.85km) *and* fly in accordance with the quadrantal rule.

(d) You *cannot* fly anywhere at night with a passenger *unless:*
   1 outside controlled airspace you have a night rating,
   2 inside controlled airspace you have an instrument rating.

(e) In all the above cases you *must* have the *correct* lighting (red, green and white) shining through the correct angles and of a minimum intensity of 5 candella red and green and 3 candella white.

Knowing what I know about the adverse effects of sticking weights on the wing tips to the handling of a hang glider (cameras or lights) I can tell you now that I don't think that I shall be doing much night flying.

Graham Hobson
8 Brencon Ave
Brooklands
Manchester

A Cautionary Tale

I don't know if Rudolf became jealous, but whilst playing Santa last Christmas, I took off only to find as I climbed out that my 330 Robin engine stayed parallel to the ground. What happened was that the bottom bolt holding my engine on to the vertical strut had sheared. On my trike it would appear the engine was resting on one of the threads of the bolt. I should mention that I have logged up 120h flying. However, I would recommend that you check this bolt regularly and also wire the bolt onto the vertical strut. (Also tie your beard down).

Tony Wells
7 Bury Lane
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* LOAD TEST — 1809.5kg — 3990 lb. Unladen weight of Austin Metro 1600 lb.

Norman Burr

Calvert has

According to the record books, Bob Calvert broke his own world altitude record for solo microlights on 19 February. Unofficially though, that earlier record (16,168ft — 4892m — over Blackburn on 27 January last year) had already been broken 16 days earlier by Geoff Ball in the Mainair Tri-Flyer Challenger. MARGARET CRAVEN, who recently interviewed Geoff, has the Mainair story (see box), while BOB CALVERT gives details of his own exploits.

Preparation

As the '82 competition hang-gliding season ended, I had the winter months available to plan some microlight record attempts. I was originally involved with the Mainair Tri-Flyer Challenger, but Mainair agreed to let Geoff Ball, who had done a lot of work on the machine, be their works pilot. Therefore I negotiated assistance from Ultrasports, Southdown Sailwings, Nicklow Engineering, O-Zee and British Oxygen.

The trike was purpose built by Ultrasports, the design concept being to achieve minimum weight —

Asadour Guzelian

done it again!

a different approach from Mainair, which chose minimum drag. The original framework was a standard Tripacer 250 with fabric pod, the components being redesigned where necessary to reduce weight and drag. Graham Slater tested the structure by dropping the frame and himself from the roof of Ultrasports!

The power plant supplied by Nicklow Engineering was a specially prepared Fuji Robin *(consisting basically of a 440 crankcase with two 250 barrels, giving 500cc — Ed)*. Thanks to Nick's considerable experience with the Robin, the power output was considerably more than the standard 440!

For a wing, I chose the Southdown Sailwings Lightning DS.

Flying

On the week preceding the attempt, I flew to 11,000, 8,000 and 18,000ft (3360, 2440 and 5500m) on consecutive evenings, due to varying success in experimenting with the carburettors! On the third of these trials, the climb rate at 18,000ft was 300 – 700ft/min (1.5 – 3.6m/s) and it was only darkness that brought me down. After all the preparation, I was at last rewarded with three unbelievable sunsets and the prospect of a new world record.

Saturday 19 February was absolutely perfect: clear blue skies, no wind and 1040mb high pressure. By 7.30am I was rigging in glorious sunshine on Middleton Sands on the Lancashire coast near Morecambe, and at 9.30 I was ready — barograph, oxygen and instruments all tested. Once suitably dressed I strapped in and started the engine, which fortunately fired first time. Nevertheless, with all my cold-weather gear on, starting was still hot work!

Acceleration to flying speed was as impressive as ever and I climbed initially with 45° bank, 45° climb. With a power to weight ratio of 0.8, this was necessary in order to see where I was going. It keeps the airspeed lower than a straight climb at full speed and an angle of about 60°. At first digits on the altimeter were going round like a fruit machine but, although there were no signs of wave, once above 10,000ft (3000m) I deliberately climbed at less than 1000ft/min (5m/s) so that the Ball vario would map out any variations in lift and sink. I positioned myself west of the Amber 1 airway and traversed north-south, orbiting whenever the vario 'peaked out'. It became very apparent that there was virtually no wave activity.

The view was remarkable. To the west I could see Ireland, to the north the Scottish Highlands, the south Snowdonia and the east the coast. The Lake

continued overleaf

So nearly there

It was common knowledge that Geoff and Bob were both after the altitude record, and all of us in the North West were watching with great interest this duel between the two local aces. When we heard on 3 February that Geoff had reached 16,720ft (5100m), it seemed that Calvert had been well and truly deposed from his throne. But it was not to be . . .

After months and months of work on the Tri-Flyer Challenger, and some frustrating delays due to bad weather, a suitable day finally arrived. Pressure was high, which at that time of year means there is a good chance of finding wave lift on the edge of the high-pressure system, and wind was light. It was, however, very cold.

To combat the low temperatures, Geoff was wrapped up in full-face helmet, thermal underwear including socks, silk-lined gloves, overgloves, handlebar mits and snow boots. Like Calvert, he wore an O-Zee flying suit over his normal clothing.

The Challenger is a very different machine from Bob Calvert's lightweight Tripacer. Bob's philosophy was to go for maximum power and minimum weight, whereas the Mainair machine is designed for low drag and is considerably more sophisticated. It uses the same Lightning DS wing as the Tripacer, but underneath is a fully instrumented fibreglass cockpit, incorporating CHT and ETG gauges, tachometer, airspeed indicator, Ball 651 altimeter/vario, barograph and oxygen supply.

Power comes from a 440 Robin with variable main jets, which allow the mixture to be adjusted in flight to compensate for pressure changes at altitude. A special prop is fitted; designed for maximum efficiency at high altitudes, it can only attain 5800rpm at ground level, but comes into its own in rarified air, where it can reach 6800rpm.

Geoff takes up the story: "I took off from Milnrow and flew north into Yorkshire. When I was clear of airways I started to climb. I reached 10,000ft (3000m) very easily — it was a straightforward climb under power — and noticed that by this altitude it was already −20°C. Around 10 – 15mile (16 – 24km) south of Settle I contacted wave and found that it was very smooth, with no roughness in the air at all.

continued overleaf

Bob Calvert (continued)

District and Cross Fell, covered in snow, were remarkably clear.

Flying at altitude is very relaxed, the air being generally smooth and the workload low. As the altimeter notched up 16,000ft (4900m), I started to concentrate harder, watching the instruments carefully and periodically checking the oxygen system.

Although the outside air temperature must have been below −20°C, I was still completely warm. I don't carry an outside air temperature gauge because psychologically it would make me feel colder.

As 19,250ft (5900m) indicated on the remaining digits of the altimeter (it had been affected by cold), the engine ran out of fuel and I set off on a 30mile cross-country triangle! Even flying quickly it took 40min to come down, giving me a flight time of a little under 2h. As I approached Middleton, Alan Parkinson came alongside deadstick after going to 9250ft (2820m) on his 250 Tripacer/Typhoon.

Although disappointed at not going higher, I was very aware of the potential still remaining from the machine. At 19,000ft (5800m) I could only fly on ⅝ throttle due to carburettion problems, while the reduction drive still needs to be matched properly — it is over-geared at present.

For all that, it had not been a bad morning's flying. We took a break for lunch at a remarkable little pub which gets cut off by high tide and hence has unusual opening hours.

Back at Middleton I prepared for another flight, this time with 14 year-old ace co-pilot Lisa Coar *(whose dad Reg is also a local microlighter — Ed).* Lisa was an obvious choice, being slightly built and a competent pilot. Strapping in was hilarious and, although we had previously tried all possible seating arrangements, there was still confusion as to where all the arms and legs were to go. For my part, I decided to minimise the all-up weight and removed one scarf, two socks and one balaclava.

Once ready, observer John Bridge called for absolute silence and we all patiently listened. Listeners were lifted shoulder high, and then to our relief we all heard it . . . tick, tock, tick, tock . . . the barograph zipped inside the fin was still functioning perfectly. I wasn't altogether surprised, as I had earlier checked it by being manhandled high enough to put my head inside the fin, but after Geoff Ball's barograph problems we weren't taking any chances.

Technically the dual flight was to be far more interesting than the solo. The initial climb out was a model 45°, and even I was surprised how little difference the extra weight made. As it was now mid-afternoon and clear blue, there initially appeared to be no lift available, but as we flew south I could not believe my luck: the northerly fells adjacent to the Trough of Bowland were in strong sunlight and light wind shadow. This created a pseudo sea-breeze marked by a distinctive line of haze.

The haze marking the front reminded me of many other sea-breeze flights in the same area except that

Geoff Ball (continued)

This made me climb a lot quicker and I soon reached 12,800ft (3900m).

"I could see other wave bars further along my course, so as I thought I had reached the top of that particular wave, off I went through the back of it, only to find myself in sink! I dropped to 12,200ft (3720m) before I contacted the next wave bar and started to climb again.

"This one took me up to 13,500 – 14,000ft (4120 – 4260m), before I topped out. This time the sink was not as bad and I maintained altitude until I contacted the next wave. By this time I was 5mile (8km) south of Settle and had ceased to go forward — I was climbing vertically. On leaving this third bar, I noticed that the temperature had dropped to −25°C.

"The next contact took me up at a good 500ft/min (2.5m/s), to a height of 16,720ft on the altimeter. At this point, I had to make a decision: to come down because of the cold. My visor was icing up on the inside, and as I opened it up to scrape off the ice I noticed that the temperature was now down to −35°C. I didn't have a chance to see much else though — my eyes started to water immediately, the icy blast froze the tears in the corners of my eyes and I had to shut them quickly. Inside thirty seconds I had shut the visor again, but that was enough to give me frost bite on my cheeks. I had also been having trouble with a draught under the bottom of my helmet, which had been affecting the underneath of my chin.

"At this point I was flying backwards in the strong upper winds, which were blowing at around 48mph (77kph) compared to my airspeed of 40mph (64kph). My main concern now was to get down as quickly as possible, as my hands and feet were now very, very cold. With the bar pulled in and the engine idling, I could descend at 600 – 1000ft/min (3 – 5m/s), but it still seemed like a long wait. By the time I got down to 1500ft (460m), I was 5mile (8km) short of Oldham, and at that altitude I flew back to Milnrow".

Geoff had a tremendous view. "I could see the whole of the Menai Straits and the biggest part of Anglesey, as well as the whole of Morecambe Bay and the Lake District mountains. North Yorkshire was spread out in front of me, while

the orientation was 270° round from the normal sea breeze. We remained in this lift almost continuously up to 12,800ft (3900m) and as we peaked out we progressed north and immediately descended. Soon, after about 10mile (16km), I cut the engine. Most of the time Lisa was doing the flying and it seemed odd to be sat there with nothing to do. As a Boeing 747 passed on its way to America, we waved but I suspect we were too far away for him to see us. In the peace and quiet we joked about what time the stewardess would bring lunch and if the film would be any good.

At 8000ft Lisa had trouble clearing her ears, so we restarted the engine and descended at 200ft/min (1m/s) until she cured the problems. The landing was as smooth as the first (well, it has only got 1 inch (25mm) back axles!) and it was a relief to get out and have a rest from flying *(never thought I'd hear Calvert say that! — Ed).*

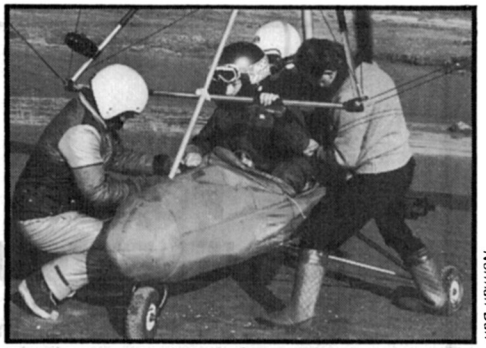
Finally, I would very much like to thank everyone who helped in the attempt, as record-breaking is very much a team effort. We do intend going a lot higher yet, and the next project has already started!

Editor's note: Hitherto there had been no two-seat altitude record for this class of aircraft, so theoretically all Bob and Lisa had to do was get off the ground, but Bob had decided not to claim a record unless they bettered 10,000ft (3000m). With 12,800ft shown on the barograph, they comfortably beat their target.

behind was Derbyshire. When I looked to the east, there was Fylingdales and the east coast".

The flight had taken 1h 54min, with maximum altitude reached at 5.07pm and landing at 5.37pm. Although the trike carries 10gal (45 litre) of fuel, the flight used only 3gal (14 litre) and Geoff reckons he could have got higher if he hadn't been beaten by cold and the onset of darkness. Nevertheless it was a new record — or was it? When Geoff and Mainair director John Hudson inspected the barograph trace, they were in for a disappointment. The intense cold in the cockpit had caused the instrument to ice up and the trace line 'wobbled' much more than usual. The mean value of the trace line at its highest level agreed with Geoff's altimeter reading, but the base of the high-level trace was actually below the existing record. Knowing that the FAI takes the most pessimistic figure when assessing record attempts, they realised that there was no point in applying for the record to be ratified.

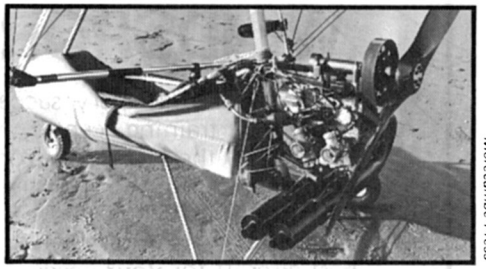
Frostbitten but unbowed, Geoff said after the attempt: "We are going to do it again and break it properly next time instead of playing around".



Norman Burr

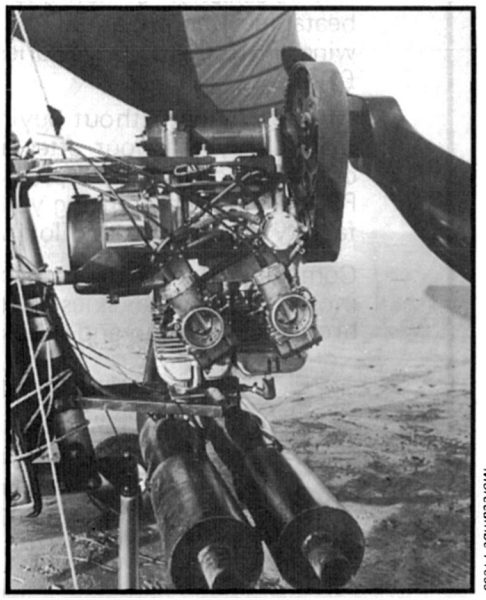
Above: A helping hand from Dad (right) as the would-be record breakers are strapped into the Tripacer, Bob in front, Lisa behind.

Below: Simple but purposeful — Calvert's special Tripacer.



Morecambe Press

Below: A very special Robin. Note the angle of the carburettors, canted forward to prevent fuel starvation: "That's the angle it flies at!" says Bob.



Morecambe Press

Obituary: Ashley Doubtfire

By Mark Southall and Roy Hill

It is with deep regret that we announce the death of Ashley Doubtfire on the 1 February.

Ashley was an early pioneer in hang-gliding, coming into the sport in 1974. He was so keen that Gerry Breen (who was almost the original hang-gliding pilot), found him camped on his father-in-law's lawn one morning, waiting for Gerry to wake up and take him out to teach him to fly hang-gliders. In his early hang-gliding days he had quite a serious accident, when he broke his femur and was off flying for about six months, spending a considerable amount of this time in hospital, waiting for his leg to be repaired. The doctors told him that he wouldn't fly again, but being Ashley, he had 'another go', and at one stage he couldn't bend his leg more than half way. Due to a heavy landing one day, his leg was bent back into position; the doctors remarked that he had been a very lucky man, having cured the problem on his own.

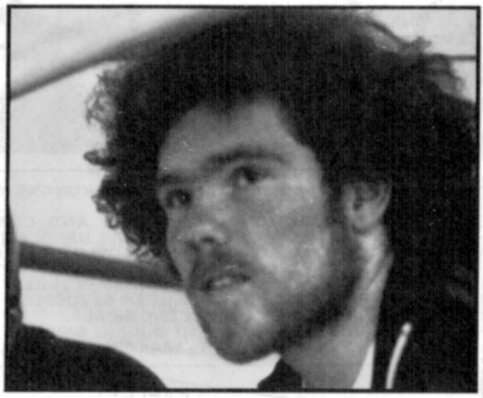
Ashley was always very keen and dedicated to his hang-gliding, and he worked with Gerry Breen operating the Welsh Hang Gliding Centre for quite a few years. In 1976 he was persuaded to start up his own school, the Birdman Flight Training School, operating from Ken Messenger's Birdman Sports factory in Marlborough. In 1977, with the foundation of the national league, Ashley was one of the original pilots to join, encouraging other pilots to join with him, some of whom are still in the league. During this time he worked as a BHGA council member for the benefit of the sport. He gradually began to take an interest in powered hang-gliding, first in the Soarmaster-type units and then with trikes.

Along with Steve Hunt and Dave Thomas, Ashley was one of the three founder members of the BMAA. Together with Dave Thomas they compiled the first *Flightline* magazine, sitting in a van one afternoon at Popham. Along with help from Steve Hunt this was printed in January 1980.

Because he was steering his school more towards power, he moved to Thruxton airfield, near Andover, where he had better flying facilities, but at the same time he ran his school from the same site. He operated from there for about two years, then found premises in a large farmer's field at Hinton Parva, near Swindon.

It was after his move back to the Swindon area that he met Melanie and later married her. They seemed ideally suited and flew dual frequently.

At this stage Ashley became involved with the Exegesis, a cult organisation that makes you realise



your own inhibitions and then sets out to prove that your potential has not been realised because your attitude to life is not positive. Ashley seemed to have been badly affected by Exegesis. He dropped out of the hang-gliding and powered scene and suffered from mental illness. When he died he was being groomed to start in his father-in-law's micro-computer business. His father-in-law is particularly concerned as to whether Exegesis contributed to his mental problems.

At the time of his death Ashley was in hospital receiving treatment and died in his sleep. Pathologists are investigating the cause of death.

Steve Morris adds this tribute: It is with sadness and regret that I learned of the death of one of hang-gliding's foremost pioneers, Ashley Doubtfire. Ashley was a person who truly loved and enjoyed life to the full. Flying formed an integral part of that life.

Owing to an illness, which began some 16 months ago and led to his death, Ashley had to tear himself away from the flying scene, thus denying many the pleasure of meeting him and experiencing at first hand the excitement and enthusiasm which he conveyed to all.

To some, Ashley Doubtfire will only be a name read in an old flying book or magazine, but to others, those who knew him, he could never be forgotten for the contribution he made to the sport as we now know it. We are fortunate, as flyers, to have had people with enthusiasm and dedication such as his.

To be remembered in the hearts of those left behind, is not to die.

Gerry Breen had his first try of the very fast Phantom.

Rivals pop in to Popham

By Norman Burr

The pod colours could hardly have been more appropriate. In the red corner, the new Pathfinder II, significantly faster and more refined than its predecessor, an obvious improvement on an already respected design. In the blue corner, the British version of the Ultralight Flight Phantom, produced by Skyriders and, thanks to the substitution of the 440 Robin for the Kawasaki, rumoured to be the fastest microlight around.

The Popham fly-in on 12 – 13 March was the opening of the new flying season — at last — and was the first round of what is obviously going to be a year-long sales battle between the two. Manufacturers and public alike had their first chance to compare the two side by side. Equally importantly, Gerry Breen had his first chance to fly them and, having sold products from both companies in the past, is as neutral and knowledgeable an observer as you are likely to find anywhere.

In the event, the honours were shared. Gerry was in no doubt as to which was the faster — the Phantom's reputation for offering electrifying performance seems quite justified — but he reckoned that the Pathfinder was nicer ergonomically, more relaxing to fly and better finished.

However, Popham was of course far more than just a comparison between two aircraft. On the Saturday there was plenty of flying and fun to be had, and if the conditions were not ideal, with an overcast sky and a rather turbulent crosswind, at least the cloud kept the light aircraft away and allowed the microlights the virtual run of the strip.

Despite its increasing familiarity, the Tiger Cub was again a crowd-puller, bringing out the Biggles in aviator and non-aviator alike. On the weight-shift front, Popham was the first showing for the new Puma Sprint, an all-Southdown Sailwings design with a faster, flatter wing than the Lightning DS used on the original Puma. Rivalling it in the two-seat weight-shift stakes were trike units from Mainair and Lancashire Microlight, both using the Striker wing.

Rivalling the Lazair for the prettiest aircraft title was the Aeolus, which boasted a finish good enough to put many a production aircraft to shame, let alone a prototype. Another predominantly fibreglass machine was the Jordan Duet, now at pre-production prototype stage and with Rotax engine, which clocked up quite a lot of airtime in Graham Andrews' hands.

Thanks to a smaller wing, cleaner design (note the single upright), and free-air cooling, the latest Pathfinder is 20kg lighter than its predecessor.

Pathfinding to Popham

The weather at the most recent Popham event did not encourage people to fly-in — though a number did make it nevertheless. However, not every Popham is so unlucky with weather, as JOHN MORRIS recalls.

Puffy cumuli contrasted blindingly against the infinitely blue sky as I wound my way up the Cheddar Gorge on my way to Popham. After three weeks of being grounded by high winds and foul summer storms, the clear skies and lack of wind seemed almost a miracle. As I topped the rising edge of the Mendip hills I saw a white sea of mist spread out over the level plateau. Out of the mist sturdy oaks strode, each an island tower of clouded green. For mile upon mile the gentle vapours filled the vales and hollows, steadily retreating before the rising sun.

Gradually the limestone country I know so well changed to more lush, well wooded chalkland of Hampshire. My Pathfinder on its trailer seemed to be coping with the journey quite well, though each large pothole produced a disconcerting rattle from the trailer! Although this route was quite familiar from flights made in my ultralight flying days, I had decided that, due to an unpredictable weather system brewing out to the west, the trailer would ensure a return home on time.

Popham airfield turned out to be a grass strip of incredible length with close shorn turf, quite alien to a backwoods aviator raised midst cowpats and prop-shattering docken plants. In the welcome hot morning sun I rigged the Pathfinder, a task somewhat lengthened by numerous friendly faces and by watching translucent gossamer deltas sailing down out of the distant blue. As is usual with such days, the time passed pleasantly by with flights interspersed with interludes of meeting old friends and new. However as the afternoon faded toward evening the urge to make a longer flight settled on me. Something more than just a jolly round the local scenery, though this indeed was interesting. I fuelled up 006, wrestled with the map, then swished over the chalk lawns to the threshold of 26.

From my remote seat the greensward runway stretched almost to the horizon, powerfully reminding me of the long gone days when the pungent aroma of avgas and the heavy throb of engines filled my sunlit youthful days and silenced the trilling larks. The same familiar blurring of the grass, the same urgent acceleration greeted my opening of the throttle and once more the surly shackles of gravity eased their tenacious grip.

Under the sparse clouds my track crept across the map. Far away to the south, the white desert of Southampton glistened, while beyond, the island lined the far horizon, the gleaming pinnacles of the Needles showing clearly. At intervals across the landscape huge blue-grey columns billowed up from the burning stubbles, tinting the air with that delicious scent that heralds the coming of autumn, with its clouds of passing thrushes and high clamouring skeins of wild geese returning to their wintering grounds.

Gradually Salisbury's medieval spired and leaden-roofed cathedral resolved out of the spreading countryside to the north and soon there passed below the little grass strip where once I put down to lunch with friends on such a sunlit day as this several years ago.

To the west on the high ground lay the fields of Compton Abbas, but now my watch was urgently telling me that within a few minutes the point of no return would be passed. With an airborne time of 1h 10min elapsed, I turned back without seeing the field I had been aiming for, although I must have come quite close. As I wanted to use this flight for my 80km out and return task, I looked round for somewhere to land in order to get a witness to my landing location. Away ahead toward Salisbury I saw a group of caravans in one corner of a huge field, so I headed that way intending to land.

Just as I began to throttle back to reduce my 2,000ft (610m) agl height, I spotted far below a miniature yellow plane scudding across the green fields. Watching it intently, I saw the craft turn over a large wood before swooping down to settle into an airstrip! In a huge swooping descent I swung in to land beside the yellow plane and as I did so I saw a group of tiny figures walk out to greet its pilot.

I landed in time to congratulate him on his first solo! It seemed that I had stumbled across a microlight flying school, the inhabitants of which turned out to be a real bunch of enthusiasts who made me very welcome.

With my position confirmed and some more fuel aboard I took off again bound for Popham. With almost unlimited visibility and nil wind, the last leg was an intensely delightful flight. Navigation was hardly required other than slight bending of track to avoid Middle Wallop and a huge area of forestry. Just to the south of Chilbolton radio telescope I rejoined the A30 which led me directly to my destination. Descending over the upwind end of the field, I slotted in behind a trike and finally landed after a total of 2h flight time and a distance of 80mile (130km) covered.

For me that day will be remembered for that flight high in glorious sunshine above Hampshire's fields, woods and rivers and for the enthusiasm and fellowship of my brother aviators.

Heading for Reading

The flying season is at last upon us, and just to whet your appetite, here's IAN RAWSON'S tale of his most memorable flight to date.

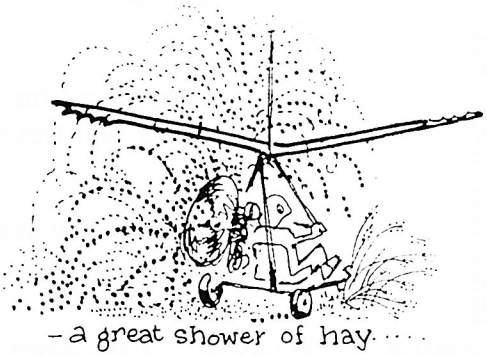
With recent flying having consisted solely of umpteen trips from Burnley to Pilling, Middleton, Cark etc, and back, I decided a bash out in the opposite direction was called for, namely, a trip to Reading near the small hamlet of London, where my sister and spouse live. So, at 11 o'clock on 11 September, I triked up out of my field near Burnley into the high-pressure windless blue yonder heading 135° over rough moorland, keeping below 3,000ft (910m) QNE until Rotherham, which I was glad to reach – that 40mile (64km) stretch being a bit short of good landing areas. After filling up in Rotherham school playing fields, and only suffering two punters, it was off again over a forest and to my first turn point, the M18, 3mile (4.8km) north east of Rotherham.

Now on 175° the next big town was Mansfield which I had to pass 3mile to the east. It was 22mile (35km) away; working on the assumption my groundspeed was 30mph, in no wind, it should take about 40min to get there, which it did, turning up right on time. This was the method used throughout the trip, and with towns and cities at regular intervals and each one and its distance from the other written on a bit of paper stuck to my knee, navigation was never a problem, with visibility being 20 – 30mile (32 – 48km).

Anyway, after Rotherham a bit of a headache came on, due to bright sunlight and engine noise. After half an hour it got pretty bad, ending up with me flying with my body stuck through the control frame and legs dangling in mid-air, to get my head away from the engine. This gave some relief and I was glad when the fuel once again got low and it was time to land, this time in a bone-jarring field just east of Nottingham. After refuelling, resting and explaining everything about microlights to a farm-worker, I had a diabolical half mile taxying session across this horrific field to a tarmac farm track where it was fit to take off.

Airborne again, I went immediately up to 2,000ft (610m) asl over Nottingham Airfield, then straight down below 1,500ft (460m) QNE to go underneath the East Midlands SRA. The next landmark was some high ground 5mile (8km) east of Leicester, still on 175°. By now, a 3 – 10mph (5 – 16kph) easterly had sprung up and the sky had become overcast, bringing the visibility down to 10mile (16km). Flying slightly sideways and with the headache now subsided, the next petrol stop would have to be a garage. With half a tankful left, and my tins empty, I began to look, passing over several villages and seeing plenty of pub forecourts but no garage ones. After half an hour, I was getting worried and so landed in a nice field outside Market Harborough, detached the tins and had a walk into town, feeling a bit paranoid on a Saturday afternoon in ski-pants and two ski-jackets, in 27°C of sunshine. Eighteen litres of two-stroke later, I was off again towards Northampton and my second turn point, which was 190° just east of the city. Refuelling again at Aylesbury I appeared to be still on course and couldn't believe everything was going so smoothly.

From then on it didn't. Seeing the Chiltern hills up ahead and realising I was nearly there, I barged confidently onwards past two hot-air balloons and over the mansion and swimming-pool-festooned high ground, all very Dallas-like in this suddenly changing landscape. Fancy forests and hillside suddenly gave way to a town which I hadn't bargained for. "Where's this?" I thought as I lined up with a field with some people in it. Touching down, I landed uphill on a 20° slope in 2ft (0.6m) of hay.



Taxying uphill to the people, a great shower of hay was thrown up in a semi-circle 60ft (18m) in the air by the propeller. On asking them what the town was called, I was met with uncontrollable laughter for five minutes before the bloke calmed down and said "Sorry mate, this don't happen to us every day!"

The town turned out to be High Wycombe, confirming that I was off course and heading for London CTR. The farmer then asked where I'd come from and I told him from Burnley. He gave me an incredulous look and said "So that's why the propeller's on back to front".

Having had enough of this banter, I fired up and blasted down his field, showering him and his cronies with hay and only just about lifting off from the 20° downhill slope, the dense hay nearly stopping the prop. Climbing out with hay streaming 10ft (3m) behind, I altered course to head south west and noticed all sorts of light aircraft, biplanes, war relics etc flying around a couple of miles away at Wycombe Air Park.

By the time I arrived at the river Thames it was now 6.30pm and light was failing a bit, so I landed on the river bank near Henley and asked how far upstream Reading was. After more incredulous looks and banter I set off up the Thames looking down on Saturday evening drunks lounging on the river bank in the balmy evening air. Sure enough, after 15min flying, two huge white gasometers loomed out of the murk, along shortly afterwards with all the other features of a large town — *Reading.* Turning left and looking at a small map on my knee I flew over my sister's housing estate picking out what I thought was their avenue, only it wasn't. Journey's end arrived on a huge playing field on the side of the main road in the posh Woodley area of Reading. It was 7pm — the journey had taken 8h with 6½h actual flying time and 9gal (41 litre) of petrol.

After 5 days slopping around drinking beer, getting fat, catching flu etc at my sister's, the high pressure was still with us, but on its way out, bringing south easterly winds, which was what I'd been waiting for. On Thursday morning the fog, which had been dense the previous two mornings, was absent and so with me carrying the glider and my sister and brother-in-law wheeling the trike down the street, we converged on Woodley Park. We asked the Woodley town clerk if I could take off from his field; he was delighted and got Woodley Magazine and the press and everybody there to watch. After a demo-flight and miles of film (theirs) being used photographing various overweight people sat in the trike, I was on my way back in glorious sunshine with a tailwind and warm temperature — what more could one ask? The flight back, over the same route, was remarkable in that it was so perfect; I knew exactly where I was throughout the journey, and when petrol station time came up again, I just looked down and there was one with a huge field just at the side of it. Highlight of the return trip was landing at Dinnington Girls' School playing field near Rotherham between two hockey matches. The well endowed games mistress insisted on wedging herself into the seat, with the rest of the staff including the headmaster looking on with great interest!

At 5.10pm I landed back at my car near Burnley, 6½h after take off from Reading, 5¼h actual flying time. I had used 16½gal (75 litre) of petrol with an average groundspeed of 35mph (56kph) throughout the trip. The trike had performed perfectly and didn't need to be touched throughout the 400mile (640km) journey. A superb design, assembled by a superb engineer — me.

Equipment used: Mainair 330cc Tri-Flyer/Solar Wing Typhoon S 166, Thommen altimeter, Suunto compass, scruffy jacket, running shoes.

Postscript

Norman Burr writes: Ian's take-off from Woodley prompted a complaint from a local resident on the grounds that the site, although very open, was part of a built-up area. CAA decided not to prosecute (although it could probably have won the case), a decision which may have been influenced by the fact that it would have had to charge the Woodley town clerk with aiding and abetting!

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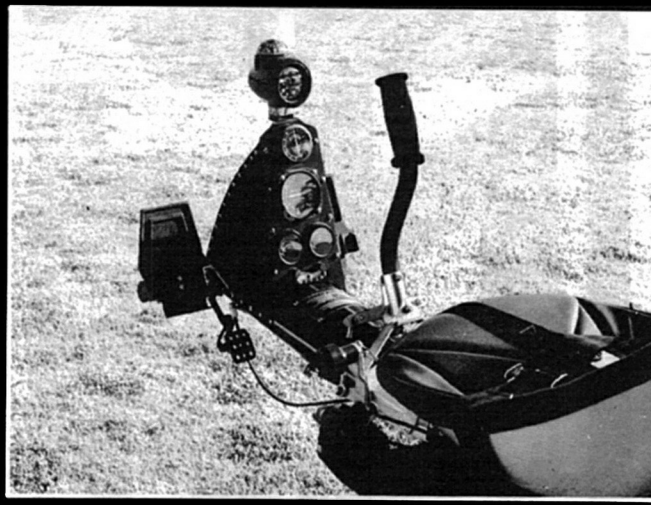

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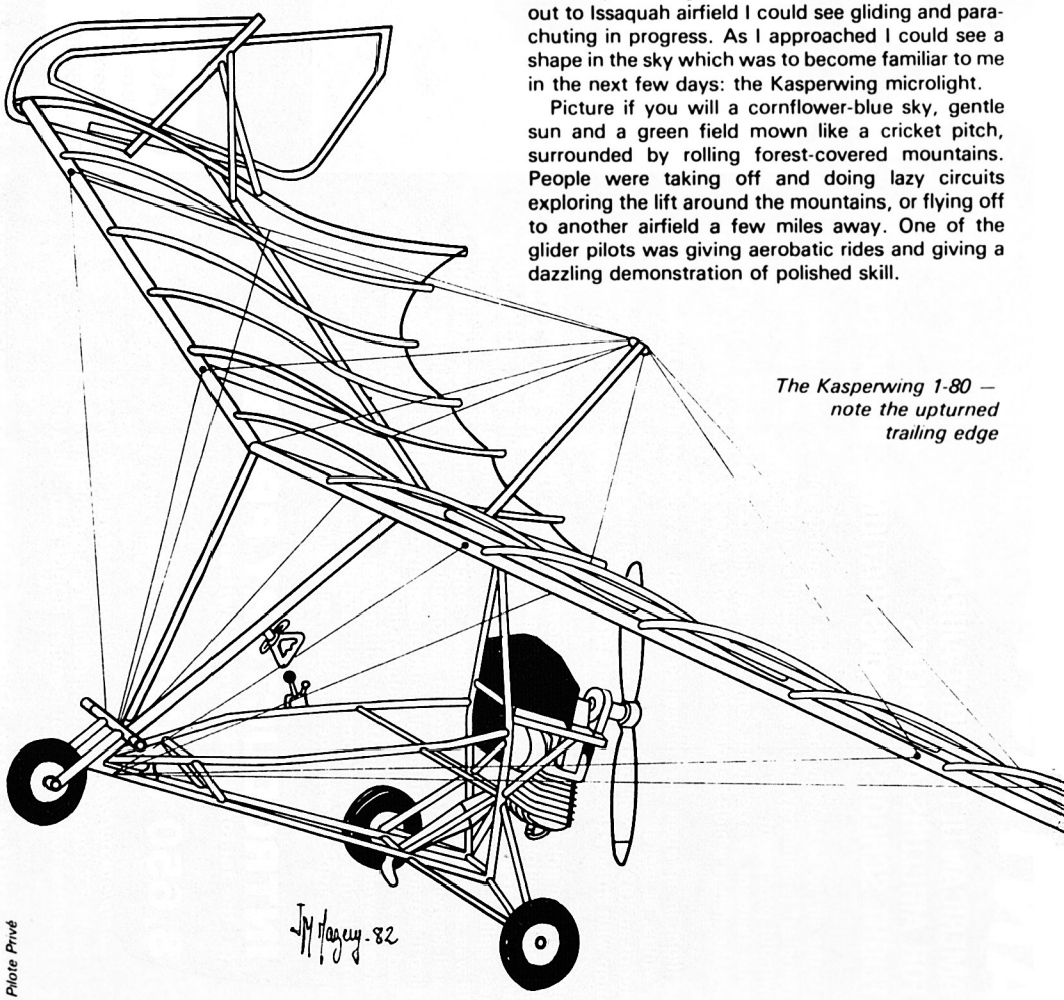
Konverted to the Kasperwing!

ADAM JEFFERSON spent some of last summer touring the USA and came back so impressed with the Kasperwing that he set up a company to act as UK agent for the aircraft. Here is his story.

My interest in the Kasperwing was initially stimulated by the AOPA reprint in the Nov/Dec 1981 issue of *Flightline*. While in America I decided to include in my trip a first-hand investigation of Witold Kasper and the Kasperwing microlight.

I took leave of my friends in San Francisco and hitch-hiked north to Issaquah, Washington state, which is the home of Cascade Ultralights. It was Saturday morning when I arrived, and as I walked out to Issaquah airfield I could see gliding and parachuting in progress. As I approached I could see a shape in the sky which was to become familiar to me in the next few days: the Kasperwing microlight.

Picture if you will a cornflower-blue sky, gentle sun and a green field mown like a cricket pitch, surrounded by rolling forest-covered mountains. People were taking off and doing lazy circuits exploring the lift around the mountains, or flying off to another airfield a few miles away. One of the glider pilots was giving aerobatic rides and giving a dazzling demonstration of polished skill.



The Kasperwing 1-80 — note the upturned trailing edge

Pilote Privé

After chatting to the Kasperwing pilots for a while, one person offered to let me stay — many thanks Denis. The following day I met up with Steve Grossruck of Cascade Ultralights as he was putting the final touches to the pod, an enclosed cockpit modification in preparation for Oshkosh.

The Kasperwing was originally developed five years ago by Grossruck in conjunction with Kasper, as a hang glider based on Kasper's much earlier flying wing gliders, the BKB and BEKAS-N. This meant a tailless layout with an airfoil and control system designed to give controllability at speeds below stall.

Kasper himself told me the reason behind his interest in slow speed flight: early on in his career he inadvertently stalled a glider on final approach and had to sit by helpless as it fell to the ground. He survived by remembering how two previous pilots had been killed in similar incidents and by taking appropriate action, which consisted of moving his head down and the control stick to one side.

His interest in developing a machine safe at the stall and not subject to these lethal characteristics led Kasper to apply his considerable knowledge of aerodynamics to the birds. After all, they earn their living flying and in the highly competitive natural world they cannot afford to stall. Besides, their Designer has been implementing a 40 million year research and development programme.

Kasper is now retired from active designing. The larger aviation companies he was pressing to take his ideas further now look as though they are not interested, so it is in the fertile soil of microlight aviation that the Kasper seed has been sown.

After Issaquah I travelled back east to catch Oshkosh in Wisconsin. On the Sunday that I arrived, I was told that 11,000 light aircraft were there, some 5% of the light aircraft in America. The following few days were a mixture of baking hot sun, thunderstorms and cool overcast weather. I spent the time watching the daily display of the Confederate Airforce Warbirds and aerobatics, and wandering amongst displays of Dick Rutan's Vari-Eze, a Dragon Rapide and other beautifully restored classics.

There were about 400 microlights, giving me a good selection to compare with Kasperwing. I spent many an hour looking at the manufacturers' displays and being introduced to some of the finer points of microlighting by Steve Hunt. About midweek, the official FAA ruling on ultralights was announced — it looks as if we in Britain have come off very well with our definition of a microlight.

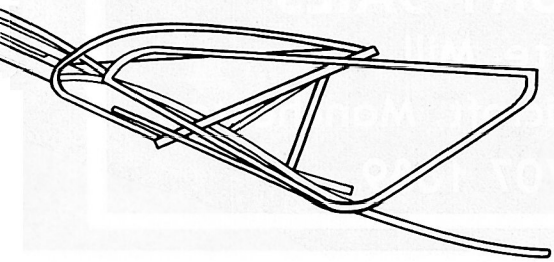
The EAA did not want to mix the ultralights with the rest of the aircraft at the fly-in, so flying was limited to about an hour or so in the evenings when weather permitted. In future years, the microlights will be given a separate date for their own fly-in.

The microlights there varied from the inevitable profusion of Eagles, Quicksilvers and Weedhoppers to many less common machines — about 30 or 40 in all — some of them very fine and some ugly monstrosities. The Mitchell wings were truly a beauty to feast one's eyes on.

The more I watched the Kasperwing fly, the more I was impressed by its performance as a bread-and-butter no-nonsense fun aircraft. I was initially sceptical of the speed range of the single-surface aerofoil but a Kasperwing won a recent race in Florida, showing another unexpected aspect of Kasper's aerodynamics. The aerofoil used gives good lifting properties, climbs well with the 250 Zenoah and thermals well with the engine off. Steve Grossruck demonstrated its full control at speeds well down below stall, by parachuting it down from 100ft (30m).

In all, apart from its unusual parachuting ability, its performance and handling appeared to be similar to the Eagle, though to me its clean and functional appearance was much more pleasant. I see it as filling the gap in the market created by people who don't like the idea of trikes dangling beneath hang gliders, but want a fun aircraft which is a little more docile, less complex and easier to fly than the current generation of three-axis machines.

Editor's note: Adam's agency is known as Sunrise Aviation, 42 Blake Dene Road, Lilliput, Poole, Dorset BH14 8HH (tel 0202 700322).



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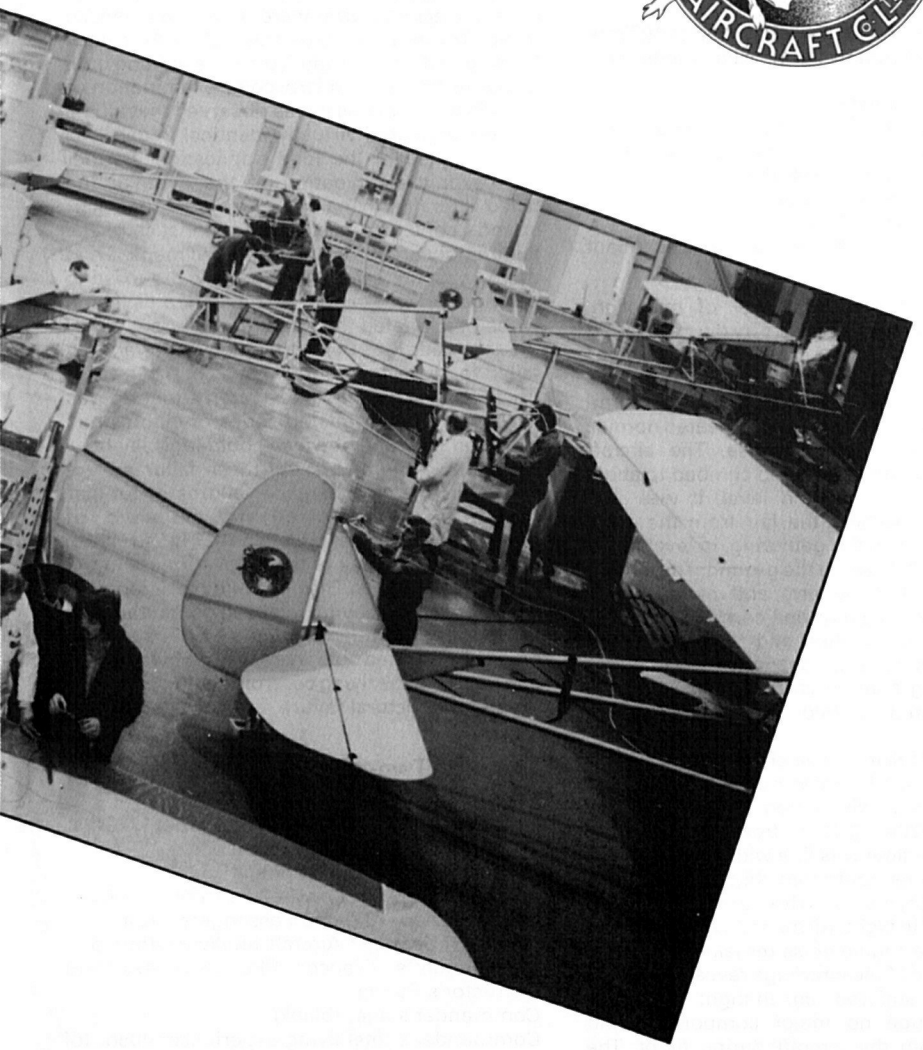


Book reviews

The Microlight Flying Manual
(by Ron Campbell & John Jones, published by Granada Publishing, price £8.95.)

This thick volume with an attractive cover is the first major microlight book in this country, but to achieve publication speedily the authors have substantially drawn from their own earlier manuals. This is particularly so in the nav and met sections, where they have sadly reproduced the same contradictory diagrams showing precipitation over a hill (4-30/4-31).

Efforts have obviously been made to translate 'aeroplane' considerations into those for microlights, and whereas what is said — and there is a great deal — is generally useful, much that is important to the microlight pilot is not there. Under 'Approach to the Stall', for example, there is no mention of the important symptoms of change in airflow over the pilot's face or change or reduction in noise; or the high rate of descent which occurs when any aircraft which does not readily stall is flown too slowly. Further, it is recommended that the turn on to the circuit base leg is started each time at the same height and position, but a very slow microlight is much more affected by the wind than an ordinary aeroplane, and in a fresh wind might never be able to get back to the landing field if this practice is adopted as standard. There is also no mention of the BMAA important pre-take off check CHIFTA, and under precautionary landings nothing is said about contacting the farmer in whose field you have arrived — a BMAA recommended practice.

In the met section there is much reference to turbulence under clouds, but not useful information such as that flying along in the sea breeze air can give a smoother ride than flying in the heated land mass air; or *never* to take off with hoar frost on your wings. On the other hand, the engine section provides the optimistic information that a two-stroke plug life is 150-200h!

If you are intending to go on to flying ordinary aeroplanes there is a mass of useful background information in this book, including 80 pages of regulations, though it is a pity there is no index.

AW

The Directory of Homebuilt Ultralight Aircraft
(by Hal Adkins, published by Haljan Publications, PO Box 291, La Moille, Illinois 61330, price $14.50 including packing and air mail).

This invaluable little publication provides a wealth of information for the British homebuilder, even though it is primarily produced for the US market. Not only does it give vital statistics of 25 homebuilt aircraft — some familiar, like the Australian Skyrider, some like the Barnstormer pretty obscure in the UK — but it also lists a large number of sources of information, components and materials. Many, but not all, are US suppliers.

Hal Adkins has made no attempt to produce a glossy publication that would look good on the coffee table. His directory is a simply produced pocket-sized paperback, but it is none the less useful for that.

Norman Burr

The Handling of the Big Jets
(by D P Davies, obtainable from the CAA Printing & Publication Services, Grenville House, 37 Gratton Road, Cheltenham; or Airtour International, Elstree Aerodrome, Herts. Price £10 excluding postage and packing).

Many people will be wondering what a book on jet aircraft has got to do with microlights? The answer is not a lot, at least not directly, but for the thinking pilot who has obtained his PPL, this book is going to broaden his horizons and hopefully give him an insight into what flying qualities he should look for in an aircraft — any aircraft, microlights included.

It was a widely publicised remark made by the author which prompted me to first read this book: "Anybody who can ride a bike and has passed a few O-levels can fly Concorde", said Davies, who is well qualified to make such statements as he was until recently chief test pilot for the CAA. He had been responsible for checking out the Viscount, Comet, 707, 747, Concorde and many others.

Flying for Davies is more than just a job and his enthusiasm is apparent throughout the book. His simple explanation coupled with a direct style make for clarity and interesting reading. Davies, unlike many of the top experts in their fields, presents the information in a vivid clear manner. In fact, this book was the first and still is the only one of its type and is widely regarded as being among the aviation classics.

Essentially, the book deals with how the flying qualities and operating procedures change as aircraft become bigger, faster and fly at higher altitudes. Davies begins by defining the difference between large propeller-driven aircraft and jet aircraft. A very useful glossary of *all* the terms used in the book is also included for those not familiar with aeronautical jargon. While the book is primarily written for airline pilots, part of the beauty of it is that everyone can read and understand it.

As there are over 30 different V (speed) values used in the book, constant reference to the glossary is required for some sections. This does serve to illustrate that airspeed is critical for any aircraft. As one progresses through the book it becomes apparent that whatever the size of aircraft they all obey the same basic Newtonian laws. By making

Culture corner

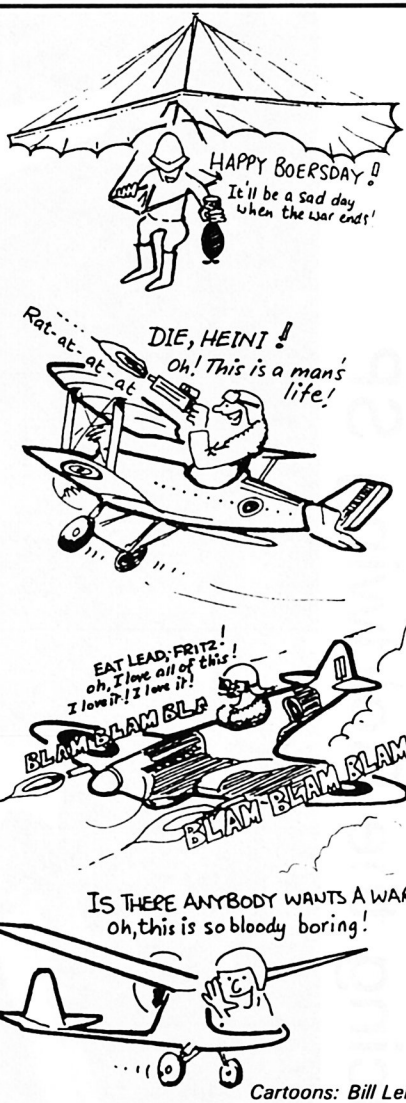
Great grandad was a flying man . . . he flew old Aders kite
He drifted south to Mafeking and gave the Boers a fright
He wandered over Zululand, Port Smith and Karalandi
And in between he coursed his nags, played bridge and drank good brandy.

My grandad was a flying man . . . came whole through World War One
Flew SE 5s and Sopwiths against the wily hun
He chased his sport through Villiers, Cap Nord and Remy Loundes
And in between he chased the girls, drank port and rode to hounds.

My father was a flying man . . . flew Spits in '42
He bagged a brace of Messerschmitts and got a gong or two
He diced with death through Limoges, Montargis and Les Mopsis
And in between he drank his gin and snogged it with the popsies.

Now, I too am a flying man . . . I fly a microlight
And . . . well, quite frankly I sometimes get a little cheesed off sitting up there day after day waiting for a bloody war to start.

Pecos



Cartoons: Bill Lehan

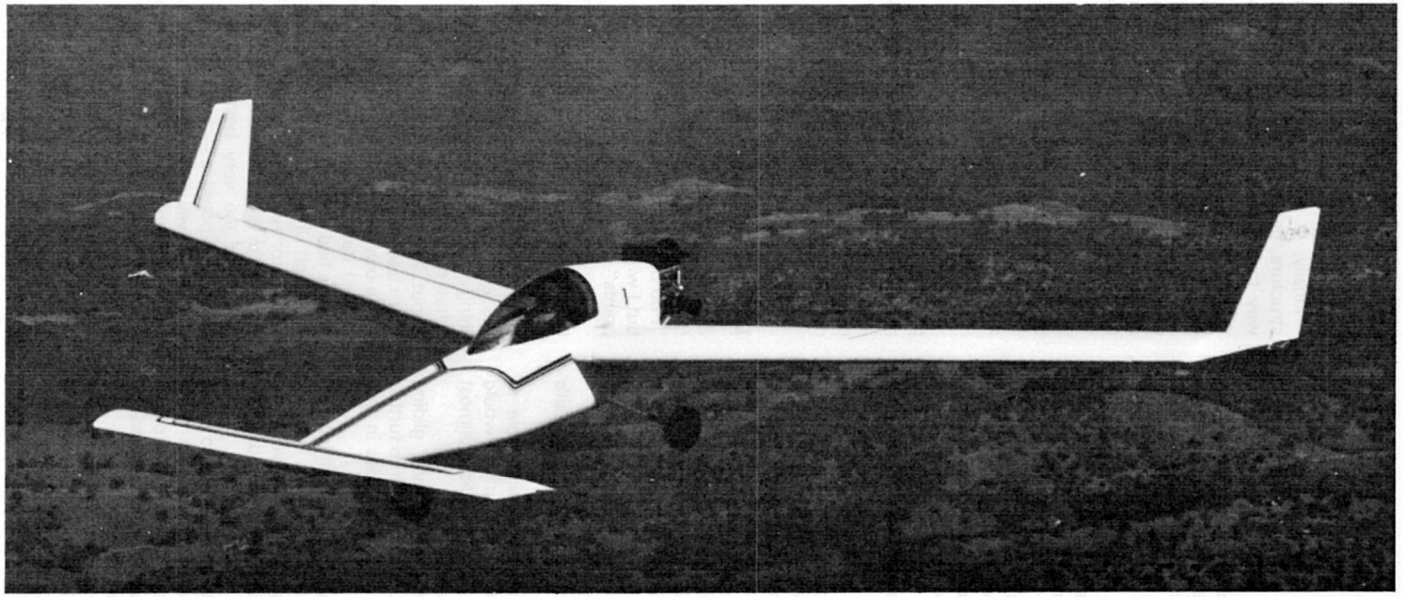
this obvious, it is a lot easier to relate a lot of the material to any size of aircraft, including microlights.

There is so much covered in the book that to outline every part would be pointless; suffice it to say, everything you might ever want to know regarding the flying qualities of large jets is there laid out in an easy to follow manner. The most interesting section to me is the one on controls, for after reading it I was able to pinpoint a control characteristic of a certain microlight which I hadn't understood before. Other areas of note are the ones on yaw and roll dampers, stick shakers and stick pushers, while the description on super stalls is an eye opener.

I must admit that to get the best out of it you need to take a bit more care in reading it than *Woman's Own*. If you don't, you will find it a bit like trying to understand Smiley's People on television without first reading the book. At £10 the book might appear a bit expensive, but those not so committed should at least obtain a copy from the library and then take the effort to read it. Come to think of it, a few copies distributed among the microlight designers wouldn't be a bad thing.

Andrew Cranfield

Announcing the Goldwing SP



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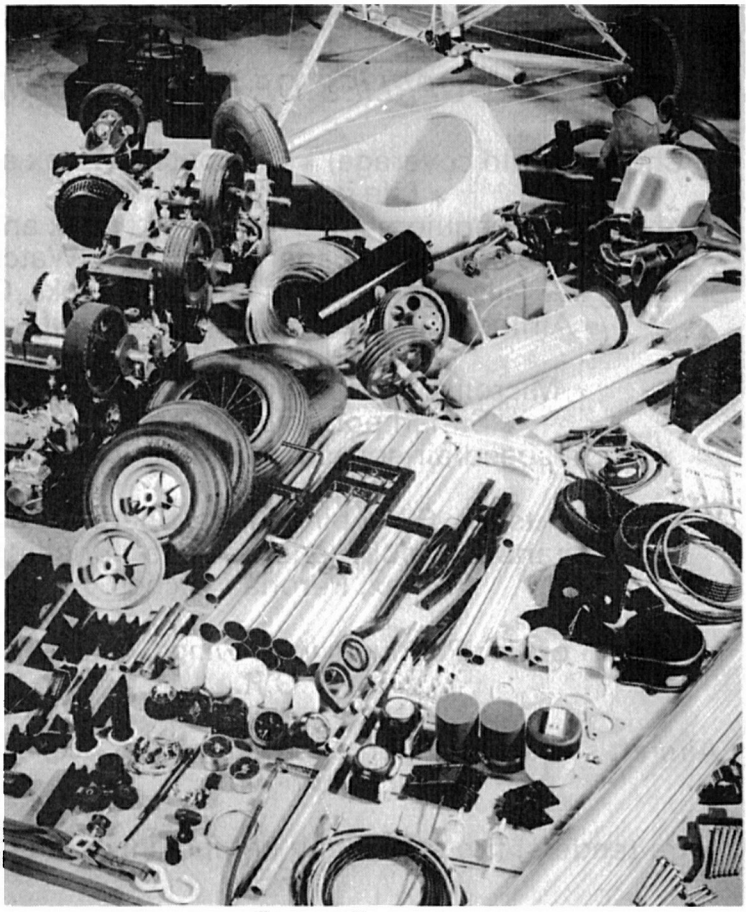

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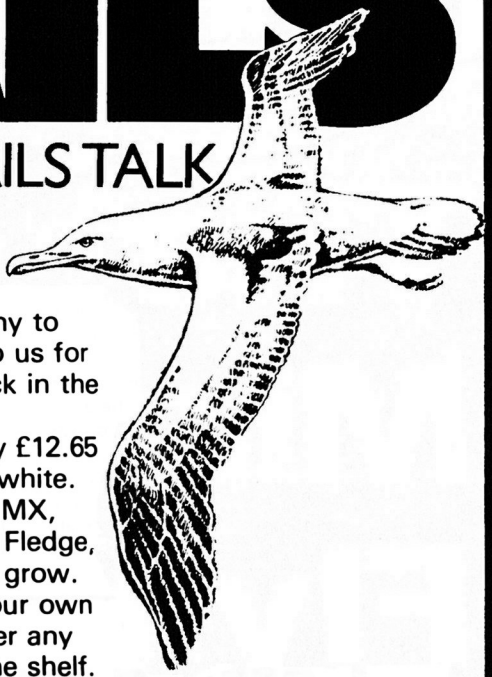

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HAZE SAILS

Echoes from Australia

By Gary Kimberley

The advent of minimum aircraft (the 'new' microlights), has made it possible once again for the ordinary layman to own and fly his own personal aircraft and has brought about the discovery of a new and exciting branch of aviation, halfway between hang-gliding and the old style ultralight aeroplane. It is a healthy, constructive and stimulating sport; a branch of recreational aviation where every enthusiast can have his own miniplane in his garage at home, and go flying for fun whenever he wishes, at minimal cost and without bureaucratic hassles. It has brought about a resurgence of such admirable qualities as individual initiative, enterprise and innovative thinking. For the first time since the Wright brothers, flying was being looked at from a totally new point of view. The challenge was to devise the minimum flying machine which could be safely and enjoyably flown; a lost and forgotten art.

The 'old' ultralight aircraft had, over the years, gradually become heavier, faster, more sophisticated and ever more expensive. They required higher levels of training and skill to fly and maintain, and in addition to the high basic costs, they became subject to a range of ever increasing government charges and imposts. Obviously, they were no longer ultralight aircraft and therefore could hardly be treated as such. Somewhere along the way, the original concept was lost.

It would be a tragedy if this should happen again with the 'new' microlights, but already there are some disturbing trends and, after all, they do say that history repeats itself. More power and greater speed creates the need for more streamlining and increased protection for the pilot; fully enclosed cockpits are the inevitable result. Already, there are microlights and minimum aircraft appearing that are virtually indistinguishable from conventional light aircraft. The wheel has turned a full circle and we have re-invented the aeroplane!

Obviously, no aviation authority can continue to turn a blind eye to untrained, unlicensed pilots in uncontrolled, unregistered aircraft flying around in the same airspace as conventional aircraft. Either microlights are separated completely from conventional aviation (as they are in Australia with ANO 95.10) or microlight pilots must be made to accept some form of training, licensing and control. The danger in the latter is that microlights could quickly be absorbed into general aviation and, once again, the original minimum aircraft concept would die.

It should not be forgotten that the current minimum aircraft was born out of the hang-gliding movement and is considered by its followers to be a completely new branch of aviation, as distinct from conventional aircraft as hang-gliders are from conventional gliders. It could never have been conceived in the straight-jacketed world of the establishment. Needless to say, any attempts to turn miniplane flying into just another branch of conventional aviation must be strongly resisted, if the sport is to survive in its present form and its basic philosophy preserved. An interesting aspect of the microlight boom has been the reaction of some elements of the traditional aviation hierarchy. These have run the full gamut from total indifference through genuine interest, resentment and scorn, to alarm and concern, and in some cases, even open hostility. However, now that it can be seen that the microlights are here to stay, there has been a subtle change in the establishment's thinking, but this does not mean that *all* pilots are enthusiastic supporters of the microlight movement. Among the main concerns of the establishment pilots, are that uncontrolled and irresponsible microlight pilots

Getting away? We ain't

By Stan Vint

The recent articles by Peter Lovegrove and Steve Hunt resurrect an old chestnut. Surely these issues were resolved at the 1980 AGM when Ann Welch was elected president and the word 'Minimum' was deleted from BMAA's title in favour of 'Microlight'. I thought the whole object of that exercise was to open up the field of very light aircraft, from the minimum powered hang-glider to the most sophisticated machine possible within the agreed weight and wing-loading limits.

I believe Peter's ideas are limited to the particular interest he is currently pursuing, which from his most recent articles I would guess is the trike, as his technical articles tend to concentrate on the early shortcomings of these machines. Today, reputable manufacturers incorporate these improvements in their current models, though this comment should

The debate about the future direction of microlights is still in full spate. Apart from the contributions on the *Letters* pages, here are three more points of view. The first is from Stan Vint, who comes down firmly in the Hunt camp. The second, from Gary Kimberley in Australia, agrees with Peter Lovegrove; Gary originally wrote it for the Australian microlight publication *Contact,* but despite their totally different legislative route, involving a 400 lb (181kg) laden weight limit and 300ft (91m) height limit, it is clear from reading it that there are many parallels between the Australian situation and our own. Finally, the Editor has his say.

might well become a hazard and could tend to give aviation in general (and sport aviation in particular) a bad name.

Obviously, microlight flying has to be controlled to some extent, for total freedom would merely result in total chaos. Naturally, self-regulation is preferable to control or regulation by some external body but, if it becomes apparent that we are not capable of a minimum amount of self-discipline, then discipline must be imposed from outside. We would then be in the unhappy position of being told how we are to fly our microlights by people who have never flown microlights in their lives and have not the slightest desire to do so, and whose first priorities would obviously lie elsewhere. Let's face it, no-one will fight your battles for you with quite as much fervour and dedication as you yourself. Pressures are building up both within and outside the movement which could well have permanent effects on the future well-being of the sport. If the miniplane enthusiasts are unable to get their act together and, as a result, fail to present an organised and unified front to the powers that be, they will lose, by default, any chance of controlling their own destiny.

Admittedly, the movement was pioneered by bold and fiercely independent individuals, but the hour of the rugged individualist is past and the time has arrived for co-operation and organisation for the sake of the future of the sport.

Conventional private flying is becoming so bogged down with rules, regulations and red tape, and is going to become so enormously expensive in the years ahead, that the minimum aircraft type machine may well become the only means by which the ordinary citizen will be able to enjoy the privilege of personal recreational flight. Although the sport is still in its infancy and experiencing acute growing pains, its potential is clearly enormous. It is my sincere belief that, provided the miniplane is not regulated out of existence, the sport, worldwide, will grow and prosper to the benefit of all, and will provide some dramatic advances in the design of lightweight aircraft structures and some revolutionary new concepts in the field of ultralight-microlight-aluminium aircraft operations. But control of the movement must be kept in the hands of practising microlight enthusiasts if the sport is to grow and flourish as a dynamic new field of aeronautical enterprise and an exciting aviation adventure.

started yet!

not be taken as a condemnation of his articles, which are valuable as a method of informing newcomers to the sport of what to look for in second-hand machines.

On the other hand Steve, being a manufacturer, looks at the other end of the spectrum. To be successful he must be ahead of or at least abreast of the competition, but in doing so he tends to forget that not everyone wants the ultimate aeroplane. Many people are quite happy to fly as he did a few years ago. This is how it should be. Steve's drive and enthusiasm have done a lot for the sport, and I know from personal experience that he is not averse to shaking the moths out of his hang-glider and diving off the top of Devils Dyke when conditions and business commitments permit.

Hang-glider pilots, in their quest for more efficient wings, have made vast improvements in the past few years and this has directly benefitted microlights. At the other end of the spectrum, those seeking the ultimate have passed back many technical developments for people to incorporate in early designs. This is an ongoing thing and should be encouraged; the article *Guide to the Scout* in the

Wanted: a microlight for

By Norman Burr

Despite the similarity of the arguments advanced by Gary Kimberley to those put forward by Peter Lovegrove and various contributors to *Flightline's* letters column, there is one crucial and uniquely British factor which so far no one has touched on — our highly changeable and frequently unflyable weather.

It is a fact that a pupil can book a week's course at a British flying school and find that through no fault of the school he has amassed zero flying time at the end of that week. It is also a fact that under such circumstances the school averages far fewer flying hours than its equivalents in France or the USA and that the resulting concentration of overheads onto a small number of hours puts up the hourly flying cost markedly.

Because of our weather, running a microlight school in Britain is not a licence to print money. A number of operators who thought otherwise have already fallen by the wayside, and the realists who remain have to live with stiff competition from non-commercial clubs. By using enthusiasts rather than employees and rooms over pubs rather than permanent classrooms, the clubs are increasingly able to offer equally competent instruction at a much lower price — provided the pupil does not mind spreading his or her training over several months and fitting in with the inevitable constraints of a voluntary organisation.

However, not everyone has the time to take the club route, or sometimes if they have the time they cannot find a suitable club in their locality. These people — and there are many of them — need the services of a commercially run school, and if those services are not available they may simply turn to some other recreational activity instead, leaving our sport the poorer.

I am convinced that a healthy sport and a healthy industry go together; commercial schools are an important part of that industry and they cannot be healthy unless they have aircraft on which they can clock up a decent number of hours of airtime each week.

This is the nub of the present dilemma, and the origin of the pressure for a 200kg two-seat weight limit. Experience is proving that while it is perfectly possible to build a viable weight-shift two-seater under 150kg (look how many Pumas there are in service), doing the same with a three-axis machine is quite another matter. It is *possible* to produce a machine which satisfies the microlight definition — the Dragon has proved that — but it is a desperately difficult business and I am sure that the Dragon Light Aircraft Co would be the first to admit that, rules permitting, it would be able to make its product considerably tougher and therefore considerably cheaper to run.

We must find a way round this problem, but it would be very dangerous to do this by seeking to change the microlight definition. There are sectors of aviation who view with envy and concern the increasing strength and organisation of the BMAA, and who would like nothing better than an excuse to press for our dismemberment on the grounds that weight-shift and three-axis are incompatible. To seek to broaden what is already by international standards a broad definition would be to give them just such an excuse. BMAA is one because the microlight

last issue showed how a pretty but flimsy minimum aeroplane, grossly underpowered and unsuited to our climate, has been improved by the diligence of Bob Adams. Similarly, Len Gabriels *Paris postscript* in the previous issue highlights how much progress has been made in three years. As part owner of the first Goldwing in Britain,I could tell a similar story.

Nothing is getting away from us — in fact we have a long way to go in airframe design and power. The engines commonly in use today were originally designed for other purposes and have been adapted for aviation. Purpose-built engines are coming and will open up even wider horizons.

What *is* getting away from us is the original enthusiasm for microlight flying, which has waned — temporarily I believe — because of the attention the media gave last year to the distressing number of fatal accidents and because of licensing.

By making 1 September '82 the deadline at very short notice, the CAA put fledgling pilots under great pressure to complete the Group D syllabus. Many like myself have only limited time available and find that two weeks slip by before a suitable flying day arrives. I know I was pushed to fly under marginal conditions and was fortunate to have a very forgiving aeroplane, in which 80km cross-countries are child's play. I duff my skid lid to those who obtained their Group D on a trike — the syllabus as laid down must be almost impossible. *(If you think trikes can't do cross-countries, read Ian Rawson's*

all seasons

definition is one; to go for a broader definition could result not in one larger definition but two smaller ones. BMAA could then find that it had no natural niche in the aviation scene and consequently no recognition either — in other words, oblivion. Perhaps worst of all, it would leave the pilot of the most popular machine of all, the hybrid Eagle, right out in the cold.

Even if we were to succeed in persuading the CAA to broaden the definition (and it does not at present seem likely), it would leave us horribly vulnerable to demands for tighter legislation on the grounds that microlights were no longer slow, low kinetic-energy machines.

No, there must be a better way. Fortunately, we only have to look across the Channel to find it, for the French are already discussing a new category for 150kg-plus machines, which in Britain could be called Very Small Aircraft or Aeroplanes Type Lightweight. In legislative terms these could fall between microlight and light aircraft; they could be used for training Group D pilots and could be sold to and flown by suitably qualified Group D holders — for instance, those who had considerably more than the minimum experience required for the licence.

Not only would this greatly improve the viability of the schools, it would also allow owners to upgrade their machines (for example with a more rugged undercarriage) as they gained more experience, without fear of pitching themselves into the legislative complication of the Group A camp. The precedents are already being set in France, and if French pilots, with their superior weather conditions, find such a category necessary, how much more necessary is it in Britain!

article elsewhere in this issue — ed). Surely there is a need to modify the flight requirements of this type of machine and possibly show on the licence to which control system(s) it applies? I would not dream of flying a trike without undergoing a conversion course. I am sure many accidents would not have occurred had the CAA given the matter more thought and us a little more time.

BMAA is doing a grand job under difficult circumstances and should be congratulated on its endeavours to promote the sport with additional events for 1983. It has been said that BMAA can only huff and puff when dealing with a powerful body like CAA, but surely it is better to huff and puff than to make no noise at all.

Greater by

GLENN BRINKS reports on the Greater Arizona Ultralight Air Race.

It was a crowd pleaser. Over 100 ultralights tearing around a trianguiar course, doing pylon turns, dropping down for a quick pit stop and then rushing off again, refueled and ready to keep chasing down the clock. It was the Greater Arizona Ultralight Air Race, the annual production of the Ultralight Pilots Association of Phoenix.

In its short history, the race has established itself as a nationally important competitive event. Pilots come from all over the country to prove themselves or their machines, and this year the prize for the longest distance traveled to the race went to a pilot from Germany.

Regardless of the distance traveled, most pilots would agree it was worth the effort. Not only was there the main race, and the handicap or rally event, but there was also a chance to get in almost unlimited flying for a few days in ideal 70 – 80°F (21 – 27°C) weather and the opportunity to look over many of the new ultralight designs.

Officially, the race was on Sunday, January 17, with Saturday devoted to set-up, but quite a few pilots showed up days in advance, and one pilot spent the preceding week over at McGill's, a nearby ultralight site, practicing for the event.

Up until race day, the weather was superb, about 10°F (5°C) warmer than usual for that time of year, and the visibility was almost unlimited. It was a friendly get-together, but more than one pilot commented about the sense of tension and competition among the flyers there. Clearly, many of the pilots meant business and didn't come just to have a good time.

As expected, quite a few factories were entered in the race, some with more than one plane. Eipper, Kasperwing, Delta Wing Kites and Gliders, American aerolights, Gemini International and Mitchell were a few of the better known teams.

Eipper had a number of planes, including a modified Quicksilver with a pilot pod, Quick MXs, and the new double surface Quicksilver MXL. American Aerolights brought Eagles, a 3-axis Eagle XL, and a prototype of their all-enclosed Falcon. Gemini had a strut-braced kit version of the Hummingbird, called the Type 103, and Mitchell debuted their all metal A-10 flying wing.

There was no shortage of new designs at Phoenix. In numbers and race results, the most impressive was the Banchee, a folding wing vaguely similar to the Pterodactyl, with a high canard supported by two booms, and powered by a Cuyuna.

A hometown company, Northstar Ultralights from nearby Glendale, introduced the Viking, a design

the year

based on the Easy Riser, but strengthened, fitted with a canard for pitch control and powered by a 37hp Kawasaki 440.

Perhaps the most attention getting design at the meet was the new A-10 Silver Eagle from Mitchell Aircraft. It's based on their B-10 flying wing, but the structure is all aluminum, even the wing covering. The control stick has been moved down to a standard position on the floor of the cockpit and a fiberglass pod is standard equipment. The A-10 was fitted with a small (compared to the 30 – 50hp engines used by many other manufacturers) 250cc Zenoah, with the hope of dominating the under 300cc, double-surface wing class.

Among the other designs being shown off at the race were the Cobra, a conventionally tailed three-axis machine in the same performance class as the Eipper MXL; the Ultavia, a folding wing with a canard; the Super Star, a TriStar modified for speed; the Meadowlark, a conventionally tailed three-axis design with an aluminum structure reminiscent of the Lazair; and the Pegasus, an Eagle look-alike. Bill Sadler brought his Vampire prototype and hoped to give a flight demonstration, but ended up being too involved in doing the scoring to get away long enough to fly his plane.

Despite the wide range of performance in the various machines, everyone had a reasonably equal chance of winning because of the number of classes in the race. Class A was for any machine with an engine displacing 150cc or less, mostly weight-shift Quicksilvers with Yamaha engines, though there were a few exceptions, such as Robert Murray's Soarmaster Trike and Dave Kilbourne's venerable Mac 101/Soarmaster-powered Easy Riser.

Class B included 151 – 300cc single-surface wings, such as the Kasperwing and the Eagle, while Class C was for 151 – 300cc double surface wings such as the Vector 610 and the Falcon.

The most hotly contested class at the race was Class D, for over 300cc single-surface wings. This is the class fought over by the hordes of Quicksilver MXs, the Eagle XL, the Rally 2B, the Huski, the JetWing and Bennett trikes and others.

The top class was Class E, for over 300cc double surface wings. A shootout was anticipated between the Eipper MXL, the new Banchee and the Cobra as well as a few other big bore machines.

The ultralights in Class A had to complete eight laps of a roughly 7½ mile (12km) course, while the other classes, being faster, had to do 14 laps. The course was triangular, with pylons at the corners. Observers at each pylon noted the numbers of the passing ultralights on each lap and made sure that no one cut inside the pylon. At the end the scorers checked the sheets from the pylon judges and disqualified any ultralight that didn't complete the full number of laps. Because of the chances of error, a pilot was given credit for a complete lap if his number was noted on at least one pylon.

All of the machines in every class were automatically entered in the rally event. Each pilot had to estimate his average speed over the course. Time spent during pit stops was included in the overall time for the speed events (lowest overall time wins), but for the rally, pilots were allowed to estimate their pit times so they could be subtracted from the overall time. The rally winners were those flyers whose actual speeds were closest to their estimated speeds. None of the pilots were given the length of the course, so to win the rally they had to accurately estimate their airspeed, the effect of any winds and their pit times.

The competition got underway Sunday, with a cloudy sky and a little chill in the air. Soon after the pilots' meeting, the ultralights were lined up on the taxiway, last-minute adjustments were made, flying suits and parachutes were donned and they were waved off, one by one, with take-off times noted by the judges.

It didn't take long for the differences in the various models to become obvious. Some seemed to almost hang in the air, droning along slowly while faster planes howled by like motorcycles passing bicycles. Piloting styles were just as varied. Some stayed wide of the course, making sure they weren't disqualified. Others hugged the course line, boring in on the pylons at low altitude and banking over into steep turns to cut every possible second from their times.

It was a real treat for the crowds, as the ultralights could be seen over most of the course. Even the pit stops were fun, watching the pilots taxi off the runway and quickly shut off the engine so waiting crews could sprint out and push the ultralight to the pit area for refueling. A few gallons of gas and perhaps a pilot change and the ultralight would be back in the race.

As the race continued, the attrition rate began to show. Pilots ran out of gas, engines siezed or lost power and other mechanical gremlins eliminated part of the field of 124 planes. By the end of the race, there were a dozen or two aircraft that were unable to complete their laps.

After the flying part of the event was over, Bill Sadler began the task of feeding the raw results into his Kaypro computer. Using an electronic spread sheet program, he calculated the overall time for each entrant, subtracted the pit times to give the rally times, and then calculated each entrant's race speed and the percentage difference between the actual speed and the estimated speed.

While Sadler was working on this, various flight demonstrations were put on to keep the crowds

continued overleaf

Stateside view

By Glenn Brinks

Mono-Fly Update

Last month we had a flight test on the Onan powered Mono-Fly. As I am writing this, I have just come back from flying the new Rotax-powered version. What a difference! The new engine puts out more than double the power (47hp at 6000rpm) and has a reduction drive as well.

It makes an astonishing improvement in the performance. With the new engine, the Mono-Fly gets off the ground in a matter of seconds and keeps climbing at angles that have it almost standing on its tail. We had some problems with our aircraft altimeter during the test, so we couldn't run a proper series of time to altitude tests, but a quick check with a wrist altimeter borrowed from a skydiver showed a climb rate in the 1000ft/min (5m/s) area, and this is without determining the exact best rate of climb speed or correcting the figures back to sea level.

Top speed is also improved tremendously. The Onan powered Mono-Fly used a standard Hall Wind Meter for airspeed, and it was more than sufficient. With the Rotax, the Mono-Fly is still climbing with the wind meter pinned to the top of its scale at about 60mph (100kph). Before I fly it again, I want to get a good airspeed indicator on it so we can find out just how fast it can go.

The extra power gets the Mono-Fly into speed ranges it could only briefly visit before. Above 50mph (80kph), the elevators get a little bit stiffer from the increased air pressure, and the elevator gets very light. The handling is still extremely docile, but pilots doing a steep, fast approach for the first time may be surprised at the way it takes only a small amount of back pressure to level off and flare for landing. A novice could possibly get into over control problems in that situation, but with the Mono-Fly's gentle handling, would probably not damage anything more than his confidence.

The actual noise level hasn't changed much with the Rotax at full power, but at cruise, the big 503cc twin can be throttled way back. We were able to get a level cruise of 40mph (64kph) at only 4500rpm, or

Greater by the year

continued from previous page

entertained. Jack Britton put on an aerobatic display with his much-modified Quicksilver and a few of the manufacturers took their machines up to show them off. Jim Handbury caught everyone's attention with a parachute deployment from an ultralight. Using a borrowed Quicksilver and a quick-release mechanism, Handbury deployed a chute in front of the crowd. On the first attempt, the quick-release mechanism let the chute go too early. Undaunted, Handbury landed, loaded up another chute, reset the release machanism and went back up again. This time it worked perfectly and the spectators got a good idea of how an ultralight acts when suspended from a chute. After proving his point, Handbury cut the chute away and then landed to a round of applause.

Reaction to the results, when they were announced at dusk, was mixed. The winners were elated, of course, and other team members and friends cheered and clapped, but there were a few pilots who were upset. Of the 124 entrants, only about half were given credit for completing the race. There weren't that many mechanical problems or forced landings — the dropout rate was from ultralights not being shown on the score sheets from the pylon judges.

Some of the complaints were the usual sour grapes from highly competitive pilots. However, some of the disqalified machines probably finished the race, but flew the pylons too high for their numbers to be read or else their numbers were obscured when they did steep pylon turns, so the judges could see only their wing tip.

A few complained about some of the faster ships being overweight and one pilot even thought his engines had been tampered with (he lost two). But most of the flyers were very pleased with the race, even if they wished they had done better.

According to race organizer Bob Caldwell, the Ultralight Pilots Association does listen to all of the complaints and comments and uses them to help plan next year's event.

When all of the pilots had packed and left, and the dust had settled (and in the Arizona desert, there was plenty of it), the records showed that about 5000 people had paid to watch the ultralight air race. After paying the bills, the remaining money from the gate receipts went to help support the activities of the UPA for another year, and an equal amount went to this year's charity, the Muscular Dystrophy Association.

With one project, the local pilots managed to entertain 5000 people, hold a competitive event of national importance, contribute a sizable amount to charity and fund their own activities for another year. I think they're onto something.

just over 40% power. At those low power settings, the noise level drops down to the point where it's hardly noticeable to observers on the ground, and certainly won't irritate those who live near the flying site.

The Mono-Fly was a fun, if underpowered machine with the Onan. With the new Rotax, it becomes a real airplane with truly impressive performance.

Results

Class A (under 150cc)
Robert Murray, Soarmaster Trike, 35.10mph (54.48kph)
Gary McGill, Quicksilver, 29.78mph (47.92kph)
Bob Bowen, Quicksilver J3B, 21.85mph (35.16kph)

Class B (151–300cc, single-surface)
Kent McFall, Kasperwing, 49.17mph (79.11kph)
Chris Caracanas, Kasperwing, 46.62mph (75.01kph)
Erling Olson, Kasperwing, 45.10mph (72.57kph)

Class C (151–300cc, double-surface)
Romauld Drlik, Falcon, 49.26mph (79.26kph)
Dyer/Davidson, Vector 610, 45.75mph (73.61kph)
Ron Snider, Nomad, 38.30mph (61.62kph)

Class D (over 300cc, single-surface)
Lyle Byrum, Quicksilver MX, 54.81mph (88.19kph)
Drisdale/Steinmetz, Quicksilver MX, 53.28mph (85.73kph)
Jack Britton, Quicksilver MX, 53.24mph (85.66kph)

Class E (over 300cc, double-surface)
Noll/Rodriguez, Quicksilver MXL, 59.09mph (95.08kph)
Scott Campbell, Quicksilver MXL, 58.19mph (93.63kph)
Greg Duhon, Banchee, 54.34mph (87.43kph)

Rally Winners
Ron Snider, Nomad, 0.8% error
Dave Brown, Prospector, 1.5% error
Dennis Merrill, Rally 2B, 3.0% error

Overall Winner
Noll/Rodriguez, Quicksilver MXL, 59.09mph (95.08kph)

VJ-24W Gets New Gear, VJ-25 Shelved

Volmer Jensen is still actively flying his VJ-24 and looking for ways to improve it. Recently, he invited me to take his prototype around the pattern a few times and comment on it. He uses a 15hp Yamaha, with reduction drive, so the climb rate won't cause a nosebleed, but that's almost incidental to the really important part of the machine — its handling. I can state with no hesitation that the VJ-24 has absolutely the finest, lightest and best feeling controls of any ultralight I've ever flown.

But it's always had those. The new additions to the plane include a Cessna-type spring landing gear made from a thick piece of aluminum plate, and a steerable tailwheel. The combination works well.

Ground handling is easy and the new main gear soaks up the bumps without letting the long wings get too close to the ground. It's much cleaner looking too. The VJ-24 hasn't gotten a lot of publicity lately because of financial problems with the company that was to produce the kits, but if more pilots could get a chance to feel those lovely controls and the instant response, the VJ-24 would be a very popular ultralight.

Jensen told me he had been experimenting with spoiler controls on the VJ-25, but he gave up the project because spoilers just don't give the pilot the same feel.

Ready-To-Fly Delta Bird

There's nothing like a tail dragging biplane for getting back to the basics of flying. Bob Hovey designed the Delta Bird with that in mind and came up with a fun little sports machine with snappy response, especially in roll with its short wings. Hovey sold plans and Ken Knowles sold kits. Now Eddie Rakestraw at El Mirage Airport is producing ready to fly Delta Birds. They are finished to customer order and cost about $7000. Quality is first rate and they're a delight to fly. It looks like they will be very popular with pilots who can't afford general aviation airplanes, but want something more airplane-like than most ultralights.

Visit to the UK

As Norman mentioned in last month's *Flightline,* I am planning a trip to the UK, probably in late May, early June. The plan is for me to do a number of articles for the US aviation and ultralight magazines on flying conditions and regulations, interesting models of ultralights and homebuilts, fly-ins and competitive events (such as the BMAA fly-in and the Lands End to John O'Groats rally), and of course, on people — flyers, manufacturers, etc. Norman Burr has generously offered to help co-ordinate the trip, so if you have any ideas for things that would be of interest to flyers in the States, please let him know.

Thoughts on drives

Reduction drives have made a great contribution to the standard of performance of most microlights today. PETER LOVEGROVE talks about the whys, wherefores and please-don'ts of this vital set of components.

To anyone who has been involved with microlights from the early days, the reasons for using reduction systems are obvious. However, because we have so many new devotees, let us just recap quickly.

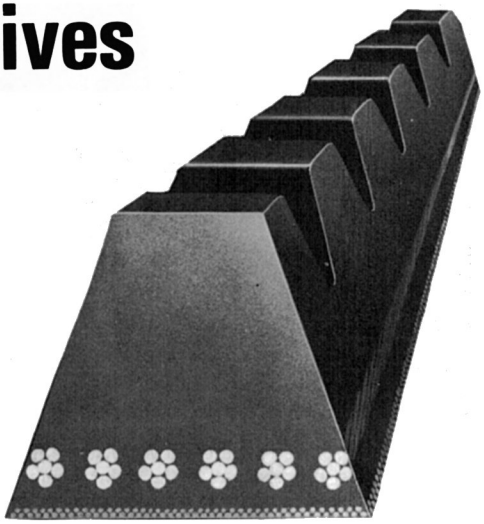
Small-diameter propellors, rotating at high speeds, are inefficient. That is to say, you generate the power at the engine but do not convert it into thrust. The reasons for this are manifold and could merit an article on their own. Suffice it to say that wee propellors, with their tips belting round at near-sonic velocities, are bad news.

On the other hand, large-diameter, slow-turning propellors give a much better performance. If, for example, you swap from a 36in (900mm) directly driven propellor doing 6000rpm to a 60in (1500mm) propellor driven through a 2.5:1 reduction, at 2500rpm from the same engine, you might expect typically a near doubling of the thrust.

So reduction systems are basically good news. What types are there to choose from? We could use any of the following, at least in principle:

1 Flat belts.
2 V-belts.
3 Notched V-belts.
4 Micro V-belts.
5 Toothed belts.
6 Gears.

Looking at each of these in turn, the flat belt is not really suited to our applications, because of our typical speeds and requirements of pulley design. There are some very clever recent innovations on flat-belt technology but none that will significantly alter our rejection of these belts for the present.



This Goodyear HY-T wedge belt (or notched V-belt) is an example of the type sometimes erroneously called toothed belts. A proper toothed belt engages in a toothed pulley; on a wedge belt the teeth are simply there to allow it to follow the tight radius of a small V-groove pulley without loss of grip or over-heating.

V-belts are, of course, the most commonly used on current machines. They are not too expensive, easy to use and maintain, and generally pretty tolerant of abuse. They do tend to pick up grit and abrade the pulleys but that is the price for simple

The Kolecki folding propeller

Jerzy Kolecki has sent us details of his universal folding propeller. Basically this is exactly what it sounds like: a propeller which is available in various diameters, which is available for clockwise or counter-clockwise rotation, which folds backwards when the engine is off, presenting very low drag, and which opens out as power comes on and its drive-shaft speeds up. It is available with or without ground-adjustable variable pitch, so that one can optimise the pitch setting for the particular engine/aircraft combination with which it is used.

The blades are of light alloy, anodised in a choice of colours. Prices in US dollars range from about $95 for a 1m (40 in) diameter propeller, without adjustable pitch, to about $145 for a 1.5m one. The inclusion of an adjustable-pitch hub adds about $15 to the price, whilst the folding feature costs about $35 extra. (These prices are obviously dependent on the rate of exchange and a further sum must be added for air-mail costs.)

Jerzy's principal interest is in powered hang-gliding rather than triking or other forms of micro-light flight, but it would be interesting to see how his propeller performed on a trike. Is anyone using one in the UK?

Again aimed at the powered hang-gliding scene,

installations. They also tend to run rather hot. Generally, though, they more than justify their popularity at present.

Notched V-belts have small regularly pitched cut-outs on their inner peripheries. These allow the belts to flex more freely, to follow smaller-diameter pulleys more readily and to run cooler. Because they follow smaller radii better, they give better grip and torque transmission for a given belt size. One would expect to see their use increasing greatly on future microlights.

The micro V-belts are rather like a multiple belt but with Vs whose heights are measured in fractions of millimetres, rather than tens of millimetres. They are excellent torque transmitters, are smaller and more compact than their normal V-belt counterparts. For my money, however, their disadvantage is that the required surface finish of the *new* pulleys is quoted in microinches. With the dirty, dusty, gritty field environments which we tend to use in the main, that sort of finish will not survive long. The performance then starts to depend on increased belt tension, with consequent undesirable bearing-load increases, etc.

Toothed belts are, in my experience, better suited to clean environments and hard-steel pulleys. I used, for example, a 3in (76mm) wide, 10mm pitch belt, to transmit 12hp. The driver pulley was of hard steel and the driven pulley was of hard-anodised (aircraft standard) alloy. The system was partially protected — though not completely — against the effects of dust and grit. In spite of this, the alloy pulley was very badly worn in less than 6h of use, and that in short bursts of about 1 to 2min. The grit picked up by the belt cut away the profiled corners of the teeth of the alloy pulley. The teeth, then being of non-conforming shape, began to wear the profile of the belt teeth away, which allowed more freedom for relative movement between teeth and belt and for pockets of grit accumulation — and so the process escalated.

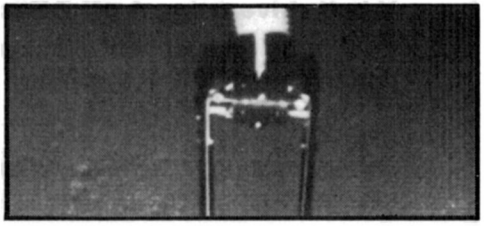
If a 3in belt at 12hp and 2.5:1 ratio, with 2200 rpm on the high-speed input end, behaved like that, what price 2in (50mm) belts, with 6000 input rpm and 20 to 50hp? No, for my money, forget toothed belts.

Gears I consider are a much neglected approach, mainly because they are probably beyond the engineering resources of most of our manufacturers and may require some development work, which belt-drives do not. But when you consider how many gear-drives are, and have been, in operation on motorcycles, where's the problem? For single-cylinder engines particularly, one has to make provision for absorbing the power variations. But if it could be satisfactorily done with beasts like the old Sunbeam long-stroke, the Norton and, more recently, brutes like the magnificent Jota, shouldn't we be reaping the benefit of gears too, especially with lovely twins like the Fuji 330 and 440? All that is required to absorb the pulsations from single-cylinder engines is the usual toothed-rubber blocks set into the take-off drive gear. One can buy these commercially, so it would not be too difficult or expensive to produce a geared reduction system. With twins, it may not even be totally necessary to have a shock-absorbing unit in the drive gear, although prudence might suggest it.

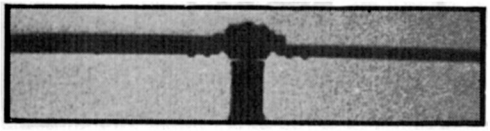
How about it, you manufacturers — when can we expect a set of reduction gear which really merits the title? It is high time we chucked aside some of the grotty plummer-blocks (many of those I have seen are not even high-quality industrial types), the bog-standard pulleys and bits of alloy plate and washers etc as spacers. If just *one* manufacturer set himself up to good geared conversions of popular single and twin engines, basing the conversions on a set of standardised components, the overall units would be no more expensive than present-day belt systems, a heck of a lot more airworthy and much less demanding of maintenance.

Jerzy produces his Motolotnia 80 'White Eagle' power pack, with which he claims to have obtained 104 lb (47kg) of static thrust and over 110 lb (50kg) when finely tuned. It uses a McCulloch engine and a standard commercial two-blade propeller which he supplies, and presumably could be grafted onto a trike unit without too much trouble.

For further details write to Kolecki New Aviation Engineering, Box 1046, 122 22 Enskede, Stockholm, Sweden.



The pusher version of Jerzy's prop: top right, still; lower right, starting; below, rotating.



Trike rigging dimensions

By Peter Lovegrove

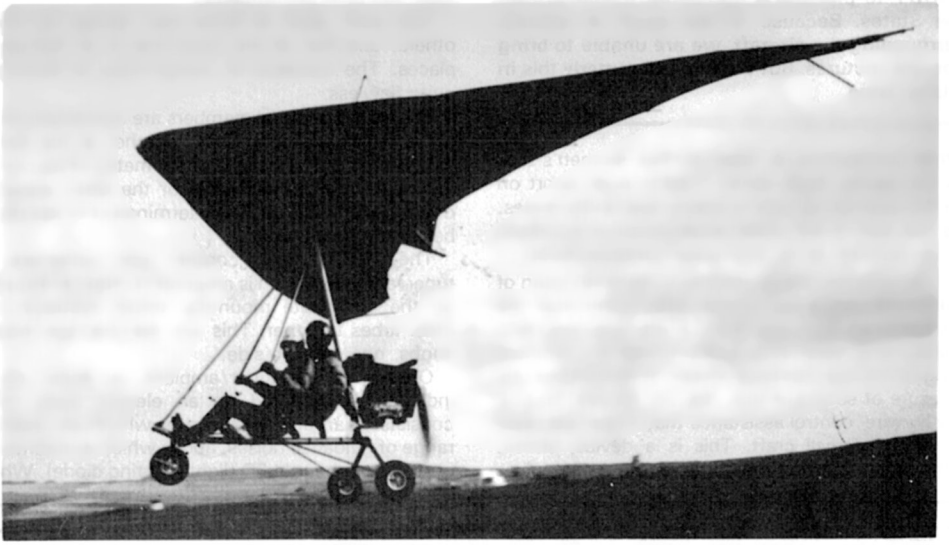
Ollie Houldridge has asked if we have any information about the lengths of the various cables on the Scorpion Rogallo wing. He considers — quite rightly — that the only way to be sure that one's machine is correctly rigged is to have a set of reference dimensions with which to compare the actual cables. That way, you know that the dihedral, billow and general safety of the machine are up to the mark.

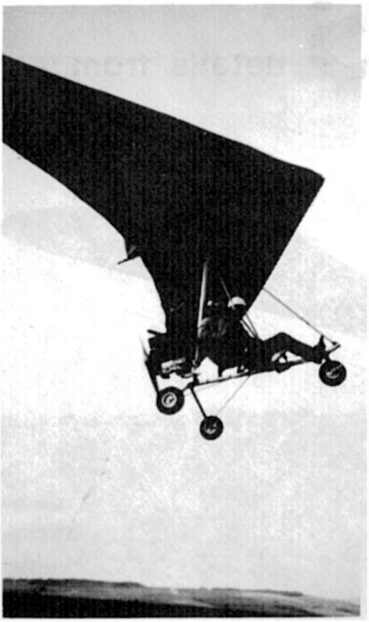
I thoroughly agree with Ollie on this point; I have a Scorpion Two on which the cables from the spar-ends to the kingpost are rather slack, but it *could* be the ones from the A-frame up to the spar-ends which are stretched. I really don't have any way of knowing. What concerns me is that the slackness in the top cables, which appears just about tolerable, is almost certainly not tolerable at all. The reason for this is that the extent to which the kingpost must move *vertically,* in order to remove a fairly modest amount of slack *along* the cables, is very much greater than one might imagine. When you stop and consider how short the plug is on which the kingpost locates, it is easy to see that it could probably come off altogether, since it only remains there because of gravity, if the cables are slack. Unlike early hang-gliders, which had a rigid spar, modern gliders have two-piece spars which *have* to have the upper and lower cables to brace them safely. With the kingpost out of position, and the upper cables no longer doing their job, the whole rigging of the modern glider is at risk. Merely adjusting the cable-tensioner, without knowing why it has become necessary, is not a satisfactory procedure.

So, will the Scorpion manufacturer, and those of other hang-gliders, supply us with information about the rigging of their products, for publication in Flightline? This is no sort of give-away of commercial information; after all, it can readily be obtained by measuring up a new machine. In fact, if we cannot get the data any other way and readers still want them, we will have to rely on this approach. For my part, however, I would prefer to see manufacturers showing a responsible and caring attitude and giving this sort of maintenance information — for that is what it is — rather than users having to take the other approach. I feel certain the CAA would be delighted to see pilots being given more information than at present, about the careful use and upkeep of our relatively fragile craft.

ULTRA SPORTS

SOLAR WINGS





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Solar Wings,
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Marlborough,
Wilts.
SN8 1NG.
(0672) 54414.

Flight test: The GRLY

This issue we are taking a break from our regular series of flight tests to allow BILL FODDY to preview a top secret machine from the States. Because of the cloak of secrecy surrounding the aircraft, we are unable to bring you any pictures, but we hope to remedy this in a later issue.

Whilst not wishing to tread on Paul Bennett's toes as the regular flight tester, I feel I must report on recent experiences with a unique type in the States. As this craft is still under development it is unlikely to be reported on by your usual correspondents.

The hardware was produced by the WM Corpn of Wisconsin and is designated GRLY. Although the company has built only three of this type they have spent many years on a sophisticated development programme and the latest model, on which I had the pleasure of several flights, has the nearest thing to 'fly by wire' control assistance that I have ever seen on such a small craft. This is a device, which, although still leaving the controls to the pilot, gives him continual feedback on flight behaviour and informs him of any correcting action which should be taken. The result is a much enhanced quality of flight and pilot performance.

The craft itself is three-axis, similar to most others, and has all the usual bits in all the usual places. The standard of construction is however, quite flawless.

The main structural members are two longitudinal tubes which are connected together at the front, where they are of very large diameter. They curve gracefully, one to each side of the pilot, swaging down in diameter, until they terminate in a neat shoe below the power unit.

The GRLY flight control unit comprises a tuner/amplifier which is mounted in front of the pilot on the composite mounting which connects the main tubes together. This unit has just two tuning knobs, one on each side.

On top of the tuner/amplifier an audio visual indicator is mounted on an elegant stalk. This consists of an audio attenuator which can make a range of guidance noises, above which is mounted a port and starboard LED (light emitting diode). When

properly tuned in by turning the knobs on the tuner/amplifier, the audio attenuator emits a continuous, pleasant hum, whilst the LEDs, which flash erratically when tuning commences, flash steadily in synch and then shut down completely when perfectly tuned. Of course the unit has to be turned on and tuned on the ground otherwise control errors in flight will not be properly signalled.

After tuning, and only then, is it possible with this equipment to insert the control column into a special socket between the main tubes.

There are two other features of this craft which make it truly unique. One is that the pilot is in the prone position as with a hang glider, and the other is yet another variation in control application, in that the control column is operated in 'push/pull' (push for tail up, pull for tail down). Pitch response is further enhanced by the fore and aft use of weight-shift.

Aged ex-radio control enthusiasts may recall a surprisingly similar system to this being demonstrated on the dunes near Yarmouth back in the early '50s, known as ANG. It used dipole aerials and similar tuning methods, but was much too expensive to catch on at that time.

Having been persuaded to take the whole baggage to the other side of the airfield where I could concentrate undisturbed on the tuning aspect before flying, I very quickly got a good feel and decided to try a flight with no more ado.

Unfortunately my enthusiasm ran away with me and nearly caused an early disaster. After a rapid roll I left the ground very quickly; my reaction to this was to push my weight forward, which I did rather sharply. The tail came up equally sharply and I bumped the ground rather hard, wrenching the control column out of its socket in the process. I was thrown in the air by the rebound, and when I picked myself up I was horrified to see that the main tubes had somehow closed together.

The control unit was thrown completely out of tune and turn the knobs as I would I could not stop the staccato howl and flashing LEDs.

Fortunately, still being alone on the far side of the airfield I had the presence of mind to think back to the ANG radio control unit with which I had a similar mishap on the dunes in the form of a 'sand blast', in which I discovered then that the only way to retune ANG was to switch off for a few minutes to give the circuits a quiescent period, after which the unit could be retuned perfectly once more.

I tried this with GRLY with an equally satisfactory result. I rapidly retuned and was gratified to note

Colibri requirements

Bronze

1. 20h solo on microlights including at least 50 logged flights.
2. Three precision landings within 10m of the centre of a given spot.
3. One precision landing within 20m of the centre of a given spot from a height of 300m (1000ft) AGL with the throttle fully closed. Demonstration of correct go-around (overshoot) procedure.
4. Two 75km cross-country flights over a triangular course, one with an outlanding at a designated point along the route.

Silver

1. 100h on microlights including at least 200 logged flights.
2. Two flights to approx 300m (1000ft) AGL stop engine(s) complete a 360° turn and land within 5m of the centre of a given spot.
3. Four 150km cross-country flights with any landing or turn points pre-declared. The courses may be straight, dog-leg (one turn point), out and return, or triangular (two turn points).

Gold

1. 300h on microlights.
2. Have competed in two national or international microlight competitions conducted in accordance with FAI rules.
3. Complete a tour of at least 500km in length flight plan within seven consecutive days, the route to contain at least three control points which the aircraft is observed to overfly or where a landing is made. Only the final landing of the tour may be made at the initial departure point.
4. Hold one of the following: (1) national microlight instructor rating, (2) national microlight record (or have held such a record), (3) national microlight seaplane rating plus two 75km cross-country flights on a seaplane, (4) national alpine rating.

We want you

By Ann Welch, President

The Microlight Colibri

The Colibri is a hummingbird, and is the international symbol of a microlight pilot. From now on you will be likely to see it more and more, either on FAI microlight documents or as a neat little pin in a pilot's lapel. This may be a Bronze Colibri, a Silver Colibri, or a Gold.

To gain your Colibri you need to prove yourself as a pilot. For a bronze the standard is similar to the flying for a PPL D, so if you already have a PPL D you may be eligible to apply for your bronze (details in box).

The silver is more difficult, with the emphasis on cross-country flying. You have to do four of these, each 150km in length. The object is to show skill in flight planning and good navigation; it is not to create an endurance record with your microlight hung around with spare fuel tanks. You can land anywhere on the course – which may be straight, dog leg, out-and-return or around a triangle – provided all the points at which you land, or turn, to achieve the distance, have been declared before you take off. You can do it even if your fuel tank is small.

The Gold Colibri will be the sign of a really good pilot and it should be fun to go for. Again the emphasis is on flying cross-country; this time to plan and fly a tour of 500km which you have to complete within 7 days. Again you can have as many intermediate landing places as you want for refuelling – or sleeping under your wing – but the course you choose must contain at least three control points at which you land or are observed to overfly.

In addition to making this tour you need to have competed in two national or international microlight competitions to FAI rules, and hold one of the following – you choose: a national (BMAA) instruc-

Flight test

continued from previous page

that the main tubes had also returned to their correct position.

Taking care not to rush things a second time, I re-inserted the control column and went gently off. I was soon at a good height and investigating the response of the GRLY to my control inputs. Too much weight shift forward and the LEDs would flash rapidly together, too much to one side and one or the other would flash, instructing me to move over. The audio tone varied according to control input, but the noise was sometimes drowned by the engine.

On descending the audio tone rises and falls rapidly, the ground input being sensitive enough to use it within a few inches of the grass.

My conclusions, after several flights, were that GRLY is in a class of its own in almost every respect. It was possible to fly with the control unit switched off, but the performance then became quite ordinary. Once used to having the unit tuned in, there really is no other way to fly. The potential opened up by this unit is tremendous; night flying is not only possible, but becomes an experience in itself, particularly in moonlight. The cost though will put it out of the range of most of us.

to get the bird!

tor rating *or* a national record (or have held one) *or* a microlight seaplane rating plus two 75km cross-country flights on a seaplane *or*, for pilots who live far from the sea, a national alpine rating.

So how do you set about getting the Colibri to wear on your jacket or flying suit? This at the moment is more difficult to answer. First of all BMAA has to set up a national register of badges as required by FAI to provide a permanent record of your achievement — useful if you lose your pin. For a bronze all that will be necessary if you have a PPL D is to fill in the BMAA Colibri application form with the details, number of your PPL D etc and send it to BMAA with enough money (probably £2) to cover the bronze lapel pin; but do not send any money yet as the pins are still being made. If you only have a PPL A you will have to do the required flights on a microlight, but you should not find this difficult.

The FAI cannot ratify the Silver and Gold Colibri levels until its general conference in September, so you could not be awarded these badges before then, but there is nothing to stop you getting the various qualifications and having them signed up on your form by an official observer in anticipation.

Observers

At present BMAA is in the process of setting up an observer scheme for record and competition purposes as well as for Colibris, so there are not yet many around. Instead the signature of a qualified BMAA instructor or a BHGA or BGA registered observer are acceptable.

There are, of course, conditions attached to the qualifications which observers must check.

1 The pilot must be alone in the aircraft for all tests, except for the 100h for the silver and 300h for the gold, where dual or passenger carrying may be included.

2 Any flight may count for any badge or qualification for which it fulfils the requirements, but Colibris may be awarded only in the correct order — bronze, silver, gold.

3 A precision landing is defined as a touchdown/staydown landing with no damage to aircraft or pilot. Distance from the spot centre is measured from the touchdown/staydown point of the main wheels.

4 No barographs are required, nor is photographic evidence. Nevertheless if a pilot wishes to use either to help support his claims he can do so.

5 Important; each leg of a cross-country flight must be completed within not more or less than 15% of the pilot's calculated flight time for that leg.

Gaining Colibri Qualifications Abroad

If, during an international competition, you complete any qualification (eg a 150km cross-country), the organisers of the competition are permitted to give you documentary evidence to this effect. On returning home you keep it with your Colibri application form until you have completed the other requirements; then you send it to BMAA to obtain your certificate and pin. This year the organisers of the ULM-83 rally, the Round Belgium rally in May, and the French Grand Prix and London to Paris event are already set up to do this, and will be presenting Bronze Colibris to those who qualify during the competitions. If you gain your bronze this way (even though you do have a PPL D) do not forget to send the paperwork to BMAA otherwise your name will not be on the national register.

In future the Silver Colibri, for example, may be made the minimum requirement for entry into an international competition.

FAI will keep an international register of the first 50 golds to be awarded. It would be good if some of the names were British.

Competition notes

By Gerry Breen, Competitions & Events Chairman

Thank you for the tremendous response to my plea for assistance and entries for the London-Paris and Grand Prix. One great dilemma seems to be the number of people wishing to enter but who have little or no flying experience. Please, please be realistic — if you have less than the requirements for a competition licence (100h minimum), the events will simply be too tough for you. Those appropriately qualified can obtain entry forms from me, which should then be completed and sent with the entry fee to France. Fees are London-Paris Fr3000, Grand Prix Fr3800. Bear in mind this includes accommodation, food and fuel en route.

On another note, I've been asked to form a Flying Circus for major events in the UK. Entries are invited from the pilots and the trade, stipulating pilot experience, aircraft type and availability. Again please, we need a minimum 100h experience.

Would any clubs able to help in ground work for events in their areas, please contact me. We shall need assistance for London-Paris and other events.

More competition news p8–9

Training notes

The First Step

By Brian Cosgrove, Training Committee member

The BMAA Council members coming in to office last November were left in no doubt as to what was expected of them, namely, fruitful discussions with the CAA on aspects of legislation which were stifling the sport and industry but were in no way essential to flight safety. In fact the legislation in some instances could be detrimental to safety.

One of the issues was the requirement that microlight pilots must sit PPL(A) Group A examinations to obtain their Group D licence. The 'carrot' dangled here was the fact that on progressing to Group A aeroplanes the microlight pilot would not have to take a further examination. This philosophy missed the point on two counts.

Countless pilots of trikes and other unsophisticated aircraft had no more intention or desire to progress to Group A aeroplanes than they had of flying to the moon. Their only concern was to fly unimpeded around their own locality as they had done in the past. Again, any pilots having the yen to progress to Group A soon met up with pilots in that category coming over to microlights for cost reasons. This quickly dashed their aspirations.

The situation was thus. The vast majority of PPL D candidates were faced with having to acquire and absorb knowledge they would never use, simply for the sake of passing an examination. Furthermore, the Group A papers failed to ask many questions peculiar and essential to microlight flight — particularly as far as navigation/meteorology was concerned.

Now anyone in the job of training knows that training for training's sake is wrong and never more so when human life is at stake. A change was imperative. To this end the matter was put most strongly to the CAA — along with other equally or even more important issues. The authority responded immediately and agreed to examine the test papers used by the BMAA previous to 1 September 1982 and since updated by the Training Committee.

I am delighted to report that as a result of these discussions, papers on Principles of Flight, Navigation, Map Reading and Meteorology specific to Group D applicants are at the time of writing (11 March) being printed for use in place of existing Group A papers. They have been produced jointly by the CAA and BMAA and they fully satisfy the 'KISS' philosophy*. Only Air Law will remain at PPL Group A standard.

One point must be made clear. In the event of a Group D pilot wishing to progress to Group A, then the Group A examinations will have to be taken except for Air Law.

Particular thanks must go to 'Timber' Woods, Mike Kemp (of precision flying competition fame) and Jim Clarke of the CAA with whom I worked on the project. They showed a keen interest in our world and readily accepted our viewpoint once validity had been proved. They went even further by contributing good microlight questions themselves, on ascertaining the level at which we were trying to pitch the standard.

There are other bridges to cross but if the same co-operation is forthcoming then maybe we can all look forward to a much brighter 1983.

Meanwhile all you who are in hiding or have given up — come back! You no longer need a nav computer nor will you need to master anything other than the essentials you should know to fly a microlight aircraft happily and safely.

* *KISS philosophy — Keep It Simple Stupid!*

BMAA Instructor Workshop

By Tim Williams & Dave Garrison, Training Committee members

The current body of Group D instructors obtained their ratings under the grandfather clause. Under these circumstances it has been extremely difficult to ensure that all students are receiving instruction of a desirable standard.

The BMAA have been given the task, on behalf of the CAA, of operating a scheme to test and examine instructors for the issue and renewal of ratings in Group D. All instructors will eventually be examined by a CAA approved flying instructor examiner.

In the short term, however, there is an urgent need to verify that all those currently instructing are doing so in a professional manner. The BMAA training committee is therefore arranging a series of instructor workshop/seminars where techniques, course structures etc can be discussed and agreed.

It is vitally important that all instructors make an effort to participate in these seminars. We must demonstrate that we can achieve a uniformly high standard amongst Group D instructors without further controls being imposed from outside.

These seminars are a genuine effort to ensure that all BMAA instructors presently rated will have their ratings renewed; currently many instructors fall short of requirements and it is to this end that we need your support. The seminars will be held at the new BMAA centre in Telford (for address, see *Secretary's letter),* running for two days. Flexibility will be the keynote, with structured discussion taking the larger part of the time available. Instructors are being contacted individually with further details of the seminars, but in the event of any difficulty, contact Ian Stokes on 056686 514.

Secretary's letter

By Ron Bott

Thank you to those who sent letters to their MPs on receipt of the last magazine. You will be interested to know that a meeting with the chairman of the Sports Council resources committee has been arranged for 18 April. Your Chairman, Treasurer and I will be at this meeting and you will be kept informed of any developments. As we must rely on self-help this year, you are again asked, no, urged, to try to enrol a new member each this spring. There is a lot going on this year and we want you all to participate in the growth of BMAA and the microlight movement.

This letter is being written at the Popham Microlight Trade Fair at which we have seen some tremendous flying and improvements in aircraft. Next week we shall be doing recruiting at London's Wind & Surf 83.

Legal Eagles

Our Treasurer, John Wincott, is searching for members who may be or have been members of the legal profession and who could assist BMAA or its members in any legal wrangles that may appear. Would any such members kindly contact John either through BMAA office or on his telephone number on the *Contents* page. It gives me considerable pleasure to state that in recent dealings with CAA, it has become very evident that they are much more understanding of microlight problems, especially those of weather restriction. Let us hope that this co-operation can be maintained and improved. Microlights *are* magic!

Fresh Approach to Registration Scheme

At the last Council meeting the BMAA's Registration & Approval Scheme was revised in the light of various criticisms which have been made of it since its introduction last year. The four categories of School, Club, Manufacturer, and Dealer have been revised into two, Affiliated Club/School and Registered Manufacturer/Dealer, and the costs have been rounded down to £15pa and £50pa respectively.

Another change is that Approved status has been dropped; the scheme is now simply the BMAA Registration & Affiliation Scheme. Participants in the revised scheme will not only continue to get the *Yellow Pages* entries and preferential advertising rates in *Flightline,* but they will also receive abridged copies of minutes of BMAA committee meetings, plus technical and safety bulletins. All in all, the scheme now offers more return at less expense, and we hope that companies and clubs will respond by joining in large numbers.

From the members' point of view, the codes of conduct which bind participants remain substantially unaltered, so you still have the same protection against getting ripped off.

If any member has a complaint against an advertiser in *Flightline,* contact the magazine or the BMAA office immediately; the same applies to complaints against any other organisation offering a product or service for microlighters.

New BMAA Headquarters

The BMAA is moving to new offices in Telford, which will be completed by the time you read this. The address will be: **BMAA, E7 Stafford Park 4, Telford, Shropshire (Tel 0952 616666).** Note that the address for *Flightline* remains as now. The office is part of a small factory unit which will also be used as a centre for microlight ground instruction and for seminars on safety and other subjects. The new extension of the M45 from Telford to the M6 near Walsall will mean that BMAA will only be 20min from Birmingham and very accessible from all parts of Britain. The new motorway opens this summer, amid a blaze of publicity that we hope to be part of. The Weston Park 'Lift Off 83' will be just down the road from Telford, provisionally on 30 July. This should be a very good event for Midlanders.

Getting Started

Thank you, Craven club, for an enjoyable evening. Other clubs please note that BMAA Council members are always willing to come along to meet your members. All that is asked is a small contribution for petrol costs which should be sent, not to the individuals, but to the BMAA Treasurer.

New members to BMAA are being sent a letter of welcome written by our President, Ann Welch OBE, who, for those of you unfamiliar with her name, was among the pioneers in certain aspects of flying, is very respected in international aviation, and certainly is endowed with the spirit of freedom and enterprise which is what microlighting is all about. Flying for pleasure on a budget and having the freedom to do so without filling in endless forms has long been Ann's forte.

The first task of a new member of BMAA is to make contact with a club. Go along, introduce yourself and sort out the ways to commence training. If there is no club in your area, then go along to the nearest one, see how they run theirs, then go home and start your own. Details of how to start a club have been given in earlier editions of *Flightline.* If in doubt, give us a ring. We will assist.

This is the time of the year to get your training sorted out. A lot of the paper work can be done at home around the kitchen table. Get your spouse to

quiz you on the exam questions, you may find that he or she has hidden talents that you never knew existed — microlights may bring a new dimension to your marriage!

I will leave you with the thought that to see the shining light in the eyes of a person who has just had their first microlight flight, will remove any doubts you may ever have had about flying one. Happy landings.

Ron Bott
E7 Stafford Park 4
Telford
Shropshire

Contact

Tiger Cub Club

Everyone interested in the Tiger Cub now has the chance to join a club which is being formed specifically for devotees of the MBA product.

Iain Barr of Midland Ultralights, himself a Tiger Cub dealer, is behind the idea. The club will be run on a non-commercial basis and will be represented at the Leicester MAC fly-in on 14 – 15 May.

Anyone interested in joining should contact Mrs M Barr at the address on p4.

Microlight Aviation Club

MAC covers the whole of central and southern England and is one of the largest and most active clubs in the UK. Prospective members can obtain details from Paula or Mac Smith at any time on 0202 822486. The club runs a BMAA training school based on Popham airfield near Winchester, and arranges monthly fly-ins from various sites throughout the South, plus regular interesting monthly evening meetings with films, talks etc. In addition

Calendar

Would all clubs and other organisations planning events, please note that the *Flightline* office is acting as a clearing house for dates, to ensure that there are no clashes. So please don't publicise an event without checking the date with *Flightline* first. Dates marked * are provisional.

15-17 April: Microlight Symposium at Bristol University, sponsored by RAS and BMAA. Details from D S Wilde on 0272 24161 extn 695.
12-15 May: First international Rally of Belgium for microlights, organised by the (Belgian) Microlight Federation and the Flying Circus. Details from Organising Committee of the Tour de Belgique, 33 rue Defacqz, 1150 Brussels, Belgium.
14-15 May: Leicestershire MAC fly-in. Details on 0533 863310.
14-15 May: Biggin Hill airshow including microlight flying display.
28-30 May: BMAA fly-in at Woburn Abbey ground, Bedfordshire. Details from Gerry Breen 060872 413, or BMAA Secretary on 065477 235.
12-18 June: Lands End to John O'Groats rally. Details from John Wincott on 0533 863310.
24-26 June: Second Annual EAA International Ultralight Convention, Oshkosh, Wisconsin. Details from EAA, PO Box 2591, Oshkosh, Wisconsin 54903, USA (tel 414 233-1460).

there are regular social events and a monthly news letter.

The club is organising a full calendar for 1983, so if you want real involvement and to meet other genuine keen microlight enthusiasts in a very friendly environment, then MAC is for you.

Wealden Microlight Flying Club

Wealden now has around 30 members and 10 pilots, but as yet no regular flying site for circuit training. Anyone interested in joining the club, or who thinks he can help with sites, should contact Andrew Gardner, PO Box 55, Ide Hill, Sevenoaks, Kent (tel Ide Hill 216).

Craven Microlight Flying Club

Craven club is now well and truly in business following a highly successful first meeting at the Tarn House Hotel, Skipton, which over 100 people attended. The club is anxious to attract both weight-shift and three-axis pilots and is likely to be co-operating with Bradford Hornet Flying Club and other local clubs when organising events.

Craven's secretary is Richard Dover, 26 Burnwells, Thackley, Bradford BD10 0SD (tel 0274 615876). Prospective new members are welcome to contact Richard, or simply turn up at club meetings at the Tarn House Hotel on the first Monday of each month.

North Bucks Microlight Club

Talks between the North Bucks Microlight Club and the nearby Upper Hayford air base have resulted in an agreement being formed regarding approach paths etc. The military authorities were worried about the relative unmanoeuvrability of a jet when committed to landing and were anxious to ensure that F111s and microlights kept out of each other's way. The club has agreed not to fly above certain altitudes on the approach paths without first phoning the base.

Bradford Hornet Flying Club

Bradford Hornet Flying Club celebrated its first birthday on 2 March and the following officers were elected: chairman Graham Priestley, secretary/treasurer Jim Kirby, training officer Richard Wolfenden, safety officer Chris Parkinson, public relations officer Brian Berry, events officer Harry Hunt.

25-26 June: Airsports Weekend (including microlight competitions) at Chasewater Park, W Midlands. Details from Airspeed Aviation, Nottingham Airport, Tollerton, Nottingham NG12 4GA (tel 0602 817626).
13-25 July: Grand Prix de France for Microlights, details from Fenwick General Medias, 67 Avenue de Wagram, 75017 Paris (tel (1)763 1211).
Week ending 17 July: Horsham Festival Committee invite microlights to participate in their aircraft exhibition. Details from L N Price at 14 Potters Croft, Horsham, West Sussex RH13 5LR.
30-31 July: Lift Off '83 microlighting and ballooning air display at Weston Park stately home near Telford, Shropshire. Details from Micro Aviation, Building 4, Stanmore Estate, Bridgnorth, Shropshire WV15 5HP (tel 07462 61013).
30 July-6 August: Oshkosh '83: 31st Annual International EAA Convention & Sport Aviation Exhibition, Oshkosh, Wisconsin. Details from EAA, PO Box 229, Hales Corners, Wisconsin 53130, USA (tel 414 425-4860).
***7 August:** *Yorkshire Post* stately homes rally from Leeds to Bridlington. Details from Bob Schofield, Yorkshire Post, Wellington Street, Leeds LS1 1RF.
27-29 August: Popham MFC fly-in at Popham near Winchester. Details on 0256 75733.
1-15 September: First ULM Rally of Tunisia. Details from Promo Sud, BP 01, Aniane, 34150 Gignac, France (tel 6757 4024).
3 September: Northamptonshire Police Open Day featuring microlight flying. Contact microlight co-ordinator Iain Barr at Midland Ultralights (address on p4).
3-6 September: London-Paris Microlight Competition, starting from Biggin Hill aerodrome. Details from Fenwick General Medias, 67 Avenue de Wagram, 75017 Paris (tel (1)763 1211).
10-11 September: Norfolk Air Race. Details from Kelvin Woodward on 0603 49934 (home) or 721340 (work).
24-25 September: Leicestershire MAC fly-in. Details on 0533 863310.
November: BMAA AGM at Wolverhampton Civic Hall, West Midlands.

For Students of Meteorology

The following meetings have been arranged by the Royal Meteorological Society. Unless otherwise stated, all enquiries should be addressed to the RMS at James Glaisher House, Grenville Place, Bracknell, Berks RG12 1BX (tel 0344 22957/8).

22 April: An evening of met films at the geography department of the University of Edinburgh, High School Yards, Edinburgh; 5.00 for 5.30pm.
23 April: Meteorology for Amateurs, one day discussion meeting at the Blackett Laboratory, Imperial College, Prince Consort Road, London SW7.
27 May: Visit to the Newcastle Weather Centre.
23 June: Visit to the Meteorological Office Radar Research Unit at the Royal Signals & Radar Establishment, Malvern, Hereford & Worcs. Enquiries to J Kings on 021-472 1301 x2796.
***8 October:** Weather & Outdoor Activities one-day discussion meeting at RMS headquarters.

Small ads

Small ads are free to BMAA members advertising *privately,* all business ads and non-members' ads £3; maximum 30 words in every case. Box number £2 extra. Please make cheques payable to BMAA and send with ad wording to: Flightline, Oak Cottage, The Green, Wennington, Near Lancaster LA2 8NW.

Aircraft for Sale/Wanted/Exchange

HUNTAIR PATHFINDER Only 2h airtime. 440cc electric starter engine. Red and white. Complete with trailer £2750. (Cost £4000 new). Phone 01-686 6487 or 01-300 5411. *(4/1)*

SOLAR STORM/250 TRIPACER. Trike as new, 3h only and not yet run-in. All in excellent condition, £1200. Phone Braintree (0376) 23773 (Essex). *(4/2)*

HIWAY SKYTRIKE 250 Fuji Robin (less than 2h flying time). Demon 175 wing, registered, £1550 ono. Phone 024267 3095 evenings/weekends (Glos). *(4/3)*

MIRAGE MKII Kawasaki 440cc engine, electric start, wheel spats, long range tanks, steerable nose wheel, complete with its own hangar all in PRIME condition. Any sensible offer considered for quick sale. Tel J Metcalfe 01-236 5211 daytime or 030382 2453 (Kent) w/e or evenings. *(4/4)*

ROBIN 440 twin cylinder **SKYTRIKE DUAL SEATER,** complete with Flexiform Sky Sails wing (low flying hours). Registered. £2000 ono. Willing to demonstrate. Tel 0704 840241 (Lancs) or 051-526 0576. *(4/5)*

SWAP MY CLASSIC CAR (1964 Sunbeam Alpine IV GT) for your microlight? Interested — telephone 01-353 8628 daytime or write Mark Pritchard, 28 Addison Road, Guildford, Surrey. *(4/6)*

EAGLE FOR SALE in very good condition, stored warm and dry. Seen me safely through Group D. Excellent air experience machine. £2200. Need money for biplane. Jeff Miles 0254 62528 evenings (Lancs). *(4/9)*

HIWAY 160 TRIKE G-MBBW Hilander wing. Just had full service. Spare engine, extras. Quick sale £875. Also custom-built trailer, fit microlight or auto-gyro, £150. Tel Pocklington (07592) 3663 (N Humberside). *(4/10)*

ROTEC RALLY 2B. 3-axis. G-MBBO. 17hp engine. Safe flying with this proven design. Must sell, building Tiger Cub. £1100. Braintree (0376) 45422 evenings, weekends (Essex). *(4/12)*

WEEDHOPPER B test flown only. Fitted sitting operable recoil starter, tuned pipe. Registered. Superb flyer. Bargain at £1550. Burgh Heath 60053 (Surrey). *(4/13)*

ROBIN 250 TRIKE FOR SALE Never flown, all new. Toothed-belt reduction with Cherokee wing. Registered G-MJPR, £1100. Tel Huntingdon 54747 evenings and weekends (Cambs). *(4/15)*

3 QUICKSILVER MX1s from £2850 (2 brand new). Also 2 TPX 720 channel receivers, £400 each. Tel Newark 704286 (Notts). *(4/16)*

BEAUTIFUL PAIR, A TREAT TO HANDLE. G-MBCJ 250cc Triflyer and large Typhoon ½S, both excellent condition, including joiner-made skis for trike. Urgent sale hence £1300 or will split. Tel (0772) 311288 evenings, (0772) 725943 day (Lancs). *(4/18)*

BRITISH EAGLE, G-MBSJ, Cuyuna 250, 7h, immaculate, going abroad — must sell soon — so offers around £2700. Altimeter included. 01-422 5016 evenings and weekends. *(4/19)*

MIRAGE MKII FOR SALE Kawasaki engine, wheel spats and pod, electric start, full instruments, many extras! Carefully run-in — 7h — moving up to motor glider. Price £3500 ono. Tel 0873 810408 (Powys). *(4/21)*

DESERT EAGLE with Fuji Robin engine. Has never flown. Offers over £2600. Contact M Tingle, 9 Eastern Avenue, Reading, Berks. *(4/22)*

HIWAY 160 SKYTRIKE. Plenty of airtime but vgc, has been carefully stored during the past year. Must sell quickly hence £500 ono. Christchurch (0202) 483847 (Dorset). *(4/23)*

HIWAY SKYTRIKE MKII Robin 250 engine. Large Sealander wing, 18 months old, 5h only. Front hub brake, ASI, 7oz nylon zipped covers. Immaculate safety officer's trike £1550. Tel 0543 472267 (Staffs). *(4/26)*

PRISTINE RAINBOW EAGLE only 8h. Excellent engine, 3 channel RT and spare unused propellor. Lack of suitable airfield forces sale. £1950 or exchange for small car. Tel Bristol (0272) 293738. *(4/27)*

STRIPLIN LONE RANGER KIT. Half complete. High wing monoplane, Zenoah engine. 3-axis control. Cost £2700. No reasonable offer refused. Tel Winsford 2173 (Cheshire). *(4/28)*

WANTED FREE! Mirage microlight fully equip, x-country instruments and trailer. Going to good home, very grounded and broke pilot. Will advertise printed wing or fly sponsored flights for charity. Contact L Guthrie, 10 Shielswood Court, Tweedbank, Galashiels TD1 3RH. *(4/29)*

DOUBLE EAGLE FOR SALE red/black, 4 months old. Twin Cuyuna 440cc, very reliable. Buying 3-axis reason for sale. Extras. £3000 ono. Phone Frank 01-286 2432. *(4/30)*

MAINAIR TRIFLYER 250cc G-MBDH. Hardly flown — just like new. Other commitments force reluctant sale. Best offer over £600 secures. Contact Tony on 061-775 4422 or write 65 Highbury Ave, Irlam, Manchester M30 6BU. *(4/31)*

WANTED MEDIUM COMET, TYPHOON OR DEMON must be in good condition. Contact Tony on 061-775 4422 or write 65 Highbury Ave, Irlam, Manchester M30 6BU. *(4/32)*

G-MBZO MAINAIR 330/MEDIUM STRIKER. 70h. Insulated fabric pod. X-country aerodynamic tank, CHT, EGT, compass, ASI. This trike has topped 16000ft, very reliable, £1750. Phone 0254 59092 mornings (Lancs). *(4/33)*

CHARGUS CYCLONE 165 WING & DRAGONFLY 250cc ROBIN TRIKE. Registered, in excellent condition, any trial, will split. Any reasonable offer considered. Tel Graham Squires, Wakefield 360829 (evenings/weekends) or Ossett 274937 (day). *(4/34)*

PTERODACTYL G-MJHH, SOLEAIR CANARD, 430 Cuyuna, wing covering removed and new bolts fitted summer '82, £1750. Please write C N Giddings, Village Way, Apse Heath, Sandown, Isle of Wight. *(4/35)*

RAINBOW EAGLE, immaculate condition with Robin engine and low hours for sale around £2000. I love her dearly but she's gotta go — wife pregnant — Jumbo Jet required. Tel Tavistock (0822) 832266. *(4/36)*

G-MBLU LIGHTNING POWER WING/330 ROBIN CUSTOM SOUTHDOWN TRIKE, and Skymaster parachute system. Excellent condition, hangared. Snip at £1650 ono. Tony Fletcher, Swansea 49825 (home), 468500 (work). *(4/37)*

MAINAIR 250 TRIKE, agent built, many mods, extremely reliable, folds and transports easily, 98 lb, ex cond. Choice of wing, Striker, Typhoon or Demon. Might split. An excellent buy at around £1200. Tel Phil Robinson, Mellor 2077 (Lancs). *(4/39)*

3-AXIS 2 SEATER MISTRAL. 400 plus h in 1982. Well proven workhorse. Excellent mechanical condition. Give away price £1950 plus VAT. Performs well even at maximum payload of 400 lb. Phone Mac Smith on Bournemouth (0202) 822486 *now.* *(4/40)*

1/5th share in fabulous **TIGER CUB** 440 based at Popham airfield nr Winchester, Hants. £950. Phone Mac Smith (The Microlight Aviation Club) on Bournemouth (0202) 822486 *now.* Full tuition to Group D PPL available. *(4/41)*

SKYHOOK TWO-SEAT TRIKE/CUTLASS WING, low hours, £2500. Will split or exchange for sports/saloon car. Anything considered. Also floats suitable any microlight, £300. Phone 0254 60586 (Lancs). *(4/44)*

PATHFINDER FOR SALE: Very good condition. Red/black/gold colours. Finance forces sale. £2500. 01-249 5985. *(4/45)*

COMPLETE SOUTHERN AEROSPORTS SCORPION. Engine less than 5h. Enormous quantity aircraft-quality nuts, bolts, washers. Windsock. Will deliver within 100 miles. Offers. 03446 77328 (evenings) Berks. *(4/46)*

RAINBOW EAGLE 10h flying, vgc, registered, hangared since erection, reliable Chryslers, skis and shoes, ideal for the beginner, £1950 ovno. Tel 0536 512978 (Northants). *(4/47)*

CP16 FOR SALE. Kit built, registered G-MJEN. Robin 250 engine. Few flying hours. Road trailer included. £1500 or offers. 031-664 3789 (Edinburgh). *(4/50)*

GOLDEN EAGLE FOR SALE 8h flying only. Can be seen in hangar £2150 ono. 021-353 6706 evenings (Birmingham). *(4/51)*

PATHFINDER, 45h, London-Paris model, training available, £2750. Tel 060872 413 (Oxfordshire). *(4/52)*

NEARLY NEW EAGLES, prices from £1800, training courses available. Tel 060872 413 (Oxfordshire) *(4/53)*

SOUTHWEST AIRSPORTS have probably got, in addition to new aircraft and kits, the largest selection of high-quality second-hand microlights in Cornwall. For full details phone Ian Stokes on 056686 514. *(4/54)*

SKYHOOK SABRE WING/HORNET 250 ROBIN TRIKE. New November 1981, G-MBUW. Complete with keel-mounted Skymaster parachute, alt & airspeed. Large saving on new, £1600 ono. Phone David on Bedford (0234) 712048 evening or 711242 day, leave message. *(4/56)*

G-MBYF SKYHOOK TR2 DUAL SEAT. Very reliable and excellent condition. Well maintained. Recent new prop. Custom trailer and single seat conversion included. Offers please. 0384 287677. *(4/57)*

HUMMER G-MBYH. Zenoah 250cc, good condition except one or two small tears, £1500. Road trailer and some new spares including engine if required. Phone Darlington 63218 (evenings). *(4/58)*

PATHFINDER 50h inspected, 60h total, Sharp & Sons toothed-belt reduction (18h), trailer and spare propeller, £2500 the lot. Ring Bedford (0234) 53388 any time. *(4/59)*

LIGHTNING 170 WING strengthened for power, red, white and black, in good condition. £550 ono. Phone Harlow (0279) 419873 evenings or weekends. *(4/61)*

330 TRIKE complete with trailer and medium Striker wing, timing-belt reduction. Nicklow exhaust, CAA registered G-MJMO, flown 4h, any trial. £1800. Tel 0254 691300; after 6pm 27197 (Lancs). *(4/64)*

CHARGUS T250 TRIKE plus Hiway Vulcan wing, in immaculate condition. Comes complete with spare prop, a gift at £950. Would consider tidy motorcycle in exchange. Ring 0761 232096 (Avon). *(4/65)*

HIWAY SKYTRIKE 160 registered, low airtime, good condition, stored inside — £300, will haggle. 0203 642196 (N Warks). *(4/66)*

CHARGUS 250 SKYTRIKE with all red Typhoon wing. Registered, 22h use from new. Immaculate condition, instruments in console, and pro-built road trailer. A gift at £1450. Tel Basingstoke 62536. *(4/67)*

PATHFINDER August 1982, 25h, as new, colour black, 330 Robin, cost £4000 with trailer, will accept £2450. Ring Mike Lister on 0978 860366 evenings (N Wales). *(4/68)*

continued overleaf

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Display Advertising

1. The British Microlight Aircraft Association, hereinafter called the Publisher, reserves the right to refuse, amend, withdraw or otherwise deal with all advertisements submitted to it at its absolute discretion.

2. The Publisher will endeavour to ensure that advertisements shall appear with all possible regularity, but will not be liable for any loss or damage, consequential or otherwise, occasioned by error, amendment, late publication or the failure of an advertisement to appear for any reason whatsoever.

3. The Advertiser will indemnify the Publisher against any damage and/or loss and/or expense which the Publisher or the Advertiser may incur as a direct or indirect consequence of the Advertiser's announcement. All advertisements are accepted on the understanding that any description of goods is true and accurate (UK Trade Descriptions Act 1968).

4. In no case does the acceptance of an order imply the right to renew on similar terms.

5. The Publisher reserves the right to amend advertisement rates at any time.

6. The Publisher reserves the right to refuse cancellations or postponements unless they are received on or before copy deadline.

7. If copy instructions are not received by copy deadline, the Publisher reserves the right to repeat the last copy used. Late delivery of material after final copy date may incur forfeiture of the space booked at full cost.

8. The Advertiser shall be responsible for the insurance of all artwork and other advertisement material supplied by him to the Publisher and the Publisher cannot accept any liability for any loss or damage.

9. The Publisher reserves the right to charge the Advertiser for any costs incurred in the conversion of origination material supplied by the Advertiser or his Agent into a form acceptable to the Publisher as being suitable for reproduction.

10. Cheques (or in the case of Advertisers outside the UK, International Money Orders) covering the full cost of the advertisement must be made payable to BMAA and must be received at the *Flightline* office not more than 30 days after the date of publication. All payments must be made in £ sterling.

11. All artwork and other printing materials will be retained for a period of one year and then may be destroyed unless written instructions have been received to the contrary. In the event of such instructions the Advertiser shall be responsible for collection and/or payment for any charges incurred for return.

12. Advertising simulating editorial content will be accepted subject to Publisher's approval and will be clearly labelled 'Advertisement'.

13. Conditions which do not conform with or are in addition to the Publisher's conditions will not be recognised as binding. Special conditions must be subject to mutual agreement.

14. The placing of space reservations by Advertisers or Agents is deemed by the Publishers to imply acceptance of an agreement to be bound by the foregoing conditions.

Small Ads

For BMAA members advertising privately, conditions 1 – 6, 13 and 14 apply. For all other small ads, conditions 1 – 6, 10, 13 and 14 apply.

Editorial

Editorial contributions are welcomed, on the understanding that the contributor agrees to the following conditions:

1. *General:* Articles, artwork and photographs are accepted on the basis that BMAA does not accept liability for loss or damage to same and will not return them to the sender unless requested.

2. *Articles:* Unless the author has already specifically requested otherwise, articles printed in *Flightline* become BMAA copyright on publication, and BMAA reserves the sole right to authorise their subsequent reproduction in other publications. In the case of publications with which *Flightline* does not have an editorial exchange arrangement, such reproduction may involve payment. Any payment received will be divided equally between the contributor and BMAA, after deduction of postage expenses etc.

3. *Photographs:* Where a prior agreement exists for BMAA to cover the cost of the film, copyright of all photographs intended for use in *Flightline* (whether or not they are actually published) belongs to BMAA. In all other cases copyright will be regarded as remaining with the photographer unless he/she instructs BMAA to the contrary. Permission of the copyright holder will be sought before reproduction is authorised of any photograph in *Flightline*'s possession. Any payment received will be divided equally between the copyright holder and BMAA, after deduction of postage expenses etc.

Miscellaneous

GROUP A PPL CONVERSION Special course for Group D microlight pilots. Three full-time instructors, efficient friendly atmosphere. Accommodation. £32.40 per hour currently. Sherburn Aero Club, Sherburn-in-Elmet, Leeds. Tel 0977 682674. *(4/7)*

U2 MITCHELL WING PLANS for sale. Brand new and unused. £40. Phone Evesham 870188 (Hereford & Worcs). *(4/8)*

AIRFIELD MARKING STRIP in various colours for marking safe landing areas (and no-go areas). For permanent or temporary use — ideal for fly-ins. Tel Weaverham (0606) 852701 for full details. *(4/11)*

ASTONISHINGLY BORED SOLICITOR aged 45, currently in industry, ex RAF Air Electronic Officer (Radio Officer/Flight Engineer) seeks gainful and stimulating employ in aviation. Call 0780 720489 Answercall (Lincolnshire). *(4/14)*

WANTED TRIKE PLANS, 160 Valmet engine. Also plans for Eipperformance Flexi Flier Rogallo, tubing and accessories. H Banks, 23 Salcombe Cl, Bedford MK40 3BA. Tel Bedford 56823. *(4/17)*

FOUR ENGINED MICROLIGHT? Several new unused 35cc 2-stroke power units, £35 each inc p&p. Mr H Shillingford, 13 Acacia Drive, Upminster, Essex. Tel Upminster 25098. *(4/20)*

SELLING UP Rapid folding 160ft² wings with readily available 32bhp engine, promises commercial potential, no sincere offer refused, due to business commitments, Penzance 2647 (day) 3423 (evenings). *(4/24)*

SELLING UP Two horizontally opposed twins, 3 to 1 reduction. Test run only. One single cyl 2½ to 1 reduction and propellor. Offers, must sell. Penzance (0736) 2647 day, 4323 evenings. *(4/25)*

FUJI ROBIN 250 POWER PACK including reduction drive, prop and controls. Only 10h since rebuild, £475. Phone Harlow (0279) 419873 evenings or weekends. *(4/38)*

REGISTRATION MARKING SETS to CAA specification. Self-stick Terylene in combinations of red, blue, black or white. Send name and address of registered owner and £12 cheque to Southern Microlight Supplies, PO Box 55, Ide Hill, nr Sevenoaks, Kent. *(4/42)*

WINDSOCKS top quality and value in orange nylon on 15ft telescopic, guyed, anodised aluminium mast. £24. Windsock only with attachment line, £13.50. Southern Microlight Supplies, PO Box 55, Ide Hill, nr Sevenoaks, Kent. *(4/43)*

BRAND NEW unused Robin 250cc engine with prop also unused, straight bars with twist grip throttle, pulley start (for ground or in flight) — cost over £700 new — sell for £595 ovno. Tel 0536 512978. *(4/48)*

KASPERWING. Send A4 SAE for leaflet; information package £4; book *The Kasper wing* £8; BKB plans £80; Kasperwing Ultralight, please enquire: Sunrise Aviation, 42 Blake Dene Rd, Poole, Dorset BH14 8HH. *(4/49)*

SOUTHWEST AIRSPORTS offer tuition to all stages of competence at competitive prices. New and second-hand aircraft to suit all needs and pockets. Phone Ian Stokes on 056686 514. *(4/55)*

FLOATS FOR SALE. 1 set of American floats, cost £800 will accept £500. Brand new, never used. Reason for sale — going abroad. R Black, 2 Neath Rd, St Judes, Plymouth. Tel Plymouth 663032 any time. *(4/60)*

EXHAUST for Fuji Robin 250, Litek vario, 55mph ASI, ventimeter, 10,000ft altimeter, 3 microlight wheels/tyres, £200 the lot or will split. Tel Harlow (0279) 419873 evenings or weekends. *(4/62)*

250 ROBIN PISTON & CYLINDER. Brand new, never been fitted. Best offer. 021-353 6706 evenings (Birmingham). *(4/63)*

BMAA registered school requires

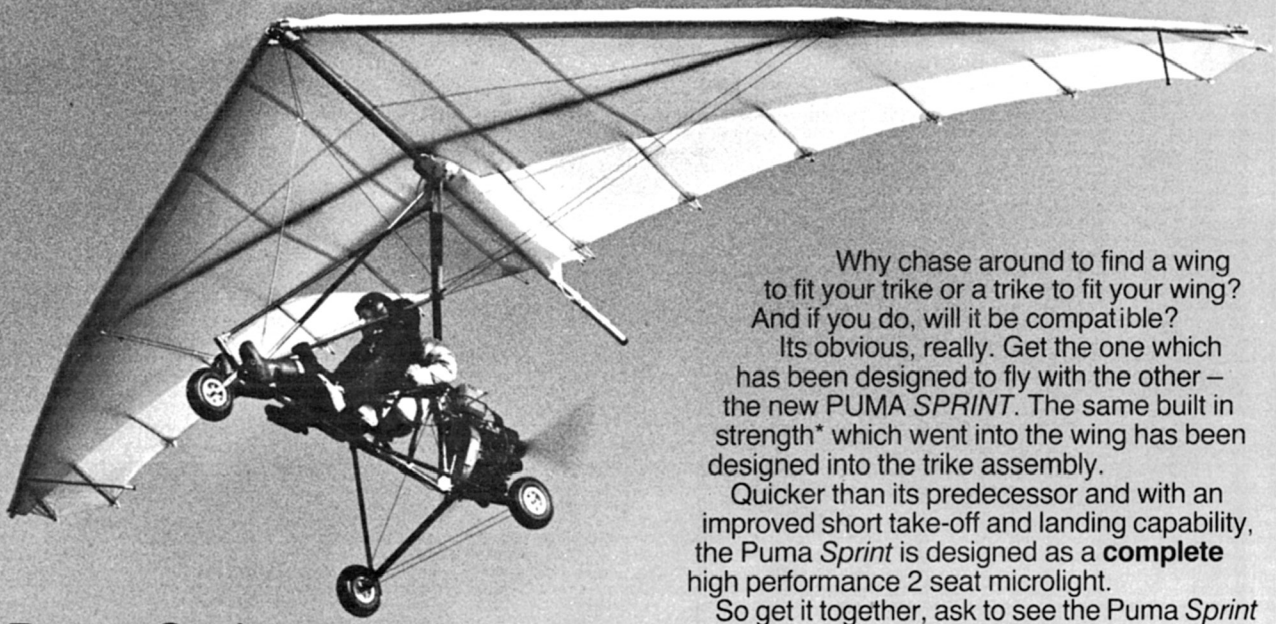
FULL TIME FLYING INSTRUCTOR

REGISTERED BMAA ORGANISATION

Preferably three-axis but weight-shift considered. Salary negotiable.

Apply to: **BORDER AVIATION, Edenwood, Linstock, Carlisle, Cumbria (tel 0228 25820)** ask for Khaldoun Moualem

NOW YOU CAN GET IT . . . TOGETHER.



Why chase around to find a wing to fit your trike or a trike to fit your wing? And if you do, will it be compatible?

Its obvious, really. Get the one which has been designed to fly with the other – the new PUMA *SPRINT*. The same built in strength* which went into the wing has been designed into the trike assembly.

Quicker than its predecessor and with an improved short take-off and landing capability, the Puma *Sprint* is designed as a **complete** high performance 2 seat microlight.

So get it together, ask to see the Puma *Sprint* from Southdown Sailwings.

The Puma *Sprint* . . . Get it together.

** Wing and trike loaded to: 2055 kg positive, 1048 kg negative.*

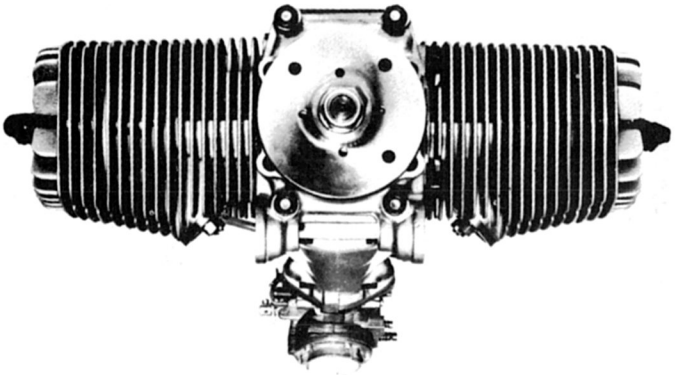
SOUTHDOWN SAILWINGS LIMITED, 82 GOLDSTONE VILLAS, HOVE, SUSSEX. TEL: BRIGHTON 732007.

KFM twins for microlights

KFM 107 TWO-STROKE

* 25bhp (max) at 6300rpm from 294cc
* Weight as illustrated 15.2kg
* Cruise fuel consumption 6.8 litre/hr
* Electronic ignition with twin coils
* Electric start option
* Three reduction drives available: enclosed toothed-belt, exposed V-belt, remote exposed V-belt

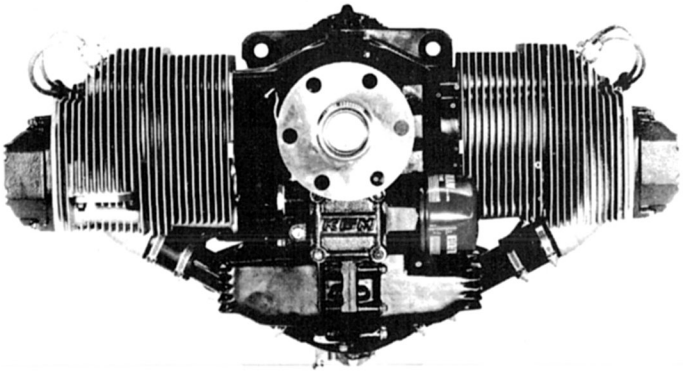
NOW AVAILABLE EX-STOCK



KFM 105 FOUR-STROKE

* 40bhp (max) at 3800rpm from 916cc
* Forged nitrided crankshaft
* Hydraulic tappets
* Weight as illustrated 35kg
* Cruise fuel consumption 7.1 litre/hr
* Dual electronic ignition, radio shielded
* Electric start option
* Aerobatic version available

AVAILABLE LATER THIS YEAR



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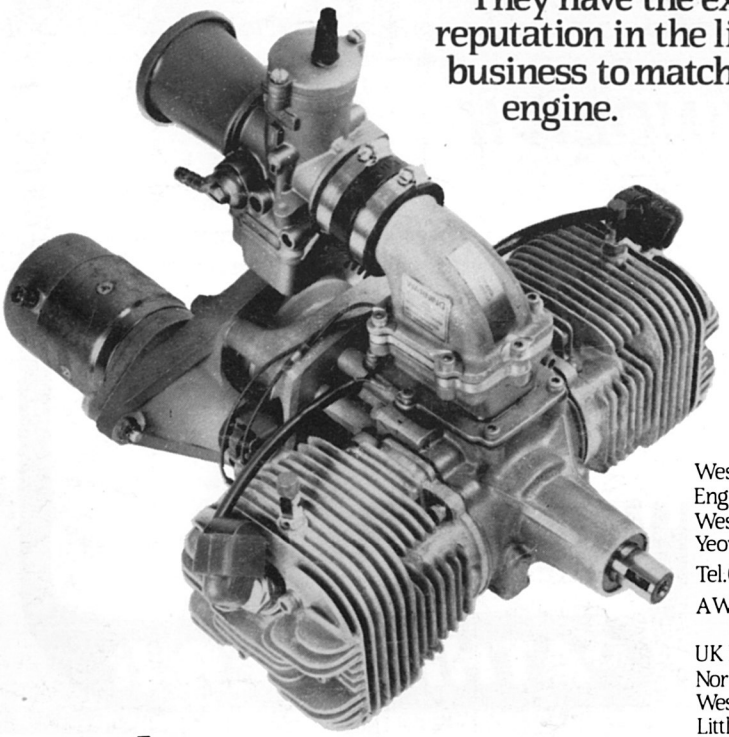

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