FLIGHT LINE

magazine of the BMAA

March/April 1981

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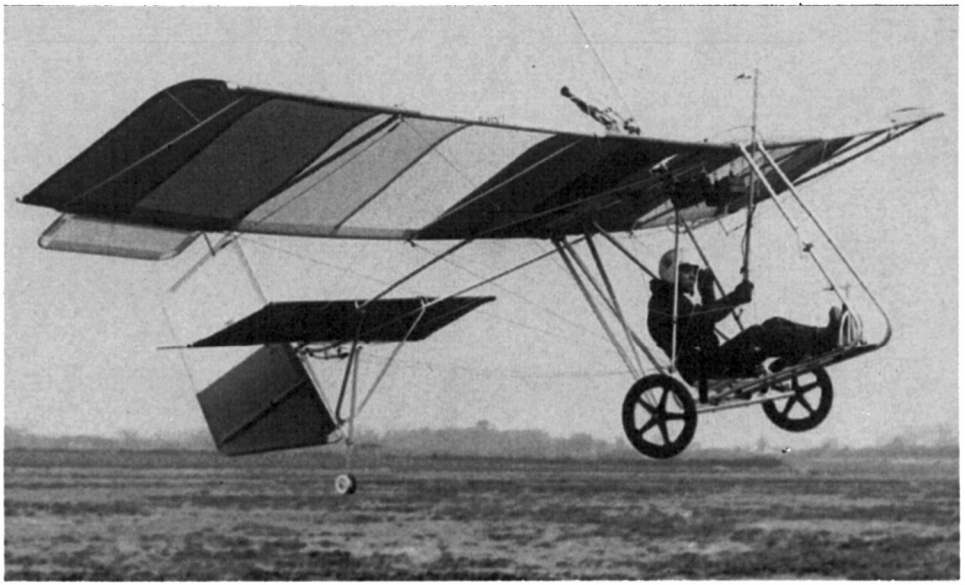

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FLIGHT LINE
magazine of the BMAA

Cover: Mike Harrington, Director of Larco Aerosport, and Rotec Factory Pilot Dennis Merrell seated in the Rally 2B cockpit

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BRITISH MICROLIGHT AIRCRAFT ASSOCIATION

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FLIGHT LINE
11 SCHOOL HILL
WRECCLESHAM
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SURREY

COMMENTS

From Paul Baker

The aim of the B.M.A.A. is to keep the expense, restrictions and bureaucracy involved with microlight flying to a minimum. However this aim must not compromise the high standards of training and pilot skill that are required for the long term satisfactory development and growth of microlight flying.

Microlight flying is an extraordinary opportunity at the moment. If we handle it properly, we can transform flying and people's attitudes towards it. If we handle it badly it will be just another good idea that failed to realise its potential.

We are entrusted with something very special and this throws a considerable responsibility on to the B.M.A.A. We have got to do what is necessary to make it succeed.

What is the most important thing at this stage? The answer must be that all pilots fly to a high level of competency and proficiency. The way that we are going to achieve this is by ensuring that the training standards are high and the tests involved in the Pilot Certificate of Competence scheme are sufficiently demanding.

It is every pilot's responsibility (yes, yours) to join in with the system and to get his or her friends and fellow fliers to do so as well.

It is important that we create an atmosphere and environment whereby it is easy for pilots to learn from one another. This is where the clubs are so important. How are you getting on with forming/joining your local club? As soon as the clubs exist and are operating we can work out how we appoint and train instructors, but this can only happen satisfactorily when there is a pool of experienced microlight fliers in the clubs.

Microlight flying is an amazing opportunity for all of us. How much is made from this opportunity relates directly to the effort that we (that includes you) put into it.

We as the B.M.A.A. have taken on an enormous responsibility. As the Training Officer, I intend to make it work; I want you to join me in doing so.

CHAIRMAN'S AIRWAVES

How Long is a Piece of String?

Since the last magazine, Paul Baker and I have participated in a "Microlight Working Group" in Paris at the Federation Aeronautique Internationale — the international body for sport aviation. The meeting was chaired by our President, Mrs. Ann Welch, O.B.E., and it was short and very productive. There were only two proposals — one that a technical committee on microlights (C.I.M.A.) be established, and the other that the following be adopted as the international definition of a microlight:

> "A microlight is a single- or two-seat aeroplane having a dry (empty) weight not exceeding 150 kg. and a wing area in square metres not less than $^{W}/_{10}$ (weight divided by 10) and in no case less than 10 square metres. (**NB:** Wing area is the area of the horizontal lifting surfaces and there is no upper limit to wing area.)"

Both these recommendations go before a general conference in June and should be adopted.

I thought that, following this favourable development, a little background on definitions might be of interest to all. From the very first day the British Hang Gliding Association — or some of its members — got interested in motorised hang gliders, a definition has been the most important item of discussion. In the early part of 1977 I was asked to be the B.H.G.A.'s power representative, there being at the time little interest in powered hang gliders on the B.H.G.A. Council. The first meeting of an informal committee took place, comprising Ann Welch, Murray Rose (Chargus), Simon Wootton and myself, and we immediately set about proposing a definition. Why, you might ask? We realised that without one we could not ask for operational freedoms. Our starting point was the Redhill Agreement for Self-Sustaining Motorised Gliders and so we came to a definition for a self-sustaining motorised HANG glider, as follows:

1. (1.1) A hang glider is a heavier-than-air, fixed-wing glider capable of being carried, foot-launched, and landed by the energy and use of the pilot's legs. (F.A.I. Definitions, extract.)
2. An S.S.M.H.G. is a hang glider as defined in 1.1 above, fitted with one or two motors and unable to take off under its own installed power.
3. The maximum weight shall not exceed 70 kg. without pilot (including engine, fuel and instruments).
4. Maximum number of persons to be carried: 2.
5. Maximum fuel to be carried: 3 (imperial) gallons.
6. The design shall be such that if the engine is in operation upon take-off or landing, there shall be no additional hazard caused to the operator by the engine.
7. Power loading shall be 15 lb./h.p. maximum.

At the end of 1977 the B.H.G.A. Council became interested and Brian Milton was appointed Chairman of a sub-committee on powered hang gliders. The following year saw support by the B.H.G.A. for the S.S.M.H.G. definition, but by late 1978 it was clear that a separate association was needed to represent the 'power people'. Jonny Seccombe (our Treasurer) was responsible for the establishment of the British Powered Hang Gliding Club with an unaugural meeting at Crickhowell on Sunday, November 19th, 1978. It is this same association which, with two name changes, is now the British Microlight Aircraft Association and which is now attracting interest from a very much wider sphere than just the hang gliding community.

In 1979 the Civil Aviation Authority suddenly came out with a suggestion that all aircraft under 50 kg. without pilot should be deregulated — clearly a very simple definition. Late 1979 saw the B.P.H.G.C.'s A.G.M. at Marlborough where many important decisions were made — to break away from the B.H.G.A., and to change the name to British Minimum Aircraft Association — and the Committee was asked by the members to drop the 50 kg. suggestion and to fight for the maximum operational freedoms for aircraft up to 100 kg. empty weight. By now the first Pterodactyls were in Britain, and in Australia and the U.S.A. many types of miniature aircraft were flying and the shape of the "microlight" was becoming a little clearer. We settled on a very simple definition then — up to 100 kg. empty weight and a wing area greater than 10 square metres.

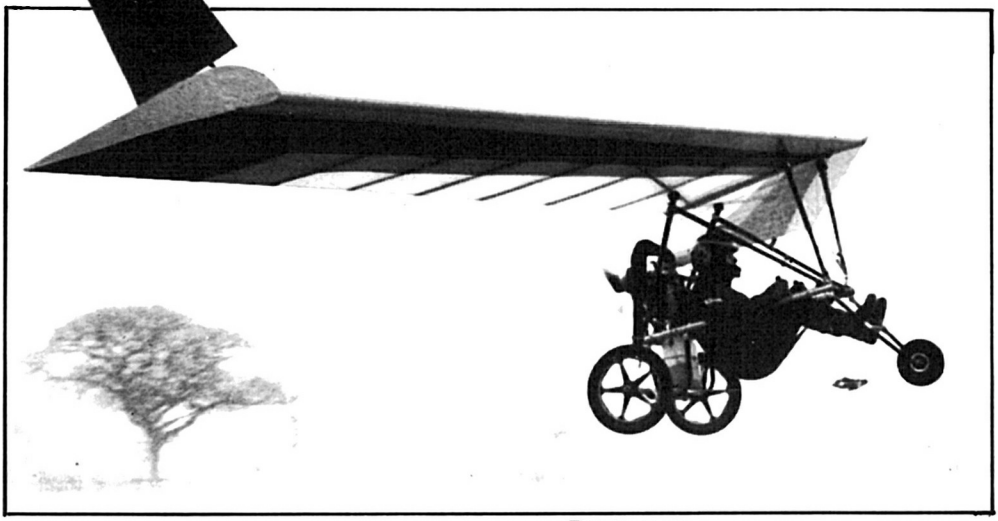
Over the last year it has become clear not only to me (as Huntair) but also to many others that the strict definition could lead to some illogical developments, and my own thoughts expounded in the Jan./Feb. 1981 "Airwaves" have resulted in this new definition. At the F.A.I. meeting there were several possible definitions proposed or brought to the notice of those present, the most notable being those from Britain, Japan and Canada, and also there was considerable discussion of the present circumstances in the U.S.A. and Australia.

Let us all hope, then, that the new definition works well and leads to sensible development of aircraft and operational systems in a wide range of countries.

S.H.

The Exciting Second Generation

MICRO-LIGHTS



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LETTERS

ARMCHAIR TYPES

Dear Sir,

Don't you think it's about time the armchair types from hang gliding clubs stopped trying to imagine they are in charge of where microlights fly. I think if they want to stay out of trouble with the National Trust, Peak Park, etc., etc., they should be telling them that they have no connection with microlights and not making promises about how they can control them and stop them flying in beautiful parts of the country, like the Peak District. It was me who flew near Mam Tor, but what is not clear is that I flew from a field I had had previous permission to use, unlike the Sheffield lads who should only land there in an emergency. Funny how they thought they had a right to tramp all over the field telling me I shouldn't be there.

Mike Hurtley

EAGLE ENGINES

Dear Sir,

I write to inform you and the membership of a serious problem that has occurred with one of our Eagle engines. Our aeroplane was delivered in October last year and the engines were run in very gently over a period of some four to five hours before any flying took place. We continued to operate our engines on a 20:1 petrol/oil mix with the carb settings always erring on the rich side, power was reduced soon after take-off and all climbing was done at no more than 80% power.

After some seven flying hours and several engine failures, one engine seized solid. Fortunately this happened at about 300 ft. and no difficulties were experienced in putting the aeroplane down safely.

On making enquiries I have found that I am not the first to have had this sort of problem, it appears to be almost commonplace. If this is so it must be only a matter of time before someone bends an aeroplane or worse through failure of this seemingly unreliable power unit. To anyone contemplating purchase of this otherwise superb little craft, I say, do seek assurances of engine life and reliability before you buy.

Martyn Smith

PARACHUTES

Dear Sir,

I have been interested to read John Hudson's two articles on the complicated problem of trying to work out some system whereby we can be saved by parachute in the event of a microlight coming apart in mid-air; it is a subject which per se must be close to all our hearts. Nevertheless the solutions look somewhat tenuous and tricky — not through any fault of John's, but because of the frail nature of the aircraft, its pusher-type engine, and the wires and tubes which make it unlikely that the pilot could get out "over the side" quickly enough (if at all) if things start to break up.

Lying awake in bed last night an alternative solution occurred to me, which the experts might like to examine for feasibility; it should be suitable for the Pterodactyl Fledge (the only aircraft I have any experience with), but there may be other types which it could apply to.

One could not, we agree, get out over the side: but why not just drop out through the floor (wearing a chest-pack parachute)? The Fledge nylon sling seat is attached to the main frame both at the back (nice and firmly) and to the horizontal front bar, where a webbing strap passes over the bar and comes back to an adjustable buckle. If this buckle were replaced by some form of quick-release catch, perhaps on the lines of the parachute ripcord, or some toggle-type fastener embodying a pip-pin, one could in emergency simply lean forward, release this, straighten one's arms (so that one would simply slide out, downwards, from the existing safety-belt webbing) and fall clear. Count five and pull the rip-cord in the time-honoured fashion.

The catch would need to be fool-proof — the thought of the seat dropping out from under one when one didn't expect it to (especially if one wasn't wearing a chute at the time) is the stuff that nightmares are made of; but doubtless some form of fail-safe mechanism could be designed, which could be made operational by unclipping something when the pilot had reached a height of 2,000 ft., or whatever.

Over to John Hudson for comments.

Donald Gurrey

ENGINES AND RADIO CONTROL

Dear Sir,

Various microlight manufacturers seem to adopt the simple and reliable Fuji Robin as a suitable power plant.

Could it be that a production machine must have an engine readily available in numbers, at a price?

The do-it-yourself enthusiast could purchase a write-off motorcyle, giving him access to, say, a 250 o.h.c. twin or similar sophisticated engine. The extra weight of this engine would be offset by the reduced fuel consumption, enabling a reduction in fuel carried. Other items could be salvaged, e.g. electric starter, electrics, twist grip throttle and cables, rear tele dampers, chains, etc.

Someone may even modify a 'fairing' to suit the Trike, dramatically reducing drag and pilot hypothermia. This would be halfway to the composite structure suggested by our Ed.

As an aeromodeller, may I suggest that the problem of 'safe' pilot instruction can be resolved by the use of low cost three channel RX TX model radio control. The small but powerful modern servo motors could easily override throttle and rudderon controls. The radio transmitter, with an additional two-way radio link between pilot and his 'grounded' instructor, would avoid the present overload situation demonstrated by the low safety factor imposed on a microlight airframe carrying **two** *170 lb. pilots, gambling that a '5G' situation will not occur!*

Iain Carswell

FLYING FLEA

Dear Sir,

Regarding your correspondent who wanted to know about 'Flying Fleas', many modern versions of the 'Flea' are operated by enthusiastic amateurs throughout the world today. "The technical difficulties were solved many years ago. . . . English speaking countries were not made aware that the early problems no longer existed" (Jaquemine, Flying Fleas, technical notes for the amateur). Personally I would regard the painstaking effort of building a 'Flea' a retrograde step in view of the tremendous progress being made with 'microlight aircraft'. Anyway the smallest 'Flea' (HM290) weighs in at 300 lb. empty, 500 lb. gross and would require a permit to fly.

David Shrimpton

FLIGHT REPORTS

FIRST EXPERIENCES

By Les Chapman

Never having ever heard of microlights until last December, I read about an Eagle somewhere and said to my partner "we gotta get one". "O.K.", he said. I rang Gerry Breen who gave me the hard sell, like "sold out". It occurred to me that a cheque might change his mind.

The next day after opening the post he rang back to say he had found one and what colour would I like! Instantly becoming a purist I settled on a brown and white job à la Wright Bros. (LE Wright Bros.?) The conversation continued:
Les: When can I learn to fly it?
Gerry: March.
Les: I'll stop the cheque.
Gerry: Ask Julian if can fit you in next week (first week in January).

Arrived at Enstone with my friend, Wally, who also decided he wanted one and bought it ex-stock!

Weather against us, we did the theory first and hoped it would improve — it didn't, but we were dragged up and down a wet runway to sort the ground handling bit. (You would think they could fit a mudguard for two and a half thousand green ones!)

It was a miserable week, the eight intrepid students each put in about six tows in total.

At this point I must say that Gerry Breen and Julian Doswell take the training very seriously and really don't want armchair aviators like me taking their aircraft away without full training. (I might need some spares.) The bald facts are that I had bought and paid for the machine and if I load it on my car and take it away they are in a slightly difficult position.

Wally and I did just that and drove home pondering how we were going to fly the damn things.

We decided to be very sensible (chicken) and do hours and hours of "hops". Chatted up a local farmer and put Wally's machine together and did one or two fast taxis and got a good 6 in. (150 mm) off the ground. Wally had another friend with him who was a Concorde pilot (honest) who thought he would like to get the feel of it. Wally said "carry on old chap".

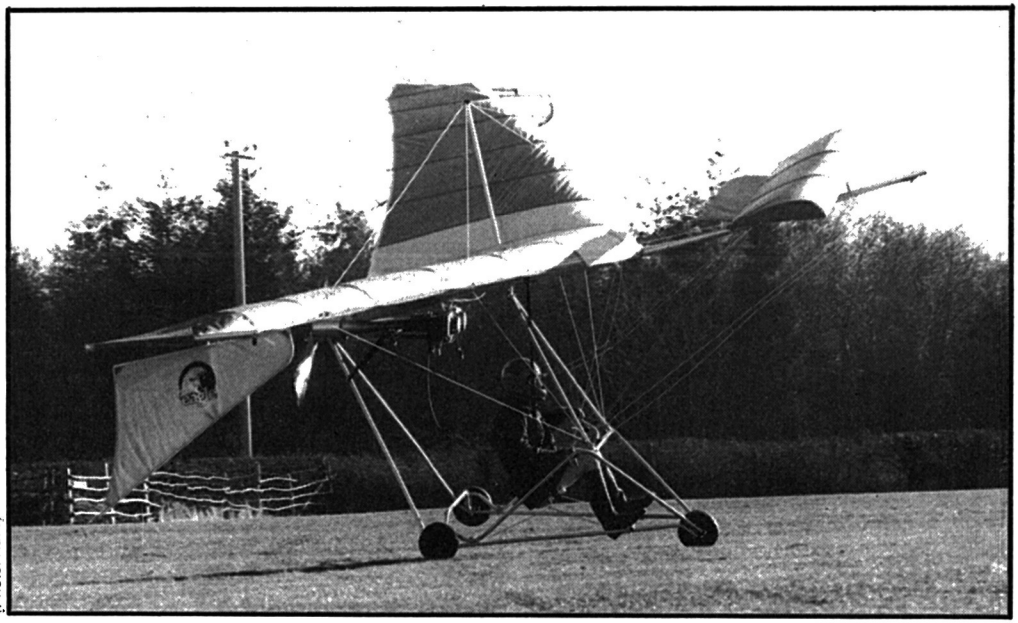
"Old chap" carried on and on and on, lifted off, went straight up to 20 ft. and came straight down backwards. New prop, new undercarriage. "Embarrassing." Wally and I decided that no one else would fly our machines unless they were experienced (like us).

In the meantime my partner, Keith, had been to Enstone for training, had a perfect week and flew all day for four days (lucky swine) — got checked out and "certified".

I suggested at this point that we all go to Popham and give these machines a bit of stick and forget all about the "hops".

We arrived at Popham and I asked Jim Espin if we could have a quick zap about. "Sure", he said ("Blast", I thought). Both machines were put together and Keith did an immaculate circuit in ours (that's what training does for you).

Wally was next! Wally never stops laughing but had a huge sense of humour failure as soon as he



(Photo: Katie)

was strapped in. To give him his due he wound the throttle open and went up like a lift. He levelled out at about 200 ft. and turned downwind ignoring the 45° rule. He made his final approach — still at 200 ft. — got halfway down the runway — still at 200 ft. — and decided to go round again! This time put it down gently — no problems but he looked a bit pale.

"Oh my God, I'm next." Unfortunately conditions were ideal. Suddenly I had a stroke of luck. I saw another chap putting a microlight together on the airfield. I went over and said, "Hello, I've got one of these and I'm just about to try to fly it." "Christ", he said. He introduced himself as Dave Thomas who I didn't know from a bar of soap, but I noticed that he had BM 001 on his wing so I thought he might know something about it.

The conversation went something like this:
Dave: Have you had any flying experience?
Les: Thirty hours or so towards a P.P.L. some years ago and I've got a hot-air balloon.
Dave: That's a relief — so you understand the basics, pitch and height control, etc., etc.
Les: Yes, yes, do you think I should do some hops?
Dave: Well, you might find it easier to take it straight up to 500 ft. and then you have plenty of time to sort it out — if you feel in any trouble, let go — it will fly itself and don't over-react, take it gently.

No problem at all I thought, so I jumped in and opened up with only a mild attack of panic. Weighing ten stone I didn't have a lot of trouble taking off and hung on to full throttle for about a minute and levelled out at about 10,000 ft. (well, the airfield looked pretty small). I was surprised how positive it felt after the sloppy tow trainer and I felt fairly confident. I started a slow turn — no drama — downwind and beginning to enjoy it, then had to think fast — next turn had to be just right, height looks O.K., banked gently not daring to turn my head and hoping that the runway would come up on my "nose". It did. Glide angle feels good, must NOT round out too soon (easy to do when your B.M. is only 6 in. off the ground). "Feed" it in with a few slight adjustments — keep the airspeed up — ease back — blimey I'm down. Keith rushed over and said "well done. Go round again before you lose your bottle". "Too late", I said.

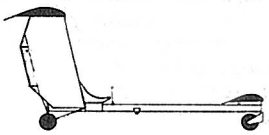
Just to bring you up to date I am now the best microlight pilot in the world, having clocked up well over 40 minutes, and am looking forward to Sandown for a bit of real competition.

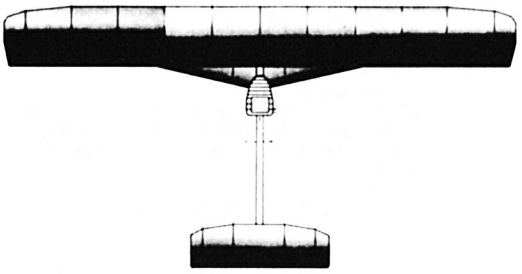
See you there?

Author's Afterthought — Please tear up all the purist letters saying "irresponsible" and "bad for the movement" as I am trying to illustrate the fact that very few trainees can hang about an airfield all winter waiting for "ideal conditions". I think this is going to be a continuing problem and the back-log of untrained owners will inevitably grow, forcing self-training like Wally and myself. What is the answer? Apart from training in the summer, when presumably thermals would cause a problem.

WASPAIR CORPORATION

TOMCAT





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SPAN	30 ft.	30 ft.
WING AREA	175 sq. ft.	175 sq. ft.
DRY WEIGHT	175 pounds	189 pounds
FUEL CAPACITY	5 galls. U.S.	5 galls. U.S.
MAX. PILOT WEIGHT	220 pounds	380 pounds
MAX. SPEED	58 m.p.h.	65 m.p.h.
CRUISE SPEED	45 m.p.h.	50 m.p.h.
LANDING SPEED	24 m.p.h.	31 m.p.h.
MIN. T.O.R.	90 ft.	120 ft.
MAX. CLIMB	700 f.p.m.	550 f.p.m.
AIRFRAME STRENGTH	+6 g. −4 g.	+5 g. −3 g.
BEST GLIDE (ENGINE OUT)	9:1	9:1

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THE H.M. 81 'TOMCAT'

By Robin Haynes, President of Waspair

(Some of you may remember Waspair. They were one of the top hang glider companies in the U.K. from 1974 to 1979. Unfortunately, for the future credit ratings of the other British hang glider manufacturers, Waspair decided in 1979 to declare their own bankruptcy and left these shores for the sunnier climes of California, owing thousands of pounds in bad debts. In California they quickly set up the Waspair Corporation U.S.A. and continued to build and sell hang gliders. They are now attempting to enter the microlight market with the Tomcat. Prospective purchasers of the Tomcat are warned of the cleverly composed sales contract which effectively relieves Waspair of any responsibility with regard to the purchased Tomcat, except for a clause which undertakes to "repair or replace F.O.B. its factory without charge any materials missing or seen to be defective which within thirty (30) days after the date of delivery by the manufacturer are proven to the satisfaction of the manufacturer to be missing or defective at the time it was delivered", etc., etc. The Flight Line Legal Dept. advises that purchasers of the Tomcat should not sign this contract, despite the fact that the contract would not 'stand up' in a court of law in either the U.S.A. or the U.K. — Ed.)

Such an unconventional design as the H.M.81 was not undertaken lightly. To develop the aircraft we had to start by doing five months of original research before the first drawings were even finalised. The original prototype, the H.M.80, flew first in May 1980 and was not a great success, but it did answer the big question about the basic concept — yes it would work. Just how well it would work had to wait until the second prototype, the H.M.81 was finished in October. The first flight of the H.M.81 brought a grin to my face that has hardly left. The Tomcat flew just beautifully and gave me such confidence that within minutes I was pushing ahead into the advanced test programme. The last few months have been spent experimenting with different airfoils, making trim adjustments and tidying up the design for production. We have also used our own mobile 'wind tunnel' to test pitch stability at acute angles, and to dynamically test airframe strength.

The H.M.81 concept is actually fairly simple, as can be seen from the pictures. The straight unswept main wing is supported by two 'dihedral wings' which are swept 13° back. These dihedral wings are the major lateral stabilizing surfaces, they are effective as a fin, simply providing side area aft of the C.G., they also tie the yaw and roll reactions of the aircraft closely together thus producing a single co-ordinated yaw/roll response to a control input or gust. The all moving canard wing whilst providing inherent longitudinal stability, also controls pitch and yaw/roll (operated by the control stick it tilts forwards, backwards and side to side).

The fuselage is a single 4'' O.D. chrome anodised boom on to which the wings, undercarriage, engine tower and padded seat are securely fixed. Control linkages run inside this boom, thus keeping the aircraft as low drag and clean as possible.

The undercarriage is a light tubular construction with integral rubber shock absorbers. The three wheels are nylon hubbed and ball bearing mounted, they are fitted with lightweight pneumatic tyres and tubes. The nose wheel is connected into the control system to facilitate easy ground handling.

After experimenting with a number of power plants, we have found the Cuyuna 430 c.c., twin cylinder, engine to be the smoothest and most reliable of the 30 h.p. options available. With the Cuyuna turning a 36'' x 16'' wooden prop, the genuine performance figures are:

take off 27 m.p.h.; max. speed 56 m.p.h. and climb 600 f.p.m.; gas economy at the cruise speed of 45 m.p.h. is about 1½ gallons per hour, useful range is around 150 miles.

The Tomcat features a unique foldable wing system. The wings fold down to a mere 12' 8'' x 11'' tubular package and yet, once assembled, form stable double surface airfoils which are clean and quiet throughout the speed range of the aircraft. The engine, seat, fuel tank, landing gear and all control linkages remain intact as one convenient fuselage module. Rigging time is about 20 minutes with assistance or about 35 minutes alone and the whole aircraft can be transported on a car roof rack and stored in a normal garage.

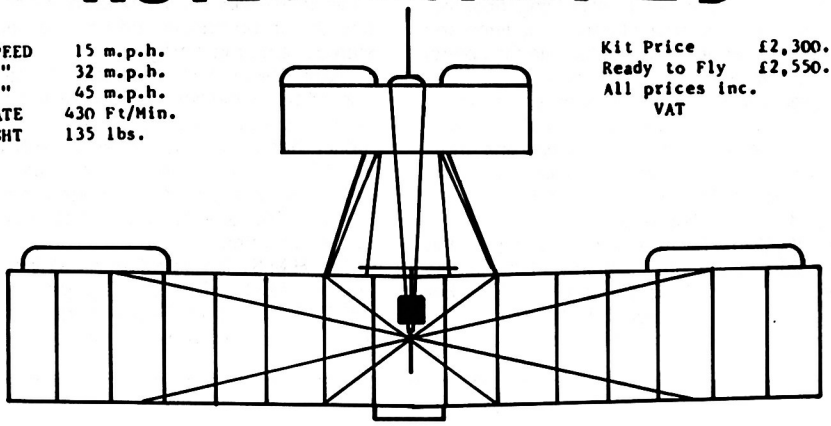
Flying the H.M.81 is a really pleasant surprise; one's natural reaction on seeing it is to think that an aircraft as 'spacy' looking as the Tomcat might have 'spacy' handling as well. In fact the H.M.81 handling is solid and responsive, turns are automatically co-ordinated and control pressures are light and positive. The elevator and rudder responses are both fully trimmable.

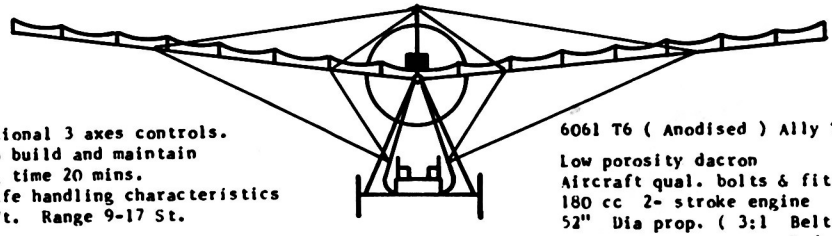
The H.M.81 is offered as an all inclusive kit for home assembly. Delivery at present is five weeks F.O.B. Sacramento. Prices range from $3,495 to $4,495 depending on what options you require.

ROTEC RALLY 2b

STALL SPEED	15 m.p.h.
CRUISE "	32 m.p.h.
MAX. "	45 m.p.h.
CLIMB RATE	430 Ft/Min.
DRY WEIGHT	135 lbs.

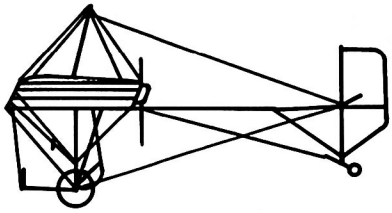
Kit Price £2,300.
Ready to Fly £2,550.
All prices inc. VAT





Conventional 3 axes controls.
Easy to build and maintain
Rigging time 20 mins.
Very safe handling characteristics
Pilot Wt. Range 9-17 St.

6061 T6 (Anodised) Ally Tube.
Low porosity dacron
Aircraft qual. bolts & fittings
180 cc 2- stroke engine
52" Dia prop. (3:1 Belt Reduction)



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CRAIG CATTO

HIS AIRCRAFT AND THE EUROPEAN CONNECTION

There is no doubt that everyone likes to see success, nowhere more so than in America, where aircraft designer Craig Catto has received more than a normal amount of exposure both in "Mechanix Illustrated" and "People" magazine and in T.V. programmes like "PM Magazine" and "To Tell the Truth". There are, in fact, several ultralight designers in the States who could claim to have produced three commercially successful aircraft. However, when one realises that in Craig Catto's case this has been achieved before the age of 22 then one begins to understand the American media's enthusiasm.

At the age of 13 Catto was already experienced in building model aircraft and rockets. On his 14th birthday he gained his full sailplane pilot's licence and proceeded to go "cranking and banking" most successfully. Shortly thereafter, Craig and his brother Chuck built a series of Icarus II hang gliders gaining considerable experience in ridge soaring and building techniques. However, being tired of travelling considerable distances and climbing up hills the brothers decided that it was time to explore power systems, the idea being to gain substantially more air time nearer to home. After experimenting for several months and carving nearly 30 different propellors a passable climb rate of over 100 f.p.m. was achieved!

With the easing of Government regulations the Catto brothers built an Icarus V hang glider, an Easy Riser and a Mitchell Wing. By the age of 15 Craig had achieved as much expertise in building ultralights as probably anyone in the world at that time and by "reading a lot" developed his understanding of aerodynamics and started to design rigid wings to his own specifications. The 49er was developed in 1975 from the basis of an Icarus V; however, this aircraft still had a multiplicity of wires so the CA-14 was designed using the construction techniques of a Mitchell Wing and the aerodynamics of an Icarus V. The CA-14 was so successful that orders were received quite

unsolicited and since a business potential existed Craig's parents began to help out with the administration and machine work on kit components. It was not long before a more refined design was seen flying in the neighbourhood, this being the CA-15. This design was to prove more efficient and easier to construct than the CA-14 and was commercially very successful, Craig being swamped with orders within a matter of months, and the word quickly spread amongst home-builders that Catto had achieved the design of a high performance motorised wing with stable handling and mellow flight characteristics.

By 1978 Craig had seen his first composite structure aircraft — the Varieze — and it was only a matter of hours before he began experimenting and testing and learning all that he could about composite construction. By exploring the potential of fibreglass, graphite, styrofoam, balsa wood, aluminium, I beams, Box spars, D tubes, ribs and other materials he was able to build up a comprehensive knowledge and understanding of these products and also the potential of combining one or two in various structures. His initial reservations about working with composite materials quickly turned to considerable enthusiasm, especially in view of the incredible strength and simplicity of fabrication.

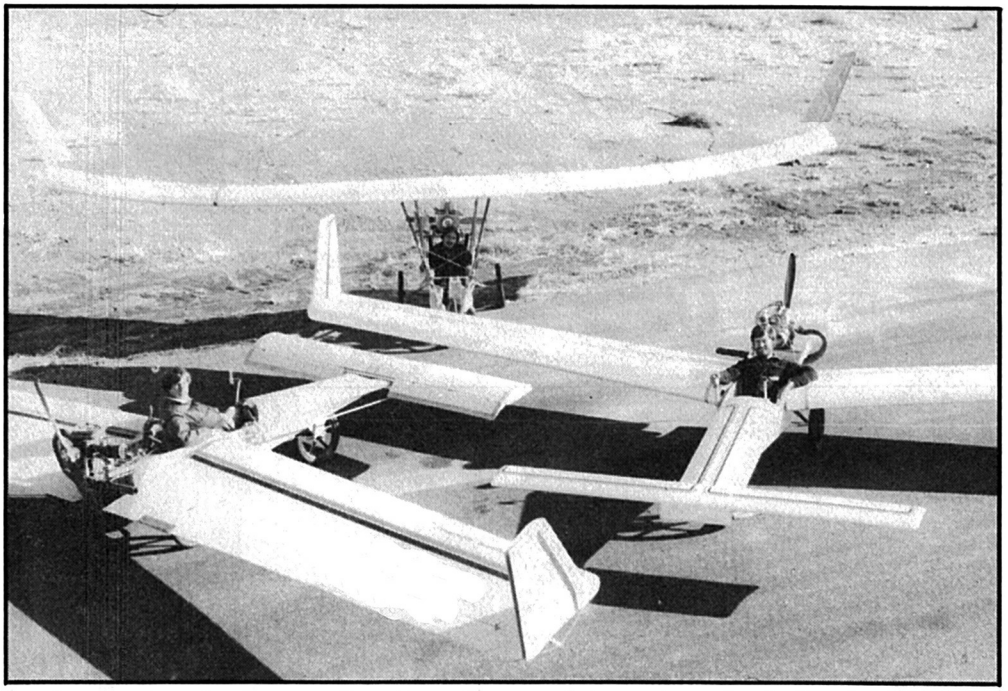
Craig Catto freely admits that his imagination was fired by Burt Rutan's canard designs, the most well known of which are the Varieze and the Quickie, and recognised the challenge in designing a successful micro-light aircraft using the canard concept. With his design expertise quickly developing and flying skills now at the level of qualified aerobatic pilot, Craig felt it was time to "break new ground" and embark on the canard design.

It was around this time that Brian Harrison of Euro-Wing in Scotland became aware of the potential which existed in the European market for an aircraft which would be attractive to those who already flew conventional aircraft but were finding costs rising at an alarming rate. It was apparent to Brian that some considerable reluctance existed amongst those potential customers towards the purchase of flex wing, or hang glider derived structures and that a demand could be generated for a rigid wing aircraft even though very little home building is undertaken in this part of the world. Euro-Wing built, and successfully flew a CA-15 and sold several kits; however, it was apparent that if some of the composite building expertise currently being used on the prototype Goldwing, which Craig had just started flying, could be applied to a flying wing then the market potential could be more readily exploited, particularly since initially it was agreed that there would be more demand for built aircraft and the CA-15 was not commercially viable in this respect.

Whilst development of the Goldwing concept continued in the States Craig took some time off to visit Euro-Wing and design and build, within one week, a CP-16 prototype based loosely on the original design of the CA-14. This aircraft flew successfully, after a hectic five-day building period, with the paint still wet at the inaugural Fly-In of the British Microlight Aircraft Association held at Wellesbourne Airfield. On returning to the States a further prototype was built and flight tested extensively so that by the time the second prototype appeared at the Tullahoma Air Show organised by The Experimental Aircraft Association of America it was flying so well and creating such interest that it received the E.A.A.'s Outstanding New Design Award.

In January 1979 the Goldwing appeared at the E.A.A. Sun 'n' Fun Meeting in Florida and an audible gasp was heard from both manufacturers and the home-building public alike. It was apparent that the evolution of a new generation of ultralight was underway. Enthused by the reaction to his design Craig then built the second Goldwing with an aluminium tube and foam/fibreglass spar this structure being used also on the CP-16. The fuselage was also changed to cure problems of torsional flexing between the canard and the main wing. Trailing edge flaps were added with an ingenious trim mechanism to retain canard lift while the main wing flaps were deployed. Dorsal fin winglets with tiny wheels were tried and then discarded in favour of more efficient winglets and the landing gear was revised to withstand more abuse. The third and fourth prototypes used doped/fabric wing coverings and the main wing flaps were discarded, whilst new aerofoils were tested to achieve an even greater speed range. Catto continued to experiment varying the wing loading and the areas of both the canard and main wings until he reached the optimum performance and handling for which he was striving.

The fourth prototype made a significant contribution to the aircraft development. Having spent considerable time searching for suitable aerofoil sections, Craig concluded that none were really suitable for ultralights since they had been developed for either very low speeds (under 30 m.p.h.) or high speeds (over 60 m.p.h.). In order to optimise his design it became apparent that Craig would have to develop his own aerofoil and eventually by modifying a high lift "man-powered section" he managed to give the Goldwing an extremely wide speed range and with the addition of an 18 horsepower motor the design was really becoming very exciting. By March 1980, with further power from the motor, the Goldwing again appeared at the Sun 'n' Fun Fly-In in Florida. At this show the Goldwing really "arrived" flying at over 60 m.p.h. and proving to be extremely manoeuvrable even at low speeds. By now the public interest was substantial and provisional orders were being forced on Craig even though he was not fully satisfied that



the aircraft was performing as well as he could achieve.

With a refreshing non-commercial attitude Craig continued to pursue improvements in his design, an effort which was substantially frustrated when vandals set fire to his trailer and literally melted the entire aircraft.

In building prototype number five refinements were introduced which would greatly simplify construction for the home-builder and also streamline manufacture of components at the factory. For the first time a full foam/fibreglass skinned wing was built, a further aerofoil section tried and discarded and by October 1980 Craig and his new business partner Brian Glenn, having built two pre-production prototypes, were at last satisfied with the aircraft. By now, of course, the home-build market was clamouring for the aircraft which had obviously the performance of a conventional airplane and the convenience of microlight.

There is no doubt that the Goldwing represents a new state-of-the-art for microlights, offering an exciting high performance, low cost ratio, unprecedented in the industry. After two years work, five prototypes, three planforms, six airfoils, the Goldwing has finally arrived and in Europe both the CP-16 and Goldwing are built on jigs supplied from America to ensure that the aircraft manufactured are exact replicas of the originals.

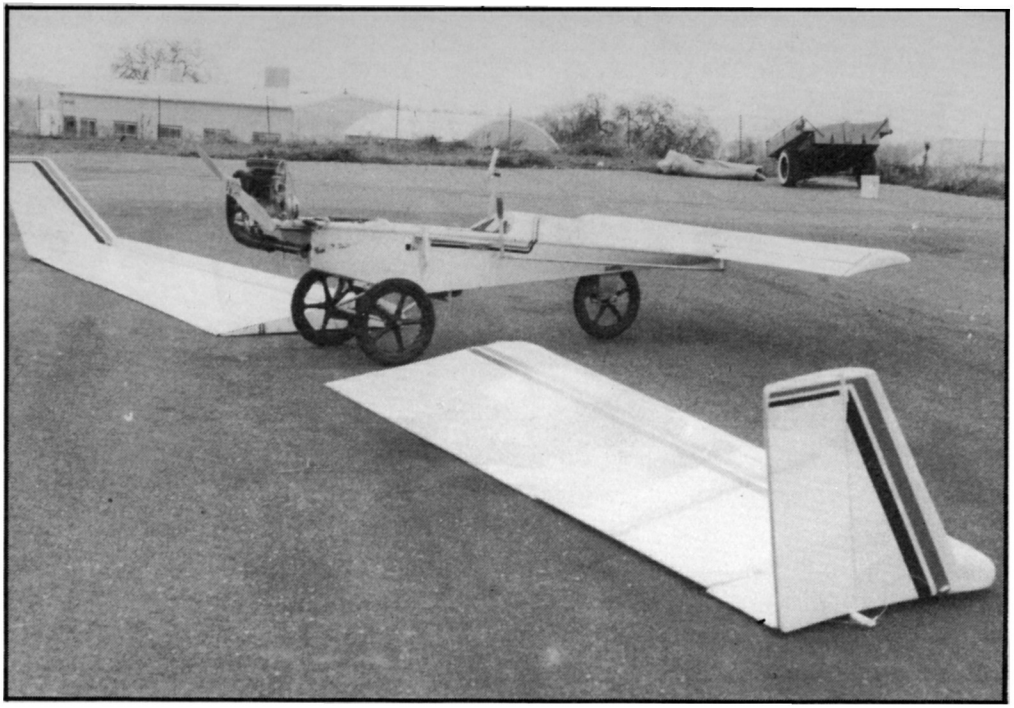
From now on Craig Catto will be spending some considerable time each year in Europe to undertake demonstration flying and also dealers' seminars and publicity work.

GOLDWING

GENERAL FLIGHT TEST REPORT

By Craig Catto

Being the designer of the Goldwing and having considerable experience not only of flying ultralight aircraft but also conventional aircraft to aerobatic qualification level, I felt that it was only right that I should undertake all the test pilot work on this aircraft. Since I understood the basic design and the aerodynamics I could quickly tell where the design was incorrect and where improvements could be made and more importantly, how these could be made. Since I was exploring new construction techniques and a range of aerofoils not entirely compatible with the speed range required, it is only



understandable that from time to time some of my ideas didn't work as well as expected — and that's an understatement! However, by prototype number 5 I was undertaking full test flying, this being done with an altimeter, digital watch, vertical speed indicator and two air-speed instruments. With a pilot weight of 185 lb., a 15 lb. parachute and six gallons of fuel, the aircraft was being flown at gross weight.

The Goldwing uses a unique combination of controls. The conventional joystick and rudder pedals actuate unconventional control surfaces. Each rudder pedal is independently connected to split rudders, this rudder being on the outside surface of the winglet and both can be actuated simultaneously to act as dive brakes. In roll the stick has right and left travel which actuates the spoiler/aileron combination. For example, when the stick is moved to the right the right spoilers will come up out of the wing together with the aileron, moving upwards at the rear of the aerofoil. At the same time there is no down movement in the left aileron. For fore and aft movement the stick controls the elevator on the canard giving good predictable pitch control.

On the runway the Goldwing is kept straight with the rudder pedals which are also connected to the nose wheel and to take off full throttle is applied, holding the stick fully aft. After about 150 ft. the Goldwing rotates and flies off the runway and the stick is then held in neutral. In this position the aircraft will accelerate to 45 m.p.h. and climb at over 600 ft. per minute. If full aft stick take-off and climb out is undertaken a "mush-type" climb is achieved at 29 m.p.h. and 300 ft. per minute with no tendency to stall! Cross-wind take-offs and landings are undertaken as with a conventional aircraft with the aileron into the wind and the rudder to keep straight. Cross-winds of up to 15 m.p.h. have been encountered and take-offs achieved without any problem.

At an altitude of 7,000 ft. A.G.L. the power is taken back to 50% and the airspeed is levelled out achieving a cruise of 68 m.p.h. and consuming just over one gallon per hour. At an even lower power setting and an indicated airspeed of 45 to 50 m.p.h. the following manoeuvres were initiated:

First left and right turns of 30° and 45° were undertaken and found to be smooth and co-ordinated. Holding the aircraft at 45° bank and letting go of the controls completely, the Goldwing returns right back to straight and level in 4 seconds. Using full rudder and aileron the roll rate from 45° to 45° is just under 2 seconds and using rudder only is just over 4 seconds.

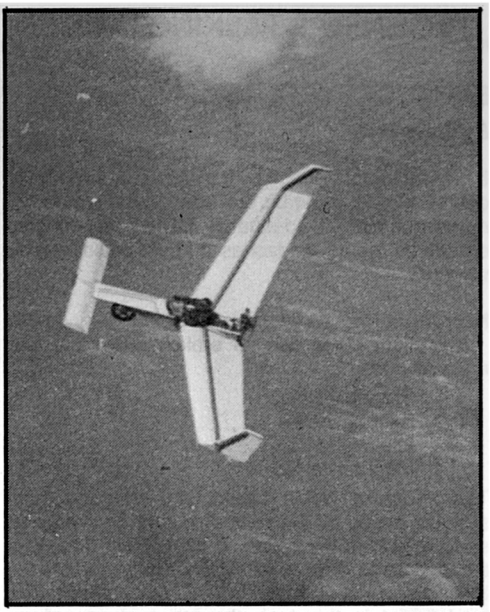
Stall characteristics were explored at three different power settings, i.e. idle, half-throttle and full throttle. In each instance the stick was pulled back gradually with the nose rising to just above the horizon. Holding full-aft stick, the aircraft continues flying at an indicated 27 m.p.h. When the stick is pulled back abruptly the canard enters a gentle

braking stall, around 23 m.p.h., and returns back to the horizon with full-aft stick being held. This, to say the least, is the strangest feeling to be able to fly an aircraft in this manner. When undertaking stalls in 30° bank turns the canard recovers back to the horizon, still holding full-aft stick, and a smooth co-ordinated slow speed turn with no tendency to drop a wingtip is undertaken. The same thing happens at 45° bank turn.

Spin testing was then undertaken by pulling the stick back abruptly and at the canard stall full right rudder was applied. All that happens is that the aircraft enters a smooth ultra-slow tight turn, again without any tendency to drop a tip.

Engine-off the Goldwing demonstrates a glide ratio of over 16:1 at 43 m.p.h. and a minimum sink of 250 f.p.m. at 38 m.p.h. Approach speed for landing is around 40 m.p.h. and the aircraft is then slowed down to round-out giving a ground roll of approximately 75 ft.

By the time of writing this analysis five pilots of conventional aircraft have test flown the Goldwing in the same manner and each report the same responses, and therefore I am satisfied that, at long last, I have achieved my design parameters.



FUNNY PHOTO CAPTION COMPETITION

A Goldwing Colour Print (36 in. x 20 in.) will be offered as prizes to the three best caption suggestions to the photo below. All entries should be sent to Eurowing, Unit 20, Dixon Place, College Milton North, East Kilbride, Scotland. Envelopes marked "Caption Competition".

EXHAUST SYSTEMS

By Steve Hunt

It is most important that pilots learn to fly well and of course aircraft must be airworthy, but if we do not make our aircraft adequately QUIET we will give ourselves many headaches that we could well do without.

Microlight Noise Levels

Microlight noise can be broken down into four main sources:

1. Propellor Noise
2. Exhaust Noise
3. Inlet Noise
4. Mechanical Noise

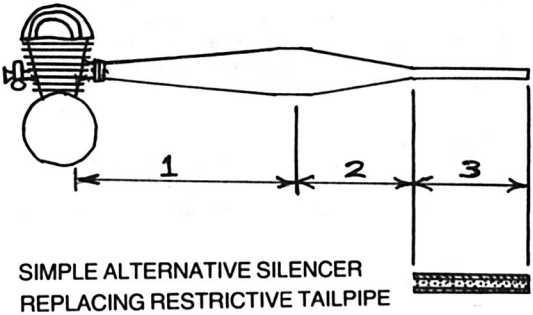
The Propellor Noise aspect is by far the most serious, but by far the easiest to cure. High prop tip speeds lead to the noise, so high power through a small prop is terribly noisy. During a day's noise testing with the CAA last year (yes, they **are** taking an interest in this too), the fitting of one of my reduction systems to Dave Garrison's Pterodactyl led to a 20 Db noise reduction. It also gave a big increase in climb rate, not strictly necessary in this case but Dave certainly liked it! So the number one rule for low noise is a slow-speed, large-diameter propellor.

Assuming that you have a reduction system fitted, it is meaningful to discuss the other three headings. Exhaust Noise; obviously a good efficient silencer is needed, and as this is the main reason for this article, we will discuss it later. After a low-speed prop and a really efficient silencer, Inlet Noise and Mechanical Noise could become significant portions of the total noise emitted. Even with current-day machines, Inlet Noise can be quite loud from some directions; the partial solution currently used is the foam block inlet filter, but I believe that market pressures will eventually lead to better inlet silencer boxes as used on most motor cars. Mechanical Noise is already noticeable on some machines in the form of; poorly fitted exhausts, loose brackets, shoddy construction and most of all, poor or non-existent servicing. Remember, if it's loose, it may fall off and that may **matter!** It's your life. . . .

Exhaust System Fundamentals

At the moment, all microlights are powered by two-stroke engines, and exhausts for two-strokes are quite complicated. With a two-stroke, pressure pulses are used to help maximise the fresh charge and to minimise the burnt gas that is left in the cylinder when the exhaust port closes. The exhaust on a racing two-stroke can be considered crudely in three parts. The first — from the port to the large

BASIC RACING EXHAUST SYSTEM



SIMPLE ALTERNATIVE SILENCER
REPLACING RESTRICTIVE TAILPIPE

parallel section — is an expansion area which helps the surge of gas to escape quickly. The second part is an area where the pipe converges quickly, halting the flow of gas up the pipe and sending pressure pulses back and forth like an organ pipe. The third area is the tailpipe, which is usually long and thin and designed to release the gas at just the right rate so as to not build up pressure on average, but also not to minimise the strength of the all-important pressure pulses within the first two parts of the system.

Because the principal requirement of this third area is the provision of back pressure, it is equally valid to use a silencer here for this purpose, rather than merely a restrictive tailpipe. Shown separately is the simplest possible — just a perforated tailpipe with glassfibre wool around it to absorb the sound. For each type of engine it may be possible to find information about pure expansion chambers (if not, references 1 and 2 can give advice), and so the rest of this article is about the silencers on the end.

Silencer Elements

I have shown in the following five drawings A to E some of the elements that can go to make up a silencer system.

Diagram A shows a baffle plate; this is useful in lowering overall noise levels, but creates a high back pressure per unit of silencing.

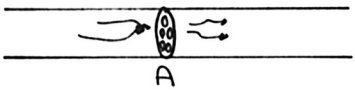


Diagram B illustrates how a perforated tube can be used as an alternative baffling system to that shown in Diagram A, but with similar results.

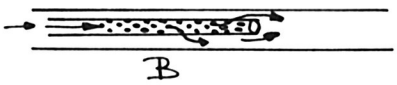


Diagram C shows a direction reverser through slots (Morrison). Much more effective, reduces noise level at a good range of frequencies.

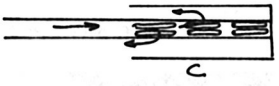


Diagram D shows an absorption silencer, which is most effective at removing the particularly annoying high frequencies. This system is used on its own in sports cars to end up with that lovely throaty growl! On microlights, a Volkswagen tailpipe is often used as an add-on accessory to an existing expanson chamber system. These types of silencer must be filled with the right type of glass wool. I tried at one point using roof insulation with distinctly second-rate results!

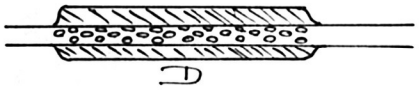
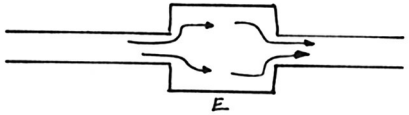


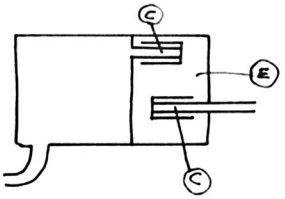
Diagram E illustrates an expansion box which can be a useful part; it can sometimes lower noise dramatically, but in other instances it can do little to help.



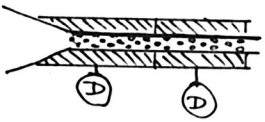
Composite Silencers

The black art of silencer design is adding together the various elements to make an efficient, lightweight, quiet unit. Here are some I have seen or tried, and the elements included are labelled as they arise.

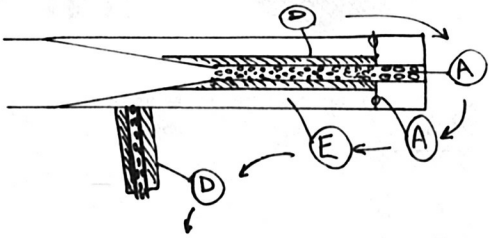
EARLY MC101 EXHAUST (Steve Hunt)



PTERODACTYL EXHAUST (Sachs)



FUJI ROBIN (Steve Hunt's modification of Fuji factory-specified silencer system)



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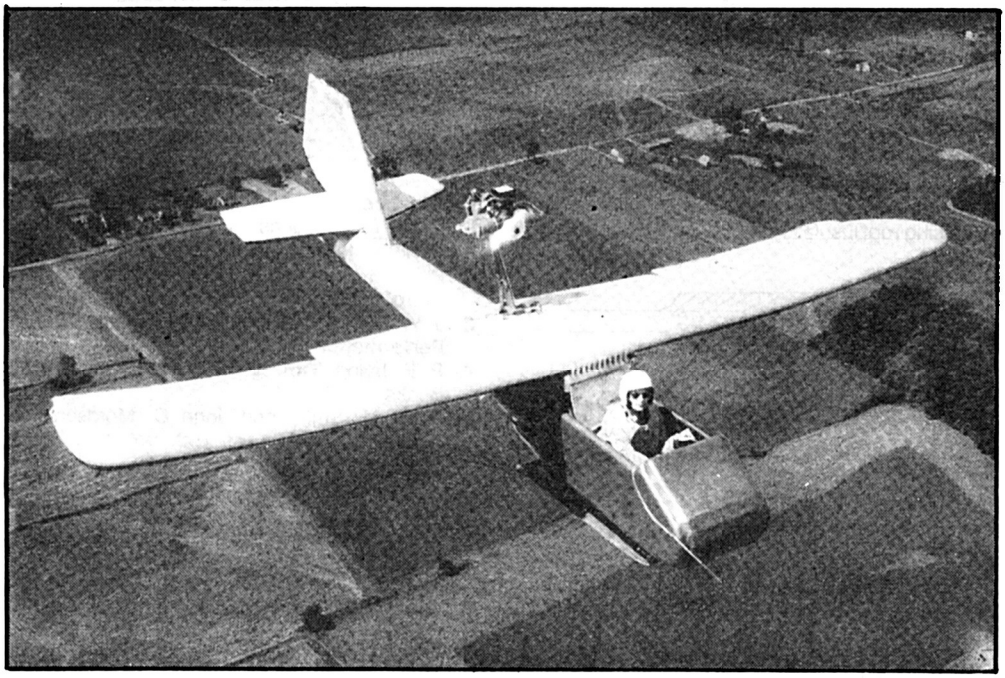
1. Gordon Jennings, **Two-Stroke Tuner's Handbook,** HP Books, Tuscan, Arizona
2. Philip H. Smith, **The High-Speed Two-Stroke Petrol Engine,** G. T. Foulis & Co. Ltd.
3. J. W. Vierdag, **Improving Two-Stroke Engine Performance,** Lodgemark Press Ltd.
4. P. E. Irving, **Tuning for Speed,** Temple Press Books
5. Philip H. Smith and John C. Morrison, **The Scientific Design of Exhaust and Intake Systems,** G. T. Foulis & Co. Ltd

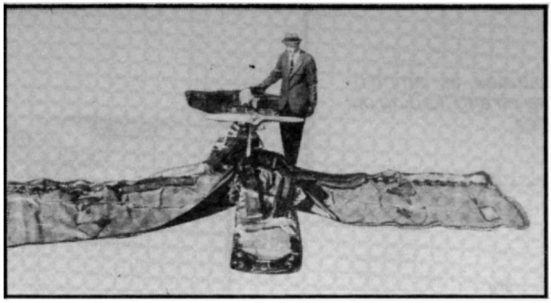
INFLATOPLANE

By Nick Regan



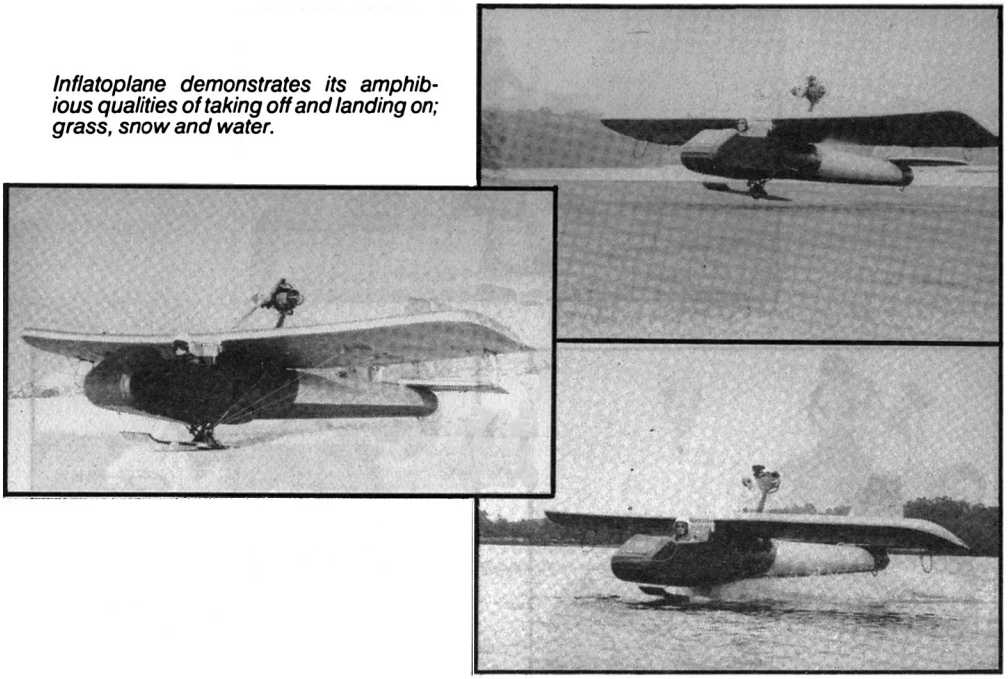
Brief History

Goodyear, the well known airship and rubber tyre company, first conceived the idea of an inflatable light aircraft in the early 50's. The first prototype was designed and built in little more than 12 weeks during 1955. It was rather crude, with the pilot totally exposed at the front of the craft, but it flew! The design was refined over a six year development and test evaluation programme, carried out under a contract jointly sponsored by the Office of Naval Research and the U.S. Army's Transportation Research and Engineering Command. Approximately 15 single-seaters and three two-seaters were built for the test programme; the final result being an elegant amphibious (what we would call) Microlight Aircraft. Goodyear had many proposed ideas for the military use of Inflatoplane, but in the end none of these were taken up. Finally, near the end of the programme, a Test Pilot was lost while flying excessive 'G' loading manoeuvres. The wing buckled upwards and the propellor slashed through it, thus deflating the airframe. The pilot failed to get out of the now 'flabby' cockpit and was killed when the aircraft fell to the ground. From 1961 onwards, nothing more was heard of Inflatoplane.



Inflatoplane in various states of inflation and deflation

Inflatoplane demonstrates its amphibious qualities of taking off and landing on; grass, snow and water.



The Aircraft

The airframe structure was completely pneumatic. The cockpit, constant chord wing and tail assembly were made of 'Airmat', a development of the British 'Lister Slab' fabric. It consisted of two layers of rubberised nylon fabric joined together by thousands of drop threads. When inflated the layers of nylon fabric were forced apart; the drop threads being stretched taut to maintain the correct surface contours. The 'Airmat' material was manufactured on a profile mill which could vary the length of the drop threads according to a set programme. Thus a simple, constant chord, airfoil profiled wing could be produced on a mass production basis. The fuselage was a simple cigar shape made of rubberised airship fabric. The airframe could withstand much rough treatment in the field and repeated inflation and deflation, due to the material's double-bias cover ply construction which restricted and localised virtually any puncture, thereby making the Inflatoplane tear resistant. The rigidity of the wing was such that it would support the weight of a man on each side just outboard of the bracing wires.

The entire aircraft when deflated consisted of an optimum package of 32 cu. ft. (single-seater) and 44 cu. ft. (two-seater). It could be transported by truck, jeep, trailer or aircraft for air dropping by parachute to enable downed pilots to escape from enemy territory. Inflation was done by vacuum cleaner, compressed air bottle, petrol driven pump, or manual pump. Package to airborne time could be as low as 6 mins. Inflation pressure was 7 lb./sq. in. (single-seater) or 8.5 lb./sq. in. (two-seater) and on the later models these internal pressures could be maintained by an engine driven compressor despite the piercing of the airframe by a number of .30 in. calibre bullets.

Inflatoplane was powered by a flat four cylinder air-cooled two-stroke engine, mounted above the rear of the wing. It directly drove a two-blade wooden tractor propellor and must have been very noisy! Fuel was carried in a 24 gal. internal bladder type tank. Flying controls were 'conventional' with stick and pedals providing full three axis control. Later models were fitted with the hydro-ski landing gear which enabled the craft to be fully amphibious. It was reported that Inflatoplane could 'bounce' take off and land in very rough water. Goodyear also claimed that, with further development, in a sea rescue operation by parachute it was entirely possible that the plane could be inflated during descent and be ready for flight upon contact with the water.

The two last current versions of Inflatoplane were:

Model 466 (XAO-2GI). Two-seater with 65 h.p. McCulloch 4318E engine.

Model 468 (XAO-3GI). Single-seater, with 44 h.p. Nelson H-63A engine.

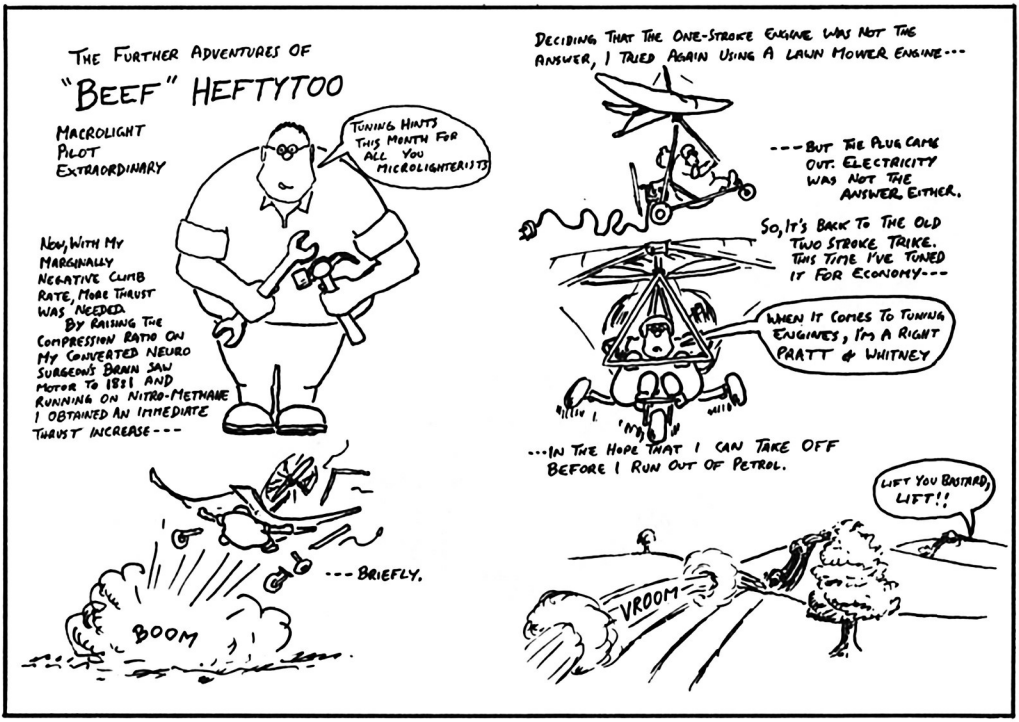
Dimensions (Model GA-468)

Span 22 ft. (6.7 m.)

Length 19 ft. 8 in. (6.0 m.)

Weights (Model GA-466)
Weight empty 290 lb. (130 kg.)
Weight loaded 740 lb. (336 kg.)
Weights (Model GA-468)
Weight empty 225 lb. (102 kg.)
Weight loaded 550 lb. (250 kg.)
Performance (Model GA-466)
Max. speed 70 m.p.h. (112 km.h.)
Cruising speed 55 m.p.h. (88 km.h.)
Stalling speed 43 m.p.h. (69 km.h.)
Rate of climb at S/L 500 ft./min. (152 m./min.)
Service ceiling 6,500 ft. (1,980 m.)
Take-off run (grass) 390 ft. (120 m.)
Endurance 5.4 hours
Performance (Model GA-468)
Max. speed 72 m.p.h. (115 km.h.)
Cruising speed 60 m.p.h. (96 km.h.)
Stalling speed 37 m.p.h. (59 km.h.)
Rate of climb at S/L 550 ft./min. (170 m./min.)
Service ceiling 10,300 ft. (3,140 m.)
Take-off run (grass) 250 ft. (76 m.)
Landing run (grass) 350 ft. (107 m.)
Endurance 6.5 hours

So! That was Inflatoplane. It could have been and probably still could **be** the ultimate 'fun' microlight aircraft. With a slight re-design, new materials and a more efficient engine/propellor package this could be the microlight of the 80's. I wonder if it will ever happen?



THE ROTEC RALLY 2B; A TRUE 3 AXIS CONTROL MICROLIGHT

By Rick Stuart, Kent Microlight Aviation Centre

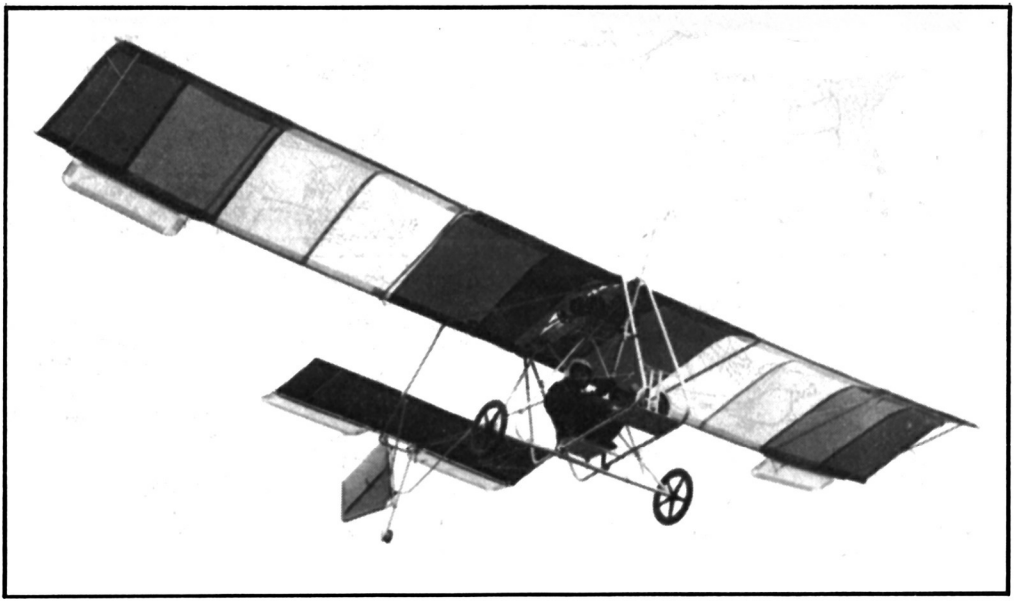
Having decided that of all the true three axis control microlights, the Rotec Rally 2B seemed to have the most interesting design concept we first built two planes from kits, and then followed this with a visit to Duncanville, Texas, to look at the new factory that Rotec Engineering have just completed.

Ten hours 15 minutes flying time from Gatwick, a six hour time difference, and landing into what was, even for Texas, a very early Spring, with temperatures nudging the eighties, plus a foul up in the meeting arrangements, did not exactly assist the writer's usual feeling of well-being, but with the aid of the highly efficient car hire arrangements at Dallas-Fort Worth International Airport, I was soon sitting in the comfort of an air conditioned so-called compact car, roughly the size of our big cars, and picking my way through the Dallas rush hour traffic the 25 miles to Duncanville, a southern suburb of Dallas itself.

The next decision was to try and beat jet lag by retiring early to my motel, and this worked well initially. However I woke at 3.30 a.m. local time, and could not get back to sleep. I presented myself at the Rotec Engineering works promptly at 8.30 a.m., having suitably fortified myself with a large breakfast that included steak, and met for the first time Bill Adaska, the President of Rotec. Bill and I had talked many times on the telephone, always with minds on the clock rather than on our conversation, and I had looked forward to a leisurely discussion with him. However, this turned out to be mistake number one. Bill, a gaunt, hollow jawed Texan, who I would guess is in his mid-thirties, spends his working day on the gallop, tossing out orders to his staff as he tears around the works from telephone call to telephone call, and standing on no ceremony whatsoever. Discussion was regulated tightly to minutes, and information on sales, developments and future plans was not forthcoming. Walks around the works are forbidden, photographs within the premises are out, and if a smoke is required, then this must be enjoyed outside!

The working day is devoted entirely to the production of aircraft, mostly in kit form, **for dollars,** and all else takes a back seat. There is a big effort into development, and to improvement. This can be detected rather than seen, and I suspect that the big projects are tucked away from prying eyes away from the main complex. It is not until a visit is paid to a set up like Rotec that the competitive nature of the microlight business in the U.S.A. can be understood. There is no information to be had openly, and you have to read between the lines to learn anything. The fact that demand for the Rally is very high indeed is, however, very obvious, and Bill's attitude reflects this sellers' market. To be fair, Bill has had his fingers burnt, especially in the U.K. where he was duped by a certain gentleman who absconded with many deposits from would-be buyers of the Rotec Rally, who naturally turned their wrath on to Bill and Rotec. However, this event has had too much effect for Rotec's own good, and Bill's lack of trust could well backfire on him in the future!

With this sketchy background, what of the aircraft



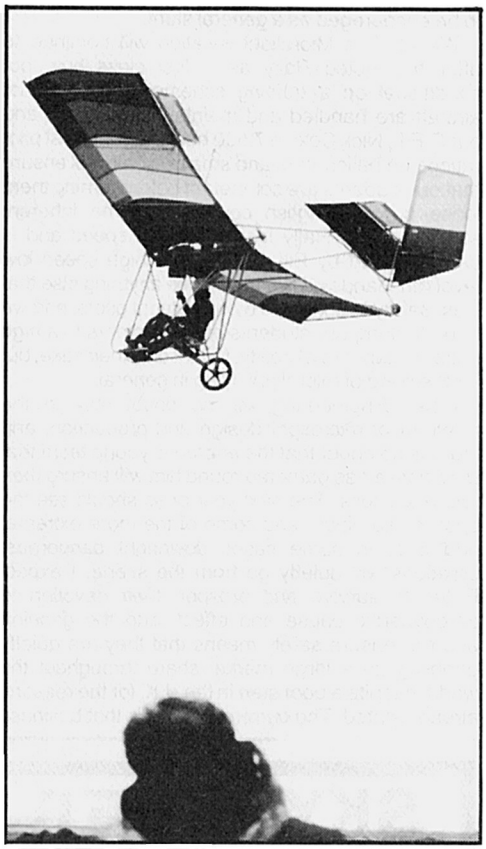
in its present form? There is little doubt that until one has seen the Rally 2B in the hands of someone who has a few hours under his belt, that it is impossible to appreciate what this little aircraft can do. Stall turns, high banked turns, full power on dives, power stalls, and rough ground landings and take offs are all child's play to this tough little plane. The lovely 54 in. wooden laminated propeller is geared down three to one from the high revving engine, and consequently the noise level is low as the prop tips do not go supersonic. Stories are going the rounds that the Rally is underpowered; well, I am nearly 17 stones and she takes me with ease. That the rigging and control lines cause a great deal of drag is another story, and indeed they must, but a top speed of 45 m.p.h. is enough for me without protection in our climate, and the cruise speed of 35 m.p.h. gobbles distance quite nicely. The climb rate is a healthy 350 ft. per minute, which is certainly adequate, and the well placed pusher prop. means that you do not have to sit shivering in your own prop. wash!

The toughness of the design means that even crash landings cause limited damage, the undercarriage collapsing progressively in relation to the severity of impact. The cheap replaceable stub axles go first, and if the impact is harder then the two drag axle struts collapse — a really meaty prang will probably deform the main axle itself. Nett cost of replacing this nasty looking mess, $63 (£28.63); I know, it happened to me! Personal injury there was none; in fact, the crash was rather like being dropped backside first from 8 ft. on to a spring mattress, and the cause was more pilot ignorance, than pilot error!

The rudder and elevator control surfaces being directly in the prop. wash are very effective, the ailerons less so, being dependent on aircraft speed, so banked turns are initiated rudder first, the large rudder surface imparting a certain amount of bank in any case. If aileron is then added a steep wing tip banked turn is effected, but plenty of power should be provided during the turn as considerable drag is produced by the high bank angle.

Take off and landing requires a very short run indeed, varied by the terrain and wind strength. The Rally becomes airborne in still air at 15 m.p.h. and the tail wheel leaves the ground as soon as the throttle is opened, even with the wheels chocked, and because of the cockpit tubing it is impossible to nose over. The fastest climb rate is attained at 20 m.p.h. at full throttle, and this configuration results in a nose well up attitude. Initial circuits should be attempted by the student pilot using the stick for pitch adjustment only, and turning on the rudder only, leaving aileron effect for trial when aircraft handling has reached the confidence stage.

Landings should be powered, this raises the safety margins at stall speeds, and with practise enables the pilot to give that last throttle blip that settles the Rally down like a feather at very low speed. Deadstick landings are faster affairs



altogether, and require a fast shallow dive, around 20 m.p.h. a check at 4 ft. or so to lose speed, and then the flare at 15 m.p.h. to allow the Rally to settle on all three. The power landing means also that you can turn into landing line at the very last moment with full control. Dead stick landings require you to take up the approach line well away from touch down point as the rudder, no longer prop. blown, is less effective.

The engine can be stopped and started in the air, so if you hit the right thermal conditions, kill the ignition and become a glider. However, the stated ceiling of 10,000 ft. should be treated with caution. Two stroke engines, however reliable, need mixture adjustment with thin air conditions, and at the time of writing there is no provision for this.

To sum up, the Rally handles well, flies well, and is a safe and challenging aircraft for both student and expert alike. Engine reliability is good, and even without it the aeroplane handles well, and can be safely landed. The seating is comfortable, the view magnificent, and the aircraft is very stable. Bill Adaska has flown in winds of 35 m.p.h., with the aid of two wing tip men in launch and recovery, and an impressive take off straight up and backwards! Not

to be encouraged as a general stunt.

We at Kent Microlight Aviation will continue to offer the Rotec Rally as a first class buy, but conditional on a training scheme to ensure that aircraft are handled and maintained properly, and our C.F.I., Nick Cole, a 7,500 hour man with test pilot ratings on helicopters and small aircraft, will ensure that our students are competent before turning them loose on the English countryside. The inherent stability of the Rally increases with speed and is demonstrated by Bill Adaska in a high speed low level run, hands off! However, like anything else that flies, safety is achieved by competent pilots, and we hope to bring our students and customers to a high uniform standard of ability, for not only their sake, but for the good of microlight flying in general.

Rotec Engineering will no doubt stay in the forefront of microlight design and production, and there is no doubt that the energetic young team that Bill Adaska has gathered round him will ensure their future success. The next year or so should see the sport settle down, and some of the more extreme, odd and, in some cases downright dangerous, creations will quietly go from the scene. I expect Rotec to survive and prosper, their devotion to aerodynamic cause and effect, and the genuine effort to ensure safety means that they are quietly gobbling up a large market share throughout the world, despite a poor start in the U.K. for the reasons already stated. The current position is that business niceties are suffering due to sheer pressure of work, and they have got to get their act together in this regard in the very near future or suffer the consequences. The build instructions with the kit for the Rally are accurate, but capable of being misunderstood, and would-be home builders should keep in close touch with their dealer to avoid mistakes. We at Kent Microlight have instigated a call and check system with our customers, so that the completed aircraft is examined before flight by one of our engineers involved in the original build of our two kits, and throughout the build a phone call will clear any doubtful points.

Rotec state a build time of 30 hours for the kit, whereas one of our kits took two men four days, and the other took one man six days. However, in the light of the experience gained, one man can now build a kit in 16 hours! This difference being entirely due to understanding the instructions and familiarity with the parts and sequences.

Finally, the portability of the completed aircraft. Knockdown and re-erection takes around 25 minutes, and regardless of its light weight, the end result is a package that is 16 ft. long. This is roof rackable, but to avoid undignified overhang, the rack should be of the extended type with front bumper supports, otherwise the best answer is a lightweight trailer. Remember, it has to carry 135 lb. only, and this gives complete security and should fit the average garage for storage.

EVENTS! EVENTS!

This year is the year that Microlight Aviation will really come alive. Not least in importance will be events. The very first meet of the B.M.A.A., or British Powered Hang Gliding Club as it was then, in October 1978 was held on a windy hill top in South Wales. We all stood around, chatted, waited for someone to fly, watched them, stood around and chatted some more. At Popham last summer there were more people and more aircraft but much the same happened, or didn't happen depending on one's point of view. My job as events co-ordinator is to turn the fly-ins into EVENTS, or whatever you, the membership, will enjoy.

Competitions

Inevitably competitions with powered aircraft are going to give rise to races. Anyone who wishes to organise aircraft to aircraft races, either handicapped or round the pylons, will find no support, either from myself or from the B.M.A.A. The technology is not ready for it yet nor is there an adequate reserve of pilot experience available. Timed races are possible but they don't have much spectator appeal and that brings me on to the second line of argument which suggests that events should appeal to the general public, T.V. if possible, wives, girlfriends, etc., as well as the participating pilot. Events must also have the aim of improving the technology as well as pushing pilot ability to the extent of safe limitations.

What are these competitions that we could organise? Gliding type tasks are obviously out. Our big brothers have navigation tasks, concours d'elegance, spot landing, flour bombing (C.A.A. permission first please), treasure hunts, etc. We could do all these, of course, but what about some event peculiarly microlight? Something we can do but other types of aircraft can not? Here are some ideas. Shoot them down if you will but put up some constructive proposals in their place.

Rig-Fly-Derig

1. Start with the aircraft derigged on the car or trailer.
2. Crew and pilot rig as fast as possible.
3. Pilot takes off and lands at a designated point.
4. Crew drives to designated point and assists derigging and replacing aircraft on car or trailer.
5. Crew and pilot drive back to point of origin.

It would be advisable to have a compulsory two minute inspection period between steps 2 and 3 while pilot and judge check that the aircraft really is rigged safely. If any adjustments are considered necessary by the pilot or judge then the inspection period would start again. The benefit of this competition would be to promote the design of easily rigged aircraft and to discourage the development of 'Murphy's Law'.

Take Off Roll

Two 30 ft. poles are held upright about 20 yards apart connected at the top by a double woolstrand made visible by bunting (or loo paper).

The pilot has a choice of position to start the take off roll but he must clear the obstacle. The winner is the one who starts closest. Wind strength will obviously play a part so some kind of knockout may be necessary. Ideally 50 ft. poles should be used but I don't fancy holding them up all afternoon.

Ground Handling

The aircraft starts near the upwind end of the field and has to taxi via a preset obstacle course/slalom to the downwind end, take off and fly back to land near the upwind end. This event could be made more exciting by having two identical parallel courses for side by side racing. (If it's too windy for flying then the event could still be held by omitting the flying section.)

Each of the above events have spectator appeal. They can take place within a relatively small area and they demand skill as well as technical ability without pushing the limitations too far. I am sure someone has some better ideas so let's hear them please.

What events are in the calendar so far? I'm sorry to say not many. The Sandown event is written up elsewhere in this issue. There is talk of another in Oxfordshire in September. There are two problems to be overcome in organising an event. Sites and organisers. I am sure there are some people with sites but who need organisers (I have two sites lined up), and equally there are willing organisers who need sites. My job is to put the two together so please write to me today (yes, I mean today) so we can get the show on the road.

A final word on suitable sites. Existing active airfields are neither necessary nor even desirable. Popham last year demonstrated that it was feasible to operate microlights from the same runway as heavies but it is not a relationship devoid of problems. Any reasonable expanse of firm grass with a choice of take off direction and scattered trees is adequate. Stately homes, golf courses and playing fields spring to mind. Dairy farms are to be avoided at all costs (cowpats?), but most farms with 30% grass over 400 acres would be more than adequate.

I will be expecting a flood of mail in the next post.

Contact: Jonny Seccombe, Events Co-ordinator, Flat 1, 34 Nevern Place, London, S.W.5.

STATESIDE VIEW

From Glenn Brinks

Sailplane Contest

Several months ago, the Soaring Society of America announced a contest for a self-launched, inexpensive, easy to build, easy to fly sailplane. The goal is to reduce the terrific expense of soaring. With the price of sailplanes climbing out of sight, and tow charges doing the same, plus the expense of needing a ground crew to set up the sailplane and then follow along whenever you fly cross-country, soaring is becoming more and more of a rich man's game.

So the homebuilding fans within the S.S.A. reasoned that building your own plane would reduce that cost, and making it self-launch would remove the hassle and expense of aero towing as well as remove the need for a ground crew for cross country flights.

The response has been enthusiastic. So far, two dozen letters of intent to enter the contest have been received and some of them are from well known names in the aircraft world.

John Monnett will enter the Monerai and perhaps a second aircraft. Jim Marske, designer of the Marske Monarch is on a team designing a 42 foot canard and Jim Maupin and Vern Oldershaw are also entered. But the most amazing name to turn up is that of T. Claude Ryan. Remember Charles Lindbergh and the Spirit of St. Louis? Claude Ryan founded the company that built the plane. Last year I had the honour of meeting him at a couple of fly-ins in Southern California and he is still very much involved in aircraft design. At both the Perris Fly-In (formerly the Diamond Powered Ultralight Meet) and the Chino Fly-In, Ryan and his chief aerodynamicist spent their time poking around the ultralights and discussing the design details. He said, "There's a lot of originality here . . . This is where new ideas are born."

The point of all this is that the requirements of the sailplane contest could very easily describe a state-of-the-art ultralight. Because of the cost of materials, the designers will be trying to keep their planes as light and as simple as possible. And the lightest, simplest aircraft are ultralights. The soaring people expect to get a low cost sailplane of moderate performance out of the contest. I expect to see a number of reasonably low cost, very high performance ultralights. Information of the contest is available from John McMasters, c/o Soaring Society of America, P.O. Box 66071, Los Angeles, Cal. 90066. There is a cash prize for the winner, so it's worth checking into if you have a design in the works.

Ultralight Division for U.S.H.G.A

Ultralights are staying in the U.S.H.G.A. according to a decision made at the recent board of directors

meeting. There was some controversy over this issue, with a number of hang glider pilots asking that ultralight pilots form their own organization. They argued that ultralights and hang gliders don't share the same flying sites, (or at least, powered ultralights aren't welcome at many hang gliding sites), that hang gliders get blamed for any ultralights that fly into airport traffic areas and such, and that the U.S.H.G.A. was formed for hang gliding only.

The ultralight supporters countered with the arguments that ultralights often get blamed for hang glider mishaps, that hang gliding and ultralight flying are just two aspects of the same sport — low speed flying, that the U.S.H.G.A. can benefit by enrolling as members the thousands of people flying ultralights, that ultralights can use the U.S.H.G.A.'s leadership in education and training and that both the hang glider pilots and the ultralight flyers will benefit from the increased political power of one unified organization rather than two, smaller ones.

After a long and sometimes emotional debate, the board voted to change the ultralight committee into an ultralight division. The new division will function within the U.S.H.G.A., not as a separate group, and will share Hang Gliding Magazine with the non-powered flyers.

A related decision by the board was to hire this correspondent as managing editor of Hang Gliding. We are going to try to present more technical and how-to articles in the future and (if I can insert a commercial here), I'd like to encourage anyone who has built an ultralight, tried out a modification, figured out a new or bette way of doing something connected with ultralights or who has a good technical or writing background to consider writing an article for Hang Gliding. Or at least let us know what you are doing or building. No one likes to have to re-invent the wheel, so sharing information, hints, and tricks-of-the-trade, ends up helping everyone in the sport. Our mailing address is P.O. Box 66306, Los Angeles, Cal. 90066. We'll be looking forward to hearing from you.

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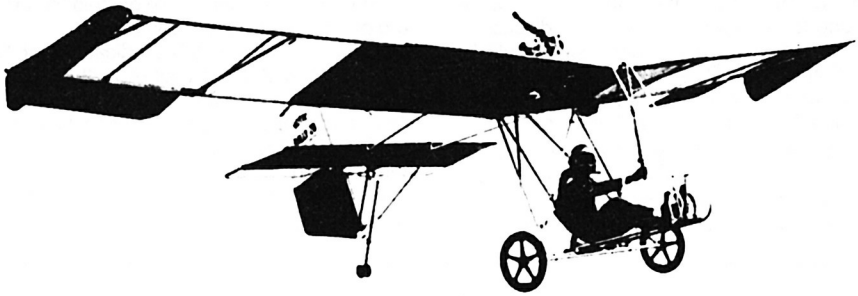

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NEWS

The F.A.I. Microlight Working Group met in Paris on February 17th, under the chairmanship of F.A.I. Vice-president, Ann Welch. Representatives came from U.S.A., Canada, Sweden, Norway, Belgium, France and U.K., ours being Steve Hunt and Paul Baker. Messages were received from Japan, Austria, Denmark and Ireland confirming that the most important agenda item was to define a microlight; aviation authorities all over the world were waiting for a lead from F.A.I. After discussion on the principles on which a definition should be based — that microlights should be light, slow and safe — it was agreed to accept Steve Hunt's proposal. The F.A.I. definition is, therefore:

> An aeroplane of one or two seats having a dry (empty) weight (W) not exceeding 150 kg. and a wing area in square metres of not less than W/10 and in no case less than 10 square metres.

The second proposal to be carried was a recommendation to the F.A.I. Council that there should be an international committee for microlights as there is for gliding, ballooning, etc. A decision on this will be taken in June for ratification by the General Conference in Japan in October. If approved in June the first formal meeting would be planned for the late autumn in Paris. At the end of this meeting elections would be held for a President and other officers for the committee.

A count around the table indicated that there are now about 6,500 microlights in the world, 4,000 being in U.S.A. A few countries ban microlights for various reasons; Austria because it has an existing serious noise pollution problem. Many civil aviation authorities have been liberal in their approach to legislation in order to encourage this inexpensive form of flying.

BRITISH MICROLIGHT AIRCRAFT ASSOCIATION

OPERATIONAL **GUIDE LINES**

These **guide lines** (not regulations) are in addition to C.A.A. requirements and the Law of the Land.

INSURANCE

1. Each microlight aircraft shall be covered by third party insurance for an amount decided by B.M.A.A. (currently £500,000).

AIRWORTHINESS

2. The pilot is responsible for carrying out all rigging, pre-flight and pre-take off checks on his aircraft, and shall not fly it unless it is serviceable.

INSTRUCTION

3. A student pilot who has not yet gained his P.C. of C. (microlicence) may be taught only by a B.M.A.A. Rated Instructor.
4. A pilot may not fly a microlight more than 8 km. from the take off airfield until he has gained his P.C. of C. (microlicence) except for the purpose of carrying out the qualifying cross country flights authorised by his instructor in order to gain that certificate (licence).

PILOTAGE

5. A pilot shall not attempt to take off if there is ice, hoar frost, or frozen rain on his wings or if the wing is wet and the air temperature at or below freezing.
6. Each pilot shall log his flights and make his logbook available on request to the C.F.I. or person in charge of flying.
7. After any outlanding the pilot is responsible for contacting the person under whose authority the land falls, and for reporting any damage.

C.F.I. AUTHORITY

8. The C.F.I. is responsible for all flying on or from his airfield and no flying may take place without his authority. In his temporary absence he shall nominate another Instructor as deputy to carry out his instructions.
9. A C.F.I. may hold this position in not more than one school, club, or place.

ACCIDENTS

10. Every accident or incident which could have led to an accident shall be reported to the B.M.A.A. Safety Officer within 28 days. Accidents involving death, serious injury or structural failure in the air shall be reported immediately to the B.M.A.A. Safety Officer, to A.I.B., and to the police.

SECRETARY'S LETTER

On February 8th your committee met in London. At this meeting we decided that self regulation of microlights was to be our main aim when we met face to face with the representatives of the C.A.A. at Redhill on Monday, February 9th.

With this aim in view the meeting proved extremely interesting and helpful. The C.A.A. at Redhill made us most welcome and proceeded to explain the legislation and regulations that govern civil aviation and how they felt we should fit into the overall picture (pattern).

We made it quite clear from the onset (start) that self-regulation was our aim and we explained that we have the competent experienced persons who will help to inspect, train and test aircraft equipment and pilots (members), through and after their flying training period.

We also have the desire to become an 'Approved' organisation which is really what they, the C.A.A., are desirous of dealing with. There is no doubt that licensing is coming, both for pilots and aircraft. Hopefully the C.A.A. will accept our ideas on both these subjects, but only time will tell. We are eagerly awaiting the outcome of their next meeting.

We felt that at this meeting we were given a very fair hearing and certainly did our utmost to put our case for self regulation forward in a polite but positive manner.

Two other meetings took place the following week on February 17th, 1981. The one in Paris (France) was the important F.A.I. meeting at which they were to discuss the international definition of the term microlight as applied to a flying machine. Steve Hunt's graph came into its own at this meeting, where it was felt that this was the best description.

The other meeting was on the same day as the F.A.I. meeting, but the venue was in London. This was the meeting of the Gas Company as it is affectionately known: its proper title is the General Aviation Safety Committee. Here representatives of all branches of aviation get together on common ground to discuss ways of improving safety in the air. Fitting strobe lights, aircraft conspicuity, contrasting wing colours (somewhat like D day markings) to enable an aircraft to be seen easily. Propellor conspicuity was also discussed, but of course everyone was extremely attentive when microlights were mentioned. I had been asked to attend this meeting and as your representative I did my utmost to give a clear and concise picture of microlight aviation as it is at the moment. Self regulation as our aim was mentioned, as one or two of those present seemed to think that anyone flying microlights walks around with a piece of straw sticking out of his or her ears (apologies to P.F.A.). It was nice to know that we have friends on that committee and I feel that we can all learn a lot from open meetings such as that was. My thanks to Mr. J. C. Ward for inviting us to attend. I look forward to the next meeting.

Apart from visiting potential flying site owners, potential flying sites, microlight flying schools, factories, airfields, sliding through the snow, paddling through the floods, answering a large number of letters, phone calls, etc., I managed to see the 'Scout' flying near Shrewsbury and a 'Striplin' being produced in Washington (the one near Newcastle). We have also started a limited publicity drive with adverts in a Midland newspaper and also the Exchange and Mart. We were refused a sub-heading of microlights in the E. and M., so can I appeal to all our members who advertise in that periodical, to ask for the sub-heading of microlights whenever they send copy for publication?

So what have YOU done in the last few weeks? Do let us know that you are alive out there. Perhaps, of course, your club is active and you have already discussed strobe lights and aircraft conspicuity. These are subjects that can cause a lot of heated discussion I can assure you, but do talk about these things, they are important. Hopefully we shall have B.M.A.A. Log Books very shortly so you can start filling them in.

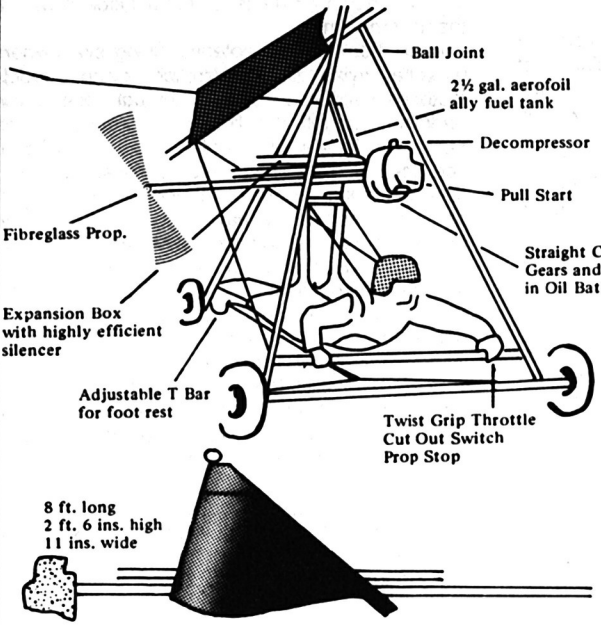
I'll end my letter on a note of safety; in Flight Line 6 Simon tells us all how "Quickly the clouds built up". For all our sakes, keep a healthy respect for clouds, and keep away. Avoid clouds like the plague, they caused such a loss of life in the 1936 Olympics, so do let's learn from someone else's mistakes; otherwise, and with no disrespect to Simon, we may all see God — a little early perhaps.

Will all Club Secretaries please keep me informed as to their progress, telephone number and location of their flying sites and if you have problems, give us a ring and we will do what we can to help, including visiting, etc.

Well, Spring is in the air and so are many microlights — is yours?

Question: What is an airmiss and who makes an airmiss report? (No, not a feminine microlight pilot.) (Do we have any?)

Ron Bott,
Secretary, B.M.A.A.,
20 Church Hill, Ironbridge,
Telford, Shropshire



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CONTACT!

The First Microlight Fly-In 1981 will be held at Langar Airfield (11 miles S.E. of Nottingham) over the Easter Weekend (18th, 19th and 20th April). There will be **no** charges to B.M.A.A. members. You can camp on the airfield free of charge. It should be a good do! See you there!

The Shanklin Show 1981 microlight aircraft rally will have a flying programme that we hope will allow pilots to enjoy relaxed and interesting flying, and at the same time give visual pleasure to the spectator. A large programme of other activities on the ground, in the air and on the sea has been arranged by our sponsors and various tasks will be dovetailed to allow these other events to take place.

The quality and tone of the Shanklin Air Rally will be set by the appearance of the Royal Air Force 1981 Aerobatic Display Team, The Red Arrows.

There will be a daily briefing at the 'Cliff Tops' Hotel, Shanklin, at 10.00 hrs.

A notice board with the day's activities on will also be on show. Information will be centred into the 'Cliff Tops' for the use of all interested parties.

Daily met. reports will be obtained from Southampton Met. Office.

Pilots may park their aircraft at Sandown Airport free of charge.

Cars of pilots may also be parked free.

Camping at the airport for pilots is free.

The facilities of the airport are free to microlight pilots and they are requested to make as much use of the canteen as possible. Canteen prices are very reasonable.

There is a landing fee of £1.50 per day per aircraft.

Concessions for pilots have been arranged in the Shanklin area and will be announced from day to day.

A special microlight airport has been set up at Sandown Airport. Microlights operate a left hand circuit at 500 ft.; other aircraft operate a right hand circuit at 1,000 ft.

If the arrangements at Sandown are a success they will be put forward for consideration as standard practice for the future.

Pilots are requested to attend the daily briefings at the 'Cliff Tops' Hotel and make every effort to check the day to day programme of activities in the interest of safety, especially their own.

The microlight flying programme will be subject to alteration according to weather conditions, etc.

Ideas will be considered for inclusion in the programme should pilots so request.

A wet weather programme has been arranged by the Hotel and Guest House Association on a day to day basis.

Concessions on the Red Funnel ferries from Southampton to Cowes are as follows. Return fare £17 per vehicle (no longer than 17ft) inclusive of any number of passengers and microlight aircraft on car roof. Pilots may stay at any accommodation they like, but to obtain the ferry concessions the bookings must be made through the Shanklin Hotel and Guest House Association, telephone Gavin James on Shanklin 863118.

In case of doubt contact Pete Scott, Seaview 2334. Address: Belle Vue, High Street, Nettlestone, Seaview, PO34 5DZ.

B.M.A.A. Microlight Trade Interest Conference is due to take place on the Isle of Wight on **5th May** during the Shanklin Show.

The Isle of Wight Hang Gliding Club warmly invites you all to join us in May for the air rally. We will do our best to make you welcome and wish you all safe flying and happy landings.

Tony Smith would welcome hearing from anyone locally who might be interested in forming a microlight club or just socialising. B.M.A.A. members are welcome to land on his 50 acres. He has one super long, gently sloping field, close to the house and there's even a pub next door! Please avoid flying low over the horses! Contact Tony at: The Brownbread Stud, Ashburnham, Battle, E. Sussex. Tel: (0424) 892381.

The Peak Powered Flying Club is now in existence on an informal basis. Present membership is around ten, all flying Trikes. New members are welcome, hopefully with different aircraft types. The club would like to know who is flying the Eagle around the Macclesfield-Congleton area. Enquiries, with s.a.e. please, to Mike Hurtley, c/o Flexi-Form, Level 3, Bedingate Mill, Legh St., Patricroft, Manchester.

The Scottish Microlight Flying Club? Anybody up there interested in perhaps being part of such a club? Give your ideas and suggestions to Ken Rolph, 3 Coats Place, Dundonauld, Kilmarnock, Ayrshire, or tel: Troon (0292) 314582 or Drybridge (0563) 850813 (Home).

CALENDAR

APRIL 18th-20th: Microlight Fly-In at Langar Airfield (11 miles S.E. of Nottingham).

MAY 2nd-9th: Shanklin Show 1981.

AUGUST 1st-8th: Oshkosh '81. 29th Annual E.A.A. Convention and Sport Aviation Exhibition, Whittman Field, Oshkosh, Wisconsin, U.S.A.. Contact: Mel Jones, E.A.A., Box 229, Hales Corner WI 53130.

SEPT. 30th-OCT. 4th: Tullahoma, Tennessee. 3rd Annual E.A.A. National Fall Fly-In.

SMALL ADS

Small Ads are **free** to members of B.M.A.A., 40 words max. Commercial Small Ads are £2 for each insertion, 40 words max. Please make all cheques payable to B.M.A.A. and send ads to: Flight Line, 11 School Hill, Wrecclesham, Farnham, Surrey.

COMPOSITE SUPPLIES, must sell; moving. Quickie/Varieze Type: epoxy, epoxy pump, fibreglass, plywood, P.V.C. foam, etc. Also two P-Fledge main wheel assemblies, trike wheel, 4130 tubing, welding rod. Inquire for details. Phone Charlie at 01-937 8741, evenings.

1980 TWIN ENGINED Mk. II EAGLE. Under 5 hrs. Assorted spares. Only £2,000 including full instruction course plus V.A.T. — save over £500 on list price. Breen Microlight Aircraft. Tel: (0873) 810019.

WANTED — Enthusiastic people to train as Instructors/Mechanics. You'll earn as you learn. You must drive well. You'll be based in Oxfordshire, with summer stints abroad. Write to Christian Marechal, Breen Microlight Aircraft, New Road, Crickhowell, S. Wales.

FLIGHT LINE back issues are still available at 50p per copy plus postage and large envelope. Postage rates are: 1 copy 14p, 2 copies 19p, 3 copies 25p. Quote your 1981 B.M.A.A. Membership No. and contact: Ron Bott, Secretary B.M.A.A., 20 Church Hill, Ironbridge, Telford, Shropshire.

ROTEC RALLY 2B — the ultimate microlight aircraft — available in Suffolk, Hampshire, Northamptonshire. Full 3-axis controls — independent ailerons. Open Day Easter in East Suffolk. David Cook will demonstrate. Fully licenced premises. Details: Blois Aviation Ltd., Tel: (072877) 354, (072885) 3209 or (0359) 40774.

TONY FUELL offers **HIWAY VULCAN** to any person or syndicate within reach of Brighton who'd like to invest in a suitable SKYTRIKE; objective is shared flying. Glider is in mint condition, and hasn't been flown much. Or if you don't want to share, I'd sell the glider, around £450 or part exchange it for a motorbike worth around that. Contact 74 Eldred Avenue, Brighton. Tel: (0273) 502952.

EAGLE TWIN POWER PACK, one engine u/s, complete with mufflers, reduction gear and as new 54'' x 20'' propellor. Will split. Offers to: Martyn Smith, Tel: Handcross (Sussex) 400041, evenings.

TRIKE FOR SALE: New large Solar Storm with Hiway Skytrike, only 1 hours testing flying, absolutely perfect; £1,300 o.n.o. Tel: Uxbridge (0895) 30627.

10 h.p. McCULLOCH 91 ENGINES for sale. McCulloch spare parts also available, including carburettors. Contact: Jerzy Kolecki, Box 5078, 16305 Stockholm, Sweden.

FOR SALE, third share in Hiway Super Scorp/Trike combination. Based at Watford. Price £500. Further details from Bill Machin, Tel: 01-340 7036.

WANTED: MICROLIGHT. I would be grateful for details/specifications from manufacturers, kit suppliers, or private owners wishing to sell, as I wish to purchase a microlight as soon as possible. Contact: Tony Smith, The Brownbread Stud, Ashburnham, Battle, E. Sussex. Tel: (0424) 892381.

PROPELLOR MAKING FOR THE AMATEUR. World renowned book showing how to draw and carve your own props. Design tables, two or more blades, plus experimental types. Balancing and protective finishes. £2.50 incl. p&p. Eric Clutton, 92 Newlands Street, Stoke-on-Trent, ST4 2RF.

U.K. CONFIRMED DEALERS WANTED for full three axis controlled microlight: HUMBUG: by European Distributor for new generation microlights. All serious inquiries to: U.L.M., Le Montcel, 78350 Jouy en Josas, France. Tel. 010 331 747 5993.

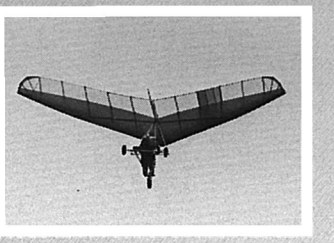
WANTED: second-hand Eagle microlight aircraft, in good condition. Tel. Stratford on Avon 750279.

PROPELLORS — need a prop. for your microlight? Any size made to your requirements. Please write, stating size, etc., for quotation: K. Fern, 311 Congleton Road, Scholar Green, Stoke-on-Trent, Staffs. ST7 3JQ.

HIWAY SKYTRIKE/SUPER SCORPION. Fully sorted rig, genuine 200+ F.P.M. up, first class mechanicals and appearance. Ring Martin on Blackpool 66122 (office) to discuss.

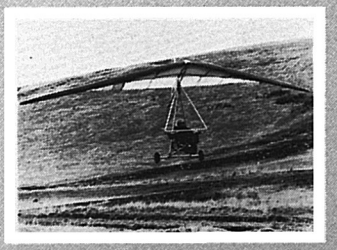
Demon and Skytrike

a devilish combination



The combination of Demon and Skytrike represents the industries' first truly high-performance ultralight powered flex wing.

Remember, the Demon you use for conventional soaring fits unmodified straight onto Skytrike.



The high speed and low sink rate performance of the Demon make it the ideal partner for Skytrike Mk 2.

The 250cc engine develops over 130 lbs of static thrust giving an impressive climb rate, quiet running and 1½ hours duration.

Skytrike folds simply for car-top transportation. The entire structure is anodised; tubes bright and fittings black.

Front forks are strengthened and the nose wheel sports a mudguard. The petrol tank is detachable and has a lockable filler cap.

Write for details and information about your local agent to:

Hiway Hang Gliders Limited
Sirhowy Hill, Tredegar, Gwent NP2 4XP
telephone: Tredegar (049 525) 4521

HIWAY

When you put your life in someone's hands, it's nice to know he won't juggle with it.

Gerry Breen was the first U.K. pilot to fly powered hang gliders. After his world record flights, and victory in the Land's End to John o' Groats race on an underpowered trike, the world's leading manufacturers asked him to market their aircraft.

He would have people's lives in his hands.

Rejecting powered gliders, he searched for something safer.

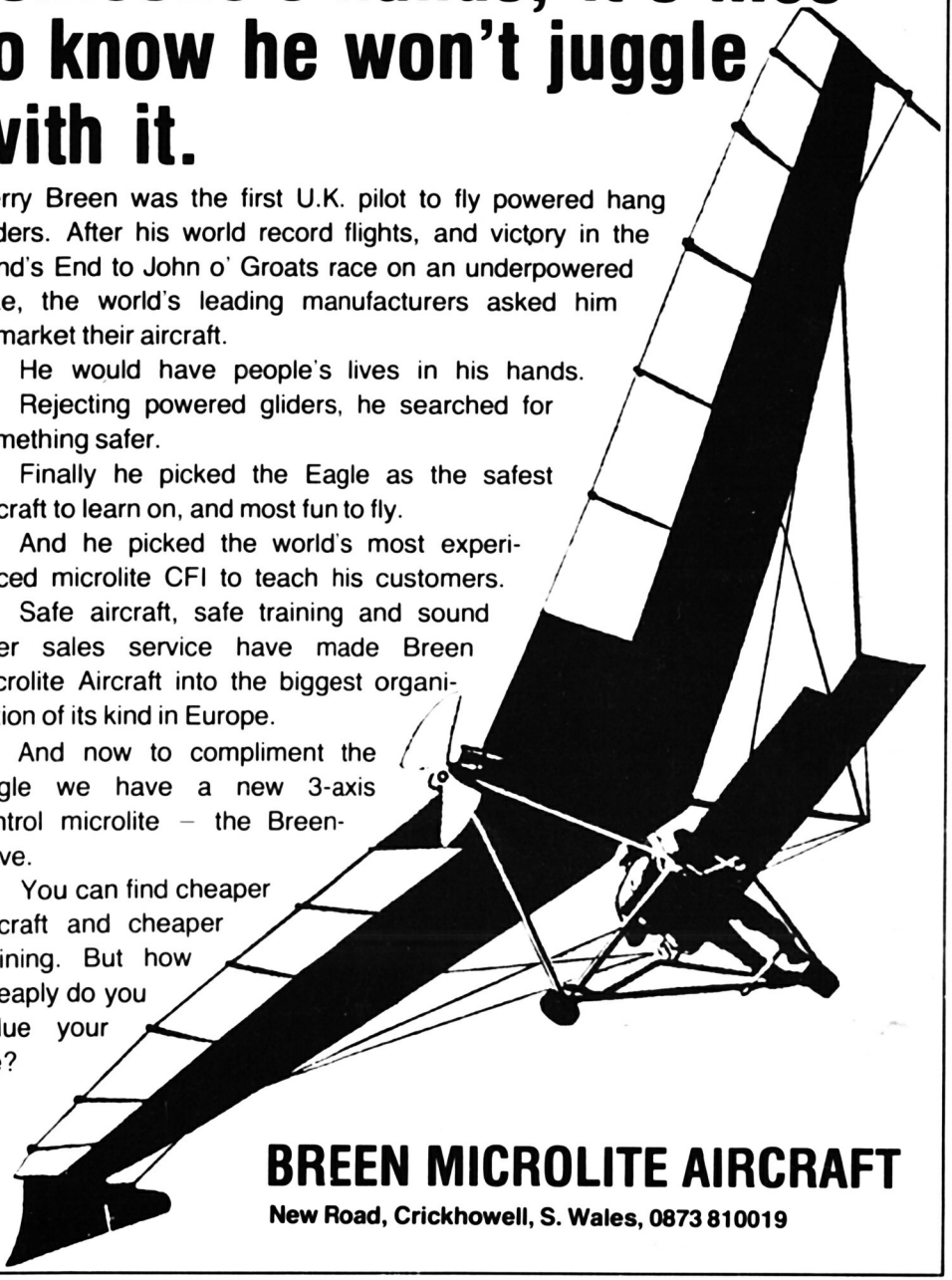
Finally he picked the Eagle as the safest aircraft to learn on, and most fun to fly.

And he picked the world's most experienced microlite CFI to teach his customers.

Safe aircraft, safe training and sound after sales service have made Breen Microlite Aircraft into the biggest organisation of its kind in Europe.

And now to compliment the Eagle we have a new 3-axis control microlite – the Breenwave.

You can find cheaper aircraft and cheaper training. But how cheaply do you value your life?



BREEN MICROLITE AIRCRAFT

New Road, Crickhowell, S. Wales, 0873 810019