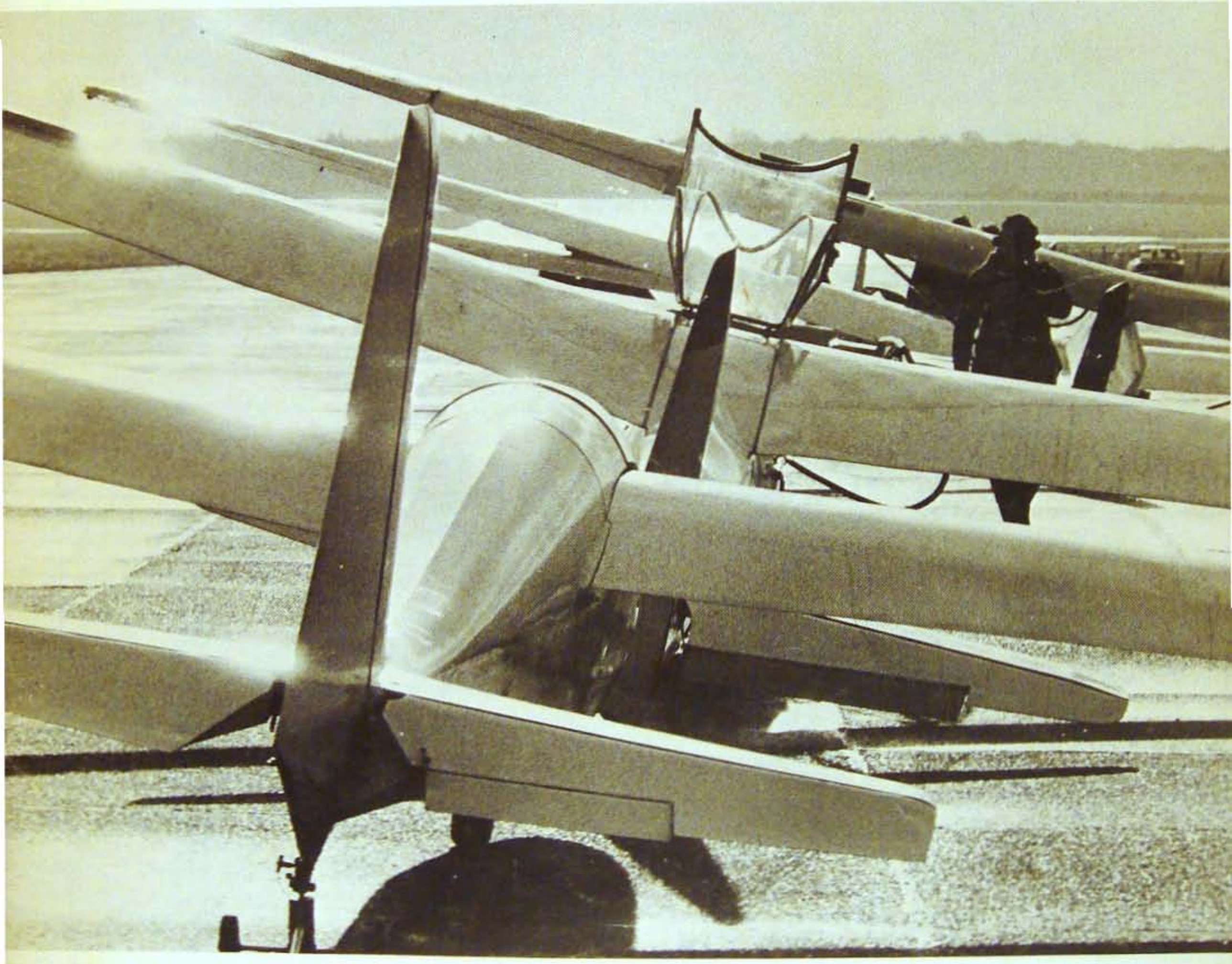
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the INTERNATIONAL gliding magazine



quarterly 25p

Summer 1973

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SOARING PILOT

the INTERNATIONAL gliding magazine

Volume 1 No. 2

SUMMER 1973

Editorial

FREDERICK NICHOLAS SLINGSBY 1894 – 1973

On Tuesday 22nd May, 1973 F.N. Slingsby died at his home near Kirbymoorside, Yorkshire.

There cannot be many glider pilots, who at one time or another during their flying careers, have not flown a sailplane bearing the name Slingsby. Whether it was a first tentative solo flight in the ubiquitous T–31, or a highly successful competition trip in one of the more advanced Darts is neither here not there, the fact remains that in the short space of four decades the name Slingsby became a respected household word among the worlds gliding fraternity. Proof enough of the quality of his products.

In 1931 he built his first machine, and from that date until quite recently Slingsby continued to create quality, craftsman constructed gliders, each subsequent aircraft bearing the advanced design techniques of a man in love with his work. By the early nineteen fifties Slingsby sailplanes were flying in most countries with competition successes reaching their zenith during this period. In 1952 Philip Wills won the title World Champion flying an 18 metre wingspan Sky. 1954 and 1956 saw similar Sky's placed second. 1960 produced a World Championship first for Rolf Hossinger in the Skylark 3B – this series of glider being Slingsbys greatest triumph.

"For many years it had been known that with a wing of a certain shape or family of wing sections, much better performances could be achieved. But the difficulty of these so-called "laminar" sections was that, to be efficient, the wing had to be much smoother and more accurately finished than with the old section, and to achieve this the cost of the aircraft would be prohibitive.

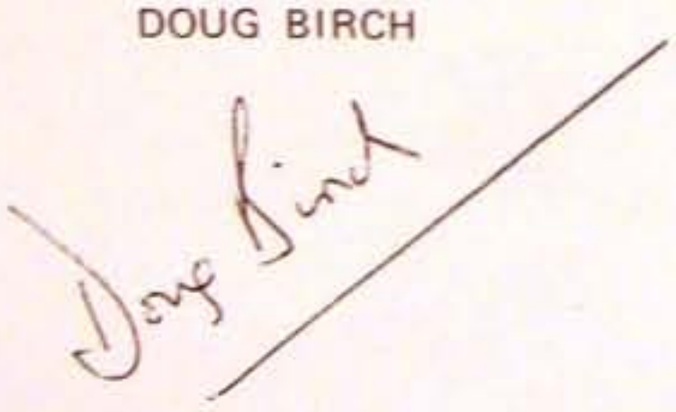
This tough nut was finally cracked by Slingsby, who used a new type of plywood made of West African gaboon (a kind of mahogany) which had the characteristics which enabled him to build aircraft with "Laminar" wings costing no more than the conventional sailplane. This was the birth of the Skylark series, which have flown to fame in every country in the world which has bought them."

This extract quoted from the Wills book, "Where no birds fly", graphically illustrates just how one of Slingsbys many fine contributions to gliding helped to bring our sport within the financial limits of a much greater band of enthusiasts.

In recognition of his outstanding work he was awarded the Royal Aeronautical Society Silver Medal in 1965.

For those of us who knew Fred Slingsby the loss is great, but let us not forget, but for the work of this dedicated man, gliding would not yet have reached the advanced and healthy state we find it in today.

DOUG BIRCH



Editor: **DOUG BIRCH**

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BRITISH NATIONAL GLIDING CHAMPIONSHIPS

Sport and Club Classes 26th May – 4th June

Reported by Doug Birch and Mike Bond from Husbands Bosworth

Saturday 26th May dawned brightly, and soon the whole of the airfield was bathed in a brilliant early morning sunshine. High cirrus was in evidence, which to the layman showed all the signs of a most promising day, but to the experienced pilot gave cause for some concern. By the time the Opening Ceremony and briefing had taken place, the worst of these fears had been confirmed, a definite haze blanket had encroached upon the whole of the Husbands Bosworth area. This haze, which was streaming north from London, played an important part during the ensuing task by cutting off thermal activity quite severely, particularly in the vicinity of the second turning point.

The championships were formally opened by Philip Wills, who in a short speech wished every competitor the best of luck; and concluded by hoping that the contest would be won – not by the best pilot, but perhaps by one who had enjoyed a little good fortune. The genuine ovation which followed his speech either confirmed this view, or merely consolidated the fact that Mr Wills is still one of glidings most popular celebrities.

Chief task setter Vic Carr's first outing for both classes was a 185 km. triangle, HB – Peterborough Cathedral – Henlow Hangers – HB. This task was well received by the competitors, although Peter Wickham and Bill Cameron, the weathermen, quashed any hopes of an easy task with their first days forecast. Moderate thermals were expected, with only small amounts of cumulus cloud (base 4000 ft. – tops 6000 ft.), but the thundery clouds to the west of the country were not expected to affect the task area. As it turned out the haze was the main bugbear, while a slight sea breeze effect around Peterborough played its part in breaking up some of the thermals.

The first leg of the triangle over the rolling Leicestershire and Rutland countryside was used by most pilots as a 'settling down' period. Progress, initially, was steady, but as the first TP drew near the thermals became progressively weaker and were spaced farther apart.

All pilots negotiated the Peterborough TP, but G.M. Chinn – Std. Libelle lost 20 points for a photographic penalty there. It was at the southern tip of the second leg that the majority of pilots encountered trouble. In an effort to make rapid progress pilots were inclined to ignore the weak lift, and so found themselves in big trouble when no '8 knotters' could be located. Alan Farmer – Kestrel 19 suffered in this manner and was the first pilot reported to have landed.

The Club class seemed to fare slightly better, their first casualty, H.A. Torode – K–6E having reached St. Neots before landing. A.H.G. St. Pierre – Pilatus B4 had a very good day; by making use of every scrap of lift he became the only pilot of his class to get home. He attributed this to an early launch which enabled him to beat thermal declination. His nearest rival for the day, C.J.N. Waller – K–6E, landed out at Wellingborough.

Sqn Ldr Ian Strachan – SF 27M, flying the only motor-glider in the contest reached Old Warden before calling off his attempt to reach base.

Out of the 22 Sport class pilots to start, only 3 completed the set task. Mike Garrod – ASW 15 just beating the heavily handicapped Nimbus 2 of Ralph Jones and the Kestrel 19 of London Club Chairman Tom Zealley.
Results after one days flying:–

Sport Class		**Club Class**	
M.P. Garrod	1000 points	A.H.G. St. Pierre	1000 points
R. Jones	830 points	C.J.N. Waller	784 points
T.S. Zealley	810 points	K. Kiely	644 points

Wickhams 'Wellies' – or a guide to good weather forecasting

During the course of the next three days all those who assembled at the daily briefings noticed that Peter Wickham attended in a voluminous pair of wellington boots, these were soon to be regarded as a guide to the type of weather forecast he would present, so when on the 30th he appeared wearing shoes, audible sighs of relief echoed around the marquee.

The final front of the slow moving low which had been the root cause of the trouble, had just about cleared the country. Convection conditions in the westerly airstream were improving slowly. These improvements were not consistent however; some brief bursts of convective activity in the middle of the day would be followed by longish periods of spread-out strato-cumulus clouds.

After digesting this report, the organisers decided the pilots should rig, but as it turned out only the Sport class departed on the stipulated task of 119.4 km. triangle. HB – Olney Church – Oundle Church – HB.

This day was a day of luck and willpower, the pilots requiring more luck than judgement to find the forecast thermals and then vast amounts of willpower to press on into a dead looking sky. Only five brave souls managed to fly the requisite distance to achieve a score, even then the longest flight covered only 51.4 km.

R.P. Saundby – Std. Cirrus took the days premier honours, with Ralph Jones finishing second. By virtue of his fine effort and Mike Garrod failing to score, Jones moved to the head of his class on general classification.

The days sad story belongs to Tom Zealley, who ground looped his Kestrel 19 when landing, which forced his withdrawal from the contest with a 'bent' wing.

Sports Class results – 2 days

R. Jones	1135 points
M.P. Garrod	1000 points
T.S. Zealley	810 points

Welcome flaming June

In most gliding contests there is usually one day which, in retrospect, is dubbed, 'fantastic', 'remarkable', 'superb' etc., June 1st was such a day during this event. The whole sky bubbled with big juicy thermals, 6 and 8 kts. being the order of the day. The pilots, who were suffering from a surfeit of rust, literally put heart and soul into the task with the result that over 80% of the field completed the trip. That evening the bar



Ralph Jones



Philip Wills opening the Championships



Dave Lilburn on grid



Sam St. Pierre after his first day Victory



Ian Strachans S.F.–27m Motor Glider

echoed to the talk of records, diamonds and other delicious goodies near to the heart of the competitive pilot.

The forecast for the day was in fact described "as one of the best of the year", with a weak ridge of high pressure giving the excellent thermal conditions over the task course. Early in the day the winds were rather fresh north-westerlies, but during the afternoon they dropped right away and only the somewhat over-convected conditions in central England stopped it becoming 'outstanding' in that area. Cloud base varied between 5000 ft. – 6000 ft.

Taking full advantage of these conditons Vic Carr decreed a 236 km. out-and-return race to Nympsfield for the Club class and a 312 km. triangle HB – Pangbourne Basin – Nympsfield – HB for the Sport pilots.

In his class Mike Garrod had a sparkling day, fully atoning for his previous flights setback. He completed the task at 70.16 kph to take the 1000 points. Finishing second for the third consecutive day was the very consistent Ralph Jones, who found that he was still in the lead after the computing had taken place - by a mere 74 points from Garrod.

Further down the table an interesting battle was now developing between the Kestrel 19's of Bob McLuckie and Alan Farmer, and the Std. Libelle of Bunny Hale – with less than 80 points seperating the three of them, just one small mistake could ruin their chances of achieving one of the minor placings.

World Championship pilot John Cardiff – Cobra 15 had a really off day. At the start of the mornings flying he lay 4th in the Sport Class, but with only managing to cover 123.3 km. he found himself relegated to 18th position at the days end. This was a body blow from which he never had time to recover – nevertheless you cannot keep a man of Cardiff's calibre down as was proved the following day.

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In the Club class, all but one pilot completed the course. Sam St.Pierre, flying as well as he has ever done in competitions, finished a creditable third to retain his leadership . Pressure, however, was being applied by Chris Rollings and his speed of 55.38 kph gave him the best figures in the class.

Oscar Tango – Ian Strachans motor glider, also had a fine race, finishing second.

Proving that the Slingsby Skylark 3B is still a force to contend with, Charles Ellis flew a magnificent task, covering the distance of 236 km. at 51.79 kph.

Sport Class results – 3 days

1 R. Jones	2074 points
2 M.P. Garrod	2000 points
3 R. Stafford-Allen	1402 points

Club Class results – 2 days

1 A.H.G. St.Pierre	1884 points
2 C. Rollings	1611 points
3 K. Kiely	1506 points

Back to normal – another difficult day

Those pilots who had been falsely lulled into believing that the competition would be completed in 'booming' conditions were sadly disallusioned by Peter Wickhams predictions on Saturday, the penultimate day of the championships.

After a very bright start to the morning he let it be known that a very weak occluded front was moving slowly into the task areas. Moderately good convection cells ahead of the front would allow gliders to get away – providing they were airborne early enough.

Bearing this in mind a 192.25 km. dog-leg race via Henlow and Downham Market Station to Swanton Morley was set for both classes.

Relatively early launching of the gliders enabled participants to get away from the airfield, but most found the thermal conditions too weak to combat the fresh cross wind which was affecting the first leg. Those pilots who returned to base in the hope that the weather would improve later in the day unfortunately made the wrong decision. Soon after mid-day the conditions at HB became overcast and no further departures were possible.

Of those pilots who heeded the met.mans forecast and left as soon as they could, the majority of them had a very exacting time on the first leg, but thereafter were able to proceed without too much difficulty.

Skill and experience were the factors which finally paid off. In the Sport class seven pilots reached Swanton Morley, the fastest being Ralph Jones, followed by a re-vitalised John Cardiff and Jack Harrison. The minor places were again occupied by Hale, Farmer and McLuckie. Mike Garrod had another poor day, landing at Poddington Airfield and scoring only 19 points. His failure to stay with Jones putting him nearly 500 points in arrears.

In the Club class Chris Rollings forced his way to the head of the table by brushing aside every possible challenge. His speed of 47.7 kph for the distance being 6 kph faster than his now nearest rival C. Waller – K–6E. Yesterdays leader, Sam St.Pierre, failed to score and dropped to fourth position. All is now set for a close finish on the final day.

Sport Class results – 4 days

1 R. Jones	2601 points
2 M.P. Garrod	2019 points
3 D. Bowden	1648 points

Club Class results – 3 days

1 C. Rollings	2231 points
2 C. Waller	2024 points
3 I. Strachan	1993 points

Final task

"A mixed bag of convection today with a fresh westerly wind, thermals likely to become moderate or strong at times during the afternoon, but complications by way of spreading-out and some showers are expected". These being the words of the forecaster on the final day.

During briefing it was announced that prizegiving would be deferred until a future date in order to make most use of todays flying weather. This decision had one or two objectors among the pilots. Although they all wished to fly it was thought that an official closing ceremony should be held; as one man said, "We only meet once a year". That surely is a good enough reason for a prizegiving albeit late in the evening. Organisers please note!

The revised task for both classes, after the weather had failed to improve by 1130 hrs., was an Alternate out-and returns to one of three turning points.



Bob McLuckie with Crew Chief Albert Johnson and daughter



Chairman of B.G.A. Chris Simpson



Mike Garrod

In theory the chance of Mike Garrod overhauling Ralph Jones was possible, but in fact, if one considers Jones form, it is highly improbable that this would occur. The same could also be said for the top Club class position. The intrigue of the last day lay in the fact that any one of at least six pilots could make third position overall.

After take-off the conditions again deteriorated, causing much speculation as to the progress of the pilots. First radio reports received indicated that Bob McLuckie was struggling desparately to stay aloft, while his fellow R.A.F. companion, Alan Farmer, was going great guns. Farmer eventually went on to make the fastest time and win the daily prize. This much needed win rocketed him right up the table. Other pilots who had a good day were M.Hill – Std. Cirrus and D. Bowden – Std. Libelle.

Ralph Jones flew a cautious race, knowing that if he were to retain his overall leadership of the race he must complete the task. This he did, taking it easy and not taking any chances. Mike Garrod made a final supreme effort to catch up but failed to make any impression on Jones lead.

Jack Harrison who had flown his usual steady race suddenly found his radio had gone u/s near the TP while in cloud. He believes a nearby line squall must have been the cause of this for it appeared to be working quite normally a few miles further down track. On the return journey he climbed to 8,500 ft. glided out to 3,000 ft. and then found "easy puffy thermals back to HB".

For Chris Rollings it was quite a different story. He took 45 minutes to reach the TP, then a further four hours to get back to Husbands Bosworth. This caused him considerable worry, he had great fears of Waller racing home ahead of him, but he was not to know that Waller was struggling in similar conditions and finding the going equally as difficult. The winner of the Club class for the final day was dark horse, J.H. Welsh – K–6E, whose confident flying earned him maximum points.

And so, in the final analysis, a very deserved victory for the highly professional Ralph Jones in his Nimbus 2, a machine that many people thought would never fly again. This was the glider involved in the mid-air collision during the 1972 World Gliding Championships when its pilot Ake Petterson was forced to parachute out after tangling with the LS–1 of David Innes.

In the Club class, newcomer to National competition flying, Chris Rollings held onto his lead to become the new champion. His was a well judged and polished exhibition of flying.

FINAL RESULTS

Sport Class

1 R. Jones	Nimbus 2	3385 points
2 M.P. Garrod	ASW–15	2836 points
3 A. Farmer	Kestrel 19	2413 points
4 M. Hill	Std. Cirrus	2136 points
5 D. Bowden	Std. Libelle	2064 points
6 R. McLuckie	Kestrel 19	1914 points

Club Class

1 C. Rollings	K–6E	3203 points
2 J. Welsh	K–6E	2705 points
3 C. Waller	K–6E	2408 points
4 A. St.Pierre	Pilatus	2355 points
5 I. Strachan	SF–27M	2258 points

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the HOT AIR BALLOON REVIVAL

by Ian McDonnell

THE HOT-AIR REVIVAL

Hot-air ballooning is a sport which is becoming increasingly popular. Since the first modern balloon took to the air, more and more people – many of them already glider or power pilots – have opted to return to the delights of low, slow, silent flight, with the minimum of instruments and equipment to monitor.

The latter day hot-air balloon shares little, other than its basic principle of lift, with the original Montgolfier version of 1783. The early balloon burned rags and straw in an open brazier, and the envelope was made from linen and paper. More efficient – and smaller – hydrogen balloons followed soon afterwards and hot air fell out of favour until the American revival in the late 1950's. Today, the fuel is propane gas (contained in lightweight aluminium cylinders) and the envelope is constructed from proofed nylon fabric. The basket is still made of willow and cane, since this is able to absorb the shock of repeated heavy landings more readily than plastic or any other modern substitute.

The pioneers of British activity formed the Hot Air Group in 1966 under the chairmanship of W. Malpas. Other members included Don Cameron (who is now a balloon manufacturer) and Malcolm Brighton, who in September 1971 disappeared over the Atlantic while attempting a west-east crossing in a hydrogen balloon.

The first aircraft built by the H.A.G. was 'Bristol Belle'. This suffered stressing problems which led to a split in the envelope (fortunately the balloon was not airborne at the time). After altering the positions of the load tapes at the crown of the structure the aircraft flew satisfactorily, and today's designs benefit from the many hours accumulated by the 'Belle' and its early successors. The initial manufacturing company, Omega Aerostatics, was succeeded at the end of 1969 by two independent companies, Cameron Balloons Ltd and Western Balloons Ltd. The price of a basic four man balloon is around £1800, and fuel costs work out at about £2.50 per hour.

Don Cameron has made several interesting hot-air flights, including a Sahara expedition and a crossing of the Alps in the largest balloon – at 140,000 cu ft – as yet built in the UK. He is now experimenting with a hot-air airship powered by a Volkswagen engine.

For normal use envelope sizes range between 31,000 and 84,000 cu. ft., and class records vary accordingly. The absolute distance record is 314 km (M. Wiederkehr, USA) and the endurance record 8 hrs. 48 mins. 3 secs. (also M. Wiederkehr) while the absolute height record of 35,971 ft. was established by Julian Knott (UK) in 1972. However, most owners find that the attraction lies in drifting along at low altitudes.

A prompt start is advisable when ballooning since windspeed is a critical factor, and conditions are generally more favourable during the early morning and late evening. Maximum wind for safe operation is considered to be about 15 knots. A drawback with evening flying is that one is tempted to fly until dusk, when landings become hazardous if electricity cables and wire fences happen to be around. On the other hand, after evening flights, group members are prone to discussing the trip over a pint or more at the hostelry nearest to the point of landing.

On reaching the launch site – which can be any medium sized field (subject to owner's permission) clear of large trees, animals and fences, and outside controlled airspace – the envelope is laid out on the ground with the mouth facing the upwind end. The basket attachment cables are checked for serviceability, up to four fuel tanks securely strapped into the corners of the basket (each provides about 45 minutes flight time) and the fuel pipes connected between the first two cylinders and the burner. The pilot flame is lit, and the burner checked on each tank in turn. A 'flame out' due to fuel line blockage could be crucial once airborne, as a 'cold descent' at about parachute speed could develop. Two independent fuel systems are therefore utilised.



Up - Up and . . . . Up!

Next, the envelope is connected by steel wires to the basket (which at this stage is laid on its side) and inspected for damage. A 'ripping panel' is incorporated to allow for rapid deflation when landing; it is necessary to check that this is sealed into the main structure, by means of velcro tape, before launching, and that the quick action ripping line is correctly attached. Additionally there is a discharge valve operated by another line, which allows hot air to escape and thus increases the rate of descent when required.

Having completed the checks, the mouth of the balloon is flapped up and down to introduce cold air into the envelope. The burner is lit, and while the

mouth of the balloon is held open as wide as possible, one helper (known as 'Cremation Charlie') enters the envelope to raise the 'roof' of the dome thus created. The seven feet long burner flame is directed to the side of the volunteer and the hot air produced is soon able to support the fabric by itself, Charlie thankfully makes a rapid exit from the billowing nylon and the burner operator gives a succession of half second bursts to inflate the balloon further. As the dome rises, longer periods are used. It normally takes around ten minutes to raise the envelope to the vertical position. The pilot, operating the burner, is in the basket at this stage, and the passengers quickly scramble in alongside him. Final checks, a few more bursts of flame, and there is enough heat available to lift the basket and its occupants. Except under windy conditions it is not necessary to burn during the initial ascent. Once airborne the delights and advantages of this form of flight immediately become apparent. Smoothly and silently the balloon



'Cremation Charlie' taking evasive action

leaves the ground behind. There is no vibration, no noise, apart from the gentle hiss of the pilot light on the burner. The voices of the helpers below drift upwards with amazing clarity. Another five second blast of the burner continues the gentle climb. It has been known for a passenger who has been busy doing something in the basket to look out suddenly and suffer momentary vertigo — one minute the ground is there, the next it is two hundred feet below. There is absolutely no sensation of movement, and no wind effect, since the balloon is moving **with** the wind. The aeronauts stand on their platform, four feet by four, watching the countryside roll by, while low enough and slow enough to hear everything that is going on below. When airborne there is very little for the pilot to do other than to maintain height with an occasional burn, so he can enjoy the view as much as his passengers.

It is easy to enthuse about ballooning: there is no other form of flying like it. Unfortunately the landing still lies ahead. When it is time to come down again a suitable field is selected, and as the balloon crosses the upwind boundary air is valved as necessary. Since there is a delay of several seconds between control and effect, it is important to anticipate all actions well in advance. The 150 ft trail rope may be released to act as a brake and stabiliser. On a calm day it is possible to alight gently, with the basket remaining upright. However, if the wind is above 8 knots the basket is likely to tip on its side as the inertia of the balloon drags it along the ground. Under these conditions the ripping line is pulled just before making contact. As one balloonist said 'Yesterday I made a good landing in several fields'. On the inner sides of the basket, handles are provided for passengers to brace themselves for a heavy landing.

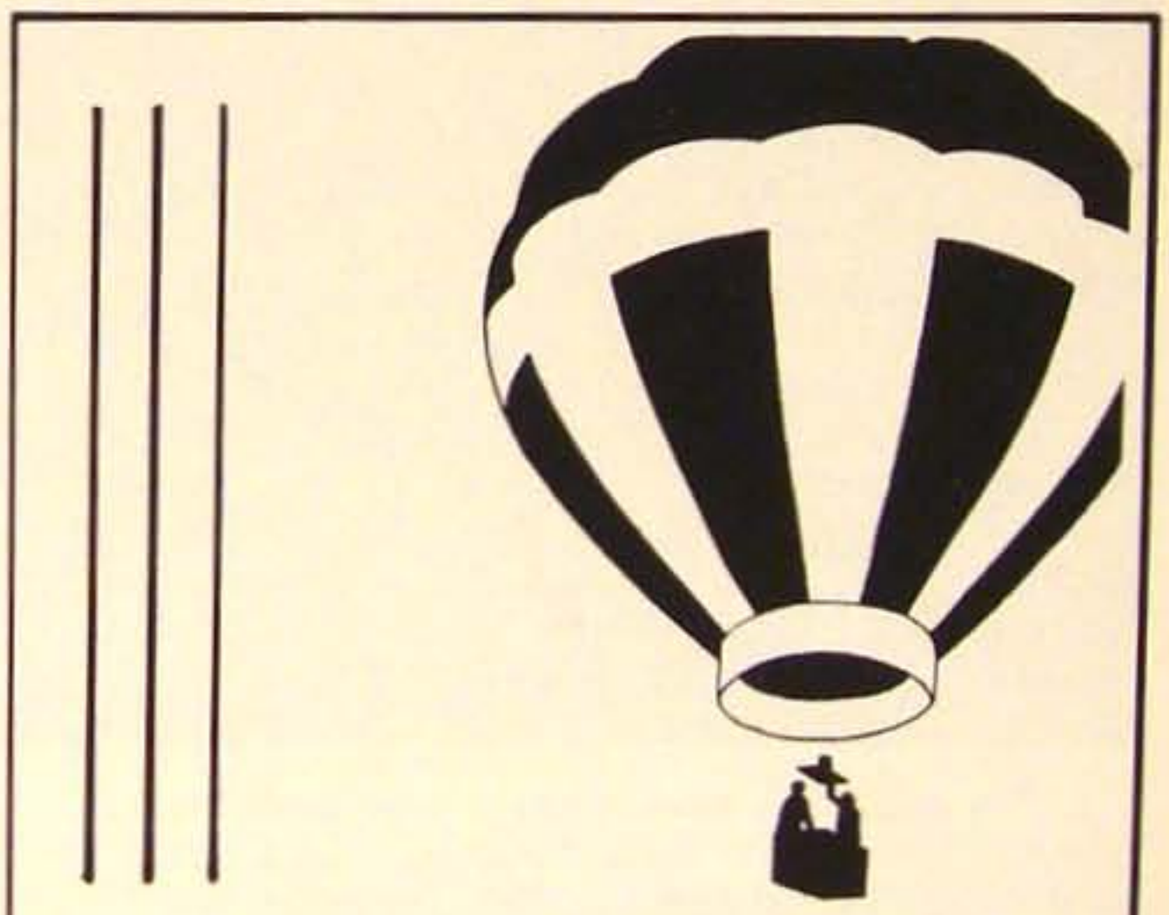
At the present time there are 42 balloons resident in the UK, and 64 people hold pilot's licences. A would-be pilot must take CAA written examinations in Aviation Law, Navigation and Meteorology, and Aerostatics. He must also have completed a mimimum of twelve hours dual instruction, and have taken a dual test flight and a solo flight under supervision. Holders of fixed wing PPL's may be granted exemption from all of the written exams except Aerostatics.

A medical check by a CAA authorised examiner is necessary every two years (every year if the pilot is aged 40 or over) and on the initial medical, electrocardiogram and x-ray tests are carried out.

The British Balloon and Airship Club (75, Victoria Street, London SW1 OJD) co-ordinates activities in the UK, and will be pleased to supply further information to would-be aeronauts. Membership of the BBAC costs £2.50 annually, and the club magazine, 'Aerostat', is circulated every two months to members.

YOUR SOARING PILOT SUBSCRIPTION FORM

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the MIKE BOND *column*



Being involved with a gliding magazine opens the door to many interesting opportunities and unusual offers. And while a natural instinct to stay alive causes me to decline the majority of these, I do occasionally enjoy slight self induced heart failure; so when the chance to fly a glider-gyro was recently offered, I accepted. But before I dwell upon the brave deeds performed during my encounter with the contraption, let me introduce the particular model which I 'rode' upon, for its history is somewhat colourful to say the least.

Glider-gyros are still in their infancy in this country, and it would appear that they are destined to remain in this state, to the best of my knowledge, clubs and associations are not in evidence to offer assistance in design or construction to would be builders. This lack of information is also reflected in the quality of the machines operated by the few ardent enthusiasts. This, I feel, is most unfortunate, for after flying the machine, intrigue rapidly became infatuation.



The machine in question was built by James Worrel, from an original plan of the BENSON GLIDER-GYRO B–8 MODEL, and was completed in 1967. The rotors, and specially hardened steel bolts were supplied by The British Aircraft Corporation, though other parts of the gyro could not boast such royal heritage. Indeed, the mainwheels began their existence as Spitfire MK III tailwheels, while the nosewheel was rescued from a mobile hot food cupboard. The control rods were those of an English Electric Canberra Bomber, and the universal joints and bearings came off an old Ford Popular!!!

Basically, the machine was professionally constructed, though Mr. Worrell employed an overhead control column (for reasons of design simplicity). The dangers and disadvantages of this feature were pointed out to him by both B.A.C. and colleagues who were conversant with aircraft control systems.

For the reader who is not familiar with this feature, let me briefly explain; in order to roll the aircraft to the LEFT, one has to move the control column to the RIGHT....

Burscough Airfield was the site chosen to test the completed gyro, and one cold March morning in 1967 Mr. Worrell took to the air. The initial part of the maiden trip was quite uneventful, the machine appeared to posess no apparent major faults. That is of course, unless one discounts the overhead control column, for as he passed the old hangar, the turbulence caused the machine to bank gently to the left. His natural reaction to return to straight and level, caused him to move the control column to the RIGHT.....

Oooops!!!

Expensive noises followed, and although he was close to the ground when control was lost the rotors were completely destroyed, he was more fortunate and escaped injury.

Undaunted, the machine was rebuilt, and was completed for the second time in 1968. This time a conventional control column was incorporated into the design. Provision was also made to make the machine a two seat model, and indeed, it was flown with much success on many instructional flights. Unfortunately, for economic reasons, Mr. Worrell had carved the rotors from the wooden rafters of demolished buildings, found in abundance in his home town of Preston, and one day.....

Ooops!!!

Expensive noises were in evidence again, but on this occasion the rotors were damaged beyond economic repair.

Learning from his mistakes, the redoubtable Mr. Worrell ordered a new set of blades from Slingsbys at Kirbymoorside, and at last, the gyro became a safe proposition.

For some time now adding power to the gyro had been considered and when the opportunity of acquiring a 1600 c.c. Volkswagen engine became available, he welcomed it with open arms. He had for some time been carving a propeller, and on completion it was forwarded to the British Aircraft Corporation to be balanced correctly. (As a matter or interest, B.A.C. returned it, stating that it was perfectly balanced.) The propeller was fitted to the engine, and the whole unit was bolted to the rear of the gyro.

The weather complimented May 24th, 1970 with suitable conditions for the maiden power flight of the machine and Burscough airfield was once more to witness an epic first flight. Worrell was again to act as test pilot,and so when strapped in, the rotor was set into motion, the engine started, and the throttle opened up. The gyro was catapulted into the sky, and a truly wonderful rate of ascent achieved. Once again the machine appeared not to have any major faults; that is to say until he tried to obtain straight and level flight.

Unfortunately, (again) he had overlooked one or two small but rather important details. Firstly, the Centre of Gravity had not been considered and was situated too far aft; while secondly the thrust line was obviously out of true,

and no matter how far the control column was moved forward, the gyro would continue to rise.

Realising his error, he released the safety harness, and leant toward the nose of the gyro. To his dismay, the rate of ascent was still unaffected. After this it soon became apparent to him that the engine was responsible for this gain of height, and without further ado, he switched it off!!! Without power the gyro immediately began a tail slide.

Ooops!!!

Once more Mr. Worrell was fortunate to escape with his life but this time the excitment of it all proved too much for him and he never flew the gyro again.

I was so intrigued by his account of the flight, that I enquired "And are you a pilot?" "No" he replied, "I'm a postman".

Two gentlemen by the name of Dave Williams and Ron Wilson were the next proud owners of the gyro. They acquired it on behalf of 2376 Squadron (Bamber Bridge) Air Training Corps, and after rebuilding the machine, they managed to persuade the whole of the staff of the Squadron to fly it solo. Whilst paying the unit a visit, I was offered the chance to dice with death.

Therefore, March of this year saw me strapped somewhat tightly into the gyro. I was aware that the machine was reasonably safe to fly, but that did not stop my heart from starting that extra rapid beat. The pre-flight briefing was quite simple, "Hold the control column fully back into the stomach until the gyro becomes airborne, then fly the machine just as you would a conventional glider." And that was that.

Having faced the glider-gyro into wind, and had the 400' cable attached, the rotor was started by hand. I held the stick well back into my stomach as directed while the blades rapidly picked up speed. It was a little disconcerning for within about 20 seconds the whole contraption was shaking and bucking in a most alarming manner. A seemingly nonchalant wave of my hand caused the Landrover to proceed slowly along the runway. A ground speed of 10 knots, coupled with the 20 knot wind speed soon had us airborne — and how, for within a few seconds, I was hovering at 200 feet.

It was sensational, and as the column was eased forward, I realised just how stable the machine was in flight. Gingerly attempted rolls to the left and right, found the controls most responsive, although turns required enormous 'boots' of rudder.

The landing also proved effortless, 'though it seemed to occur in slow motion. I was still attached to the Landrover at this point, but had already made the decision to release on the next trip.

The second launch was identical in character to the first one, with the added ingredient — enjoyment, for I was now comparatively relaxed, and had gained confidence, both in myself and the machine. At 300' I pulled the release toggle and settled down for the long final glide. I cannot over emphasise how truly exhilarating the flight appeared to be, and upon reflection was similar to that of my first solo flight in a conventional glider, when as I recall I sang, "Rule Britannia", around the circuit.

On touch down, however, I encountered a minor fault in the design. The nose wheel was not steered by the rudder controls, but was in fact steered by separate pedals welded to the axle. Need I add that they operated in adverse directions to rudder controls!!!

Ooops!!!

Once again those expensive noises were in full voice, and once more the rotors ended up as matchwood.

Dave and Ron are at present building new rotor blades, and I might add, altering the nosewheel mechanism so that it steers in unison with the rudder pedals. Upon completion, the gyro is to be entered in the Blackpool Tower — Isle of Man race and will be towed over the sea by a high powered launch.

The prize hoped for is that of 'Most Unusual Mode of Conveyance', and for my money, they are sure to win. May I allow you one guess as to who has offered to fly it for them.....

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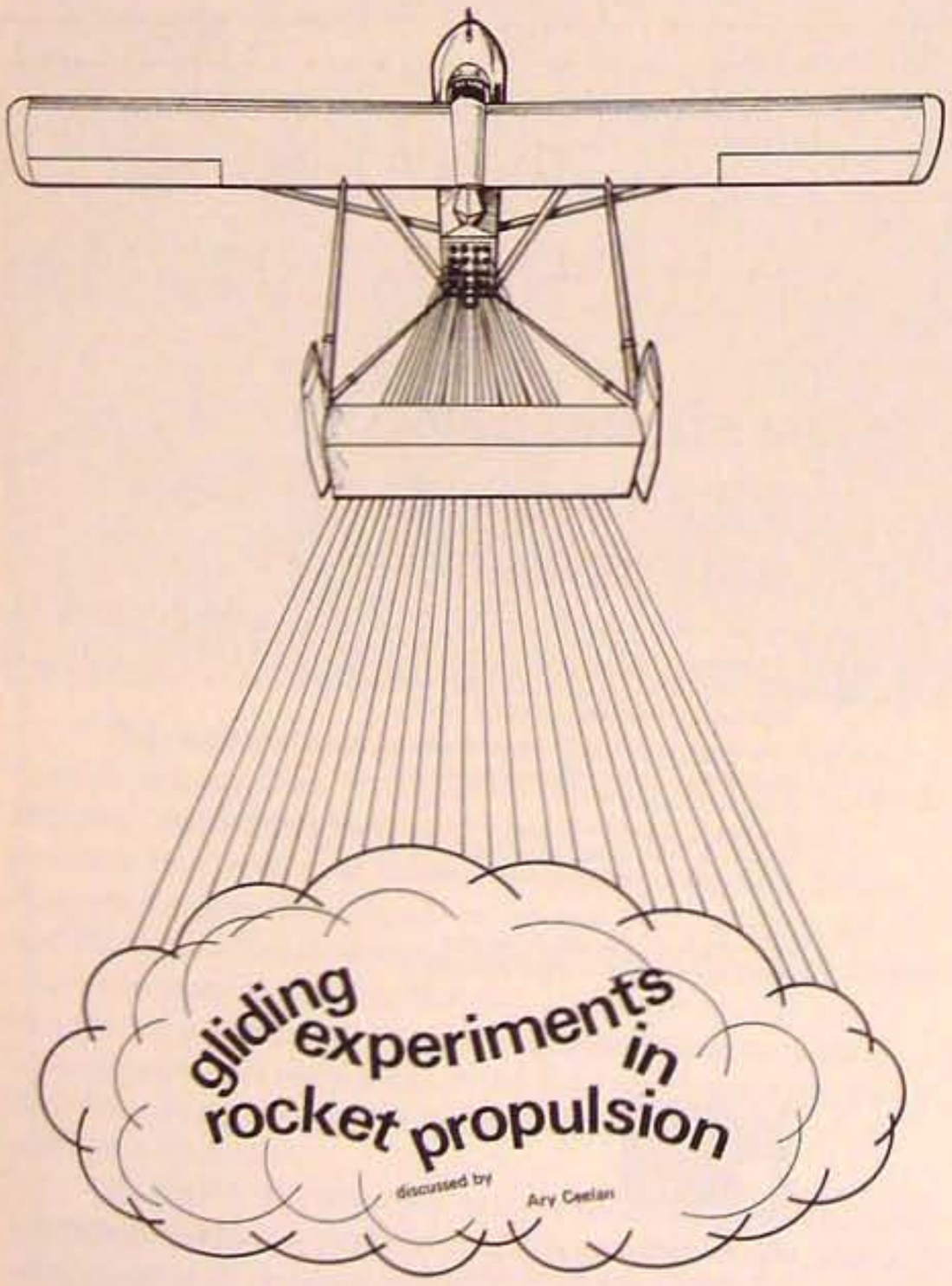
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The history of gliding, which officially commenced in 1920 on the Wasserkuppe in Germany with the advent of the Rhon gliding contest, has, since that date seen a series of experiments aimed at solving the intriguing problem, "How to achieve a state of flight without the aid of man or motor-power".

Lilienthal and many after him have jumped off slopes and promontaries with hang gliders strapped to their backs in pursuit of flight, while later, when larger gliders were built, launching took place by means of a rubber bungy cable. Other experiments followed which were to establish modern launching methods – namely the winch and aero-tow. But in the Roaring Twenties some pioneers had other ideas on this subject.

Initial Investigations

Car magnate Fritz von Opel, while searching to increase the publicity for his products, made contact in 1927 with a certain Max Valier, who was a leading figure in the "Verein für Raumschiffahrt" (VFR) – Society for Space Navigation.

With the funds Opel made available, rockets with solid and liquid fuel were designed and Valier was convinced, that by using these methods of propulsion, planes, cars and other modes of transport could be mobilised.

By 1928, with the help of pyrotechnician Herr Alexander Sander, a small rocket had been developed which when grouped together into a battery drove a specially designed car named the Opel-Sander (RAK-2). In addition, a certain Herr Hatry was commissioned to prepare drawings and build a glider, which would be designated Opel-Sander (RAK-1). Furthermore, the well known aircraft engineers Alexander Lippisch and Gottlieb Espenlaub were both asked to build different types of gliders for rocket experiments.

Espenlaub built the RAK-3, a glider of normal design, but with a series of rockets centralised on top of the wing. To prevent the fin burning, a light metal protective sheet was fitted. After experiments on the ground, and a single attempt to take-off, the tail caught fire and Espenlaub went over to building the E-15, which was completed in 1929. This was a tail-less plane with a three wheeled undercarriage and the rocket propulsive system again attached to the centre section of the wings. After many experiments, Espenlaub flew the E-15 for the first time at Bremerhaven on 4th May 1930.



First rocket propelled flight – True or False?

The Hatry glider Opel-Sander (RAK-1) was fitted out with 16 rockets giving a propulsive thrust of 900 lbs. After two false starts Fritz von Opel flew this machine for the first time on September 30th, 1929 over the Frankfurt-Rebstock aerodrome. The flight distance being almost 5000 ft. and the maximum speed 95 mph.

Years later, in 1962, this event was commemorated as the first rocket take-off by glider, in the form of a special chart published by the Deutsche Raketen Gesellschaft (German Rocket Society). On this chart one can see depicted the double tailed RAK-1 glider, while the text mentions that the first flight of a rocketplane took place on September 30th, 1929.

But.....was this really the first flight with a rocket plane? Had not Fritz von Opel by reason of his large financial contributions toward the development of the rockets, directed most attention toward himself?

Before accepting the von Opel claim, let us first discuss the Lippisch design, and the interesting facts revealed when searching for data with reference to the history and development of German gliders in the period before 1940. In this history, beside Lippisch, a certain Fritz Stamer played an important part.

In 1925 Stamer had taken over the management of the Arthur Martens Flying School at the Wasserkuppe where, with enormous enthusiasm, he taught young people to glide. Together with Lippisch he built a simple trainer, the Zögling (the baby), which received fame all over the world.

Alexander Lippisch was a gifted aircraft designer from whose drawing board many fine machines were evolved, the Wien (Vienna) in which Robert Kronfeld made his great performance flights in France and England, the Professor, and the Fafnir, built specially for Günther Groenhoff, these being a few samples of his glider designs. Furthermore the tail-less planes Delta 1 and 11 along with the not to be forgotten famous rocket-fighter ME 163 were further products of his fertile mind.

The "Duck" Flies

When Fritz von Opel asked Lippisch to build a glider suitable for rocket propulsion, Lippisch designed something



These test flights were carried out within the space of a few days. When I saw the correct dates of the flight, I realised that the history of gliding by rocket propulsion was considerably different from that originally accepted.

Fritz von Opel did not make the first rocket-propelled glider flight on September 30th, 1929. The first flight was made by Fritz Stamer (now deceased) on 11th June, 1928 at 19.00 hrs at the Wasserkupe. (Authentic data exists to prove this and, moreover, I have a statement by Mrs Lotte Stamer, the widow of Fritz Stamer, confirming his flights.)

I believe this is sufficient reason for publishing, on June 11th 1973, a new commemorative chart on the 45th anniversary of the true first Rocketflight by glider. History must be put right.

extraordinary and built a machine with a tail-first configuration. Vertical surfaces were attached to the wing which was braced above the aft end of the fuselage, this housed the pilot and a bank of Sander rockets. The glider consequently looked like a duck and he named it "Ente" (Duck). The pilot of this experimental aircraft was.....Fritz Stamer.

In a report entitled "Rakete – Weniger Reden – Mehrarbeiten" (Rockets – less reason – more work) he reported his experiences, the first paragraph reading:
"The first attempts to fly by rocket propulsion were carried out with the experimental glider "Ente" of the Research Institute of the Rhön-Rositten Society....."

The best flight covered a distance of 4000 ft in 70 seconds. The fourth test flight, unfortunately, turned out to be the last one; when igniting one of the rockets the whole battery exploded and the plane caught fire in flight. Stamer was able to land safely but could not prevent "Ente" from burning out completely.

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Gliding at Waikerie

By Martin Simons

It probably surprised many people when the Gliding Federation of Australia made a formal bid in 1970 for the next World Gliding Championships to be held in Australia. The outcome surprised even some of those Australians who had supported the bid; although Yugoslavia actually succeeded in gaining the 1972 contest, it was agreed that Australia should be be host in 1974. All except a few optimists had expected the bid to be scorned because of the obvious difficulty of transporting pilots and aircraft from Europe and North America half way round the world and back. The fact that for Australian and New Zealand teams to enter previous World Championships involved them regularly in such journeys, with even more limited resources than the larger nations, was not expected to carry any weight with the C.I.V.V. However, the Australian delegates were able to promise good flying weather and free air space, which are increasingly rare commodities in the more developed parts of the globe but less scarce in Australia than most other regions.

The site proposed for the 1974 meeting was Waikerie in South Australia, although there was a great deal of argument in the first few months about whether this was in fact the best place. No-one so far has questioned Waikerie's pre-eminence from the meteorological point of view; apart from the well known record flights, and a long succession of contest winning pilots for which the Waikerie.Gliding Club has achieved an international reputation, a very detailed study was made of climatic figures and weather records which showed that the contest area centred on Waikerie could quite confidently be expected to provide ten days good soaring out of any fourteen, in January. True, there are other gliding clubs in the same general region which have the same conditions, but none of these could hope to accommodate a World Championship meeting. Very few gliding sites in Australia could.

There are over seventy Gliding Clubs in the country, but many of these are small, country town clubs with the minimum of equipment. The total flying membership of 77 clubs in the last statistical year was 2772, an average of 36 per club. As with all averages of this type, the figure conceals more than it reveals. A handful of large clubs accounts for more than half the pilots, the other clubs are therefore really quite small. Australia is one of the most urbanised countries. In the 1966 census, 57% of the total population were located in the six State Capitals – Sydney, Melbourne, Adelaide, Brisbane, Perth and Hobart. Nine other centres, including the National Capital, Canberra, accounted for nearly all the rest; only 17% of Australians live in small country towns or on farms and rural 'stations'. Since 1966 there has been further growth by foreign immigration to the cities and many farmers also have walked off their land in drought years.

It is thus not surprising that the gliding population is largely composed of city people, though to get away from the airspace restrictions around the airports many of them drive 100 miles or more inland to reach their club site. Waikerie itself is a country town of about 3000, but it is linked to Adelaide, the State Capital of South Australia, with a population of about 800,000 by an excellent highway. The drive of just over 100 miles takes less than two hours and the majority of the club's flying membership is now of city people. Some are even attracted from Sydney and Melbourne, though these of course do not turn up every weekend.

There is only one other Australian gliding site that could seriously be considered an alternative to Waikerie for the World Championships; this is at Benalla, home of the Gliding Club of Victoria. Like Waikerie, the G.C.V. draws its members mainly from a city, in this case Melbourne, more than 100 miles away. Benalla aerodrome is a good one and the club has good hangarage and workshops, a nearby army camp has provided basic accommodation in the past for National Championship meetings, with adequate hotel and caravan camping facilities in the township itself, which is bigger than Waikerie. However, the weather at Benalla is somewhat less reliable (although still good). The selection of Waikerie was made provisional on there being a great deal of work done on the site to bring it up to a suitable standard.

With much support from the local council, the South Australian State Government, and from the Federal Department of Civil Aviation. Waikerie aerodrome has been transformed in the last two years from a drought-stricken dust bowl to an oasis. There remains more to be done in the next few months, but the doubts felt at the beginning are now evaporating.

In the accompanying photograph, everything is new except the 'Nissen' type hangar and the small flat-roofed building, which used to be the clubhouse, to the left of the swimming pool. The large hangar, with its apron, the large new clubhouse, the swimming pool and the various annexes to the buildings, the tree plantation and the associated lawns, have all been established since the C.I.V.V. meeting mentioned above. In addition, on the aerodrome itself two new bitumen strips have been laid down to keep powered aircraft off the grass. This was essential since in the semi-arid climate of the region, the slipstream from taking-off aeroplanes not only raises great clouds of dust but also blows away the grass roots themselves. For the World Championships, there will be large grassed pads, sufficiently wide for four gliders to be drawn up abreast, twenty in line. These grassed areas have to be irrigated liberally every day; to achieve this the club had to install a powerful pump on the River Murray banks half a mile away, and lay pipelines in trenches to feed moving sprinklers on the aerodrome. Irrigation water for the lawns and trees around the club buildings, and also for the whole of the very large 'tie down' area, all has to be pumped up from the river. By such means the dust problem has been solved.



Briefing Hangar

Accommodation for competitors and crews will vary in standard and price. There is one Hotel/Motel in the town, with air-conditioned rooms. There are also well-appointed mobile houseboats available for hire on the river, there will be caravans in the town's two caravan parks, and the local high school, with its new assembly hall, will be temporarily converted into dormitory accommodation for about 350 people. The clubhouse itself will be used as the administrative centre and for social gatherings, briefings will be in the large hangar.

The contest area itself is of an irregular shape. To the north of Waikerie there is a vast area of almost deserted country, covered by semi-arid scrub vegetation. There are places in this scrub where it would be possible to land a glider, in clearings or on dry lake beds, and the scattered homesteads all have airstrips. However, after such a landing the pilot might have to wait several days for his retrieve, since roads are mere tracks and to navigate them with a trailer would be a major undertaking. No tasks will be set into or across this region and in fact no glider pilot has ever attempted the crossing, although the author, among others, has flown forty or fifty miles into it on good days with cloud bases above 10000 ft., and clearly a crossing would be feasible on such a day. (After 100 miles open country follows again).

To the south, the country is wide open as far as the coast, settled and cultivated. The fields are all very large, wheat and barley are the main crops, the harvest being in December so that by the time of the competitions in January there is no shortage of stubble fields for landing. In places the soil is very soft sand, which can cause trouble when the retrieve vehicle is taken into the field, and on the lower land near the river there may be some large stones, but pilots very rarely run into any serious trouble. Here and there, particularly where the sand hills, remnants of a former desert dune area, rise more than 100 ft., there are patches of scrub, but in all cases these are easily crossed and task routes will be chosen to avoid the worst of them in any case. The only important hazards in this whole vast region are the single wire power lines which run long distances from the main grid to connect the farms to the supply. The lines are easily seen from the air, but they do sometimes spoil fields that would otherwise be perfect for landings.

Twenty miles to the east of Waikerie a large southern loop in the Murray encloses an area of irrigated land with the fruit growing towns of Berri, Barmera and Renmark. It is not possible to land safely in a fruit orchard, and in this area there are also patches of river swamp and scrub, with, on the north side, a large oval lake. There are some open areas and several airstrips within easy reach at all times, but this district has quite a reputation among local pilots for being difficult. Probably the generally wet nature of the ground, Nature's own floods being supplemented by the irrigation water, tends to inhibit thermals, and pilots going eastwards or returning from the Waikerie Gold C milk run out and return, adopt a cautious policy in this area. Beyond this tricky patch (which is frequently negotiated quite cheerfully by pilots on their Silver C cross country so it can't be really bad) the country opens out again and continues for hundreds of miles without any serious hazards. All is sheep and wheat country, with only occasional areas of scrub, through most of Northern Victoria and southern New South Wales, until the foothills of the Great Dividing Ranges are reached 700 to 1000 miles away. It is not likely that any 'free distance' tasks will be set, during the internationals, but it is possible that Hay aerodrome, 443 km. from Waikerie, will be used as a turning point. Balranald, which lies 330 km. from Waikerie in this direction, was the turning point used by John Williamson when he broke the British out and return record from Waikerie in January this year.

West and northwest of Waikerie the country is quite different. The Mount Lofty ranges which rise behind the city of Adelaide, run northwards, the peaks increasing in height from around 2000 ft. to nearly 4000 in the north, where they continue far into the true deserts. The pilot heading off in this direction has to cross about 60 km. of gradually rising ground, some of it rather broken, before reaching the ridges which run almost due north and south with very steep slopes sweeping down to cultivated and well settled vales between. Often the thermals over this country are tremendous, the mountains set

up waves at certain seasons, and of course for the pilot who gets low there are many opportunities for hill soaring. (The author once won a minor competition by slope soaring thirty miles along one of the ridges in this area; skills learned at Dunstable paid off in a quite unexpected manner on that occasion!) It is almost certain that tasks will be set into this hill country, which provides a different type of experience from that of the extensive plains. Sea breezes from Spencer's Gulf and Gulf St. Vincent sometimes catch the unwary pilot on the wrong side of the ranges, and there is nearly always a marked change in conditions as they are crossed. The most northerly turning point likely to be used is Hawker, which is 296 km. from Waikerie.



Lawn outside Clubhouse

In summer, away from the coasts, the weather over all the contest region is good. This does not mean it is always easy. More often than not the air is stable, and dry. During the morning the ground heats up steadily under a clear blue sky, and although thermals may start quite early, they tend to come up against the inversion after a few hundred feet. As the day warms up, of course, they improve and, commonly, dust devils appear. On many days it becomes possible to reach six or seven thousand feet in 'blue' thermals before mid-day, and there are enough good thermals for quite high cross country averages to be achieved. Clouds sometimes appear momentarily at the top of the thermals on such days, but they are usually evaporated by the time the pilot reaches them. When down low, the bare, fallow fields, reddish brown or sandy yellow, cooking in the sun, produce the best thermals, patches of scrub and of course the irrigation areas usually yield nothing, or sink. Immediately above a dust devil there always seems to be some sort of lift, often extremely strong and very rough, but sometimes only weak and broken. However, there are good thermals which do not show up on the ground. Even though there are no clouds, thermal streets are common. Also on several occasions, thermal waves in front of the thermals themselves, have been found. It is evidently not necessary to have a cloud to create such waves. Also, of course, there are areas of strong sink. Low down, one of the most trying features is the high temperature in the cockpit. The un-restricted sun which produces temperatures of 35 to 45°C on the ground, beats through the cockpit canopy and heats up the 'greenhouse' so that the pilot who is scratching below 2000 ft. begins to cook quite rapidly. Few gliders have ventilation adequate for this sort of thing, hopefully the International pilots will not have to spend much time at such altitudes.

On some days, the same temperatures occur at low levels, but because of extreme stability in the air mass the thermals do not get so high — such days also often seem to be accompanied by strong winds, hot and dusty, with no relief to be gained by rising to great heights.

However, with a quite small change in the conditions, the day which begins just like this, clear and cloudless can develop rapidly into a record breaker. Clouds begin to appear over the ranges before 9 a.m., and soon there are cumulus growing all over the sky, with bases above 10000 ft. Sometimes the clouds are much higher than this, so high that pilots can't reach them without oxygen, and the lift seems to go right on up to the cloud at ten knots or more. Even at Waikerie, of course, these days are rare, and when they do occur no-one ever seems to be entirely ready for them. Most record flights at Waikerie have been achieved on days judged, retrospectively, as only moderately good.

Of course, when clouds develop they can over-develop, and this happens at Waikerie just as it does anywhere else. Summer thunderstorms are not uncommon, though the rain that falls may evaporate before reaching the ground. Cold fronts sometimes sweep in rapidly from the Southern Ocean, and bring with them all the usual excitement of fronts elsewhere, followed, quite likely, by a few days of cooler weather and soaring conditions of a distinctly more European type. South Australia, however, never seems to suffer from the 'warm sector' type of depression. The hot air is pushed out and up in one go by the cool change, the warm front of northern latitudes does not appear. As far as soaring is concerned, this means that the change is quick and relatively clean, there is no long interval with dreary overcast skies or drawn out periods of rain preceding the change. As an example the author two years ago attempted an out and return flight on a day with cloud bases at 11000 ft., but on the return trip a front came in and could not be avoided, since it stretched from horizon to horizon. Ahead of it dust was being lifted from the ground in a great red cloud, behind it the rain was pouring down. Passage through the front was surprisingly easy, but after being covered in mud by the rain, which seemed to contain most of the dust that had been swept up from below, there were very strong downs on the other side of the front and 6000 ft. was lost in a couple of minutes. A strong headwind prevented further progress. However, an hour after the landing, having been promptly retrieved by aero-tow, soaring to five thousand feet was possible, the wind had died, while the ground temperature had dropped from 40°C to 20. Next day everything began to warm up again and another good soaring day resulted, though with lower cloud bases.

Sometimes, as during the last Australian Nationals, masses of dense cirrus and alto stratus appear over Waikerie, cutting off the sun for long periods, or creating a broad pattern of sunlight and shadow. The cloud apparently originates in upper level troughs these being associated with tropical cyclones far to the north west. The cyclones themselves never penetrate the land mass as far as Waikerie, but the moisture is present in the upper atmosphere. Such days look exceedingly un-promising, and it cannot be denied they are difficult. However, thermals are present even under the high overcast. The pilot who can fly from sun patch, will certainly do best, but quite good lift still appears elsewhere and providing the day goes on long enough it is still possible to fly large distances at quite good average speeds. The high cloud can move in very rapidly indeed, at times, being carried by the jet stream. A convenient sun patch can move away faster than a glider can fly. Choice of start time in a race can be extremely critical, since five minutes too soon or too late can make the difference between catching the sun and being caught by the shadow. However, a false start and return to try again can pay off if another broad sunlit area approaches.

It would be possible in January 1974 for every single day of the competition to be a boomer, with all sorts of record times being set up by the international stars. More likely, the weather will vary from good to very good, with almost inevitably a few bad days which will, all being well, come at convenient intervals and so be converted into rest days. It is most unlikely that there will be more than four or five really impossible days. The chances are that the Waikerie meeting, for for the first time ever, will produce the maximum permitted ten contest days.

VINTAGE GLIDER CLUB OF GREAT BRITAIN

Flying concurrent to the National Championships at Husbands Bosworth, the first major rally of vintage gliders attracted a gratifying number of enthusiasts and their machines, including entries from Germany and Switzerland.

During the course of a rather damp week, in which most of the gliders had to be content with local flying, one or two bright moments did stand out, in particular the flight of Willi Schwarzenbach in his Spalinger 18 who covered 220 km. during the course of a days flying.

Perhaps the most important resolution put forward during the meeting was the proposal of the formation of a Vintage Glider Club of Great Britain. Put forward by Britain's most ardent vintage glider enthusiast, Chris Wills, the response to his suggestion must have justified even his wildest dreams.

Although early days yet, most pilots present agreed that it was the correct time to form such a body. 50 years of gliding have just been celebrated and early examples of gliders are now either lost for ever or rotting away in some dark corner. One of the aims of the Club is to ensure that any old machine which might be lying about is brought to their attention for the possibility of restoration.

One of Chris Wills beliefs is that our vintage sailplanes should be kept airworthy and flying, a sentiment echoed by all present. A 'live' vintage meeting has ten times as much effect as a dust covered museum piece; this point being so overwhelmingly proved by David Ogilvy of the Shuttleworth Trust, whose magnificent displays of veteran and vintage aeroplanes attract hundreds of thousands of visitors each year.

Husbands Bosworth, historically, is perhaps the most suitable site in Great Britain to hold an inaugural meeting of such a body. Not far away, at Stanford Hall, one of Britains most famous gliding pioneers, Percy Pilcher, met his untimely death while attempting to master the then unknown science of flying.



The Concours d'elegance trophy, kindly donated by Mr and Mrs Philip Wills, was presented to Kurt Kummel for his magnificently restored Minimoa, with second prize going to the Rhonbussard of Graham Saw. Other prizes were presented to the Spalinger 18 and the T.21 for meritorious flying performances.

For further details of the society contact, Mrs Frances Furlong, Otford House, Otford, Nr Sevenoaks, Kent.

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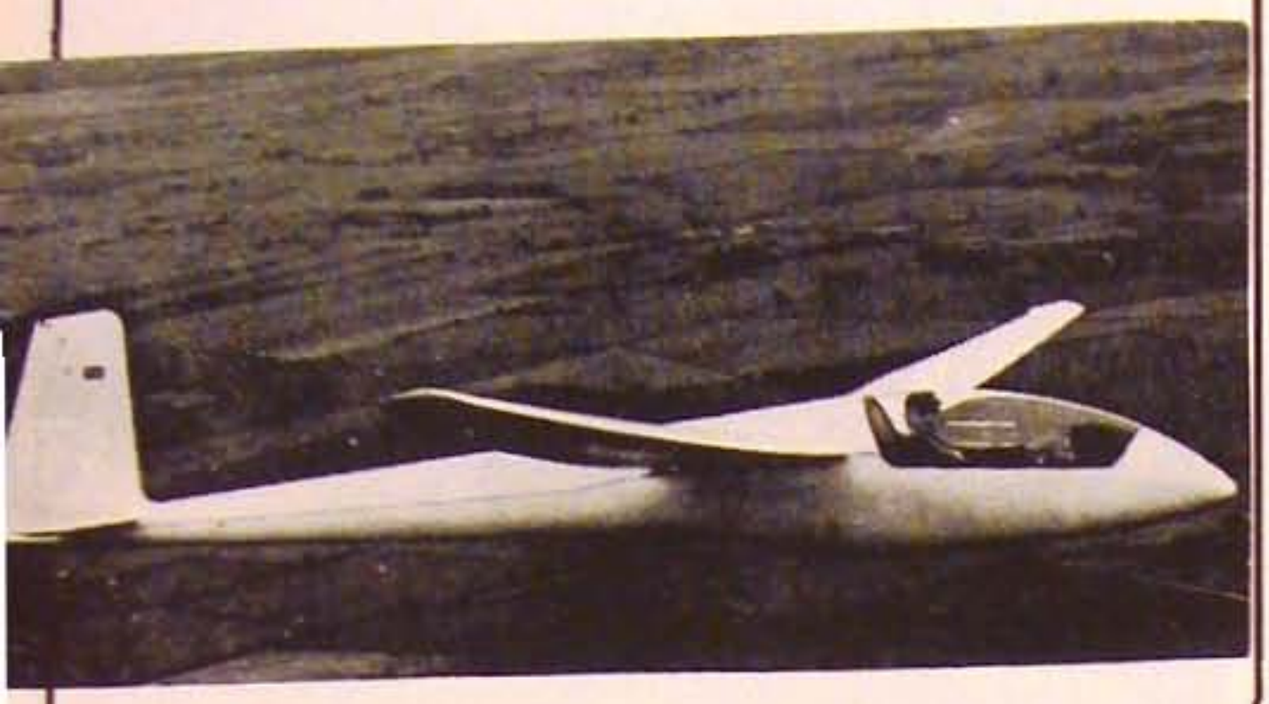
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Sport flying has always had to fight for its existence. The enthusiast, whether amateur novice or airline captain on a busman's holiday, has always had a struggle to keep in the air.

Public dislike, soaring costs, unco-operative aerodrome owners, planners, heavier and heavier Government restrictions, the military, and even commercial aviation have all been the enemies of the sport flyer.

Now part-time enthusiasts who have been minding their own business and interfering with no-one are being threatened yet again. This time it is by a motorway, which, at least, means the flyers are not alone in their plight.

The M 11 motorway from London to Cambridge will soon be slicing its way through some of the best Essex countryside, including parts of Epping Forest, and lying directly in its projected path is North Weald aerodrome — home of the Essex Gliding Club.

The Department of the Environment, who are responsible for building the giant new road, have said they object to gliding continuing once the M 11 is open because it would be dangerous for passing drivers.

At the moment the club's future is hanging in the balance on another front as well. Apart from the new road, which will plough across the western edge of the old R.A.F. airfield, there is Ministry of Defence speculation about what the aerodrome's future use should be.

The Essex Gliding Club was started 13 years ago by a small group of keen gliding folk with two gliders — a Slingsby T21 trainer and an old Slingsby Tutor single-seater. Now there are 200 members, four club gliders and 15 high performance syndicate machines owned by club members.

Today the club is an efficient and successful organisation serving gliding people not only from Essex, but also north London and eight other counties.

It is affiliated to the British Gliding Association. At least 100 members are trainees and there is a generous sprinkling of bronze, silver, gold and diamond badge pilots among the rest.

The club fleet consists of a K—13, Ka7, Slingsby Swallow and K6—CR, which are housed with other equipment in a small corner of an old R.A.F. hangar.

But despite its achievements, including an excellent safety record, the club has never been certain of its place at the old Battle of Britain airfield.

Club secretary Chris Nicholas is now waiting for a deputation from the Department of the Environment to visit the club on a flying day. He and other committee members want them to see for themselves how the club operates.

He said: "The officials fear we cannot continue here safely when the motorway opens sometime next year. But it is not us they are concerned about. They fear we will be a danger to drivers on the new road and have said they object to us staying here once the road is built.

Motorway Problems



by Peter Perry

What we are hoping for now is the chance to show the Department of the Environment officials just how we operate and prove to them that we can fly here without crossing the M 11. If we can satisfy them we shall satisfy Essex County Council as well because they have said they will go along with whatever the D-o-E decides.

North Weald is ideal for gliding. Its vast north/south, east/west runways and generous grass areas make it possible to aero-tow and motor-tow. It is the only site serving the area and the obvious high demand keeps the club open every weekend of the year and some summer weekdays.

But even if the motorway men do let them stay the Essex Gliding Club is then faced with the Ministry of Defence and their decision about the airfield's fate.

Chris Nicholas said: County and local councillors are keen to see it kept as an open space for recreation and we know that local people would like us to stay here. Essex planners have said they would be against any use for the site except as an open space.

We have drawn up plans showing how the airfield could be used for several sports, including gliding, land yachting, go-karting and other minority activities needing a lot of space and having few spectators.

This way they could be put together and catered for at one centre. There would be no need to have them dotted around always struggling for existence and a place to operate, as so many minority sports do.

We have put this plan to the Eastern Sports Council and they support it, which is especially encouraging.

In the meantime, though, the future is very uncertain and the Essex Gliding Club committee is continually discussing the pros and cons of the situation. Ideally the club would like its own site, but that would be tremendously expensive and finding a site in the rich Essex farmland would be difficult.

At the end of the year work starts on the M 11 and fingers are crossed at North Weald, for it might not be long after that when yet another group of sport flyers are shoved aside and moved on like public nuisances.



OXYGEN IN GLIDERS

By J. Stevens
Canberra Gliding Club

The gain of height required for the award of a diamond to the Gold 'C' is 5,000 metres (16,404 feet) above minimum height following the launch. Similarly, the height gain required for the Gold 'C' is 3,000 metres (9,843 feet). For these flights, and all others in unpressurised aircraft operating above 10,000 feet Above Mean Sea Level (AMSL), DCA regulations specify that oxygen equipment must be used by the pilot. The active participation in wave camps by several clubs has prompted me to write this article in an effort to promote an exchange of information and ideas on glider oxygen equipment and to assist new clubs contemplating fitting their machines with oxygen equipment.

The Requirement for Oxygen

The proportion of oxygen to nitrogen in the air is the same at all heights; however, pressure decreases with altitude, and it is pressure which forces oxygen through the lungs and into the blood. Oxygen breathing apparatus increases the proportion of oxygen breathed in as height is gained, and in this way counteracts the reduction in pressure. Additional oxygen must be supplied to the glider pilot at altitudes above 10,000 feet to prevent the significant decrease in efficiency which hypoxia (lack of oxygen) would cause above that height.

Let us trace the effects of flying at certain altitudes in unpressurized aircraft without using supplementary oxygen:

a. 4,000 feet – the first evidence of hypoxia occurs when night vision deteriorates;
b. 10,000 – 15,000 – progressive cerebral deterioration, frequently with insidious onset; headaches, visual changes; defective judgement; poor discrimination; slowing of reaction time; exhilaration and rarely, a lapse into unconsciousness;
c. 15,000 – 22,000 feet – an extension of the above effects, with weakness, cyanosis (bluish discolouration of skin and nail beds); tremors of the hands, fingers and head; loss of useful concsiousness (10–20 minutes) and death (1–4 hours);
d. 22,000 – 25,000 feet – loss of useful consciousness in 4–7 minutes:
e. 25,000 – 30,000 feet – loss of useful consciousness in 1–4 minutes, with death in 8–10 minutes:
f. 30,000 – 40,000 feet – loss of useful consciousness in 30–60 seconds, and death in 2–5 minutes:
g. 40,000 – 50,000 feet – loss of useful consciousness in 15 seconds; and
h. above 50,000 feet – you shouldn't be there in a glider. If it's any consolation, death will rarely occur in less than 90 seconds below 65,000 feet. In any case, at these altitudes some form of partial pressure clothing is required.

The above are only average values, because every person reacts differently. The symptoms may occur in some individuals at lower altitudes than those listed, in others, at higher altitudes. The altitude limits can be lowered by 2,000 – 3,000 feet for persons who smoke moderately to heavily, or are in poor physical condition. Alcohol also has a deleterious effect (including the morning after!) by reducing the body's ability to absorb oxygen from the blood. A hypoxic pilot quite often doesn't realise his condition, as one of the characteristics of hypoxia is a feeling of euphoria and "don't give a damn" similar to the effects of alcoholic intoxication.

Oxygen Systems

As previously mentioned, at altitudes above 10,000 feet a pilot of an unpressurized aircraft can only remain in full possession of his faculties for long periods or survive at high altitudes by breathing oxygen-enriched air or pure oxygen. Aircraft (and glider) oxygen systems can be divided into two broad categories:

a. Continuous Flow Systems; or
b. Demand Systems.

Either of the above are available in a fixed system in which everything is attached to the aircraft (except that the oxygen mask is attached to the system by means of a flexible hose), or a portable system in which the entire supply and equipment is small or compact enough to be worn or carried by the user.

Reproduced by courtesy AUSTRALIAN GLIDING

Continuous Flow Systems. Continuous flow equipment provides a continuous flow of oxygen to the dispenser (regulator). There are many types of continuous flow systems available, varying in complexity and price, and oxygen economy. In its simplest form, oxygen is delivered by a pipe stem held in the pilot's mouth, or by a simple strap-held nasal mask. These methods are hazardous, wasteful of oxygen and never more than 46% efficient.

Other continuous flow systems use a mask which incorporates a breathing bag (usually of about one litre volume). The breathing bag fills up with oxygen when the user exhales, and is emptied when the user inhales.

Demand Systems. These systems are characterized by a very sensitive control valve in the oxygen regulator. This valve responds to the slight decrease in pressure created in the mask at the onset of inspiration, opening to permit oxygen flow into the mask. As the user ceases inhaling, the slight increase in pressure in the mask causes the valve to shut off the oxygen flow.

Demand systems can be sub-divided into the following:

a. **Straight Demand Systems.** Supply pure oxygen in quantity equal to the user's requirements. These systems are extremely wasteful at low altitudes where only about 4% of the oxygen supplied can be used by the body.

b. **Diluter Demand Systems.** These systems incorporate a regulator which senses ambient altitude and automatically introduces the correct amount of outside (cockpit) air to mix with system oxygen to give the correct breathing mixture. Oxygen masks used with this system incorporate simple flapper check valves at the exhalation ports to prevent the intake of ambient air during inspiration.

c. **Pressure Demand Systems.** These systems permit operation at altitudes up to 10,000 feet higher than those permitted by diluter demand systems. Pressure demand systems require the use of a special oxygen mask which has a compensated exhalation valve plus one or more inlet check valves. In effect, the exhalation valve is balanced by the pressure in the mask inlet (supply) hose, so that the valve will not open unless the pressure in the mask exceeds the pressure in the inlet line. At altitudes from about 27,000 feet up to 35,000 feet, a slight positive safety pressure is added to counteract the possibility of cockpit air leaking into the mask due to an imperfect mask fit.

Care and Maintenance of Oxygen Equipment.

Correct operation of an oxygen system is largely dependent on the oxygen mask making a good airtight seal on the wearer's face. A poorly fitted mask will result in serious lack of oxygen at altitude, with the likelihood in the worst case of loss of consciousness by the wearer, and at best discomfort to and watering of the eyes due to leakage of oxygen between the nose and the mask, particularly at the higher altitudes. Careful attention should therefore be paid to fitment of the mask at your leisure before flight.

Of equal importance is correct and regular maintenance of the components of the oxygen system. The following hints may be helpful.

a. **Oxygen Masks.** Periodic cleaning of the mask and its components is necessary because of soiling due to breath condensation and perspiration.

(1) detach the hose from the mask;

(2) immerse the hose and connector fittings in a solution of warm water and mild disinfectant 1 part disinfectant, to 80 parts of distilled water. Gently stretch corrugated hoses to clean the corrugations;

(3) clean the inside of the mask with a solution comprising 75% medicinal alcohol to 25% distilled water, paying particular attention to the inspiratory and expiratory valves and their seats. If the mask is badly soiled, it may be necessary to use a water/disinfectant solution to get it acceptably clean. This treatment should be completed well before any flight on which it is planned to use the mask, in order that the mask is odour free before use. Any odour in your mask or oxygen system can rapidly make you ill, particularly when you are compelled to breathe it continually;

(4) the mask and hose should then be air dried, care being taken that excess moisture is shaken or gently blown out of the valves and connectors. The mask inspiratory and expiratory valves should be double checked to ensure no 'gumminess' remains. If the valves are 'gummy' a further clean with distilled water/alcohol mixture applied with a fine signwriters brush should rectify the problem. If the rubber edges of the mask become tacky and sticky to the touch, the rubber is perished and the mask should be discarded. A cleaned mask should be sealed in a plastic, dust proof bag until required, as even a speck of dust under a valve seat can result in ambient air being admitted to the mask.

b. **Oxygen Regulators.** Regulators should be checked at intervals of no greater than 12 months, by a competent person or organization. A certificate to the effect that the item has been checked and is serviceable should be obtained and retained in a safe place, preferably the back pocket of the aircraft's Log Book. If held in storage, the regulator should be stored in a dust proof bag.

c. **Oxygen Cylinders.** The oxygen cylinder should never be completely exhausted of oxygen, or condensation within the cylinder will occur. This in turn necessitates a complete (and expensive) cycle of cleaning, hydrostatically testing and recharging the cylinder. All flights should be planned so that the aircraft is back on the ground well before the cylinder would be exhausted.

Safety Precautions.

A fully charged oxygen cylinder is a potential bomb, and should be treated with due respect. The fire and explosion hazard associated with high pressure oxygen coming in contact with even a minute blob of oil or grease, organic matter or even metal filings cannot be over-emphasised – if you don't know what it's all about, don't fiddle with the system – leave it to those who do.

Before assembly the various threads and fittings should be degreased and cleaned with trichlorethelene. It follows that the hands must be scrupulously clean, with no trace of chapstick, sunburn cream, hair oil or any other oily preparation or substance on them when oxygen equipment is handled, and particularly when the mask is worn for high altitude flight. Any leaks should be traced by using a solution of soap and water, applied with a brush. NO LUBRICANTS OF ANY KIND MAY BE USED IN SYSTEM ASSEMBLY.

Some precautions to be observed for oxygen flights:

a. it's elementary I know, but – ensure the cylinder is turned on and that you have adequate oxygen for the flight before you take off;

b. ensure your mask is connected to the oxygen inlet hose, and that the hose is not kinked or passing under your safety or parachute harnesses;

c. during flight, monitor your oxygen cylinder gauge. Your aim should be to be back on the ground before the cylinder is empty. The object of any oxygen flight should be to get up there, attain your goal and get down again as soon as you can, even if only to give the next bloke a go! Chances are you'll be so perishing cold that you won't want to linger anyway;

d. if you have reason to suspect that you are hypoxic, SELECT EMERGENCY OXYGEN ON, OPEN THE AIRBRAKES AND DESCEND BELOW 10,000 FEET AS SOON AS YOU CAN; and

e. after landing, have the system checked to trace the cause of your becoming hypoxic – check your mask fit and valve operation first. If necessary, have the mask cleaned and re-fitted. Don't forget to turn off the oxygen cylinder valve, and ensure the cylinder is recharged before the next flight.

New Developments

A new development (or rather, an improved version of an old principle) in oxygen systems of interest to glider pilots is the chemical (or so-called 'solid state') oxygen generator. An example recently examined and used by the writer comprised a fully self contained unit measuring 16 ins. in length by 4¾ ins. in diameter, and weighing 4½ lbs.

The generator operates on the principle of incomplete reduction of an alkali chlorate by finely divided iron particles. These chemicals are cast or compressed into a cylindrical form called a 'candle' which is held in a container or 'furnace'. The system is ignited by a percussion cup acting on an enriched section of the end of the candle, when the end cap containing the oxygen mask is removed and the mask pulled out. An oxygen flow is then initiated at the rate of at least 2.5 litres per minute, for at least 30 minutes.

The new system, although still in the early stages of development and not yet readily available, offers the following advantages.

a. considerably lighter than an equivalent compressed gas unit;
b. maintenance is limited to replacement of the candles after use. The unit requires examination only after 25 'burns';
c. candles have an indefinite shelf life – about 10 years;
d. maximum pressure within the system is 40 – 50 PSI;
e. the unit is expected to cost about £35 as against about £225 for a compressed gas unit; and
f. candles are expected to cost £3 – £6 when development is completed.

There are disadvantages with this system;

a. once set going, the unit produces oxygen until the candle is exhausted. There is no provision for storing the generated oxygen for later use;
b. the system has a limited duration, although this can be expected to improve with further developments; and
c. the generator must be located in a freely ventilated area to prevent the heat buildup which can occur in a confined space (during operation, temperature on the container surface typically rises to between 300 and 500°F).

At present under development is a demand version of the solid state oxygen system. A demand system would utilize a low pressure accumulator for storage of a small quantity of oxygen. As this quantity became depleted and accumulator pressure drops, a pressure sensor would signal the generating apparatus to burn a further chlorate candle to recharge the accumulator. Such a system, when fully developed, would give greater endurance than is presently available, could be used in both single and two seat gliders, and would be inexpensive. Some interesting developments in solid state oxygen systems should be apparent within the next few years.

Conclusion

I have tried to briefly cover the various aspects of using oxygen in gliders in this article. Where heights are quoted they are, of course, heights AMSL and not height above the ground. I hope that this article will lead to an exchange of ideas with other clubs and individuals interested in this subject.

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The German Super Ship

After the successful inaugural flight of the 22 metre wing span SB–9 our group was faced with the problem of increasing the performance of its successor the SB–10. With the optimization of wing geometry and fuselage aerodynamics being well known a slight improvement in performance may therefore have been possible with a more thorough application of this knowledge. However, the arduous task of undertaking the construction of a new aircraft was not very appealing, and in addition to this, little research had been carried out into improving performance by means of Fowler flaps or telescopic wings. It seemed more logical, therefore, to develop further the SB–9 design and improve performance by increasing the wing span to 30 metres. Calculations indicated that the angle of glide could be improved by 10–15% over and above any existing high performance glider. This fact alone was very inviting, but was it not possible that better performance might be nullified by restricted manoeuvrability and poorer handling capabilities? This was something the technical designers would have to overcome. Another question raised was, whether or not it was beyond the capabilities of a student group to construct a machine of these dimensions? The ideal solution we decided would be to insert an 8 metre long centre wing section in to the SB–9 wing. The relatively small wing ratio of 15.3% ruled out the possibility of using the well known GFK method of construction if the wing modification was to be kept within reasonable proportions to the weight.

At this point the manufacturers of KFK offered their assistance (KFK being a synthetic material made of reinforced carbon fibre), claiming the manufacturing process to be similar to that of GFK. However, as KFK had never been used in the manufacture of aircraft components which would be subject to stress, exhaustive tests would have to be carried out on its durability. Also the very high price of the fibres posed a difficult problem.

Beset with these problems we presented our project to professors in the aeronautical faculty of Braunschweig University. They were eventually able to secure financial support for research into the testing and application of carbon fibres in high stressed aircraft components. Two recently graduated AKA pilots were recruited for the project, to be undertaken at the Braunschweig Institute for light aircraft manufacture.

Although this still left us with a considerable volume of work we felt that the problems were no longer insurmountable and decided to go ahead with the project.

The following had to be taken into account if the wing span was to be increased; – total wind resistance; i.e. resistance incurred by the wings, fuselage, tail unit and possible prevailing weather conditions. Profile and induced resistance account for the amount of resistance depending on the profile polar curve and the Reynolds number (Re). This is obtained by increasing the wing chord l : Re. ~ v.l (v = face velocity).

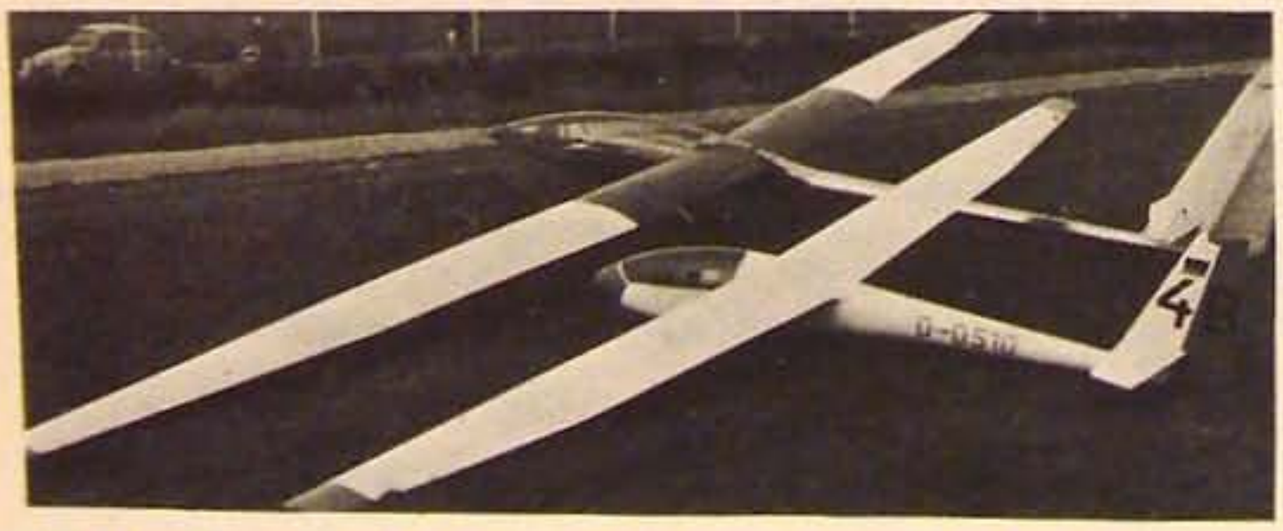
The co-efficient of induced resistance is $c_{w_i} = \frac{c_a^2}{\pi \cdot \Lambda} k$ where Λ is the aspect ratio and k a factor which takes into account the lift distribution in relation to the wing spread. If an elliptical lift distribution can be produced then k will have a minimum value of 1. All that now remained to decrease the amount of induced resistance was to increase the aspect ratio. A fixed wing spread would mean a reduction in the wing chord thus resulting in increased profile resistance. The only alternative was to raise the aspect ratio by increasing the wing spread. Statistical evaluation of components subject to wind resistance showed that a greater wing area reduced the co-efficient of detrimental resistance. This clearly indicated that detrimental resistance, which is largely influenced by the fuselage, is quite independent from the wing area, as the size of the fuselage depends to a great extent on the space occupied by the pilot.

An increased aspect ratio is only desirable up to a point where the decrease in induced resistance is absorbed by the increase in profile resistance incurred by a decreasing Reynolds number. A large wing area is therefore favourable as it decreases the co-efficient of detrimental resistance. It was therefore decided that an increased wing spread would be the simplest method of achieving aerodynamic improvements. Dimensions decided on for the SB–10 were; aspect ratio 36.6, wing area 22.95m^2 and increased SB–9 wing spread of 29 metres. The central wing section would be of similar profile to the SB–9 wing unit – a modified Wortmann FX62–K–153, and the aileron type FX60–126.

To enable the second crew member to be housed at the centre of gravity the wing was swept back by -1 degrees. The central wing section would be a 1.5 degree negative dihedral, thereby improving ground clearance and improving flight stability. To avoid detrimental resistance as much as possible the fuselage was to taper sharply from the trailing edge of the wings to the rear. As a smooth laminar flow was desirable a cockpit had to be designed which would create the least possible wind resistance, the resultant design being one which was incorporated into a sharp cone-shaped nose. The high moment of inertia of the wings required a large rudder assembly and sizeable control arm. To keep the centre of gravity within permissible limits the pilot was seated as far forward as possible. This resulted in there being enough space behind the pilot to accommodate another crew member or measuring instruments for test flights. Special consideration was taken, particularly in the case of the first crew member, to design a comfortable seating angle and a good field of vision. The size of the cockpit made the occupants vulnerable to heat and light and good ventilation would have to be provided to alleviate this problem. It was decided to incorporate NACA vents which, beside providing adequate ventilation, were incorporated into the fuselage with no protrusions to marr the smooth fuselage contours.

Special consideration would have to be paid to the undercarriage suspension dampers if we were to achieve a smooth impact on landing. The undercarriage leg would have to protrude considerably to give good ground clearance for the wing tips.

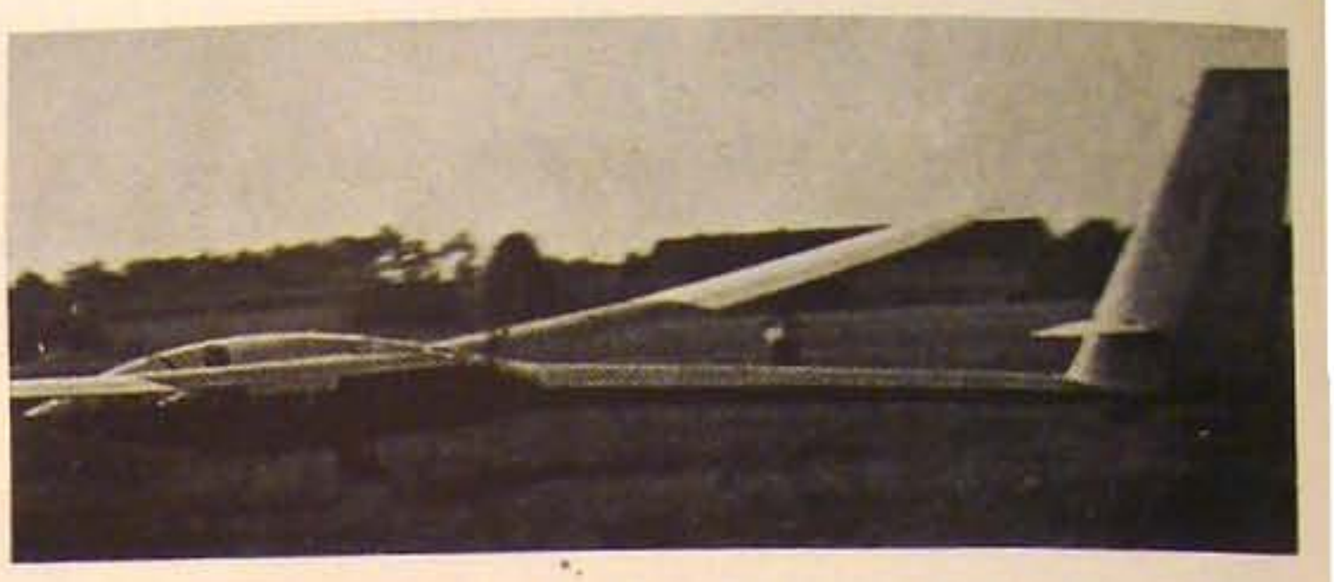
Regarding the tail unit assembly we rejected the T-shape in favour of a cross shaped unit which, although aerodynamically less favourable, is not as prone to oscillation.



INVESTIGATIONS INTO THE PROPERTIES OF CARBON FIBRES.

The realisation of the SB–10 depended upon the construction of a central wing section which was not only durable but also extremely light. It was therefore essential, by means of exhaustive experiments, to become familiar with the properties of KFK and to compile information on its structure.

Carbon has two forms; diamond and graphite. The carbon fibres we were concerned with were made up of graphite crystals whose atomic valence is very strong within the layers but weak between them. As the strength of the carbon atoms lies on a horizontal and not a vertical plane the graphite crystal layers must be aligned parallel to the ordinate line of the fibre.



Mono-crystals (Graphite whiskers) appeared to be an ideal substance as they produce a tensile strength of up to 2,000 kp/mm^2 and E–Moduli of 100,000 kp/mm^2. They are 2–3cm. long and 0.5–5m. thick. However, their manufacture (expansion in direct current – a carbon arc in Argon under a pressure of approximately 100 kp/cm^2 at 3,600°C) and the broad dispersion of their ultimate strength values due to defects in the crystal lattice make their technical application impracticable. Polycrystalline graphite fibres of greater strength were subsequently developed, whose defective areas could be compensated by other crystallites and the dispersion of their ultimate strength values thereby reduced.

Carbon fibres are produced by the carbonization of organic artificial fibres. Two fibres can result from this process; Cellulose-Rayon & polyacrylnitril fibres (e.g. Dralon & Orlon). In the U.S.A. rayon is the main basic fibre whereas Japan and England are engaged in the pyrolisation of polyacrylnitril fibres. In simple terms the manufacture of carbon fibres from polyacrylnitril fibres takes place as follows; the raw material is heated to 200–300°C then re-heated in a protective gas atmosphere to 1,500°C. By this heating process almost all the impure atoms, except the carbon atoms, are removed from the artificial/synthetic fibre, thereby producing a carbon fibre of maximum tensile strength. With a further increase in temperature the E-Moduli rises sharply and at temperatures above 2,500°C further increases the tensile strength.

Although carbon fibres can be widely employed in aircraft technology where minimal weight and high tensile strength is desired its prohibitively high price makes application in other fields unlikely. One kilo of carbon fibres costs between £40 and £240 (according to the grade), but it is hoped that increased production will cause a significant drop in prices – this will not be the case with boron fibres.

Carbon fibres are delivered in the shape of 'rovings' which consist of between 5,000 – 12,000 single threads.

Carbon fibres are used in the manufacture of solid substances of high stability and tensile strength. As a basic material (matrix) for synthetic tensile substances epoxy resin is normally used. The matrix has to determine the orientation of the fibres to the direction of the force, and to prevent the fibres buckling when under stress.

Extensive tests had to be conducted before the SB–10 central wing section could be produced from KFK. In order to create a protective layer on the carbon rovings a simple dipping device was developed which worked as follows; the rovings were guided under a sprinkler, through a resin bath, then over a fulling and pitch roller through a scaled down tuyère system which by removing superfluous resin determined the required resin content.

It would be too involved to fully describe the stress tests carried out, but suffice to say we experimented with wind trials and pressure tests on rounded surfaces and rotating bending tests to produce a stress–N graph. Bending tests were carried out on small box spars with KFK girths and plywood cross pieces. Overall stress tests were made on a scaled down mock-up wing. We also investigated the resistance of KFK to temperature variations. Finally by means of torsion cylinders we determined the pressure resistance and tensile strength of carbon laminates.

FUSELAGE & LANDING GEAR

The pilots are housed in a twin sectional cockpit (rear half is removable) in a semi-prone position, the rear pilot being slightly more upright for reasons of visibility. Behind the trailing edge of the wing the stressed section of the fuselage is a tapered steel tube unit comprising four flange mounted stays., with the delayed action cut-out being placed just fore of the landing gear.

The excellent suspension on the swivel undercarriage is made up of 240 annular spring shock absorbers with an initial stress force of 100 kp.

Because of the high gross weight of 900 kp. and the high ground clearance requirements (600mm. clearance from the ground to the lowest part of the underwing fuselage section) a great amount of hard work went into the planning and construction of the landing gear.

THE CENTRAL WING SECTION

By early 1972 experimentation and construction on the centre section was so far advanced that it could now be incorporated into the glider. This was achieved as follows – From the upper to the lower surfaces of the wing; firstly, incorporation of the KFK torsion bushing and the balsa layer; next followed the cross piece, the ribs, the upper spar flange (made of KFK rovings) and the incorporation of the compartments into the exposed box spar. At the same time the radix ribs and fixtures were inserted into the wing/fuselage connecting point. The lower spar flange and base supports for the landing flaps were then positioned. Finally the lower KFK torsion shell was put into place and primed. Once completed it was found that the calculated weight of 160 kp. had been almost exactly adhered to.

THE TAIL UNIT

The tail fin was constructed from a spar of light metal which could be easily riveted to the fuselage. Plywood strips were attached to the girth of the U-girder and subsequently encased in a balsa wood shell. This method of construction was tested on the HKS 111. The stressed ribs were made of plywood. The spar elements were fitted with a balsa wood leading edge and, after various other small additions had been incorporated, covered with a fibre glassed balsa wood plate. Because of weight considerations the side rudder was covered with fabric. To minimise the operating force a rudder horn was chosen as an aerodynamic compromise. The elevator was constructed as a plywood-foam-plywood sandwich, a difficult task but desirable due to the relatively small profile thickness of 6%.



THE CONTROLS

The construction of the controls proved to be extremely involved, as the design of the glider necessitated good handling on all control surfaces, good manoeuvrability and good short landing capabilities. By re-constructing the SB–9 control surfaces we hoped to achieve greater manoeuvrability. The elastic trailing edge flaps were replaced by standard ones and the wing and trailing edge flaps were super-imposed to co-ordinate their operation. The trailing edge flaps of the SB–10 now comprise three units; the original SB–9 wing flap, trailing edge flaps and the central wing landing flap. Because of the different lift distribution in the individual aerofoil sections all three flaps naturally had to be independently operated. The following problem arose with the landing flaps which were limited to a maximum 75° tilt; in flight the wind resistance was too great to enable the flap to be operated manually and power-assisted controls of 60 kp. had to be adopted. The aileron and the Schempp-Hirth-flap are actuated by push rods and the rudder by steering rods.

MAIDEN FLIGHT OF THE SB–10

The SB–10, flown by Helmut Triber, made its first flight in the early hours of 22nd July 1972: firstly the 26 and then the 29 metre version. The SB–10 was towed to 1000 feet by a Dornier 27 giving the pilot ample time to familiarize himself with the controls of the machine. The division between wing flaps and side rudder proved excellent and the elevator also functioned satisfactorily. However owing to slight over-reaction on the side rudder a Flettner aileron had to be fitted. On the second landing the central landing flaps were tilted to 30° achieving, along with the SB–9 braking flaps, a short landing. Most surprising to the pilot was the good manoeuvrability which was comparable to that of a 20 metre machine. The Certificate of Airworthiness trials scheduled for late Spring this year will finally prove whether or not the conception of the SB–10 was a viable one.

SB–10 SPECIFICATION TABLE

1	**WING**	5 sectional	3 sectional
	Span	29m	26m
	Area	22.95m^2	21.81m^2
	Aspect Ratio	36.6	31.0
	Negative dihedral	1.5°	
	Sweepback (nose)	–1.0°	
	Profile	Wortmann 62-K-153 inner mod 62-K-131 central mod 60-126 outer	
2	**TAIL SURFACES**		
	Span	3.3m	
	Area	1.46m^2	
	Aspect Ratio	7.45	
	Profile	NACA 63-006A	
	Amplitude	‡20°	
3	**RUDDER ASSEMBLY**		
	Height	2.21m	
	Area	2.45m^2	
	Aspect Ratio	2.00	
	Profile	NACA 64 012 A upper 64 009 A lower	
4	**FUSELAGE**		
	Length	10.36m	
	Width	00.68m	
	Height	00.94m	
	Landing gear	retractable. shock mounted	
5	**WEIGHTS**		
	Max weight	897 kp	889 kp
	Empty plus fixed weight	577 kp	569 kp
	Safe load (with 100 kp waterballast)	320 kp	320 kp
	Wing loading	20-39 kp/m^2	30-41 kp/m^2
6	**PERFORMANCE**		
	Min. speed	65 km/h	69 km/h
	Best glide ratio at 90 km/h	1:53	1:51
	Min. sink at 75 km/h	0.41 m/s	0.43 m/s
	Max. speed	200 km/h	200 km/h

Glider Construction

by J. C. Gibson



GLIDER CONSTRUCTION

George Burton's article on the Kestrel 19* makes particularly interesting reading to me in respect of the development period needed to turn the existing Kestrel 17 design, begun 6 years ago, into the successful "19". Having sweated out several years of spare-time work bringing the present BG 135 to fruition with Pat Moore and Keith Emslie (Sailplane Design Ltd.) and the Birmingham Guild Ltd. who made it, I find the parallels noteworthy. Both short-span Kestrel 17 and 12m Gipsy prototypes flew in 1970, and while the production Kestrel 19 delivery was building up ahead of the first Gipsy batch, the design effort available to develop the latter was probably only a fraction of the former, and there was no ready-made factory organisation to build gliders.

This leads me to my main point, which is to contest the too-ready dismissal of metal construction in the Kestrel article. I do not know if metal is supposed to be wrong only for very high performance gliders - inclusion of the T.53 suggests not. Only the adoption of metal construction enabled the joint experience of SDL and BG to be utilised for Gipsy, whose performance allied with its other qualities has tempted even Libelle pilots! Any faults of the HP.14 and T.53 were not related directly to their metal construction. Over 10 years ago the outstanding high-performance glider was the all-metal Sisu, and I suggest that with a modern aerofoil section it would still be formidable. Sigma, whose drag problems are not related to metal construction, and the phenomenal BJ series owe their existence to metal structures. Study of past and present World record lists shows the contribution to them of metal gliders. 1500 Blaniks testify to metal construction. Pilatus are laying down a second production line to meet the demand. Schweizer's could not sustain glider manufacture in any other material.

Slingsby's published their reasons for turning to metal construction (Refs. 1,2) which one must suppose were based on a thorough study of available facts. Perhaps the most powerful argument was the labour required to build wooden gliders, e.g. 1500 to 3000 manhours for typical single-seaters. 40% less hours were needed to make the Dart tailplane in metal than in the original wood, and though these references give no other figures, Schweizer's (Ref.3) needed to get manhours down to 600 during a production run to be able to sell at $6000. Presumably they succeed, and they also quote manhours for glass fibre gliders as 1500 to 2000.

However, economics have never deterred pundits from buying the highest performance, and there is of course no argument about the dominance of glass fibre construction in the top-performance field. Do glass and resin possess magical drag-reducing qualities? Of course they do not. It is the modern understanding of glider aerodynamics (although one could write at length about some obvious misunderstandings current where they ought not to be!) which gives the potential for high performance, the achievement of which depends on close control of the surface shape. Glass fibre just happens to be easy to lay up in an accurate mould and so achieve the desired shape. Nothing else about it is easy, and Slingsby's earlier objections to it were bypassed to some extent by purchasing the know-how from the most experienced manufacturer.

For the rough-and-tumble of Club and less-experienced syndicate operations, the suitability of glass fibre construction ought to be examined very carefully. The British Gliding Association do not hide their concern over the repair and inspection of such gliders, while readers of the U.S. journal "Soaring" have been left in no doubt that problems exist, as the following extracts show. As can be seen, the trouble starts after leaving the manufacturers, who - you can be sure — put all they know into ensuring a sound and defect-free structure on delivery.

Ref. 4. This letter refers to the bombardment of warnings and requests to inspect tail surfaces for bond separation, all other areas for hairline cracks that might point to more severe hidden damage; sonic and hypersonic testing experiments, which were ineffective with no comparison sample; the expenditure of $200 in stripping and repairing just to prove that there was no damage. This was after the fatal accident to a well-known type whose tail appeared to have split open.

Ref. 5. This letter reports that the owner of another make glass fibre sailplane found that the tailplane had a joint you could push a hacksaw blade into across two thirds of the span.

Ref. 6. This letter reports the extreme difficulty in determining that there had been any damage at all after a groundloop in a ".....", yet in fact half the glass holding one of the elevator trunnion bearings had been broken. After a "....." had groundlooped the elevator trunnion bearings were torn out, but it was not easy to find damage, even for an experienced inspector.

Ref. 7. The author of this article has experience of developing hundreds of fibre reinforced composite structures using glass, boron quartz, dacron, nylon, steels, ceramic and graphite fibres. His main theme is that while the glass reinforced structure components are themselves very strong, they are in the end just glued together — though "bonded" sounds better!

"...When we make a basic change in materials and concepts of construction, we don't just start out at the level of technology of, say, metal aircraft, which has really been the result of 45 or more years of building and using these aircraft; we have a learning stage to go through. This learning can be painful. We have seen a few letters and some comments on hairline cracks and debonded joints in fibreglass sailplane structures. It is serious. In my opinion we are only seeing the beginning of the problem, a condition that will be with us for a long time..."



The author also refers to doubts about present inspection methods in the absence of anything better, and discusses the possibility of ultrasonic testing, which can only work given comparison samples of proven quality.

The hundreds of glass gliders operating now are a tribute to the efforts of manufacturers and authorities to ensure structural integrity. However, while the worst feature of earlier examples are becoming rarer, we are still left with subtleties of structure and handling qualities which seem to me to be removing the sport too far from the semi-amateur state which admirably combines the needs of the majority of its members with the highly technical environment of airworthiness standards, airspace regulations, etc... Could it be that the "resurgence of interest in the medium performance glider" mentioned in another article in the first "Soaring Pilot" is due to a growing realisation that recent glider development has mainly benefited the elite? The enthusiastic welcome accorded the BG.135 during its tour of clubs recently offers evidence that manufacturers have forgotten what gliding is all about for most of its adherents.

It has been the availability of metal construction alone which has resulted in the existence of this glider, which can be flown safely by the relative novice, can be landed in small fields, has 300 km. or more capability in British conditions, can compete with older Championship winners of 4 or 5 metres greater span, has flown a near-200 km. triangle at a similar speed to the Dart 17R U.K. record, and above all is **fun** to fly.

Ref.1. T-53 Construction Methods. "Sailplane & Gliding" June-July 1968
Ref.2. Slingsby T-53 "Progress Report" Brochure, 1967
Ref.3. Schweizer Aircraft's Position on Fibreglass Sailplanes. "Soaring", Aug.1969
Ref.4. Letter, Steve du Pont. "Soaring", March 1972
Ref.5. Ditto "Soaring", April 1972
Ref.6. Safety Corner, Letter from J. Armitage. "Soaring", Sept. 1972
Ref.7. Some Thoughts on Composite Bonding. D. Golladay, "Soaring", July 1972

Development of the Kestrel 19 – Soaring Pilot Vol 1 No 1. We must apologise to George Burton, managing director of Slingsby Sailplanes for our error in failing to credit his name to the above mentioned feature.

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Competition Round-Up

ROYAL NAVAL COMMANDER WINS PREMIER INTER-SERVICE GLIDING AWARD – by the Editorial Staff

The first major British gliding competition of the 1973 season, the Junior Inter-Service championship, took place at R.A.F. Spitalgate, Lincolnshire from 5th–13th May.

Organised by the R.A.F. Gliding and Soaring Association, the event was divided into Sport and Club class fields, the Sport class machines varying from the super-exotic Kestrel 19 and Nimbus 2 via the popular Libelles and Cirrus 15's down to a venerable Skylark 3, which in the hands of Bernard Spreckley, put up a magnificent performance to finish joint 14th.

In the Club class the K–8 was the numerically dominating glider, 14 out of a field of 20 being this type.

Opened on a very wet, dismal Saturday by A.O.C. Training Command, Air Marshall Sir Neville Stack KCB, CVO, CBE, AFC., the day was soon to be closed officially by met. man Ron Cashmore, whose forecast soon had pilots and officials back in caravans and messes.

To Swanton Morley – by cloud

On the 6th day of May it was decreed fit to fly. This announcement being the signal for frantic fettling to commence and the discussion as to the merits of 'glass' in the existing conditions, which the majority of pilots were inclined to believe would prove difficult. These opinions were somewhat justified later in the day when an analysis of speeds revealed that a difference of 26 kph existed between the first and last man to complete the set task in the Sport class. In the Club class the figure was 20 kph. A further interesting point revealed that the average speed of the first 7 Club pilots was faster than their Senior counterparts.

The tasks stipulated for both classes were dog-leg races to Swanton Morley. Sport class distance being 140 kms., with a turning point at Ely Cathedral, while the Clubmen had 112 kms. to cover, their turning point being at Wisbech.

Leading pilots in both classes made full use of clouds to enable them to cross the 'dead' gaps which existed. Knowledgable pilots in the Sport class on reaching the TP, retraced their flight paths to join an inviting cloud street which had poistioned itself a few miles to the NE of Ely. Club pilots were able to join the same street just past their TP. This in fact considerably helped the majority of pilots home.

Cdr. Mike Livesay climbed to 6,300 ft. before commencing his final glide out to Swanton Morley. On arrival he found that Colin Woodier had completed the task 1.65 kph faster to win the day. He spent the rest of the night wondering if those extra turns in cloud were now justified.

In the junior section, R.A.F. pilots Miller and Wood finished the day at the head of their class.

To Dunstable – you must be joking!

After a further days rest through inclement weather, it was announced by a rather cynical met. man that this was the day to fly south. Convection would be slow to brew, but it would be there.

By grid time it was decided to scrub the Club class, but the Sport would be on. As it turned out, the maximum points scored that day were 4 by J. Simms – Std. Cirrus, who covered 53.02 kms. Mike Livesay joined Colin Woodier at the head of the table when he was awarded 2 points for a flight of 51.48 kms. These being the only points scored. Both pilots found two thermals only, and after reaching the Husbands Bosworth area decided further progress was virtually impossible.

If at first you don't succeed – try again

Day three, which turned out to be the penultimate task of the competition, always had the promise of something spectacular. For the Sports class, an out-and-return race of 152kms. via Melton Mowbray TV mast was the set task, while the Club pilots were confronted with a gently angled dog-leg race, virtually downwind, of 165 kms. to Great Yarmouth.

This was a day of improving conditions with the later starters having the obvious advantage. In the senior event, the position at the top of the table was extremely close, Livesay, Woodier and Dixon watching each others every move. The decision by the Naval man to have a second go, after he had completed the task, was a brilliant piece of gamesmanship motivated by two major factors; firstly he knew that arch-rival Woodier was making very good progress, and secondly the weather promised him every chance of improving his first time. He further decided that if he was to succeed, he would use only succulent thermals generating a minimum of 4 knots. He did in fact find he was able to do this, but found the spacing of the convection cells were more widely placed. On arrival at the TP he was slightly behind schedule, but a backing wind and a rapid climb to 5,500 ft. over Leicester enabled a final glide to be calculated which would beat his first time by four minutes and give him the fastest time of the day. This win put him four points ahead of Woodier, who finished the day in third position, behind Dixon.

At the top of the Club class the K–8's of the R.A.F. Strike Command team were literally putting themselves in an unassailable position, Stockwell, Joslin, Hartley and Wood turning on the heat at exactly the right moment.

Just one point

On a day when conditions turned out to be marginal, a 214 km. triangle for the Sports class and a 169 km. out-and-return for the Club class were designated by task-setter George Lee.

Right from the start it became obvious to those listening in on their radio's that it would be highly unlikely if any one pilot would complete the course. Regular landing messages were being received as conditions continued to deteriorate. The excitement of the day lay in the fact that the overnight leader in the Sport class, Mike Livesay was struggling desperately to stay aloft. He could not afford to let Woodier get too far ahead as his marginal lead of 4 points could soon be retrieved. However, it was the weather which had the final say, clamping conditions after about 100 kms putting paid to the heroic attempt of Colin Woodier to re-take the lead. By landing a few kms. ahead of Livesay he was able to regain three points, which resulted in him missing the title by just ONE solitary point. Hard luck Woody and congratulations Mike.

The major honours of the days flying were collected by K–6E pilots Staines and Andrews who flew 102.23 and 99.4 kms. respectively.

FINAL RESULTS

Sport Class

1. M. Livesay	Royal Navy	Libelle	89 points
2. C. Woodier	Civilian	Libelle	88 points
3. R. Dixon	R.A.F.	K–6E	79 points
4. R. Cole	R.A.F.	K–6CR	74 points

Club Class

1. J. Stockwell	R.A.F.	K–8	47 points
2. C. Joslin	R.A.F.	K–8	46 points
3. K. Hartley	R.A.F.	K–8	42 points
4. M. Wood	R.A.F.	K–8	40 points





Spitalgate Smatterings

What happened to the super-exotic ships?

Mike Livesay first flew his Libelle 10 days before the event!

Are the Air Training Corp showing re-newed interest in the T–53, sorry, teh YS–53? All the staff of the No. 2 Gliding Centre who flew this machine showed great interest and enthusiasm about the re-vamped glider.

Brigadier Goozee proved once again that 'closing ceremony' speeches have no need to be the dull routine affairs they usually turn out to be.

Finally. Where would the Club class be without the redoubtable K–8?

SCENE International

U.S.A.–
World Soaring Record for Out and Return Increased to 782 Miles

William C. Holbrook, 51, of Cumberland, Maryland, has claimed a new out-and-return world soaring record of 782 miles (1260 km.) for a flight he made on Saturday, May 5, 1973. He flew a Glasflugel H-301 Libelle sailplane from Lockhaven, Pa., to Hansonville, Va., and return in 11 hours and 58 minutes, thereby shattering the existing record of 682.60 miles by almost 100 miles or 15%.

Alerted by a forecast of ideal weather for the record attempt, Holbrook took off at 0604, releasing over the airport at 0607 under a 3000-foot overcast in light snow. He carried about 70 pounds of water ballast, to which some anti-freeze had been added, so faster speeds could be achieved. The expected upcurrent from a steady 15-knot wind on the adjacent ridge was reached and used for the run southwest at about 90 knots. It was this combination of wind and a long mountain ridge with only a few gaps that made the flight possible. Some light icing on the canopy and wings was experienced initially but it did not have a noticeable affect on performance. Holbrook reached the gap at Altoora, Pa., about 0700, where he headed upwind over the valley to encounter wave lift in the lee of the facing plateau. This enabled him to climb to 5000 feet and cross the gap, after which he went back to the ridge. The next gap, at Bedford, Pa., was negotiated in much the same way. Clouds became more broken with higher bases as he proceeded south until near Covington, Va., where it was clear.

The turn point was reached right at noon, duly photographed, and the return trip began. The booming ridge lift was now augmented by excellent thermal conditions. A few thermals that pegged the variometers at over 1000 fpm were worked for a few turns to 7000 feet but faster time could be made on the ridge. Cumulus cloud bases appeared to be near 10,000 feet, lowering to the north. Cloud cover increased, also to about 50% in Pennsylvania and near overcast again at Lockhaven. Radio greetings were given to participants in a soaring contest as Holbrook passed his home town of Cumberland, Md. For the final portion of the flight he was escorted by two friends in their sailplanes, Tom Knauth and Karl Striedieck, holder of the existing world soaring record for out and return. The landing back at Lockhaven was at 1805, only eight minutes longer than the flight plan Holbrook had filed earlier in the day. Average speed for the 782-mile flight was 65.3 mph, although the actual distance travelled along the curved ridge was 816 miles and over 70 mph was achieved for much of the flight.

The existing world O & R record of 682.60 miles was set on October 15, 1972, by Karl Striedieck of Port Matilda, Pa., flying a Schleicher AS-W15 sailplane over much the same terrain. Holbrook accompanied him in his Libelle sailplane on that flight but broke it off near the end because of fading daylight. For the May 5th flight, Holbrook started from a point further north on the ridge and had a turn point further south.

The National Weather Service makes special forecasts for attempts at national and world records. For this flight it was NWS meteorologist Charles Lindsay, a sailplane pilot himself, who saw the condition developing and so advised Holbrook.

DENMARK – No more gliding in ten years

At a recent C.I.V.V. Congress Mr. M.B. Petersen, Chairman of the Danish gliding organisation, informed the meeting of difficulties being met in Denmark at the present time. He warned that similar troubles would arise everywhere. It was, he said, probably "a waste of time to discuss competitions and types of gliders because I don't think there will be any glider pilots in ten years".

The cause, he said, was the increasing tendency of air-space control authorities to demand a complete, and unnecessary, monopoly of airspace. In Denmark it had been proposed in 1971 to limit gliders over large areas of the country to ceilings of 1000 ft. or 2000 ft. This proposal was resisted but has now been replaced by one limiting gliders over the whole country to 3000 ft.

He mentioned the similar problem being faced in Germany, and warned that if the trend continues gliding as a sport will soon cease everywhere.

The Danish gliding movement was, he said, working on a system which would enable gliders on cross-country flights to be plotted via a "datamat" by the air traffic control authorities. He promised to keep other gliding movements informed; and also called for support in the Danish struggles against an arrogant and ignorant bureaucracy....

..... but regardless of what Mr. Petersen says and despite high insurance premiums, taxes and air space problems, gliding is nevertheless making encouraging advances in Denmark. Proof of this are the new sailplanes which will pass through the Danish frontier in the next few months. The number of synthetic sailplanes is expected to double to twenty and in addition six B 4's, four SF–25C's and a tandem Falke have been ordered for delivery in the immediate future.

GREAT BRITAIN
YS–53 Sovereign now in production

Yorkshire Sailplanes development of the Slingsby T–53, the YS–53, we are reliably informed is now in full production. The original snags which dogged the T–53 having all been ironed out. A 'demonstrator' is available for those clubs interested.

100 Km. Goal Speed Record Broken (subject to homologation)

On Saturday, April 7th, Justin Wills, flying his Standard Libelle, set up a new UK 100 km Goal Speed Record of just over 138 k/ph. He started from a point ¾ of a mile west of Henley-in-Arden, and flew to Booker. Had the early morning promise of cloud streets developed, and had the wind had a slightly less northerly component, it is likely that this speed would have been much greater. But no doubt this remains for another day!

The existing record of 128.4 k/ph was set up in April, 1969, by Jack Harrison flying an SHK.

GERMANY –
A Survey of the Present Activities of Schempp-Hirth

The Nimbus II

As it well known the Nimbus I was an experimental aircraft with a wing span of 22 metres. The Nimbus II was developed expressly as a production machine. It has a four part wing, something new at its conception, but since then a well proven construction. The Nimbus II, winner of the open-class in the world gliding championship in Yugoslavia, is a single seat mid-wing monoplane made of GFK. It has trailing-edge flaps, a T-shaped tail unit, brake flaps on the upper wing side and a drag parachute built into the side rudder. Up to now, apart from slight modifications to the pilots seat, nothing has been altered. Twenty five machines have been delivered and present production stands at three per month. About 75% are exported and its present cost stands at 44.000 DM.

Standard Cirrus

Production of the Standard Cirrus is no longer confined to Kirchheim but is also carried out under licence by Grob aircraft manufacturers at Mindelheim. This firm produces 4-5 per month, 90% being sold directly through Schempp-Hirth of which about half are exported. There are about 150 in Germany mostly club machines and cost 26.900 DM (including VAT). A water tank is an optional extra for 700 DM. The wing has been tilted slightly to about three quarters of a degree which has considerably improved its long distance flight capabilities. There have also been slight modifications to the pilots seat, and to cockpit strengthening and sealing. In addition an adjustable back rest has been incorporated.

The Yugoslavian venture with the 18m Cirrus VTC.

For the past 18 months this machine has not been produced at the Schempp-Hirth factory in Kircheim but at Vrsac where the last sailplane world championships were held. This manufacturing under licence by Vazduhoplovno Tehnicki Centar (VTC) has turned out far better than anticipated. The machines are of high quality and several are flying in Germany to the complete satisfaction of their owners. Many are sold within Yugoslavia and to countries in the eastern bloc. The demand for this aircraft in England has also risen considerably over the last few months.

Present delivery dates are from 7-8 months, this great demand arising mainly from the fact that for an aircraft in this performance class, the price (28.200 DM inc VAT) is extraordinarily low. This being possible solely through being licence built in Yugoslavia.

Klaus Holigman comments on this success:– "The difficult time we had to obtain a licence has proved well worth while. We were only prepared to produce an aircraft in a foreign factory provided the personnel were fully conversant with the GFK method of construction. For over eight months we employed a full production team from Yugoslavia in our factory solely on production of the Cirrus 18M and on their return with the plans they were perfectly able to produce the craft without supervision. Raw and semi-manufactured materials are supplied by Schempp-Hirth, packed in small containers and sent by rail to Yugoslavia. In this way we can maintain close control over the quality of the materials. In addition a small team from the Yugoslav factory spend three months in our works, at the end of which they returned to Yugoslavia to put into practice any new ideas and modifications we have brought about. Co-operation is facilitated by the fact that the chief structural engineer has spent many years in Germany and is a fully qualified, highly experienced man. Present production is 2–3 per month".

Yugoslavian experts

During the sailplane world championships in Vrsac an 18m powered glider was much in evidence, the SSV 17 constructed by engineers Voigt (who designed the LO–100 and LO–150) and Sostaric. It is the first synthetic powered glider with a span of 18m and a front located engine. The Yugoslavs have rapidly learned to put the knowledge gained from licenced manufacture to good use. There is however an agreement with the Yugoslav factory which forbids any development which may conflict with the interests of Schempp-Hirth.

Standard sailplanes

Klaus Holighaus has stated that Schempp-Hirth do not intend to develop any further standard sailplanes: "There is no necessity to do so, as I see no future in the new type landing flaps which are often incorrectly described as trailing edge flaps. This new type of landing flap can only be used as a trailing edge flap in the area between the fuselage and the main wing flaps. As the main landing flap is fixed, positive and negative trailing edge flap operation results in a considerable lift drop and thus a loss in performance. Also, the use of this brake flap would rule out the possibility of using the highly popular Schempp-Hirth flaps. I forsee a definite danger of cracking, especially with gliders used by clubs. For our part we are now engaged in the development of a high performance two seater which will fly in the second half of 1973."

High-performance powered gliders

Klaus Holighaus; "As far as powered gliders are concerned the most successful in my opion will be the high performance models. The reason powered gliders have met with no success in competitions is that no high performance models exist. The Scheibe SF–27M is a machine with a comparable performance to the KA–6, but this era is now past. For a powered glider to achieve success as a high performance machine it must have a lift-drag ratio of at least 40. However as such an aircraft would be expensive and difficult to develop no one is at present prepared to take on such a project. The only solution would be to utilise already proven parts. Nimbus II sections for example could have possibilities.

No carbon fibre gliders

Klaus Holighaus; "The fact that I have engaged the engineer Helmut Treiber does not mean that our next aircraft will be made of carbon fibres! At a cost of 400 DM per kilo this is just a trifle too expensive. Helmut Treiber has, it is true, worked on the SB–10 and indeed test flew both the 26m and 29m versions. However, the very existence of this machine depended on it being constructed from carbon fibres and it can only be regarded as a purely experimental sailplane."

The club machine

Klaus Holighaus on the club machine: "The main drawback in sailplane manufacture is the high labour cost as it is a labour intensive industry of around 75%. Even a wooden glider today costs from 15,000–20,000 DM. I am in favour of the present

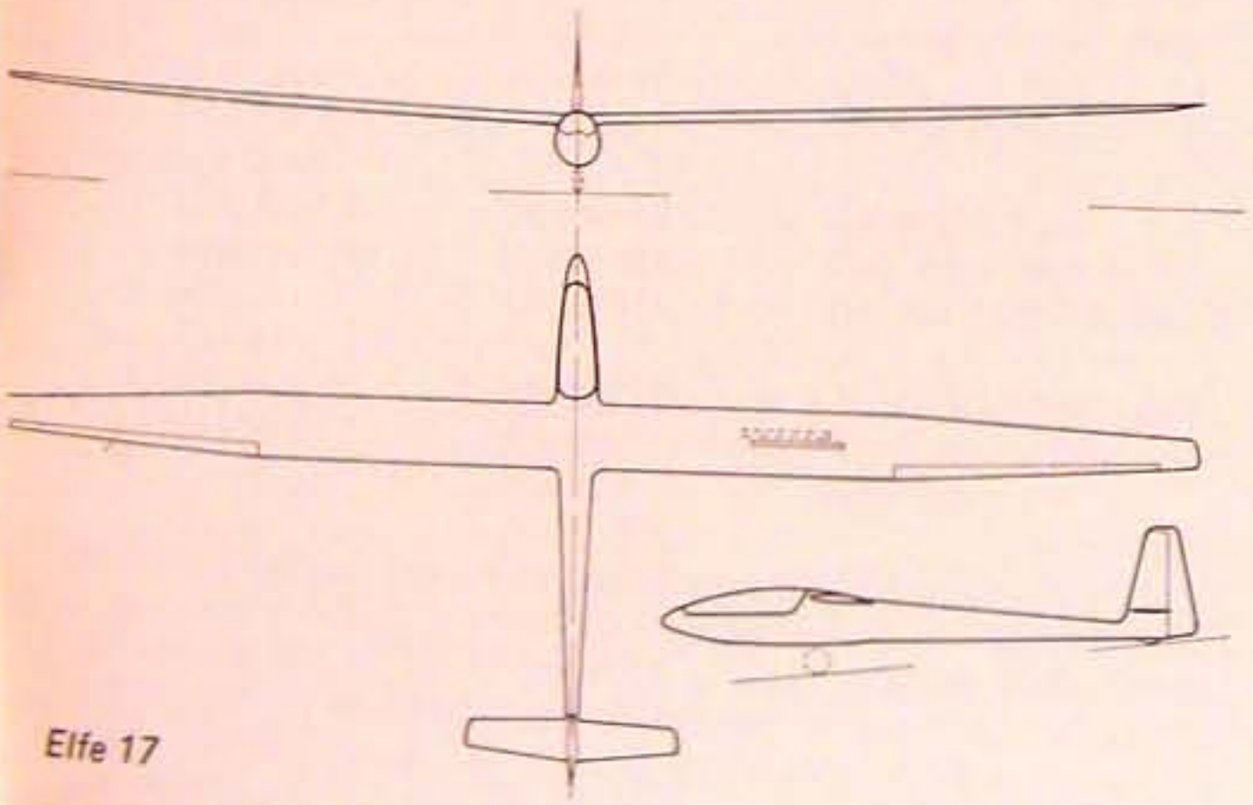
Yugoslavian 18m Cirrus VTC



type of club aircraft as long as it remains a wooden or composite craft. But as soon as synthetic sailplanes enter the club class then the high prices will make it a very exclusive sport and will de-value the wooden and composite machines. This would mean the death of the old and the start of a new type of club class. This new class would eventually incorporate the GFK standard class, making a club class glider as expensive as a small light aircraft. I would not condone the introduction of synthetic sailplanes into the club-class as the performance gap between these and wooden sailplanes would make any fair assessments in a club class competition impossible. Besides, it is not possible to produce a true club class glider from synthetic fibres, for a club machine should be capable of slow flight which requires a low wing loading. Low wing loading would require a span of around 15m and a large wing surface area. A large wing area of synthetic substances would cost far more than one made of wood as the material is more costly, and in addition would involve many more man hours. If it was laid down that no synthetic sailplanes would be permitted in the club class then flying groups interested in competitive flying would have more incentive to develop a wooden machine to this end. Should this come about such machines would be better produced in one of the eastern European countries to keep the price reasonable. The Scheibe Motorfalkes were classed as composite craft due to the fact that they were used for training and pleasure flying but not for high performance flying. And let's face it, wood, tubular steel and fabric are still the most simple, economic and above all the easiest materials to work with.

Future trends

Klaus Holighaus had the following to say about future trends in sailplane manufacture: "Present machines on the market will become firmly established and new developments, especially those which will enter production, will be less frequent. Improvments in performance with new machines will be far less pronounced than has been the case in recent years. With the materials available at present a 20m. span is the optimum in relation to price, handling capabilities and performance. It is not yet known how the SB–10 will show its paces in competitive flying but I hope that this craft, should it prove successful, will bring the world championship to Germany, for it would be difficult for other countries to build such a craft on these lines.



Elfe 17

A High Performance Build It Yourself Glider

An interesting glider made its first flight at Cologne during February: the Elfe–17, designed and built by Heinrich Schoenenberg, a member of the Oskar Ursinus group, and constructed by Swiss aircraft manufacturer Alfred Neukom. The Elfe–17 is interesting not merely because of its high performance, but because it will be available in kit form, which will bring a top performance sailplane within the reach of pilots and clubs who are lacking in finance.

The glider is built of aluminium and man-made fibres with a GFK coated wooden fuselage and aluminium fixtures. The front section of the fuselage is in the form of a GFK shell.



The 17 metre wing spread is constructed in a sandwich pattern of wood, tubular matting and aluminium. The Elfe-17, an improved version of the 15m. model, will have a lift-drag ratio of 1:40 and better slow speed flight capabilities. Subject to demand it is hoped that this machine will be manufactured on a production line basis. The most interesting fact concerning the Elfe–17 (& 15) is that only the wing, metal, and GFK sections need be bought ready-made as the other parts can be made up from scratch.
(In the kit there is a complete wing with metal fixtures, a complete set of GFK fuselage fixtures, elevator and rudder sections, retractable undercarriage and cockpit). The cost should be around 12,000 DM with a construction time of 300–400 man hours. A completed 15.m. model will cost around 22,000 DM and the 17.m. version 500–1000 DM more.

The Elfe–17 is in roughly the same class as the Kestrel 17, and because of the wing construction there is hardly any deflection at high speeds.
(Application will be made to the LBA in early summer for a simplified type test and it is hoped that all flight tests will be completed in the course of this year.)

ELFE–17 and 15 Data Table

		Elfe 17	Elfe 15
Type			
Company/manufacturer		Schoenenberg	Neukom
Designated for		high performance	high performance
Crew		1	1
Wing span	m	17	15
Length overall	m	7.3	7.3
Height overall	m	0.75	0.75
Wing area	m^2	13	11.8
Wing aspect ratio		22.2	19
Profile		Wortmann	Wortmann
Weight empty	kg	250	225
Safe load	kg	120	120
Max T–O weight	kg	370	345
Wing loading	kg/m^2	28.5	29.2
Best glide ratio		40	38
at	km/h	90	90
Min speed	km/h	70	70
Min sinking speed	m/s	0.55	0.59
at	km/h	75	75
Max speed smooth air		220	220 km/h
" rough air		220	220 km/h
" Aero-tow		145	145 km/h
" Winch launching		110	110 km/h

FRANCE–
Inaugural Flight of the RF–8

Rene Fournier's RF–8 recently made its first flight in the hands of works pilot Bernard Clauvreau. Ten hours of test flying followed this, confirming the hopes of those persons involved in its design and construction. A contract was signed in 1970 between Rene Fournier and Indraero of Argenton-sur-Creuse to jointly construct a two seater all metal RF–8. Rene Fournier's latest creation is by no means a simple aircraft. Nothing has been omitted to make this 'fail-safe-construction' aircraft a Super RF with a performance superior to conventional aircraft in the same class.

The considerable wing-span, laminar profile, trailing edge and double brake flaps, backward sliding cockpit, air conditioning and the 115–PS Lycoming engine make the RF–8 a far cry from its successful simple and low priced predecessor of 1965, the RF–3.

Why should there now be a SUPER machine of such elaborate technology? Quite simply to satisfy the international demands of spoilt and difficult customers, who on the one hand wish to stick to Fournier machines yet on the other hand would like a luxurious and comfortable aircraft. These demands contradict the original projects of the planners who envisaged a simple, low priced metal RF–5: mainly for use by flying clubs, which once in large scale production would be cheaper than previous models. Difficulties in acquiring permission to use the Volkswagen engine and American perfectionism in light aero engines led to the formers rejection in favour of the Lycoming engine for the RF–8.

This naturally put the RF–8 in a higher class than ordinary club machines and all improvements envisaged for earlier machines were incorporated in it. Within two years a two-seater RF–8 had been produced: highly adaptable and unique in its class, but with a relatively high price of 120,000 French francs.

Despite the fact that over 450 RF–3s, RF–4s and RF–5s are flying in as many as 30 countries, Rene Fournier is convinced that even amogst his present customers, there will be considerable interest shown in the RF–8.

Description – Basic

The RF–8 is equipped with tandem seating, single track under-carriage and Lycoming 115-PS engine. The monospar wing is twin sectional mating at the wing stubs, with ailerons that cover over 30% of the spread. The adjusted value of 70% can be increased should this prove necessary. The lift improving flaps, without clearance, can be moved through an angle of 8° to over 45 degrees. Drive is in the inside fin. The brake flaps, 1.25 metres in length have an upper wing surface element of 39% and a lower wing surface of 54% They are complete units and, like the RF–4 and RF–5, create a gap when they are extended.

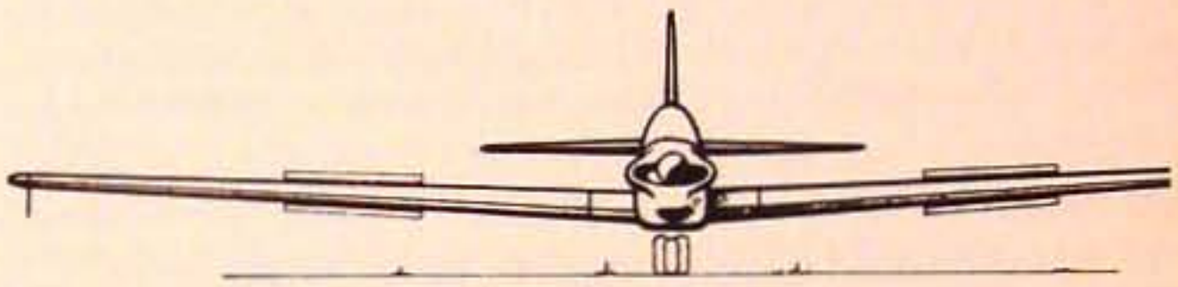
Both pilot's seats have lateral instrument consuls, and there is ample luggage space behind the rear seat. The cockpit cover is a single unit and is opened by pushing backwards. The single spar tail unit, like the fuselage, is stress covered. Similar to most gliders the rudder assembly and the fin are detachable.



The rudder assembly is cable operated while the ailerons are electrically controlled and the brake flaps by torsion rods. At the wing/fuselage root all control parts are joined automatically to simplify removal.

The undercarriage consists of a nosewheel, a single leg main undercarriage unit at the centre of the four spar fuselage and two supporting wheels to maintain equilibrium when taxying. The main undercarriage leg has hydraulic suspension and is located in the body axis. Its has two hydraulic braking wheels (380/150) which retract backwards under the luggage compartment. The nosewheel, which is linked to the rudder pedal, and the main undercarriage leg are electrically operated and retract simultaneously. The aircraft can be operated from either seat although the flaps are operated only from the front seat, the rear seat being intended mainly for teaching purposes. The front instrument panel is more comprehensive than that at the rear but its top row can be easily seen from the rear seat.

The reclining front seat can be unhinged to facilitate entry for the rear pilot. The instrument consuls and the floor are removable so that all steering and other components can be easily serviced. Similarly the wing fairings between main and auxiliary spar are removable to give easy access to all the brake flap components.



Technical data of the RF–8

Company	Indraéro
Type	RF–8
Power Unit	Lycoming 0–235–C1B 115PS
Crew (+Passenger)	1 + 1
Length	7.42 m
Height	2.40 m
Wing Span	12.40 m
Wing area	13.00 m^2
Wing aspect ratio	11.80
Weight empty	600 kg
fuel	66 kg
lubricants	5 kg
crew	80 kg
useful load	124 kg
safe load	275 kg
Gross weight	875 kg
Wing loading	67.30 kg/m^2
Performance loading	7.60 kg/PS
Max Speed	265 km/h
Cruising speed at 1500 m	230 km/h
Rate of climb	6.80 m/s
Operational ceiling	7500 m
Range	800 km
Take off distance	120 m
Distance taken to reach a height of 15 m	241 m
Stopping distance on landing	60 m
Stopping distance on landing from a height of 15 m	200 m (with flaps 145 m)
Landing speed	80 km/h
Safe load as a percentage of the gross weight	31.4%
Pay load as a percentage of the gross weight	14%

SWEDEN –
Swedish Soaring Figures – 1972

Gliding activity in Sweden during 1972 showed the following successful results. Flying time increased by 12% to 34,529 hours and the number of take-offs by 17% to 78,479. Flying time for pure training was 10,187 hours and the number of launches was 37,992.

Gliding clubs registered as active during the year totalled 79, of which 76 were licensed to carry on training. 4,200 of the 5,700 club members were active glider pilots.

During the year 725 persons were trained to achieve C certificates and 426 new holders of the official gliding license were registered.

At the end of the year there were 264 gliders in the country of which 127 were 2-seat Bergfalkes, 26 K–8, 23 23 Ka–6, 12 Mucha Std, 15 Libelle, 6 Std Cirrus and 10 Phoebus A B and C.

26 new instructors and 15 gliding technicians were trained and approved at the instruction centre at Alleberg. Since 1948 the central organisation has trained and licensed 370 gliding instructors (teachers). During 1972, 234 of them worked in Swedish clubs.

One new gliding record was registered during the year. Goran Ax (World Champion – Open Class) flew 500 km triangle at an average speed of 87.20 km/h.

Yngve Norrvi

LATE NEWS

The results of the International Soaring Contest held at Dinslake-Schwarze Heide (Germany-Nordrhein Westfalen) from 10th - 21st May are listed below. Pilots representing the National teams of West Germany, Denmark, Poland and Switzerland took part along with a special team representing Berlin.

Club Class		
1. R. Nagel	K–6E	Germany
2. H. Biebricher	K–6E	Berlin
3. H. Laucht	K–6E	Berlin
Standard Class		
1. H. Eitschberger	St. Cirrus	Germany
2. H. Muszcynski	St. Cirrus	Poland
3. St. Kluk	LS 1c	Poland
Open Class		
1. S. Baumgartl	ASW–17	Germany
2. H. Stolze	Cirrus	Germany
3. M. Dick	Kestrel 17	Germany

930 km flight by Hans Werner Grosse

Late news arriving on the editorial desk informs us that Hans Werner Grosse of Germany flew a triangle of distance 827 kms. on 16th May, on completion of the course he continued an extra 103 kms to his home town of Lubeck. His average speed being 92 kph.

VICTOR BOIN CHALLENGE contest deferred

The one day contest for the VICTOR BOIN CHALLENGE at Eindhoven, Netherlands, which was planned for Saturday 19th May was cancelled due to poor weather conditions. As the met. forecast for the following day was expected to be poor the contest committee put the date back until August.

Postscript. 20th May turned out to be a brilliant day with cross-country flights taking place throughout the Netherlands.

Aero-Press. Holland

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Book Reviews

MEMOIRS OF AN OLD BALLOONATIC – Goderic Hodges. Published by William Kimber and Co. Ltd., Godolphin House, 22a Queen Anne's Gate, London SW1. £3.25.

This book is written in the very individualistic style of Goderic Hodges – a style which the reader will find most enjoyable or exceedingly irritable.

When the 1914 – 18 war broke out G.H. was studying as preparation to taking Holy Orders, but immediately on hearing the news joined the O.T.C., then the T.A. Signal Company. Believing in the principle that young officers should always volunteer for everything he eventually found himself applying for observation balloons. This was the start of his great love for the army and balloon section, a love which glows brightly throughout the book.

He gives an almost step by step account of his training, which leaves the reader feeling confident enough to handle himself and a balloon in a very capable manner should the need ever arise!

We are steeped in that special brand of humour and mode of speech peculiar to the military and, as well as the hardships and desolation of these men in wartime, we learn of the very human happenings which kept hope and courage uppermost in their minds. While in Belgium and in command of his own section G.H. was severely injured when his foot was shattered in an explosion. Bleeding profusely, he was carried to safety on the back of a comrade. Before commencing to amputate the remainder of the foot with a parachute knife, this young man is recorded as having uttered, "I say, old man, you've absolutely ruined my bags". After the long ordeal of operations and pain, causing flashes of horrific recollections of war, he eventually recovers, and with the aid of an artificial leg is passed fit for duty and returned to his beloved balloons.

At the end of the war he has to face the now new problem of, quote, "At the age of twenty-five I should have to face the world with one leg, and a knowledge of Hebrew and balloons."

On reflection, a most enjoyable book.

C.M.B.

INTERPRETING THE WEATHER – Ingrid Holford. Published by David and Charles, South Devon House, Newton Abbot. Devon. £3.25.

This most professional text book of meteorology should prove invaluable to both the ab-initio and competition pilot alike. It is written in a simple, yet concise manner, and covers all aspects of a subject with which the glider pilot must become familiar. The illustrations are well drawn, simple to understand, and relate quite clearly to the subject in question. The photography is also of a high standard, with some most unusual plates – in particular the one taken from the Nimbus III satelite.

With great effect, Ingrid Holford has employed simple domestic parallels to simplify the hitherto complicated theories and practices of heat distribution, pressure, cooling and wind behaviour; and although the author's interests lie within sailing and horticultural spheres, this being evident throughout the book, she manages to maintain a general picture which is most acceptable. The text is easily digested and the continuity very good.

In conclusion, a most authorative and informative introduction to meteorology, which if not written specifically for the airman, is nevertheless a soundly recommended investment.

M.B.

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Peterborough Evening Telegraph reporter, Ray Williams, decided he would like to write a gliding feature for his paper. His enlightened management said "away young man and join the Peterborough and Spalding Gliding Club, learn to glide then write your feature". This is exactly what he is now doing. After the initial shock had worn off he made a tentative air-experience flight in May. Now, according to secretary Jack Lovell, he has declared his intention of hoping to go solo on his 21st flight. Read next issues thrilling instalment and find out whether Ray Williams **did** achieve his ambition.

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