

FLIGHT

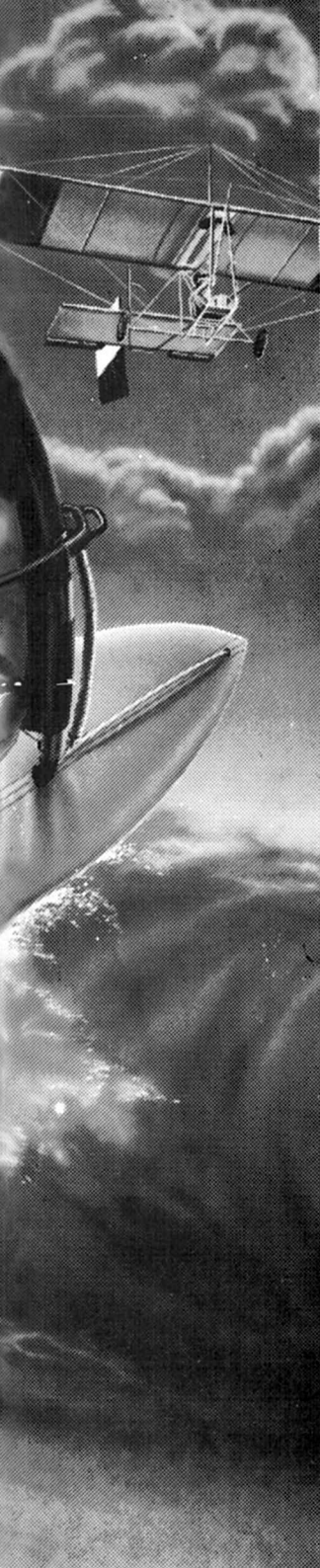
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Magazine of the BMAA

Mid-February 1983





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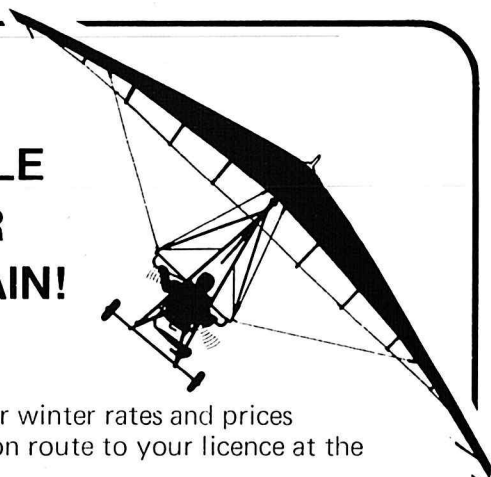
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FLIGHT line

Published by the BMAA

Mid-February 1983

COVER: Ian Wheeler previews the Uli, a promising West German microlight, on p35

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Comment

By Norman Burr

Spring is Coming, Thank Goodness

At the time of writing the whole country has been suffering an unusually long period of unflyable weather. This has two effects. First, it makes everyone fed up — pilots because they can't fly, students because they can't learn, schools because they can't teach and dealers and manufacturers because people don't want to buy — especially when the market is experiencing a once-and-for-all glut of second-hand machines from licenceless owners.

Second, it makes people sit back and take stock, a process which has been reflected in the pages of this and the last issue. Technical Editor Peter Lovegrove started the ball rolling last month with his *Is it all getting away from us?* piece, which has prompted a strongly worded reply from Steve Hunt, while on a slightly less serious note Tim Williams has added his own viewpoint.

Regarding Peter's piece, I think that Steve has taken personally an article not really directed at him. After all, Peter was basically criticising the power race, which Steve has consciously eschewed with his latest design, the Pathfinder Mark II, in favour of lightness and refinement. Anyway, read it for yourself on p46 and, when you have reached your own conclusions, let *Flightline* know your views on the future direction of microlight design. Whether you agree with Steve or not, there's no doubt that his energy continues to contribute greatly to the sport and to this magazine — witness his various contributions to this issue.

Why Didn't I Think of That?

In *Secretary's letter* in this issue, Ron Bott discusses a really first class idea which could do a lot of good both for the public and for microlighting's image. Why not, he says, use microlights to help in search and rescue missions? Admittedly they won't be able to help when the weather is bad, but there are bound to be occasions when a microlight can do a spotting job just as effectively and much more cheaply than, for instance, a helicopter.

The idea is to run the scheme through club safety officers, whose names and phone numbers would be kept on file by the relevant authorities — police, mountain rescue etc. In case this sounds impractical, bear in mind that one far sighted copper, Inspector Peter Mulholland of Lancashire Constabulary, has already expressed an interest in evaluating a microlight for just this purpose. So if you have appropriate experience and fancy undertaking some interesting

Gerry needs your backing

By Norman Burr

If you have any interest at all in entering either of the two events organised by Fenwick General Medias for 1983 — the London-Paris and the Grand Prix de France — it is vital that you contact Gerry Breen *now*. So far Fenwick's event organiser Bernard Lamy has had an enormous response from prospective French competitors and virtually none from British, and to ensure that Britain is represented in these events Gerry has bravely made a 'block reservation' of ten places in each event for British competitors.

Gerry has done this of his own initiative in his capacity as BMAA Competitions and Rallies Committee Chairman, in the interests of British microlighting as a whole. It is now up to British pilots to come forward and prove that Gerry's act of faith was justified. "Even if you're not sure what aircraft you'll be using, you can still enter", Gerry told *Flightline*. "The main thing I want right now is names".

If you are interested but worried about the cost, think about sponsorship. Microlights make a great advertisement and even say £100 from a local garage or shop can make a big difference to the feasibility of an entry.

Still on the subject of competitions and rallies, Gerry is anxious to build up the Competitions & Rallies Committee and would be pleased to hear from anyone wishing to join this committee, especially if they can help obtain sponsorship for events. Ideally, prospective members should live or work within convenient travelling distance of a line between Oxford and Bristol — Gerry's two bases — but even if you don't, Gerry would still like to hear from you. Again, time is of the essence — the first meeting of the committee must be held soon to discuss the Woburn Abbey event.

Whether you are interested in entering events or in committee membership, or both, the number to contact Gerry on is 060872 413.

flying to the benefit of both the public and the sport, contact Ron Bott right away.

Incidentally, credit for the idea must go to Ann Welch, BMAA's President. Who says presidents are just figureheads?

New Goldwing Variant

Eurowing has announced the development of a new variant of this popular rigid wing machine, to be known as the Goldwing SP. The main change with the SP is the adoption of a fully enclosed cockpit, the extra weight of which is more than counteracted by a change to the Normalair-Garrett twin instead of the much heavier Robin 330.

The NG engine will also be standardised on the normal Goldwing, which will continue in production. Both applications of the new engine will feature a patented vibration-absorbing toothed-belt reduction drive.

One and One Makes Not Quite Two!

Not content with making single seaters and two-seat trainers, Mainair has now come up with what it calls a 'one plus one' trike. Though basically a single seater, the new machine has a seat which can be rejigged to carry a second, light, person.

Total pilot and passenger weight is limited to 280 lb (127kg), which allows the aircraft to have a decent performance while retaining a 330 Robin power unit. Initially the engine will be installed in the traditional inverted position, but later machines will have the power unit 'right way up'. A beefed-up Striker wing is used, but the new machine departs from usual

Whistles in

trike practice in that it has no rigging wires — it is entirely strut braced.

The strut bracing, plus the fact that anodising has been discarded in favour of red and white epoxy coating, gives the new trike a distinctive look. The bad news is that the machine will not initially be available in the UK; the glut of second-hand aircraft from licenceless pilots has forced Mainair director John Hudson to look abroad for business, and five of the new one-plus-ones, plus a two-seat trainer, will be touring France on a joint Flexiform Skysails/Mainair sales promotion drive in the first two weeks of April. John Hudson is currently looking for an able weight-shift pilot with good French to accompany the tour and anyone interested (who wouldn't be!) should contact John on 0706 55131.

Midlands Event

The Nottingham company Airspeed Aviation is planning Airports Weekend, an aerial extravaganza for Chasewater Park in the West Midlands on 25-26 June.

By Graham Andrews

It has been a dismal winter thus far: flying has been rare in the wet and windy weather and there have been few people interested in learning to fly at the schools, or buying aircraft from the manufacturers. But rather like a hint of spring there are some hopeful signs emerging. Thanks to some intense lobbying following the approach to CAA mentioned in the last issue of *Flightline*, our licensing problems are being taken very seriously and by the time you read this we should have some welcome improvements. On the airworthiness front CAA have agreed our full budget and will be funding us to do the bulk of the work required in 1983 — in subsequent years we will be expected to become increasingly self-sufficient.

You may have noticed that *Flightline* now carries the logos of the Royal Aero Club and the Fédération Aéronautique Internationale and we are proud to be able to do so. As you can see below, these bodies represent all facets of sporting aviation, nationally and internationally respectively. The history of both would fill several volumes but sufficient to say that the Royal Aero Club holds in perpetuity the Schneider Trophy. The club has been honoured and privileged to have as its patron Her Majesty the Queen and successively as its presidents Their Royal Highnesses Prince Philip, Prince Charles and, presently, Prince Andrew. At a recent RAe Club dinner I had the

Chairman's

honour of meeting His Royal Highness and finding a tremendous enthusiast for sporting aviation. With any luck, in 1983 . . . !

How the Structure Works

The FAI is the international controlling body of sporting aviation; the RAeC is the UK national controlling body. The relationship between the various facets of these bodies is as follows:

National	International
RAeC of the UK	FAI
RAeC Council	FAI General Conference
RAeC Council	FAI Council
RAeC Council and FAI Committee	CASI (International Aero- nautical Sporting Committee)

A whole host of different aviation sports come under the RAeC and FAI umbrellas, as follows:

Activity	RAeC body	FAI body
Gliding	BGA	CIVV
Ballooning	BBBA	CIA
Parachuting	BPA	CIP
Aerobatics	BAA	CIVA
Aero modellers	SMAE	CIAM

the wires

The microlight part of the event will include timed events and flour bombing, for which there will be cash prizes, and the competitions will be run in heats on the Saturday, with finals on the Sunday. In addition to microlights the event will feature hot air balloons and, it is hoped, Formula 1 air racing.

Chasewater Park is between Walsall and Lichfield on the A5. Anyone interested in the event should contact Martin Jones at Airspeed Aviation, Nottingham Airport, Tollerton, Nottingham (tel Nottingham 817626 work, Derby 701127 home).

More Record Attempts

Z E Myers' microlight record for distance in a closed circuit, which stood at 60km, was comfortably broken by Jerry L Brown in a Quicksilver MX on 17 November, the FAI has recently announced.

Jerry flew 75.6km at Midland, Virginia but his record was short lived: just three days afterwards another MX pilot, John Hansen, achieved 88.5km in the same locality and is thus the current world record holder.

Meanwhile, back in Britain, the only home-bred



Keeping his hand in with a Puma while Ultra Sports builds his record breaker, Bob Calvert gazes wistfully at the horizon over Pilling Sands, passengered by Chris Mason.

record holder has been preparing to beat his own best. Bob Calvert is aiming to beat his own height record of some 16,000ft (4900m) but this time will not be using a Mainair machine. Geoff Ball of Mainair has put a lot of work into developing a

continued overleaf

airwaves

Activity	RAeC body	FAI body
Home built aircraft	PFA	CIACA
Hang gliding	BHGA	CIVL
Microlights	BMAA	CIMA
Helicopters	HCGB	CIG
Air education	AERO	CIEA
General and sporting flying	AOPA	} CIAG
Racing, rallying and records	RRRA	
Precision flying	BPPA	
Formula air racing	FARA	
Aero medical	FAI	
	Committee	CIMP
Man powered aircraft group	FAI	CASI
Parasailing	Committee	CASI
	FAI	
	Committee/ BAPC	CI Astr
Aerospace	FAI	
	Committee/ RAE	

The RAeC's FAI Committee assists with coordination and exchange of views of all RAeC's officials and delegates to FAI Council and commissions. The RAeC is represented at FAI General Conference and

Council by its FAI vice-president, at CASI by a senior committee member and on the commissions by representatives/delegates from the various RAeC member organisations.

FAI Commissions meet once a year, usually in Paris, but elsewhere occasionally.

As BMAA Chairman I represent you on the RAeC Council and FAI Committee together with Ann Welch, who is an honorary vice-president of the RAeC. Ann has also been the FAI delegate.

Microlight Course

A short course on microlight design and construction will be held at the University of Bristol on the evening of Friday 15 April from 19.00 to 21.30, continuing on Saturday 16 April from 09.00 to 17.30.

It is intended for the microlight enthusiast and will cover: types and examples; one and two seaters; aerodynamics, control and stability; power plants; construction; flying qualities — and will end with a forum. Ann Welch will chair the meeting and will give the introductory lecture.

A separate display of microlights has been arranged for Sunday 17 April and participants may bring their own machines. Fee for the course only is £15 including refreshments but not meals. Full information is available from D S Wilde, Department of Extra-Mural Studies, 32 Tyndall's Park Road, Bristol BS8 1HR (tel 0272 24161 x695).

special record-attempt version of the Tri-Flyer called the Challenger and not unnaturally Geoff now wants to fly it! Bob has therefore agreed to use an Ultra Sports trike for his attempt and a friendly rivalry has now developed between the two would-be record breakers.

As *Flightline* went to press bad weather had prevented any serious attempt, but with the spring now approaching the Ball/Calvert battle is likely to begin in earnest very soon.

Phantom's Progress

Skyriders' efforts to establish itself as the legitimate supplier of Phantoms in the UK (*Flightline* 1 Jan p24) appear to be bearing fruit.

Since the last issue, relations with US manufacturer Ultralight Flight have improved considerably, Steve Laugharne of Skyriders told the magazine, and supplies from America are beginning to come through, and the disputed MAMTA press release has been retracted by Ultralight Flight. Nevertheless the British company is maintaining the legal pressure and has now, Steve says, been granted injunctions restraining Ultralight Flight from handling UK sales through any other company, and restraining the British company Micro Aviation, which at one time was claiming the right to handle UK enquiries for the Phantom, from dealing with the aircraft.

Deliveries have now commenced, with the 440 Robin being used in preference to the Kawasaki.

Africa Bound

About the time this copy of the magazine drops through your letterbox, Philip Berent should be setting out on what must surely be the longest ever microflight light.

Having gone from complete novice to PPL A in

one year, Philip is now flying a Pathfinder from Salisbury to Salisbury — ie Wiltshire to Zimbabwe — or at least he was until the Zimbabwe government changed the name of its capital city to Harare! But whatever the name of the destination, a flight from England to southern Africa would be a marvellous feat and one in which Philip deserves the best of luck. We hope to bring you regular progress reports of the trip, which Philip estimates will take around four months.

A Lotus Microflight?

The untimely death recently of Lotus car chief Colin Chapman has left a question mark hanging over the top-secret microflight project with which he was involved.

Officially, Lotus does not even admit the existence of the project, but a well informed source within the company told *Flightline* that a Chapman-designed prototype, using an engine of his own design, was already flying in the States and that at the time of his death he was organising a European and American dealer network. Chapman's death precipitated a review of company operations and it is not yet clear whether the microflight project will survive, but the source thought that the aircraft stood a good chance of getting into production.

Further details have come from *Flightline's* French correspondent Alain-Yves Berger, who met Chapman on the racing circuits many years ago and remained in touch with him. Alain-Yves says the Lotus machine is a composite-construction tandem two-deater using a canard wing and incorporating carbon fibre for some components. Design top speed is 125mph (200kph), fuel consumption 5 litre/h and Chapman planned a production run of 500, with a selling price around £5500.

Open letter to manufacturers and importers

From Norman Burr

As you are probably aware, the BMAA brochure cum application form has just been reprinted — indeed, a copy is enclosed with this issue of the magazine. However, since the quantity printed will only last a few months, now is the time to start thinking about the next version, and in particular about photographs for it.

Hitherto, the brochure has used a few large pictures rather than a number of smaller ones, because colour printing works out cheaper that way. However, it has become clear that the publicity value to a manufacturer/importer of having his aircraft illustrated in the brochure is such that it is rather unfair to pick out just two or three machines, even if the companies concerned contribute towards the printing costs.

So instead I want to illustrate a variety of aircraft in the next edition, and accordingly I invite manufacturers and importers to submit to the *Flightline* office high quality colour transparencies (not prints) of their products. Because this change will greatly increase costs, any company whose pictures are used must be willing to pay BMAA £80 per picture used towards printing costs. As we will probably print 20,000 of the next edition, this represents quite a lot of exposure for the money.

Would companies interested in offering pictures please note that:

- all aircraft illustrated must be UK registered and displaying their registration letters at the time the photograph is taken, even if the camera angle prevents their being seen,
- Aircraft must be available to the public — no prototypes please, unless they are genuinely representative of the production version,
- each aircraft illustrated will be captioned in small type with its name and that of its manufacturer/importer,
- pictures will be chosen to provide a selection which is both aesthetically pleasing and representative of the different control systems, structures etc available in the UK. Obviously the brochure cannot illustrate every aircraft available, and the decision as to which pictures to use and how large to use them will rest solely with a person or persons appointed by BMAA; such person(s) will have no financial connection with any microflight manufacturer/importer.

In devising this method of brochure preparation, I have tried to produce a system which is fair and can be seen to be fair. I sincerely hope you will support BMAA in this venture — after all, better publicity material means more members and that in turn means more sales.

London Flyers Read This

London Ultralight Flying Club has lost its application for planning permission to fly from Bovingdon airfield near Hemel Hempstead. According to Dave Simpson of LUFC, the club intends to appeal against the decision, which was made on two grounds: first that microlights are too noisy and second that there was no proven need for a micro-light flying facility in the area.

It is this second provision which is exercising Dave right now. Bovingdon is one of the closest sites to London and it seems inconceivable that there is no need for a site near such a huge population. His problem is that, to prove that point, he needs the names and addresses of a large number of potential users. Therefore any microlighter within a 25 mile radius of Bovingdon is urged to make himself known to Dave right away, on Hitchin (0462) 52103 home.

The loss is a particular blow for LUFC because the club has been using the site already for microlights for 1½ years, only to hit problems when it tried to formalise the situation.

Cold Enough To . . .

Hopefully by the time you read this the freezing weather will be mainly behind us, but just in case the winter lingers on, *Flightline* is passing on a tip recently circulated by the NW Microlight Aircraft Club.

In very cold conditions pit pins (ie ball lock pins)

can freeze in the open position, allowing the pin to fall out, possibly with disastrous results. So when you've fitted a ball lock pin, pull on it to make sure that the ball has locked out.

John Takes a Break

John Hollings, founder of the Windsports Centre in Yorkshire, is taking a break from microlights for a while and has sold out his share in the centre to his former partner, Geoff Foard. John will be retreating to the depths of Wales to renovate a house he has bought there. David Stamper will become the new CFI and CAA 'X' examiner.

A keen triker himself, Geoff told *Flightline* he intends to maintain Windsports' standards of training and service and continue developing its facilities for all branches of microlight aviation. He has recently obtained a Microbiplane dealership and is now busy building kits ready for the spring.

In another interesting development at Windsports, the centre recently supplied Harlech TV with a Mainair two-seater/Flexiform Striker to be used in the making of the film *Coral Seas* by Krov Menuhin, son of Yehudi. Krov is a naturalist film maker and will use the trike for low level aerial photography of coral through the clear waters of the South Seas.

Already an experienced three-axis and helicopter pilot, Krov recently spent several days at Windsports familiarising himself with weight-shift control.

"BEEF" HEFTYTOO

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SUB OR TWO DESIGNING
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MYSELF AS THE CONTRACTORS I TRIED DIDN'T SEEM
TO UNDERSTAND THE REQUIREMENTS---

WE GOT THE SILENCERS,
SO WHO DO WE SILENCE?

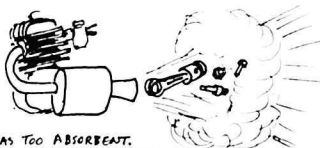
YEH, WE'RE IN TO
LUBRICATION, JOHN

--- THEY SEEMED TO BE BANKRUPT TOO---

SO I MADE AN EXPANSION CHAMBER---



-- BUT I OVERDID THE EXPANSION.
MY ABSORPTION DESIGN---



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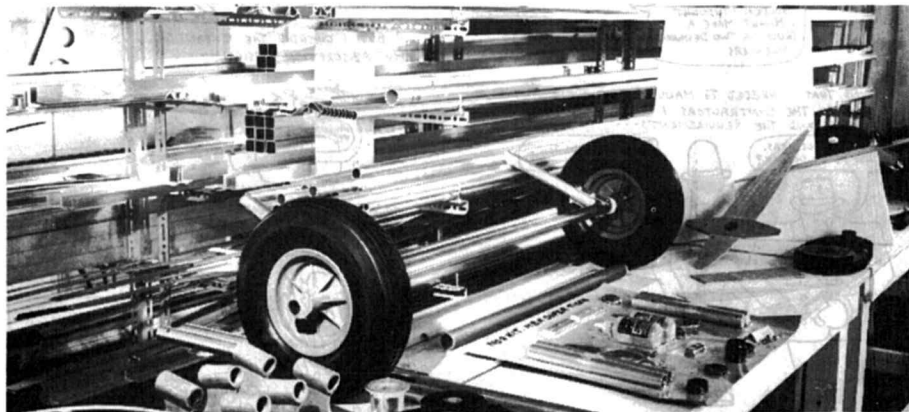
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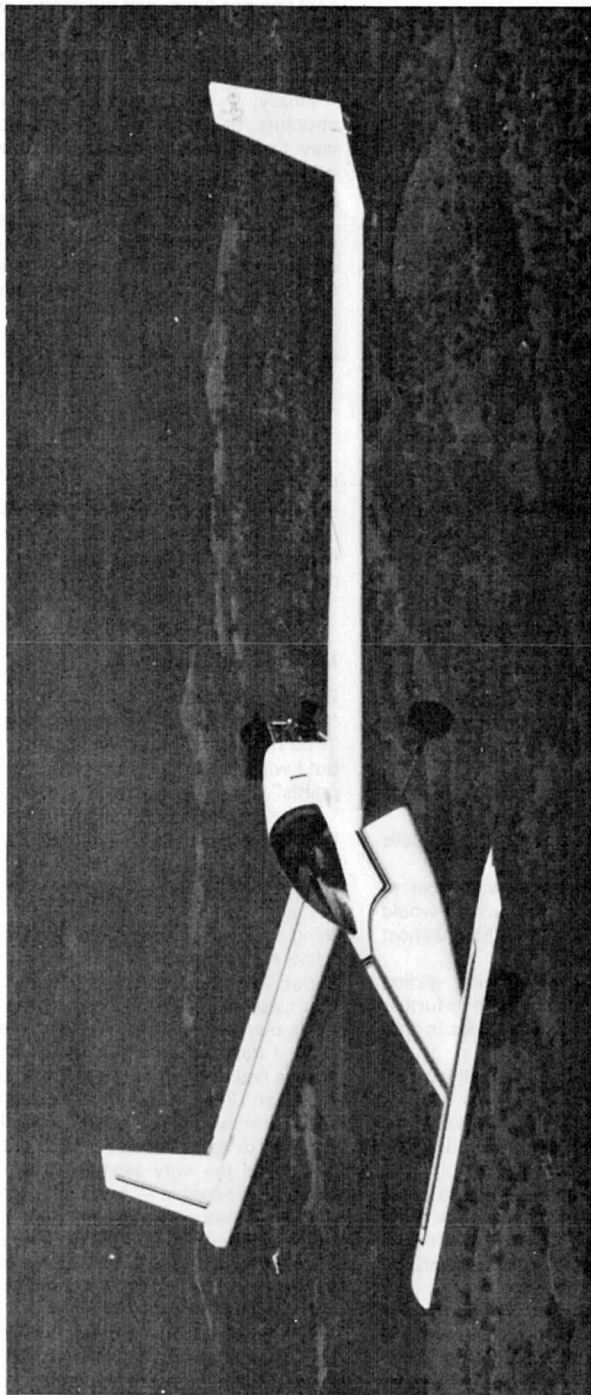


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Letters

Lovegrove Backed 1

Sir, Peter Lovegrove for president! He may be interested to know that everyone who has contacted me in connection with the Mitchell Wing concurs with his feelings, expressed in *Is it all getting away from us?*

Personally, I regret the passing of the term 'powered hang glider', since it expressed so clearly what I thought it was all about; a soarable hang glider capable of taking off from and returning to a limited, unprepared site. I still hanker after the days of the foot-launch — in theory, at least!

May I suggest that the only way to encourage development along the lines suggested by Peter Lovegrove is for the BMAA to create a structure of competitions at club and national level, based on a formula which encourages competitors, designers and manufacturers to 'think thermals', and treat the microlight as a powered glider.

In this way, attention is diverted away from the engine and concentrated on the aerodynamics.

The criteria for such a competition are many and demanding. Among them are:

- 1 It must function at club level on a regular (preferably every weekend) basis, so competitors' costs and ground administration must be kept to a minimum.
- 2 It must avoid large concentrations of airborne aircraft, both on safety and noise grounds.
- 3 It should encourage the development of the skills of a good pilot.
- 4 Ideally, it should be sufficiently watchable to attract spectators and sponsors. It would appear, however, that this conflicts almost inevitably with requirement 2.

My suggestion is based on the hang gliding national league, which has done so much to further the development of design and flying skills in that sport.

Aircraft would be fitted with a competition fuel tank of standard capacity, and a back up tank for emergency use. The changeover valve would be sealed, and breaking the seal would mean disqualification.

The object of the competition would be to go as far as possible, in any direction, and return using only the fuel in the competition tank. Proof of the destination, if required, would be furnished by photographs, as practised by gliders.

Although this system works best in good thermal conditions, it is still capable of providing a good competition and a good test of skill on other days, and is, therefore, capable of being used on a regular weekend basis by clubs. Ground administration is

kept to a minimum, and the winner will rely far more heavily on skill than on the cost of his aircraft, whose design would tend towards the ideals set out by Peter Lovegrove.

Finally, I am convinced that a strong club structure, based on regular competition, is the best way to absorb the energies of those who would otherwise spend their time joining in the fun at Gatwick, or trying to get aerial photos of St Pauls.

What is urgently needed is for the BMAA to set up a national competition with sufficient prestige to attract designers and manufacturers. Entry to the national competition should be through the clubs, in order to encourage club competition. And all of this is needed *now*, before we are completely swamped by cheap imitation Cessnas and Tiger Moths.

David Bremner
4 Rowlands Road
Bury, Lancs

PS: I am building up a good store of information about the Mitchell B10, and would like to hear from anyone else with an interest in this aircraft. I know of one other that is flying, and several more nearing completion.

Lovegrove Backed 2

Sir, Peter Lovegrove says at the conclusion of his fascinating article *Is it all getting away from us?* that "I do not expect many members to agree with me, but I will certainly welcome any discussion on these points". For what it is worth, here is my view.

He is absolutely right about what he says, though I have no experience at all of trikes. I can only speak up for what I thought he had in mind until I read his references to trikes — namely the fabulous Eagle — yes, even with those twee Chryslers. They are everything he says in his paragraph about getting back to what microlights were originally going to be all about. They are even cheap now that there are a few first-class second-hand ones on the market. As an Eagle owner since I first saw one in early November 1980, I have never regretted the choice and have always had nothing but the highest praise for them. Although I hold no brief for the manufacturers, my supplier or even my instructor, I still think that what I received in early December 1980 and early January 1981 was the very best in flying machines and instruction possible — I was lucky admittedly (I had Julian Doswell personally instructing me and a few others at Gerry Breen's set up in Enstone) and as a result I flew with 100% confidence on my first flight from my own back garden, using skis on the Eagle in mid January 1982.

The Eagle is ultra safe, very robust and far more capable of absorbing shocks from rough field landing than it appears (you should have seen some of us behind the Land Rover at Enstone), and is so

forgiving of fools yet very controllable that I really wonder why a flier should want anything else.

When it arrived in the UK it was billed as the most advanced machine of its time and an amazing, safe, fun machine to fly. We see far too little of the Eagle these days, though thanks yet again to Gerry Breen we see it with floats film making in Italy and Switzerland — and what a riveting write-up that was. If there had been more Eagles sold and less of the other contraptions that Peter has written about, I venture to suggest that we would not be in the position we are today. Also, to my eye, an Eagle is beauty personified — at any angle.

After my many flights from home I have been approached by various people including would-be fliers and one or two turned my blood cold with their descriptions of what they were proposing to do with their newly acquired microlights. It would be invidious to mention specific instances, but the need for thoroughly intensive training is glaringly apparent. Otherwise people will continue to defy rules made for their own and others' safety and protection, with only themselves in mind and no thought for what might happen to the sport as a whole.

More power to your elbow Peter Lovegrove — as BMAA's Technical Editor use the clout that you have and bring any cowboys into line — we can do without them.

Don't think I am being patronising to anybody — I just know I owe my life to the superb qualities of the Eagle and to Breen for its first class instruction. Microlighting obviously can be fraught with danger — but if you do what I did two years ago you shouldn't go wrong.

*R J Osborne
Oneacre, Warkton
Kettering, Northants*

Where Are We Going?

As a retired engineer who ran his own business and also an old PPL holder, I first became interested and involved in microlights some two years ago.

From then on I have watched with interest the development of the sport and have come to some conclusions. It seems a pity to me that we still have to buy American machines when so many of our own countrymen are out of work. Where are our budding British aero engineers? Even Steve Hunt is an Aussie by birth; still good luck to him, may he prosper. I am sure that if more British microlights were available purchasers would get better value for their money.

I have also noticed that there are quite a lot of microlights for sale now. (Why?) I am beginning to think people purchase a machine, take lessons at the firm's own flying field and then get rather frustrated at not having their own permanent site to fly from — and also rather bored flying on their own.

Until we have more sites we can fly from regularly, in club form with proper organised competitions, this will happen. Only the other day an

Meet Glenn

Glenn Brinks, who as well as being *Flightline's* US correspondent also writes for a number of US aviation publications, is hoping to make a trip to Europe this spring or summer, when he would naturally like to see as much as possible of the UK sport. *Flightline* will be helping him work out his schedule, so any club wishing to invite Glenn to an event, or any manufacturer willing to let Glenn visit its premises and try its products, should contact the magazine.

instructor visiting our club meeting stated that he felt teaching pupils to fly was rather boring. As an old pilot with a fair number of hours I must agree; that is unless you are in a glider as a pilot, pitting your wits against the elements.

I am also a member of a well run sailing club, which has its own reservoir and runs competition racing every weekend. Why not not run microlight clubs on similar lines?

First a permanent field must be found, together with say a Portacabin for a club house. Then for the licensed flyers organise competitions: spot landings, bombing on a target, timing the longest flight time with a dead prop from say 1000ft and small cross-country reconnaissance flights similar to those arranged by car clubs. Until this happens I am sure that the sport will stagnate. Even my friends who have purchased speedboats soon get bored with speeding about on the sea, unless they belong to a water skiing club.

Now to machines. What is a microlight? As I see it, it must be a machine that can be packed or folded up and carried on the top of one's car, and also stored in the garage.

These solid wing machines are all very good and efficient from a flying point of view, but they defeat the object of a microlight; you might as well buy or build a Turbulent, Luton Minor or Evans VW — and they fly in most weathers in comfort. Maybe they are a little more heavy on petrol but so what? The amount of flying one does is small. No a microlight is simply a fun machine and should be used similarly to

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a sailing dinghy. In fact some of my sailing club members have joined our microlight club. When it's windy they sail and when it's calm they fly — the best of two worlds.

For myself, having built a Flying Flea many years ago and also later an Adams Wilson helicopter, I now hope to build my own microlight when I can get suitable plans.

*Jack Dilks, News Editor
Leicestershire MAC*

Toothed-Belt Enthusiast

Sir, I have recently had my reduction gear improved. The Robin 330 with 2.3:1 V-belt reduction was quite compatible for simple modification, giving the benefit of toothed-belt drive, using Sharp & Sons own sealed bearing unit, incorporating Timken taper roller bearings with lubrication.

This system raises the propeller shaft $\frac{3}{4}$ in (19mm) and sets it back (in the case of a pusher installation) 3/16 in (4.8mm), which is well within acceptable limits for most installations.

Very little modification was required, as suitable top and bottom spacers are supplied for the required type of installation. Only minor modifications, like reversing some bolt heads, are needed.

Propeller fitting can incorporate the existing fittings, or alternatively a straightforward four-bolt arrangement will be supplied.

Mr Sharp is quite happy to modify your engine while you wait, if you take it to his workshop. If you do it yourself, the only tricky part is shimming for the final belt-tension adjustment.

I have no connection with Sharp & Sons other than as a satisfied customer.

*D B White
228 Goldington Road
Bedford*

Clubs Are The Key

Sir, Visiting the Lasham Gliding Society recently I was prompted by all the activity to ask myself why it is that gliding appears to remain a flourishing sport whilst microlights appear to be in the doldrums.

I decided that apart from the awful safety record of microlights, which may be deterring some people from having a go, the basis of the gliding movement, unlike the microlight movement, is not private owners but groups of people helping each other to fly a club-owned machine and so enjoying themselves.

I believe that it is this group or club approach towards getting people flying that has much to offer over the commercial approach offered by some schools, especially since this often means having to own one's own machine in order to go solo. The microlight used for this purpose is of course usually recommended by and bought through the school.

I suggest it would be preferable and cheaper for a group of microlight enthusiasts to get together and

start a club to jointly purchase a machine, probably a two-seater, which could be flown dual or solo (*the Leicestershire club is already doing this — ed*). The financial outlay could be quite small depending upon the number of people involved. If the group could also opt into its membership a farmer or two and hopefully an instructor, then the scope for growth of membership and acquiring more machines becomes a practical proposition.

Forming a committee from amongst the membership would probably be as difficult a task as any, but once this is achieved the work of finding a flying site and purchasing a machine should not be too difficult for a determined group.

Other considerations likely to affect the success of a group are the choice of machine and its maintenance. For instance, the microlight chosen should have removable or easily folded wings so that it can be towed or put away every night with absolute ease. Farmers I am sure would feel more pro-microlight if they were not obliged to put up with permanent or, worse, semi-permanent buildings or parking areas full of half-rigged microlights.

Hopefully also the new microlight airworthiness regulations will allow the more technically minded members of the group to carry out maintenance for the safety of the group as a whole.

As I see it, the group or club is the way ahead for the many people who cannot afford microlight flying at the moment. I certainly see no reason why such a system should be less successful for microlights than it has been for gliders.

*David Shrimpton
60 Flexford Close
Eastleigh
Hants SO5 1RZ*

Anonymous Adventurer

Sir, I would like to condone Graham Hobson's feelings (Nov-Dec p15) on preserving the sport's adventurous and free spirit, whilst at the same time showing that some regulations are necessary, by relating a small tale from the past.

On buying a secondhand, weight-shift Pterodactyl in February 1981, I arranged with my old regiment to do two weeks' training with them near Salisbury. I intended to learn to fly well enough to enable me to 'drop in' on friends in the local area.

The weekend prior to starting duty, I picked up the machine, having spent a morning putting it up, and talking through how it worked. I arrived early for duty on the Sunday and carefully saw to the storage of the machine.

Sadly the weather was not up to much for the first week and a half. The weather finally cleared on the last Friday, which only left me a potential three days' flying time. I checked the machine over on the Friday morning, returned to the mess for lunch, and let it be known that I would attempt my first 'flight' that afternoon. Not surprisingly this announcement received an 'at last' sort of response.

After lunch I started to learn with a series of 'bumps'! These little hops became bigger as the afternoon wore on, and I suppose I must have reached the princely height of 30ft (10m) on my last 'flight'.

That evening we had a debauched evening in the mess which resulted in me being offered a wager. For half a case of the best of champagne, I was to fly to the local point to point the following day in my DJ. I accepted the wager.

I woke up the following morning knowing I had 'enjoyed' myself the previous evening and then suddenly remembered the wager. I dived to the window to check the weather. Luck was with me. It was a little windy and there was a thin mist. The sort of mist that enables one to see quite well for a mile or two, but then renders everything grey after about five miles.

We had arranged to eat at the course, so I spent most of the morning drinking copious quantities of coffee in an attempt to kill off the effects of the night before. By the time we had to leave the mess I was beginning to miss some of the dutch courage I enjoyed so much the night before!

Once on the field with a few spectators at hand, there was little to do but get on with it. Dressed in tank boots, DJ, army parker, ski-gloves and a moped helmet I started her up, got in, put the throttle on full drive, and took off on my first flight (in anything).

I had decided that the most likely way of avoiding disaster was to fill up, and keep going up. After all, the only thing that could kill me was the ground, and with 3h worth of fuel in the tank I had plenty of time to sort out how the machine worked in practice.

I remembered to take off into the wind and spent the first four or five minutes fighting hard to keep her into wind, whilst still trying to gain height. This produced one or two tricky moments.

After this initial thrust into the unknown void, I decided to level out at about 1,500ft (500m) and see where I had got to. She came out of the climb very easily but would not stay level. For perhaps a minute or so she kept insisting on going into steep dives followed by equally steep climbs. I managed to work out how to keep her reasonably level after a while and then tried to solve my next problem — visibility.

The mist made it difficult for me to clearly see the roads which were my means of getting to the course. I therefore had to get down a bit. I tried leaning right forward but it did not seem to work very well, so I decided to bring down the engine revs a little and come down that way.

At this stage my adrenalin was flowing quite freely but I felt reasonably confident that I would achieve my aim. But just as I lent forward to throttle back, I nearly had a heart attack — the engine stopped! The next few seconds were full of silence. What was it going to do? Did it glide? If so, did everything work the same way without the engine? If not, could I

experiment and learn the new ways before we came to earth?

To my relief there was no violent action. The machine just kept going on. I looked down, and remembering I had to land into wind, I selected one of four potential landing places (one being a sewage works!) Unfortunately I fell short of the field I had hoped we would land on by about half a mile. Luckily however, we scraped over a six-foot fence, a small country road and just managed to squeeze between two large elms before the machine rolled to a halt on a rugby pitch (not being used at the time).

Thinking I was liable to loose the wager I tried to start her again but she would not have it. A few minutes later I managed to get a lift to the point to point.

Quite rightly such foolhardy acts are now illegal. Few I am sure, would argue otherwise. What is interesting however is that I do not believe I am any different from the next chap and that, as such, I choose carefully if and when I put my life at risk.

The microlight concept presented me with such a powerful combination of freedom and adventure, that I was prepared to stack the odds against myself far more than I had ever in the past. For me this power of attraction is a rare thing in the world, and although laws are needed, let's not kill the very elements of the sport that attract so many of us to it.

CM6

P.S. I was awarded two bottles for effort!

Nobody Checked Mine

Sir, The film about microlights on *Nationwide* in November has prompted me to write. This showed a reporter learning to fly a microlight and having a control wire come adrift at the same time.

This led me to think about the several occasions I have flown with an instructor in a microlight, and I now realise that on each occasion no attempt was made at a pre-flight safety inspection of the aircraft.

I have now changed to a PPL A course and before any flight I have to religiously "run" through a check list inspecting the aircraft, even if someone has just landed in it.

Microlights, by their exposed design, should be the easiest aircraft to inspect, as every structural member is visible, unlike a Cessna. Is it normal to check over a microlight before flight? (Yes, if you care for your safety — ed). Are checklists supplied with new microlights, or does the apparent simplicity of the microlight lead to contempt?

J Chandler
8 Hooked Lane
Wilstead
Bedford

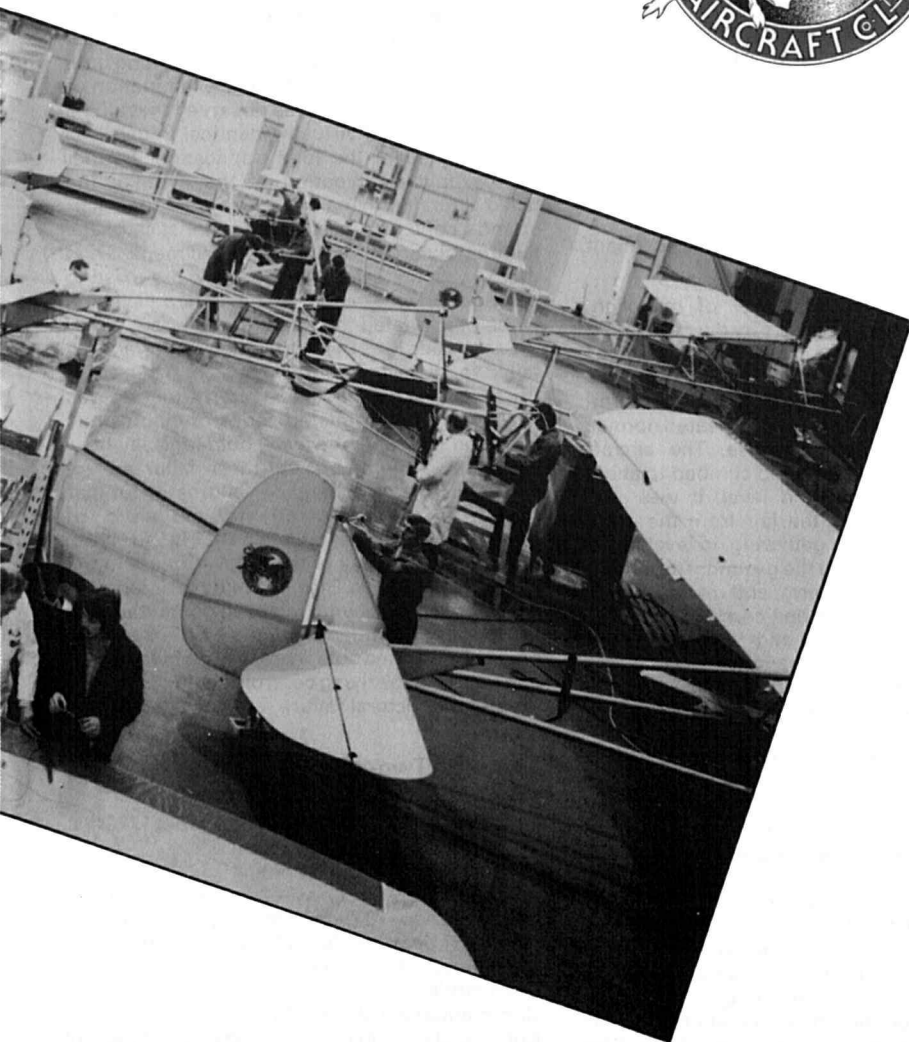
(Proper manufacturers' literature will almost certainly be one of the requirements of the airworthiness scheme — ed).



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JACK DILKS, at 73 one of BMAA's oldest members, recalls his first trip in a microlight and proves that you don't have to be young to fly a microlight, just young at heart.

First I had better explain my situation: I obtained my PPL around 1948, flying Austers and Tigers as a member of Leicestershire Aero Club, then based at Ratcliffe Aerodrome. My instructor was the then well known glider pilot Arthur Coltman (who incidentally taught BMAA President Ann Welch to

Old, maybe —

fly and is still alive and interested in microlights, despite being around my age). Later I progressed to owning and flying for several years a Piper J3 C65 two-seater, but that was all quite a while ago. More recently I started building an Adams Wilson helicopter, now sold to hang glider Tony Thorn in Cornwall.

So when Leicester MAC member George Rowbotham, the Quicksilver agent in Loughborough, offered me a flight in an MX, fellow LMAC members were thinking "Ah, will our Jack go up or is he all wind and scared?" Sure, I was known to be interested in microlights — after all, I helped found LMAC — but that's different from actually going in one!

"Come on Jack, jump in and I'll give you a flip" urged George. He had just landed at Stoughton Aerodrome to help LMAC members erect their joint club/BMAA stand for the next day's Leicestershire Aero Club annual display. It was a perfect Saturday evening — no wind and a clear sky.

With a look of surprise I remarked that I was not



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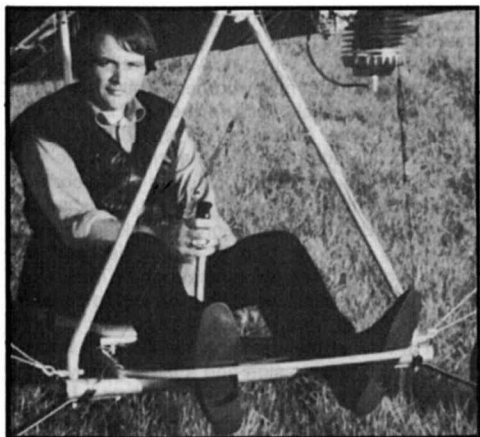
How they remind us of our innocent
beginning

With its wonder of the world
Whose depth remains through all our days,
A gentle-winged and timeless Eden.

Never was a dream so lightly realised;
The very earliest aircraft lifted from the earth
By primitive motors, whispers of power,
Adventuring through fields of air
With slow and cloud-like beauty.

A few there were that faltered,
Hurling into gravity
To lie like broken angels
In a green, surrounding silence,
Honoured in the glorious lists.

But others rose with vivid elegance
Above the quilted landscapes
Of those far-off summers.
From a cleaner world than ours,
They led the way into tomorrow.



Scout evolution: Above, Bob sits proudly in the Mk2. Immediately below is a side view of the same aircraft, while below that is the Mk3/3R as it arrived from Skycraft. Opposite is the Mk3/3R as modified by Bob, complete with cockpit, heavy duty undercarriage, tuned exhaust, and instrumentation.

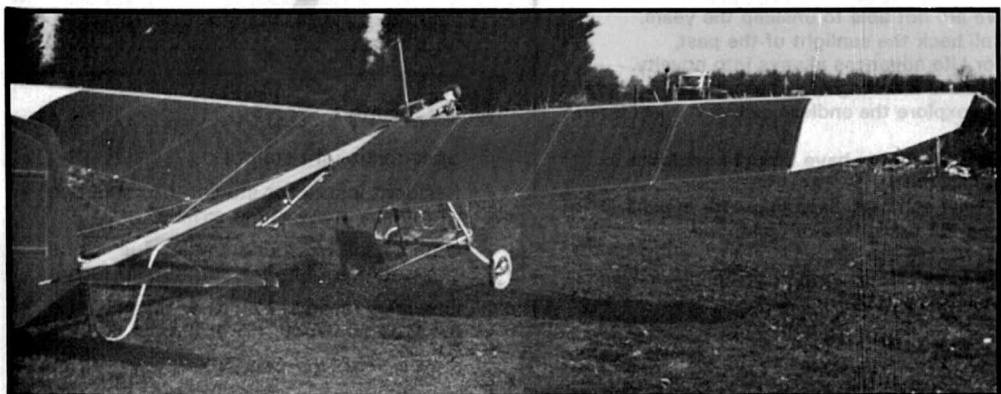
A guide to

BOB ADAMS, proprietor of Scout agent Flylite (East Anglia), describes his long, sometimes painful but ultimately rewarding experience of Mk2 and 3 Scouts.

At the end of April 1981, I became the owner of a Skycraft Scout Mk 2, a two-axis microlight. Little did I know what I had let myself in for.

Microlights were about to become the 'in thing'. The Scout was the nearest I could find to suit my particular needs and fulfil my ambition to operate my own aircraft.

The control system was as near conventional as any aircraft available at the time, and visually the aircraft looked good. I had certain misgivings about the two-axis control and the 173cc Pixie Major engine. This I expressed at the time but was told that with 400+ aircraft flying in Australia, and a few flying in this country, the power unit was well-proved and



the Scout

the two-axis control perfectly suited to the machine. There was no instrumentation and control was effected via a conventional joystick — fore and aft for pitch, and side to side for yaw/roll.

I successfully transported the craft from Scotland on the roof of the Metro, and back in Norfolk I and my friendly aircraft engineer set about the task of running in the engine, with the fuselage tied to the nearest tree. The procedure commenced as per the book. Five hours of running in at various throttle settings allowing the engine to cool between runs, and gradually increasing the setting in anticipation of full throttle. Then the fun began. Full throttle seize: full throttle seize! What were we doing wrong? Thirty seconds at full throttle, and seize time after time. We stripped the engine and deglazed the bore, but still no improvement. The only solution appeared to be more engine time at lower throttle settings. We rigged the aircraft and commenced test

trials. Half an hour in the aircraft on the ground enabled me to become used to the idea of keeping straight using the joystick.

We started doing a few hops on my airstrip, but still the engine was seizing. Then the electronic ignition broke down. At this stage the writing was on the wall. It's a shame one can't always see it. This engine was a bad one. Having replaced the ignition system it was back to short hops and gentle turns, but as yet no circuits. Yet again we deglazed the pot, and full throttle was available. It was then that we realised how sensitive the engine was to mixture setting, with continual adjustment required over the course of the day, to allow for air conditions.

The first flight was an involuntary lurch into the air due to the pilot's realisation that a wooden fence was nearer than it ought to be! The lack of climb soon became apparent, and a circuit was carried out at some 100 – 150ft (30 – 46m). On the approach the fan became stationary, followed by a rapid descent to terra firma — the first of many cornfield landings! After a small first flight celebration we were ready to start again, this time from a local airfield. A perfect flight was concluded by the disassociation of the



plug lead from the plug. During the next flight the cylinder head warped and compression was lost, resulting in two bent A-frame sections. A phone call to Scotland followed rapidly. After effecting repairs things suddenly improved — we were blessed with several technically uneventful flights, although flying-wise every second was a handful in anything more than a 5kt (9km/h) wind. Poor climb and the tendency for Dutch roll to develop made for very interesting flying!

With the benefit of hindsight, an accident was inevitable and it occurred on 15 August 1981, during a circuit of the home field. The starboard wing dropped and although that didn't particularly worry me, I could find no way of picking up the wing. From then to the ground I remember nothing.

The following four months were spent recovering from the effects of this 10min fun flight. Twenty-five fractures divided between both feet and ankles, broken ribs and head injuries take some getting over. Having to learn to walk again at the age of 31 is quite an experience, and not a recommended form of relaxation.

During April last year another trip to Scotland enabled me to see the three-axis Mk 3 Robin-engined Scout in flight. The improvements carried out by Ron Wheeler were evident, and seeing the aircraft in the hands of Ian McMillan certainly proved that the Mk 3 was a very flyable little aircraft. The

next day a Scout was heading south on the back of a Datsun truck.

Once home we set about the task of running in and checking and testing the new aircraft. The snags were very few. The engine was in a different league from the old Pixie, and the airframe was much better engineered. Then followed a break of three months for recovery after the removal of screws and plates from both legs and ankles. But in July we were ready to start again.

During short hops at the airfield, improvements in handling due to the three-axis layout were immediately apparent. At last the Scout was getting nearer to that 'real aeroplane' feel. During this period G-M BUD was fitted with low-pressure tyres on split nylon wheels and taper roller bearings, to replace the plain-bushed high-pressure arrangement. A stainless steel plate was located under the foot position to act as protection, in the event of another incident. We also modified the A-frame/under-carriage/axle bolts which delighted us all by shearing three times! All Mk 3 Scouts have since been modified to ensure that this fault will not recur.

August arrived along with the cockpit, and this addition of 3kg of fibreglass improved the security, comfort and flyability of the aircraft. Yet still she lacked that final something. We fitted a tuned exhaust to gain improved thrust, from 95 lb to 125 lb on our own test rig, and set about another flight test programme. Several flights later we decided that the roll control, although effective in a straight line for picking up the wing, was for turning purposes rather vague. The induction of high drag in the upgoing wing and the resulting adverse yaw required considerable use of rudder to stop the nose rising. Turns were flat and unimpressive; we had to gain more control of the trailing edge, and this we achieved by linking the tops of both wings by cable operating control rods from the wing leading edge aft to the existing aileron control point. The effect was incredible. I had suddenly become the owner of a superb little aircraft. A delight to fly, with turning no problem and take-off and landing trouble free. The little Fuji EC25 purrs away up front giving a cruise of about 55 miles/h (88km/h) at half throttle, and a rate of climb of about 500ft/min (2.5m/s). The Dutch roll has gone and handling is safe and predictable. She's car toppable and easily assembled or dismantled by one man in about 20min — and how many other aircraft can claim this?

You might wonder, having read this article, if it was really worth the pain, suffering and frustration. The answer must be yes. I entered microlighting as a raw PPL, with 11 years' experience on several types of machine but little knowledge of microlights. I have learnt the hard way and am looking forward to years of pleasure from the Scout. Must fly!

PS: Who pulled my coil cable connector apart at Leicester? It took me ages to find the problem.

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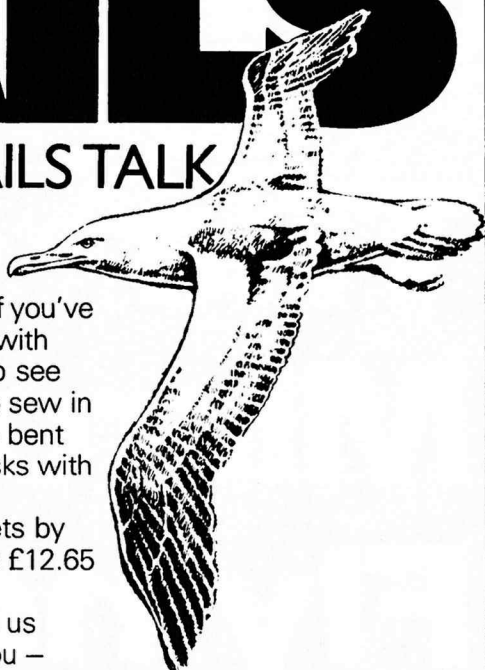
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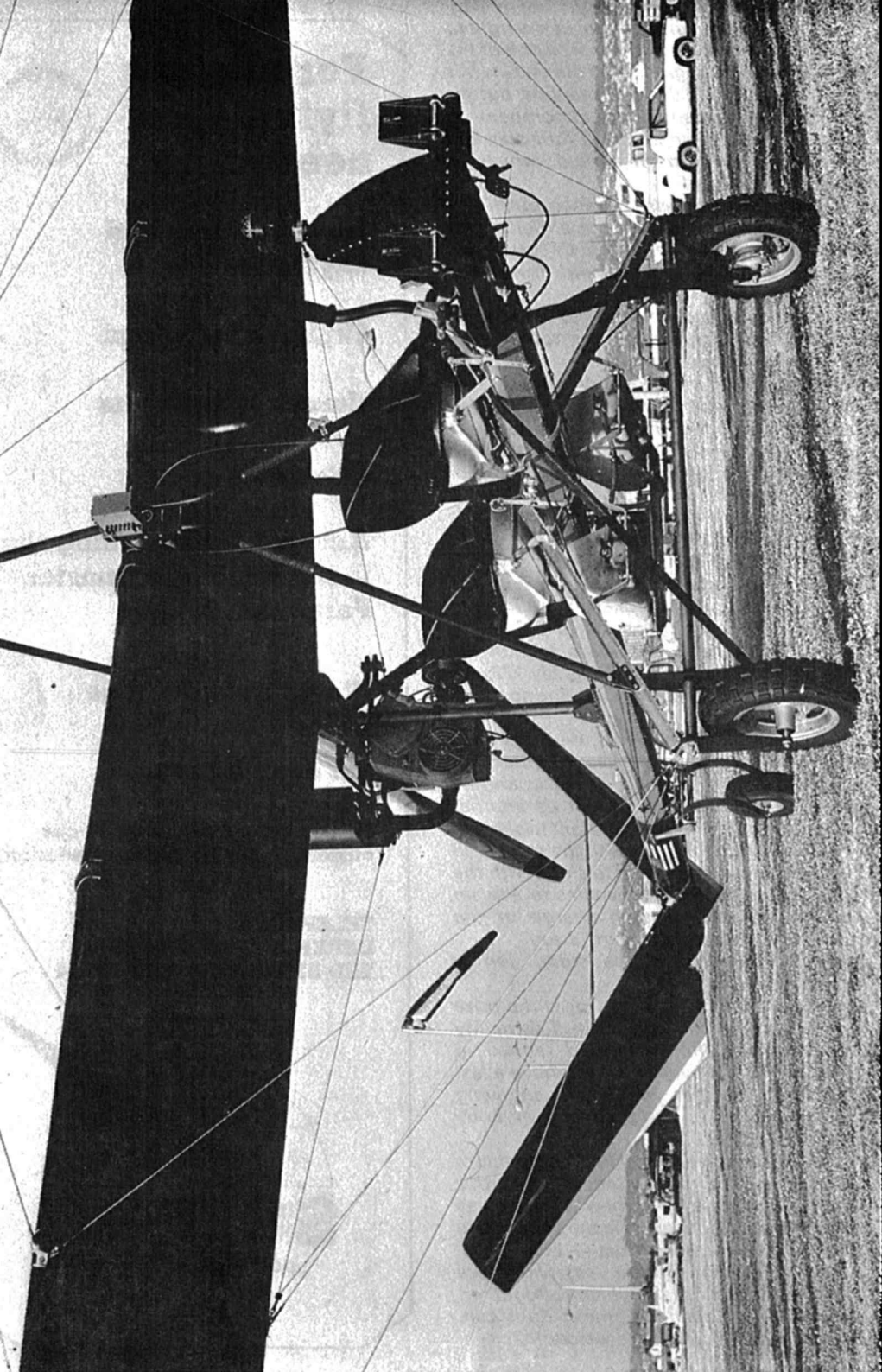
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Aeolus: the February flyer



By Norman Burr

Sooner or later some bright manufacturer had to cotton on. Someone was bound to realise that between the absolute exposure of the simplest microlight and the closeted boredom of a Cessna there was a market waiting to be tapped, a market which didn't want to lose the simple man-to-air communication of a microlight but which was getting pretty fed up with being frozen stiff for five months of the year.

Enter Aeolus, a fully enclosed microlight with perspex canopy (removable for summer days) and a wing loading deliberately made as high as possible within the microlight definition, to maximise the number of days when the aircraft can be flown. Since these are hardly the type of considerations that loom large in the minds of Californians, it is not surprising to learn that this thoroughly British concept is the product of a British company — Aeolus Aviation, based in Reading.

Aeolus director and chief designer Kevin McGrath has created a high-wing pusher-prop machine with conventional three-axis layout, differential ailerons for roll control and an elevator trim control. A GRP pod houses pilot (single seat only), controls, fuel and engine — and also has room for up to 6kg of baggage, another sign that the Aeolus is intended to be taken seriously as a cross-country machine. Wing and tube structure is conventional tube and fabric (Haze Sails is making the wings), though production models will have strut braced wings rather than the cable bracing shown in our picture of the prototype. Another production change to this tail-dragger design will be the use of a cantilever instead of coil sprung suspension for the main undercarriage. No

electric start is fitted or planned for the 330 Robin, but manual in-flight restart is easily done from the cockpit, the company says.

With stressing to +4g -2g (+6g -3g ultimate), the Aeolus is clearly not intended to be the ultimate performance machine, and is only modestly powered for an aircraft of 280 lb (127kg) empty. However, that is no bad thing, and the aircraft should find ready acceptance among pilots seeking a more comfy alternative to a Pathfinder, for instance. The price is a competitive £3100 including VAT for a complete aircraft (the maker says about 12h of spanner work is required) and deliveries are expected to commence in May.

Specifications: Aeolus prototype*

Manufacturer: Aeolus Aviation, 10 Western Rd, Reading, Berks RG1 6PD (tel 0734 586553).

Wing span: 32ft (9.8m).

Wing area: 140ft² (13.0m²).

Empty weight: 280 lb (127kg).

All-up weight: 500 lb (226kg).

Load factors: design +4g, -2g; ultimate +6g, -3g.

Engine type: Robin two-stroke, twin cylinder in line, 330cc, 30hp, manual start, belt reduction drive.

Cruise speed: 58mph (93kph).

V_{ne}: 81mph (130kph).

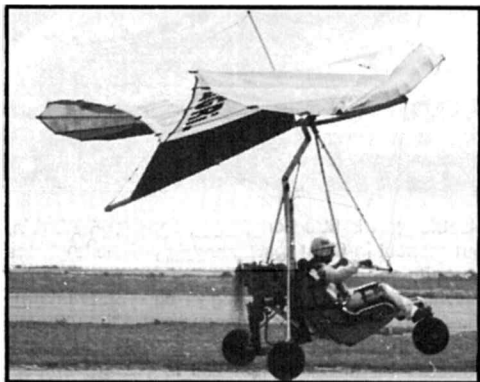
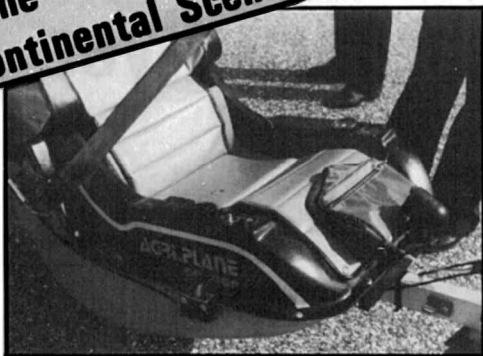
Stall speed: 25mph (41kph).

Climb rate: 550ft/min (2.8m/s).

Estimated range: 230mile (370km).

Estimated ceiling: 10,000ft (3000m).

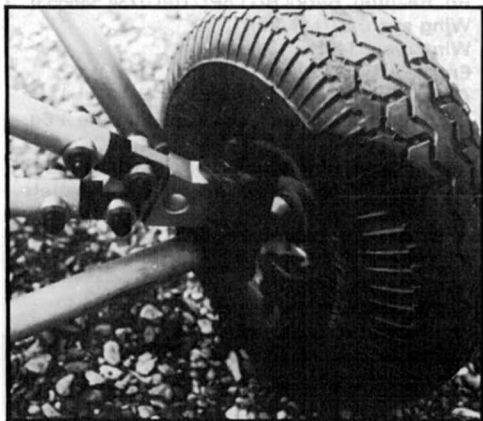
*performance figures taken with full fuel tank and 180 lb (82kg) pilot.



Top: *Pièce de résistance* of the Agri-Plane is this fully instrumented seat-cum-tank, divided internally to contain fuel in one half and spraying materials in the other.

Immediately above: Agri-Plane specialises in making trikes for crop-spraying, but take the nozzles off and you have a farmer's fun machine.

Below: No plastic saddle washers here! The Agri-Plane lacks suspension, but at least the construction looks robust.



Triking French style!

By Norman Burr

In common with the rest of microlighting there, triking is booming in France, thanks to a combination of good weather, simple regulation and a naturally aviation-minded population. It's impossible of course to do a proper survey of French weight-shift machinery in the very limited space we have here, so instead we've concentrated on showing some of the more unusual aspects.

Relevant names and addresses for the machines pictured are as follows:

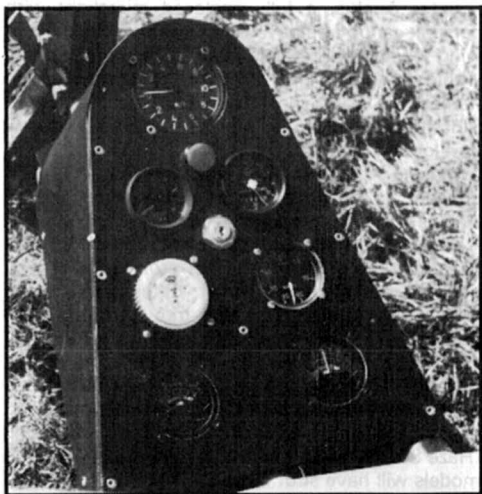
Agri-Plane: La Culture de l'An 2000, 86110 Mirebeau (tel (49) 504434).

Danis: Danis et Fils, 69-71 rue Roger Francois, 94700 Maisons-Alfort (tel (1) 3682237).

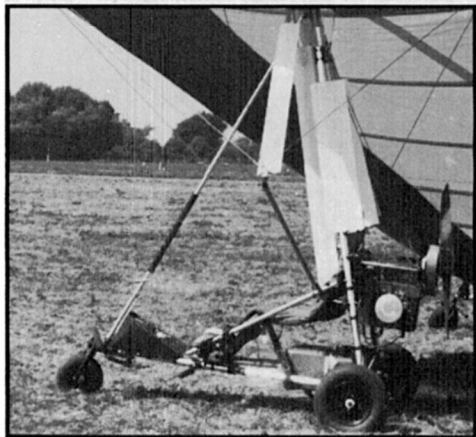
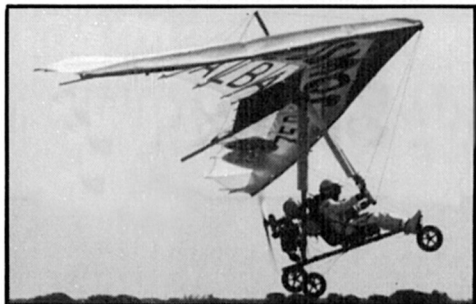
Dragster: Cosmos, rue de Stade, 21121 Fontaines-Dijon (tel (80) 574747).

KDA: KDA, Aérodrome d'Avignon, 84140 Montfavet (tel (90) 220914 weekends, (90) 225296 other times).

ULM Pyrénées: ULM Pyrénées, 65200 Orignca (tel (62) 952083).



Above: These neat instrument panels can be bought off the shelf in France. Surely there is a market for something similar in this country?



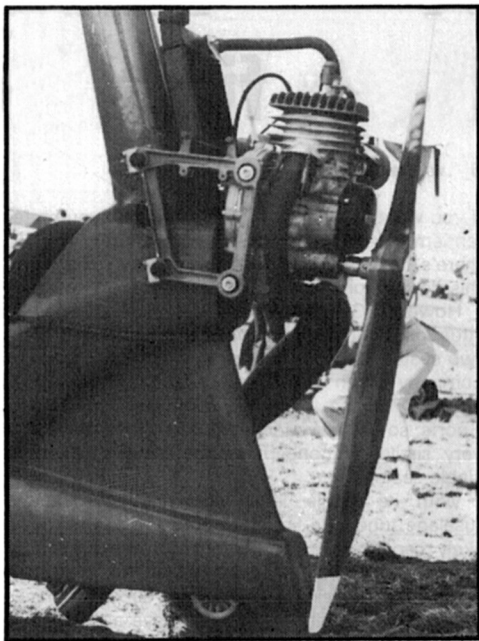
Top: Dragster single seater produced by the Cosmos company.

Immediately above: Danis is one of the largest French manufacturers and uses Hirth twins for its two seaters. Note the drag-reducing plastic fairings clipped around the tubes — a popular trick amongst London — Paris competitors.

Below: This ULM Pyrenees machine uses two Solo singles side by side and costs approximately £1000 without wing.



Above and below: Undoubtedly one of the prettiest weight-shift machines, the KDA uses a 125cc Hiro water-cooled engine like the latest Hiway trikes. Note the cast engine bearer and the curious little vertical fin at the rear of the fuselage.



So you thought Sirocco was



X-99: first Swiss import

By Norman Burr

If you want to learn to fly three-axis and you prefer tandem seating to side-by-side, tough luck — there's no microlight on sale in Britain answering this description!

However, Georges Borgeaud aims to change this situation, by introducing to Britain his X-99 tandem two seater. Georges is president of ULAC, a Swiss company which at one time held a European sales agency for the Hummer, produced by Maxair Sports, so it is not surprising to find that the X-99 is very similar in concept to the familiar American single seater.

With its single large diameter low-mounted fuselage tube, the Hummer concept was always a likely candidate for a tandem conversion, but in fairness to ULAC, it must be stated that their machine is not simply a Hummer copy. Machines imported to Britain are likely to have a completely redesigned wing of 14m span, sufficient to bring the

wing loading inside the UK microlight definition. It will be possible, Georges says, to rig the new wing to two different widths — 14m or 10m, though unless the weight is reduced the 10m span will probably be of academic interest to the law-abiding Group D holder. With its present wing of 10.4m span the X-99 lies just outside, thanks to an empty weight of 145kg and a wing area of 13.67m².

In view of the development work still in progress at ULAC, *Flightline* is not printing full specifications at this time, but claimed figures for the prototype exhibited on the Continent (with 438cc Hirth in-line twin of 40hp), were stall, cruise, maximum and V_{ne} speeds of 24mph (38kph), 46mph (75kph), 62mph (100kph) and 71mph (115kph) respectively. Climb was stated at 350ft/min (1.8m/s) glide ratio at 7:1 and rigging time 40min.

ULAC is also working on its own single seater, the S-77, but no details are available yet. The company can be contacted at PO Box 1252, Monthey 1870, Switzerland (tel (4125) 717061, tx 456288).

a Volkswagen?

By Norman Burr

Despite what the car buffs might tell you, when spelt with two 'c's Sirocco is the name of an undeniably elegant three-axis microlight produced by the French company Aviasud. The aircraft was first shown last summer and attracted considerable attention at the Lyon show in September.

Designed as a cross-country machine, the Sirocco uses the McCready TK7315 aerofoil. The wings have rigid leading edges and spoilers are used for roll control. The fuselage is made from glass fibre and provides the pilot with a semi-enclosed cockpit.

A more unusual application of glass fibre is its use as the suspension medium for the tricycle undercarriage (a solution also adopted for the American Sunburst, incidentally). An interesting option is a heavy duty undercarriage which allows the aircraft to be towed on its own wheels behind a car. This idea, plus what is claimed to be a very simple wing folding arrangement, should make the Sirocco easy to transport.

Standard engine is the JPX PUL 425cc opposed twin, which thanks to a new exhaust system develops 27hp in this application. As is usual with JPX engines, there is no reduction drive. Altern-

atively, the Sirocco can be fitted with the closely related three-cylinder radial JPX, of 640cc.

Other options include a fuel gauge (visible in flight), trim adjustment, ballistically deployed parachute and radio equipment.

So far there are no Siroccos in Britain and none on sale here, but Aviasud is known to be interested in the British market. Price in France is approximately £4500.

Specifications: Sirocco

Manufacturer: Aviasud, "Les Cigales",
Chemin St Antoine, 83600 Bagnols en Foret,
France (tel (94) 400480).

Wing span: 33.2ft (10.1m).

Wing area: 148ft² (13.8m²).

Length overall: 19ft (5.8m).

Dry weight: 231 lb (105kg).

All-up weight: 460 lb (209kg).

Load factors: ultimate +6.7g, -3.6g.

Engine type: JPX two-stroke, twin cylinder
opposed, 425cc (640cc optional), 27hp,
direct drive.

Take-off run: 115ft (35m).

Cruise speed: 65mph (105kph).

Maximum level speed: 71mph (115kph).

Stall speed: 25mph (40kph).

Climb rate: 700ft/min (3.5m/s).

L/D maximum: 12.



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Uli: a steel tube beauty

IAN WHEELER describes the birth of the Scheibe Flugzeugbau Uli, and gives his first impressions of this new West German micro-light.

I jumped off my first hill with wings on my back as long ago as 1942, and progressed by way of model aircraft to designing a man-powered aeroplane in the late 1950s. This was also to be fitted with a cycle motor, thus making it the first microlight, so I guess that may make me the father of our sport. Anyway that's another story and dreams aside, somewhere along the line I managed to pick up a PPL.

Being a professional jazz musician and spending most of my time on tour makes it very difficult to keep my PPL current, but I have one very good friend in Germany with whom I usually manage to log a few hours a year — and that brings us to the purpose of this article.

Specifications: Uli prototype

Manufacturer: Scheibe Flugzeugbau GmbH, West Germany.

Wing span: 31.0ft (9.5m).

Wing area: 136ft² (12.6m²).

Empty weight: 198 lb (90kg).

All-up weight: 396 lb (180kg).

Engine type: Hirth two-stroke, twin cylinder in-line, 22hp but only developing 16hp in this application (see text).

Take-off run: 150–200ft (40–60m).

Landing run: 100–150ft (30–40m).

Cruise speed: approx 45mph (60–70kph).

Maximum speed: approx 50mph (75–80kph).

Stall speed: 27mph (43kph).

Climb rate: 400ft/min (2m/s).

As well as being a fine jazz clarinet player my friend, Christian Gad, also happens to be partner and test pilot in a firm called Scheibe Flugzeugbau GmbH, and with a name like that it is perfectly obvious that they are involved in the manufacture of aircraft. In fact, as well as a range of gliders, their most well known design is the Motor Falke, an aerobically motorised glider that has gained a deservedly fine reputation over the years.

A couple of years ago I suggested to Christian that it might be fun to have a flight in one of the new breed of aircraft known as microlights. At the time he seemed somewhat less than enthusiastic at the thought of risking his neck in such contraptions, but with the passage of time he became more interested (especially after I had shown him a few copies of *Flightline*).

Then in November last it happened. I was in Munich for a couple of days with the band; Christian appeared at my hotel, thrust an envelope in my hand and told me that it contained specs of the prototype microlight his company had built, and that I was to go and see it the next afternoon.

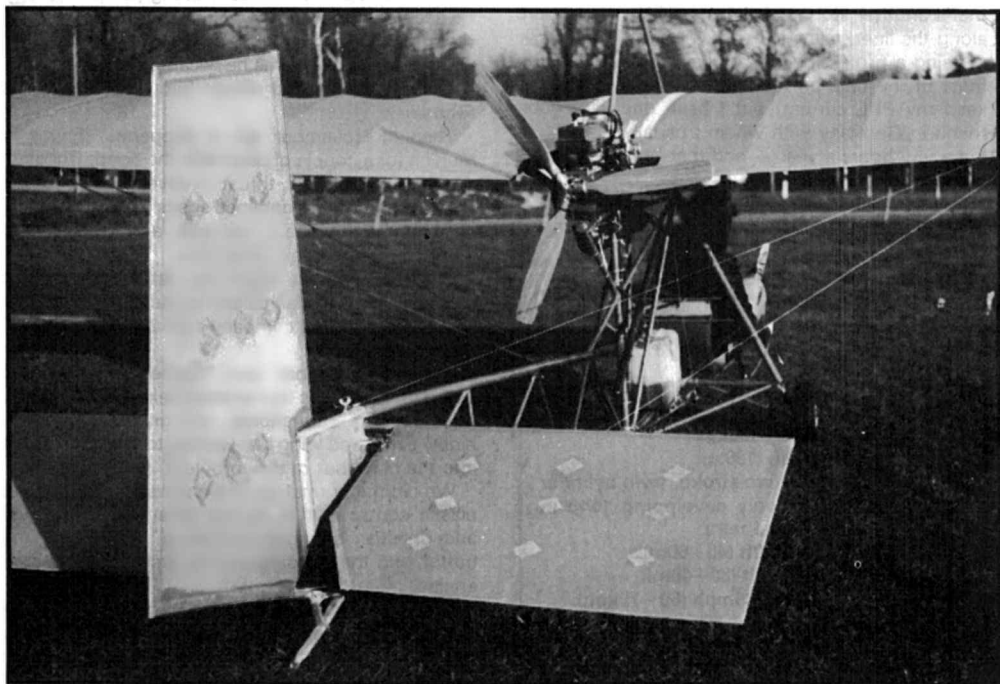
The day dawned bright but rather windy, and around noon Christian called for me at the hotel and drove me out to the company's private strip just outside Munich.

The hangar doors were opened and Uli was wheeled out. I was immediately taken by its sturdy good looks — functional, yet graceful, with its highly cambered wing just waiting to whisk you aloft into the blue (but rather turbulent) yonder.

We did the normal ground checks, topped up the plastic container that served as a temporary tank and Christian strapped himself in. A press of the button and the onboard electric starter fired up the engine.

After a short warm-up period he taxied out to the grass strip and lined up. The wind was right down the runway, and as he opened up and started to roll the tail lifted almost immediately, then in what could

The Continental Scene



not have been more than 30 or 40yd (27 – 36m), he was airborne. He held it level for a few moments to build up airspeed, then eased back on the stick, and up she went, at such a steep angle, I felt sure it would stall. He levelled out at about 300ft (97m) and did a couple of low circuits before cutting the power and lining up for final. The attitude on approach is fairly steep but the landing roll after touchdown was fantastically short, even allowing for the strength of the wind.

Christian turned and taxied back to where I was standing, appearing to have no difficulty in handling the machine on the ground. He lined up into the wind again, got out (off?) and asked if I would like to fly.

Now although I hold a PPL, I have never flown a microlight (an omission soon to be rectified I hope) and in view of the wind strength I decided I would rather be 'old than bold', so I contented myself with a few ground hops.

The acceleration seemed quite remarkable for such a small engine and the aircraft seemed to come unstuck almost as soon as the roll got underway. The controls felt light and responsive and with a little practice I'm sure that the Uli will be a dream to fly.

The Uli is, I believe, the first microlight to be built by an established aircraft manufacturer and as such is of great interest to the movement. The construction follows, in the main, normal aircraft practice. The fuselage is made from steel tubing, welded together as is the company practice with their Motor Falke. The wings are double skinned, with two large aluminium tubular spars, spaced by ribs that are cut from foam and capped top and bottom with wood. All the flying surfaces are covered in Ceconite. The wings are in two pieces and are braced by three flying wires to the fuselage and two landing wires to a kingpost over the central joint. The wires are fitted with turnbuckles and the whole aircraft can be dis-

mantled or assembled by two or three people in about 10min.

The three-axis controls are operated in the normal manner with a central stick and rudder pedals. In front of the stick is a small console holding flight and engine instruments. The all moving tail and rudder are aerodynamically balanced making operation very light, and the ailerons are rigged to give a degree of washout to the wing tips.

The engine is a 22hp Hirth two-stroke twin mounted behind the wing in pusher configuration. On this prototype machine, the engine is directly driving a three-bladed propeller and is only developing about 16hp (at around 3400rpm). Production machines are expected to have a reduction drive to enable the engine to develop its full potential.

The prototype Uli is a tail wheel aircraft but it is expected that the production models will offer trike configuration as an option.

Also the production models are expected to offer something more in the way of pilot comfort by means of a lightweight fairing up front.

Altogether, Uli is a welcome addition to the ranks of microlights, not least because it has been designed and built by a long established aeroplane company. The Uli is still a prototype and must be thoroughly tested before production gets under way — after all, this manufacturer has a reputation at stake, which I hope will ensure that the Uli is one of the safest microlights in the air.

Editor's note: Ian has undertaken to keep Flightline informed of the aircraft's progress (for which many thanks), and will also answer genuine individual inquiries if accompanied by an SAE, though he asks people not to expect an immediate reply. Latest estimate of the production Uli's price in West Germany is DM18,000 (£4,800 approx.). Ian's address is 48 Carey Park, Killigarth, Polperro, Cornwall.

All buttoned up

CRIS RAVEN writes from Munich on the West German microlight regulations, which in many respects are more restrictive than those in the UK.

If one of our West German colleagues would like to take his Frau or Fraulein (or anybody else for that matter) for a quick trip round the German Alps in his microlight, he can't. In Germany two seaters are not allowed!

That's just one of the regulations issued by the German Ministry of Transport last May in an attempt to improve the safety of microlight flying. The German Ministry of Transport is the governing body

of aviation here and is responsible for these new guidelines. Although microlights are now legal and 'non registered', they are governed by new legislation and must have a permit to fly. When flying, pilots must carry with them a certificate of airworthiness and a certificate of pilot competence.

The new regulations have classed all ultra-light aircraft into three groups.

Group 1: hang gliders. These are defined as aircraft without motors which are controlled partly or completely by weight shifting of the pilot and whose construction including harnessing, parachute recovery system and instrumentation does not exceed 40kg.

continued overleaf

Group 2: Ultralight gliders are aircraft without motors which are three-axis aerodynamically controlled and whose construction including parachute recovery system and instrumentation does not exceed 70kg.

Group 3: Microlights (better known in West Germany as ULs) are aircraft with motors which are controlled by weight shifting and/or aerodynamic means and whose construction including parachute recovery system, instrumentation and empty petrol tank does not exceed 100kg.

Each type of microlight must undergo tests for correct function and performance at the factory and be given a certificate of airworthiness. Production aircraft must be compared to and not deviate from a sample aircraft which has previously been certified. Any changes to the design must first be approved by the official certification office. The only aircraft allowed to fly without official certification are those which are undergoing tests for airworthiness. Owners not in possession of such a certificate had until 31 December 1982 to obtain one.

If you are visiting, the authorities will recognise an equivalent UK certificate (*when such a document exists — ed*).

All West German microlights are required to have a notice placed in a clearly visible place stating that the aircraft is not subject to the normal rigorous tests and certification of registered machines and that users fly at their own risk.

Every manufacturer must provide an instruction handbook with the machine and it must be written in German. The handbook must include information about the limits of operation and if necessary information concerning dangerous flight manoeuvres etc. It must also include details of the aircraft's construction, operation, service and maintenance procedures.

The microlight itself must have a wing area of at least 10m² and the minimum speed to support flight with the maximum allowable weight must be 1m/s. At a minimum flight speed of 45km/h all controls must be fully functional. Petrol tanks must not exceed a capacity of 20 litre and the instrumentation must include at least an airspeed indicator, altimeter and compass.

Now a word about noise. The noise level of the aircraft when flying at a height of 150m above ground must not exceed 60dB(A). This regulation will exist until 31 December 1985 and thereafter the maximum noise level will be 55dB(A).

The training of microlight pilots may only be carried out by qualified pilot instructors who are in possession of an official instructor's certificate of competence. The instructors must carry this certifi-

cate with them during instruction. If the instructor is resident outside of the Bundesrepublik his own country's certificate of competence will be accepted.

Microlight pilots must be 18 years of age or over, wear a helmet and carry a parachute. Flying is not allowed in controlled airspace although exceptions can be made with the permission of the flight safety authorities. Low flying military zones should be avoided. Flying is also not allowed near nature reserves or otherwise protected areas, houses or public places. Exceptions will be made for overland flights for which the pilot must apply for and be in possession of a special clearance certificate. Throwing out objects, dragging advertisements, night flying and aerobatics are all prohibited.

Pilots over 45 years of age must undergo a medical examination which must be repeated every 3 years.

Microlights must take off and land from airfields which have been recognised by the appropriate authorities for regional air traffic. Normal flying is only allowed between 50 and 150m above ground. These limits may be exceeded in the case of overland flights. Airfields must have a wind direction indicator and first aid arrangements. Take-offs and landings may only take place when a competent supervisor is present who is in a position to conduct air traffic and who can give immediate help in the case of accidents. The owner of a microlight must be insured.

Fines of up to 10,000DM (£2,500) can be given to persons not abiding by these regulations. Anyone who wilfully contravenes safety regulations and brings other persons or property of value into danger, is liable to a prison sentence of up to 5 years, (and that's 5 years in anyone's language.)

Postscript

By Donald Gurrey

A recent article in the West German magazine *Der Spiegel* (13 December issue) throws further light on the sport in that country.

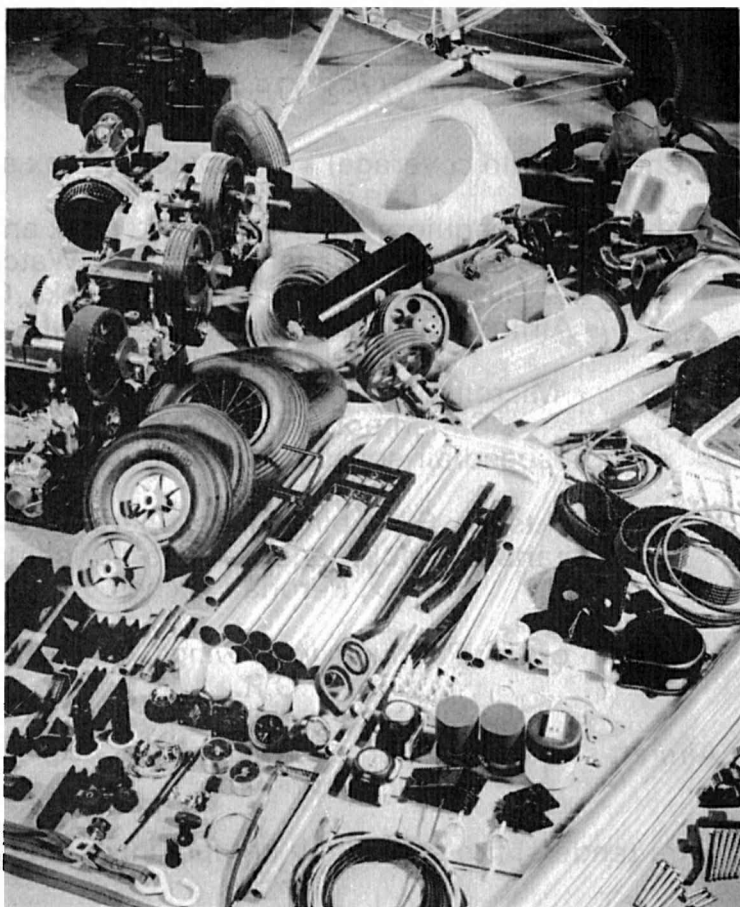
According to the article, the first microlight to be approved as airworthy by the German authorities was the Firebird M1, built by Schweiger and Jehle of Seeg/Allgäu. The M1 weighs 98kg, has a 24hp motor, a canard and a 10m wing span. Fuel consumption is 6 litre/h, maximum speed 50 mile/h, and cost including parachute and Mae West is around 22,000DM (£5,500). There has already been one fatal Firebird crash, after which the authorities insisted on the wing profile being changed.

At present qualifications can only be obtained at Tannheim airfield in Allgäu province, at a cost of 4,000DM (roughly £1,000). The would-be pilot must have 30h flying plus 60h theoretical instruction with an exam at the end; trained pilots (presumably PPL A types) need only 5h training.

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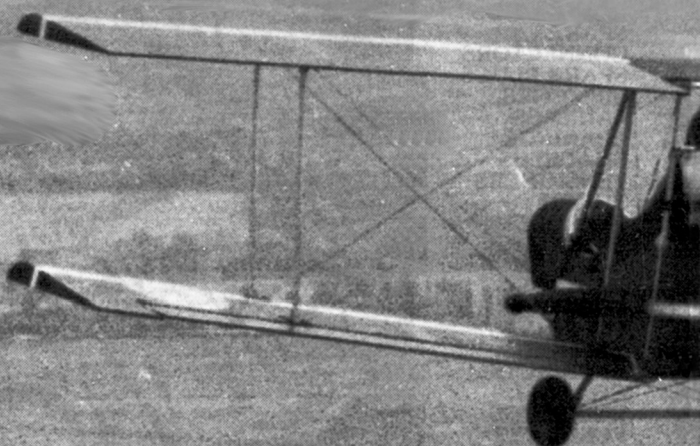
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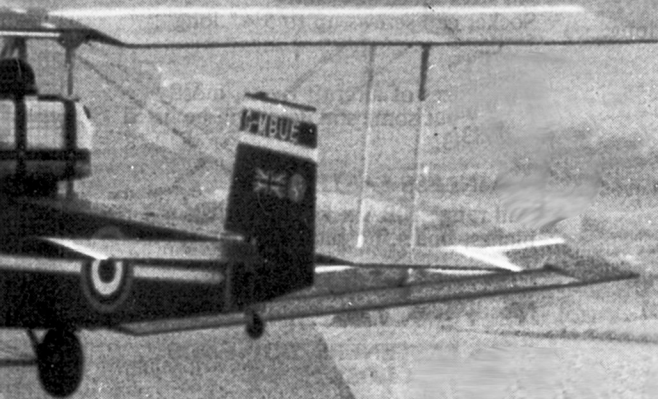
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The Microlighter's dilemma!

By Tim Williams

When Francis Rogallo invented his flex-wing, he didn't realise that a few years later it would act as the catalyst for the development of microlight aviation. The humble hang-glider was the world's first truly portable, foot-launched aircraft.

Because of the extreme simplicity of the design, the Rogallo wing was home-built in large numbers. As time went by, the more (sometimes less) proficient home-builders became manufacturers of these aircraft. The first exponents of the sport of hang-gliding were so delighted to find anyone who actually made these aircraft, that they forgave the early manufacturers for some of the defects in their aircraft. Everyone was learning. The troubles started when the really 'ab-initio' punters arrived on the scene; they wanted off-the-shelf wings and off-the-shelf expertise in flying them. These idiots started hurling themselves off hills and caused accidents all over the place. The ensuing bad publicity is still affecting us to this day.

So . . . when people started putting engines on

hang-gliders, the ghouls of the media looked on with glee and microlights got off to a shaky start. Keel-mounted engines on wings, with marginal pitch stability, were doomed to failure in the hands of anyone other than experts. The Powered Hang-Gliding Club was formed. Gerry Breen lost some toes and Brian Milton lost credibility, when his powered 'Safari' hang-glider tucked and broke up in front of the news cameras, whilst he was practising for a cross-channel attempt. Dave Cook made the news with the first powered hang-glider to cross the channel, a VJ-23 three-axis machine (which now resides in an aviation museum).

Things were also buzzing in America, with most effort being concentrated on McCulloch engines installed on Rogallo wings. Some people put engines on an archaic hang-glider called the Quicksilver, others experimented with a rigid-winged machine called the Fledge (now the Pterodactyl). However, microlighting in America was to divert along the three-axis route, not too far into the future.

Some little time later, along with much flatulence and good humour, something else was happening down in the Welsh Valleys. Hi-way hang-gliders crossed a NASA Rogallo test vehicle with Frank Tarjanyi and came up with something called the 'Skytrike'. This got rid of all the instability induced by high thrust lines characteristic of previous designs. Here was the real start of microlight aviation for many people. By now, there were a dozen or so trikes, a few old keel-mounted powered Rogallos and a couple of Pterodactyls flown by public schoolboys and members of the Dangerous Sports Club.

Now all this cheap aerial activity couldn't go unnoticed for long. Rumbles were heard in Kingsway and Whitehall. Luckily, the legislative machinery doesn't move terribly fast and microlights were destined for at least a few years' unhindered development.

A multitude of frustrated aeronauts now took up the cause. Aeromodellers, lapsed PPLs, glider pilots and armchair aviators of all types looked at these new aeroplanes with delight. "Let's re-create the golden years of aviation", they chorussed. "Take a Tiger Moth, Bristol M1 Monoplane and Flying Flea and redesign them a bit, build them out of Dacron and aluminium tube like these hand (sic) glider things".

Thus all the mistakes made during the evolution of the aeroplane were made again, but this time the evolution was compressed into four years. Most of their efforts were highly commendable; most didn't

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fly very well. Rotec Rallies, Lafayettes, Weedhoppers and Scouts all appeared and made their presence felt (mostly on the ground!). A miraculous stall-proof aircraft appeared from America (well, that's what the ads said) and did for Gerry Breen what the Model T did for Henry Ford. The Eagle brought microlight aviation to the masses and before you could say "seized Chrysler", the rush was on. Schools and dealers were setting up all over the place. Self-appointed instructors, having only just learned how to fly the craft themselves, now inflicted their ignorance on an unsuspecting paying public. Yes, the public came in droves and was quickly frustrated, disappointed and injured by what they found. The instructors (so-called) didn't understand what all the fuss was about. They were all deaf due to direct drive props! Some dealers turned out to be fly-by-night (without IFR rating too) extortionists and, perhaps worst of all, there were no two-seat aircraft for training.

Solo training was an activity which relied on luck and the low terminal velocity of the microlight. Weird and wonderful schemes were dreamed up in instructors' seminars, where people who considered themselves fit to teach others whilst learning themselves, discussed: tethering aircraft on speed boats, towing aircraft on ropes, hanging aircraft from gibbets on the front of trucks and best of all . . . having a radio-controlled throttle with the instructor in charge of the transmitter. (This arrangement was too prone to shoot-down by CB, we all decided). Heath Robinson would have gained enough inspiration for volumes.

Whilst all this was going on, the flaccid handshake of the bureaucrat was being felt by the smiling microlighters. The BMAA (newly formed out of the Powered Hang Gliding Club) became the BMAA (Micro not Minimum) and immediately busied itself with falling out with itself.

Presidents, generals, henchmen, training officers and assassins all came along and smartly disappeared up their own posteriors. Finally, the benevolent dictatorship learned how to say "yes" and cause a lot less aggravation. A lot was gained, a lot was compromised. The trike pilots, who had in the meantime flown from Lands End to John O'Groats and notched up hundreds of hours, came down to earth with a bump. The new baby had mutated into — horror of horrors — a fully organised bureaucratic machine with similar objectives to the CAA.

More people started the safer habit of talking about flying, rather than actually doing it. These people found themselves with more time to form committees and make much verbal sewerage. The fliers, too busy to say much high in the sky, had allowed their sport to be shot down. The age of the mini aeroplane had arrived. These aircraft, designed, flown and crashed by middle-aged men with more money than sense, began to make the headlines.

Microlighting soon became big business. Moon-

BMAA insurance policy

Several BMAA members have asked *Flightline* if we can print in full the insurance policy under which they are covered when they take up BMAA third-party insurance. We are sympathetic to this request — obviously people have a right to see the policy they are paying for — but the document is rather long and as such would take up too much valuable space if reproduced in full in the magazine. Instead we have made arrangements for a copy of the policy to be sent free of charge to any member requesting one. To obtain a copy, write to the BMAA membership office (address on Contents page) not please to *Flightline*.

lighting, the hype, the advertising con and the glossy image all took over. Big aviation companies began to get involved. £¼M spent on one design, £200,000 on the next. Imports of shoddy American machines escalated, as did the price one had to pay for the delight of flight. Chrysler became the new swear word on the canard pilot's lips. The microlight world discovered the realities of marketing, cash flow, law suits, exegesis and bankruptcy.

And the committees looked back on what they had achieved and were pleased. "We're with the big boys now", they were overheard to say. "We've got numbers on our aeroplane and licences in our pockets. Even space-shuttle pilots can't look down on us now. We've arrived".

"Oooh no you haven't", chorussed an invisible pantomime audience of unregistered, unlicensed non-BMAA pilots flying round to their hearts' content. But the committee chose not to hear them. "Airworthiness next", they said . . . "JAR 22 and CAIPs, we've got to make this sport safe for everyone".

Up in the Welsh hills, a 56 year-old farmer/trike-owner took off from his back field. High up into the cool evening air he climbed, as the dying rays of the sun turned the windows of his farmhouse red. He was free; he could fly. His delight stemmed from a gallon of two-stroke mix and the taut feel of his soaring microlight. He couldn't hear the committees bickering and didn't care for their type of flying anyway. CAP 53, bar-room rhetoric and memories of Spitfire and Lysander were alien to him.

Had this farmer heard of Jonathan Bach, author of musical ancestry, he would have recognised a kindred spirit in Jonathan Livingstone Seagull. Another author also would be proud . . . Orwell!

The important pig at the head of the table looked over his horn-rimmed specs at the other pigs around the shiny mahogany. "We've got to implement this 68dB noise limit right away, or we'll be sued out of existence", the pig said. Sadly, the pig was right . . . as was the farmer with his simple philosophy. Hope springs eternal that each might realise the other's dilemma and that pigs might fly. They should at least try!

No it isn't all getting away

By Steve Hunt

"It is easy to invent a flying machine; more difficult to build one; to make it fly is everything." — Otto Lilienthal

I for one am fed up with the pseudo-technical articles in *Flightline*, which it seems to me must be written by people with no real experience of microlights or of piloting them, apparently with the sole idea of pulling apart the work done to build up the sport in this country. I take particular exception to the very negative review of the microlight scene put forward by Peter Lovegrove in the last *Flightline*.

Every change in the sport over the years has been made for good logical reasons, and I've had a lot to do with some of them. My first practical 'microlight' was a Super Scorpion hang glider with one of those 125cc McCulloch engines down the keel, and at that stage we did a lot more than just 'try to fly', as Peter supposes. I did more cross-country flying on that aircraft in 1978/79 than I managed again until the end of 1981. The aircraft was safe to fly, pitch-stable, had ample climb rate and was a hell of a lot of fun, but its flaw was that it needed at least a shallow slope and not inconsiderable skill to launch it safely. This machine was flown by a number of other experienced hang glider pilots — remember the 1978 Perranporth event? (Already at that time the potential future of power was obvious to me and I had been talking to the CAA about it since 1977.) That powered hang glider, in the very skilled hands of Gerry Breen, made a single-step flight of 202 miles from Tredegar to Norwich, not to mention his first microlight London-to-Paris flight. All this, not forgetting similar work done by others in Britain, was certainly more than 'trying to fly', and like it or not it was setting the scene for the microlight movement we have today.

At that time I became seriously interested in power flying and after my first visit to Oshkosh in 1979, at which time the 'state of the art' was the direct-drive Pterodactyl, I was of the firm belief that there were two real directions for the development of microlights: either (a) what we now know as the trike but what I described at the time as a gyroplane-type bottom end with a hang glider on the top, or (b) a full three-axis aeroplane which could still fold up onto a car roof. My preference was for the latter, but the availability of 100 Valmet engines and the obvious practicality of the trike layout led quickly to Britain's first commercial microlight, the Hiway Skytrike/Super Scorpion combination. This machine was at the time an incredible breakthrough, but with my weight (too much), the Valmet Skytrikes climbed at 24mph (39kph) but sunk at 21mph (34kph) and 27mph (44kph), and in even very mild turbulence I couldn't climb at all, so it wasn't operationally very safe for me. Further developments

of the trike, including frame redesign and more powerful engines, have made them less marginal and therefore safer and more functional; in my opinion, a good modern hang glider with a good 330-twin trike represents a very usable device.

Despite the overall excellence of up-to-date trikes, I fervently believed it was possible to build a good little aeroplane with full three-axis control; I believed — and the results have proved me right — that this type of aircraft could be more compact to transport on a car roof than a trike, but much more important, more stable in the air, and able to cruise at a worthwhile airspeed (I get bored sitting stationary into wind!). It could also be much more positively controlled, especially at airspeeds a good margin over its stall speed. All in all, I'm one of those no-good (*Peter didn't use this adjective — ed*) designers and developers who has built heavy complex aircraft described by Peter Lovegrove as 'macro-microlights'.

When I called the inaugural meeting of the BMAA in late 1979, the meeting discussed weight limits as a first attempt to define what we were moving into; and 100kg was proposed. Over the next year, it became obvious to me that craft could indeed be built within this limit, but that it left no room for the degree of safety which I felt was essential: airframe strength, decent undercarriage, more than marginal power availability — all these together, which Peter also desires, could hardly be achieved within 100kg with current technology. My thoughts led to my article in the January 1981 *Flightline* and to the international 150kg wing-area-related definition which Britain now operates. (A microlight under 70kg does enjoy some privileges in Britain.) However, I think the 150kg limit gives sufficient design freedom and personally I am not totally in favour of a 200kg limit for two-seaters.

Our 1982 Pathfinder weighed 133kg; heavy but, apart from one or two mechanical imperfections, it has proved to be rugged, reliable and functional, and of immediate interest to the priced-out conventional pilot. Where do my designs go next? Forwards, not backwards — not necessarily to a bigger engine or a second seat — but to the Pathfinder Mark II with quick folding wings, better engine mounting, more performance from the 330 engine and improved handling. In short greater elegance with reduced overall weight. We are keeping our eyes on engine developments with a view to losing yet more weight.

The microlight industry is a new one, and Peter, it seems, would have had us strangled very soon after birth. With his negative views he must be in the minority among microlighters (although he may well be more representative of the general public!) As with any new industry it is inevitable that people will

from us!

head off in the wrong direction and already there have been too many tragedies — fatalities, frauds and failures — which have given our business a bad name with customers, suppliers and the public. Our industry has been typical of any other with rapid early development (hare-brained schemes and all) with a slowing-down and consolidation to come. With steady progress along a sensible course, we shall progress to a sound and safe sport.

The BMAA stands for *flying*; we cannot expect to have no regulation but we can fight for relevant and effective controls. Sure, you can build yourself an aircraft under the aegis of the PFA and your craft can indeed cost you less than a microlight — if you don't count the cost of your labour and overheads, and your running costs if yours is one of the lamentably small number of projects finished by the initiator. Meanwhile, the microlighter has been clocking up his hours in the air . . .

Peter is right that the designer has a lot to answer for, but he would have a lot more to answer for if his machines were lighter but weaker; one supposes that the designer should be permitted views on this, and on the direction microlight development should take. However, within the constraints of the definition there is much scope for elegance, economy and simplicity; sophistication does not necessarily mean complexity. In the end, the public can still exercise choice and need not buy if it does not like the product or service or trading terms offered — and the trade will respond.

My view of the microlight movement is that it has not yet come of age, but it is beginning to mature. There are competent, professional companies building aircraft and training pilots, and there are users who are more careful, educated and discriminating. Despite acute current difficulties it is certainly not all getting away from us. Microlights still offer cheaper practical flying than in almost any other period of aviation, and together we have the will to make it work. Let's stop whingeing and get on with the flying!

Peter Lovegrove writes: If the phone calls I've received, stating agreement and support, are anything to judge by, I must have come close to hitting some nails on the head. I'm sure Steve Hunt is honestly stating his own attitude and approach, but I think he has largely missed my real point. I would welcome more written comment from users — specifically non-manufacturers — so we can get an unbiased picture. Norman Burr adds: In fairness to Peter, I must set the record straight regarding his own flying situation, since he is by no means the armchair aviator that Steve implies. Peter flies a Hiway trike and has also test flown a microlight of his own design and construction.

Flightline Mid-February 1983

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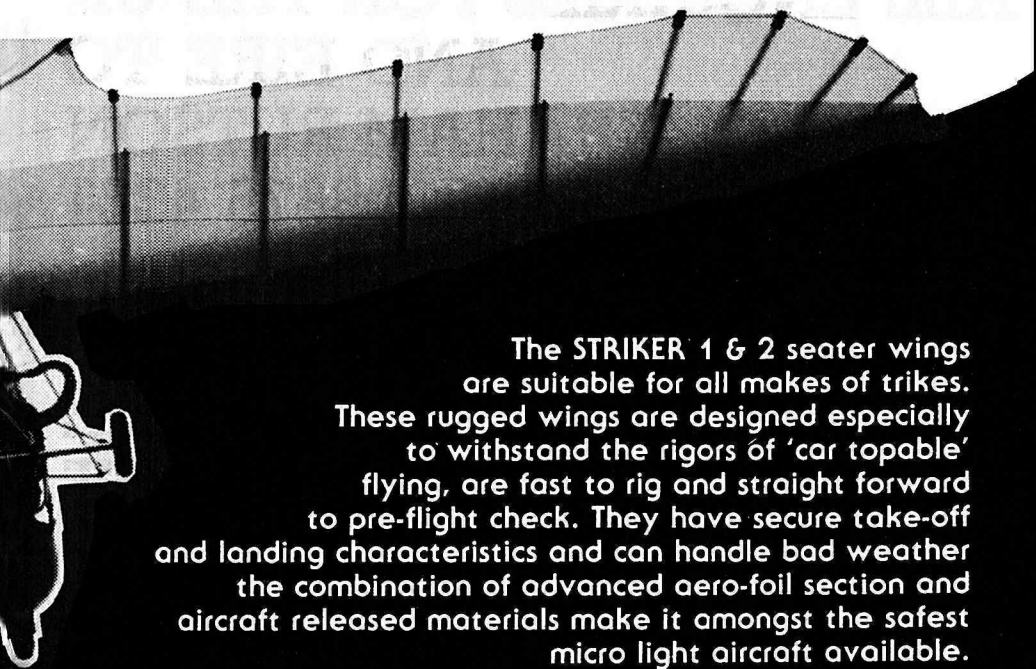


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Stateside view

By Glenn Brinks

Bob Teman and the Mono-Fly

Bob Teman is not your average homebuilt/ultralight designer. Instead of moving from hang gliders and model airplanes to ultralights, Teman came from the other end of the aviation spectrum. As a structural engineer, he has worked on projects ranging from the Cruise missile to the tiles on the Space Shuttle.

On his own over the past few years, he has designed and built a number of airplanes including a man-powered aircraft and a biplane. He kept working on his designs and developing them until he arrived at the configuration of the Mono-Fly, a strut-braced, high wing monoplane with a conventional tail, pusher engine and tricycle gear.

It worked well and Teman was soon selling plans for his creation and showing up at local southern California fly-ins. In time, he was selling so many plans that he formed Teman Aircraft and devoted himself full-time to producing plans, materials kits and pre-fabricated 'quick-build' kits. Despite the economic conditions, he has already moved to a larger shop and plans to move again in a few months.

Obviously, there are a number of pilots who like Teman's idea of building a real airplane that flies as cheaply and almost as slowly as an ultralight. They must also like the way Teman puts a higher priority on simplicity and strength than on saving every last ounce. The Mono-Fly isn't a lightweight at 260 – 280 lb (118 – 127kg). By juggling tubing wall thicknesses and making the airplane much more complex (lots of small parts instead of one big simple one), a Mono-Fly could be built 20 – 30 lb (9 – 14kg) lighter. However, the simple structure is not only easy to build, but also incredibly strong.

For example, the wing spar is a simple 5 in diameter (127mm), .052 in wall (1.3mm) aluminum tube. Officially it is rated at a limit load of 6g and an ultimate load of 9g. Chris Spangenburg uses a Mono-Fly wing and strut on his TOPA Scout and he tried to load test one to failure. At 10g, the wing hadn't broken but the test fixture began to give way. Teman estimates the wing would actually break somewhere around 12g. The rest of the structure is equally rugged.

The prototype of the Mono-Fly has gone through so many modifications and repairs that it was finally retired and hung from the ceiling of the new shop. When we arranged to do a flight test, we got to fly a privately owned Mono-Fly that was built from plans.

Builder Jon Carlson started with a set of plans and a \$30.00 sheet of aluminum. "I couldn't afford a kit right off, so I just started a part at a time." He found



few problems in building it and said most of those were "when you don't read the plans and you make the parts the wrong size." He rates the drawings as very good and says the only complaints are with the explanation of how to put twist in the wing and the angle of incidence in the spar box. Both of those were explained by calls to the factory and overall, he says the factory support was excellent.

After about 300h of "taking your time and doing the job right," Carlson had an excellent example of the Mono-Fly. It was completed in time for a fly-in near San Diego and one of the judges told me it would have won the Best Ultralight award had it flown at the meet. The first test flights were done the following weekend. A week or two later, we met Carlson, Teman and Ridge Heindl, a factory technician and pilot, at Lake Elsinore to check out Carlson's airplane.

With its rigid wing and non-folding fuselage, the Mono-Fly requires a trailer, but in return it offers a quick set up time. It can be put together by one person, but it's easier with two, and should take only about 15min (less, if you hurry).

Once set up, pre-flight is easy because the important things are exposed. All of the important structural bolts, pins and other attachments are visible and the aileron, rudder and elevator bell cranks and cable attach points, and the rest of the control system, are all out in the open.

Climbing in the cockpit, the Mono-Fly pilot is met by something unique in ultralights. There is no swing seat, no handlebars or twist grips or even a stick, but a genuine control yoke. Cessna drivers will feel right at home. The yoke is turned to activate the ailerons for roll control, and is pushed or pulled for pitch, just like a 152. A rudder bar handles yaw and is hooked to the nosewheel for push-right, go-right



steering. Pushing the yoke all the way forward pulls a piece of aluminum extrusion into contact with the nosewheel for braking. The throttle control is a lever worked by the right hand (you can reverse it and mount it on the left, if you prefer), and there is a kill switch on the yoke.

The seat is an upholstered fiberglass bucket bolted to the fuselage boom tube. Seat belts and a shoulder harness hold the pilot in place, but don't restrict use of the controls, even with the addition of a parachute.

One item missing from Carlson's airplane was a proper attach point for a parachute, but this is an easy thing to add. I always fly with a chute (after all, no matter how strong and stable the plane, there is always the possibility of a flawed bolt, a midair with some bonzo who isn't looking, etc) so we eventually

hooked my chest pack into the seatbelt attachment.

After a hand-prop from Teman, the Onan fired right off and settled into its distinctive 'pok, pok, pok' idle. At any ultralight fly-in, one sure way to pick out a Mono-Fly is to listen. If, under the buzz of the two-strokes, you hear something that sounds like it escaped from a museum, you've found it. At 80 lb (36kg) and 20–22hp, the Onan (the same as used in the Quickie) has a poor power to weight ratio, but it offers good reliability and low price (about \$500.00) and no reduction drive is needed.

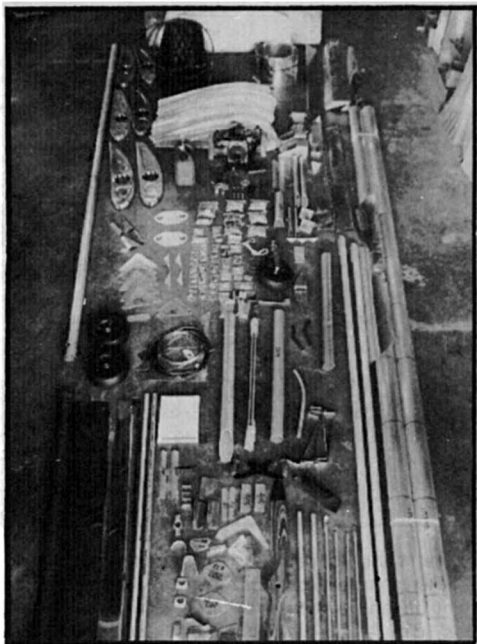
Taxiing is easy with the steerable nosewheel and the gear, sprung on all three wheels, does a good job of soaking up the bumps. We didn't get a chance to try one, but a classic soft field takeoff, holding the yoke back to lighten the nosewheel and lifting it off as soon as possible in the takeoff run, should allow the Mono-Fly to handle all but the roughest of fields. Larger, flotation type tires will soon be available, giving it even better rough-field performance and making the Mono-Fly a prime candidate for agricultural and other off-airport uses.

When the throttle is moved forward, the Onan gives surprisingly good acceleration for its 22hp. Hold the yoke roughly centered, and when the plane starts to feel light (30–35mph, 48–56kph), pull back a bit and it lifts off gently with no tendency to porpoise.

Once off the ground, the limitations of the Onan become apparent. Climbing out at about 37mph (60kph), the ground falls away quickly at first, but the actual climb rate is only about 200–250ft/min (1–1.3m/s) max, with a well tuned Onan and about 170 lb (77kg) of pilot, helmet and chute.

With a heavy pilot, or on a hot day, performance gets even worse. Part of the reason is that the Mono-Fly climbs at a much faster speed than most





The Mono-Fly fast-build kit. All metal parts are cut, bent and pilot-drilled.

ultralights, so virtually all of the 22hp is needed just to fly the plane, with little left for climb. The factory is aware of the problem and they've been trying a number of solutions. They experimented with a mechanically driven supercharger and even tried using two Onans.

Teman was reluctant to use a two-stroke, but he finally found two he liked. The Kawasaki TA-440 with 37hp will be a factory option and they're hard at work building a prototype with a 47hp Rotax. Individual builders have used engines ranging from Cuyunas to Volkswagens and report exceptionally good climb performance with the more powerful engines.

Once established in level flight, the Onan gives a maximum level flight speed of about 50mph (80kph) at 3800rpm. Throttling back to 3300 results in a 40mph (64kph) cruise and a fuel consumption of about 1 1/2 gal/hr (6.8 litre/hr). Full throttle, the Onan creates a real racket, giving a noise level of 111–114dB(A), depending on prop. Earplugs are a must. Fifty feet away (15m), however, the noise level drops off to about 86dB(A). We didn't get a sound reading at cruise, but at the lower rpm, the engine noise goes down, and the prop tip speed is reduced, cutting the prop noise, so the overall noise level is as low as most other ultralights and less offensive to neighbors because the sound doesn't have the irritating, high-frequency rasp of a two-stroke.

In level flight, the stability of the Mono-Fly is immediately apparent. It just goes where it's pointed. The broad, constant-chord wing resists any rolling motion, but the ailerons are powerful enough to overcome that. There is a little friction from the push-pull cables, but much less than on a factory prototype I flew a while ago. The improvement is due to the use of better quality Teleflex cables.

Rudder pressure with the full-flying vertical tail is very light, and at 30–35mph, the plane can be flown with rudder alone if only gentle turns are made. At higher speeds, or steeper bank angles, opposite aileron is needed to keep the turn from tightening and to roll back to level flight. At some speed/rpm combinations, there is a little 'nibble' you can feel in the rudder bar, caused by the rudder cables shaking in resonance, but this has no effect on the handling and is soon ignored.

The horizontal tail surface is a stabilator, a full-flying stabilizer and elevator. Like the rudder, it gives a very light control force at the speeds the Mono-Fly is flown. It's generously sized and placed a long way from the wing, so it offers excellent pitch damping. Changes in power and pitch have no tendency to start an oscillation. Set the speed where you want it with yoke position and the Mono-Fly stays there.

The stabilator has one unusual characteristic — it stalls. As the yoke is brought back, speed drops off until the plane is down to about 30mph. At this speed, it is very stable and there is no buffeting or any other signs of stalling. If the yoke is pulled back further, the airspeed remains at 30mph, but the tail stalls and stability is lost. The plane then tries to drop off on one wing. With concentration, it's possible to keep it level with quick responses on the rudder, by kicking rudder into the high wing. It's similar to slow flight behind the power curve in a conventional airplane. However, the main wing doesn't actually stall. The stabilator doesn't have enough power for that. At the point where the main wing is almost stalled, the stabilator stalls first. Pulling back further doesn't increase the angle of attack of the wing. Unstalling the stabilator and restoring normal flight is done by simply easing forward on the yoke.

The Mono-Fly is so stable at 30mph with the tail still flying that it is tempting to fly an approach at that speed. However, this will result in a very hard landing, or even a bent nose gear because pulling back on the yoke to flare just stalls the tail instead.

Proper approach procedure is to come down at 40mph, power on or power off, and begin flaring at 10ft (3m) or so above the ground. Speed bleeds off rapidly with the thick airfoil. Gently cut back on the power and it will touch down at 30–35mph. Holding 40mph will allow you to just paint it onto the ground every time, with or without power. With any headwind, the descent angle is very steep and with practice, spct landings should be no problem. Forty mph also gives an approach attitude that seems very

nose-down because the Mono-Fly doesn't have any windscreen or panel in front of the pilot for a horizontal reference. But the technique is simple and becomes second nature after a landing or two.

The bungee-sprung main gear makes a good-looking landing easy. It is very compliant, has a long travel to absorb energy, and it doesn't tend to rebound and bounce the airplane back into the air the way a stiffer spring can. It's possible to bounce a landing, but you really have to work at it.

Crosswind landings are easy in the Mono-Fly because of the powerful ailerons. You can hold a wing low into the wind and come in straight or slip sideways and kick it straight as you flare. The combination of a fairly high wing loading of 4.43 lb/ft^2 (*I presume Glenn means laden, otherwise at 212 N/m^2 , this is outside the UK microlight definition — ed*) and powerful controls allows the Mono-Fly to operate safely in winds that ground most ultralights.

The Mono-Fly's handling got a good test when the prop disintegrated at about 100–150ft (30–46m). There was a loud bang and the engine began to run roughly and lose power. There was no drama. I just put the nose down when I saw the speed bleeding off, blipped the throttle a few times to see if it would regain power, flared, and did my best landing of the weekend.

I didn't realize the prop was gone until I went back to look at the engine. A spectator carried the pieces

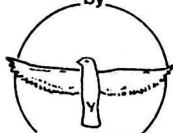
of the prop up a few minutes later. It turned out that the prop was operating above the manufacturer's rpm limits; Herb Gillespie of Revmaster inspected the prop and said it had been poorly made and that scorch marks on the center of the prop indicated it had been moving around a little on the hub. Since there were so few hours on it, apparently it had loosened up after the first run-up and should have been re-torqued.

None of this reflects on the Mono-Fly itself. Throughout its normal flight envelope, it showed only the most docile, predictable handling. We didn't get a chance to do accelerated stalls (power on, in a turn), but based on its straight ahead stall/mush behavior, the Mono-Fly should do an accelerated stall about like a Cessna 152 or any other trainer. It's underpowered with the Onan, but better engines are now available from Teman, and it may be the strongest airplane on the market.

Teman Aircraft has developed a 'fast-build' kit for the Mono-Fly, which it estimates can be assembled in 80h, or two work weeks. Everything to complete the airplane, including rivets, bolts, covering material and airspeed indicator, are included for \$3400.00 (\$2515.00 without engine). Plans and materials kits (which also include the pre-fab ribs, tail surfaces and aileron skins) are also available from Teman Aircraft Inc, 10092 Northampton Ave, Westminster, CA 92683, USA (tel (213) 402-6059).

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For once, PETER LOVEGROVE is very favourably impressed by a microlight manufacturer; in this case, the company is Southdown Sailwings.

I recently had a long telephone conversation with Roy Venton-Walters of Southdown Sailwings. I am bound to say I was most impressed by his whole attitude to the design, development, manufacture of, and training on, microlights. Having had the opportunity to study, in detail, the operator's manual and service and information bulletins for the Puma and Lightning DS wings, which he was kind enough to send me, I am yet more impressed.

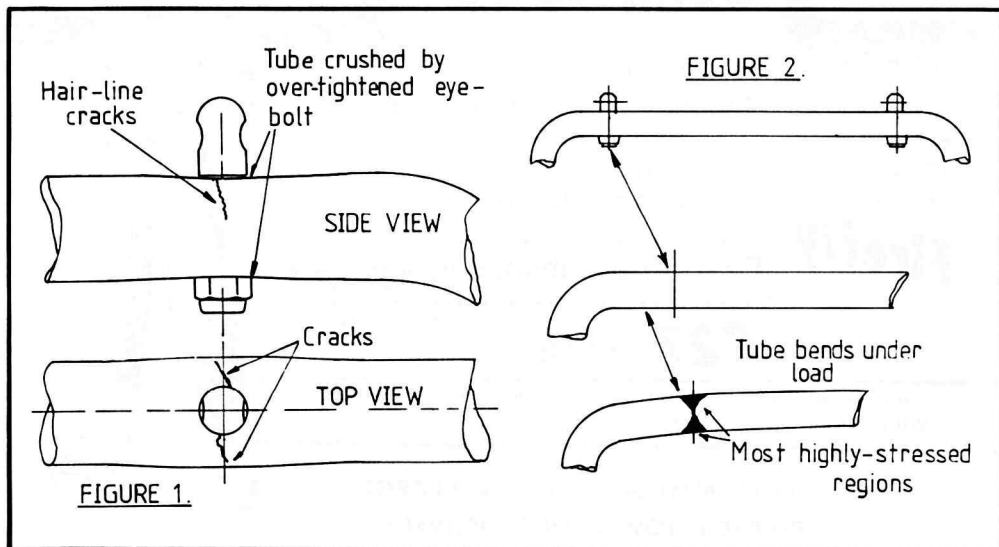
Even if a manufacturer does produce a good microlight, it is useless for him to assume it will remain perfect. It has to be expected that the users will inevitably unearth minor problems, or find ways of introducing fairly major ones! The only way to begin to deal with this sort of difficulty is firstly to try to persuade users to provide feedback to the manufacturer about any problems, however trivial. Sometimes, trivial indicators are pointing to serious troubles to come, which only the designer might be in a position to recognise. Secondly, the manufacturer needs to set up an information service to reach *all* his customers, be they direct purchasers or those who bought through dealers. He can then inform all of them what to look for, what difficulties have arisen and what the designer's recommendations are, to put matters right. Such a follow-up procedure, allied to a comprehensive handling manual, is about all any responsible manufacturer can be expected to provide and is generally adequate to keep the users safe and happy.

Southdown Sailwings has done all this; I do not

Struck by

say this makes it unique, but I have not yet heard from any other manufacturer that he/she/they are doing the same. I would be delighted to do so. The more we can analyse and compare different approaches to the handling of users' problems by manufacturers, the sooner the BMAA can arrive at some minimum common standard to be attained by all manufacturers. This is no sort of imposition on the latter, since the better the reputation of a firm, the more customers it will generate.

Some manufacturers may think it is a sign of failure to have to tell their customers that their product has some problem or other; it certainly is not. Any sensible person knows that users have a unique ability to ferret out problem areas that all manner of testing and development could not reveal. Remember how drivers found the early Minis stopping whenever they drove through deep puddles, because of wetted ignition? A friend of mine has just bought the latest product of one of the biggest car manufacturers in the world and found that, with four adults on board and all their luggage in the boot, the floor of the boot flexes and cracks and bangs alarmingly as it 'oil-cans', from the local pressure of the rear suspension. Clearly the development boys did not think to test with four fatties and their luggage on board; a 'fix' is needed. If multi-million-pound industries have these problems, what have our small manufacturers to be ashamed of?



Lightning!

Anyway, back to Southdown Sailwings: the company's *No. 1 Information Bulletin* points out that the Puma wing has been statically loaded *above* the operating manual design figures, in the positive 'g' mode, in the presence of an official CAA witness.

Their first service bulletin relates to the effect of clumsy or careless transportation or storage of the Puma DS wing-ribs. The cause, effect and prevention of the difficulty is fully and clearly spelled out (*see p73 last issue — ed*), so users can readily check to see if they have unknowingly run into this problem and, in any event, can effectively deal with it. The provision of full-size rib templates is a very helpful point in handling such snags. Southdown are to be commended on their forethought.

Their operators' manual for the Puma is comprehensive, covering, for example, design, development, flight characteristics, tuning and inspection, rigging and derigging, inspection and maintenance, as well as many other valuable areas of information about which any pilot who enjoys life ought to want to be told.

Changing the subject slightly, Roy sent me two pieces cut from the seat-frame of a trike unit which his staff were overhauling. (It was *not* one of their machines). The seat-frame on this particular craft, I am told, is all that holds the mast correctly in position relative to the keel. Failure of the seat-frame would thus be *totally* disastrous. Such a poor design

format should be questioned by any potential buyer, I would strongly suggest.

The piece of seat-frame in question has two eye-bolts through its top horizontal section. As is shown in Fig 1, these were overtightened so that the tube was partially crushed. This would help to initiate cracking. More important, it appears that the eye-bolts were located in the tube so that the holes through which they passed were coincident with the areas of peak bending stress (Fig 2). The almost inevitable effect of the loading was to initiate cracks round from both sides of the 'top' of the tube, beginning at the bolt-hole. Engine vibration was not necessary in order for this sort of cracking to start. The high forces (and fatigue, of course) from the bouncing around of the pilot's weight, plus the overtightening of the eye-bolts, would be quite enough to initiate it, particularly with the weight of the whole wing, mast and engine working in the same evil direction during the bounces. What engine vibration *would* do, is to *greatly* accelerate the propagation of the crack.

Whoever the owner of this machine is, he may well have the astute mechanic at Southdown Sailwings to thank for his life. That seat would certainly have broken away completely in another hour or so of use. The BMAA could then have had another morbid fatality to explain.

What is most important here is, if the Southdown mechanic could spot this cracking, so could the owner/pilot, if he had done his pre-flight inspection to the required standard. So be warned; not many of us get this sort of second chance!

Finally, as I said earlier, if any other manufacturers have different approaches to user/service dealings, we would be most pleased to hear about them.

Weedhoppers again...

Readers' queries have prompted PETER LOVEGROVE to elucidate on one specific area of criticism which he raised against the Weedhopper B.

In my previous article on the Weedhopper, (*Flightline* Nov – Dec 1982), I expressed concern about the bends in the wing-struts and the effect of axle bending-loads on the overall wing-support system. Several readers have asked me exactly why I think this area of the machine's design is so questionable. I imagine I gave satisfactory answers to their questions, but perhaps I should discuss this feature

in a little more detail, to forestall any further questions. Incidentally, the last couple of paragraphs of that article, on p50, got screwed up. It should have read:-

Postscript:

Since this article was prepared for publication, Stephen Reynolds, who is now distributing the Weedhopper C, has been in touch with me. Stephen says that the criticisms levelled at the A and B Weedhoppers are certainly not true of the new C. He claims that the quality of manufacturing is outstanding enough to put it up with the very best, if not ahead of them all; it has to be seen to be believed.

With claims like that, I look forward to seeing a C

model and making a fresh appraisal of the Weedhopper at the earliest opportunity.

The basic arrangement of wing support on the Weedhopper is as shown in Fig 1. As can be seen, the solid, 1 in (25.4mm) diameter, alloy axle-shaft extends outwards beyond the wheels and the struts are bolted through horizontal transverse holes in its ends (Fig 2).

The pilot's seat rests on the centre of this axle-rod so, when the machine is on the ground and fully laden, all the major bending forces combine to cause sag in the axle (Fig 3). The downward, compressive loads from the wing struts tend to try to reverse this sag (Fig 4) but, because of the over-riding leverages, have little effect.

However, when the machine is airborne, the struts are, of course, under tensile loading and therefore tend also to pull the outer ends of the axles upwards, assisting the general sag.

What must not be overlooked, however – and this is most important – is that acceleration forces, especially during taxiing, will be both upwards and downwards. Since the pilot is (presumably!) strapped to the seat and axle, as is the fuel tank, the axle gets alternately forced to bend further downwards or move upwards, ie to 'sag' or 'hog'. Needless to say, so I'll say it, this entails subjecting the alloy axle to our worst enemy, fatigue (stress-corrosion, if you like). It should come as no surprise, therefore, if cracks start to appear in the axle at the region of highest stress, ie at the base of the triangular frame-member. This could be a worrying aspect, because this is a particularly difficult area in which to carry out a properly detailed preflight inspection.

I say worrying because, with most microlights, if the axle breaks, you may lose a wheel whilst you are on the ground, or landing back on to it, but not much else. With the Weedhopper set-up, the axle remains under tensile loading – fluctuating with air conditions and, thus, varying g-forces – after the machine becomes airborne. So any crack can, and will be induced to, continue propagating. If the axle does let go, the effect will be obvious and instantaneous (Fig 5).

I am not suggesting that every Weedhopper is likely to be about to do just this. What I *am* saying is that it is very poor design practice to incorporate such a fail-to-disaster, highly stressed, assembly. I find it no surprise to hear Weedhopper owners so often discussing fitting back-up cables and the like to safeguard against such an accident.

Talking of Weedhopper owners, Gordon Cleophane has followed Don Robert's example and fitted a Robin twin to his machine in place of the Chotia engine, which had given such abysmal performance. With the new twin, the aircraft is apparently totally transformed, as one might expect, although steady-ing the large engine mass requires special mods.

Gordon has also altered the attachment of the wing struts to the axle tips. Instead of the tubes with curved ends, bolted through the axle, he has used straight tubes anchored into pieces of channel which are then bolted to the axle (Fig 6). This arrangement provides the struts with simple pin-jointed ends, free of the stress so unavoidable with the previously curved struts. The freedom for pivoting in the vertical direction is retained, since the small pieces of channel can still swing on the bolts which pass through the axle ends. With the channels being tied together at their outer ends, this complete assembly is now composed of items which are linked by bolts in simple single- or double-shear, and which are able to pivot so as to maintain the stresses at their lowest possible levels of compression or tension.

Returning to the axle itself, whilst it may seem that the use of a solid alloy bar is better than using a tube, I would suggest that this is not necessarily so. For example, as far as simple bending is concerned, the important parameter for a given material is the I-value, (or 'second moment of area'). For a 1 in (25.4mm) diameter solid bar, this is 0.0491 in⁴ (20437mm⁴). For a 2 in (50.4mm) diameter, 16swg (1.6mm) tube, the I-value is 0.1826 in⁴ (76000mm⁴). So, from the bending aspect, the tube is approximately four times better than the bar (Fig 7). This is because more of the metal is located farther away from the 'neutral axis', and is thus able to resist the bending stresses more easily.

In tension, the cross-sectional area of the member is all that matters; the stress is directly in inverse proportion to it. Don't let that throw you! All it means is: the more cross-sectional area, the more metal carrying the load, and the less the stress! So, since the 2 in tube has a wall cross-sectional area of 0.389 in² (251mm²) and the 1 in bar has an area of 0.785 in² (50.7mm²), any tensile stress will be

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$251 = 2.02$ times *larger* in the *tube* than in the *bar*. However, 0.389 in² of alloy is a great deal of metal and it will safely carry the sort of loads involved here.

This is equally true of compressive stress, but here another factor is in favour of the tube. The larger the diameter of a strut (as a member in compression is correctly termed), the lower its propensity for buckling (Fig 8). So, if you have a given cross-sectional area of metal (and thus, weight of material) to use for a strut, a large and thin-walled tube is generally the better way to go; the bigger and thinner the better, if no other factors such as aerodynamic drag (or crumpling, if you are daft enough to use a paper-thin tube!) enter the argument.

Where a tube often falls short of a solid bar is in *bearing* stress (usually a form of compressive stress). Suppose you need to put a cross-bolt through the member in order to attach it to a frame. With a solid bar, the area in bearing stress is equal to

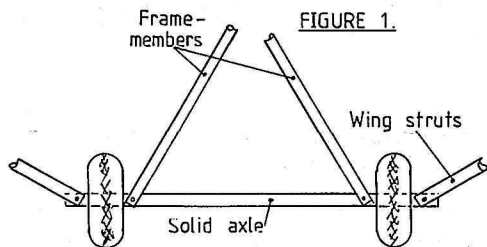


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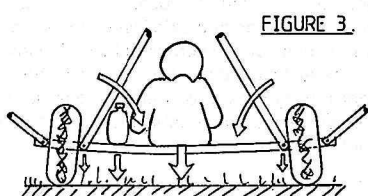


FIGURE 3.

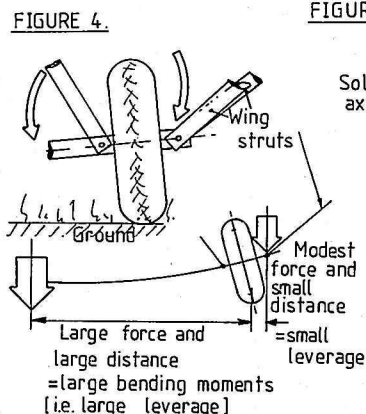


FIGURE 4.

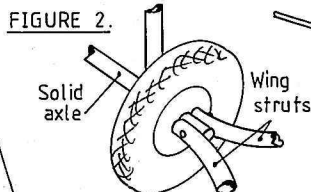


FIGURE 2.

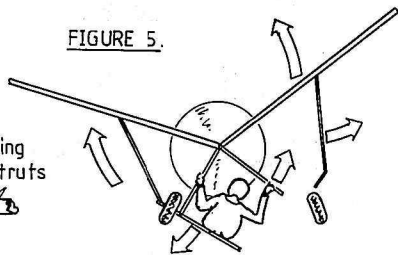


FIGURE 5.

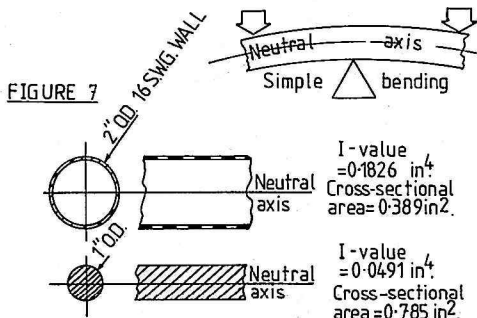


FIGURE 7.

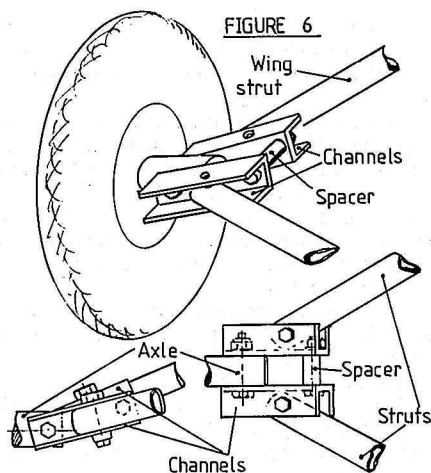


FIGURE 6.

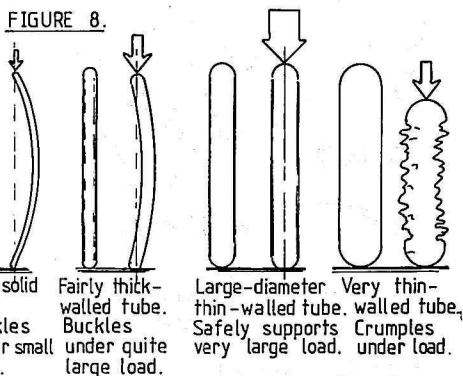


FIGURE 8.

the diameter of the bolt, times the diameter of the bar (Fig 9). With the tube, it is the diameter of the bolt, times twice the tube-wall thickness. In order to bring the bearing stress in such a tube member down to acceptable levels, it is usually only necessary to fit an internal or external doubler (Fig 10).

On the subject of large-diameter tubes in use as struts, most people have heard of the problems with Weedhopper wing-struts collapsing downwards on the ground in wind gusts, as actually happened to Gordon Cleophane's machine whilst it was tied down. The cure for this particular ill is to use larger-diameter tubes, with correspondingly thinner walls,

as I presume Gordon is doing. Again, though, be careful to maintain the bearing stress at the end fixings to the tube at a safe level. One simple way to do this is to sleeve the cross-bolts with alloy tubes to raise the effective diameter. Because the strut is of proportionally greater diameter, the larger holes will not present an unacceptable loss of local wall cross-section (Fig 11).

Plummer-block

A cautionary note from PETER LOVEGROVE, to which STEVE HUNT adds details of his own experience.

Absolutely green with envy, I watched a microlight ambling pleasantly back and forth near my home. Finally, when it appeared to be circling to land, I leapt into my car to find where and to chat to the pilot. I succeeded — along with countless other people — and was quite impressed with the general standard of this particular three-axis machine. Looking at the engine installation, however, one shortcoming was soon observed, which resulted in the owner grounding the machine immediately. On dismantling the craft for transport, the engine area showed a second result of cruel vibration, which is something with which we have to come to terms.

The first problem lay with the use of an alloy spacer-tube between two plummer-blocks (Fig 1). It had hammered out at the front end, so that it no longer acted as a spacer between the bearings, but had about 1.5mm play. With the thrust variations and vibrations from the engine, the propellor shaft had moved back and forth inside the bearings. The split-pinned castle nut, outside the front bearing, was so worn that its thread, and that on the front end of the prop-shaft, were free of each other. It was, in effect, a washer! Only the split-pin kept it in place.

In a way this is history, because the manufacturer (Huntair) has since, very responsibly, modified the design, but similar arrangements are used on other machines so it is still a point worth watching. I have, for instance, seen the same hammering of the spacer tube on a popular two-seater trike; the nut in this instance is a Nylok or similar, but the sleeve was still of the wrong type.

For repair my choice would have been to use a steel (4130 or T45 at least) tube as the spacer and possibly a larger nut and thread size. However it is done, this kind of assembly *must* be kept clamped drum-tight, but *properly dimensioned* so that the bearings are exactly located and not pulled together or pushed apart. That would cause them to run hot and last very little time.

The second problem on the three-axis machine concerned the tubes which supported the channels bearing the plummer blocks (Fig 2). These tubes were supported on shouldered shafts extending from other anchorage points. The shouldered lengths were less than the diameter of the tubes, with the consequence that the tubes had vibrated against the threads and the holes had enlarged.

FIGURE 9.

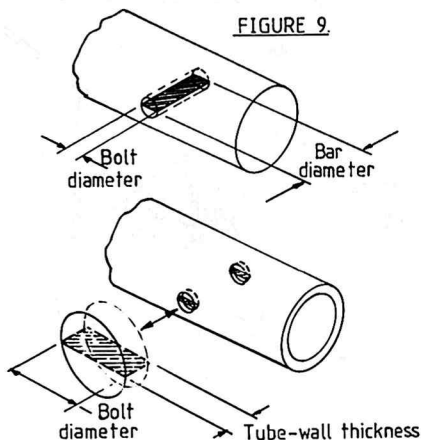


FIGURE 10.

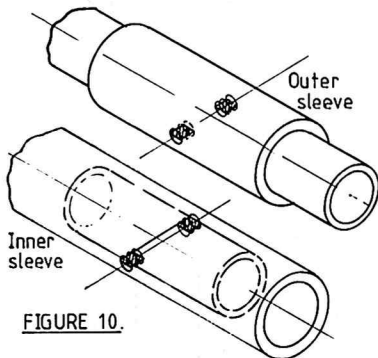
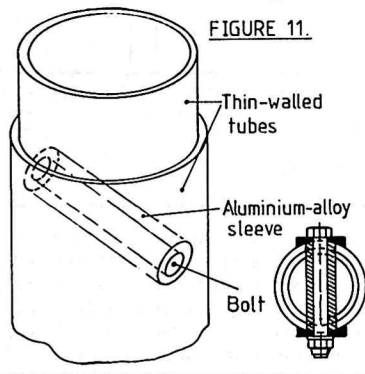


FIGURE 11.



spacers

With the outboard side unconstrained, the 'inside' ends of the holes had then started to be hammered oval. New shafts and saddle washers would be the better solution (Fig 3) but a repair job could be done as in Fig 4. If the bushes were bonded or welded into the tube initially, this latter method would actually be stronger and better than the simple shaft-through-tube installation, in such a difficult vibrating environment.

Huntair Comments

Steve Hunt writes: Driveshafts have always given problems and there is no doubt that Peter's comments are valid. Given a faulty component to look at, most manufacturers act promptly when a problem develops. At Huntair, our early engines did indeed use alloy spacers and these proved reliable on low-power engines, but as engine powers went steadily up (the 250-330-440 progression), and also as aircraft practicality developed and a dramatic increase in airtime was attained, systems which had appeared totally satisfactory became useless. Our spacers are now made of 1 1/4 in (32mm) x 11swg mild-steel tube, with a milling operation to lock the front spacer against the drive pulley.

A much more important point is the driveshaft itself. The above spacer faults will not lead to sudden failure but a broken driveshaft on a three-axis machine could. Huntair's solid driveshafts have always been made from 55t steel — an extremely tough grade. However, we have recently heard of an incident when one of our Pathfinder pilots decided to fit a grub screw to prevent bearing rotation. (It is our practice to remove these from bought-in bearings and not to fit any other type of connection). He

drilled small location holes in the driveshaft and 'Loctited' in grub screws. A stress concentration at a location hole on the driveshaft surface caused a shaft failure in flight. He cut the engine and executed a safe outlanding. We must therefore advise any other owner of a Huntair engine unit who has refitted grub screws in this way that we consider this unsatisfactory.

FIGURE 1.

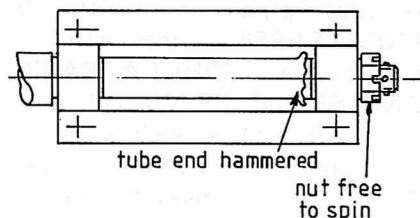


FIGURE 2.

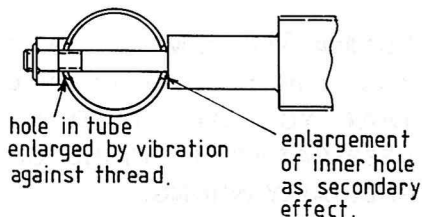


FIGURE 3.

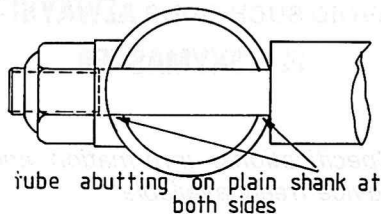
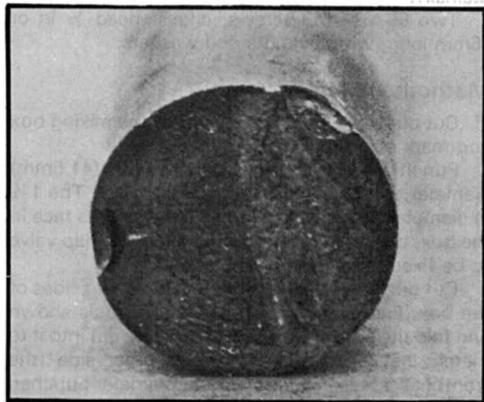
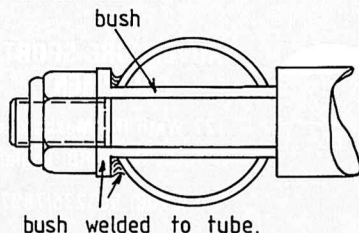


FIGURE 4.



The failed shaft: note the grub screw location hole.

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Warming to

In *Flightline* May/June 1982 p40, OLLIE HOULDRIDGE described his Valmet 160's carburettor anti-icing arrangement. Since then he has refined the system to give warm or cold air at will and in doing so has produced a design which, with a little adaptation, could be fitted to a wide variety of engines.

The system for feeding pre-warmed air into the carburettor has been well-tested and has proved very successful, but I have decided that to use such a system without further modification would be unwise at temperatures over 13°C. At these temperatures the warmed air at the rear of the engine is hot enough to cause reduced volumetric efficiency and hence reduced output power.

I have therefore designed and built a simple mixing box which incorporates a neoprene flap, operated by a Bowden cable from a control lever on my seat frame. I can now select warm or cold air as on a conventional aircraft. Should icing occur, I can select warm air, descend, and then revert to cold or cooler air when the ice has dispersed.

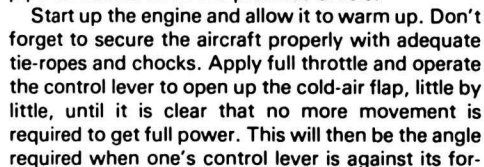
Materials Required

- 1 Sheet steel or aluminium (0.036 in or 1mm thick).
- 2 Neoprene sheet (0.125 in or 3mm thick).
- 3 Some thin-walled steel or aluminium tubing (2 in or 50mm outside diameter).
- 4 Approximately 2.8m (110 in) Bowden cable and casing.
- 5 One hand control lever (obtainable from Mainair).
- 6 One additional foam air-filter (obtainable from Mainair).
- 7 Two 6BA or M3 screws, cheese-head ½ in or 15mm long, with locknuts and washers.

Method of Manufacture

- 1 Cut out the blank for the walls of the mixing box and mark out. (Fig 1).
- 2 Punch or cut the holes (warm air 1½ in (41.5mm) diameter, cold air 1½ in (38mm) diameter. The 1½ in diameter hole is not centrally placed on its face in the box, but biased to the left to allow the flap valve to be fixed at its right).
- 3 Cut out the blanks for the remaining two sides of the box (Figs 2 and 3). Crop the corners as shown and fold the edges. One has an aperture cut into it to match the carburettor inlet. The other side (the front) has a hole 1½ in (44.5mm) diameter punched or cut into it centrally, so that when the box is fully assembled, one can gain access through this hole to

7 Finish off the box by plating, anodising or painting. (do *not* chrome plate) and fix to



ward stop. The Mainair-supplied control lever pulls the Bowden cable through a distance of 30mm from stop to stop, and was satisfactory on my set-up.

The hole for the cable was punched through the flap as shown in Fig 4. To return the flap to its seat, I used a light tension coil-spring attached to the cable nipple underneath the flap. The lower end of this spring was held in the inverted 'U' formed in the wire staple (Fig 5).

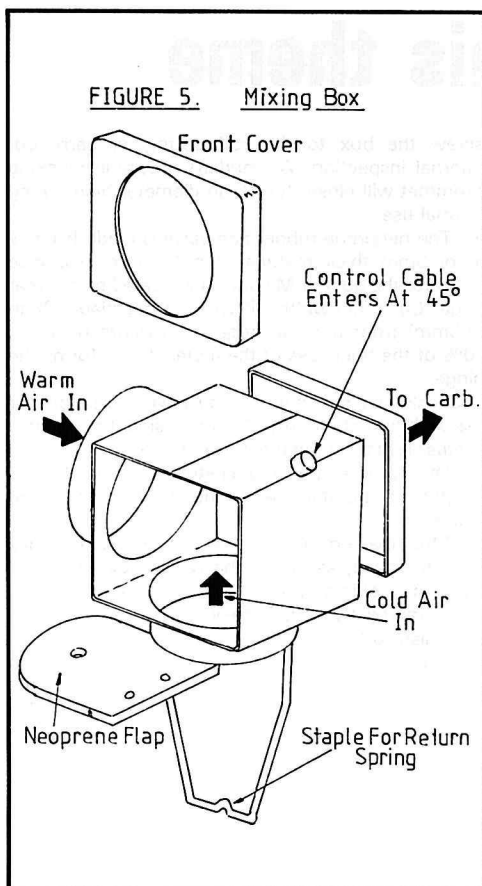
The routing of the Bowden cable from the mixing-box to the control lever is important, because any friction in the cable run will be reflected in the necessity for an excessively strong return spring beneath the flap, which will bring further problems.

8 A final check, to determine if the valve is permitting enough air for full power, is to flight-test two or three times, from lift-off to 4-500ft (120-150m). Use a stopwatch to measure the times and repeat the operation as soon as possible with the whole system removed.

Initially, I had thoughts of having the flap valve moving so as to open up the cold-air inlet and completely close off the warm-air hole. However, tests with a smoke-tube show that only a trickle of warm air comes into the mixing box when the cold-air inlet is uncovered by the flap valve. Further tests confirmed this; applying full throttle with the cold-air inlet open (flap open) and blanking off the warm-air feed with my hand gave no change in engine speed.

Postscript

I have temporarily removed the above system and am now working on an induction silencer. My aim is to reduce the level of noise emitted at or near the carburettor mouth as the piston ascends in the cylinder and uncovers the inlet duct down into the crankcase volume. At the moment of uncovering the duct, the crankcase is at a much lower pressure than atmospheric, hence, there is a rush of air and a noise similar to a cork being pulled from a bottle. This noise, at normal engine revs, is actually more objectionable than the exhaust and can be heard at ground level when the craft is half a mile or more



away, especially when the carburettor is facing the ground-listener. I have not, as yet, seen or heard of a microlight engine fitted with any form of induction silencing. It will not be an easy nut to crack, but I will have a go anyway, keeping in mind, reliability, cost, weight, drag and effect on power.

Handy hint number 5

By Paul Donaldson

When installing the bolts in your microlight, apart from placing them so that gravity keeps the vertical ones in their holes if the nuts should be lost, and so that the wind drag keeps them in place if they are horizontal, there is one more important trick. Always put any transverse bolts the same way round, ie all heads to port (left) or all heads to starboard (right).

The virtue of this is that it makes it that much easier to carry out the pre-flight inspection. If all nuts are *below* tubes or fittings, or to the *rear* of them or to the *left* of them, you won't be inclined to think that you checked 'that bolt' when you were doing the 'other side'.

In case readers think this is just being nit-picking, it's worth mentioning that some ARB inspectors insist on it — and so should future BMAA inspectors.

Technical notes

By Steve Hunt, Technical Committee Chairman

Since the AGM there has been a lot of activity on the technical side, with the aim of implementing a BMAA airworthiness scheme relating to production microlight aircraft at the earliest possible date.

At the first meeting of the Council, I was appointed Chairman of the Technical Committee, and early in December its first meeting was held in London when about 20 of us with strong interests in airworthiness matters gathered to decide how to progress. (The BMAA had already received from the CAA a copy of the *Sailplane Airworthiness Requirements (JAR 22)* marked up with the CAA's ideas of how a set of microlight standards might look, and this had been worked through by myself, by Roy Venton-Walters from the hang-gliding side, and by Lorne Welch, who continues to bring to us his vast knowledge and experience from the gliding world, without which we should all be the poorer.) At the meeting, the modified CAA standards were distributed for comments (to date none have been received), and a structure for the implementation and operation of a BMAA airworthiness scheme was discussed. The composition of the Technical Committee was also established and encompasses a wealth of qualifications, experience and expertise including representation from the BHGA and BGA, and a Flight Test Group was established which has already been laying its plans.

Due to much hard work by Graham Andrews, there is a good possibility of the BMAA obtaining financial assistance from the CAA for airworthiness purposes, and our principal requirement is for the funding of a paid Technical Officer who would be the keystone of the operation of the scheme, together with the Flight Test Group. At the time of writing, discussions of this funding are proceeding with the CAA, but obviously until our position is clear, we have been unwilling to contact manufacturers with details of the scheme. Assuming that funding is forthcoming, the appointment of a Technical Officer will be a priority, and we are already poised to circulate details of the scheme immediately.

The first aim of the airworthiness scheme is to look at production microlight aircraft offered for sale in Britain with a view to 'approving' an aircraft type through physical testing, engineering and production appraisal and flight testing in line with the BMAA Airworthiness Standards document we have at present. Provision has been made for the very special requirements of hang glider/trike unit microlights, to the satisfaction of the 'hang glider' people so far involved.

The CAA has indicated broad acceptance of the procedures which we are setting up, but only by working together with the CAA and by actively progressing an airworthiness scheme in the field can we fulfil our responsibility to the BMAA membership and eventually gain the formal approval of the CAA to control completely our own airworthiness regulation.

A further stage of airworthiness work which must follow shortly is inspection of home-built aircraft and periodic inspection of microlights at agreed intervals. Following a recent *Flightline* article by Bruce Giddings, several people have come forward to offer their services as inspectors and when the time comes to implement this stage, we shall already have the basis of a highly qualified local inspectorate. My thanks go to those who have already come forward as volunteers in this capacity.

Think before you buy!

By Norman Burr

Like every other publication in Britain, *Flightline* is subject to the Advertising Standards Authority code of conduct, which basically requires that advertisements are 'legal, decent, honest and truthful' in the words of the ASA's own publicity.

BMAA does its level best to ensure that advertisements in *Flightline* comply with the ASA code, but in the fast moving world of microlights, where companies can spring up overnight and sometimes disappear just as quickly, it is no easy task. We do query any wild-sounding claims or data which appears obviously inaccurate, but it is impossible to check every fact in every advertisement.

So the advice to readers must be 'buyer beware'. We are not saying that you should assume the organisation you are dealing with is crooked or financially unsound — the vast majority are bona fide companies trying to earn an honest living — but we are saying think before you buy — keep your eyes and ears open. If you have any reason to be dissatisfied with any goods/service, or the advertising promoting it, please contact *Flightline*.

Safety notes

Safety Through Knowledge

By Julian Doswell, Safety Committee Chairman

As we are constantly confronted with endless listings of aviation accidents and with sombre, dispassionate reports of fatal incidents, it is sometimes difficult to understand what exactly the reporting is trying to achieve. There must surely be an ultimate objective? And of course there is — knowledge, (not the kind that budding London taxi drivers learn with clip boards on the front of their Mobylettes) but the kind of knowledge that stops people hand swinging their engines with the throttle fully open — and an empty seat.

Last year was not a particularly good year for the microlight aeroplane as a safe aerial vehicle — but not as particularly bad as certain pilot's magazines would have their readers believe. It can not be disputed, however, that we gave them plenty of ammunition. So how do we ensure there is rather less flack shooting around in '83? We can further develop the network of club safety officers, we can keep them better informed, we can form a Safety Committee of experts from all fields of microlight aviation to comment on incidents, we can produce a safety and accident investigation handbook — and indeed we are instigating all these things. But above all we need information and feedback from you — the consumers.

Safety is concerned with all aspects of the operation of microlight aircraft — flying training, ancillary equipment, sites, met conditions and of course, the aircraft and pilots themselves — above all it involves everyone who flies a microlight aeroplane.

I wonder how many of us have read through accident reports with a distinct feeling of déjà-vu. Wasn't it a shame we didn't tell anyone when it happened to us? For every hundred of us that experiences an accident or incident and says nothing, there is probably one that never gets the chance to report a similar event.

The future of microlight flying as a safe and expanding pastime rests with us all. As the technical quality of microlight aircraft improves and flying training develops pilots' skills further, we will be attempting to realise the full potential of our faster and more manoeuvrable aircraft. This is fine — provided that our attitude towards safety shows an improvement commensurate with that of our machinery. The alternative, I fear, will show a shift in the nature, rather than the number, of accidents.

The single greatest weapon against the alternative

is the sharing of information through our safety network. So please take a few minutes, next time you experience a 'close shave' and file an accident/incident reporting form. It is quite possible that your insignificant incident will prevent someone else's significant accident.

Safety is achieved not through fear but through knowledge — it's rather less painful that way.

Skymaster Caution

By Norman Burr

A recent accident where faulty installation caused a Skymaster parachute to open without the pilot's knowledge has highlighted the importance of correctly fitting aircraft-attached parachutes.

The accident happened in January in Buckinghamshire, when a pilot of a Chargus Titan two-seater trike was taking off. The Chargus wing uses a sliding keel pocket which under flight loads slides some 5 in (127mm) up the keel. The parachute release cable was mounted on the underside of the keel in such a position that as the aircraft took off, the normal movement of the keel pocket trapped the cable between the keel and the sail fabric. The resulting force on the cable was sufficient to deploy the chute, bringing the aircraft back to earth from a height of some 70ft (21m) — fortunately without injury to the pilot, though the aircraft was damaged.

There is a clear lesson to be learned from this story for all users of aircraft-attached parachutes, whatever aircraft they are fitted to and whether or not they are Skymasters. Look at your installation and ask yourself: "Is there any conceivable way that any part of the release cable could be snagged by any part of the aircraft?" If the answer is yes or even possibly, rethink your installation!

Vector Recommendations

Flightline's short article on the Vector 610 grounding and its subsequent lifting has created considerable interest, so with acknowledgments to *Glider Rider* we reprint below a story on the subject which appeared in its January issue.

Turners Falls, Mass. — Vector Aircraft has completed a series of dynamic load tests which they say demonstrated the structural integrity of the Vector 610. "With the strength of the Vector confirmed, we have lifted the grounding, with some conditions," explained company president Bernt Pettersen.

"We have detailed what must be done in a letter to all owners and dealers," he continued. The letter explains that leading and trailing edge spars in both wings must be removed and inspected for damage, such as excessive wear or unusual bends.

Further, the inspector should determine that the aft spars have not been reversed, and that aft spar tips have been pop riveted front and rear with 5/32 in steel rivets. "Aluminum pop rivets in this location are not acceptable," the letter says.

Evidently, Petterssen explained, some customers are utilizing the wrong rivets in some cases. In others, the rivets have been left out entirely. "We have discovered the extreme importance of attention to detail," Petterssen said.

Two fatalities in October prompted the Vector 610 grounding, a swift, safety conscious move. "The investigation of one accident illustrated to us that some people don't know to fly within the design limitations of the plane," he continued.

The accident in question resulted from an inexperienced pilot's attempt to swiftly arrest speed by pulling up from a steep angle. "There are simple parameters for the pilot to remain within," Petterssen detailed. As listed in the letter to customers, those limits are: no more than 30° up or down to the horizon; no more than 45° in banked flight; a V_{ne} in smooth air of 55mph (50, if using the popular Hall airspeed indicator); and a manoeuvring speed limit in rough air of 45 (40 by the Hall).

Dynamic load testing performed by George Aelo, Vector's West Coast distributor, reaffirmed the craft's design limitation of about 5.5g positive. Missing rivets on one of the fatal craft prompted company officials to search among other consumers' craft for similar practices.

"We found several disturbing habits among our customers," Petterssen confirmed. "We hope the

investigation and this letter will go a long way toward preventing a repeat of these accidents."

Copies of the Petterssen report can be obtained from Julian Doswell on 0446 710331 work.

Pathfinder Check

Cracks around the upright tube where the undercarriage bolts on have been discovered on a number of Pathfinders and owners are advised to check this area regularly and carefully. The incidence of cracking varies considerably, with some aircraft logging over 100hr without trouble, while others have shown defects after only 10hr.

Steve Hunt of Huntair stresses that the cracking does not affect the flying abilities of the aircraft. He says there is no question of it causing Pathfinders to drop out of the sky, but if left unattended it could ultimately lead to undercarriage failure.

Huntair says it is circulating details of the problem to all Pathfinder owners and any owner who has not yet received such information is urged to contact the manufacturer. On the new Pathfinder Mark II, the area concerned has been redesigned with the object of preventing a recurrence of the problem, but according to Steve Hunt there is no practical remedy for earlier machines, so owners must simply keep an eye on the component and replace it as and when necessary.



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Flight test: Double Eagle

By Mervyn Selley

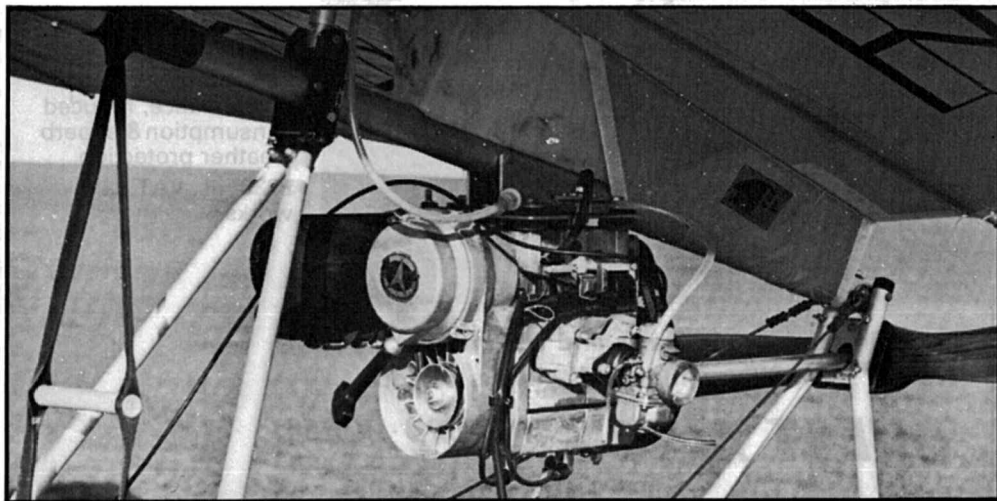
Introduction

Eagles have the reputation of being the ideal beginner's microlight and are very popular for training.

The combination of weight-shift controlled canard, set at a higher angle of attack than the wing so that it stalls first, and a simple tiller control for

throttle and yaw/roll, produces an aircraft which pilots find easy to fly and almost impossible to stall.

This latest version, known as the Double Eagle because of its twin-cylinder Cuyuna engine, has a stronger wing and very much more power than its predecessors, allied to a smaller canard. These two changes make the Double Eagle (at least in solo



single-seater

guise) more performance oriented than earlier versions.

Like all Eagles, it is a high-wing machine with a pusher prop. The wing is partly double surface and the tubing layout gives the pilot a useful degree of protection.

General

Aircraft: Double Eagle single-seater.

Manufacturer: American Aerolights, 700 Comanche NE, Albuquerque, New Mexico 87107, USA.

UK distributor: Breen Aviation, Enstone Airfield, Enstone, Oxon (tel 060872 413).

Price: £3434 plus VAT (late 1982 figure, may vary with exchange rate) ready to fly.

Construction: Dacron fabric, 6061A aluminium alloy tube.

Power unit: 430cc twin-cylinder Cuyuna, 35hp pull start.

Empty weight: 210 lb (95kg).

Controls: Weight-shift operating canard elevator; "handle bars" to operate throttle and drag rudders.

Push-right go-left steerable nosewheel.

Undercarriage: Tricycle, small suspension movement on rear wheels only, no braking.

Fuel consumption: 4.3gal/h (19.5 litre/h).

Fuel capacity: 2.5gal (11.4 litre) with single tank; triple tanks optional.

Rigging time: 45min with two people.

Portability: Roof rack or trailer.

Performance

Pilot weight for test: 165 lb (75kg).

Air pressure: 990mbar.

Air temperature: 5°C.

Wind speed: 9mph (14.5kph).

Climb rate: 800ft/min (4.1m/s) not on full throttle (see below).

Level flight speed: 40mph (64kph).

Top speed: 45mph (72kph) in level flight. Higher speeds are possible but the aircraft starts to climb and there's no way of holding it down.

Take-off roll: 100ft (30m) on grass.

Landing roll: 50ft (15m) on grass.

Roll/yaw response: There is a slight delay, but response is pleasantly direct.

Pitch response: Sensitive but safe.

Stall characteristics: All Eagles tend to porpoise at stall; the canard stalls, the nose drops, speed picks up and the aircraft climbs until the canard stalls

Score Chart

(1 excellent, 2 good, 3 fair, 4 poor)

Engine	2
Flight controls	2
Noise level	2
Ground handling	1
Flight handling	1
Crosswind control	4
Ground steering	1
Climb rate	1
Glide and sink rate	1
Speed range	3
Rigging and portability	2
Design and construction	2
*Beginner suitability	1
Pilot (PPL) suitability	4

*ease of familiarisation for those unused to the aircraft.

again and the cycle repeats itself. With this version of the Eagle, the porpoising is much more marked, particularly if some throttle is being used at the time, in which case the climb out from the dive is very steep and the aircraft almost feels as if it could loop. The smaller canard probably does not help in this respect.

Comments

The Eagle is the safest microlight I know and great fun to fly. Even though this model is not as foolproof as some smaller-engined versions, it is still fairly docile. It is well made, easily capable of short cross-country and thermals well. However, it does not like turbulence and is not very happy in winds above 14mph (22kph).

I had the seat adjustment as far forward as it would go and I would have liked more, to counteract the weight of the big engine. I found that when the aircraft was at its best, in fast level flight, I had my weight well forward and my feet over the nose-wheel. Eagles characteristically prefer to climb than to sink, and the big engine accentuates this tendency; glide and sink rates are very good. Trike pilots will feel at home with the push-right go-left steering, but three-axis flyers will find it takes some getting used to.

The very high fuel consumption of this machine made me wonder if the carburettor was correctly set up. However the engine was certainly not down on power and appears to be very reliable, though the rear cylinder gets very hot, a tendency which I am told is improved by using two-star rather than four-star petrol in the mix.

In conclusion, I believe the Eagle fully deserves its reputation as a safe, fun machine, but I would advise purchasers to think hard before paying the extra for the Double Eagle version. Unless you are very heavy or intend at some time to convert it to two-seat specification, you would be better off with the single-cylinder 215cc Cuyuna.

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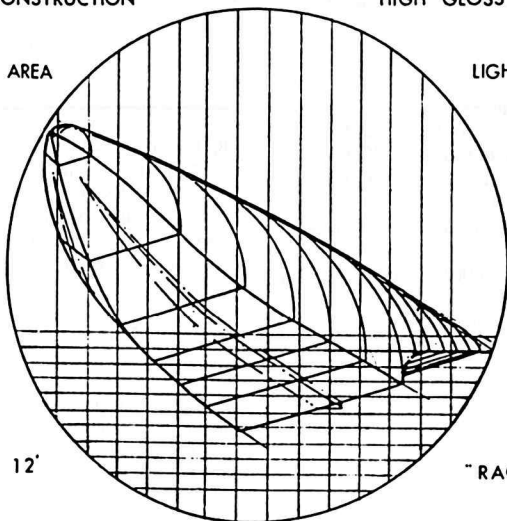
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Training notes

DI or Die

By Ian Stokes, Training Committee Chairman

DI stands for Daily Inspection, Die means Kaput, Finito, Finis, End of the Runway (with no brakes and not enough air speed), or any other term in either a foreign lingo or good old fashioned Anglo Saxon that indicates that your soul is no longer within your body, you have shrugged off your mortal coil, you have gone to the great airfield in the sky, *you are dead*.

There are many ways of describing this state just as there are many ways of achieving it, the most popular amongst microlight pilots being the failure to do a proper DI or preflight inspection on their aircraft. The most recent occurrence in a long list was reported by Glenn Brinks when he related the events leading up to the tragic death of Bob Lovejoy, who was test flying his new design, the Avion, when it suddenly dived straight in.

On examination of the wreckage the bolt or clevis pin connecting the elevator control cable to the control stick was found to be missing, it had *fallen out* through lack of a safety pin or Nyloc to keep it in place. Had Bob performed a proper DI this could *never have happened*.

Unfortunately this was not an isolated incident, and many of the accidents and near accidents that happen are caused by such carelessness. The sad thing is that a DI is not a vast chore that takes half a day to complete, but a simple walk around the aircraft looking, feeling and prodding, and when done properly takes about two minutes. They say you are a long time dead and I firmly believe this as I have never yet met anyone who has come back, so can two minutes really be too long a time to ensure that you remain in this world until old age finally pulls the plug?

I will not waste space by going into the mechanics of a preflight inspection as it varies so much from one model to the next, and it *should* have been taught to you at a very early period in your training, along with the use of a check list. I will, however, remind you that it is a good idea to date and sign your aircraft log book to the effect that you have carried out such an inspection and note what defects (if any) were found and rectified.

I am quite sure that the captain of a Concorde would not take off without a signature to the effect that someone had been round and kicked the tyres, and on a much smaller scale nor should a microlight pilot. In using the last simile do not think I am suggesting you take someone else's word for the fact that the microlight you are about to fly is serviceable; it's your life, *do it yourself*. Then follow with a pre take-off check to ensure that nothing

obvious has been overlooked, and when you are *finally* satisfied you can take off and enjoy your flight in the sure knowledge that you will return having had nothing fall off.

Incident Report Form

By Tim Williams

Most incidents that could have resulted in an accident are not reported. In many cases good luck is the only factor between a lucky escape and disaster.

Quite often trends arise in incidents which, were they acted on, could help prevent a future accident. It is hoped that by making the reporting of incidents anonymous, people who would otherwise be too embarrassed or ashamed might report their mishap and prevent a further incident of the same type.

For this system to work all incidents must be reported, however minor, whether it be an engine failure due to lack of fuel or an aircraft turning over in gusty winds on the ground. The causes of these incidents might at first glance be misconstrued as being pilot error, but the truth might be very different. A fuel gauge might be of bad design or hard to read and a particular design of aircraft prone to turning over; should this be the case, owners of these types of aircraft can be warned about this possibility.

At regular intervals an analysis of the incidents should be made and significant trends reported in *Flightline*.

In order to test the system, training establishments, schools and clubs will be supplied with a number of these forms. You will find one with this issue of *Flightline*. Just because the scheme has been introduced now it does not mean that past incidents should not be reported.

Please report your incidents: you may save a life and it may be your own.

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Secretary's letter

By Ron Bott

Part of my last letter discussed a possible Sports Council Grant. On the 6 January I received this year's reply when I phoned John Scott of the Sports Council Development Unit. It was lucky that as he spoke to me I jotted down the main points, namely that "the Sports Council cannot give any administration grant at this present time as they are fully committed and have no available funds. There was to be a review of motor-aided sports by the Sports Council, in the 'near future' and the Sports Council had accepted a 'new approach' paper and had put a complete freeze on grants to new governing bodies of sports (such as us). Grants up to 75% of the sums requested had been made in the past and those bodies already receiving grants would continue to receive them during 1983. The Sports Council was on a 'standstill budget' from the government and he held out no hope of a grant in the foreseeable future".

Pretty strong stuff you might think. As I put the phone down I looked at the notes that I had made. They had been written in the margin of a letter from the Sports Council to BMAA dated 4 January 1981. Signed by a Mr T Wilkinson of the Sports Development Unit it was identical with what I had just heard over the phone, stating that "We are unable to extend our grant aid programme to include additional governing bodies because of the cash limits which are imposed upon us" and "We shall be undertaking a review of our programme in due course which may

lead us to reconsider our present policy (not to aid motor-aided sports)".

Not at all encouraging was it? So I considered my reply to the Sports Council, but I needn't have bothered because at the time of writing (20 January) BMAA has not received any communication from the Sports Council about grants, even though I have requested one and have even visited them in an effort to speed things up.

So where do we go from here? The £35,000+ that the CAA has collected for the government from our members for registrations and licences (yes we all know that the CAA has to cover its costs) will be just about entering the vaults of the Treasury by now. Some of it will no doubt be passed on to various departments of independent bodies such as the Sports Council for distribution and we shall be the losers — or shall we? Do we simply accept that we are not entitled to a grant? After paying so much money for the privilege of being allowed to continue with our sport? I don't think so.

What we must *not* do is sit down and do nothing. They say that God helps those that help themselves, so that's where we start. If every BMAA member can bring in one new member, we are on the right road. We are enclosing with this magazine a brochure which we hope will help you do this. Obviously the last thing we wanted, higher subscriptions, are now inevitable. We are raising the subscription to £15 for members resident in the UK and £20 for overseas members wishing to receive

Contact

North Bedfordshire Microlight Club

William Tremayne is interested in setting up a microlight club in the North Bedfordshire area and would like to hear from any like minded enthusiasts. He can be contacted at: Heligan, High St, Oakley, Bedford (tel Oakley (02302) 4517 home, 01-380 8055 work).

Long Marston Microlight Flying Club

The new non-commercial Long Marston club is now getting into gear and is arranging its first fly-in for 1-4 April. Events planned include an air race, a treasure hunt using compasses and requiring three out-landings, duration flights (in which pilots have to stay aloft as long as possible on one gallon of fuel), spot landings, timed flights and a best turned-out aircraft competition.

Good news for student pilots is that club CFI Keith Vinning (not Chris Bishop as incorrectly reported in the last *Flightline*) will be in attendance, so it will be possible for trainee pilots to get involved in the spot landings, timed flights and of course the concours.

In contrast to the previous event, exhibitors are offered free space, though they are expected to provide a prize for one of the competitions. Plenty of awards will be needed, as they will be given down to third place in each event. Another change is that camping will be free. Evening entertainment will be laid on and the usual Long Marston bar and eating facilities will be available.

The Long Marston club now has some 30 members and issues its own monthly magazine. As well as being CFI, Keith Vinning is also chairman and can be reached on Knowle 77737. Secretary is Ron Harris, 50 Bishopton Lane, Stratford-upon-Avon CV37 9JW (tel Bidford-on-Avon 66955) and the fly-in organiser is events officer Stephen Comben, who can be

their magazines by airmail (£18 surface mail). To soften the blow, we shall have a period of grace up to the end of April, during which people can renew their membership (if it is due the following month), at the old rate of £12 (UK), £15 (other). We are extremely sorry at having to raise the subscription even though we will have kept it at the same level for 2½ years, which in these days of inflation is pretty good.

Another thing we must do is to make people in authority understand that when BMAA asks for assistance, it is to advance the cause of microlight flying by *ordinary people*. Remember, it's ordinary people like you and I that put MPs into their highly paid jobs and let us not forget that this is probably election year. How often do you feel like writing to your MP to complain about some inequality or other? If you feel as strongly as other members, then now's your chance to get your message direct to your own MP, because enclosed with this magazine is a letter which only requires you to put the name of your local MP on the top, sign it, pop it into an envelope and send it off to the appropriate MP at the House of Commons, Westminster, London SW1. If we can *all* do this during the next few days perhaps some of these MPs will get the message and will ask questions in the House about the possibility of microlight aviators getting some of their money back in the form of a grant.

If you want to upset your MP why not tell him also that, according to a member of the CAA who compared the number of PPLs per head of population, the UK comes a long way down the list of aviation-minded countries, lower in fact than Egypt. This is because the current charges for flying are far too high for all aviators — and whose fault is it? Probably some of the branches of aviation are too

willing to accept these high charges and are afraid to voice their true feelings. Let us set an example to them, by protesting before other charges are levied on us, again with no return. We can help rekindle an interest in aviation in this land. No matter how young or old you are *you* can help restore the balance. Where else in the world would the authorities suggest a starting point for a rally called London to Paris, which, in order not to upset all those in their ivory towers, was actually 30 or 40 miles away from the place called London? If the French authorities can allow the competitors to fly into the heart of Paris, then what's wrong with our own authorities permitting a starting nearer London?

BMAA has just announced the voluntary scheme to assist local authorities during search and rescue missions (during good weather only), which will probably save some local authorities quite a lot of money. Again, we are showing the world that microlight aviators are responsible people.

Can I leave you with a sobering thought? If those people who were involved in microlight fatal accidents during last year had had a parachute system like the Skymaster fitted to their machines, then many of them would be with us today. Let us all learn from their mistakes. Flying without a chute is stupid!

Fly safely, see you at Popham 12–13 March. *Please* get those letters to MPs in the post now!

Happy landings.

Ron Bott

*20 Church Hill, Ironbridge
Telford, Shropshire TF8 7PZ*

*Membership secretary and sales:
BMAA, Abergynolwyn
Tywyn, Gwynedd LL36 9YR*

contacted at home on Bidford-on-Avon 772983.

New members and visitors are welcome at the club's meetings, which are held on the first Friday of each month in the club room of the Old Control Tower at 8pm.

Pterodactyl Owners Register

Tom Carroll would like to hear from other Pterodactyl owners with a view to setting up an owners register and organising a flying meet in the summer. Anyone interested can contact Tom at 9 Walkwood End, Beaconsfield, Bucks HP9 1PR (tel Beaconsfield 4828 home, 01-965 7700 x3803 work).

Pennine Aviation Society

Pennine Aviation Society has to date found a number of flying sites but not many members. The club, based in Chapel-en-le-Frith near Buxton, would therefore like to co-operate with other clubs in order to meet people with more experience. In

particular, it would like to develop a list of contacts who it could phone on Friday evenings to find out where flying is likely to take place over the weekend.

Pennine club's contact man is Paul Quinn on 061-487 2374, who will be pleased to hear from anyone interested in joining the club and/or helping it develop.

Popham Microlight Flying Club

By Jim Espin

Popham MFC now has both its 1983 events confirmed, with the forthcoming 12–13 March fly-in being supplemented by an August Bank Holiday event. Full details of both are in club's advertisement in this issue.

Popham's December meeting was very well attended and quite rightly so, with a guest speaker as famous as Derick Piggott, acting CFI at Lasham, author of several aviation books and pilot of many of the aircraft seen in post-war films. He gave a first-

hand account of how the famous flying sequences in such films as *The Blue Max* and *Villa Rides* were made and was very entertaining to say the least. His blackboard illustrations of how some of the one-off replica aircraft were made to fly were certainly very similar to a number of the current production micro-lights — we all learnt something, that's for sure!

The club meets at Popham on the first Saturday of each month and visitors are always welcome.

Strathclyde Microlight Club

Brian Harrison of Eurowing has started up a new club for enthusiasts in the Strathclyde area. The club will be run on a commercial basis and will initially offer training on single and two-seat trikes, with the new two-seat Goldwing to follow. Brian will be CFI and can be contacted at Eurowing during working hours (tel 03552 46498).

Craven Microlight Flying Club

Craven MFC is now forming and invites microlight enthusiasts in the locality to attend its first meeting, on Monday 28 February at 8.30 pm at the Tarn House Hotel, Skipton, N Yorks, where an MX will be on static display and a video will be shown.

Thereafter meetings will be held on the first Monday of every month. Membership is £5 per year and flying members will have the use of a flying site at Skipton. So far all aircraft within the club are privately owned, but as the club grows it is hoped to purchase a club machine.

Richard Dover is acting as secretary of the new club and can be reached at 26 Burnwells, Thackley, Bradford BD10 0SD, tel 0274 615876 home.

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.

12-13 March: Popham MFC fly-in at Popham near Winchester. Details on 0256 75733.

18-20 March: Wind & Surf '83 Action Leisure Exhibition, Alexandra Pavilion, London. Details on 0303 53463/66015.

19-27 March: Aero '83 Exhibition, Friedrichshafen, West Germany, including Rally Around the Lake international microlight competition. Details from Gerry Breen 060872 413, or BMAA Secretary, 065477 235.

1-4 April: Long Marston MFC fly-in. Details in *Contact*.

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.

28-30 May: BMAA fly-in at Woburn Abbey ground, Bedfordshire. Details from Gerry Breen 060872 413, or BMAA Secretary on 065477 235.

***June:** Lands End to John O'Groats rally. Details from Gerry Breen 060872 413, or BMAA Secretary on 065477 235.

25-26 June: Airports 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).

***16-17 July:** BMAA fly-in at Weston Park. Details from Gerry Breen 060872 413, or BMAA Secretary on 065477 235.

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.

***August:** Norfolk Air Race. Details from Kelvin Woodward on 0603 49934 (home) or 721340 (work).

27-29 August: Popham MFC fly-in at Popham near Winchester. Details on 0256 75733.

3-6 September: London-Paris Microlight Competition. Details from Fenwick General Medias, 67 Avenue de Wagram, 75017 Paris (tel (1)763 1211).

24-25 September: Leicestershire MAC fly-in. Details on 0533 863310.

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

EAGLE FOR SALE, minus its Chrysler engines, approximately 3hr airtime only, any offers considered. Reason for sale, a need to raise much needed cash. Tel Accrington 385445 (Lancs). (2/6)

BRITISH EAGLE G-MBSJ, Cuyuna 250, 7 months/7hr old, immaculate, £2700. Tel 01-422 5016 evenings and weekends. (2/7)

EAGLE Zenoah, low hours, in excellent condition. £1800. Also **MIRAGE MKII**, in excellent condition, 40hr. Conversion course available if required. £1800 ono to sell quickly. Tel Nottingham (0602) 474194 day, 618409 evenings. (2/8)

G-MBLU Southdown Lightning Skytrike, 330cc Robin. Excellent condition, never car-topped, with Skymaster parachute system. Still climbing 12000ft (see Sept/Oct *Flightline*). £1800 ono. Swansea 49825 (home), 468500 (work). Tony Fletcher. (2/10)

TYPHOON TRIKE G-MBUN 250cc low airtime, many extras, well maintained. Reluctant to part with my rig but alas can't afford two aircraft. Price £1450. Phone office 0462 815016 x2482, home 066477 599 (Leics). (2/11)

160cc VALMET TRIKE £250. Demonstration given on Typhoon or Storm. Also Medium Storm £400. Robin 170cc with gear box £30. Yamaha 175cc with notched-belt reduction £20. Cheltenham 39555. (2/12)

EAGLE — twin Chrysler engines, good running order, recently overhauled. £1150 ono. Tel Blackpool 51067. (2/13)

FOR SALE 440 PUMA dual seater. Red wing, good condition. Genuine reason for sale. Any trial, £2450. Contact Keith Vinning, Knowle 77737 (W Midlands). (2/15)

IMMACULATE RAINBOW EAGLE 10hr, carefully run-in twin Chryslers, unused 250cc Robin, hangar stored, registered, some extras — £2950 — Tel 0536 512978 (Northants). (2/16)

SOLAR STORM FOR SALE (medium) great first wing, wonderfully stable. 15min rigging time. Rigid cross-boom — no wobble! In good condition with B-bar and bracket for Hiway trike if required. £350. Tel Sunderland 293100. (2/17)

PATHFINDER FOR SALE: very good condition. Red/black/gold colours. Finance forces sale. £2500. 01-249 5985. (2/18)

SHARE in Druiene Turbulent available to PPL Group A pilot. Based Stapleford, Essex. Canopy or open cockpit, radio. Microlight flying costs, 2 1/2 gal/hr. Very pleasant and safe handling. £500. Tel Epping 73361 (Essex). (2/20)

EAGLE, Robin powered, very low hours, excellent condition, £1950. Price includes full instrument set. Training available locally. David North 01-330 0900 (Kingston, Surrey). (2/21)

FOR SALE QUICKSILVER MX hangar stored, in very good condition, only 25hr airtime. £2250. Tel West Chilton 3745 any time (W Sussex). (2/22)

HUNTAIR PATHFINDER — run-in only, hangar stored, as new, electric start, ASI, alt, tach, Phone 021-550 7331 day, 0562 884858 evenings (Birmingham). (2/23)

ULTRASPORTS/SOUTHDOWN PUMA 440s. As new, 5hr running. £2500. Contact Graham Hobson 061-973 4085 (Manchester). (2/24)

SKYHOOK TRIKE UNIT, Hunting 260 motor, 5hr airtime only. Registered and in excellent condition. Sensible offers only please. Derby 662909. (2/25)

PTERODACTYL, reliable 350 Sachs engine, immaculate condition, very fast, single stick control, reduction gearing, easily car-topable, registered, first reasonable offer or swap for car. Ipswich 713000. (2/28)

OFFERS INVITED FOR 1YR OLD TRIKE. Wing marked indelibly with useless advertisement. There is the odd small hole in the wing. Front wheel damaged and rear axle bent due to bad landings. The machine is not at present available for inspection. Offers please to Box 1, *Flightline*. (2/29)

PUMA 440cc dual seater, under 30hr, as new, CAA registered, £2500. Please phone 0795 843604 after 5pm (Kent) (2/31)

CHARGUS T250 trike with many mods, plus Hiway Vulcan wing. This trike is fully sorted and easy to fly — comes complete with spare prop. Tuition available. Ring Geoff on 0761 232096 (Avon). (2/32)

CP16 for sale, 4hr airtime, waterproof wing bags, and trailer. Phone 098984 310 (Hereford). (2/33)

EAGLE undamaged, less than 3hr flying time. Twin engines, green and white, must go. Any offers? Tel 021-704 3191 x29 or 32, office hours (Birmingham). (2/34)

TRI-PACER 250 trike, full independent suspension all wheels, Lightning L170 wing, registered, specially built road trailer with ramps and suspension. Complete £1850, phone 0702 76390 (Essex). (2/35)

WEEDHOPPER B, test flown only. Fitted sitting operable recoil starter, tuned pipe. Registered. Superb flier. Bargain at £1550. Burgh Heath 60053 (Surrey). (2/36)

PUMA MS. Our two-seater demonstrator for sale. Factory maintained. Ultra reliable. £2800. Any trial. Mainair Sports. 0706 55131 (Rochdale). (2/37)

POWER PILOTS. Full range of new and used 250, 330 and 440 Triflyers plus Strikers, Typhoons and Puma wings in stock. Mainair Sports. 0706 55131 (Rochdale). (2/38)

HALF SHARE IN GOLDWING for sale. Aircraft now nearly completed, to very high specification. Phone 0704 893389 (Lancs). (2/40)

175 DEMON/250 TRIPACER. G-MBAL. With Skymaster chute, compass, road trailer, trike cover, pilot glassfibre pod, 2gal fuel carrier. Roof rack — glider support. Engine decarbonised, new piston and ring fitted, only test flown since. Excellent flier with or without trike. £1995 ono. Ring Lincoln (0522) 720009 evenings. (2/41)

EAGLE microlight, twin Chrysler engines. Bit tatty, but good flier. Ideal for beginner. Bargain at only £1395. Phone Rugby 62680 after 6pm. (2/42)

HIWAY SKYTRIKE 160 (late model), good condition, reliable, £350 ono. Flight Designs parachute £120 ono. Willis Gold variometer and Diplex altimeter, £60. Phone Bondgate 2196 (Warks). (2/43)

FOR SALE — MEDIUM HIWAY DEMON WITH 250 ROBIN MKII SKYTRIKE. No bugs and excellent condition at 40hr — going dual — £1450 ono. Phone Blackburn (0254) 22339. (2/44)

EAGLE MICROLIGHT, canard safe, low hours, Zenoah 20hp engine, hangarage available, excellent condition, registered G-MBCE, only £2200 for quick sale. 56 Welland Road, Peterborough. Phone 0733 60722. (2/45)

DRAGONFLY 250cc Robin trike, registered, with Cyclone 165 wing, will split, £950 ono. Tel Ossett 274937 work, Wakefield 360829 home. (2/46)

FLEXIFORM SEALANDER and Mainair 250cc Robin Triflyer trike, registered, stored indoors, good condition, £800 each, delivery possible. Tel 061-799 0926 (Manchester). (2/49)

TRIKE Chargus solo, £200. Modified to take 330. Phone 0760 21385 work, 0328 70250 home (Norfolk). (2/50)

HIWAY DEMON 175 red/white, new rigging and keel. £300. Phone 0760 21385 work, 0328 70250 home (Norfolk). (2/53)

HIWAY SKYTRIKE 250 Robin plus Demon wing. Engine bench run-in, aircraft virtually new — only 1 1/2 hr airtime, registered. £1550. Tel Len on Bolton 21421. (2/55)

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 056696 514. (2/56)

WEEDHOPPER Red Baron colours, two sets of sails, 10hr flying, latest engine. Canvas sail and propeller bags. Quick to assemble and easy to fly. £1500, trailer available if required. Tel 0494 771731 (Bucks). (2/58)

WEEDHOPPER 24B Sunburst colours, complete with tailor-made open trailer, instrument panel. Latest engine meticulously run-in. Mothered by enthusiasts. Pristine condition. Quick sell price £1750 ono. Ring Guy Smith, 01-546 0370 (Surrey). (2/59)

TRIKE-MAINAIR 250. Agent built, with Lightning Phase II CFX wing. Both ex' cond'. Trike has numerous worthwhile improvements. Exceptional reliability and performance, well known in the North West. £1300 or will trade for 330 Puma. Phil Robinson, Mellor 2077. (2/60)

MAINAIR 440cc TWO-SEATER with electric start, battery and Lightning DS. Road trailer. Just run-in, flies beautifully. Also ASI, altimeter, CHT, spare prop, three thermal flying suits, two full-race helmets with intercom built in, two pairs flying boots and many spares. Phone Geraldine McCarty on Limerick 061-92194 11am-8pm mon-fri. (2/61)

Miscellaneous

FLIGHTLINE back issues are available at 75p per copy including postage. Also **BMAA PILOT'S LOG BOOKS** at 30p each. **TRAINING ON MICROLIGHT AIRCRAFT** by Ann Welch at £1.00 each, enclose SAE please. Always quote your BMAA membership no, and send to BMAA Sales, Membership Dept, Abergynolwyn, Tywyn, Gwynedd LL36 9YR.

MICROLIGHT AND HANG GLIDER airframe repairs, complete service including sail repairs, whether originally supplied by us or not (phone details to us for estimates). Skyhook Sailwings Ltd, 061-624 8351 (Manchester). (2/1)

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. (2/2)

1982 GREATER ARIZONA ULTRALIGHT AIR RACE is now available on PAL or NTSC video tape on any domestic format. Hire £5 per week plus deposit of £37.80. Please add £1.50pp. Beattie-Edwards Aviation Ltd, 20 Normanhurst Ct, Crawley, Sussex. Tel 0293 20565. We are the largest aviation video supplier. (2/3)

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. (2/4)

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, Sevenoaks, Kent. (Trade enquiries welcome). (2/5)

WANTED, ADJUSTABLE TWO or THREE BLADE PROP. Tel Lincoln 810896. (2/9)

FOR all your WEIGHTSHIFT requirements in the MIDLANDS: gliders, trikes (new and secondhand), dual training with CAA instructors, instructors' course for PPL D exams, flight tests. New Hiway Hiro DEMONstrator. Contact Keith Vinning. Knowle 77737. (2/14)

NICOPRESS swaging tool. Toggle action type, as new. £75. Linsdell, Blind Lane Cottage, Kington, Guiting Power, Cheltenham, Glos. Tel Guiting Power 616, evenings. (2/19)

VOL LIBRE MAGAZINE SUBSCRIPTIONS: This French magazine is the leader in Europe for microlight activities. 1 year £21 and 2 years £42. Cheques to British correspondent; Michael Carnet, 143 Loder Rd, Brighton BN1 6PN. (2/26)

MODEL HANG GLIDER MOBILES with pilot, 22 in wing span. Genuine sail cloth, perfect gift, only £5.95. Send cheque or p.o. to NWHGS, 65 Highbury Ave, Irlam, Manchester M30 6BU. (2/27)

FLYING WITH SKIS? I am interested in contacting people with experience of this type of flying, particularly using a Skyhook trike. Please contact Graham Harris on Poynton 871766 home, Macclesfield 618242 work (Cheshire). (2/30)

GLIDER RIDER the essential magazine for microlight pilots. The whole USA scene. Subscription £17 pa. Mainair Sports, Shawclough Road, Rochdale, Lancs. (2/39)

ABSOLUTELY UNUSED FUJI 440 POWER PACK; includes Nicklow exhaust and reduction gear, unbeatable price at £700 ono (over £900 new). Contact 061-973 4085 (Manchester). (2/47)

ASTONISHINGLY BORED SOLICITOR aged 45, currently in industry, ex RAF Air Electronics Officer (Radio Officer/Flight Engineer) seeks gainful and stimulating employ in aviation. Call 0780 720489 Answercall (Lincolnshire). (2/48)

FUJI 330 toothed-belt drive, 54 in prop, 210 lb thrust, totally reconditioned, £600 ono. Phone 0760 21385 work, 0328 70250 home (Norfolk). (2/51)

KONIG 3-cylinder totally reconditioned, electric start, exhaust and prop. £250. Phone 0760 21385 work, 0328 70250 home (Norfolk). (2/52)

HIWAY REDUCTION DRIVE for 330, exhaust and prop. £100. Phone 0760 21385 work, 0328 70250 home (Norfolk). (2/54)

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. (2/57)

JOHN BARRATT where are you? Please land as soon as possible and contact Dr Richard Lawson at the Surgery, Weston Road, Congresbury, Avon. (2/62)

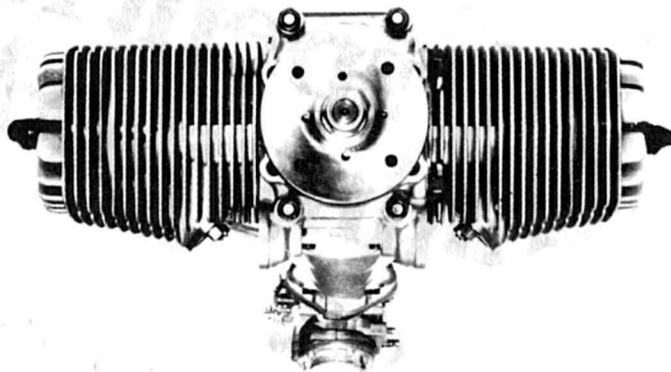


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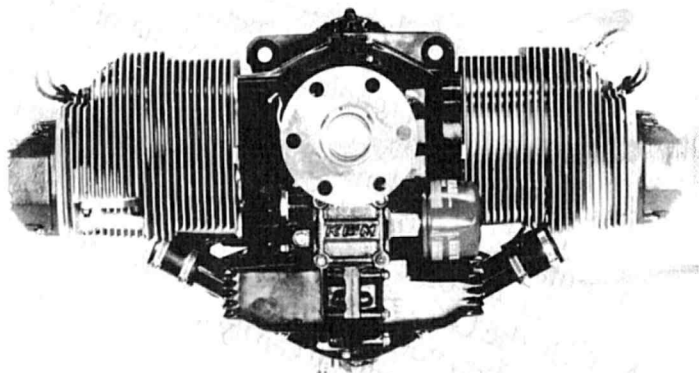
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Parilla TT25: As Parilla TT27 but 16bhp at 8000rpm, reed valve induction.

Spares for all these engines available from stock.

WOULD YOU PUT YOUR LIFE IN THE HANDS OF AN AMATEUR?

Microlight aviation is a new sport, but there are a number of companies who have been involved for many years.

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Before you buy a new microlight, lessons or equipment contact one of the following:-

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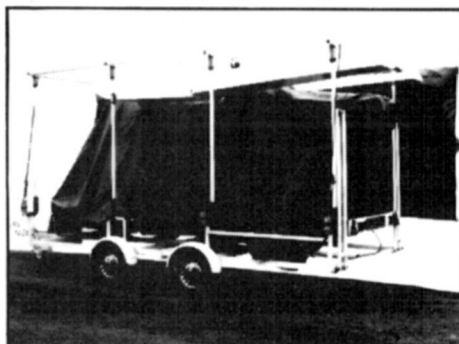


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