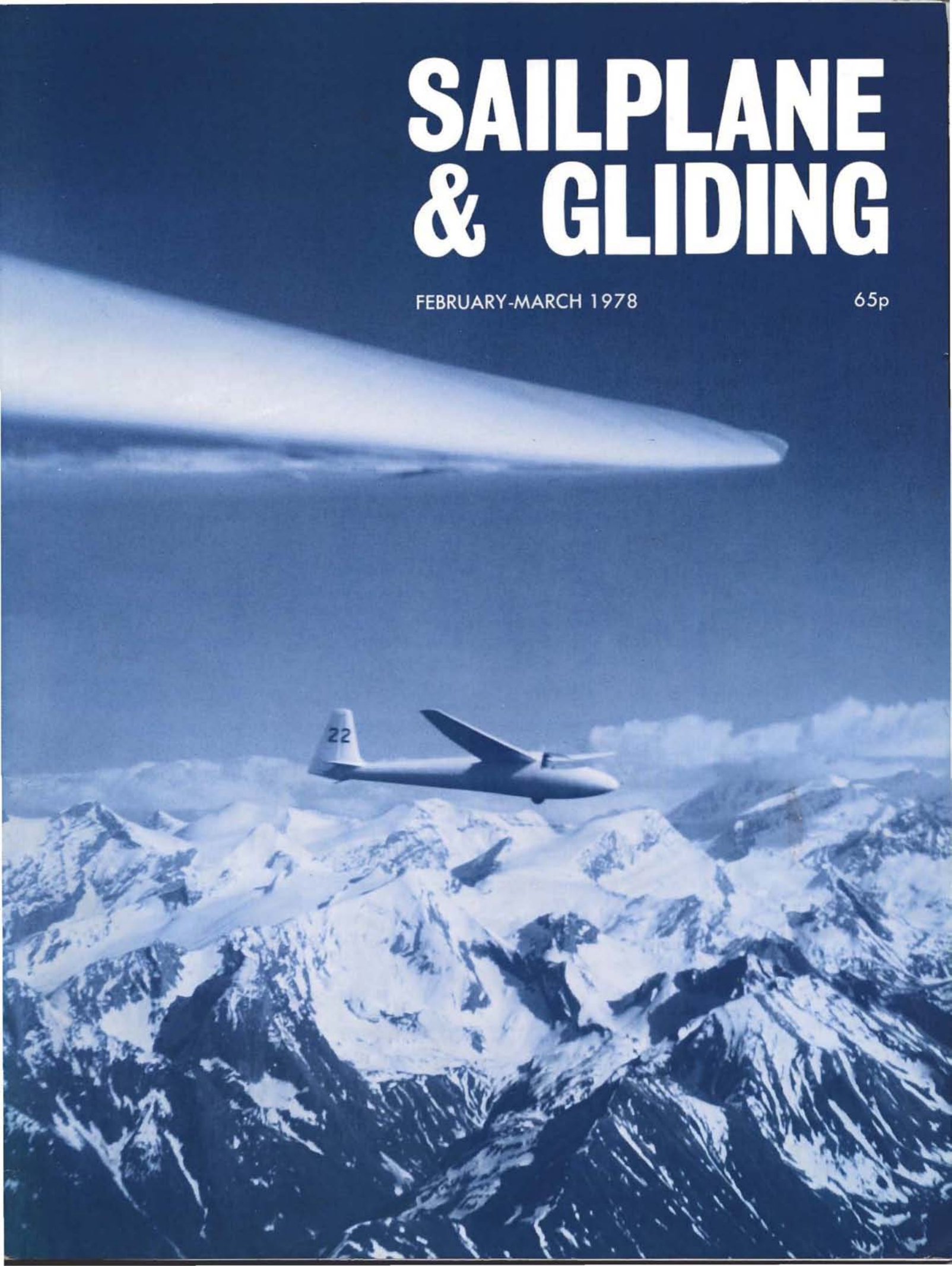
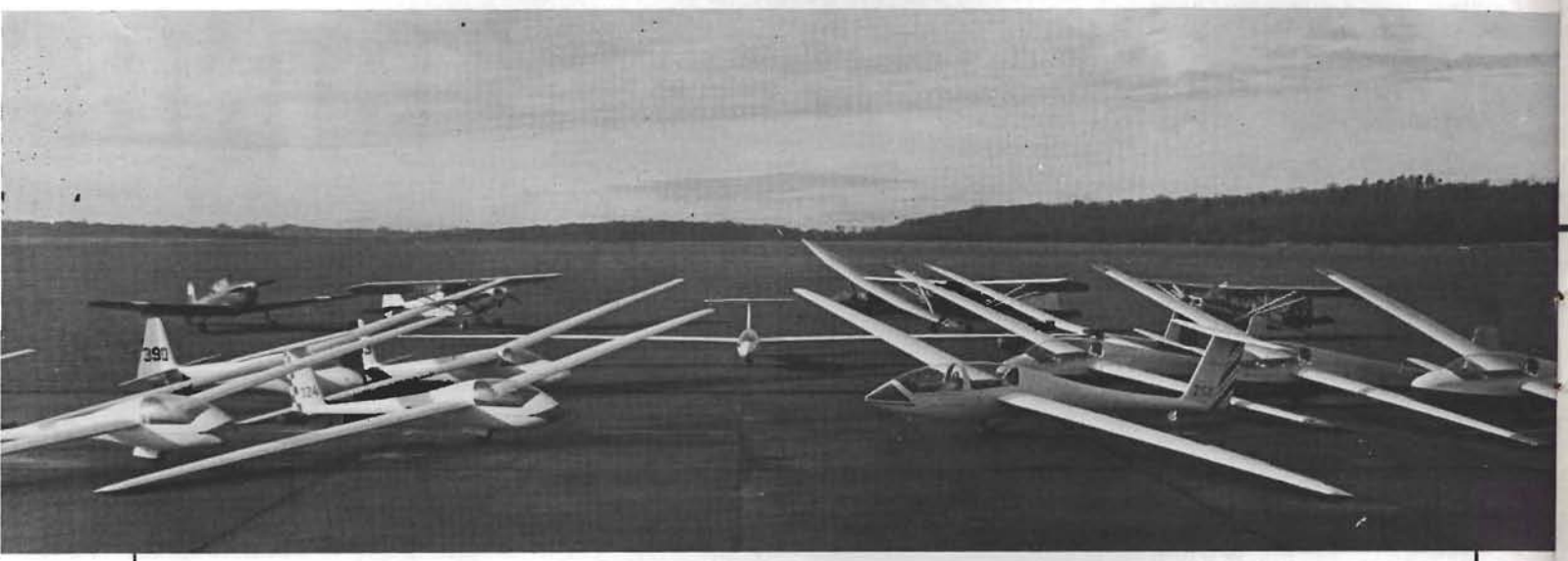
SAILPLANE & GLIDING

FEBRUARY-MARCH 1978

65p



Join us at Booker



We have the following aircraft for you to fly:

1 Twin Astir	2 K-6E	1 Jantar 19	2 180 Super Cub
3 K-13	2 K-8B	2 Astir CS	1 160 Terrier
1 Falke	1 B-4	1 Skylark 4	1 Chipmunk

Do you know?

★ We fly 364 days a year with professional staff

★ We are less than an hour from London on M40 and close to M4

★ We have 28 Full Cat. and 37 Assistant Instructors

★ You can fly X-country with a National Champion in a Twin Astir

★ We charge a max. of £3/hour ($\frac{1}{2}$ price after 3 hrs.)

★ We have a ridge as well as thermals

★ We have less rules but more competition and instruction

★ We run Holiday, Evening, Advanced and Instructors' Courses

It is always easy to get help to rig. There is a nucleus of pilots who fly X-country any day of the week, join them and improve your technique. You can learn to soar efficiently – we have 9 instructors with 3 Diamonds.

We can offer any rating test and have 5 pilots who can run instructors' courses.

COSTS: £37 entry fee, £40 membership fee
£2.45 to 1400′ (then 35p/200′) (Prices as at 1/1/78)

CONTACT: Doug Freeman – Ickford 450 or Booker Secretary 0494 29263

SAILPLANE & GLIDING

Magazine of the BRITISH GLIDING ASSOCIATION

Editor:
Gillian Bryce-Smith, 281 Queen Edith's Way, Cambridge, CB1 4NH. Tel. Cambridge 47725.

Consultant Editors:
Alan E. Slater
Rika Harwood, 66 Maisemore Gardens, Emsworth, Hants. Tel 024-34-4580

Subscriptions:
Jenny Rolfe. Tel. Market Harborough 7084.

Committee:
P. B. E. Thompson (Chairman),
M. Bird, F. G. Irving

Advertisement Manager:
Peggy Miéville, Cheiron Press, 8/10 Parkway, London, NW1 7AD. Tel. 01-267 1285

Cover: This Alps scene featuring a K-6E was photographed by Tony Maitland.

Volume XXIX No. 1 FEBRUARY-MARCH 1978

Published by British Gliding Association
Kimberley House, Vaughan Way, Leicester. Telephone Leicester 51051

Printed by Creative Packaging, Eli Lilly & Co, Joule Road, Basingstoke, Hants.

VERY LIGHT GLIDERS

RICHARD FORTESCUE

In a rational world, people would decide what they wanted to do with their leisure time, and manufacturers would then produce (for a consideration) the equipment which they needed. By this criterion, golf may belong to a rational world, but gliding definitely doesn't. Our sport originated from, of all things, an international treaty forbidding power flying. Since then it has followed a course determined more by the gliders available than by any reasonable analysis of what we wanted to do. Gliders came along with ever better cross-country performance and we set our sights on longer and longer flights, more or less regardless of everything else, including cost. Then Francis Rogallo produced a totally different kind of glider which was far, far cheaper, and the resulting explosive growth of hang gliding split the sport into two almost separate halves.

After all, it transpired, there *were* other gods in the field of motorless flight besides our cross-country kilometres. Freedom to operate among the hills, freedom from most of the chores of rigging and trailers, freedom from the need to invest thousands of pounds in elaborate and sophisticated equipment, was worth having; and one could still enjoy gliding despite very few cross-country kilometres indeed.

Nine pilots killed in one week

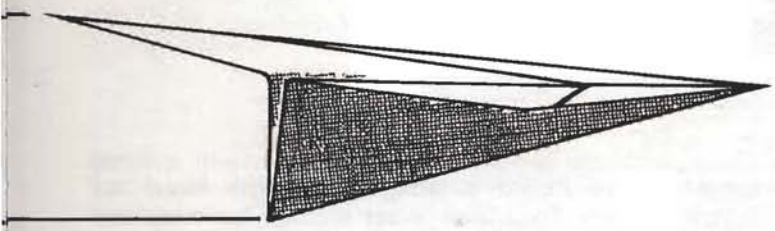
Sadly, hang gliding seems beset by one disastrous disadvantage; a lot of accidents with pilot injuries, which are too often fatal. Improved organisation and training will certainly get things better, but fairly drastic action seems needed; nine pilots in Germany were killed in one week in 1977. Unfortunately, there seems to be pretty fundamental aerodynamic problems in the control of aircraft at very low speeds, and in keeping flexible aerofoils in desired shapes under conditions of turbulence. It would be surprising if the risks of injury could be reduced to the level of, say, Rugby football, and, alas, many of us cannot claim to be even rugger-fit.

Under these circumstances, one feels that sooner or later a glider will be produced which is some kind of compromise between the ones we use for our kilometre-orientated flying and those of the hang-world. To identify this kind of thinking, we can perhaps speak of a "Very Light Glider" project. Compared with our "high performance" types, the new design should gain in respect of simplicity of operation, wider choice of sites from which to fly and substantially lower cost. Compared to hang gliders, the advantages are to be much greater regard to pilot safety, and much better prospects of cross-country flying. Of course, the gains will have to be set against the losses. The cross-country flights will be rarer, and much shorter, than we expect with our current big, heavy ships; and the new type will be a good deal more expensive, and less flexible in transport and site requirements, than the Rogallos.

Not the way gliding has developed before

We are now getting dangerously close to specifying a glider in advance of its actual existence, which I have said is not the way in which gliding has ever developed before. I have, in fact, drawn up such specifications from time to time, but the precedents against doing things in this order are so strong that I propose not to reveal these activities. Instead, Table 1 gives some dimensions and "performance" estimates for five gliders which are known to fly, and have weights which bracket the region in which the VLG project is most likely to develop.

Type	Hang	Hippie	Pegasus	K-8	Open 15m
Span (m)	6½	10	10½	15	15
Aspect ratio	2½	11	13	16	22½
Wing area (m^2)	18	9	8½	14	10
Wing loading (kg/m^2)	5	15	16	20	40
Flight weight (kg)	90	133	135	280	400
Glide ratio	5	12	15	25	42
Min speed (km/h)	13	23	23	30	36
Empty weight (kg)	16	48	60	190	230



None of the quantities in the table should be taken as precise; but the very wide range of empty weights is an interesting indication of the differences in concepts between the two extreme forms of gliding. It is also interesting to see that Hippie and Pegasus have very similar "specifications". They are in fact totally different in appearance; Hippie looks like an old-time primary trainer, while Pegasus looks relatively modern, apart from having struts to locate the wings. The actual design dates neatly reverse this, Hippie being a product of the 70s, while Pegasus was around in the later 30s! Minimum sinks are not given in the table; they can be estimated, to the degree of roughness of the performance figures, by applying 80% of the glide ratio to the minimum speeds. The all-important cost factor is also left out, because this is not a list of gliders actually in production today and because there is an open question as to how much can be saved by various degrees of home-production (see letter from Michael Beach, S&G October 1977, p229, with the very interesting suggestion that the whole concept might be related to a "maximum hours building time" limit). All one can say, costwise, is that the price of a modern, high-performance orthodox glider is between 25 and 50 times that of a hang glider, so there is plenty of room left for something in between!

It seems to me that launching by pilot-power alone is probably incompatible with safety standards anything like those to which we are accustomed in orthodox gliding, though that is not to say that one cannot expect ever to get off the ground in that way. Given the right wind, and the right slope, a very light glider might do so; but in general the need for pilot protection when landing is going to demand assisted take-off in one form or another. Bungey launching and variations on that theme seem the least restrictive, site-wise; but probably autotowing would be used whenever wide enough flat surfaces were available and enough gliders were operating to provide a driver (a big disadvantage compared to the hang-world, but remember the gains!).

Nothing happens until that moment of genius

The depressing part about all this is the precedent that nothing really happens until some designer hits that moment of genius and triggers the pipe dreams into reality. Nevertheless, things *are* going on, at least in closely related fields, and one step which could be taken straight away is to ask for more information on very light gliders to be circulated among BGA clubs. Which brings us face-to-face with the question: "Is the BGA concerned *only* with gliding in its present orthodox form?" Of course, our clubs exist primarily to provide facilities for gliding "as is", and that takes most of the time and money available (sometimes more). But no orthodoxy should expect to continue unchanged for ever, and we shall surely one day feel that long distance cross-countries have got long enough. Also, at an earlier stage in our history, we amassed a lot of experience relating to light glider operations, and it would be disappointing if a renewed interest in that kind of flying had to collect all this know-how afresh. Nevertheless, a very-light-glider movement would require a good deal of independence if it was not to become just a second-class version of our orthodox gliding.

One envisages a powerful VLG Class Association with its own series of pilot qualifications, Gold, Silver, Bronze, or whatever; its own meets and competitions; its own specialised training and VLG-only sites; its own very-light records, if you like. Even so, it would be attractive to feel that this time we could assimilate the new thinking and that the required degree of independence would not neccessarily entail complete dissociation from the BGA and its experience. Perhaps there is already enough interest to justify a meeting under BGA auspices with some introductory papers outlining people's ideas, and a general discussion to follow on, open to anyone who thought it worth attending.

Note 1: No reference has been made to VLG gliders being strictly one design, but obviously this is one of the best ways of controlling costs. In accordance with the policy of not specifying the gliders in advance, it is probably best to keep an open mind on the issue; for, if not one design, the project would certainly require close, and carefully worked out Class restrictions, amounting to very nearly the same thing.

Note 2: Data on the K-8 were given in the table as representative of the lowest wing loading design most of us are familiar with. It is an interesting exercise to consider what might follow if a substantial number of pilots got together to form a K-8 Association along the lines suggested for the VLG Association, together with organising a supply of kits in various states of assembly for home completion: if need be, with a nacelle and single tube fuselage to avoid all that welding. K-8s can certainly fly across country (even 500km, if it is 1976 weather!); they can be bungey-launched and can land in quite small fields. If there was a whole K-8 hierarchy of badges, competitions, records, and so on, and the things cost only a quarter of the price of the current ships, I wonder what proportion of pilots graduating from U/T would choose that option? My own guess is quite a lot.

MRS PLATYPUS TAKES FRENCH LEAVE

Mrs Platypus, married to Platypus whose humorous articles on gliding have entertained readers of this magazine for many years, went with her husband and a party of friends to France last summer in search of sunshine – and found herself in a Diamond Factory.

"Madame, please to hold the cock steady," the young Frenchman ordered sternly, as we stood waist high amid the alien corn.

"We usually call it the fuselage in English," I told him primly, "or possibly the cockpit . . ."

He had already staggered off with Platypus' wing. Platypus had outlanded (*aux vaches* – with the cows, they call landing out in France) in a field of corn. French corn is, Platypus complained plaintively, *greener* than English corn and he had taken it for a meadow. He had put the Std Libelle down very neatly in it, anyway – *"un bel atterrissage"*, the retrieve crew congratulated him on his landing, fortified doubtless by the prospect of champagne to come, back in the clubhouse. The scent of Provencal herbs growing in the fields nearby drifted on the evening breeze.

An effortlessly achieved Diamond altitude

We were at Sisteron, in the Southern Alps, a beautiful gliding site which is known as the Diamond Factory because so many pilots pick up Diamonds there. Indeed, one of our party did. Roger Barrett, the Chairman of the BGA, stepped into the Libelle owned by the Sisteron Club a day or two after our arrival and effortlessly achieved his Gold C and Diamond altitude all in the same afternoon, flying in wave. This was in June. The wave is best of all in February, they told us.

The Sisteron gliding site is at Vaumeilh, a couple of kilometres north of Sisteron. It is run by Marcel Touzé, an energetic, dedicated, charming Frenchman of unbounded enthusiasm and vision. There is already on the site a small clubhouse and a couple of hangars. Marcel has all kinds of plans for development and wants to build eventually a swimming pool, tennis courts and other facilities. There is a Club Janus, a Club Libelle and a M-200 which Marcel intends to replace imminently. There are a couple of tow planes and you can either fly your own glider, or hire one of the club machines.

Sisteron itself is a picturesque town clustering round a mediaeval Citadel overlooking the River Durance. It is worth climbing up the steep hill to the top for the view over the pantiled roofs of the town and the river winding away into the distance.

Sisteron is on the borders of Provence, which is actually defined, Marcel Touzé told us, by the groves of olive trees which end just south of the town. We bought fat local olives in the supermarché each morning and took them for a lunchtime riverside picnic, together with crusty French bread, sweet and succulent melons, tomatoes, paté, cheeses and local red wine.

Flying usually began at about eleven in the morning and went on till nine at night. When we had launched our pilots, the rest of us drifted off to the river bank and sat under the mimosa trees, eating, drinking, reading and playing chess. The countryside is beautiful around Vaumeilh – fields reminiscent of Renoir paintings, thick with blood red poppies; others filled with sweet scented lavender and honeysuckle, and cornflowers grow in profusion. Everywhere there are beehives – we came back laden with huge jars of Provencal honey.

Gliding isn't the only attraction of the area, of course. The Mediterranean is not far to the south and we made the journey for the benefit of one of our party who wanted to buy a tee-shirt with CANNES on the front (and CAN'T on the back, someone suggested). It was difficult to prise Platypus away from the beach, as all along the Cote d'Azur the tax-exiled ladies from those vast and vulgar yachts were too impoverished to afford more than the bottom halves of bikinis, and topless bathing is the norm.

After that Avignon and Arles seemed rather flat . . . no, not really, the sun-bleached Roman remains were unbelievably romantic and not to be missed; nor was Les Baux, a unique mountain-top village accessible only on foot, where bauxite was originally mined. Guided by Michelin and the epicure among us, we found some enchanting restaurants and ate and drank splendidly at the end of each day's flying.

The mountains near Sisteron, called La Montagne de Lure, Mont Ventoux and the Gache, still hold plently of unmined Diamonds and we plan to return – Platypus is still short of one. The French for taking French leave, incidentally, is *s'en aller a l'anglaise*. Whatever you like to call it, we hope to be in Sisteron again this summer.

Some practical advice by PLATYPUS

Unlike many English clubs, the club at Sisteron will allow visiting pilots to fly high-performance (glass-fibre) gliders cross-country, provided the visiting pilot has a fair degree of experience* and passes a check in the Janus two-seater. July and especially August are very busy months, however, and if Sisteron is to become popular with visitors from England and other countries, it will pay either to go in other months or to take one's own glider.

Please take note of Bill Malpas's invaluable advice on the details of forms etc, which we have printed on the opposite page.

Costs – (courtesy of Roger Barrett). Basic flying charges per hour in 1977 were 45, 27 and 33 francs for the Janus (two-seater), Std Libelle and Cirrus 75, respectively; launches, at four francs per minute tug time, last about seven to ten minutes, *ie* 28 to 40 francs. (Allow about ten per cent increases all round when estimating charges for 1978). A form of temporary membership charge of 25 francs per flight up to a limit of 250 francs was also made. Clubhouse accommodation, quite nice two-bunk rooms, is only 15

** Gold C distance and 250hrs would probably be a minimum, though the two-seater check is more important than the hours in the logbook. When writing to M. Touzé at Sisteron, give details of your flying experience.*

INDEX TO VOLUME XXVIII, 1977

Compiled by Rika Harwood

Pages	1	-	48	February-March
"	49	-	96	April-May
"	97	-	144	June-July
"	145	-	192	August-September
"	193	-	240	October-November
"	241	-	288	December-January 1978

A

B

C

BACK COPIES OF "SAILPLANE & GLIDING"

The following copies are offered for sale. Please send your order clearly indicating which copies are required, together with your remittance (65p per copy), to Sailplane & Gliding, Kimberley House, Vaughan Way, Leicester.

1964 Vol 15 Nos 1, 2, 3, 4, 5.
1965 Vol 16 Nos 1, 2, 3, 4, 5, 6.
1966 Vol 17 Nos 1, 2, 3, 4, 6.
1967 Vol 18 Nos 3, 5.
1968 Vol 19 Nos 1, 2, 3, 4, 5, 6.
1969 Vol 20 Nos 1, 2, 3, 4, 5, 6.
1970 Vol 21 Nos 4, 5, 6.
1971 Vol 22 Nos 1, 3, 4, 5, 6.
1972 Vol 23 Nos 5, 6.
1973 Vol 24 No 4.

NEW FORMAT

1974 Vol 25 Nos 3, 4, 6.
1975 Vol 26 Nos 1, 2, 3, 4, 6.
1976 Vol 27 Nos 3, 5.

Roger Barrett photographed by Mrs Platypus after his Diamond flight.

francs per night per person, but most people use local hotels. It is clearly best to give warning of your plans: please write to M. Marcel Touzé, Chef du Centre de Vol à Voile, Union Aerienne de la Durance, Aérodrome de Sisteron-Theze, 04200 Vaumeilh, France (tel 30 à Valernes, ask first for Sisteron (92) 639111).

Learn to speak and write some French if you don't already. The French rightly regard this as the most civilised language in the world and out of choice (not laziness, which is the British excuse) generally do not speak other languages. Excellent briefings on wave locations and safe landing sites are given, both in person and over the radio, by CFI Marcel Touzé; you can't always have an interpreter standing by when the crucial Diamond is trying to elude you.

If you take your own glider make sure your radio has the right channels and get that oxygen properly installed and working! By the way, in this area, radio is a better retrieve-aid than telephone. The French relay pilots' positions speedily by radio – so take a phrase-book in the cockpit!

- and some personal observations

How does Sisteron compare with the Austrian Alps and other mountain soaring locations? Personally I can only compare it with Zell am See. Zell is more beautiful, but perhaps more frustrating as a result of the combination of unreliable weather (heavy rain for days is a common phenomenon) and the need for high (4000ft agl) tows to contact mountain lift, which in turn means long intervals between launches. Sisteron is itself a far less spectacular location but a few kilometres to the north the true Alps begin, and the scenery is as rugged, snow-bound and breathtaking as anywhere in Europe. The variety of soaring conditions – wave, hill lift, mountain (anabatic) lift, thermals, combined with a Mediterranean climate, means that even in "worst soaring year in recent history" 1977, on almost every day cross-country soaring was feasible. However, the clincher for gourmets and admirers of the French lifestyle is that excellent restaurants at reasonable prices abound, as do shops with cheap wine and all the requirements of a *déjeuner sur l'herbe* – except the naked lady; you'll have to bring your own. (Sorry, I'll have to go now, Mrs P. has got my ear in a steely grip . . .)

GLIDING IN FRANCE

– information compiled by W. E. MALPAS

Pilot's Licence. If you are flying your own machine, an FAI Gliding Certificate will be adequate. Flying French club gliders, the Chef du Centre will almost certainly insist upon an *Equivalence Francaise* of your glider pilot licence or certificate. It costs nothing and can be obtained from: Service de la Formation Aéronautique, 246 rue Lecourbe, 75015 Paris, on the presentation of the FAI Gliding Certificate. Send your certificate at least a month before you intend to leave England.

Importation (temporary) of Glider. In theory the French Customs can insist on a formality at the frontier which involves filling in a special form for the temporary importation (up to six months) of an *aeronef.* In practice (the British Team on the way to Angers, for example), people with gliders just say they are on holiday in France for so many weeks and the formality is by-passed. It is important to avoid the form filling if possible because the Customs people never have the right form and it may take them a day or two to find one. Also avoid talking about radios.

Communications. Officially glider pilots use 122.5 and 123.5; and unofficially other frequencies close to these. For cross-country flying in the mountains one of these two frequencies is essential.

Prior Advice. Wherever you go, it is recommended to write to the Chef du Centre in advance asking permission to use the airfield.

Licence – Assurance Federale. If flying French club gliders you will also be invited to buy an assurance for the whole year (120 francs). This can be done at the club and is valid for the calendar year for anywhere in France.

ACCIDENT REVIEW – *SPEED CONTROL*

The problem of speed control concerns pilots and instructors alike. Failure to control the speed at critical phases of flight is a frequent cause of serious and fatal accidents. Here BILL SCULL, Senior National Coach, examines some of the teaching problems.

A fundamental difficulty in giving basic instruction is getting just the right degree of emphasis on any point that you want to make; too much emphasis on speed control has the consequence of a pilot who watches his instruments to the detriment, often of accurate flight, and nearly always, to airmanship. Striking the right balance is difficult and made worse by the fact that any one student flies with too many different instructors, each of whom brings a different degree of emphasis to any aspect of flying (and occasionally none at all). In the context of speed control the extremes of emphasis may range from "fly by attitude – you don't need to watch the ASI" to "for goodness sake watch your airspeed" (the latter being a probable prompt for the circuit and approach). Between these extremes the student is left to sort it out for himself, which just isn't good enough.

The product of our basic training system should become established as a solo pilot with a good standard of accuracy and, moreover, striving to be more accurate still. If his philosophy of speed control (and he can only get this from his instructors) were right he would know when to monitor the airspeed and at what rate. To highlight the problem, if we first of all consider a moderately experienced solo pilot and ask him how often he **glances*** at the ASI he probably can't give an answer, except to say that he does it most often when he is low, getting away from low down, in the circuit or soaring a ridge.

There are a number of relevant factors in determining the rate of airspeed monitoring:

1. How accurately can you fly without monitoring it at all?
2. What is a "critical" height for the particular glider? If it were stalled inadvertently how much height would be lost if the stall became a spin and the pilot was slow to initiate recovery (because he did not believe it was stalled or spinning not having noticed any symptoms)? This height must surely be at least 800ft?
3. The prevailing conditions; wind turbulence, curlover and thermal activity.
4. The time taken for the glider to be brought to the point of stall inadvertently. This point is an obscure one in that the answer would vary considerably with the circumstances; a pilot running out of height in the circuit might reduce speed to a critical figure in a few seconds in attempting to conserve height. Soaring a ridge with the wind gradually reducing in strength the same loss of speed might take several minutes – obviously one needs to monitor the ASI more often in the former case. The rate of monitoring depends on the circumstances being as frequent as three to five seconds in a difficult situation but never less often than every eight to ten seconds once below the "critical height". One other significant point is that in some gliders the ASI will misread if yaw is present, so that in glancing at the instrument one should also check whether the ball is in the middle.

Now the instructors' problem is how to bring the student to a good standard of speed control – obviously it can't be done in a single flight and emphasis at the right stage is important. The first exercise after the familiarisation flight is the effect of elevator; traditionally this has been given with little or no emphasis on the use of the ASI. The exercise should be extended as follows:

Patter	**Remarks**
Fly the glider in the normal attitude – note the ASI reading. What is it?	*Better to ask than to tell so that you know he can read it. There might also be a discrepancy between front and rear cockpits.*
Lower the nose and hold a new attitude.	*This is a prompt – you don't need to do it for him.*
Observe the ASI – it takes some time to increase to the new value (reading).	*The consequence of intertia and instrument lag.*
If you try and keep the airspeed constant by watching the ASI alone then this situation can arise. I have control.	*Take control and demonstrate a pitching oscillation (phugoid) with the ASI reading constant or nearly so.*
The primary reference is attitude, the ASI a cross reference.	

A simple enough exercise I'm sure you'll agree but one which may go some way towards pre-empting a common enough problem. Incidentally, if conditions are soarable, then it's worth introducing flying at the right speed in rising and sinking air; after all you are trying to train a soaring pilot! Hopefully with this additional elevator/attitude/ASI reading demonstration you will discourage ASI watching and "chasing".

General Handling.

Above circuit height in the student's general handling practice an increasing accuracy must be encouraged. It is not entirely satisfactory to state a tolerance on a particular speed *eg* ± 2kt because allowance must be made for the conditions – incidentally, always be sure that you can do better before criticising. One might, for example, specify a circling speed of 42 ± 2kt for a given glider in thermic, but not very turbulent, conditions and 45 ± 2kt if the turbulence were marked. In the thermalling case, however, additional allowance would have to be made if the glider was not centred in the thermal. You can see how difficult it is to lay down realistic tolerances. Whatever figures fit the circumstances your real aim is to impart a philosophy of speed control to your student so that he is always trying to improve.

One other teaching point worth noting in this respect is that once a student is making 30° banked turns within acceptable limits of speed further improvement will only come from practice of steeper turns. Using only one angle of bank "programmes" him for a fixed backward pressure on the stick.

* *Note the choice of word*

Other phases of flight also need an increase in emphasis on speed control; one of these is the launch and launch failure and cable break.

The launch (winch and autotow).

Climbing before a safe speed is achieved is a fairly common cause of accidents in the event of a cable break. What many pilots fail to appreciate is that the wind gradient helps you on the way up. If you (and your glider) are at 30-50ft with a speed of 40kt in a wind gradient, then some of that speed is a bonus from the wind gradient – it will take some of it back if the cable breaks! Therefore, a safe speed varies with the conditions and whilst 40kt may be all right in no wind, a minimum speed in a gradient may be 45 or 50kt at the same height.

In the launch failure, and perhaps more so in the cable break, cross reference to airspeed is very important. A glider may be in a steep nosedown attitude and stalled because the pilot was slow to recover. The situation here is often exacerbated by premature (and unnecessary) use of airbrakes – a reflex action. The other possible consequence of failing to monitor the speed results in running out of height in the circuit or circle (*ie* 360° turn) because the glider is flown too fast.

The critical height.

Returning to consider this nebulous "critical height" it must be emphasised in basic training that flying too slowly when low is downright dangerous. It may be difficult with relatively vice-free training gliders to convince the student that the risks of spinning are real when you, the instructor, may be unsuccessful in making the glider spin for the purpose of demonstration and recovery practice. However well he knows the symptoms of the stall or spin in the inadvertent case the pilot has not noted any symptoms and may not believe that he has stalled or spun. At best there will be a delay in initiating a recovery if he is able to analyse the condition, *ie* that the glider is not responding to normal control inputs; at worst, of course, he fails to recover at all.

The only real protection against the inadvertent stall or spin is good speed control achieved through adequate airspeed monitoring. How do we deal with this in basic instruction you might well ask? The critical stage for each student comes, I believe, in the early stages of judgment development; in this phase of training his concentration on judgment of the circuit and the approach may, and indeed usually does, result in a reduction in handling accuracy. Eventually, however, the student is able to divide his concentration between handling and judgment considerations (it being a reasonable assumption that at this stage he will not be able to fly accurately without paying quite a lot of attention to the balance of flight and speed). As soon as he is able to attend to the handling you can prompt him to show your rate of airspeed monitoring – reading out the airspeed at the appropriate intervals; having made him aware of the need you can have him tell you the airspeed every time he checks it.

One other way of emphasising you believe good speed control is important, is by taking over control if he flies outside limits (at critical heights), so making the point in no uncertain way that you are not prepared to take such risks. A practice I've adopted in instructor training in the last few years is to point out the over-ruddered final turn, even if the speed is right.

Whatever the point is that you are trying to stress, it's all part of instructing techniques which go beyond practice to philosophy. Remember though, that too much emphasis on speed control may be to the detriment of lookout.

The approach.

Poor speed control in the approach may have a number of causes, lack of elevator/airbrake co-ordination and unawareness of the need to compensate for gradient effects predominating. Emphasis on speed control should be tempered with a note of caution to discourage pilots from looking at their instruments when they should be rounding-out and even in the last hundred feet or so. If the speed has been adequate down to this height, then it is better to accept a small loss due to the gradient effect than it is to attempt to monitor the airspeed.

The final analysis.

In the final analysis there is no other protection against stalling or spinning at critical heights other than by monitoring airspeed. Do you place enough emphasis on it when teaching? Is your speed control good? As an exercise why not see if you can establish your own rate or airspeed monitoring in different circumstances.

My Experience of Flying a Motor Glider

BRENNIG JAMES

If you own a yacht the advantages of having auxiliary power is so enormous that few are now built without engines. The idea of having an auxiliary powered glider goes back at least to about 1935 but until recently suitable engines and airframes have not been available.

Having had about 900 hours of flying in my Diamant 18 I did not see much point in just getting another glider with a better performance. I thought it would be more interesting to try for something entirely different, so when I heard that Willibald Collee was selling his SF-27M CX motor glider I snapped it up. During the last three years I have acquired a good deal of experience with this machine and in general I think auxiliary powered gliders may soon have widespread use.

As a glider with the outriggers removed, the performance is about the same as a Std Cirrus since the fixed wheel and steel tube fuselage is cancelled out by the 18m Cirrus wings. As a powered aircraft it has a range of about 220nm at 70kt, a take-off run of 250 yards and a rate of climb of 500ft/min. It cruises at about quarter throttle and uses 7-8 litres per hour, giving an endurance of approximately 3½hrs. At full throttle consumption is about 22 litres per hour and the ceiling is around 15000ft. The fuel is 25.1 two star petrol and two-stroke oil is carried in a tank just behind my head. The engine, a 650cc Hirth two cylinder two-stroke, gives about 45hp at 6000rpm full-throttle climb. The engine has a twin ignition electric starter and a generator charging a 15amp/hr 12v battery.

As a powered aircraft it is very satisfactory and I think that any owner of a motor glider should start by getting in 50 hours of flying in a powered aircraft so that he has a good idea of what the aircraft can do. He should also do a good number of relights in the air so he feels confident about the aircraft's ability to spare him the necessity of a forced landing. The normal procedure using the aircraft as a glider is to give oneself a launch to 2000ft, costing about 25p for four minutes engine time, fold away the engine and do a task. If the weather turns bad one can wind out the engine and motor back home.

This saves the bother of sitting in a queue for a launch and the aggro when someone jumps the queue. It is possible to fly to a gliding contest some distance away in the morning, fly the task and then fly home in the evening. I was able to fly to Euroglide at Husbands Bosworth on a couple of days last summer. On the Sunday I took-off from Booker at 9.30 am, landed at HB after an hour's flight and flew the 380 triangle *hors concours,* returning by air in the evening. This cost about £3 for eight hour's flying time, saving the expense of a crew and accommodation, and there is nothing to prevent this being done on a much larger scale.

Pilots could take-off from their home base and fly on a daily basis at a contest, so saving one of the headaches of gliding contests, the provision of a sufficient number of tugs.

On another occasion I flew around the London TMA photographing a good deal of the city (the control zone crosses the Thames just east of Tower Bridge) and landed back while the gliders were still on the grid at Booker waiting for the thermals to start.

I think it is important to decide what kind of pleasure you want from gliding and how you are going to pursue it, otherwise you end up spending a lot of money to get something you don't really enjoy. When you first start it's enough just to feel you can fly, then later on you want to prove yourself by winning competitions and breaking records, but after you've been World Champion a few times you realise that there is a very agreeable view around which you have been too busy to look at while competing.

When you are gliding you tend to avoid getting below 2000ft on cross-countries so the details of the scenery are pretty distant and everything looks pretty flat. With an engine you tend to prefer to fly between 500 and 1000ft so that the landscape is more interesting and in hilly countryside the sculptural qualities are added to the pictorial ones. The amount of visual information you are confronted with is vastly more than it is possible to digest in one flight, so I photographed quite liberally in colour. Many scenes which are quite banal at the time become of rivetting interest when projected. I use Kodachrome 25 in a cheap Zenith 35mm camera which gives excellent results.

A bit of a personal epic

Last summer, when competing *hors concours* in the Vinon International Mountain Contest in France, I decided to fly as a motor glider and compete as a glider. I left Booker at 8 am and arrived at Vinon at about 7 pm local time, a distance of about 570nm, having landed at Lydd, Le Touquet, Beynes and Moulins on the way. Petrol is easily obtained but it is better to carry your own oil as you only need about 600ml and the cans contain two litres. You should allow at least 40 minutes each time you land to deal with the inevitable snags and problems. The flight was a bit of a personal epic although the more experienced air tourist might have considered it humdrum. The entire cost of the contest was £250 while the British pilots who took their own gliders had to pay £300 merely to cross the Channel and back.

There was only room for basic clothing and personal items, plus a sleeping bag and airbed in the cockpit. I could have slept in a corner of a hangar but the airfield authorities kindly let me have bunkhouse accommodation.

We flew about eight tasks (see S&G October 1977, p207) and I also flew a 300km on a practice day and motored to Fayence and back on a rest day. There was a fair amount of electro mechanical fumble in the engine due to vibration and next time I shall include a VOM and a 12v soldering iron in the tool kit.

On the way home I experimented by adjusting the throttle to give me a 1:70 glide at 70kt so when gliders of this performance become available I will be experienced in their use. Flying the aircraft is a bit of a strain because what might be a nasty accident in a glider would be a very nasty accident in a motor glider. While the engine is running you worry whether it will not start when you need it. Supposing

you get low in the mountains and decide to start the engine? This is the drill: Fuel on, petrol pump on, release engine catch and wind out engine, ignition on, throttle open and press the starter. If she fires, all well and good, if not switch off the ignition, apply the engine brake, observe prop position in mirror, if horizontal touch the starter until it is vertical then wind down into the fuselage and check that it is locked. While you are doing all this you should be picking a field and planning an approach. If there isn't one – bad luck!

Sometimes there isn't time to put the engine away so you land with everything hanging out, taking care to switch off the fuel and ignition otherwise the engine might cut in and mess up your approach.

My general conclusions are that motor gliders allow you to have your cake and eat it. They will perform well enough as gliders to give good competition experience and as powered aircraft allow a lot of interesting flying when you wouldn't otherwise bother to get airborne. In some ways they save money since launching and retrieving use less time and petrol. They are complicated mechanically and electrically so you save a great deal by doing your own servicing and C of A.

All gliders bite fools but motor gliders could bite you a good deal worse and burn you into the bargain. I think motor gliders using an engine on a pole should be reserved for experienced private-owners who could really get to know their aircraft thoroughly. The outriggers should retract into the wing but no sufficiently robust installation has been developed yet. Fortunately my aircraft has not a retractable wheel as that would be one more thing to remember on a hurried forced landing. I can quite well imagine future motor gliders having a panic button which winds out the wheel and engine and then starts the engine – all done electrically in a few seconds. I think the petrol should be in the wings and one should have a maximum range of 350 miles. A twin boom configuration with a pusher prop behind the pilot might work quite well and the outriggers might retract cleanly into the booms.

Taxiing is a great advantage. It is a dreadful bore towing a glider across a field, particularly if you have difficulty in getting people to take the wingtip, although in a fresh wind the motor glider needs a wingtip man to taxi downwind.

The general reaction to the aircraft is very favourable. Most pilots think it is a good idea although the purist competition pilot scoffs and feels that making things easy in this way must lead to a moral degeneration in glider pilots. My experience is quite the opposite. You may worry a good deal more when you get low, but if the engine does start it may save a long wait in a field and a late return to the airfield.

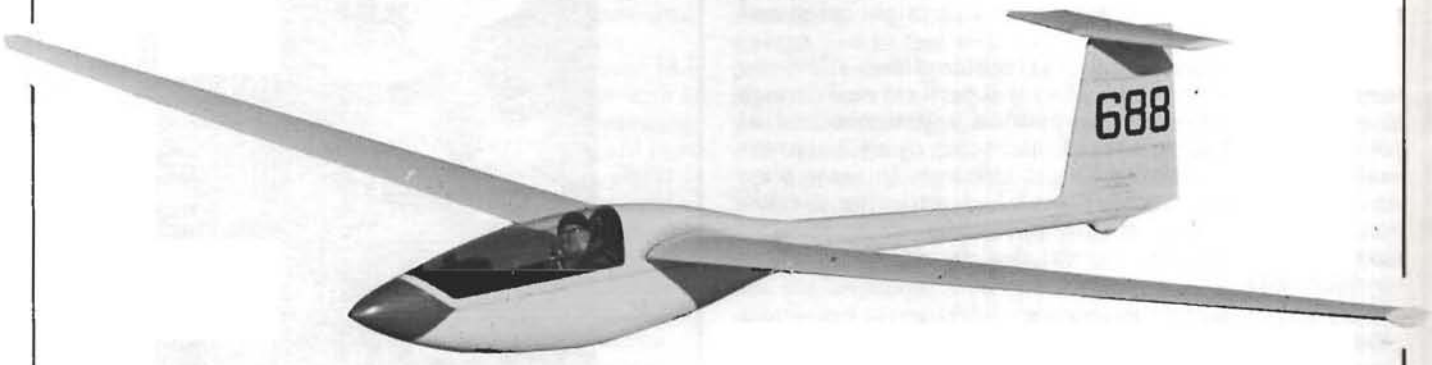
On occasions five minutes engine time gets you across a gap and keeps you airborne for hours. My experience of using the engine to explore wave is strictly limited but at a wave site it would help you contact wave, allow you to let down through cloud over the plain and motor back home beneath cloudbase.

At many clubs there is a division between power pilots and glider pilots which seems most unnecessary. I have even heard such insane complaints that people take up gliding to get a cheap PPL by flying a Motor Falke. I think motor gliders offer cheap power flying to the power pilot and once committed many will be encouraged to use their aircraft for soaring. Finally, I think it is worth taking far more photographs from the air. Since you are paying such a lot to get into the air, it's worth paying a little more to relive the experience several more times at your leisure.

JOHN HULME

BOTTISHAM · CAMBRIDGE

Telephone Cambridge 811323



PIK 20D-78

- ☆ **Lightest in its class · Space technology in today's sailplane**
- ☆ **Proven design – around 300 now flying**
- ☆ **Effective conventional airbrakes and separate flying flaps**
- ☆ **Available for 1978 flying season – two options on short delivery**
- ☆ **1978 model features repositioned tailplane and reshaped nose**
- ☆ **Tightly sealed – all pushrods, fairings, wheel box, etc.**
- ☆ **Super handling – an easy aircraft to fly in which you are quickly at home**

BALL ELECTRIC VARIOMETERS – Sole UK Agency

Model 400/6

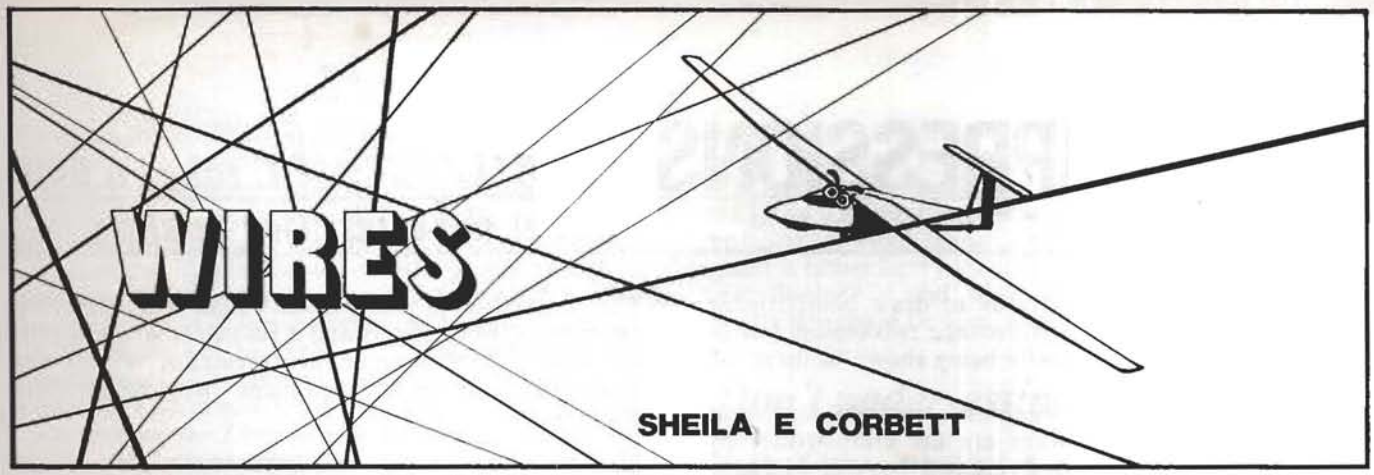
- Latest models in stock
- Very low battery consumption
- All self-contained – no awkward bottles
- Standard sizes $3\frac{1}{8}$ and $2\frac{1}{4}$ inch available
- Netto, cruise, Variable gain, variable damping, averager
- Accessories available

And of course:

C's of A, Repairs in all materials,

Trailers, Spares & Materials,

Range of Instruments



It was one of those desperate summer days when the air is still, the visibility awful and the thermals blue and few. It wasn't a day for cross-country flying - many had even abandoned local soaring in favour of sunbathing. A check on the logbook showed that nobody had got away from a wire launch and that an aerotow was a better proposition.

On the principle that you should have a specific objective for each flight, and that each one should teach you something new. I optimistically planned a mini cat's cradle; no point being more than five miles from the site.

Off the aerotow and out to point number one with no trouble, I reached Matching Green at 2000ft and set off for Stapleford, but encountered very heavy sink and was unable to find the associated thermal. Most fields had crops which, by early July, had acquired a distinctly lush and textured look. I didn't have to pick my field - there was only one possibility. It was a partly mown hayfield, the cut section appearing as a neat flat strip, almost exactly lined up with the runway, which was now an almost impossible three miles ahead.

I started the downwind leg of my circuit and studied the field more closely - the nearer I got the better it looked. True there were some high trees and power wires to fly over on the approach, but it was a good long field and the Pirat has good brakes. There were no poles in the field and the surface looked fine. With the cut grass lying in rows parallel with the wind direction, it seemed very much like a runway. For a bonus, there was easy access from the adjacent road. In fact, I've never gone into a field with so much confidence.

I was calm and collected, my heart wasn't hammering, I could even breathe normally. Base leg and final turn completed, and nicely lined up, I crossed the trees and wires, then applied full brakes for the descent, eyes fixed on my aim point.

Imagine my horror when three very near, bright green wires appeared in my field of view. The duck-under dive was completely instinctive. There was a fleeting wonder as to whether the T-tail would clear before I was rounding out and floating gently into the really lovely surface. I stopped rolling with half the field to go.

It took several minutes for the reality of the situation to strike me. First of all, by some miracle, I had negotiated two sets of power wires, both at telegraph pole height and less than 50 yards apart, by flying over the first set and under the second. Secondly, in my appraisal of the field, I had completely failed to spot the second set of wires. Thirdly, if I had spotted them, there were two easy and alternative circuits I could have adopted without difficulty. I could either have overflown both sets of wires and still had plenty of field in which to land, or in such a very light wind I could have reversed my circuit and landed in the opposite direction.

I walked over to examine the wires which had so nearly proved my undoing. There were the first set running down the road which I had clearly seen from the air. The other wires ran out from this line at an angle, making a diagonal across the corner of the field. There was a supporting pole in the hedge and two more poles in the barley field next door. I had actually flown alongside this field on my downwind leg and, by lining up the three poles, it must have been perfectly obvious that the wires continued across "my" field. And yet I had been so intent upon this chosen field that I could spare no more than a cursory glance for its neighbour where the warning message was spelled out loud and clear.

Just two weeks earlier the pilot of a light aircraft going into a field to retrieve a glider had failed to notice a diagonal power line and faced a long spell in hospital. I knew about this and yet failed to apply it to my own situation.

Did I say that I believed you should learn something from every flight? I had a very lucky escape and it has taught me a lesson. I shall never again fail to study the fields next door. Maybe confession is good for the soul but, in this instance, I hope it may prevent another line in the accident statistics.

FIRST IMPRESSIONS

BILL SCULL takes a look at the latest two-seaters

It may seem a bit presumptious to draw comparisons between the various high-performance two-seaters but as considerable interest is currently being shown in them the attempt is justifiable.

The machines currently available are the Calif, Janus and Twin Astir; at prototype stage are the Globetrotter by Ursula Hänle which is already flying and the ASK-21 due to fly this March. Direct comparison may not be too good an idea because the design concepts, it should be recognised, are different. Making this statement is akin to putting one's head on the block with an axeman standing by, especially so as I haven't discussed all the gliders with their respective designers. I would suggest, however, that the designers may have in their minds, in broad terms at least, either a club glider in GRP to replace the last generation (all of which have similar performance), or a high-performance glider at all costs. It is possible, of course, that they attempt to strike a compromise which means that "handling" on the ground, in the air, or both, is not as good as it might otherwise have been.

Examining each of the gliders in turn may not reveal the category the designer was aiming for unless they have said – as has Rudolph Kaiser in designing the ASK-21 as an ASK-13 replacement, albeit with much better performance. The Janus, for instance, has flaps with a range of performance and landing settings but a fixed wheel (two in fact); does a fixed undercarriage suggest a club glider for general use or an acceptance of the performance penalty in an attempt to keep the cost down? The main-wheel doesn't protrude very far nor is it sprung, indicating, perhaps, that allowance for bad landings likely in basic training were not being made. The Twin Astir, by way of contrast, doesn't have flaps but does have provision for waterballast which must surely indicate the aim of producing an adaptable glider for club use or sheer performance.

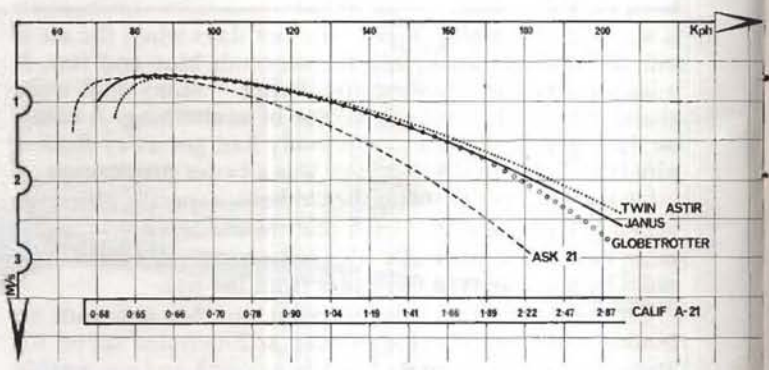
As it is important that those contemplating buying a new two-seater should make the right decision, all factors must be considered. It ought to be said that there are two things which might prejudice my views; first, a preference for side-by-side seating and, secondly, a roomy enough cockpit for me to be comfortable (I'm 1.97m tall).

A detailed comparison must start with general data and performance; the following is taken from the manufacturers' specifications:

Manufacturer	*Caproni*	*Schempp-Hirth*	*Burkhart Grob.*	*Schleicher*	*Start + Flug*	*Romanian*
Glider	*Calif*	*Janus*	*Twin Astir*	*ASK-21*	*Globetrotter*	*IS-28B2*
Best L/D	*43 at 56kt*	*39 at 51kt*	*37.5 at 54kt*	*34 at 51kt*	*36*	*34 at 54kt*
Min sink						
Wing span (m)	*20.38*	*18.2*	*17.5*	*17.5*	*17.0*	*17.0*
Wing area (m^2)	*16.19 **	*16.2*	*17.9*	*18.1*	*15.8*	*18.24*
Aspect ratio	*25.65*	*20.0*	*17.1*	*16.9*	*17.0*	
Empty weight (kg)	*436*	*370*	*390*	*350ca*	*350*	*360*
Max AUW (kg)	*644*	*620*	*610/650**	*570*	*600*	*590*
Max wing loading (kg/m^2)	*39.8*	*38.2*	*34.1/36.3*	*31.5*	*38.0*	*32.4*
No. produced		*50+*		*prototype first flight*	*prototype flying*	
Price	*£18000*	*DM57750*	*Dm42660*	*March '78*	*Dm43000*	*£9311 + VAT*

* *with waterballast*

This comparison of polars doesn't show much difference between the various gliders and it isn't clear which of them is the result of performance measurements. What is suspicious is the similarity between them – with the exception of the ASK-21.



The only true comparison is, of course, in a competition; last year's results – there were Janus's (or is it Jani?) flying against a Calif at Hahnweide and Angers – showed that the Janus scratches a bit better than the Calif but that on a good day the Calif has the edge. This is borne out by the relative wingloadings but not by the comparison of the polars.

If other factors are taken into account in comparing these two gliders, then the Calif wins on seating position and cockpit comfort; although cramped for a very tall pilot the feature on which it wins hands down is the support for the thighs. In the rear of the Janus the seating position is such that the knees (mine, that is) are bent through more than 90° – the Germans describe it as a gynaecological chair – from which you can draw your own conclusions! Incidentally, the Twin Astir is similar in this respect but not quite so bad.

We have had a little more time to evaluate the Twin Astir than we did the Janus but second impressions only confirm one's initial liking for it. Cockpit comfort is good, apart from the proviso already made, and I was able to fly it from either seat – fitting in with ease. The controls are well harmonised and the airbrakes and undercarriage retraction mechanism easy and light to operate; all controls came

readily to hand. The only feature which caused much comment was the limited up-elevator travel which almost excluded stalling; there was a lack of trim range, too, so that a backward pressure had to be held all the time although the loads were not large. The manufacturers, however, say they will adjust this. The lack of up-elevator meant an adequate amount of down – as Andy Gough found when he flew it inverted as well as doing several outside loops. It is unlikely that the glider will be certified as fully aerobatic as the manufacturers do not intend to go for this category of C of A from the LBA (Luftfahrtbundesamt).

For club use the Twin Astir looks like a good bet; so far we have only limited experience of winch launching – John Williamson has tried this out at Bicester. The glider is designed to be launched with a stronger weak link than we normally use (1200lb) and this, I think, could eventually mean that we will end up following the German practice of using two different link strengths for single-seaters and two-seaters. If you regard a glider with retractable undercarriage and waterballast as too sophisticated for club use, then you will be interested to hear that Grob intends to offer a version with a fixed, sprung, wheel and without waterballast tanks at a reduced price of DM39420.

The Twin Astir appears to compete in both rôles – as a club glider and a machine for outright performance. It will be well on its way to proving itself in the former rôle by the start of this season; for the latter watch the competitions.

The possible rivals, taking into account the price, for the Twin Astir are the ASK-21 and the Globetrotter, which was originally known as the H-121. The record of Start + Flug rests on the Salto – a single-seater, fully aerobatic, GRP glider with a Std Libelle wing shortened from the root end to give it a span of 13.6m. The Globetrotter, which has a three-piece wing and staggered side-by-side seating, is aimed at the clubs by virtue of its easily removable wingtips which make it suitable for small hangars. If the design weight of 350kg (empty) is achieved it might well prove to be better for winch launching than the others. However, the glider is rather heavy looking – perhaps due to the thickish rear fuselage – and with no moulds made yet, series production could be some time away.

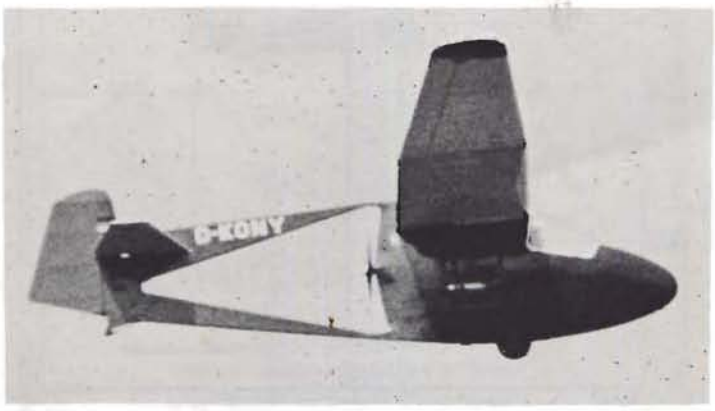
Don't under-estimate its potential

The ASK-21 is scheduled to fly in March and although a comparatively late starter it would be wrong to under-estimate its potential. With the Schleicher/Kaiser record of achievements many people will, I'm sure, want to wait and see. The design aim is a replacement club two-seater, which is, of course, the predominant need. The delay in production has been due to a change in the method of construction used for the fuselage; originally it was planned to use a steel-tube but now the aircraft will be entirely GRP.

You might be a little surprised at the lack of information on the IS-28B; the brochure doesn't give a polar and the glider, so far as I know, has not been demonstrated. I suspect that there is some doubt in many people's minds about metal construction – although the Blanik has been popular enough (44 in the UK); there are, to my knowledge, three IS-28B's in the country and as they offer a glide angle of 1:34 they are obviously worth considering.

My advice to anyone faced with choosing a new glider is to see them for yourself; by the time this article appears there will be a Janus in the country so you can make your own comparisons. It might well be the case that if advanced training is your aim the Janus, with its flaps, tail-parachute and good airbrakes, is more suited to the task. The decision might well rest on whether you thought it necessary to teach the use of flaps. The tail-parachute could also be an advantage for teaching but the concensus of opinion regards them as unnecessary for UK fields. On a safety note, quite a few gliders get broken by misuse of tail'chutes – so if you do want a complete training facility you will need two different types of glider which, incidentally, is what some German clubs envisage.

CAN ANYONE IDENTIFY IT?



This machine was spotted at München-Gladbach, West Germany. Members of the Phoenix GC haven't been able to identify it and Sgt R. Murray, who sent us the picture, says the number doesn't appear to be on the current register.

A NEW TOTAL ENERGY HEAD

FRANK IRVING

An Irving total energy head mounted on the Imperial College Gliding Club Astir.

To achieve an input to a total energy variometer which is correct at all heights requires a device producing a suction equal to the dynamic head of the airstream. Whereas the corresponding pressure head – the pitot tube – requires no calibration, there is no device that I know of which will automatically produce the correct suction. They are all dependent upon or influenced by viscous effects and hence involve a certain amount of experimentation and calibration. Moreover, when a satisfactory device has been achieved, subsequent production needs to be very carefully controlled if the accuracy of the prototype is to be maintained.

The original Irving venturi of 25 years ago displayed all of these features. The internal shape, with its sudden expansion, was intended to reduce its sensitivity to manufacturing errors, but the dimensions were obtained entirely by trial-and-error. The external ring, to reduce sensitivity to pitch and yaw, was "borrowed" from a war-time device. The prototype was very accurate indeed and some subsequent wind tunnel tests on a production example selected at random showed that the accuracy had been maintained. I suppose I should be flattered by the sight of pirated mini-versions still being provided with a certain 15m sailplane.

Apart from sundry variations on the venturi theme, the next significant device was the Braunschweig tube (Ref 1). Presumably, somebody found the references from the early 1930s which are the basis of the curves and observations in Ref 2. In general terms, these indicate that the pressure coefficient over much of the downstream side of an infinite circular cylinder at right angles to an airstream is about -1.0 at Reynolds numbers, based on cylinder diameter, around 10000. At sea level, this corresponds to a ¼in diameter tube at 45kt or a 3/16in tube at 60kt. (A pressure coefficient of -1.0 means a suction equal to the dynamic head.) Of course, the bent-over end of a Braunschweig tube is of very finite length, so the situation is not quite as shown in Ref 2. The downstream suction increases towards the end of the tube, due to the vortices shed from the end, and is obviously influenced by the proximity of the bend.

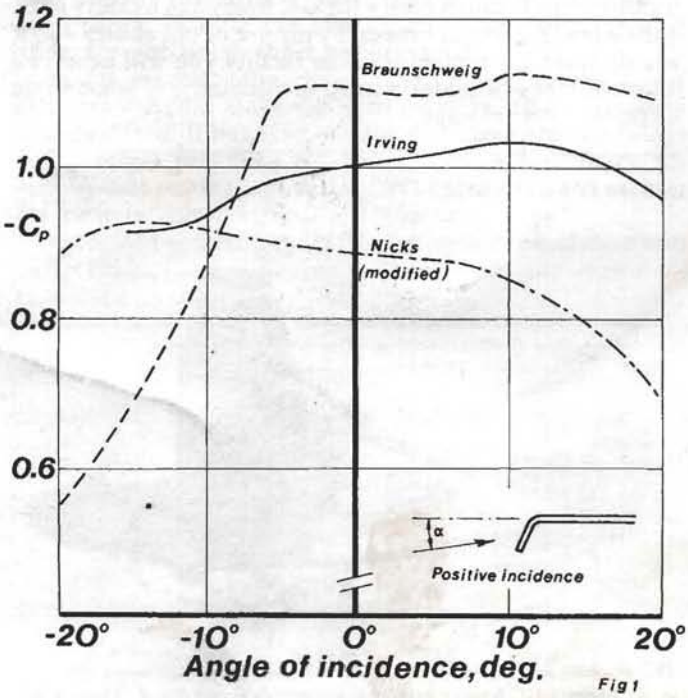


Fig 1: the suction produced by various total-energy heads as a function of incidence. Suctions are expressed in multiples of the dynamic head, the desired value being 1.0. See the text for an explanation of the "Nicks" figures.

Fig 1 shows, *inter alia*, the results of wind tunnel tests on a Braunschweig tube. The tube in question was of light alloy, commercially made, and purchased in this country. It was tested in the "as received" condition and no attempt was made to adjust it. It will be seen that over its working range of incidence, the suction is about 11% too high. One potential snag with this design is the use of slots on the downstream side: slightly too deep a slot will increase the mean suction picked-up, and will increase its sensitivity to yaw.

A development of the Braunschweig idea was proposed by Oran Nicks (Ref 3). His tube was inclined at 70° to the airstream instead of 90° and had a hole rather than slots. In Fig 1 will be seen a curve labelled "Modified Nicks", showing suctions about 12% too low. Allow me to explain at once that this tube was not made exactly in accordance with the dimensions given in *Soaring*. It retained the 70° end and the same hole location but was just a bent tube like the Braunschweig type, as opposed to his somewhat more elaborate construction. So my measured figures are no real guide to the accuracy of Oran Nicks' original device. However, they illustrate a significant feature of the 70° end; it is relatively insensitive to incidence changes, whereas the Braunschweig's suction collapses at incidences below about -5°.

It occurred to me that it ought to be possible, with a few careful adjustments, to produce a tube with the simplicity of the Braunschweig, the advantage of the 70° end and an accurate calibration. The behaviour of the final product is shown in the full line of Fig 1. The suction is almost exactly correct at zero incidence, within 4% of correct between -9° and +20°, and only 8% too low at -15°. Do we need such large angles of incidence? A total

range of about 12° covers the steady flight conditions of an unflapped sailplane. Rather less (say about 8°) suffices for a flapped sailplane if the flaps are always at the optimum setting. But we also need to deal with unsteady conditions; errors due to sudden incidence changes induced by gusts will produce incorrect variometer readings which may take a little while to disappear, even if the pilot isn't taking much interest in the transitory reading at the time of meeting the gust. Moreover, the setting of the tube in relation to the wing chord line is not usually known so, when all the uncertainties are added together, there is a lot to be said for a wide incidence range.

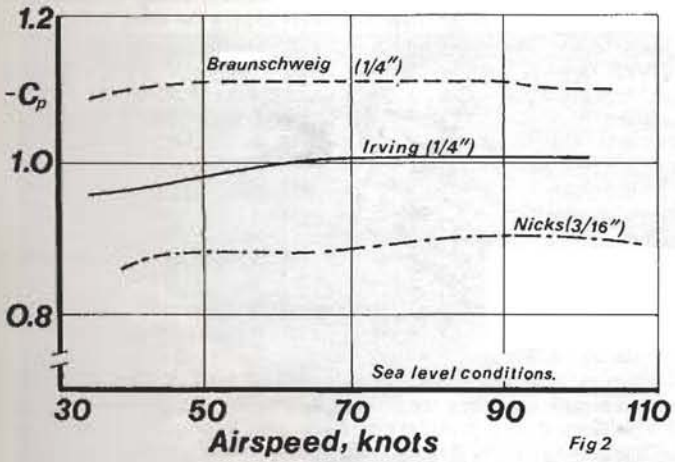


Fig 2: the effect of airspeed on the suction produced by various TE heads. The changes are due to the effects of Reynolds number.

Fig 2 shows the variation of pressure coefficient with speed at zero incidence for the three tubes. In all cases, it initially becomes a little more negative as the speed increases, this being the expected Reynolds number effect. Two of them show a slight reversal of slope at high speeds.

There is no point in plotting curves to show the effect of yaw. Up to 25°, at any rate, none of the tubes tested showed any measurable effect.

The Irving tube is now available commercially, made of stainless steel and supplied with a sleeve for fitting to existing installations. On Kestrels and Astirs, the front end should point downwards to prevent its wake impinging upon the pitot tube. Otherwise, it matters little whether it points upwards or downwards; the choice depends on the owner's views on the ingress of rain, etc.

The light-alloy prototype was fitted to a Kestrel 19, No. 347, connected to Winter variometers. The obvious swooping motions were carried out with very gratifying results. The effects noted in Ref 4, previously exaggerated by the excessive compensation of the Braunschweig, were present to just about the forecast extent. That fitted to Libelle 466 shows similarly gratifying results. It is also used to provide the pressure difference for operating the variometer in the "Netto" mode by connecting the appropriate capillary across the bottle side of the variometer and the static pressure.

REFERENCES

1. Welch and Irving "New Soaring Pilot" Third Edition, John Murray 1977, p289-290, 2, Goldstein, S. (Ed) "Modern Developments in Fluid Dynamics", Oxford 1938 (and a Dover paperback, 1965), p423-424, 3, Nicks, Oran "A Simple Total Energy Sensor", "Soaring", September, 1976, and 4, Irving, F. G. "Variometer Readings during Pitching Manoeuvres", S&G, October 1977, p204.

Keeping the string straight?

HARRY COOK

Some while ago, I became involved in a discussion on the correct use of rudder in turns and the question was asked, "Should one use top rudder in turns?" In trying to find a lucid answer to this question some interesting facts emerged.

It is common experience, particularly with gliders having a span of 19m or more, that one has to "hold off bank" in order to keep the string straight and, therefore, avoiding any slip or skid. This is because the wing at the outside of the turn is going faster than the inner wing, and so generates more lift. This extra lift on the outer wing has to be balanced by moving ailerons to increase lift on the inner wing and reduce lift on the outer wing, so that the angle of bank remains constant.

When making a turn to the left, in order to prevent bank angle increasing, the stick must be moved to the right. As the left aileron goes down to produce some extra lift on the left wing, the right aileron goes up and reduces the lift on the right wing.

Unfortunately, when the left aileron goes down it produces an increase in drag as well as reducing lift, and the difference in drag between the two ailerons causes the nose of the glider to swing to the left. Consequently, skid out of the turn develops unless some right rudder (top rudder) is applied to prevent it.

Therefore, in the case of a typical soaring turn to the left (30° of the bank and low speed), it is necessary to hold the stick to the right of centre to prevent bank angle increasing, and to use top rudder to prevent the nose of the aircraft swinging to the left because of the high drag to the left aileron compared with the right. In this way we can keep the string straight, indicating no slip or skid.

I would like to question whether we should fly like that at all.

Surely to fly with the stick and rudder off-centre is wrong, even though most of us have been taught to do it in order to keep the string straight.

After a long time struggling to fly with the string always accurately centred, in wide span gliders from T-21 to Kestrel 19, with controls off-centre as described above and feeling quite smug about my ability to do it accurately, I read George Moffat's *"Winning on the Wind"*. On p67 he mentions, "later I discovered from Klaus (Holighaus) that I had been using quite the wrong thermal technique. The Nimbus 2 likes to be thermalled with a pronounced slip of about 5°." On p72, talking about the Std Cirrus, he says, "as I grew to know the ship better. I discovered that the best technique seemed to be to fly just above the separation speed with about 5° of slip. That method looks and feels all wrong but the ship climbs like a shot."

As a result of reading this apparently heretical statement I tried it for myself and found that the Kestrel loves it! In a typical soaring turn (30°-40° of bank and 40-45kts IAS) with the string about 10° off-centre indicating slip into the turn, it is not necessary to hold off bank. It is even possible while thermalling to allow the glider to fly itself for limited periods, which in a big thermal easily provides time for maps to be refolded and for other domestic activities. The glider actually appears to enjoy thermalling under these conditions instead of "acting awkward" as it used to do.

Why is this?

I think it is simply because instead of having to prevent bank increasing by "holding off bank" with the stick, the slip into the turn provides the same effect by producing more lift on the inner wing and less on the outer.

For the aerodynamically minded, the explanation is probably that lv = lr (rolling moment due to slip equals rolling moment due to yaw) is achieved, and this is the equivalent of holding off bank with the ailerons and correcting the effects of that with top rudder.

To sum up – if you want to fly with the string straight, or ball in the middle, you will need top rudder in low speed turns. It is questionable, however, whether this is the right way to fly. The alternative is to let the glider fly the way it likes to, slipping into the turn but with the stick and rudder neutral.

Incidentally, in the case of my Kestrel, with the string about 10° off-centre, the effect on the ball of the turn and slip indicator is hardly noticeable. I think this is because the position in which I have the string fitted on the Kestrel makes it extra sensitive, so that the actual angle of slip is probably a lot less than that indicated by the string.

Book Reviews

Jane's All The World's Aircraft 1977/1978 edited by John A. R. Taylor. Published by MacDonald and Jane's Publishers Ltd at £27.50.

The new look given to **Jane's** last year when it was completely re-set is carried through to this latest edition which, like most things this decade, is more expensive. However, the reader is given 40 more pages of main text for the extra £2.50 and for the first time since 1918 a glossary of aerospace terms.

Gliding is well represented, with some beautiful photographs and shares the section with hang gliding, though still dominates by a total of 45 pages to six. Predictably, this edition is of extreme quality and one can only admire the editor for his consistency in collating a vast mountain of material to make such a precise, infinitely readable reference book on the output of the world's aircraft industry.

G.B.S.

Sierra Sierra by John Joss. Published by The Soaring Press, PO Box 960, Los Altos, California 94022, USA. Available from the BGA, price £4.50.

"The story of an ex-Marine fighter pilot, Mark Lewis, whose closest friend, John O'Halloran, was killed before his very eyes. Mark returns to John's family, only to be ensnared in the glider project. John was to have flown in a sailplane (glider) built by the father and designed to take the World records in height and distance. Jennifer O'Halloran, sister of the dead man, turns out to be the key to the story, both emotionally and technically." That

is what the news release says and it is all true. The reviewer is now going to make an unfair comparison.

For most people the definitive aviation story is probably Ernest K. Gann's **Fate is the Hunter.** Well spread over time and place, what could have been a string of anecdotes is bound together by the continuous presence of some brooding force not particularly well disposed towards human beings – like a reviewer, I suppose! – saving or savaging them according to the laws of some completely inscrutable cosmic logic. It is the very unpredictableness of this **fate** that gives Gann's book its power.

Sierra Sierra is a first *novel,* nicely written and full of plenty of authentic detail. The gliding descriptions are good, if occasionally "slightly over the top". But, the two overlapping story lines, bringing together the past of a Vietnam jet jockey and present world record bidder, converge on a conclusion – everything comes out right, but only by a hairsbreadth – like the leading edges of a You Are Here arrow. About the only thing you know to be certain in Gann's book is that he will survive to write it. **Sierra Sierra,** on the other hand, good as it is, purrs cleanly and neatly along to its appointed end – with a beautiful description of a nail biting final glide in the dark – under something a little bit too much like remote control, at least, for my liking.

A good New Year buy, **but,** "I say, old chap!" **why** is the story's briefly appearing man from the UK a drunken *News of the World* reporter?

STEVEN LONGLAND

HORSES FOR COURSES

CHRIS RIDDELL comments on the optimisation of sailplane design.

In his paper published in S&G (June, 1977, p110) Prof Eppler discusses in some detail his approach to the design of sailplanes to achieve the best cross-country speed, within the limitations of the 15m span. He points out that the nature of the design will depend on the weather conditions the designer expects for his design.

My first sailplane was the prototype Skylark 1, and was very advanced for its time (1954) having a small wing area and NACA laminar flow section. It gave me some very fast cross-countries and a great deal of pleasure, but it was severely handicapped in weak conditions.

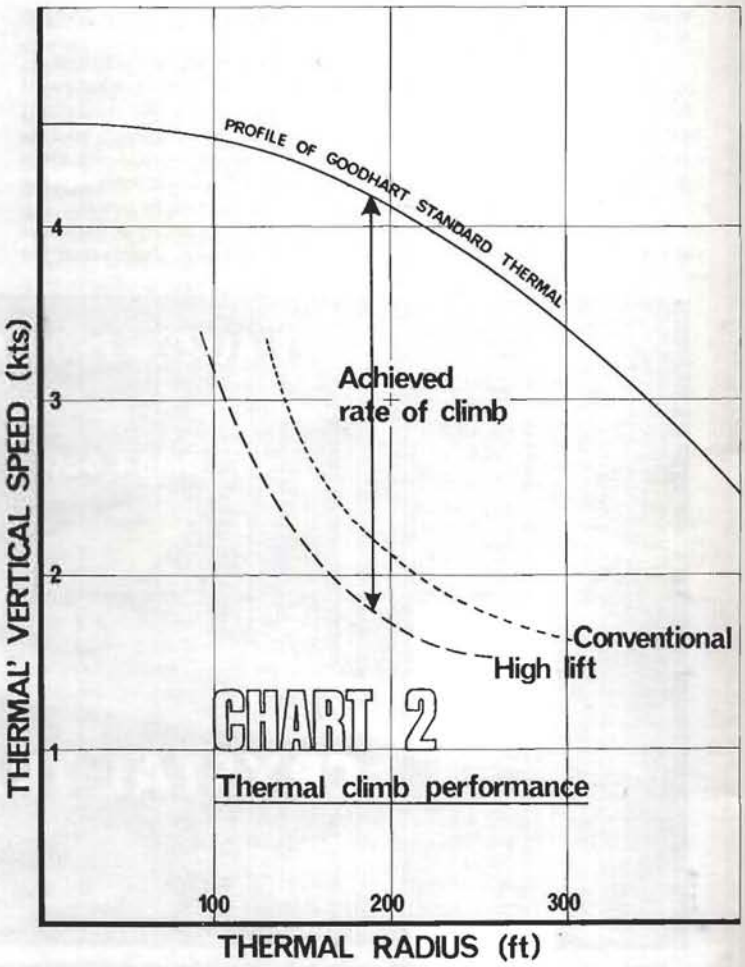
As I progressed as a pilot, I flew abroad in Europe, and I was impressed by the much stronger soaring conditions there and in lower latitudes. My newly acquired Gallic racing technique was only of use to me in one UK Nationals, and then it put me up well on the day. However, most of the time I seemed to spend in thermals of two and three knots at these Nationals and Regionals.

Of course, there are many examples of optimising the design – adapting to best suit the conditions – around the world. Pat Beattie in South Africa is a well-known example with his BJ designs. In America spans are often extended by the addition of extra wing tips; and the widespread use of waterballast is another example.

Dr Eppler's point was that sailplane design may have moved too far towards the desire for high-speed cruise and as a result wing areas are too small. This has resulted in sailplanes with a diminished capacity to climb in small weak thermals. It can be assumed that such thermals may well appear small and weak to the pilot of the speed ship, but to a glider with better climbing performance the thermals are more than adequate.

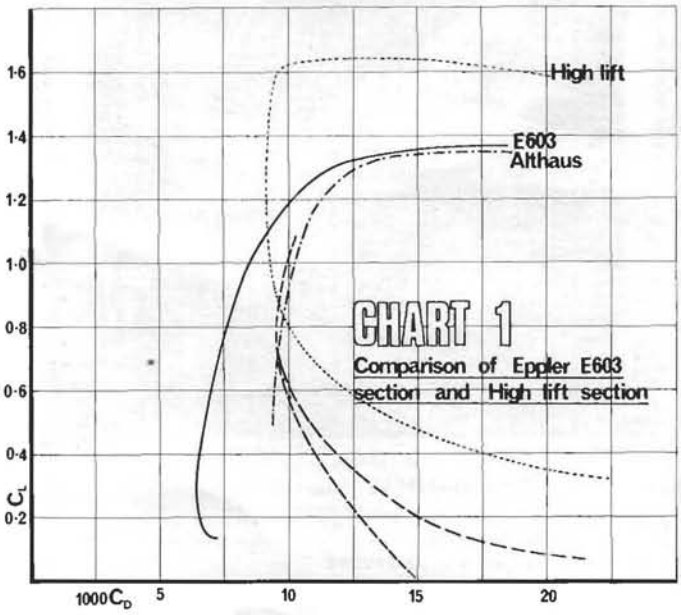
The increase in wing area is not all gain, as Prof Eppler points out. As the parasite drag is a function of the wing wetted area, it is not proportional to wing area and represents about half the total drag of the sailplane at speed. Thus an increase of wing area from 120sq/ft to 133.5sq/ft represents an 11% increase. Care has to be taken not to overdo wing area.

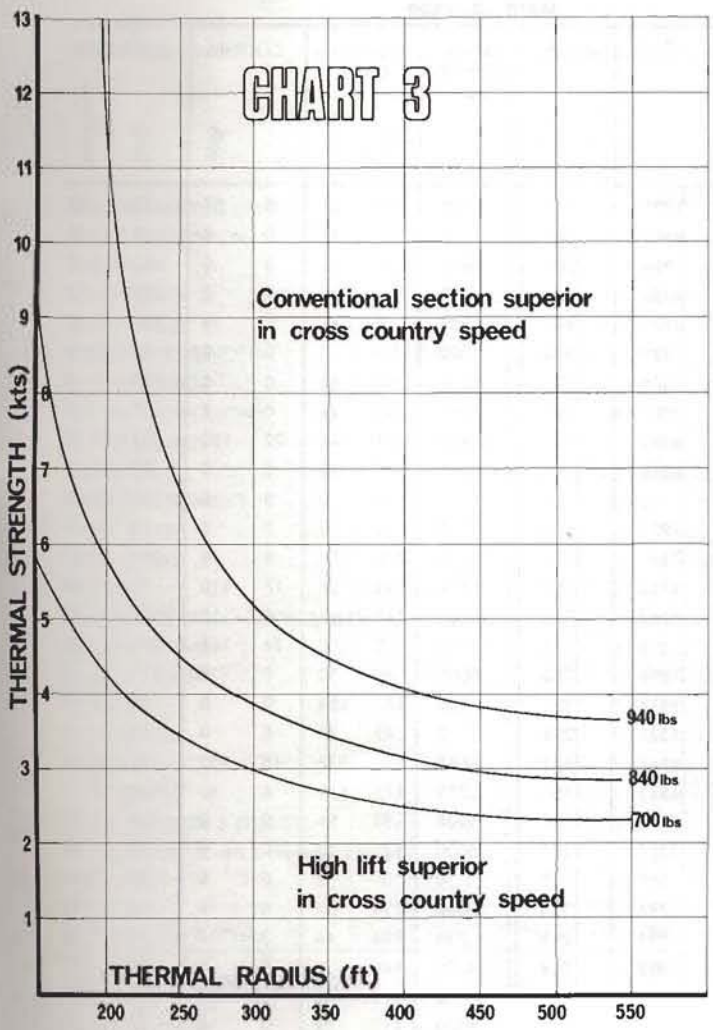
A compromise has to be reached between the desire for a high aspect ratio for low induced drag while circling, and the benefits of the larger wing area and the lower operating speeds that this will allow. Wing planform is largely decided by the aspect ratio used, for GRP allows a close approximation to the elliptical planform in the double tapered planform now almost universally favoured. The designer is left with little choice of variables with which to achieve even better performance.



The last area of opportunity is the design of the wing section for the wing profile to best suit the desired glider performance. Dr Eppler puts forward his E603 section as a good solution, but I feel that he does not go far enough in his $C_{L\,max}$. It seems to me that he is in danger of producing a glider with this section that will not climb as well as a sailplane with the high lift section, and at the same time it will not achieve the high speed glide angles of the racer.

In order to justify these remarks, I compared this E603 section with that of a high lift section, and I plotted the C_L-C_D section curves on top of each other, so the differences are apparent (Chart1). As the lift developed by a wing is a function of the section lift coefficient at that incidence, and the chord of the wing section at that point, it follows therefore, that if you can get a section which will generate a high $C_{L\,max}$ it is possible to reduce the wing chord and still achieve the same or greater value of chord X $C_{L\,max}$ as





that of the lower $C_{L\ max}$ section; that is to say you can employ a higher aspect ratio with the advantages it will give in thermal performance. I have worked out the thermal performance comparison of Prof Eppler's information and that of a similar design using a high lift section at the same weight. Chart 2 shows this on the now familiar Goodhart standard thermal.

When we now come to optimising the performance, we are up against the question of definition; the polar curve is no longer adequate as the measurements are taken in straight gliding flight and do not bring in thermal performance. The BGA method of handicapping gliders is a blunt instrument but a step forward, as it does bring in the concept of cross-country speed. The purpose of this article is to show how the extension of the concept of cross-country speed can be used to show how a glider will perform in a variety of thermal conditions, and how the wing section can affect this at differing flying weights.

We compared the computer cross-country performance of the glider with a high lift section and with a conventional section at a number of thermal strengths and sizes. In the weak conditions we found the high lift section achieved a higher cross-country speed by virtue of its higher rate of climb and, as you might expect, when conditions were better, the more conventional section gave a faster cross-country speed. It follows therefore that there is a point at a given thermal strength and radius where the two gliders achieve the same cross-country speed. That point is the thermal strength at that radius, and can be plotted to form a series of points on an exchange curve. A line is drawn across the graph on Chart 3 and it follows that in conditions existing below the line the high lift section will achieve a higher speed, while for conditions above the line, the reverse is true.

If the all up weight of the sailplane with the high lift section is increased, the line moves up the curve to the right, showing that the addition of waterballast will increase the range of conditions in which the cross-country speed is greater. This is a visual expression of common experience, but does give a measure of the water to be added in the existing conditions. It should be appreciated that at all times I am comparing two sailplanes at the same flying weight, and the only significant difference is the use of the high lift section. I might add that the characteristics of the high lift section have been confirmed by flying experience.

* * *

To sum up, the use of high lift wing section has many benefits for the sailplane designed for weak conditions. It can also achieve higher cross-country speeds better than the more conventional sections in these thermals. When the design of sailplane is first specified, I feel that the conscious decision must be taken to optimise for either a Climber or Racer. The difference in the performance is represented on the concept of the exchange or suitability curve, and the hope is expressed that this can show more clearly the characteristics of a chosen sailplane. However, in the event, the performance of the sailplane still depends on the thermal strength that you encounter. In other words, horses for courses.

ANNUAL STATISTICS – OCTOBER 1, 1976 to SEPTEMBER 30, 1977

GLIDING CLUBS	AIRCRAFT				LAUNCHES	HOURS	CROSS-COUNTRY KMS	FLYING DAYS		COURSES		MEMBERSHIP	
	Club 2s	Club 1s	PO	Tugs				Total	Soaring	No.	Pupils	Flying	Non-Flying
ALBATROSS	2	2	0	0	1715	162	170	59	27	5	57	53	13
ANGUS	2	2	2	0	4600	541	0	119	37	0	0	60	10
AQUILA	2	1	5	1	1926	261	850	75	20	0	0	40	8
AVRO	3	1	0	0	4481	460	719	130	49	0	0	208	12
BATH & WILTSHIRE	2	3	15	2	4572	1447	12219	58	44	1	10	105	30
BIRMINGHAM UNIVERSITY*	1	3	3	1	749	314	700	0	0	0	0	55	0
BLACKPOOL & FYLDE	3	2	14	0	3500	1320	1300	98	58	0	0	153	0
BORDERS (Milfield)	2	2	5	0	2981	467	1150	101	26	0	0	57	2
BRISTOL & GLOUCESTERSHIRE	3	4	26	3	6392	2735	27643	224	144	22	150	224	40
BUCKMINSTER	3	3	13	0	6318	1186	4200	147	45	0	0	98	2
BURTON & DERBY	2	0	6	0	0	0	0	0	0	0	0	80	15
CAIRNGORM*	2	0	2	0	1878	354	0	0	0	0	0	20	5
CAMBRIDGE UNIVERSITY	2	5	23	2	7460	3108	38100	278	104	8	48	263	35
CORNISH	2	2	8	0	4710	763	351	142	58	17	110	93	24
COTSWOLD	3	2	16	0	6267	1465	11204	162	69	3	18	137	23
COVENTRY	3	4	40	3	0	0	79950	0	0	24	161	269	26
CRANFIELD	1	2	7	1	1296	770	5000	89	30	0	0	110	0
DEESIDE	3	2	5	2	2574	1225	1000	187	104	0	0	95	0
DEFFORD (RSRE)	2	0	0	0	1525	224	0	48	29	0	0	24	2
DERBY & LANCASHIRE	5	3	24	0	8064	2682	5688	180	138	15	250	191	74
DEVON & SOMERSET	2	2	12	1	6983	1855	2735	175	112	6	50	169	32
DONCASTER	3	4	20	2	7172	2108	5008	190	96	0	0	154	18
DORSET	3	3	11	2	3584	1275	6000	121	53	0	0	125	36
DUMFRIES	1	0	2	0	359	29	0	37	9	0	0	20	10
DUNKESWELL	2	0	4	2	3796	355	1080	120	53	6	48	55	15
EAST SUSSEX	1	2	5	0	2991	295	735	106	46	3	17	92	28
ENSTONE	2	0	12	1	3592	568	4300	108	0	0	0	75	12
ESSEX	3	2	20	1	8778	2179	0	171	0	16	108	205	13
ESSEX & SUFFOLK	2	1	11	2	2143	1203	5750	112	54	0	0	75	30
GLAMORGAN	1	0	0	0	Included in South Wales return							7	0
GLASGOW & WEST OF SCOTLAND*	1	1	0	0	Included in S.G.U. return							61	0
HAMBLETONS	2	4	0	0	2928	1122	0	141	30	0	0	194	0
HEREFORDSHIRE	3	0	16	2	5198	2726	23700	229	125	27	118	120	0
HIGHLAND	1	2	1	0	2027	312	150	86	42	0	0	31	0
IMPERIAL COLLEGE	1	3	2	0	1390	322	2520	0	0	3	10	88	20
INKPEN	1	1	6	1	630	410	7000	39	27	0	0	30	0
ISLAY*	1	1	0	0	222	29	0	0	0	0	0	14	0
KENT	4	2	12	2	9337	1312	2850	263	133	32	350	216	54
KIRKNEWTON	1	0	0	0	15	10	0	6	3	0	0	9	1
LAKES	2	1	6	1	2576	660	200	117	61	9	72	65	5
LANARKSHIRE	2	1	1	0	1545	277	0	84	0	0	0	40	0
LASHAM	6	0	92	5	25334	6113	71750	294	0	99	299	689	368
LINCOLNSHIRE*	3	2	9	1	6864	1121	912	0	0	0	0	59	6
LONDON	4	5	55	6	13542	5384	0	300	250	33	243	365	50
MIDLAND	3	3	15	1	9953	2407	3858	211	123	27	223	221	68
NEWCASTLE & TEESSIDE	2	2	3	1	1658	395	400	104	82	0	0	44	6
NORFOLK	3	2	14	2	2559	1291	3749	140	67	5	38	120	20
NORTHUMBRIA	3	1	13	1	4796	814	1000	181	80	12	72	170	22
NORWICH SOARING*	1	0	5	1	207	463	3310	0	0	0	0	13	0
OUSE	2	2	12	1	4457	1465	5300	128	68	0	0	104	18
OXFORD	2	3	11	0	3609	1061	0	111	0	0	0	122	6
PETERBOROUGH & SPALDING	2	2	9	2	1560	780	0	0	0	0	90	55	9
POLISH AFA*	0	3	1	0	0	0	0	0	0	0	0	62	1
RATTLESDEN	1	1	5	0	1449	197	180	57	24	0	0	30	0
ROYAL AIRCRAFT ESTABLISHMENT	4	0	3	0	4078	911	2487	134	55	0	0	79	12

ANNUAL STATISTICS – OCTOBER 1, 1976 to SEPTEMBER 30, 1977

GLIDING CLUBS	AIRCRAFT				LAUNCHES	HOURS	CROSS-COUNTRY KMS	FLYING DAYS		COURSES		MEMBERSHIP	
	Club 2s	Club 1s	PO	Tugs				Total	Soaring	No.	Pupils	Flying	Non-Flying
SCOTTISH GLIDING UNION	4	6	23	2	12687	6360	2350	293	18	22	240	370	36
SCOUT ASSOCIATION	1	1	1	0	1100	283	300	172	23	12	72	40	0
SHROPSHIRE	0	0	10	1	408	525	5000	70	55	0	0	21	0
SOUTHDOWN	3	2	13	1	6071	1588	10780	161	57	0	0	204	43
SOUTH WALES	2	1	10	1	2954	895	2000	111	61	3	30	107	15
SOUTH YORKS & NOTTS	2	1	5	0	2477	323	508	95	37	0	0	41	2
STAFFORDSHIRE	1	1	5	0	1949	210	0	91	28	1	12	72	2
STRATFORD ON AVON*	3	2	10	2	5136	2126	4872	0	0	0	0	85	10
SURREY & HANTS	0	11	0	0	5375	2106	11174	0	0	0	0	313	0
SWINDON	2	3	10	1	4312	1071	4750	147	68	0	0	86	11
TIGER CLUB SOARING	0	0	1	1	162	66	0	20	3	0	0	10	0
TRENT VALLEY	2	2	9	0	4746	828	2640	89	32	0	0	76	2
TYNE & WEAR	2	0	3	1	420	147	410	37	20	0	0	51	0
ULSTER	2	3	4	1	1246	350	500	70	0	0	0	30	0
UNIVERSITIES OF GLASGOW & STRATHCLYDE					Included in Lanarkshire return							20	0
UPWARD BOUND	3	0	2	0	2730	275	55	78	0	0	0	25	5
VALE OF NEATH*	1	1	2	0	977	121	0	0	0	0	0	40	4
WELLAND	2	0	2	0	1048	201	50	49	28	0	0	25	0
WEST WALES	3	0	1	0	1942	356	500	89	50	0	0	35	10
WOLDS	2	1	4	1	5150	817	3000	145	51	0	0	100	10
WOODSPRING*	2	1	4	0	5448	658	910	0	0	0	0	110	0
WORCESTERSHIRE & DOWTY	2	0	9	3	1450	365	590	128	30	3	22	57	5
WYCOMBE (AIRWAYS & THAMES VALLEY)	7	7	30	5	10500	3500	62000	250	130	14	56	276	0
YORKSHIRE	3	3	30	2	7800	1900	12400	320	200	22	157	332	34
CIVILIAN CLUB TOTALS:	172	145	789	75	302428	84004	470007					8839	1368
ARMY GLIDING ASSOCIATION:													
KESTREL	2	4	1	0	5235	861	9680	96	49	0	0	62	30
SOUTH WEST DISTRICT	2	4	0	1	4188	825	8000	103	0	2	14	75	0
ROYAL AIR FORCE GSA:													
ANGLIA	2	2	0	0	2387	397	1167	90	0	0	0	78	0
BANNERDOWN*	2	3	4	1	9104	1880	12241	0	0	0	0	64	30
BICESTER*	4	16	0	1	18115	8022	53276	0	0	0	0	495	0
CHILTERNS	3	3	1	0	3024	717	3271	99	43	0	0	54	9
CLEVELANDS	2	5	5	3	5258	2453	8285	157	55	1	12	180	5
CRANWELL	4	2	1	0	3044	411	2872	80	35	0	0	50	0
EAST MIDLANDS	2	2	0	0	2436	337	573	92	30	0	0	65	0
FENLAND	2	2	2	0	6669	956	2000	110	30	0	0	90	0
FOUR COUNTIES	2	5	7	0	6806	1724	6738	0	0	0	0	97	10
FULMAR	2	3	1	0	3761	622	600	92	31	0	0	54	0
HUMBER	2	2	3	0	3898	492	4800	0	0	0	0	63	2
MAWGAN VALE*	2	1	3	0	2145	261	75	0	0	0	0	43	10
WREKIN*	2	4	3	1	6938	1685	5350	0	0	0	0	80	0
ROYAL NAVAL GSA:													
CULDROSE	3	2	3	2	2536	597	476	83	37	1	12	50	0
HERON	3	3	3	3	2361	699	3200	77	34	1	16	58	0
PORTSMOUTH NAVAL	3	3	2	4	3104	925	1174	127	34	1	16	125	5
SERVICE CLUB TOTALS:	44	66	39	16	91009	23864	123778					1783	101
CIVILIAN TOTALS (B/F):	172	145	789	75	302428	84004	470007					8839	1368
GRAND TOTAL:	216	211	828	91	393437	107868	593785					10622	1469

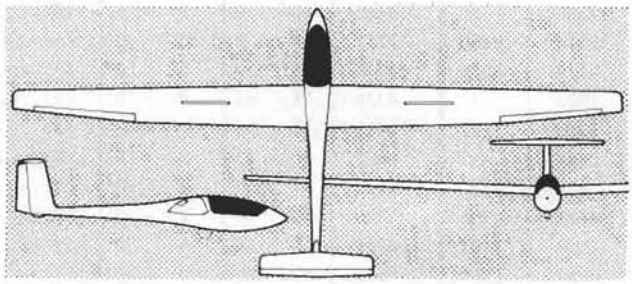
CLUBS MARKED * HAVE NOT SUPPLIED STATISTICS AND 1976 FIGURES HAVE BEEN USED

The PIK 20D photographed by Andrew Hulme after its first flight in this country.

SAILPLANES 1978

Compiled by ANDREW COATES

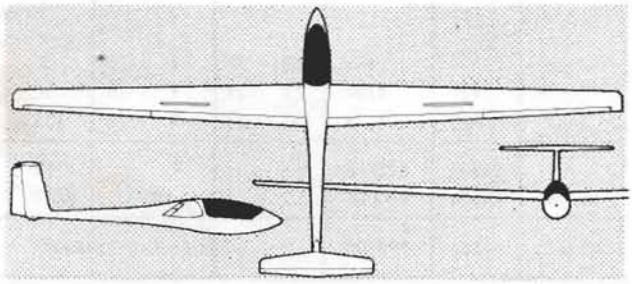
The following tables present (in alphabetical order) the majority of sailplanes at present in, or about to go into production. The figures included give a guide to the sailplanes but for a complete picture, careful reading of the Pilot's manual is essential. In particular the weight of maximum waterballast should be checked against the maximum all up weight. Stall speed is given for minimum weight because of the jettison of water before landing. Performance figures are in most cases calculated. Prices have not been included and anyone interested should write to the manufacturers or their agents. This is the third S&G review of sailplanes, the first being published in February, 1975, p24, and the second in February, 1976, p18.



Astir CS 77

Manufacturer	Burkhart Grob
Span (m)	15
Wing area (m^2)	12.4
Aspect ratio	18.2
Wing section	Eppler
Wing loading (kg/m^2)	36.3
Empty weight (kg)	270
AUW (kg)	450
Waterballast (kg)	100
Stall speed (km/h)	60
Max speed (km/h)	250
Min sink at 75km/h	0.6
Best glide at 105km/h	1:38

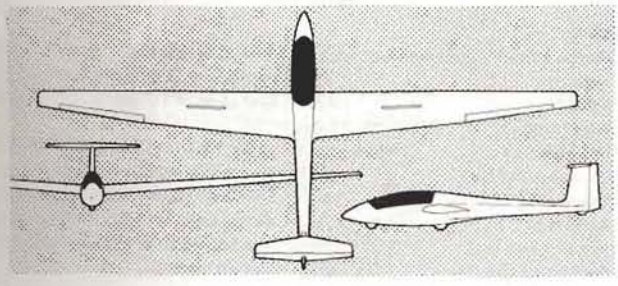
New slim fuselage. Wings swept back by 1°. Push-pull controls replaced by rotating levers. Club Class version with fixed landing wheel and no waterballast available as Astir CS Jeans.



Speed Astir 2

Manufacturer	Burkhart Grob
Span (m)	15
Wing area (m^2)	11.47
Aspect ratio	18.4
Wing section	Eppler
Wing loading (kg/m^2)	29-45
Empty weight (kg)	265
AUW (kg)	515
Waterballast (kg)	140
Stall speed (km/h)	64
Max speed (km/h)	310
Min sink at 75km/h (m/sec)	0.60
Best glide at 120km/h	1:41.5

Astir CS 77 fuselage combined with a flapped wing designed by Prof. R. Eppler. New tailplane. Scheduled to fly in December 1977.

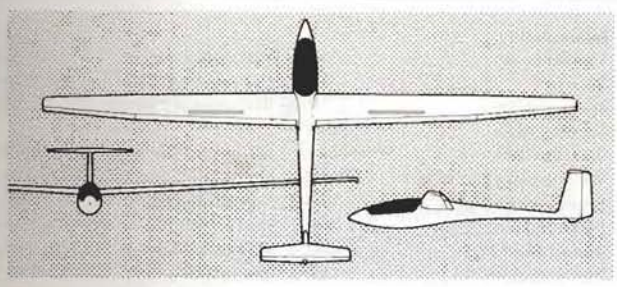


ASK-21

Manufacturer	Schleicher
Span (m)	17.5
Wing area (m^2)	18.1
Aspect ratio	16.9
Wing section	Wortmann
Wing loading (kg/m^2)	26-32
Empty weight (kg)	350
AUW (kg)	570
Waterballast (kg)	None
Stall speed (km/h)	62

Max speed (km/h)	220
Min sink at 67km/h (m/sec)	0.65
Best glide at 95km/h	1:34

Tandem seating with adequate space for a tall pilot. Sprung mainwheel and fixed nosewheel. Originally it was planned to use a steel-tube fuselage but now the aircraft will be entirely GRP. Scheduled to fly in Spring 1978.

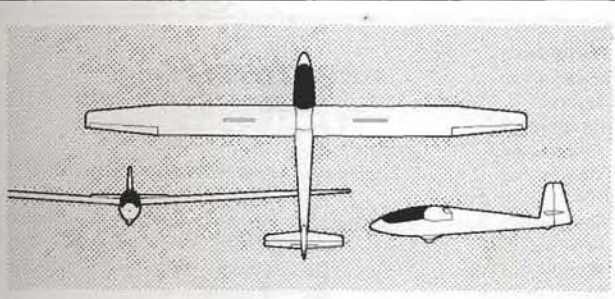


ASW-20

Manufacturer	Schleicher
Span (m)	15
Wing area (m^2)	10.5
Aspect ratio	21.43
Wing section	Wortmann
Wing loading (kg/m^2)	30-40
Empty weight (kg)	240
AUW (kg)	420
Waterballast (kg)	120
Stall speed (km/h)	69

Max speed (km/h)	250
Min sink at 73km/h (m/sec)	0.60
Best glide at 100km/h	1:43

Flapped version of ASW-19. Flap setting automatically co-ordinated with airspeed. Large airbrakes on upper surfaces only. Forward hinged canopy.

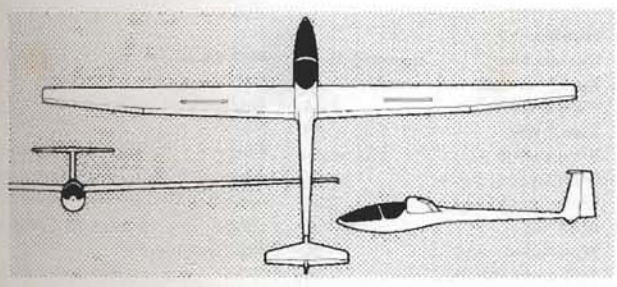


D-77 Iris

Manufacturer	Siren
Span (m)	13.5
Wing area (m^2)	11.4
Aspect ratio	16
Wing section	Bertin
Wing loading (kg/m^2)	27.2
Empty weight (kg)	200
AUW (kg)	310
Waterballast (kg)	None
Stall speed (km/h)	60

Max speed (km/h)	160
Min sink at 73km/h (m/sec)	0.68
Best glide at 90km/h	1:33

French single-seater training sailplane of glass-fibre construction. Upper surface airbrakes. Landing wheel fitted with hydraulic brake. First flight on February 26, 1977.

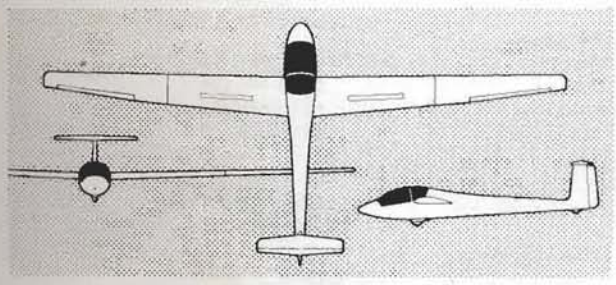


DG-200

Manufacturer	Glaser-Dirks
Span (m)	15
Wing area (m^2)	10
Aspect ratio	22.5
Wing section	Wortmann
Wing loading (kg/m^2)	31-45
Empty weight (kg)	235
AUW (kg)	450
Waterballast (kg)	130
Stall speed (km/h)	63

Max speed (km/h)	268
Min sink at 72km/h (m/sec)	0.56
Best glide at 110km/h	1:42

Flapped version of DG-100. Coupled flaps and ailerons. New tailplane. Canopy hinged aft. Flap connection automatic when rigging. Parallelogram control column linkage.

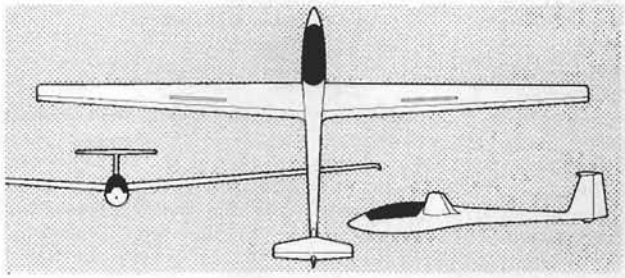


H-121 Schoolmaster

Manufacturer	Start + Flug
Span (m)	17
Wing area (m^2)	15.8
Aspect ratio	18.3
Wing section	Eppler
Wing loading (kg/m^2)	31.6
Empty weight (kg)	290
AUW (kg)	500
Waterballast (kg)	N/A
Stall speed (km/h)	N/A

Max speed (km/h)	250
Min sink at 80km/h (m/sec)	0.65
Best glide at 100km/h	1:36

Staggered seating. Right seat 250mm further aft. Canopy slides forward. Fully aerobatic. All glass-fibre construction with three-piece wings. Large top surface airbrakes. First flight on July 28, 1977.

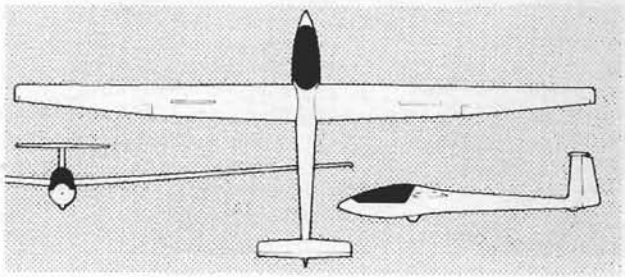


LS-3

Manufacturer	Rolladen-Schneider
Span (m)	15
Wing area (m^2)	10.5
Aspect ratio	21.4
Wing section	Wortmann
Wing loading (kg/m^2)	45
Empty weight (kg)	240
AUW (kg)	470
Waterballast (kg)	120
Stall speed (km/h)	65

Max speed (km/h)	250
Min sink at 70km/h (m/sec)	0.55
Best glide at 100km/h	1:40

Single root to tip flaperon. Airbrakes coupled to flaperons. Large cockpit. Forward hinged canopy. Sprung undercarriage. Airbrakes, water tanks and flaperons all automatically connect on rigging.

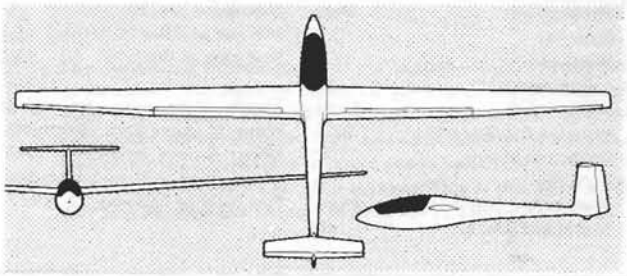


Mistral-C

Manufacturer	ISF
Span (m)	15
Wing area (m^2)	10.9
Aspect ratio	20.7
Wing section	Wortmann
Wing loading (kg/m^2)	28-32
Empty weight (kg)	230
AUW (kg)	350
Waterballast (kg)	None
Stall speed (km/h)	62

Max speed (km/h)	250
Min sink at 65km/h (m/sec)	0.60
Best glide at 90km/h	1:35

All glass-fibre construction. Club Class. Built by Dipl-Ing Strauber-Frommhold Ltd of Bensheim, Germany. Roomy cockpit. Efficient aileron and rudder action. Large spoilers for short landing. Flew in 1977.

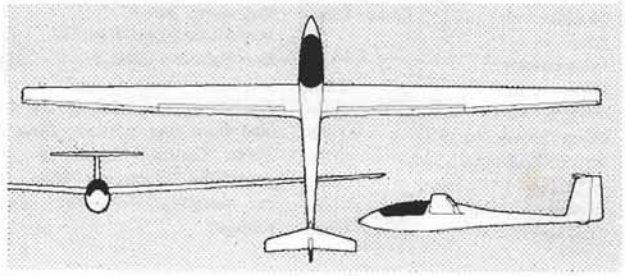


Mosquito

Manufacturer	Glasflügel
Span(m)	15
Wing area (m^2)	9.86
Aspect ratio	23
Wing section	Wortmann
Wing loading (kg/m^2)	33-46
Empty weight (kg)	235
AUW (kg)	450
Waterballast (kg)	120
Stall speed (km/h)	65

Max speed (km/h)	250
Min sink at 78km/h (m/sec)	0.57
Best glide at 106km/h	1:42

Flap/airbrake system. Carbon-fibre ailerons move as flaps are raised or lowered. Controls automatically connect when rigging. Front hinged canopy. Winner of 1977 Euroglide 15m Class.

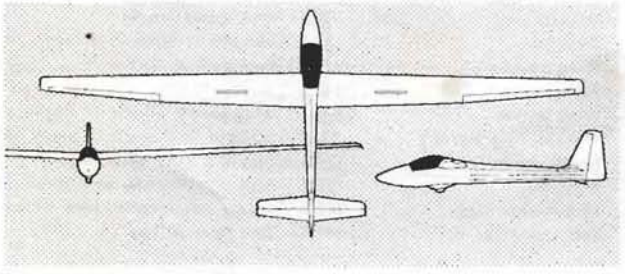


Nimbus 15

Manufacturer	Schempp-Hirth
Span (m)	15
Wing area (m^2)	9.86
Aspect ratio	23
Wing section	Wortmann
Wing loading (kg/m^2)	33-46
Empty weight (kg)	235
AUW (kg)	450
Waterballast (kg)	120
Stall speed (km/h)	65

Max speed (km/h)	250
Min sink at 78km/h (m/sec)	0.57
Best glide at 106km/h	1:42

Cirrus 75 fuselage and Mosquito wings with flaps incorporating wing root fairing. Controls automatically connect during rigging. Combined flap/trim system.

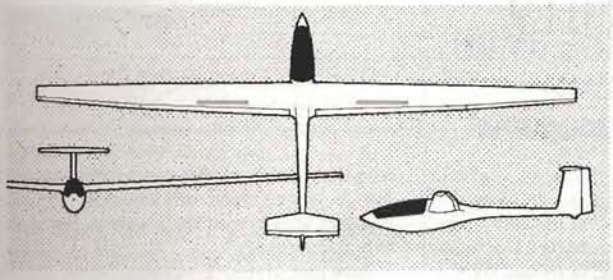


PA 15-35

Designer	Jean Potter
Span (m)	15
Wing area (m^2)	18
Aspect ratio	18
Wing section	Bertin
Wing loading (kg/m^2)	34.5
Empty weight (kg)	190
AUW (kg)	380
Waterballast (kg)	80
Stall speed (km/h)	60

Max speed (km/h)	250
Min sink at 70km/h (m/sec)	0.63
Best glide at 77km/h	1:34

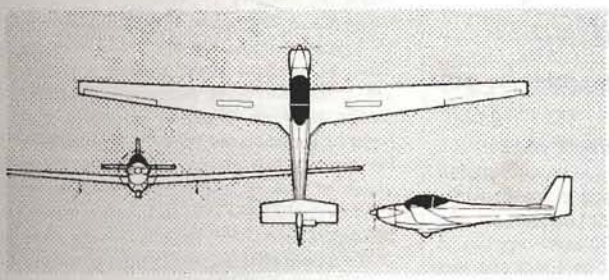
Amateur construction version of the French glass-fibre Carmam JP 15-36. Same contours and dimensions but fuselage and tail unit of wood and fabric construction. JP 15-36 wings used.



PIK 20e-78

Manufacturer	Eiri Avion	Max speed (km/h)	292
Span (m)	15	Min sink at 56km/h (m/sec)	0.66
Wing area (m^2)	10	Best glide at 117km/h	1:42
Aspect ratio	22.5		
Wing section	Wortmann		
Wing loading (kg/m^2)	29-45		
Empty weight (kg)	220		
AUW (kg)	450		
Waterballast (kg)	140		
Stall speed (km/h)	74		

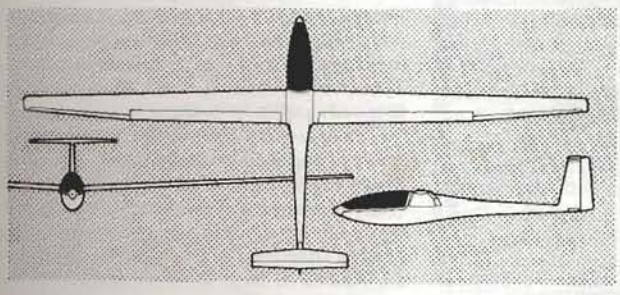
New pointed-nose. Tailplane moved forward by 12cm. Carbon-fibre wing spars. Full span camber-changing flap/aileron system. Cockpit reinforced. Adjustable backrest. Pneumatically sealed canopy.



SF-33

Manufacturer	Scheibe	Min sink at 80km/h (m/sec)	0.85
Span (m)	15	Best glide	27-28
Wing area (m^2)	12.5	Power plant	BMW 900cc
Aspect ratio	18	Rate of climb (m/min)	150
Wing section	Scheibe	Take-off distance (m)	150-200
Wing loading (kg/m^2)	32		
Empty weight (kg)	300		
AUW (kg)	410		
Stall speed (km/h)	67		
Max speed (km/h)	170		

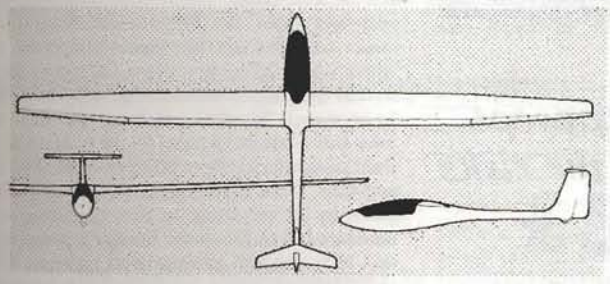
Single-seat training motor glider. Wood and fabric construction with steel tube fuselage. Powered by two cylinder motorcycle engine.



Vega

Manufacturer	Vickers-Slingsby	Min sink at 82km/h (m/s)	0.65
Span (m)	15	Best glide at 111km/h	1:42
Wing area (m^2)	10.05		
Aspect ratio	22.4		
Wing section	Wortmann		
Wing loading (kg/m^2)	30-44		
Empty weight (kg)	234		
AUW (kg)	440		
Waterballast (kg)	109		
Stall speed (km/h)	63		
Max speed (km/h)	250		

Carbon-fibre wing spars with one piece flexible flap/brake on each wing. Roomy cockpit with adequate headroom for tall pilots under forward hinged pneumatically sealed canopy. Retractable tailwheel. Maiden flight in June 1977 and the first batch will be ready in the spring.



Zuni

Manufacturer	Aero Tek	Max speed (km/h)	334
Span (m)	15	Min sink at 80km/h	0.52
Wing area (m^2)	10.13	Best glide	N/A
Aspect ratio	22.2		
Wing section	Wortmann		
Wing loading (kg/m^2)	59.10		
Empty weight (kg)	220		
AUW (kg)	500		
Waterballast (kg)	180		
Stall speed (km/h)	78		

American 15m all glass-fibre sailplane. First flight November 18, 1976. Full span camber-changing flap/aileron system. All controls automatically connect when rigging. Side-mounted control stick.

JSH Scorpion. This home-constructed sailplane, built by John Halford of Oxford, flew for first time on July 9, 1977, at Cranfield. It is a further development of Ken Holmes' KH-1 which flew in 1970. It features 18.50m wings fitted with new trailing edge flap brakes 2m longer than those of the original model. The claimed L/D of 1:37 at 89km/h is the same as that for the KH-1. Photo: Andrew Coates.

WHAT PRICE THE BLOOD-CHIT?

LIONEL ALEXANDER

It all began with an international agreement called the Warsaw Convention. This limited the liability of international air transport undertakings in respect of claims arising from death or injury to passengers, and at the same time ensured that the undertakings would automatically be liable up to the limit. Most governments (ours included) extended the principle by further Convention to non-international carriage. The current UK legislation is contained in the Carriage by Air Acts (Applications of Provisions) Order 1967. The present limit in respect of any one passenger is £40000 odd, expressed in sterling.

The burden of liability in sums of this magnitude was at the time thought to be too much for flying clubs. Accordingly, the Board of Trade, as a matter of course, used to grant exemptions from the UK legislation to clubs on application. That left the club liable (in theory) without limit, but it also left the club free to limit its liability by contracting with its passengers. The standard form of limitation was the so-called "blood-chit" of the general type familiar to gliding clubs. Compulsory limitations of ordinary liability ("exclusion clauses" as they are sometimes called) have lately become unpopular. If you have ever read the small print on a car hire contract, you will see why. I remember once being invited to sign a form before taking delivery of a hire car in which I, *the hirer*, warranted the unseen car to be in good condition. I said I would sign if they would lend me the car for a day together with the use of their hoist, their diagnostic equipment and tools and a pair of overalls. We parted bad friends, and I hired a car elsewhere. Anyway, the Law Commission recently produced a report on exclusion clauses; the indirect result is the Unfair Contracts Terms Act 1977, which has just been enacted and, from February 1, 1978, greatly curtails the extent to which a business can exclude normal liability in relation to its customers.

Following the publication of the Bill in Parliament, the Board of Trade decided that it would be appropriate to withdraw exemptions from the 1967 Order. All those likely to be affected (including the BGA) were consulted, and all exemptions were withdrawn from midnight on September 30, 1977.

Where does that leave gliding clubs? Are they liable under the 1967 Order? Does the 1977 Act make the blood-chit illegal? What happens now?

Before giving direct answers, I fear that I have to direct your attention to two legal principles. The first point to grasp is that there are clubs and clubs. One sort of club is exemplified by many commercial flying clubs. Essentially they are a business carried on by the proprietor, even if (as often happens) he offers members general rights, such as the use of a clubhouse, in return for their subscriptions, rather than selling them goods or services on a one-at-a-time basis, as a shop does.

The other sort of club is the members' club, that is to say, an association of individuals conducting some activity for their mutual good. All British gliding clubs (and the BGA itself) have these characteristics. What matters is the reality, not the form. The Cambridge University Gliding Club, for instance, is owned by the Cambridge University Gliding Trust Ltd (a company), but the whole outfit is none the less a members' club.

Clubs not trading with members

The next point is that members' clubs do not trade with their members. If you buy a bottle of beer in the club bar, the club is, technically, diverting to you for payment a slice of the members' common store. The same applies to your flight in a club glider. The Licensing Act 1964 speaks of "supply" of liquor in the context of members' club and "sale" in the context of public house sales. It is also a sale when a visitor buys a drink at your bar (if the rules so permit).

Because of these features of members' clubs, the 1967 Order *never applied to gliding clubs.* The confusion in people's minds stems from the fact that, until about 1964, the BGA regularly applied for (and got) exemptions for BGA clubs from the provisions of the predecessor to the 1967 Order. At about that time I called the BGA's attention to my view that the exemptions were unnecessary. To be absolutely sure, we took counsel's opinion; in the end, the Board of Trade acknowledged that we were right. Since then, there have been no more exemptions for gliding clubs (not, at any rate, through the BGA). The private flying movement didn't notice this, which explains why flying clubs, including those that were members' clubs, continued to apply for exemption.

A contract to accept the risks

BGA clubs, then, and for that matter members' flying clubs, have always been "open-ended" as regards passenger liability. Hence the blood-chit, which is nothing more than a contract with the new member whereby he agrees, in return for the privileges of membership, to accept the risks of what he is doing (including a *faux pas* on the part of some other member), and so limits the club's liability. If the club was not subject to the 1967 Order, either because it was specifically exempted (commercial flying clubs) or because it was not within the Order at all (members' clubs both power and gliding) it could limit its liability in any way it chose. This would of course be subject to the ordinary law about the duty of care which people owe to one another, most recently brought up to date as regards visitors to premises by the Occupiers Liability Act 1957. It was never true that the blood-chit was a complete protection to gliding clubs, still less to the individual member who caused the accident. But it was a valuable safeguard.

Now the Unfair Contracts Terms Act 1977 renders the blood-chit nearly valueless in relation to a trader. The commercial flying club, therefore, will not be able to contract out of the unlimited liability to passengers which obtains under the ordinary law. It therefore pays it to be (as indeed it is) within the 1967 Order instead. This, as we have seen, gives it a measure of automatic protection. We have also seen that the Order does not apply to members' clubs as regards transactions with their members. But beware. A club giving joy-rides to the public *would* be trading, and would thus be within the 1967 Order and the 1977 Act, so that it could not, by using a blood-chit, limit its liability other than to the extent that the 1967 Order provides. This is why it is essential, if someone wants to ride, first to enrol him as a member. The blood-chit takes care of this, if it is in the standard BGA form. However, the law is not an ass (or, not always). A club that habitually had a two-seater doing circuits with the sole object of giving rides to the general public might be held to be an Air Transport undertaking. It would also be in other forms of trouble, by being in breach of numerous provisions of the Air Navigation Order. What gliding clubs generally do is very different. They offer to prospective members the opportunity of a short trial membership "to dip their toe in the water". They also give to members' guests a chance to see for themselves what goes on. Neither of these activities undermines the essential non-trading and mutual nature of what they are doing.

The blood-chit, then, has disappeared for commercial clubs, but is alive and well for members' clubs. Does it have any limitations? Apart from its lack of blanket protection, to which I have referred, it doesn't of course limit *the size of a claim.* This is a matter best dealt with by insurance. No gliding club can ever hope to meet (for example) a claim by the relatives of a third party who has been killed or maimed by its activities. If for instance a two-seater or glider flown by an instructor on duty practising out landings descended on the head of a passer-by, thus reducing him to permanent paralysis, the total damages might today approach £70000-£80000, not to speak of legal expenses. So sensible clubs carry heavy third-party insurance. Because of the limitations of the blood-chit, it is prudent to carry all-embracing insurance, including liability to passengers, in similar amounts. Sedgwick, Forbes Ltd, who do a lot of the glider business in the UK, tell me that they are advising cover of £400000 as a combined limit for Third Party and passengers. The premiums are in the order of £100-£125.

For those who only read headlines, here is a short ready-reference question-and-answer. For some of the questions, I am indebted to Eric Wilks, of the Derby & Lancs club, without whose pestering this article would never have been written.

Q. *Does the removal of exemptions from the 1967 Order mean that gliding clubs are now subject to the Warsaw Convention?*

A. No. They never were so subject and are not now.

Q. *The Board of Trade say that flying clubs are subject to the 1967 Order and will not be exempted. Why are gliding clubs different from flying clubs?*

A. They aren't. The reason why flying clubs seem to be different is that most of them are commercial, whereas gliding clubs are not. It makes no difference what aircraft you fly; only what sort of club you are. Gliding clubs operating powered aircraft are in exactly the same position in relation to these aircraft as they are in relation to their gliders.

Q. *Is there any monetary or legal limitation on the liability of a gliding club to its members or third parties?*

A. No.

Q. *Can anything be done about this?*

A. Yes, the blood-chit limits the circumstances in which the member can claim, though not the size of any claim. There is no way of contracting out of liability to third parties (except spectators in certain circumstances).

Q. *Does the Unfair Contracts Terms Act 1977 make the blood-chit illegal or valueless?*

A. Not in the case of an ordinary gliding club.

Q. *Does the blood-chit then give complete protection as regards members?*

A. No, but the protection it does give is well worthwhile (not least because it makes clear that the passenger is a member).

Q. *Should my club carry insurance to cover passenger liability, in spite of the blood-chit?*

A. Certainly.

Q. *How much?*

A. Ask your broker.

Q. *Will the premiums ruin us?*

A. No, but an uninsured claim will.

BGA & general news

AN HONOUR FOR GEORGE

Our congratulations to George Lee, the World Open Class Champion, on being awarded an MBE in the New Year's Honours List.

COMPETITION NEWS

Badge and Record Claims. The BGA has been fairly lenient in the past when validating turning point photos, by accepting any start photograph which the official observer is able to certify as taken at the time of declaration. However, from March 1, the BGA will insist on strict compliance with the FAI Sporting Code para 2.7.2, which requires a photograph to be taken before take-off of the task declaration board, signed (with date and time) by the pilot and the observer. **Remember, photograph your declaration before you take-off.**

Competition Rules. A revised edition of the Competition Handbook will be available from the BGA from March 31. Some of the main changes are:

a) Scoring. "Place Scoring" has been withdrawn but "Air Mass Scoring" has been introduced as an optional alternative for handicapped competitions. This simple refinement, developed by Ken Brown, handicaps each leg according to its relationship with the wind. It aims to produce a fairer result, especially for the lower performance glider which struggles vainly to land just short of an upwind turning point, whilst the faster machines whistle downwind on the way back. A further change in scoring is the devaluation of races in which the winner takes less than two hours; as well as being generally fairer, it will give tasksetters scope to set short tasks in brief patches of soarable weather.

b) Held Starts. Held startlines will be optional for Regional Competitions, but whatever the organisers choose must apply throughout the competition.

c) Glider Conspicuity. Recommended Practice No. 22 of the BGA Laws and Rules (8th edition), which calls for bright extremity markings on pale-coloured gliders (including white glass-fibre types), will be mandatory for all BGA rated competitions in 1978. Full details are in the BGA Technical Note, S10 (G), issued September 1977.

Gordon Camp,
Chairman BGA Competitions Committee

EUROGLIDE DATES: *We were given a wrong date for Euroglide, printed in the last issue. It will be at Nympsfield, home of the Bristol & Gloucestershire GC from August 19-28, not August 20-28.*

ROYAL AERO CLUB - ANNUAL PRIZEGIVING

Prince Charles with the British Team and crew members.

The Prince of Wales Cup to the 1976 British Gliding Team; a Gold Medal to World Champion Open Class, George Lee; the O. P. Jones Cup to Pamela Newall, and FAI Paul Tissandier Diplomas to John Large and Roger Barrett were the awards collected by members of British Gliding at the Royal Aero Club's annual prizegiving, held on November 30, 1977, at the Royal Automobile Club.

An unusually large crowd of members and guests of both the Aero Club and the Royal Aeronautical Society attended this event. HRH The Prince of Wales, President of the Royal Aero Club, presented the awards.

The 1976 British Team were justly proud to be the first recipients of The Prince of Wales Cup, a beautifully cut glass goblet, donated by Prince Charles to commemorate the Queen's Silver Jubilee.

Simon Ames, who is leaving the Aircraft Owners and Pilots Association (formerly British Light Aircraft Corporation) after 17 years of service, received the Silver Medal.

Members of the Royal Aeronautical Society had turned out in force to celebrate and witness the presentation of the £50000 Kremer Prize for Man-Powered flight. It had taken 18 years for the prize, which originally was £5000, to be claimed.

Paul MacCready, the winner, had come over from the States with a party from his team to receive a lasting memento in the form of a silver trophy, handed over by Prince Charles and the cheque from Henry Kremer, the donor of the prize money. The qualifying flight was carried out in the States in the Gossamer Condor on August 23, 1977, piloted by Bryan Allen.

After the presentations were made, Prince Charles spent some time chatting in an informal way to the various award winners.

R.H.

ANY CHALLENGERS?

Dudley Hiscox, who started gliding with the London Club in 1930, still flies solo; last year, at the age of 83, he climbed a Skylark to more than 4000ft. He would like to know if anyone exceeding this age is still flying sailplanes solo.

RESULTS OF THE NATIONAL LADDERS

Doug Freeman (Thames Valley) has come top of the Open Ladder to win the Enigma trophy with four flights in an ASW-19. He covered distances of between 300 and 400km with the highest unhandicapped speed of approximately 80km/h.

Verdon Luck (Airways) heads the Club Ladder to gain the L. du Garde Peach trophy. His flights were in a Skylark 4, Astir and K-6E, none of which exceeded 213km.

Mike Garrod, National Ladder Steward, said that once again Coventry made the largest entry with 98 flights, followed by Derby & Lancs (79) and Booker (77). The number of participating clubs was slightly up on last year but he was

disappointed some of the smaller ones didn't enter, commenting that the north had little representation in spite of the obvious encouragement in the scoring system. As expected from the relatively few good days last summer, the top totals were substantially shorter (by over 2000pts) compared with 1976.

Open Ladder

Leading pilot	Club	Pts	Flts
1 D. Freeman	Thames Valley	7746	4
2 L. Beer	Thames Valley	7734	4
3 L. Bleaken	Cotswold	7434	4
4 F. Sheppard	Airways	6706	4

Club Ladder

Leading pilot	Club	Pts	Flts
1 V. Luck	Airways	3937	4
2 T. Cockett	Thames Valley	3173	4
3 J. Gorringe	Thames Valley	2707	4
4 C. D. Lovell	Surrey & Hants	2499	2

INSTRUCTORS' TASK WEEKS

There will be two instructors' task weeks this year. The first at Dunstable lasts seven days from June 12-18 and the second is nine days at Lasham from July 1-9. Application forms are available from the BGA and the fee is £20, which includes membership at the host club.

BGA INSTRUCTOR COURSES

The following instructor courses have been arranged and anyone wanting a place should book early: C1, Booker, March 11-17; C2, Lasham, March 25-31; C3, Booker, April 1-7; C4, Booker, April 15-21; C5, Lasham, April 22-28; C6, Husbands Bosworth, April 29-May 5; C7, Lasham, May 6-12; C8, Booker, May 13-19; C9, venue to be arranged, May 29-June 4; C10, Lasham, June 24-30; C11, Lasham, July 15-21; C12, Husbands Bosworth, August 12-18; C13, Lasham, August 26-September 1; C14, Sutton Bank, September 2-8; C15, Lasham, September 9-15; C16, Lasham, September 23-29; C17, Booker, September 30-October 6 and C18, Booker, October 14-20.

BIG DEVELOPMENT FOR TRAILER FIRM

Mechanical Services Ltd, manufacturers and suppliers of trailer equipment, have been granted planning permission for a 25000sq/ft high level warehouse. This is part of the plan to turn the 5½ acre site of a former cotton mill from a dilapidated old industrial works into an efficient manufacturing and distribution unit employing some 300 people.

FEARS ABOUT GLASS-FIBRE CATALYST

There is an alarming item in the CAA's General Aviation Safety Information leaflet under the following heading:

Glass-Fibre Catalyst Can Cause Blindness.

At a recent safety conference held in Vancouver, an eye specialist described a hazard which was unknown to many attending the conference. The hazard is the catalyst (often called "hardener" or "accelerator") that is added to glass-fibre resin before the resin is applied. The eye specialist reported that a drop of this catalyst in the eye will progressively destroy the tissue of the eye and result in blindness. This will occur even though an attempt is made to wash the catalyst from the eye, and once the chemical has started to destroy the eye, there is no known way of stopping the destruction, or repairing the damage. *(From FAA General Aviation Inspection AIDS - September 1977).*

CAA Comment: This hazard is unknown to most people, many of whom have used glass-fibre resin in aviation, car repairs, etc. This hazard should be brought to everyone's attention, including wives and children who may also use a similar kind of resin and catalyst when working with some hobby kits.

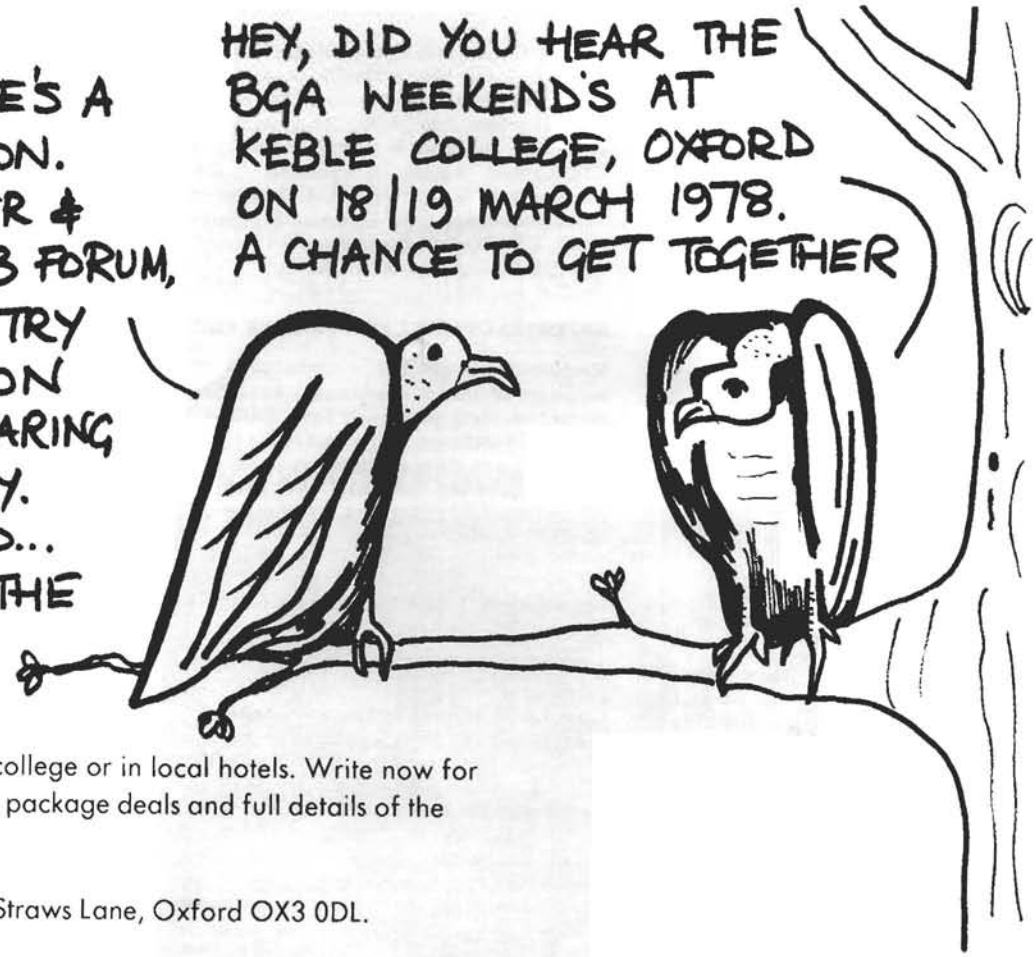
TRAILER CONNECTING AID

Trailer Connectors of Horsham, with the delightful address - 6 Tuggles Plat, Warnham, Horsham, have developed an ingenious device to enable your single man (or woman) crew to connect the trailer to the car without the risk of a dented boot.

The kit consists of a mirror to be mounted on the front of the trailer and triangular markers which are fixed on the rear view mirror and rear window. When the markers are aligned the trailer's towing cup is positioned directly above the towing ball on the car. The kit is £4.95 plus 50p p&p.

NEW GLIDER

We are told there is a new two-seater from the Romanian stable - the IS-32 which is a developement of the IS-28B2. We will give more details and a photograph in the next issue.



Accommodation at the college or in local hotels. Write now for special rates, alternative package deals and full details of the

BGA WEEKEND

to: Dee Reeves, 16 Jack Straws Lane, Oxford OX3 0DL.

OBITUARY

Joan Price

With deep regret we have to record the death, after a prolonged illness, of Mrs Joan Price, who as Joan Meakin was specially prominent in British gliding in the 1930s, but continued to keep in touch with gliding affairs for long afterwards. Already an aeroplane pilot, she visited the Wasserkuppe during the Nationals of 1931 with a friend in an Austin Seven, and later that year was flying a Falke at a meeting on the South Downs.

A few years later she became well known all over the country for her gliding demonstrations in Sir Alan Cobham's flying circus, using a Rhönbussard which she had brought to England from Central Germany by aerotow in stages. (The Press added up these stages and made it a World gliding distance record.) In it she would be towed up high and then loop the loop all the way down, concluding with a downwind beat-up of the airfield followed by a turn into wind and a spot landing in front of the spectators.

Press cuttings from local papers would come pouring in, each beginning "Titian-haired Joan Meakin . . .", evidently from an official handout. This suggests a strong personality and, as an example, she utterly refused to stay in hotels with the rest of the team; instead, she would crawl into a tiny tent on the airfield.

At the end of one of these shows the sky looked so soarable that she begged to be allowed to try a cross-country. So she was towed up to a cloud street and flew under it to its far end, then glided on downwind to a landing some 40 miles from the start. But she made such tight loops at the displays that by the end of the first season the Rhöbussard had developed a pronounced dihedral angle, and a new one was obtained.

In 1936 Joan married Ronald Price, who had been Cobham's manager. During the war they had a girl and a boy; both developed into highly original characters.

In 1937 Joan flew in the British Team at the first World Gliding Contest, on the Wasserkuppe in Germany, sharing a King Kite with another pilot; the only other women competitors were Hanna Reitsch of Germany and Emi von Roretz of Austria. Her longest cross-country was to an isolated village where she suddenly landed after seeing only 400ft on her altimeter, having forgotten that she had set it at zero on the Wasserkuppe summit. Though not knowing a word of German, she was given a marvellous reception, including a huge meal with 12 potatoes, at the village inn, which laid on a dance and became packed tight, inside and out, apparently with the entire village population.

Joan's next cross-country was from the Surrey Club's original site at Reigate in 1938; she flew northwards across the Thames estuary and landed on the east coast on a golf course at Frinton-on-Sea, where a golfing Colonel refused to believe her story, and still refused to believe it even after searching the fuselage inside and out many times for evidence of a motor.

After the war Joan was a regular visitor at Dunstable, near which her husband worked; then they moved to the New Forest, and finally to the Isle of Wight, where she suffered her last illness. She had long been a lovable asset to the British gliding scene.

A. E. SLATER

London GC will be holding a Regional Competition from May 6-14. Application forms from John Jeffries, CFI.

GLIDING CERTIFICATES

ALL THREE DIAMONDS

No.	Name	Club	1977
81	H. R. Jarvis	Eagle	12.5
82	D. S. Watt	Airways	26.10
83	P. S. Whitehead	Deeside	22.10
84	D. J. Freeman	Thames Valley	4.11
85	R. Feakes	Four Counties	4.11

DIAMOND DISTANCE

1/146	H. R. Jarvis	Eagle	12.5

DIAMOND GOAL

2/853	T. A. Joint	Bannerdown	1.8
2/854	D. L. Pratt	Waikerie	10.3
2/855	R. Dalling	Kestrel	15.7
2/856	T. S. Lamb	Oxford	3.9
2/857	A. J. Millson	SW District	10.8
2/858	D. W. Reed	Coventry	15.7
2/859	R. G. Furley	Cotswold	3.9
2/860	J. R. Baxter	Swindon	3.9
2/861	S. Hymers	Four Counties	3.9
2/862	J. M. West	Surrey & Hants	9.9
2/863	G. D. N. Smith	London	15.7

DIAMOND HEIGHT

3/304	M. B. Jefferyes	Essex	11.10
3/305	S. G. Falla	SW District	5.10
3/306	W. T. Lewis	Cornish	5.10
3/307	A. B. Crease	Imperial College	5.10
3/308	A. P. Porter	Imperial College	11.10
3/309	D. S. Watt	Airways	26.10
3/310	P. S. Whitehead	Deeside	22.10
3/311	J. H. Odell	Kestrel	11.10
3/312	G. C. Corbett	Essex	11.10
3/313	W. C. Medcalfe	Essex	11.10
3/314	A. F. G. Clutterbuck	Surrey & Hants	1.10
3/315	J. M. Alcock	Bicester	4.11
3/316	J. R. Edvean	Chilterns	25.10
3/317	G. W. M. Neill	Angus	4.11
3/318	J. W. Turnbull	Borders	11.9
3/319	N. W. Dempster	Bicester	25.10
3/320	B. A. Roberts	SW District	5.10
3/321	D. J. Freeman	Thames Valley	4.11
3/322	T. C. Harrington	Bicester	4.11
3/323	A. R. Hancock	Bannerdown	11.10
3/324	T. M. Braganza	Bicester	4.11
3/325	M. R. Pack-Davison	Dorset	11.10
3/326	R. Feakes	Four Counties	4.11
3/327	J. R. Horst	Bicester	4.11
3/328	M. J. Millar	Fenland	25.10

GOLD C COMPLETE

633	D. L. Pratt	Waikerie	10.3
634	W. C. Lombard	Kestrel	11.10
635	B. A. Roberts	SW District	5.10
636	D. S. Watt	Airways	26.10
637	W. C. Medcalfe	Essex	5.10
638	J. E. Lowe	Thames Valley	3.11
639	P. J. Coward	Bath & Wilts	26.10
640	A. J. Millson	SW District	5.10
641	T. M. Braganza	Bicester	4.11

GOLD C HEIGHT

C. Ranger	Deeside	5.10
V. Rendle	Cambridge Univ	8.6
C. Brock	SW District	5.10
C. Berry	Coventry	11.10
S. G. Falla	SW District	5.10
W. C. Lombard	Kestrel	11.10
P. Singleton	Clevelands	11.9
C. J. Stothard	Yorkshire	11.9
P. M. Nurse	SGU	1.10
A. Hendersan	Newcastle	22.10
A. Hardie	Newcastle	20.10
B. A. Roberts	SW District	5.10
J. E. Harber	Fulmar	20.10
E. Pollard	Surrey & Hants	5.10
D. S. Watt	Airways	26.10
F. McFarlane	Highland	20.10
T. F. Cockett	Thames Valley	26.10
E. W. Lipski	Essex	11.10
W. C. Medcalfe	Essex	5.10
L. Groves	Portsmouth	11.10
A. Appleby	Essex	11.10
P. B. Gray	Derby & Lancs	11.9
P. Perry	Essex	13.10
D. E. Elkin	Surrey & Hants	26.10
J. R. Edvean	Chilterns	25.10
J. E. Lowe	Thames Valley	3.11
A. P. Smith	Fulmar	26.10
I. Hewitt	Chilterns	25.10
J. W. Tomlinson	Thames Valley	26.10
P. J. Coward	Bath & Wilts	26.10
R. W. Whiting	Surrey & Hants	22.10
K. R. Taylor	Humber	6.11
N. W. Dempster	Bicester	25.10
A. J. Millson	SW District	5.10
R. G. Goble	Clevelands	19.7
T. M. Braganza	Bicester	4.11
G. W. Sturgess	SW District	11.10
C. M. Towle	Bicester	3.11
M. D. Kochman	Surrey & Hants	20.10
I. Grimwade	Aquila	5.10
Judith Watson	Northumbria	2.7
H. E. Stevenson	Fulmar	26.10
A. D. Bould	Fulmar	20.10
A. K. O'Fee	Fulmar	20.10
P. R. Barley	Fulmar	20.10
W. H. Bramwells	Fenland	26.10
M. A. Simmonds	Fenland	22.10

GOLD C DISTANCE

T. A. Joint	Bannerdown	1.8
D. L. Pratt	Waikerie	10.3
S. Hymers	Four Counties	28.10
R. Dalling	Kestrel	15.7
T. S. Lamb	Oxford	3.9
A. J. Millson	SW District	10.8
D. W. Reed	Coventry	15.7
R. G. Furley	Cotswold	3.9
J. R. Baxter	Swindon	3.9
J. M. West	Surrey & Hants	9.9
G. D. N. Smith	London	15.7

Correction: Silver C No. 4790 in the October issue was given as E. R. Duffin instead of E. R. White.

OVERSEAS NEWS

Please send news and exchange copies of journals to the Overseas Editor: A. E. Slater, 7 Highworth Avenue, Cambridge, CB4 2BQ, England.

THREE WORLD TWO-SEATER RECORDS CLAIMED

On November 16, 17 and 21, Tim Mouat-Biggs and his passenger, Mr Murray, took a Janus two-seater round 300, 500 and 100km triangular courses at speeds of 135, 138 and 147km/h respectively. The flights were made in South Africa and are subject to homologation.

AUSTRIAN NATIONALS

Austria's 1977 Nationals were divided into four Classes, the winners and runners-up in each being, Open Class, Helmut Frint, Othmar Fahrerfellner; 15m, Peter Helfer, Andreas Hammerle; Standard Class, Christian Pinter, Jonas Felberbauer; Club Class, Friedrich Ronig, Franz Angermann. The average distance per flight in each Class was : Open, 435.92km; 15m, 448.40km; Standard Class, 436.71km; Club, 341.13km. – *Flugsportzeitung*

OSTIV CONGRESS

The 16th Congress of the Organisation Scientifique et Technique Internationale du Vol à Voile (OSTIV) will be held from July 20-29 at Chateauroux, France, the site of the next World Championships.

Authors, affiliations, titles of papers and comprehensive summaries should be received as soon as possible, but not later than February 28. Technical papers should be sent to: Floyd J. Sweet, Chairman OSTIV Technical Section, 1910 Massachusetts Avenue, McLean, Virginia 22101, USA; and scientific papers should go to: Dr Joachim P. Kuettner, Chairman OSTIV Scientific Section, 345 17th Street, Boulder, Colorado 80302, USA.

The Technical programme will cover sailplane design, construction, instruments and operation and the Scientific session is concerned primarily with aspects of soaring meteorology. In addition, there may be joint sessions on special subjects covering both fields or being of wide interest for technicians, scientists as well as soaring pilots. Topics may include, but are not limited to, dynamic soaring, general philosophy of Competition Classes, hang gliding and man-powered flight.

Nominations for the OSTIV Plaque and the Klemperer Award, to be presented at the Congress to the person who has made a noteworthy scientific or technical contribution to soaring flight, must be sent to the President of OSTIV, L. A. de Lange, Van Halewijnplein 37, Voorburg, Holland, by March 31.

OBITUARY

Harro Wödl

Austria's leading sailplane pilot, Harro Wödl, has lost his life in circumstances which are obscure and are still undergoing investigation, according to *Flugsportzeitung*.

On October 5, 1977, he was flying with a pupil in a high-performance two-seater Janus, occupying the front seat, presumably at Aigen. It was a calm evening among the mountains. After soaring for 15 to 20 minutes over the west slope of the Grimming, barely maintaining height, they encountered an apparent thermal in which they started circling. There was immediately a violent shock, in which Wödl "suffered fatal injuries"; his companion, also badly shocked, managed to alert the airfield by radio. After landing, he and the body of Wödl were taken to hospital, reaching it three hours after the accident.

Harro Wödl was born in 1927 in a village near Vienna, and began flying in 1942. He flew in all the World Gliding Championships from 1963 to 1976.

NEW FOR 1978

IMPROVED GLIDER DESIGNS
BASED ON PROVEN FORMULAE

JANTAR 2B

10 basic improvements on world beater which came 2nd and 3rd in World comps and on which Steve White won 1977 Nationals 20.5 mtrs. 48:1 glide angle.

DELIVERY MAY 1978

Price complete £15,250
Incl. Del. instruments
Duty & V.A.T.

JANTAR STANDARD '2'

15 basic improvements on proven design.
40:1 glide angle. Fully instrumented, dust covers, technical documentation, delivery, duty and V.A.T. incl. **£9,000.**

DELIVERY MAY 1978

PIRAT '75'

DELIVERY APRIL 1978
Ideal for club use

An improved design of well-known Pirat 15M with 'glass' tips and fueselage giving an improved glide angle and better performance in poor conditions. **All inclusive price £7,500.**

Still Available
2 Pirat 15m's at unrepeatable offer of **£5,000 + V.A.T.**
Ex stock.

ALSO NEW FOR 1978

A new management which is not based on the previous formula. All enquiries will be dealt with promptly – contact us with all your enquiries and problems relating to Polish aircraft.

PZL instruments stocked Trade enquiries invited.

ANGLO-POLISH SAILPLANES LTD

WYCOMBE AIR PARK · BOOKER AIRFIELD · MARLOW · BUCKS

Telephone: High Wycombe (0494) 40911
24 hour answering service

"DO USLYSZENIA" *(which means: hoping to hear from you)*

THE *Cambridge* VARIOMETER SYSTEMS

The outstandingly successful Sailplane variometer system.

The only **Complete** system from Variometers to advanced accessories.

Proven competition successes.

Available in Standard (80mm) case or miniature (57mm) case.

All system components, Variometers, Audios, Speed Directors and Integrators fully compatible, retrofittable and interchangeable.

STOCKED IN U.K. BY SOUTHDOWN AERO SERVICES LTD., LASHAM AIRFIELD, ALTON, HANTS GU345SR. TEL: HERRIARD 359

CAMBRIDGE AERO INSTRUMENTS INC.
365 OLD MARLBORO RD., CONCORD, MASSACHUSETTS 01742 USA

your letters

THE ULTIMATE TEST!

Dear Editor,

Having for years been at the receiving end of manufacturers' generous performance statistics and designers' rose-tinted predictions, may I commend to your readers (and especially those who are also designers and/or manufacturers) the following philosophy proclaimed by Dick Johnson (*Soaring*, September, 1977) - "A claimed glide ratio should be equal to that which the claimant is willing to be towed out over an ocean on a calm, clear, early morning, and still expect to land dry back on the beach."

Edinburgh DEAN CARSWELL

BILL SCULL BEGS TO DIFFER

Dear Editor,

I feel obliged to take up my pen when you publish an article such as "It should never have happened" (by Randle Lunt, S&G, December, 1977, p258). Whilst the article was interesting I do not feel that it makes a significant "safety contribution", indeed, it may have just the opposite effect.

Surely the conclusion (2) "Keep the brakes open until all flying speed has gone" implies that it is usual to fly the glider onto the ground. Although this is done often enough it is not good technique and every effort should be made to discourage it.

The article does make clear some, but not all, of the hazards attendant to the "fly-home". Conclusion (1) suggest that different landing techniques (fully-held-off, flown-on) will alter the position at which the glider comes to rest. On runways I'm not sure that it does - certainly not a few hundred yards; landing in the right place is achieved by correct approach control unless, of course, there is a powerful and reliable wheel brake.

Quite a lot of accidents occur each year as a result of "fly-homes", your press deadline precludes me researching them in detail but there are three points which must be made clear to pilots of limited experience attempting this (exercise):

1. That they are to make a normal approach and landing (*ie* not flown on) in a different place.
2. If the landing position chosen does not allow a margin for overshoot then it shouldn't be attempted.
3. Landings close to obstructions may mean turbulence, curlover and, perhaps, less headwind on the ground run.

The risks are still present even when a pilot is regarded as competent to carry out fly-homes. Many years ago I came second in a hangar-flying, spot-landing competition; the winner hit the wingtip on the petrol pump!

I am also tempted to have a go at Dave Watt for his entertaining article "The Rule Makers" (S&G, December 1977, p254); although much that he says is valid, some rules really are necessary, it is the manner of enforcement and the lack of flexibility which rankles. My only comment is "how nice it would be to run a gliding club without rules" because everyone was very experienced and mature as pilots. Unfortunately this isn't the case so we end up with some rules. A few hospital visits to a pilot who chose to fly along the ridge just below hilltop height might convince Dave that some rules are good; some very eminent pilots have bit the dust because they didn't believe "don't go behind the back wall".

I hope that someone else will respond to M. Wells' letter ("Are gliding courses good value for money?", S&G, December 1977, p276) - they ought to! Again I'm tempted but I can visualise the Editor reaching for her pencil or scissors.

One final point (please Editor). I think your (our) magazine is super - keep up the good work.

Alton, Hants BILL SCULL,
Senior National Coach

RULES ARE FOR INTELLIGENT USE

Dear Editor,

Dave Watts' very interesting and thoughtful article has no doubt stirred up a hornets nest of varying points of view, both for and against his arguments. I doubt very much, however, that any CFI worth his salt ever introduced a rule in the pious hope that this might be the answer to lack of airmanship or plain commonsense. In general, CFI's are voluntary, part-time administrators who, since it is physically impossible for them to oversee every single operation, lay down guide lines in the form of rules or local operational regulations which are based on their own experience and the experience of others.

Dave is very fortunate in that most of the members of his club, if not actually engaged in flying for a living, are probably associated with aviation. This factor, coupled with the presence of a full-time professional CFI, ensures that a constant high standard of airmanship is maintained. Contrast this with the task of most instructors at other clubs. Faced with perhaps a fairly large proportion of *ab-initio* and low hour pilots who probably fly at infrequent intervals and are of widely differing abilities and backgrounds, laying down of basic, simple rules may be the only way in which chaos can be avoided.

Some hard line rules may appear unnecessary or even stupid, especially to a visiting pilot of some experience and ability. They may have been instituted following some incident or series of incidents and stem from a desire to avoid similar happenings. Note I say avoid and not prevent - one cannot protect people from themselves. Simple basic rules make life easier for everyone, since observation of such rules makes behaviour more predictable; I wonder what Dave's reaction might be if he met another pilot circling the opposite way and at the same height in a thermal? Or met another vehicle driving towards him on the wrong side of the road?

Having seen some of the results not only of ignoring rules but also of slavishly following them, and on occasion done the same things myself, I can only say that the majority of rules are laid down in the light of hard won experience; not to prevent accidents, but to steer people away from them, particularly so in the case of special local conditions. Perhaps the fault lies not so much in making rules but illogically enforcing them. In a sport such as ours, enforcement smacks of quasi-military authority, something most of us are probably trying to avoid.

Enforcement or disciplinary action often appears easier than education or persuasion, especially if the pilot concerned is not amenable to criticism, or the instructor in charge is feeling bloody-minded and over-reacting to what may have been a fraught situation.

Generally any rule which cannot be reasonably followed, or is honoured more in the breach than the observance, is a bad rule. But consider, for example, a rule which states that pilots below a certain standard stay within gliding range of the airfield - a commonsense rule designed to avoid the pitfalls of field landings by inexperienced pilots while allowing them to soar within reach of a safe landing area. What does one do about the low pilot who just scrapes home over the fence and then turns through 90° at zero feet to land into wind? Or his contemporary who, finding himself low and unable to make the airfield, pulls off a sound field landing three miles away? One cannot revoke the rule on the grounds that it encouraged the one to scrape home or that because it was ignored by the other it was a bad rule.

Rules should be understood as aids to the unimaginative or inexperienced and should be administered with imagination and flexibility by those whose job it is to show them the way. Most CFIs I have met enjoy their jobs despite the responsibility and occasional aggro and try to steer a middle course between too many regulations and too little communication. I must confess to a self-interest having recently joined their ranks, but in case Dave thinks I'm suffering from a guilt complex I haven't initiated a single new rule - yet!

Nottingham RON DAVIDSON,
CFI of Coventry GC

EIGHT CHEERS FOR DAVE!

Dear Editor,

There seems to be an attitude about which thinks that the forces of nature and physics will not act if one obeys the rules. If this is drilled into the beginner, it can rob him of a far more valuable asset - his initiative; in a dangerous and unusual situation (*ie* not covered by the rule book) it is initiative that creates a survivor. I was very glad to see his article.

London T. WILDMAN

THE ESSENTIALS FOR SUCCESSFUL COURSES

Dear Editor,

Gliding courses need to be successful, and I feel a very large percentage are, but I agree that any one of the points put forward by M. Wells (S&G, December 1977, "Are Gliding Courses Good Value For Money?", p276) will be sufficient to spread gloom.

For a course to be successful several points are vital. Course members must be met by someone in authority, preferably their course instructor, or club steward, and shown the layout of the premises. A cup of tea at this stage can work wonders - your visiting pupil may have just completed a 200 mile journey.

A logbook and training progress sheet should be provided. These do not skim off too much profit and certainly improve the relationship; the training chart works in two ways - the pupil can see the progress made and there is evidence of the exercises yet to complete (always handy to show non-gliding types who cannot understand why solo status was not reached in a week). If at anytime flying cannot take place, especially the first day, then a full explanation must be given to course members. Instructors should also have sufficient back-up material to cover non-flying weather; this can be in the form of diagrams, colour slides, films, tape recordings and models.

Should all else fail take your course members out to local places of interest, after all the pupils probably chose your club because it is situated in spectacular scenery. A measure of how successful the course has been can be judged by the amount of inquiries about the club locations and membership fees.

Frodsham TONY KNIGHT

MORE THOUGHTS ON COST-EFFECTIVE AEROTOWING

Dear Editor,

Having read the article and letter on tug fuel usage in recent S&Gs (see August 1977, p165, for Cost-Effective Aerotowing by C. C. Rollings and October 1977, p228, for T. A. McMullin's letter, Fuel Consumption of Tug Aircraft) I offer the current figures obtained at Lasham where we have five tugs and do about 8500 tows a year. We have Lycoming 150hp engines in our two Super Cubs and Pawnee, a Rolls-Royce 130hp Condor and a Lycoming 130 in a Kittiwake, an aircraft which has direct operating costs similar to the Condor.

We check on fuel consumption in two ways, method 1 by checking an aircraft over a number of continuous tows, and method 2 by dividing the fuel used monthly by the number of tows the aircraft has done after making allowance for non-tow flying. This figure is a practical one for costing aerotowing and comparing aircraft.

	Method 1	Method 2, average for Jan to Oct, 1977
Tug	galls/tow	galls/tow
Super Cub 150	0.95	0.98
Super Cub 150	1.01	1.04
Pawnee 150	1.10	1.18
Condor 130	0.72	0.86

If looked at in greater detail the method 2 figure shows a rise to a Max of 1.25galls per tow for January and February, then decreases as utilisation improves so that in the summer the figures for both methods are equal. This rise in consumption is mostly due to longer warm ups, more taxying to and from the flight line and more cold starts, but clubs with low tug utilisation may find themselves with an overall figure as high as this for a large part of the year. As well as the winter/summer variation, we have noticed in the past that a worn engine can noticeably increase fuel consumption and take the overall figure up to 1.3galls per 2000ft tow.

Although these figures disagree somewhat with those published in the October issue, they seem to be in reasonable agreement with the 13US galls (10.8imp/galls) an hour quoted by Lycoming for an 0-320-A2B running on full throttle; 500ft minute climb rate, the average for a K-13, means four minutes on tow, so 0.72galls will be used in the climb alone.

A point I question in Terry McMullin's letter is that 20p for fuel for different aircraft is considerable for a busy club. I think there is a danger here in getting fuel costs out of proportion to the total cost; 20p for example is 6% of our current aerotow rate of £3 and other costs, especially maintenance, are going to vary even with similar aircraft by at least 6% - and there are other considerations. For example, looking at our fuel figures it would seem reasonable to use our Condor as our first tug, but if we did, its slower climb can mean longer queues and so a second tug has to be brought into use, resulting in more fuel used taxying, warming up, etc. Also the Condor has a 1500hr engine life compared with the 2000hr Lycoming, which means at least 10p more per tow towards the cost of a replacement engine.

Another factor that needs to be balanced against fuel costs is the opinion of the tug pilots. At Lasham there is a preference for the better visibility of the low wing Pawnee and it may be better to have an aircraft which is nice to fly and a queue of tug pilots, rather than 20p cheaper tows and tug pilots who have to be press ganged away from their lemonades in the bar.

Debating the various pros and cons could take up most of S&G and would probably only serve to underline the fact that there is no one perfect tug suitable for everyone's operation.

Alton, Hants DAVID OLIVER

This letter was sent to the BGA

DISSEMINATION OF AERONAUTICAL INFORMATION

Two recent incidents have occurred in which a lack of knowledge of current aviation warnings appears to have been a significant factor. One involved a light aircraft and a Canberra, the other a glider and a major formation of RAF aircraft.

While pre-flight planning is an individual responsibility, it is the second incident which causes NATS considerable disquiet. It is reported that, in discussion following this incident, it was discovered that the gliding club involved no longer received NOTAMS. The club had apparently decided to save £7.50 a year by removing themselves from the NOTAM mailing list.

NATS is concerned that such action might be symptomatic of a general attitude toward aeronautical information such that other gliding clubs - and even powered flying clubs - are flying around the UK, totally ignorant of Royal Flights, special formation flights, danger area changes, prohibited areas and other vital warnings. Doubtless you are well aware of the terms of Article 32(a) of the Air Navigation Order 1976 concerning pre-flight planning, and you may feel it useful, in order to protect the good name of general aviation - and the lives of individuals - to draw your members' attention to the foolhardiness of such penny-pinching by their clubs and to their individual responsibility with regard to the law.

We do our best to publish accurate information but our efforts are to no avail if it isn't read.

AIR COMMODORE M. H. MILLER
Chairman of the National Air Traffic Managers Advisory Committee

Rex Pilcher, Chairman of the BGA Airspace Committee, comments:

The letter speaks for itself, but affords an opportunity to remind all pilots that both clubs and individuals are responsible for adequately preparing for flights. Our relative freedom of movement implies self-discipline, and this must surely include being aware of potential hazards by means of NOTAMS.

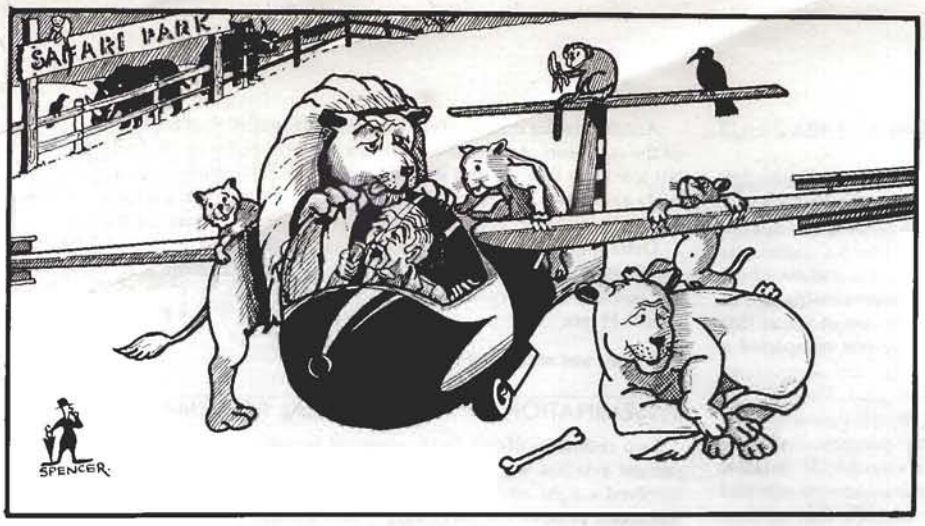
SKILL NOT ONLY FROM EXPERIENCE

Dear Editor,

Having read Max Harris' letter in the last S&G (p276) I have to speak up. While I agree that there is no substitute for skill in the world of flying, this skill should result from education, training and practice and not only from experience. If a pilot is either likely to "lose it" dangerously or unable to "find it" again afterwards, then he is unsafe in any aeroplane. How many times have we agreed with the phrase "all aeroplanes bite fools?"

I believe that a pilot can be trained to fly a slippery aeroplane with minimal experience and that many hours in a supposedly "safer" sailplane is no guarantee of safety after progression.

Bois d'Arcy, France EDDIE VANN



"– a rather difficult retrieve, I'm afraid – over!" By Mike Spencer.

CLUB NEWS

Copy and photographs for the April-May issue should be sent to the Editor, S&G, 281 Queen Edith's Way, Cambridge CB1 4NH, tel Cambridge 47725, to arrive not later than February 14 and for the June-July issue to arrive not later than April 11.

December 6, 1977 **GILLIAN BRYCE-SMITH**

BLACKPOOL & FYLDE

John Todd used moderate thermals on September 3 to tour the southern Lakes in his Skylark 3. He had to soar a slope near Kirkby Lonsdale for a while, then set off for Coniston against a 15kt wind. He slope soared the length of the lake until more thermals took him within a long crosswind final glide of Walney, a total distance of 110km. If the tide had been out he might just have got there.

Flying had to stop for November when the surface of the field started to cut up. The few inches of soil above the clay got thoroughly soaked but it has dried out enough for us to start flying again.

The AGM recorded our faith in the committee by re-electing them, and those that dared to criticise our finances were press-ganged into a Fund Raising Committee. We are solvent and able to buy plenty of materials, but could do with a little more capital. We intend to remain fully amateur, to cherish our terrific club spirit, and to keep our costs and charges low; the annual sub will rise to £25 next August.

We dined and danced on November 4, when we gave the pots to Frank Devine for progress, David Barlow for enthusiasm and Fred Connors for service. Gil Haslam went furthest and Roy Greason went highest for the third time.

K.E.

BOOKER

We have flown on most days throughout the bad summer. We now have a second Super Cub which is having a 180 engine fitted. This gives us two Super Cubs and a Terrier. The fleet is still growing – we've just had twins (K-8) and our Twin Astir is due any day.

There were some good ridge days in November and members are also busy on the C of A work. Congratulations to Steve White on being selected for the British Team and to Doug Freeman for winning the National (Open) Ladder in his newly acquired ASW-19, putting Laurie Beer into second place by a small margin. The list of new gliders on order by private-owners includes a Mini Nimbus, DG-200 and an ASW-20.

P.J.M.

BORDERS

The winter has progressed quietly so far, the highlights being Derek Piggott's talk about flying in films and the visit of a band of hope from the Four Counties Club. A total of 60hrs flying from 20 launches is a token of the success of the visit.

Congratulations to Pete Stewart on completion of Silver C. Club members took advantage of the chance of midweek with flying to complete several five hour flights with 17-year-old Ian Lowes also trying to get to Gold height in the Skylark. Unfortunately he was 300ft short.

The hangar story has taken on the dimensions of an Icelandic saga but at the time of writing the framework is in position and we hope for completion before this is published. The Tutor has been sold within the Club and we are all looking forward to the annual ball in February at Seahouses.

G.B.

BRISTOL & GLOUCESTERSHIRE

In preparation for Euroglide, work is progressing rapidly on the toilets and bunkhouse extension. This should also improve facilities for summer holiday courses.

Following the cessation of flying at Colerne, a Motor Falke is now on site and being flown regularly by its owners as well as qualified club pilots. Our Terrier tug, which has been given a new engine by "Chalky" White, should be flying in the spring, bringing our tug fleet up to two again (plus, of course, Colin Pennycuick's Cruiser). The T-21 is having its wings recovered and should be ready for those big, gentle warm evening thermals this summer!

R.A.R.

BUCKMINSTER

We continue to develop and prosper but there is a slight cloud on the horizon – the Vale of Belvoir coal mining scheme. According to the Coal Board's present plans by the 1980s our airfield will be covered by a 400ft high spoil heap. So we may end up with a ridge but nowhere to take-off or land! The NCB are now well aware that Saltby airfield, far from being disused, is occupied by an active gliding club.

The Auster, which used to be kept in our hangar and hired to us for aerotowing, was sold in 1976. So apart from a few occasions when aircraft visited us, it has been all reverse autotow. However, we have now bought this Auster and the club Olympia 2 has been replaced by a K-8 from Germany, both machines financed entirely by interest free loans from members.

A number of Silver Cs have been completed, Alan Roberts gaining his just a year after starting gliding and Geof Hill getting all three legs in one flight. Arthur Keeling, Rupert King and Steve West have qualified for assistant instructor ratings; Mick Webster passed his full Cat test and Ralph Purdue has become a BGA Inspector. All these members started gliding with the club and only Arthur Keeling had flown before – Lancasters during the war.

D.R.P.

DEESIDE

The autumn wave season was very successful with 26 Diamond height claims and 20 separate Gold height claims. Gillian Stubbs, who went solo in June, completed her Bronze C, Silver and Gold heights and five hours in one flight. Congratulations also to Peter Whitehead who completed his third Diamond with a climb in the club K-6E to 21000ft after first ridge soaring and then thermalling to 5000ft.

Our new Ralleye Commodore has arrived to supplement our Super Cub. We are hoping to build a new hangar for the tugs and a second runway to cope with crosswinds.

D.I.N.S.

DUNKESWELL

The fleet is building up at Dunkeswell – there is now a second Swallow syndicate, with all the attendant friendly rivalry! And our complement of instructors is growing all the time. Ron Perry, an assistant instructor with the Albatross Club, has joined us and we congratulate Barby Fairclough on becoming a full-rated instructor; also Bruce Bint on going solo.

Following on from the appendix on safety procedures we had a well-attended discussion on all aspects of operating in the midst of all the other clubs at Dunkeswell, and now the party season is nearly upon us with lots of parties, dances and "events" planned.

A.C.P.

ENSTONE

After months of hard work by Pete Moss we are pleased to announce that the club is now a Limited Liability Company. Our training programme continues with great success and Roger Bunker is at present doing full rating tests with three of our instructors.

Work is nearing completion on our K-7 which has been completely stripped and re-covered by our members under the supervision of John Halford.

M.W.

IMPERIAL COLLEGE

After the near disasterous year of 1977 (especially for us due to the loss of our Astir and K-8 in April) the club has rediscovered its enthusiasm and optimism for 1978.

Congratulations to Andy Lincoln, Rob Williams, Tony Crease, Tony Porter and, perhaps most of all, to Allison Jordan, our first student Diamond girl, for their various Diamonds during the last year. With these trendsetters showing the way, sights are privately set rather higher for 1978 with more distant parts of the country being scrutinised. With a complete fleet, the Astir's first full summer has been decreed a good one.

J.B.

INKPEN

So optimism, stubborness and a lot of hard work do eventually pay off. At least they have in our case, for as from April Inkpen once again becomes a seven day a week club with a full programme of holiday courses, improved facilities for all our members and ambitions for a very prosperous future.

After a year of part-time operation at Thruxton, our good friends Western Air Training and the estate managers of the airfield were most receptive to our suggestion that we should utilise the existing amenities of the site to greater efficiency. The result could well provide our movement with a new and very valuable stronghold in the south where demand for soaring facilities has always exceeded supply.

What we need now is more members, more private owners and, of prime importance, more qualified instructors to cope with the undoubted upsurge in membership we shall get, once it becomes known that our tongue in cheek claim to be "the new gliding centre of the south" has more than a tinge of reality. Plans are already well in hand to secure the use of a second tug and an addition to our two-seater capacity. The winch, which was seldom used at the old site, has been overhauled and will greatly increase our instructional capacity.

One of the more delightful memories of the past was the number of good friends from other clubs who visited us during the summer to take advantage of our superb soaring terrain and free airspace. Our new home is only about five miles south of the old site so the conditions are virtually the same and we look forward to seeing some familiar faces back on our launch point in the coming year.

R.G.W.

KENT

Thanks in no small way to Glyn Richards and Terry Bramfitt, our intrepid professionals, 1977 was our best ever course season. Our launching facilities have been considerably improved by the addition of a Citabria from Switzerland and we plan to buy an Astir to augment the top end of the fleet and encourage more cross-country flying. Nevertheless, we had some good flights in 1977, the outstanding one being John Hoye's 458km on September 5.

The annual dinner-dance was well attended and our retiring Chairman, Ron Cousins, reported that the club was in a sound financial position and well placed for the future.

D.H.

LONDON

Without back-tracking too much just a mention of the results of our two summer task weekends. The first was won by John Cardiff and Andy Eltis (IS-28B2) with John Jeffries and Jenny Law coming second in the K-13. The weather not being too kind, experience showed through. The mini Comp over the August Bank holiday had better weather. J. J. came first (K-13) with Colin Ansen (K-6E) watching how it was done. However, Bob Drewel (PIK 20) is hailed as the winner, with Jane Jones, (K-6E) second – J.J. doesn't count!

Our wave expedition to Shobdon in early November was a great success with more than a dozen gliders going. The heights of 10000ft plus reached each day have encouraged even more members to join in the next one (late February, early March). The fun started with the double dual tow to Shobdon, which necessitated an early field retrieve for one of the K-18s. John Jeffries, with two of our newer instructors, Ron Page and David Crisp, kept the K-13 and IS-28B2 flying continually during the daylight hours, an exhausting but rewarding effort.

Our Astir syndicate had a depressing set back when a large quantity of its instruments and equipment were stolen from the trailer while in the members' workshop. The number of residents are good security guards for most large thefts, but no one would question midnight activity in the repair shop.

With the departure, after 12 years, of Chairman Tom Zealley we greet 1978 with several new faces. Peter King has bravely stepped into Tom's chair. Our charming tug pilot for the past two years, Stuart Goldspink, has left to take his CPL. Tim Barnaby is staying another year, joined by Malcolm Humphries (a home grown tug pilot – converting from a Silver C). Mark Pearce, winch driver, has left and is replaced by Dick Cooper who, being a first class mechanic, will also be in charge of maintenance. John Whittle has moved from course instructing into the workshop and we have gained another secretary in the office. Our good wishes and grateful thanks to all those going, and a hearty welcome to the new faces.

D.Y.

MIDLAND

The autumn brought us many winch launches in excess of 2000ft, the record being 2450ft with a K-13. Don Brown (Dart 17R) achieved 12200ft in wave and Richard Wheatly, a sprightly pilot in his seventies, gained his duration. The secret of his success, he confided, was a pre-flight raw egg!

Congratulations to Sue Humphries and Ken Rogers, the first solo pilots of our new weekend *ab-initio* training courses, and to Sandie and Norman Kimberley on the arrival of their new ASK! (Anabel Sara).

Improvements have been made to the previously congested rigging area by separating it from the car park. On the social scene we have held a bonfire party, film night and Christmas lunch. We are looking forward to our annual dinner-dance on February 25 at the Lion Hotel, Shrewsbury.

N. and S. H.

NORTHUMBRIA

We are now involved in two major projects – to make good the two and a half miles of fence surrounding the site and the building of a new clubhouse. Members who have worked so hard

OXYGEN EQUIPMENT

The Air Apparatus & Valve A.I.R. 24 series oxygen equipment for gliders is now available for self installation, comprising a control head and 630 litre oxygen cylinder. With all the in-flight oxygen controls situated in the one position, this control head has been developed from the Company's highly successful Domiciliary oxygen unit to Drug Tariff Specification 01B.

The cylinder is of British manufacture and carries C.A.A. approval No. E 11460. It is supplied valved and charged to 2000 p.s.i.

The Company also supplies portable oxygen equipment based on 230 and 630 litre cylinders, and face masks complete with valves and economiser bags.

In the unlikely event of servicing being required, the Company operates a 24-hour turn round postal system.

AIR APPARATUS & VALVE LTD,
Oakfield Works,
Branksome Hill Road,
Camberley, Surrey.
Tel: Camberley 35073/35486.

on the fencing, a formidable task, have saved the club over £4000.

With the fence in good order we should have no problem in re-negotiating our lease with the National Coal Board and secure tenure of our site for the next 30 years. This is an important step towards securing the grants essential to the achievement of our second project.

There has already been a good response to vacancies for club members on our summer five-day courses. One week, organised by the CFI for solo pilots, is already heavily subscribed.

R.R.H.

SOUTHDOWN

A K-7 in very good condition has recently been added to the club fleet. Also a new tractor is being made ready for operation, thanks to all the hard work by Dave Corraway.

Three members have gone solo recently – Michael Balcombe, Derek Sephton and Jacq Lyon-Williams. Ted Palmer gained Silver height, Dave Knight completed his Silver C with a 50km cross-country and John Haigh has his Bronze C.

B.A.B.

STRATFORD ON AVON

Plans are well ahead for the purchase of a new two-seater to supplement the Blanik and this will probably be a Twin Astir, subject to successful wire launching capability. Several instructors and committee members have flown the Astir from Bicester and report very favourably on its merits for advanced training. Our President, Eric Rolph, chaired a recent EGM which confirmed overwhelmingly an earlier decision to go ahead with a new glider rather than a second-hand machine, even if finances are stretched for a few months.

Dave McQue, our CFI for three formative years on the new site of Long Marston, has resigned and his deputy, Jim Tyler, takes over. We thank Dave very much for all his hard work and wish Jim every success for the future. A note for visiting pilots or retrieve crews – please use the front double steel gates on the main A46 Stratford/Cheltenham road; do use the perimeter track to the launch area and please note the telephone No. is Stratford on Avon 3290.

The last month has seen terrific activity converting a modern cattle shed into a hangar for the club gliders. Three members, Peter Kenealy, Colin Bushell and Peter Candy, have grafted every weekend welding/fabricating superb steel tubular gates and partitions. We now have excellent storage for four gliders and towcars, plus plans for a clubhouse nearby.

H.G.W.

SURREY & HANTS

We really did like our B-4s (397 and 398) – 398 had even done a 500km triangle but fate has taken a final decision. After a short wave flight in October during the Portmoak expedition the pilot of 398 ran into some control difficulties, not yet investigated fully, and baled out near Kinross. He landed safely close to the glider which, along with its sister, has since been pronounced a write-off.

I think Lasham will certainly like to forget that 1977 ever happened at all with the poor weather and a number of expensive accidents. New gliders are on order but deliveries are slow so an interim purchase of second-hand equipment will probably have to be made to cover the gaps left by the B-4 accidents.

We apologise to Cotswold for assuming that 500km in September only happens at Lasham – well done! (See Surrey & Hants and Cotswold club news contributions in the last issue.)

C.L.

TYNE-WEAR

As this is our first contribution we had better start by telling you something about our club. We fly from Sunderland airport which is about six miles south of Newcastle and four miles from the coast. The prevailing wind is westerly which keeps the sea breeze at bay and often produces good wave.

We were formed in February 1977. At the moment we have about 60 full and family members. We expect this to increase to our target figure of 80 as a result of our Introduction to Gliding weekend on October 15-16. We have two club two-seaters, a K-2 and a K-2B, one of which is used for solo flying, an Eagle, also used for training, two Oly 2B's and a Kestrel 19. All launches are by aerotow using a Cessna 172 and we shall soon have the use of a Terrier and a Cessna 182 as well.

We have had some good soaring this year both in thermal and wave. The dreaded sea breeze front has proved more of a help than a hindrance and opens some interesting possibilities for really fast cross-countries. It has even been soared three miles out to sea. Our heart-felt thanks go to Newcastle & Teesside Club from Carlton Moor who are "lending" us instructors to help us over our current shortage. Geoff Gregson has just completed an instructors' course which will ease the situation.

Our Introduction to Gliding weekend received wide coverage from local TV, press and radio and we had well over 60 visitors to the airfield. Unfortunately, there was thick fog on both days and no flying was done, so we showed films and gave lectures throughout both days and hopefully quite a lot will come back to fly. The highlight of the weekend was when George Lee, World Open Champion, received a cheque on our behalf from Mr Bill Saunders, Principal Regional Officer of the Sports Council. On the Saturday evening our social evening was well attended and George gave a most interesting and entertaining talk about his flying experiences.

Congratulations to Jim Barnes and George Hall on their recent first solos. George Hall had 45 minutes of wave soaring on his first solo! We have recently bought an Atlantean double-decker bus and are fitting out the downstairs as a kitchen. It really is a splendid vehicle, in good roadworthy condition, so we are planning a club expedition to Chateauroux to see the next World Champs.

Visiting pilots can be assured of a warm

welcome, but if you are flying in, keep your eyes open for powered traffic and parachutes.

P.S.E.

WOLDS

Our annual dinner was in November when the awards were presented as follows: for the most meritorious flight, Tony Acey; for the most successful cross-country, John Derman and for the most progress in 1977, Alan Hunter.

Congratulations to Moni S. Chana on completing his instructors' course and to Chris Price and Chris Van de Vliet on going solo. Two new syndicate gliders arrived in November and Roy Andrews has organised a Christmas flying week.

A.J.B.

Service News

BANNERDOWN (RAFGSA)

The year ended with our club hanging on by its fingernails to the hangar, clubhouse and airfield, as these are being nibbled away from under us. With a change in control of the airfield and two rapid changes in CFI, club members have had little representation in what goes on in high places. Tony Clarke, our present CFI, has tried his utmost to maintain communication between the RAFSGA, the club and our new Army landlords. Happily, there is now a small gleam of hope and we look forward to 1978 with renewed vigour.

The soaring season ended on a bright note with our mini Comp. Members thoroughly enjoyed themselves, with Cary Darby nominated the navigator of the year award having flown more than 50km off track, and Jackie Hancock completing her first ever closed triangle. We are also pleased to have had so many visitors from local clubs. The "winner" was Dave Hodsman with Bob Bromwich a close second, both giving amazing performances in K-6E's.

Jim Paull (Skylark 2B) managed an heroic five hours at the end of the season and John Attaway completed his duration in the club K-13 on a very active day. Mick Webb came a close second in the RAFGSA's John Martin Memorial trophy award for the fastest 100km triangle. Andy Hancock succeeded in gaining his Diamond height after a two week bridge session at Aboyne, with a one hour flight to 20000ft.

J.J.H.

BICESTER (RAFSGA Centre)

The airfield bus has been completely refurbished, thanks to Vic Dawson and Mick Boik, whilst the success of the October barbecue was due to the hard work of many.

Brian Harrison has acquired a Piper Cub which is giving us extra tugging. The Twin Astir demonstrator is currently sited at Bicester and proving to be a popular and successful two-seater trainer.

The Aboyne expedition during October and November was particularly successful with ten pilots achieving a total of 161hrs flying three Astirs and two Std Libelles. There were many flights of more than 15000ft with Jack Alcock, Terry Braganza, Rick Horst, Tim Harrington and Bill Dempster gaining Diamonds and Colin Towle a Gold height.

C.M.T.

CHILTERNS (RAF Weston on the Green)

For the first time the Vintage Club visited our site with some 15 machines in early September. It was good and soarable and Al Fox celebrated by getting his 300km and Ray Godwin went solo.

Alisdair Raffan became one of the youngest BGA Inspectors having used our K-4 as "practical experience". He then went on to get married on December 3 – we wish him and Lesley well for the future.

The Aboyne expedition produced three Gold heights and one Diamond (Jed Edvean). The CFI just missed again, this time by 600ft – Mrs CFI should let him go again in March!

The AGM was in December when the following awards were presented: Pundit's pot, Al Fox; Aspirant's trophy, Dave Saker; Member of the year, John Burn and CFI's trophy, Eddie Wright.

J.M.

CRANWELL

Richard Meyer and Bruce Tapson gained their Gold heights at Aboyne and further trips are planned for the near future. Our thanks to Tim Dickinson for fitting the radio and oxygen in the Astir.

We welcome two new full Cats, Paul Gibson from Wittering and Frank Wilson from Chilterns. "Porky" Barnes has his assistant Cat and Nigel Heaton has returned from Bicester with his full Cat. The Christmas party was a success – our thanks to Anna and Bev for the catering.

N.J.M.

FULMAR

We have just returned from our winter wave expedition at Aboyne, this time with a certain amount of success. Gold heights were gained by John Harber, Andy Bould, Tony Smith, Alan O'Fee, Steve Stephenson and Pip Barley. Al Mellor achieved 21500ft to collect a Diamond. Since we moved from Milltown and lost our tug we are unable to use our ridge for five hours, so Mal Thompson was lucky getting this at Aboyne to complete his Silver C. We are now hoping for a good wave season at Kinloss. So far we have had climbs of up to 10000ft from the winch.

Regretfully we say goodbye to Tony Smith, MT member, who is off on a course and will probably fly at Chilterns. He has given invaluable help to the club.

G.E.H.

PHOENIX (RAF Brüggen)

We are still bearing the fruit of our two open days, with such a demand for training machines that we have bought yet another two-seater, a K-13. We have three new solo pilots: Rick Parody, our tame Canadian from AFCENT, Tony Radnor and Colin Davey. During the latest Vennebeck expedition several people were cleared for aerotow – thanks Bill and Geoff for tugging. Terry Mitchell gained his five hours and our CFI got his feet wet. Altogether this year we did 7000 launches, 1600hrs and 6000km cross-country; were visited by the high-powered team of Don Spottiswood, Andy Gough and Bill Scull and warmly welcome Graham Thompson, our youngest member.

Next year we look forward to an exciting

expedition planned for February to Sisteron, a mountain flying and wave soaring site in the Southern French Alps, and we are also hoping to send a member to the UK for a rated competition.

M.T.

PORTSMOUTH NAVAL

"Nobby" Clark, the new Secretary of Portsmouth Naval GC, photographed on a visit to the RAFGSA Centre at Bicester.

We had a very successful year with 11 A and B certificates and one C certificate, three Bronze Cs, several Silver legs, with Pat Hudson and Ron Baker completing Silver C, and Derek Aldridge and Les Groves Jnr gaining Gold height. A special mention to Colin Barnes who completed his Bronze C in four days at the RAFGSA Centre and congratulations also to Messrs Groves Jnr, Hibberd, Fox and Clarke on successfully completing their instructors' courses.

There have been a few committee changes – "Nobby" Clarke has taken over from Simon Owens as Secretary and "Dusty" Rhodes relieves Les Groves Snr as AEO. Our thanks to Simon and Les for their past efforts.

The visit to the Kestrel GC's longest day was a notable success. The gliding was superb and the celebration afterwards is still talked about.

The K-7 is almost back in the air after its C of A and we are keeping our fingers crossed hoping for an addition to our fleet in 1978.

H.C.

TWO RIVERS (RAF Laarbruch)

Since we were last in print CFIs have come and gone; Geoff Millward, who took over from Eddie Edwards has had to give up the job and Dave Wood (ex Wrekin) has taken over. Several hard core members have been posted away and are severely missed. Brian Hemstock went to Saudi Arabia (after completing his Gold distance and Diamond goal), Mick Davis has gone to Wrekin, Shaun Murphy, former Chairman, has left and Steve Dennis has been posted to Leeming.

On the profit side we have gained Dave Wood, Leigh Hood has returned and Brian Harvey from Cranwell has also joined the instructors. Over the past year the lack of instructors has been acute at times, an unfortunate result of Service postings.

Fleet changes have been minimal; the Cirrus had an argument with a set of power cables during the Detmold Comps and has been on extensive repair. The pilot, also on extensive repair, is now well on the mend.

Due to the drop in membership, plans to buy an Astir have been postponed for the time being. The K-7 suffered from "the more you look the worse it gets" disease but should be flying this year, looking like new.

The Detmold Comps went well, if one forgets the Cirrus, with two members gaining 300km. Most notable performance was Steve Dennis who completed a 300km triangle in 7hrs 41mins in the K-8. Several 300km were attempted from Laarbruch but in the indifferent weather this year none were completed. However, Silver C legs have been numerous and include three five hours on October 31, the last day of our gliding year.

An expedition to Issoire was enjoyed by six members and at the same time three gliders were at Vennebeck and produced a crop of durations. High flying *ab-initios* include two Americans, Hank Habernicht and Bill Ashbridge, who have really been bitten by the gliding bug.

The club has had an enforced move from its hangar. The accommodation we now have is far better but is a long way from the station domestic area. Over the August Bank holiday a mini-Comp was held in the form of scored tasks. Several German clubs took part and although the tasks were small (aimed at K-8 pilots) we had a good time.

G.M.

WREKIN (RAF Cosford)

During 1977 we achieved some 5500 launches and 1000hrs flown – less than the previous year, for reasons of weather and the use of our site by others. Despite this, we remain runners-up in the RAFSGA Founders trophy and the Bicester cup. We have also had an excess of expenditure over income which must be put right early this year.

Due to great efforts by Marty Platt and Bob Leadbeater, two trailers have been built for the K-18 and Astir. A high standard of aircraft servicing by "Polly" Parrott and Bob Leadbeater has given us a fully serviceable fleet again, and Dave Cottle has given much time and energy to maintaining the MT and winches in working order. We now have two fully mobile winches. A shortage of full category instructors is the biggest problem yet to overcome.

We are sorry to say farewell to Roger Cox, our Chairman for 2½yrs, who took with him, on posting to Germany, the club award for the pilot making the swiftest progress to Silver C. Other awards have been made to "Polly" Parrott, for the first hour's flight of the year from a winch launch (1 hr 9 mins in March); to Jake Jacobs for the first Diamond of the year; to John Lambert for the first Silver distance and to John Richardson for his flight of over 250km in the syndicate K-8. Colin and Dot's award has been shared by Jake Jacobs, Bob Leadbeater and Dave Cottle, the latter for the fourth time! The CFI's award for outstanding services to the club went to Andy Batchelor and Ron Jackson, and a special award, with the appreciation of us all, was made to Rosemary Leadbeater for her great efforts in running the bus canteen and for the considerable contribution to club funds from donations of the profit.

Finally, a warm welcome to Derek Jackson, our new Chairman, and to the latest and youngest associate member, Vicky Louise Platt.

I.D.M.

Club News Contributors: If you are not able to send in typed reports, please print all names. Sometimes it is impossible to work them out, even after going through countless back copies for clues!

Advertisements, with remittance, should be sent to Cheiron Press Ltd., 8/10 Parkway, London, NW1 Tel 01-267 1285. Rate 20p a word. Minimum £3.00. Box numbers 80p extra. Replies to box numbers should be sent to the same address. The closing date for classified advertisements for the April-May issue is March 9.

classified

FOR SALE

ASTIR CS, one-year-old, fully instrumented, with new trailer. Offers. Tel Ballard, Colwall 40142 (evenings).

JASKOLKA 16M. Quarter shares, based Cambridge (or Essex?). Full panel, flaps, parachute, trailer. New C of A and insurance. £950. Or would sell basic outfit £3650. Tel Brentwood 216884.

KESTREL 22, listed by BGA as top performance glider in the World. Full CA, C of A but with limitation of 110kt and 10000ft because of flutter at 140kt. Offers. 15 Metre wooden trailer, as new, built for PIK but never used. Offers. Vickers-Slingsby, Kirkbymoorside, Yorks. Tel 0751 31751. Telex 57911.

K-4 two-seater with 12 months' C of A, built 1965, looks and flies beautiful. Good trailer. £1650. Dinnington 3060, Nr. Sheffield.

THAMES VALLEY GLIDING CLUB has for sale a Pilatus B-4 with instruments, new C of A and respray. £4900. Phone Staines 54084.

SHK, good condition, new canopy, complete with trailer and instruments, barograph, radio, parachute also available if required. Tel Kelvedon 70783.

IS-29 D. In immaculate order. Full instrument panel, TM6 radio, dry battery, parachute, modified undercarriage bay, complete respray under guarantee. Wings stripped and painted at BAC Hurn, Linee trailer fully fitted, syndicate disbanding hence sale. £7600. Freddie 01-505 4141.

BOCIAN 1E, new Oct 74, flown approx 160 hrs. Plane as new, C of A will be now at sale. Full instruments, no radio or trailer, new tyre. Phone offers to 033523 480.

TWO NEW PIRAT 15MS offered at an unrepeatable price of £5000 plus VAT. Immediate delivery ensured by ringing High Wycombe 40911.

SKYLARK 2, full panel, trailer, C of A Jan 78, £2850. Tel 051-546 4192.

FOR SALE

K-6E, new C of A, basic instruments, open trailer, excellent performance with superb handling. £4900. Tel 0664 812835.

PHOEBUS 17C. Based at Booker, fifth share, immaculate condition, full panel, including A/H and audio vario, parachute, fully equipped trailer, rigging aids. £1300ono. B. Bailey, 01-977 1635.

SHORT NIMBUS. Unique gull wing 1947 high performance two-seater sailplane. Instruments, new canopy, variable droop ailerons. Good condition. Offers. Callington 2561.

L-SPATZ (SCHEIBE'S K-8). The only 300km machine for £2200. With instruments and light wooden trailer. All in very good condition. C of A 78. Bristol 696096 or Pilning 2966, evenings.

LIBELLE 201B. Third share available at Booker. Phone Laurie Beer, Amersham 4819 day, Great Missenden 3384 evenings.

SKYLARK 4, fully equipped plus trailer and November 1977 C of A. £4700. Box No SG 541.

OLY 463. Full panel, radio, trailer, outfit in exceptional condition. £3950.Tel 0621 815491.

GRUNAU BABY 3. Built 1953. Exceptional condition. Only 100 launches since complete refurbish. Full canopy. Instruments. Open trailer. £1000. Hemyock 342.

K-6E, fully fettled, full panel, Horizon, PZL and Ball Audio, oxygen, radio, parachute, trailer. Will haggle on offers over £5500. Ring 02602 3525, evenings.

CANOPIED T-21B, £1600. Contact Mr D. Godfrey, Fritwell 594, after 7 p.m.

DART 17R. ¼ share, based at Lasham, excellent condition. Fully equipped inc oxygen, radio, etc. Phone Winchester 712662 (weekday evenings).

BADGES, cuff links, tie clips and other presentation items to your own design, in any material. Markovits, Cobbold Mews, W12. Tel 01-743 1131.

COBRA 15. Full panel, instruments and trailer. May be seen at Dishforth. £5500ono. Tel Scarborough 583661 (day) or 862773 (evenings) and ask for Richard Brisbourne.

IS-28B2 two-seater performance glider. Max L/D 34:1. Flaps, powerful air brakes, full basic instrumentation front and rear seats, radio, approximately 1 year's C of A. Price £6500 plus VAT. Contact the Manager, London Gliding Club, Dunstable Downs, Beds. Tel 0582 63419.

FOKA 4, 400hrs, original owner, oxygen, radio, closed trailer. All in 2 years, best offer secures. Tel 0279 23422, evenings. Box No SG 538.

PIK 20B. Trailer and instruments, coupled flaps/ailerons. View West Midlands. Tel Berkswell 33162.

Kestrel 19 with trailer, basic instruments, oxygen and new C of A. Excellent condition, proved performance (3rd in Euroglide '77), £10500. Tel Melton Mowbray 812835.

TUG FOR SALE, PZL Wilga tug with only 150hrs since new. Used in preparation for and during World Lightplane Championships by Polish team (which came third). Price fully equipped, delivered and with radios £16000. Please ring High Wycombe 40911.

FOR SALE

BOCIAN 1E. Excellent condition. Finished white. C of A. Open trailer. Tel Bristol 299277 (day) Chippenham 3385 (evenings).

1975 STD CIRRUS, immaculate condition, full panel with radio, elaborate functional fittings with excellent trailer, £7900. Davis. Bath (0225) 833459.

KESTREL 19. Trailer, full panel, oxygen, parachute and radio, £9850. Box No SG 539.

DART 15. Prangless, 320hrs, wooden spars, instruments, parachute, new C of A and new metal trailer. Nice machine. £4500. Graves, 250 Kempshott Lane, Basingstoke, Hants, or on Basingstoke 3191 by day.

KESTREL 19, 55hrs only, instruments, trailer. Reason for sale: going sailing. Offers to A. Brooks, Convenen Cottage, Treloquithack, Helston, Cornwall. Tel Helston (03265) 4343.

SWALLOW, £1800, trailer, full panel, respray, view Booker. Phone Luck, Beaconsfield 6085, Breen, High Wycombe 35005.

OLYMPIA 2B, full panel, parachute, barograph, excellent low-line trailer, beautiful original condition, view Midlands, current C of A. Ring 0254 830909 or 021-453 3405.

SCHLEICHER K-7 two-seater for sale, made in 1963, from optical and technical point of view in excellent condition. Colour: fuselage red, wings white, approximate price DM15000. Luftsportverein Hofgeismar, V.d. Schöneberger Tor 7, 3520 Hofgeismar, Germany.

MOTOR FALKE based Halfpenny Green, quarter share available. Business 021-444 8411, home 021-474 4430.

SIE-3 (glide ratio 1:34). Because of ending syndicate. Glider is in excellent condition, two years old, 200hrs, 200 launches. Complete with basic instruments, Dittel radio, recharg batt, barograph, parachute, etc. With new alum trailer. Mr P. de Liefde, Mare laan 27, De Meern 2543, Netherlands.

SWALLOW. £1900 including VAT. 12 months' C of A. Open trailer. Stratford-on-Avon GC. Phone 021-427 7219.

GLASFLUGEL MOSQUITO carefully flown for one season only. Available March/April. Will sell complete outfit or hull only. Phone 0735-29 2544.

CLUB FLEET consisting of Std Cirrus and two Pirats is for sale. All gliders are fully equipped and with trailers if required. All inquiries regarding price etc to Zenon on 01-891 1058.

OLYMPIA 2B. Excellent condition, instruments incl, varios and T/S, radio, barograph and trailer. £2100. Phone Fozackerley, Longton (0772) 612560.

K-8B with open trailer, excellent condition, £3400. Tel 0664 812835.

FOR SALE

SKYLARK 3F with full panel plus usual extras. Full details phone Thame 4132, evenings.

FERRANTI Mk6 Artificial Horizon with economiser inverter. Also miniature turn and slip. For details phone Bicester 42691, evenings.

ARTIFICIAL HORIZON. Ferranti Mk 6 (small light type) with low consumption inverter. £130. Tel Bristol 696096, evenings.

SCHEMPP-HIRTH STANDARD AUSTRIA 'S', in superb condition, glide ratio 1:34 complete with trailer. £3650ono. Pagham 4396.

SWALLOW in excellent condition with Skylark canopy and antibalance tailplane mod. £1600. Open trailer available if required. Seen at Hus. Bos. or contact R. Davidson, 31 Lime Grove, Stapleford, Nottinghom. 062 392199 day, 392340 evenings.

PILATUS B-4, good condition, low hours (high mileage) with instruments, £5500. Professionally built metal and fibreglass trailer £900. Also available parachute, barograph and radio. Tel Preston 863974 anytime or Doug Holmes, Derby & Lancs GC. Tel Tideswell 0298 871207 at weekends.

K-4 two-seater, basic instruments, front and rear. C of A to Feb 1979. Several mods. £1000. Lunn, 5 Falkirk Avenue, Blackpool. Tel (0253) 56415 or 41764.

OPEN CIRRUS 83. The very best Cirrus in the country. NAV and 360 Com. The last word in instrumentation. Contact Middleton, Market Harborough 880281 or Davidson, Nottingham 392199.

17M JASKOLKA. BGA No 941. Flaps, retractable u/c. Full inst panel, parachute and 12 months' C of A. New all metal trailer. Price £3000. Contact R. N. Lancaster, Nottingham 811307, evenings.

DART 15. Complete with trailer, barograph, parachute, oxygen and radio. View at Shobdon. £4700. C of A August. Harlow, Cuffley 4866 (evenings).

SKYLARK 3 No 133, with trailer. Beautiful condition. Full panel including Horizon and Audio Vario. Dart canopy. £3950. Tel 0625 20748. Leave message 02602 71277.

OLYMPIS 2B, excellent condition, instruments, trailer, C of A May 1978, £1900. Kempsford 442.

20.5M JANTAR 2. Less than one year old, 1977 Nationals winner, immaculate condition, hull plus basic instruments plus wing covers. Owner has to fly 15M this year. Apply Steve White, Marlow 4035 or Alister Kay, Great Missenden 2491.

SKYLARK 4, complete with instruments and excellent metal trailer, aircraft just resprayed, with new C of A. £4700ono. Tel (day) High Wycombe 29263.

WINTER BAROGRAPH, Bohli compass, J8 horizon, altimeter, PZL ASI, oxygen set for sale. Tel 01-930 4785 or 044-284 2348.

T21B. Good condition. Canopies, basic instruments, covered trailer. C of A April 1978. Seen Mynd. £1750ono. Bill Smith, Tarvin 40444.

K-7 with improved canopy. In good condition. £3500. Secretary, Lasham Gliding Society, Herriard 322 or Deon Midhurst 4285.

2-YEAR-OLD IRVIN EB62 Parachute. Regularly repacked. Offers. Tel 01-351 4275.

PORTABLE VHF MONITOR RECEIVERS, crystal controlled on 130.1, 130.4 and 128.6mhz, £60. 8ch air-band scanners £200. Send 10p PO for details, not stamps. RADIO COMMUNICATIONS LTD., St Sampsons, Guernsey, C.I. Tel (0481) 47278 9/10am, 6/7pm Mondays to Fridays.

FOR SALE

PIRAT. Metal trailer, £4000ono plus VAT. Tel Sutton (Thirsk) 237 (08546).

SIE 3 (L/D 1:34). Fully inst, closed trailer, £4200ono. L-SPATZ-55. Fully inst, trailer, £1350. K-6CR inst and trailer, £3000. Mallon; PSA, RAF Laarbruch, BFPO 43, West Germany.

EoN 463. BGA 1355. 2 varios, audio, ASI, Alt with Speedwell trailer. Whole outfit in very good condition. £3850ono. Tel 0903 62597.

SYNDICATE OWNED "OLYMPIA", modified as "2B", good outfit, wings recently recovered, sound trailer, view Camphill. £1800. Lynchehaun, 051-339-7447.

EX-DEMO PIK 20B, carbon spar, with "go-faster" stripes and works trailer. With or without instruments. Considerable saving on new price of PIK 20 and only 18 months old. Can be flown in Cambridge area. Contact J. Hulme, Cambridge 811323.

PIRAT available immediately. Standard colour scheme, hand finished. Complete with set of covers, with or without instruments. First class condition – come and see it. Contact J. Hulme, Cambridge 811323.

SECONDHAND K-13. Nearly one year's C of A to run. Basic instruments front and rear cockpits. £6750 plus VAT. Tel London Gliding Club, Dunstable (0582) 63419.

TWO "A60" FAUCONNET, standard instruments, glide ratio 1:27. One £1800 and one £1400. Write ASVS, BP 93, 02200 Soissons, France.

T-21, good condition, basic instruments. Seen Pershore. £1800 or offers. Staton, 021-476-1833 (evenings).

EoN BABY, starboard wing damaged, £300. Canopy Mould and Oven, £200. Jack Ramsden, Whinny Fell, Brampton, Cumbria.

TRAILER, built 1975 by Javelin, York. In good condition. £400ono. Includes Pirat rigging aids. Phone Brighton (0273) 507481.

ZLINAVION TYPE 24 KRAJENAK (BGA No 655 Ex G-ALMP). This Vintage glider (circa 1946) held the endurance record and is the sole surviving example in the Western World. Current C of A. Basic instruments. Soars well. With trailer. Will sell as complete or split. Can be inspected by appointment. Offers invited. Box No SG 540.

WANTED

ASTIR. Tel details to Thame 4132, evenings.

CASH always waiting for Glider wrecks. Pieces or broken instruments. Good price paid. R. A. Reece, Tel Worcester 353372.

WANTED URGENTLY. Trailer suitable Oly 2B. Must be good towable condition. Willcox, Tel Branscombe 268, evenings.

WANTED. Pilatus B-4. Good condition essential. Phone Mansfield 754982 (day) Leobrooks 4766 (evening).

OPEN CLASS CIRRUS. Write Brigden, 7 Hampton Place, Brighton, Sussex or, better, phone 0273-25668.

K-7, two-part canopy. Details to John King, 51 Worthing Road, Horsham, Sussex. Tel 4667.

WANTED. Fournier RF-4 or SF-31 motor glider. Write description and price to Lew Tuttle, Route 3, Box 522, Boonsboro, Maryland 21713, U.S.A.

ACCOMMODATION

COTTAGE accommodation to rent, 3 miles from Scottish Gliding Union, Portmoak. Details phone 031-225 7764, evenings. Competitions.

BUCKMINSTER GLIDING CLUB EAST MIDLAND REGIONALS

3rd - 11th June, 1978

Details from:

Miss L. E. Munro,
2 Airedale Close,
Long Eaton,
Nottingham.

SERVICES

Seat belts repaired or modified to Pull Ups.
Control cables made up on request.
Barograph Calibration to 50000ft.

Above services offered by BGA inspector.
Telephone Ottery-St-Mary 2928.

AUSTRALIA'S LEADING GLIDING CENTRE

G.C.V. – BENALLA

- *Full Time Training by 4 Staff Instructors.*
- *Cross Country Dual Training, January and February.*
- *Open and Standard Class Sailplanes for exclusive hire.*
- *On site Accommodation.*
- *Accessible to Internal Transport.*
- *Close to International Air Terminals.*

MODERN FLEET

Open	1 Kestrel 19m
Standard	3 Hornet, 1 Libelle, 3 Super Arrow
Dual	5 Brosov IS-28B, Falke Motor Glider
Tugs	3 Piper Pawnee

Further details:

GLIDING CLUB OF VICTORIA
PO BOX 46, BENALLA 3672
Telephones: Benalla 057.621058 Melbourne 03.2321098

ADVERTISERS' INDEX

Four miles Shobdon

Secluded country house, 5 acres grounds, easy parking for caravans and trailers. Self-catering flatlets. B&B. E. meals

Details: Mrs Weir
"Lynhales", Lyonshall 277
Hereford HR5 3LN

BOOKS

HANG GLIDING

Bob Mackay

This very successful basic guide now in THIRD large edition, same price, 50p. Revised and with new material included.

From your bookseller, or 59p post free from Thornhill Press, 46 Westgate St, Gloucester.

TUITION

LEARN TO FLY IN SUNNY KENYA

Why not combine a holiday in Africa with learning to fly

We operate 365 days a year from our two unrestricted aerodromes and offer residential courses for the Private Pilot's Licence, Night Rating, Instrument Flying, Aerobatics, Gliding, Multi-Engine and Assistant Instructor's Ratings

Contact Kenya's Specialists in Full Time Residential Courses

The Nakuru Aero Club, PO Box 848, Nakuru, Kenya, East Africa

COME TO BRITAIN'S LEADING TRAINING CENTRE FOR A HANG GLIDING HOLIDAY

Two, Four or Seven Day Beginners' Courses

Colour Brochure from:
Dept SG, Welsh Hang Gliding Centre
Crickhowell, nr. Abergavenny, S. Wales
Telephone (0873) 810019

GLIDING

Five-day holiday courses for beginners and early solo pilots. May to September. Beautiful Peak District. Tuition and full board inclusive

Apply Steward, Derby & Lancs Gliding Club, Camphill Farm, Great Hucklow, Buxton, Derbyshire. Tel Tideswell 871270

SITUATIONS VACANT

INSTRUCTOR – SHOBDON
for 1978 Course Season.

Preference for FULL RATING, PPL, MGIR/xperience, Good cross-country (gliding) experience.

Applications to: CFI
Herefordshire Gliding Club, Shobdon Airfield, LEOMINSTER, Herefordshire HR6 9NR.

London Gliding Club requires
INSTRUCTOR
mainly for *ab-initio* courses.
March to October inclusive.
Write with experience and qualifications to:
The Manager, London Gliding Club,
Tring Road, Dunstable, Beds.

COURSE INSTRUCTOR required by the Midland Gliding Club Limited as assistant to the resident instructor for 1978 season from Easter to mid-October. Apply to K. R. Mansell, The Manor House, Ratlinghope, Shrewsbury.

GLIDING INSTRUCTOR/TUG PILOTS. 2 Course Instructors are required by Inkpen Gliding Club for 1978 Season at Thruxton. Senior Instructor. Full category ideally with PPL and tugging experience. Assistant Instructor. Full or assistant rating. A full-time tug pilot will also be considered. Some tugging experience is desirable but would train a suitable applicant. Apply in writing with full details of qualifications and experience to: Ray Hunt, 17 Savernake Close, Tilehurst, Reading, Berks.

COURSE INSTRUCTOR required by Derby & Lancs Gliding Club. May to September 1978. Full Category essential, Motor Glider Rating preferred. Apply to Mr R. A. Hare, Course Organiser, 116 Chorley Road, Sheffield S10 3RL.

LASHAM
Seasonal Staff 1978

Applications are invited for appointments as:

GLIDING INSTRUCTOR (Full Cat.)
TUG PILOT and
TOW CAR DRIVER

April – September

Apply: **THE MANAGER**
LASHAM GLIDING SOCIETY LTD.
LASHAM AERODROME
ALTON, HANTS

CHALET ACCOMMODATION

Top-quality six berth Chalets for hire at Balgedie, Kinross, 2 miles from SCOTTISH GLIDING UNION, Portmoak.

Full details from:
A. Sneddon, Stand-ma-Lane,
Balgedie, Kinross. Tel Scotlandwell 257

CARAVANS?

Save on accommodation and hire a caravan from us from £20 per week.

WHITELEY CARAVANS
1270 LINCOLN ROAD, PETERBOROUGH
Telephone (0733) 71666

PUBLICATIONS

"SOARING" – official monthly journal of the Soaring Society of America. Edited by Douglas Lamont. Address: Box 66071, Los Angeles, California 90066 USA. Subscriptions. $13.00 outside USA; apply to your post office for a form.

Put yourself in the Picture. Buy AIR PICTORIAL each month for the world air view in pictures and features. Reports and photos of aircraft and sailplanes, military aviation news, spotters' notebook, etc. Price 50p from your newsagent. For free specimen copy send 20p in stamps to Dept S.G., Seymour Press Ltd. 334 Brixton Road, London S.W.9.

LATE NEWS

BRITISH CLAIM WORLD RECORDS

Con Greaves and Christopher Simpson, flying a Janus in the South African Nationals held at Vryburg over the Christmas holiday, are claiming two new World Multi-Seater records. On December 28, they flew a 762.72km triangle with turning points at Campbell and Odendaalsrus at a speed of 104.01km/h to lay claim to the 750km triangle speed, and triangular distance records for both the World and British National Categories.

On December 27, Con and Chris flew a 550.06km goal and return to Belmont and with this flight claim the British National goal and return held by Alf Warminger and R. Tucker since 1968 and are the first claimants for the British National 500km goal and return with a speed of 101.15km/h.

Two days later they completed a 300km goal and return to Mafeking for the British National 300km goal and return record with a speed of 100.01km/h over the 311.54km course. This was held by John Jeffries and N. Foster, Calif A-21, at 81.9km/h for a flight on August 17, 1975.

Mike Carlton was also competing, sharing the Janus with Con and Chris, and although they did not fly on one day and abandoned the task twice, they came 11th in the Open Class.

Chris Rollings, Astir, who finished seventh in the Standard Class, was one of four pilots to complete the 762.72km triangle on December 28 and the first British Standard Class pilot to achieve this distance.

The leading results were as follows: Open Class: 1, Erwin Müller, Germany, ASW-17; 2, Klaus Goudrioan, ASW-17; 3, Tim Mouat-Biggs, Nimbus 2. Standard Class: 1, Dick Bradley; 2, Tom Badus, Switzerland; 3, Paul Hodge, Rhodesia, all in Std Cirrus. (All record claims are subject to homologation.)

Graham Thomson Ltd. is pleased to announce we are now a worldwide distributor of Ball Electric Variometers

Series 401 micropower total-energy variometer
(with built-in adjustable compensator)

$265.00

Series 400 micropower basic variometer
(for use with Venturi or Braunschweig tube compensation)

$235.00

Series 405 audio,
interrupted tone during climb
Series 404 audio,
interrupted up, steady down

$95.00

Ball variometers are calibrated 1000 or 1500 fpm, 10 or 15 knots, 10 or 20 m/s. Please specify when ordering, also choice of 3 volt model (recommended for club and school sailplanes) or 5-20 volt model for use with audio or cruise control.

Options

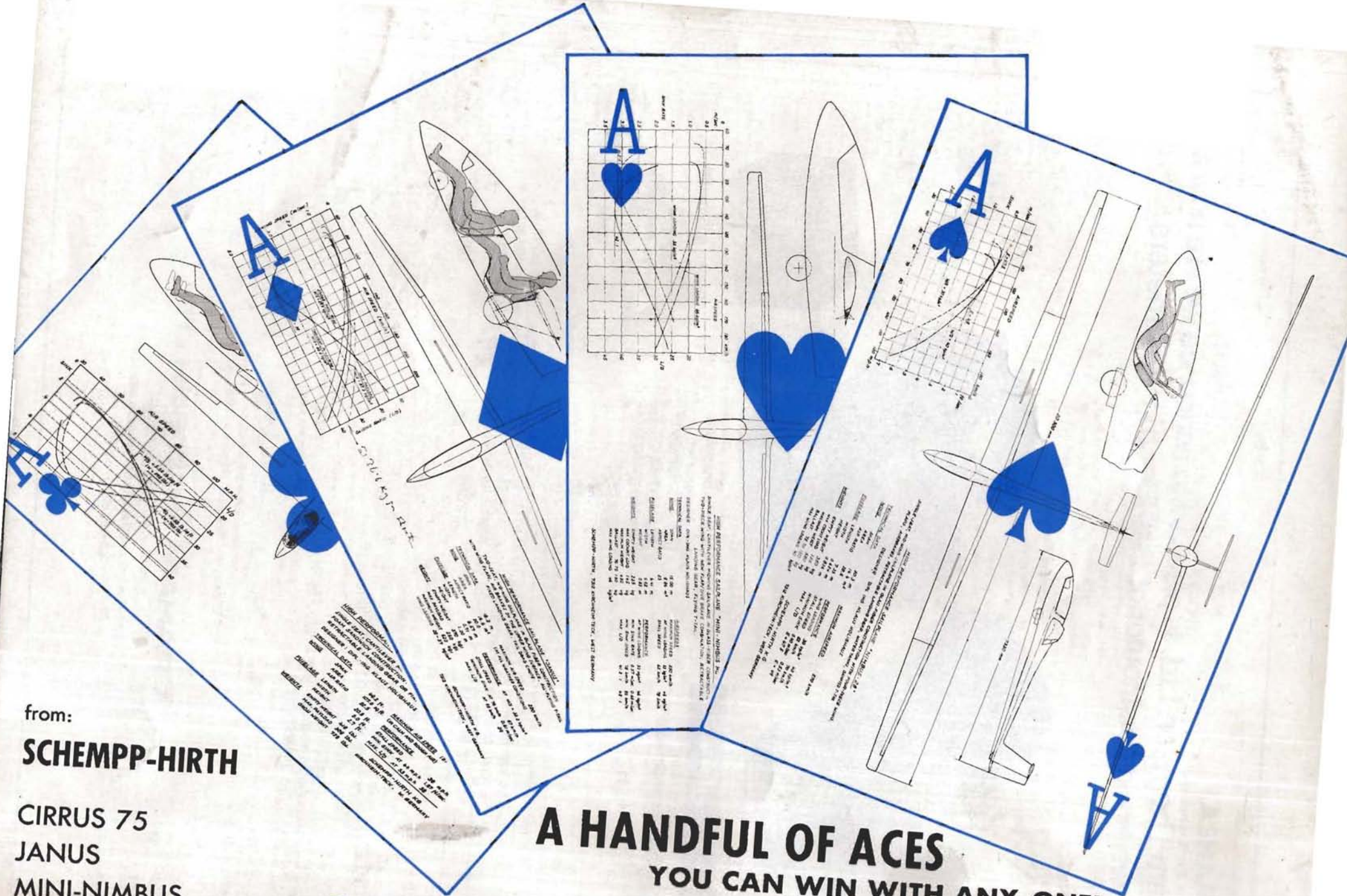
Averager (with thin meter)	$175.00
Rear cockpit repeater	90.00
Cruise control (specify sailplane)	95.00
Netto, with valve (specify sailplane)	35.00
Variable damping (4 values)	20.00
2-gain selector	15.00
3-gain selector	25.00
Audio selector (for 2 variometers)	25.00
Speed-to-fly ring	12.00

Please add $10.00 airmail shipping charges

Immediate delivery from stock
Dealer and overseas enquiries invited

GRAHAM THOMSON LTD

3200 AIRPORT AVENUE
SANTA MONICA, CALIFORNIA 90405
(213) 390-8654



from:

SCHEMPP-HIRTH

CIRRUS 75
JANUS
MINI-NIMBUS
NIMBUS 2B

A HANDFUL OF ACES

YOU CAN WIN WITH ANY ONE!

SOUTHERN SAILPLANES

MEMBURY AIRFIELD, LAMBOURN, BERKS

Telephone 0488 71774