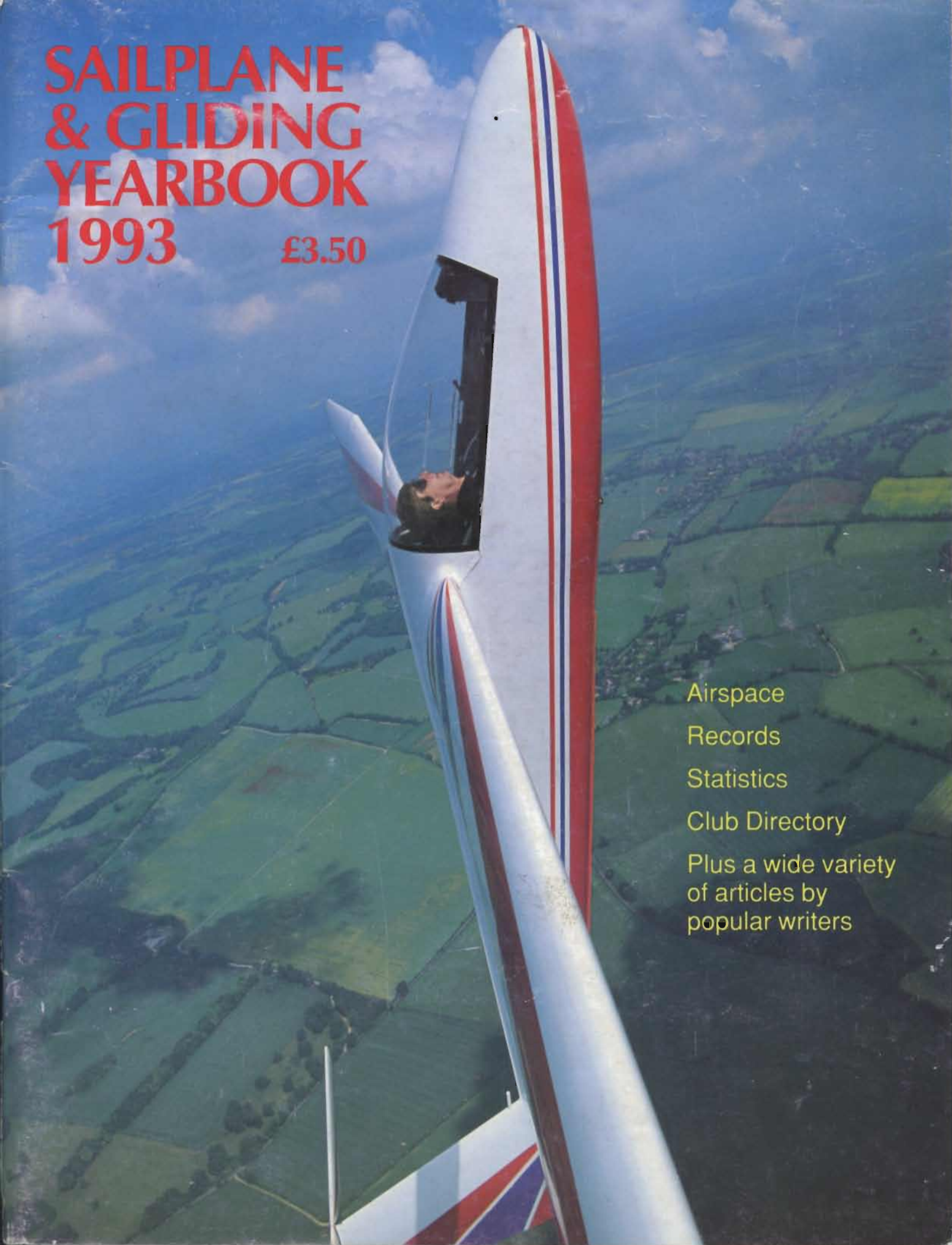
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EDITOR
Gillian Bryce-Smith
281 Queen Edith's Way
Cambridge, CB1 4NH
Tel 0223 247725
Fax 0223 413793

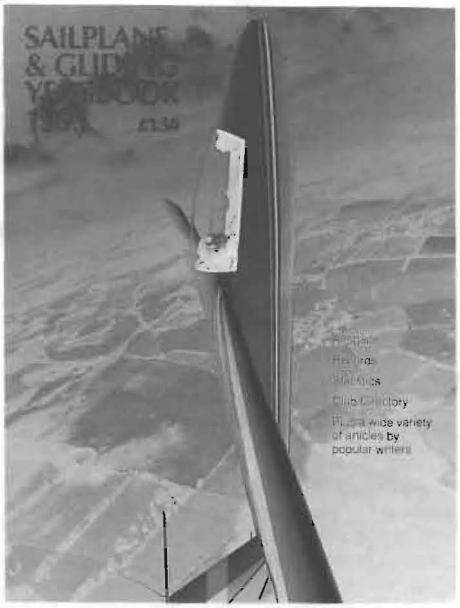
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Cover: Another spectacular photograph organised by Terry Joint, CFI of Lasham Gliding Society, with a camera mounted on the wing of a Pilatus B-4 flown north of Lasham by Sam Mummery, British aerobatic team member. Incidentally if you like the idea of experimenting, cameras and mounts are available from Joint Air Services who are also in demand for advertising photography.

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GLIDING AND UK AIRSPACE

Chris Garton, chairman of the BGA Airspace Committee, gives the latest airspace position

ICAO Airspace Classification. In November 1991 the UK adopted the new system of international airspace classification developed by the International Civil Airspace Organisation. The status of a piece of airspace is denoted by a letter which will be shown on all aeronautical charts, and it is this letter rather than the title of the airspace that will determine the rules applying to it. *Eg* in the UK airways will all be Class A, but in other countries they may be Class E. In order to fly within Controlled Airspace, gliders will often require legal exemptions, and the availability and nature of these will vary from country to country.

Class A Controlled Airspace

Cotswold CTA **Daventry CTA**
London CTR **London TMA**
Manchester TMA **Worthing CTA**

All **Airways** (except where they pass through a TMA, CTA or CTR of lower status).

The airspace is effectively closed to gliders, since it is subject to permanent Instrument Flight Rules, whatever the weather, and there are requirements relating to filing of flight plans, standard of equipment, pilot qualifications and adherence to ATC clearances. Gliders cannot comply with these. However, specified airways may be crossed by gliders under the provisions of Rule 21(2) which stipulates:

1. The crossing must be carried out in the most expeditious manner and, as far as is practicable, at right angles to the airway centreline.
2. The crossing must be carried out in VMC, by day.

The **UK Air Pilot** contains a map showing the crossable airways and maximum permitted crossing levels. In summary, these are:
Crossable below FL245: A25, B2, B3 (NW of Manchester), B226, B1, R14, R39.
Crossable below FL95: A1, A2.
Crossable below FL55: B3 (NW of Luton), R8 (west of Midhurst)
Airway G1 is crossable below FL195 to the west of A25. To the east of A25, it is crossable below FL165 and FL105 as denoted by the base of the Cotswold CTA.
Exceptionally, gliders may fly in other Class A airspace by virtue of a Letter of Agreement or other pre-arranged permission.

Class B Controlled Airspace. The entire airspace over the UK above FL245, comprising the **Upper Airspace CTA** and the **Hebrides Upper Control Area (UTA)**, is Class B Airspace. Gliders are permitted to fly in this airspace without restriction. Since the upper airspace contains Upper Air Routes and Military training Areas, glider pilots intending to fly at high altitude would be well advised to acquaint themselves with these areas, since jet aircraft speeds are much greater than at lower altitudes, and their pilots may not be aware of the presence of gliders.

Class C Controlled Airspace. No UK airspace currently falls in this category, though it is possible some may be so redesignated in future.

Class D Controlled Airspace. Formerly Special Rules Airspace, there are effectively two types of Class D airspace for glider pilots – those areas in which they need ATC clearance to fly and those in which they may fly without ATC clearance subject to maintaining VMC. Class D airspace is subject to Rule 27 which stipulates that any pilot wishing to enter it must:

1. Contact the ATC unit and pass details of the flight.
2. Obtain entry clearance.
3. Remain on the ATC frequency whilst in that airspace.
4. Comply with ATC instructions.

The above rules apply to gliders in the following Areas:

Belfast CTR **London Gatwick**
Belfast City CTR/CTA **CTR/CTA**
Birmingham CTR/CTA **London Stansted**
Bristol CTR/CTA **CTR/CTA**
Brize Norton CTR **London City CTR**
Cardiff CTR/CTA **Luton CTR/CTA**
Edinburgh CTR **Manchester**
Glasgow CTR **CTR/CTA.**
Liverpool CTR

Gliders are exempted from the provisions of Rule 27 and may fly in the following airspace without ATC clearance in VMC:

Aberdeen CTR/CTA **Newcastle CTR/CTA**
Bournemouth CTR **Southampton CTR/CTA**
East Midlands **Southend CTR**
CTR/CTA **Teesside CTR/CTA**
Leeds/Bradford **Scottish TMA above**
CTR/CTA **6000ft.**
Lyneham CTR/CTA

Guidelines for the use of this airspace by gliders in VMC have been drawn up by the BGA and approved by NATS. These are set out at the end of this article.

Class E Controlled Airspace. The Scottish TMA below 6000ft including the Scottish CTR outside of the Glasgow CTR, and the Belfast TMA are notified as Class E, and permit all aircraft (including gliders) to fly in these areas without ATC clearance subject to maintaining VMC.

Visual Meteorological Conditions (VMC). To comply with VMC in order to cross Class A airways in accordance with Rule 21(2), or to use the exemption described above to fly in certain Class D airspace, a glider shall remain at least 1000ft vertically, and at least 1500m horizontally from cloud in a flight visibility of at least 8km. In Class E airspace, the visibility requirement becomes 5km when below FL100.

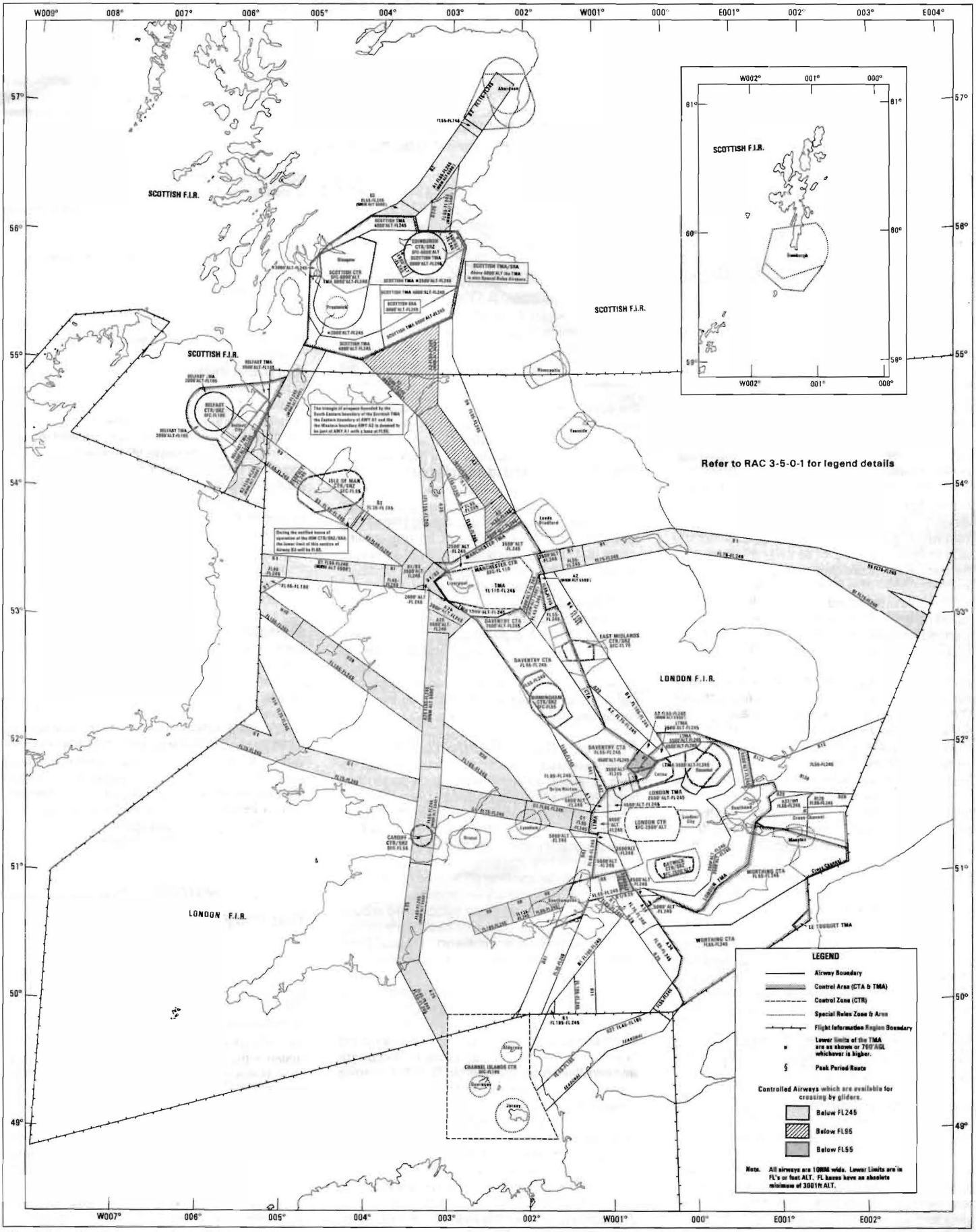
Local Agreements. A number of local agreements exist which modify the effects of some of the airspace listed above. Letters of Agreement (LoAs) between a gliding club and a nearby airport can make airspace either more or less restrictive than described above, depending on circumstances. These arrangements are too numerous to list in full, but the principal ones are:
Luton – A large segment of airspace in the north-west of the Luton CTR is delegated to London GC, up to 3500ft in summer and on request in winter, to permit gliding operations at Dunstable. London GC should be contacted for full details. (See *S&G*, June 1987, p141.)
Brize Norton – The LoA concerning glider transits of Brize Norton CTR has been discontinued. HQ Strike Command have assured us that requests from glider pilots for transits of the zone will continue to be accommodated, subject to operational requirements. At weekends the chances of a glider pilot obtaining transit clearance are good, though it may not always be possible midweek.
Airway Bravo 2 – At weekends, a section of this airway between Glasgow and Aberdeen may be de-regulated on request from the Scottish Gliding Union to permit wave soaring from Portmoak to proceed unrestricted within the confines of the airway.

Class F. Airspace. An Advisory Route (ADR) is a route used by airline type traffic, but without the full protection of an airway. Although depicted only as a centreline on UK aeronautical charts, it is nominally 10nm wide. Gliders may cross Class F airspace without restriction, but caution should be exercised.

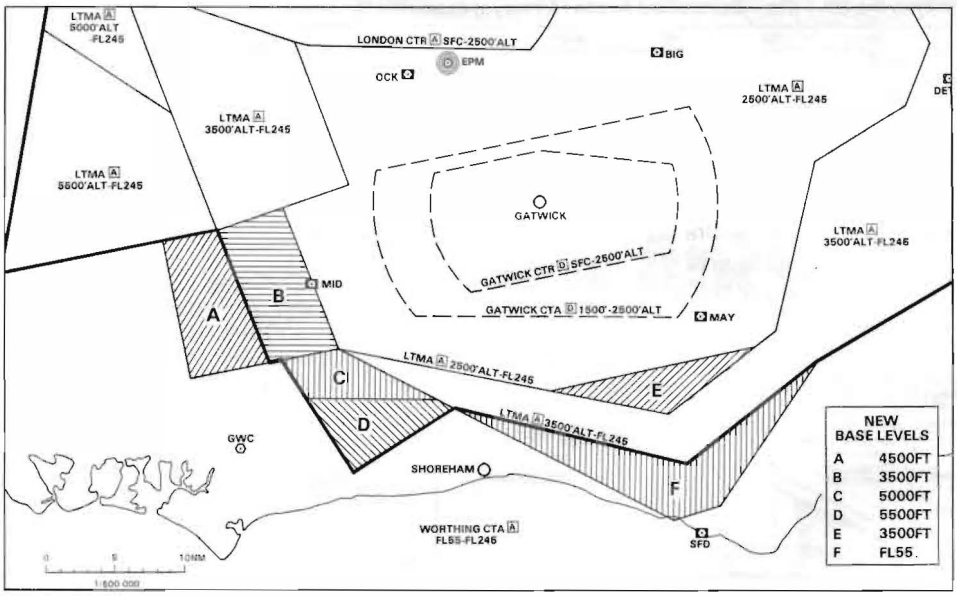
Class G Airspace. This is the term given to the "open" FIR (Flight Information Region), which is the uncontrolled airspace not subject to any of the afore-going classifications. Within Class G airspace there are various non-ICAO types of airspace, which are described below.

Aerodrome Traffic Zone (ATZ). A glider pilot wishing to enter an ATZ must first call the airfield on the notified radio frequency. An ATZ is only active during the notified hours of operation of the airfield. Many military airfields are notified as permanently active though in reality this is not the case. Nonetheless the ATZs

Controlled Airspace and Special Rules Airspace within the UK FIRs – Controlled Areas (Airways) available for crossing by gliders.



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must be regarded as active at all times.

At an airfield with an Air Traffic Control (ATC) unit, that unit is able to give or refuse permission for any aircraft to enter the ATZ and to give clearances to take-off or land.

At an airfield with an Aerodrome Flight Information Service (AFIS) or Air/Ground (A/G) service, that unit is able only to pass information from which a pilot may judge whether or not it is safe to enter the ATZ or to take-off or land, *ie* the unit cannot issue clearances or withhold permission.

The following categories of airfield are protected by an ATZ: government aerodromes, and licenced aerodromes with one of the above types of service.

The ATZ comprises the airspace extending from ground level to 2000ft above the level of the aerodrome and within a radius of 2 or 2½nm of the centre of the aerodrome, depending on the length of the main runway.

At airfields without ATZs, including most gliding sites regardless of how busy they are, an itinerant aircraft may legally penetrate the airspace near and over the airfield, provided the pilot conforms to the traffic pattern or keeps clear of the circuit airspace, and observes the normal rules of good airmanship to avoid conflictions.

For landing at airfields with or without ATZs, it should be noted that many are listed in the **UK Air Pilot** as "PPR", "PPR to non-radio aircraft" or even "not available to non-radio aircraft". PPR (Prior Permission Required) means that landing permission must be obtained in advance of the flight, *eg* by telephone. All military airfields are effectively PPR and will not permit landings by civil aircraft except where they have been prearranged, or in an emergency.

Military Aerodrome Traffic Zones (MATZ). The rules applicable to the penetration of a MATZ are not mandatory for civil aircraft, and the same applies to the **Honington Military Control Zone.** However, radio contact is advised, and inside every MATZ there is an ATZ, the rules of which must be observed.

A standard MATZ comprises the airspace within a 5nm radius of the centre of the airfield extending from the surface to 3000ft above airfield elevation. In addition, projecting stubs 5nm long and 4nm wide extending from 1000ft to 3000ft above airfield elevation are aligned with the approach to the main runway at one or both ends. Some MATZ may lack stubs, or form part of a combined MATZ (CMATZ).

Upper Heyford Mandatory Radio Area. On weekdays gliders may only penetrate the UHMRA after establishing radio contact on 128.55Mhz, must listen out during transit and must call again on leaving or before landing within its confines. Gliders should not be issued with ATC instructions while within the UHMRA, unless they appear likely to enter the Upper Heyford ATZ.

At weekends and on UK and USA public holidays the UHMRA is deactivated, but the ATZ is still active. There is no requirement to contact Upper Heyford except to enter the ATZ. Gliders based within the UHMRA are covered by special procedures defined in LoAs with the clubs concerned.

Prohibited and Restricted Areas. A Prohibited Area (P-prefix) is prohibited to all aircraft, whereas a Restricted Area (R-prefix) permits limited access by aircraft under defined circumstances, *eg* landing at a nearby airfield. These areas include atomic energy establishments, security areas in Northern Ireland and sensitive military installations. Most Restricted Areas should be considered as prohibited to gliders, but the following are exceptions.

The Restricted Airspace established around high security prisons is applicable only to helicopters, and R105 at Highworth House, Glos, applies only to helicopters and microlights.

R313 at Scampton exists for the purpose of protecting the Red Arrows' display training – not normally more than two periods of 20-30min/day. The area is a circle of 5nm radius extending to 9500ft amsl and active only during Scampton's normal operating hours, which are weekdays and as notified by NOTAM. During these times, a glider may enter the area by permission of ATC Waddington.

The Highlands Restricted Area is a large piece of airspace over NW Scotland used for military low flying and weapons training, up to 5000ft. It is outside of the area of current glider operations, and access to it is set out in the **UK Air Pilot.**

Temporary Restricted Airspace. Major air displays such as Farnborough or Fairford are often protected by temporary Restricted Airspace. Local gliding clubs usually negotiate limited access routes to and from their sites to enable non-radio gliders to continue operating, but a glider equipped with suitable radio may fly in the area if it contacts the ATC unit designated by the NOTAM as the controlling authority.

Other types of temporary Restricted Airspace are effectively closed to gliders. They are established to protect Red Arrows' displays throughout the country, plus major flypast formations, over events of political significance and over the sites of major disasters. The duration and extent of the restriction can be quite short, and will be published by NOTAM. The Royal Flight Freephone Service will also give details.

Purple Airspace. Purple Airspace is established from time to time on a temporary basis to protect Royal Flights in fixed wing aircraft. Full details are promulgated by special NOTAM. It is important that gliding clubs receive and publish this information, because gliders are not permitted to fly within Purple Airspace, even by contacting ATC. Royal Flight NOTAMs also cover royal helicopter flights. These are not protected by Purple Airspace, but all the pilots are required to look out for and keep well clear of the royal helicopter. Some Royal Flights are arranged or changed at short notice. For this reason a Freephone service is available for the latest information.

Danger Areas. The UK is covered with Danger Areas of many types, shapes and sizes. They are active part-time, permanently or when notified by NOTAM. Full details will be found in the **UK Air Pilot**, RAC Section. The chart of UK Airspace Restrictions is also useful.

The **UK Air Pilot** lists only the type of activity most likely to be encountered, but in practice various hazards may be encountered in one area simultaneously. Furthermore high performance military aircraft may be encountered manoeuvring outside of the confines of the Danger Area, especially, if it is a Weapons Range Danger Area.

Flight not prohibited but may be foolhardy

Many Danger Areas contain areas over which flight is prohibited at times within the period of activity of the Danger Area by reason of bye-laws made under the Military Lands Act 1892 and associated legislation. It is also worth noting that the **UK Air Pilot** does not list Danger Areas with upper limits 500ft or less above the local surface, to which prohibiting bye-laws may also apply.

With these exceptions, flight through a Danger Area is not prohibited, but may be foolhardy.

For Certain Danger Areas, a **Danger Area Crossing Service** is available, most notably for Salisbury Plain. (Call Salisbury Plain Control on 122.75MHz.) A **Danger Area Activity Service** is available in other cases: this should be viewed as a means of establishing the state of activity of a Danger Area at a particular time, not as a

clearance to cross it. A convenient summary of these two services and the ATC units to contact is printed at the foot of the 1:500 000 series CAA charts.

Particular care should be taken to avoid Weston on the Green (D129) which is extensively used for military paratroop training. Brize Radar (134.3MHz) will confirm activity status.

Other Hazardous Areas. Other types of hazard include **free fall parachute sites.** The airspace is contained in a circle radius 1½ or 2nm from the centre of the drop zone up to a maximum of FL150. It may not be apparent to a glider pilot, observing the drop zone in flight, whether or not there is parachuting in progress; parachutists normally free-fall down to 2000ft agl and are extremely difficult to see. Beware!

High Intensity Radio Transmission Areas contain powerful radio emissions which may cause interference with glider radios and electronic variometers. In particular, Fylingdales is so powerful that prolonged exposure may be injurious to health.

Areas of Intense Aerial Activity. An AIAA is airspace which is not otherwise protected by regulated airspace, but where the activity of civil and/or military flying is exceptionally high, or within which aircraft regularly participate in unusual manoeuvres.

Gliders may penetrate these areas, but in view of the hazards, a sharp lookout is essential.

Military Low Flying System. Low flying by high performance military aircraft takes place in most parts of the UK up to 2000ft agl, with the greatest concentration between 250ft and 500ft. A chart is available denoting the system (**UK Air Pilot**, RAC Section).

All gliding sites are notified to MoD, which affords them the status of a Military Avoidance Zone, radius 1½nm.

The Low Level Civil Aviation Notification Procedure (CANP) enables civilian aircraft operators to give advance warning to MoD of any activities that could conflict with low flying military aircraft. In the case of winch launching permission this is done automatically, but clubs planning to make use of a temporary aerotow or motor glider site, especially midweek, may wish to take advantage of CANP.

Radar Advisory Service Area. A RASA is airspace in which a pilot may, if he so chooses, avail himself of the services of a radar unit. There is no requirement to do so, and a glider pilot should not assume that other aircraft are being separated from him, nor even that the radar unit is aware of the glider's presence.

The Airmiss System. An airmiss may be filed by a pilot who considers his flight to have been endangered by the proximity of another aircraft. All airmisses are investigated by the Joint Airmiss Working Group (JAWG), whose deliberations are confidential so as to preserve anonymity. The purpose of a JAWG investigation is to determine what lessons can be learnt, not to take punitive action.

Prompt airmiss reporting is vital if the other aircraft is to be traced. If in radio contact with an ATC unit report to them at once, or if not possible, telephone straight after landing. Either call the nearest ATS unit or Freephone 2230 (on Monday for a weekend incident) to speak to AIS (MIL) at LATCC West Drayton, who will start trace action at once and tell the Joint Airmiss Section (JAS). Follow up with a written report on form CA1094 to JAS within seven days. Always use GMT (UTC is the same) in reports.

JAS can be contacted in working hours on 0895 76-121, 122 or 125, or fax 0895 76124.

Code of Conduct for Glider Flights Through Class D Airspace.

1. Glider pilots should plan to route their flights through Class D airspace only when it is clear there are significant advantages from so doing, such as better soaring weather and shorter track distance.
2. Flights should be arranged so that the minimum amount of time is spent in Class D airspace. Pilots should avoid circling on or close to the runway extended centre lines, since this may interfere with aircraft carrying out instrument approaches or departures.
3. Good lookout is vital at all times, and glider pilots should be prepared to initiate avoiding action notwithstanding their right of way priority. Gliders are not always visible on radar, and other aircraft, including commercial jets, may not have been warned of a glider's presence.
4. Pilots of gliders equipped with suitable radio should listen on the appropriate frequency for information on other traffic in their vicinity.
5. Competition tasks should only be set through Class D airspace after consultation with the appropriate ATC unit. Where a task leg has to be set close to but not through Class D airspace, the ATC unit should be informed. When possible, photographic control point(s) should be established, to help ensure that gliders remain outside the airspace.

Use of Radio. A glider pilot possessing a radio operator's licence (R/T Licence) is entitled to use all the available aeronautical frequencies of a 760-channel radio. This permits seeking access to the following types of airspace that may be otherwise closed to gliders: Class D airspace not subject to glider VMC exemptions.
Aerodrome Traffic Zones.
Upper Heyford MRA.
Some types of permanent and temporary Restricted Airspace.
Some Danger Areas.

Radio cannot be used to request entry clearance into Class A or B controlled airspace (except by special arrangement) or into Purple Airspace.

NOTAMS. The NOTAM system has changed significantly over the last few years. Essential flight planning information is obtainable from several different sources.

UK Air Pilot AIRAC Supplements are the formal method of notifying permanent changes to airspace, but can only be obtained as part of a subscription to the entire **Air Pilot.** Recently airspace changes have also been announced by way of **Aeronautical Information Circulars (AICs)**, major changes by way of a dedicated AIC and minor changes *via* six monthly summary AICs. A monthly *GASIL* summary covers minor changes also.

Temporary Navigation Warnings (TNWs) are published twice weekly, giving notice of airspace warnings such as air displays, military exercises etc, and outline details of Royal Flights and Temporary Restricted Airspace.

UK Air Pilot Supplements (green pages – obtainable separately from whole **Air Pilot**) give full details of Temporary Restricted Airspace arranged well in advance for (*eg*) major air displays plus the dates but not the times of Red Arrows' displays.

Full details of Royal Flights are to be found in **Royal Flights NOTAMs**. A daily update of Royal Flights and Temporary Restricted Airspace is obtainable on the Freephone service (0500-354802).

All above available from CAA Printing and Publication Services (0242-235151) except Royal Flight NOTAMS from AIS Heathrow (081-745-3464).

Airspace Changes. The following changes have occurred since publication of the *1992 S&G Yearbook:*
Airway B4 – the base level of this airway has been lowered to FL75 and FL55 (from FL105) in a small section in the vicinity of Bedford.
London TMA – base levels over Sussex raised by amounts between 500ft and 2000ft, and stub of adjoining airway R8 raised from 3500ft base to 4500ft.
Class D Airspace removed: Prestwick CTR, Cross-Channel CTA, Manston Cross-Channel CTR.
Changes to boundaries and vertical limits of Bournemouth and Southampton CTRs. Southampton CTA renamed Solent CTA, with new boundaries. No change to rule permitting penetration by gliders in VMC. Effective 24.6.93.
ATZs removed: Abingdon, Binbrook, Elvington, Greenham Common, Kemble and Panshanger.
ATZs established: Colerne and Perranporth.
MATZs removed: Abingdon, Binbrook, Elvington, Filton, Kemble and Brawdy.
MATZ established: Manston
Danger Areas EG D123 Imber and EG D125 Larkhill – minor reconfigurations to the boundaries in Salisbury Plain area.
Changes to Prohibited Areas in Northern Ireland.
BGA Letter of Agreement with Brize Norton discontinued.
(Information as available at 31.12.92.)

References. The information in this article is only a brief synopsis of the airspace rules as they affect glider pilots, and is believed to be accurate at the time of writing. In case of doubt, authoritative references should be consulted. These are: Air Navigation Order 1989; Rules of the Air Regulations 1991; **UK Air Pilot**, RAC section. **BGA Laws and Rules**, Edition 13, July 1992 reflects the current legislation, but previous editions are now obsolete.

Abbreviations. CTA=Control Area; CTR=Control Zone; TMA=Terminal Manoeuvring Area; (the lower limit of a CTA or TMA is an altitude or flight level above the surface, whereas a CTR extends to ground level). ■

CROSS-COUNTRY WEATHER

1992 was a disappointing year for cross-country flying. The first few months seemed about average but conditions grew worse as the summer contest weeks arrived. This left the impression that the soaring season was "the worst in living memory". To see if this was true I looked back through old copies of *S&G*. The results are described in the first part of the article. The second part lists factors which combine to give a good cross-country day and suggests what signs to look for

PART 1 – LOOKING BACK AT PREVIOUS YEARS

The number of days when pilots gained badges for distances of Gold C or better gave a guide to the number of good soaring days in England and Wales. This list inevitably misses all the days when long distances were flown by pilots who already had their badges. However, it does show up the good and bad years. The annual total of cross-country distances flown (a rather suspect value) was also plotted; it shows similar peaks in the good years but less marked dips in the poor years. These trends also appear in the numbers of Gold and Silver badges each year.

Wave flights were left out

Only days when flights were made in thermic conditions were used. This excludes distances achieved over Scotland because much of them could have been done in wave rather than thermals. Mid-winter flights were assumed to be either done in wave or abroad.

Good years and bad

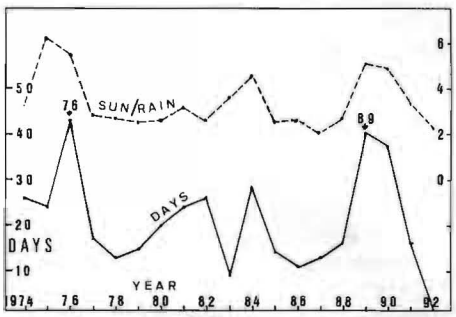


Fig 1. How the number of badge days fluctuated from 1974-1991 (scale shown on left) and how the Sun/Rain index varied. Scale for this index is given on the right.

Fig 1 shows how numbers of badge days fluctuated from 1974 to 1991. The solid line shows the numbers each year, the pecked line above is a "SUN/RAIN INDEX" (hours of sunshine divided by mm of rain) which gives a rough indication of how good the weather was. Full numbers for 1992 were not available at the time of writing. Some claims do not appear in print until February or even April the following year.

The best soaring was in the drought years

The years of 1976,1989 and 1990 were particularly good. These were years when the summer months had more sunshine and far less rain than usual. In most cases good soaring summers are those when the water companies complain of drought and hosepipes are banned.

The worst year before 1992 seems to have been 1983 when there were only nine badge days listed. The "SUN/RAIN" index does not show why this turned out so badly.

Days without rain

The number of days without measurable rain can be a useful guide. Here are the figures for Birmingham over recent years: The upper row shows just the most popular months of July and August while the lower row gives the May to August range.

NUMBER OF DAYS WITHOUT RAIN

	1981	82	83	84	85	86	87	88	89	90	91	92
JULY-AUGUST												
	44	40	46	46	32	29*	37	39	46	48	46	29*
MAY-AUGUST												
	74	69	74	86	72	63*	58	66	91	96	80	72

Low numbers suggest poor years. The worst are marked with an asterix. July and August 1992 were very poor months. August 1992 was the wettest month since 1956 (over England and Wales).

Monthly variations in badge days

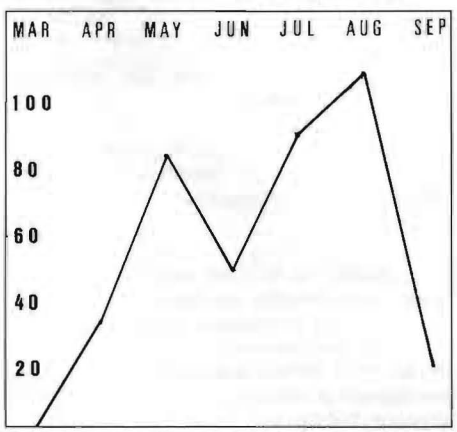


Fig 2. Monthly fluctuations in the number of badge days.

Fig 2 shows the monthly variation in the number of badge days over the period 1974-1992. March was too early for most people and scored very low; a number of pilots flew 300km in March but very few were badge flights.

April is a much better month because the days are longer and there is often a good dry and sunny spell. In past years there have been spectacular flights at the end of April. The first (undeclared) 750km triangle was flown on 28/4/76. However, unless the good days occur at weekends few people are able to make use of the outstanding days.

May is often a good month; not only are the days longer but there are more optimists ready to take a weekday off when the weather is good. In 1990 two consecutive days (May 26 and 27) gave a total of 22 Diamond distance badges). In 1985 May 28 had 54 distance and goal Diamonds in one day.

If length of day was a major factor June should produce most good days but over the years it has usually been a disappointing month. There were lots of days when short flights were possible but few were good enough for first attemps at 500km. The relatively poor conditions in an English June do not extend into France. Norbert Siacchitano summarised the Buno-Bonnevaux weather some years ago and found June gave more good days than any other month.

In England July and August produced by far the most badge flights. One outstanding day, July 7 1985, seems to have topped all others with 76 Diamonds (35 for distance and 41 for goal).

September is usually the end of the season of good thermals; the weather usually breaks after the first ten days.

Over the whole year numbers are influenced by the weekend weather. A series of wet weekends outweighs fine midweek days.

Upper air patterns which make a good soaring summer

In any one year the conditions vary a lot from month to month. In good months the upper flow

usually has a ridge over or just west of the British Isles. These ridges are not fixed, they build, move on and collapse. What distinguishes a good year is the way a new ridge soon forms in the same longitude as its predecessor. This tendency for ridges and troughs to recur at the same longitude can only be explained in terms of the global pattern of very long waves in the upper flow.

In good years the jet stream stays far away

The jet stream, the band of very strong winds found just below the stratosphere, stays far away from us in good summers. The line of the jet usually arches far to the north of the British Isles, carrying its lows with it. Jet streams are often associated with major fronts. If the jet was far away it is almost certain that most of the active fronts were also well clear of the UK.

Effect of an upper ridge

If an upper ridge lies near or just west of us it tends to produce lots of surface highs or ridges. When fronts do arrive they are apt to weaken and give little or no rain. This is because the region below and just downwind of an upper ridge is also a region where the air is slowly subsiding. This subsidence warms and dries out the air making upper clouds disperse. The ridge also limits the size of cumulus clouds so that few grow big enough to produce a shower.

Monthly means charts

Many months are so changeable that all the interesting features are smoothed out by the averaging process. When a definite pattern appears one can be fairly sure that it dominated the weather.

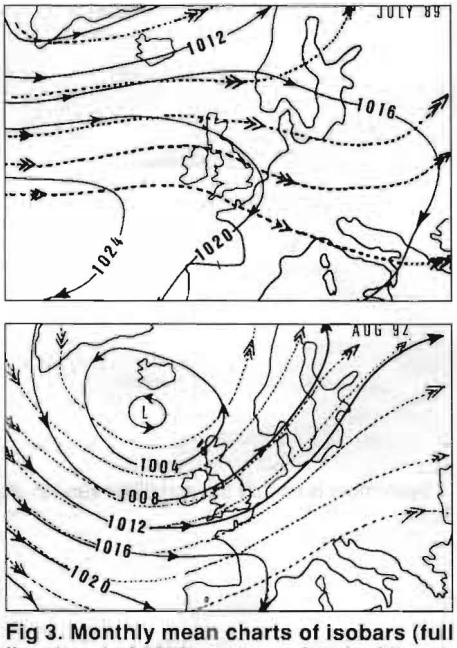


Fig 3. Monthly mean charts of isobars (full lines) and 18000ft contours (pecked lines). "A" shows July 1989 a very good month, "B" shows August 1992, a bad month.

Fig 3A shows a very good month, July 1989. The mean isobars are drawn as full lines. The 500mb contours, representing the pattern at about 18000ft, appear as pecked lines with double arrows for direction. The surface isobars show a strong ridge extending across England and Wales from an Atlantic anticyclone. The average pressure was above 1020mb, the isobars have anticyclonic curvature and they are widely spaced showing light winds. The 500mb ridge with its axis over Ireland is not so prominent.

Fig 3B is an example of a bad month, August 1992. The difference is easy to see. There is a depression centred south of Iceland. The isobars over the UK have cyclonic curvature and are also much closer together showing stronger winds. The pecked 500mb contours are similar to the surface isobars. Both have cyclonic curvature and close spacing. During this bad month the axis of the upper trough lay well to the west of Ireland. This put the UK in the sector where lows usually form or deepen.

Signs of a bad summer

Poor summers are generally those when the upper ridge is far away to the east, giving fine weather over eastern Europe. The jet stream curves round the southern side of a semi-permanent upper trough which sits to the west of us. This jet stimulates frontal lows to form ahead of the mid Atlantic upper trough and then steers them towards the British Isles.

Strong jets make deep lows

The stronger the jet stream the more rapidly surface lows move and the more vigorous they become. This was one of the features which ruined the latter half of summer in 1992. Once this south-westerly pattern sets in it is apt to be repeated with distressing frequency. Not only are the fronts more active but any ridge you see coming eastwards across the Atlantic is liable to disappear before it ever reaches us. Summer 1992 was an example of this. After the relatively dry spell of early summer had broken, the weather never recovered. A succession of late summer storms continued into the autumn ending up with flooding. Water companies finally removed their hosepipe bans, but only after some fields vanished under water.

Little success in long range forecasts

Forecasts for several months ahead have not shown any great success so far. Perhaps this is fortunate because a reliable prediction of a dismal summer would send even more pilots emigrating to sunnier countries. At present we can still hope for better days.

PART TWO – MAKING THE BEST OF THE BRITISH WEATHER

Although long range forecasts are not reliable the medium range ones for a few days ahead are often quite good. To get full benefit of the Met facilities I try to combine both the BBC T V presentation with "MetFAX" the dial-up fax service. This fax service expanded considerably during 1992 and now provides almost all one could ask for. The aviation items now available are listed in the appendix.

The Sunday "Weather for Farmers" at 1255 and also the midweek presentation are often good guides for the week ahead. During the run-up to a fine spell the MetFax charts for 48 and 72hrs ahead are a valuable early warning. On the penultimate day I dial up the 12 GMT actual and forecast charts. Nowadays the forecast for 24hrs ahead is very reliable as regards the positions of fronts and isobars.

Indications of a good soaring day

The isobaric pattern. Good soaring weather is most likely if the isobars have anticyclonic curvature, that is they curve round a centre of high pressure. The best conditions are usually in ridges and near the centres of highs. The table below shows how the frequency of good days is associated with the isobaric pattern. The figures give the percentage of badge days in each category.

High or strong ridge	**49.3%**
Weak ridge	**16.6%**
No ridge but a/c curve	**11.6%**
Col between highs	**10.3%**
Straight isobars	**9.2%**
Slight cyclonic curvature	**1.8%**
Trough	**0.5%**
Too complicated to classify	**0.5%**

Importance of distance from high centre: the High/Low index

The subsidence associated with a ridge or centre of high pressure usually makes the air fairly dry and restricts the depth of thermals under an inversion. This may give dreary weather in winter but during summer months it provides good soaring. Most good cross-country days occur when the area is fairly close to the centre of a high.

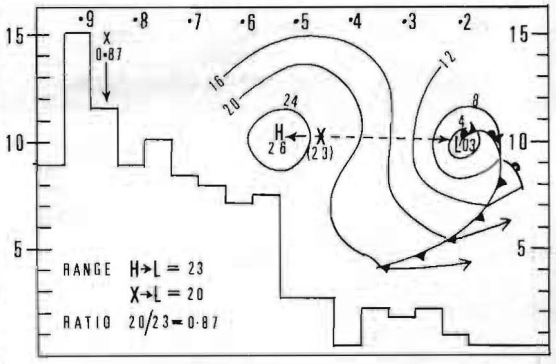


Fig 4. The percentage of badge days related to the proximity of the cross-country area to the centre of high pressure. The sketch chart on the right shows how the High/Low ratio was calculated.

The High/Low index shows how close the area was to the centre of the nearest high. Fig 4 shows the percentage of badge days distributed in 5% ranges and the sketch chart on the right demonstrates how the percentage was found. In this example the high centre was 1026mb, the low was 1003mb. This gives a total pressure range ➡

of 23mb. "X" marks the gliding area where the pressure was 1023, 20mb above the low. In this example the High/Low ratio is 20/23 or 87%. A score of 100% means the gliding area lay directly under the high while 0.0% is the centre of the low.

Pressures rather than distances were used because they give a better indication of the influence of the high; it is often hard to say exactly where the centre of a large flabby high is; one can more easily find the central pressure of highs and lows from Bracknell's fax charts, and it saves one measuring distances.

More than half the days occurred in the range from 75% up to 100%. Values below 55% usually only gave good conditions if the wind was light and there was a good ridge or col. The combination of a strong ridge and a high percentage for the High/Low ratio is a reliable sign of good soaring.

Another guide which can be combined with the presence of a ridge and proximity to the high is the actual MSL pressure over the gliding area. The table below shows the frequency of badge days related to the midday pressure.

MSL PRESSURES

These have been grouped in 3mb steps.

Pressure range (mb)	Percentage frequency	
1037-1035	0.8	
1034-1032	0.8	
1031-1029	6.3	
1028-1026	15.0	
1025-1023	23.2	*Peak frequency
1022-1020	20.0	
1019-1017	15.3	
1016-1014	10.6	
1013-1011	5.0	
1010-1008	1.6	
1007-1005	1.1	
1004-1002	0.3	

If the pressure is near the top of the range the day is quite likely to be blue.

Best days often occur when rising pressure has peaked

The first day of rising pressure after the passage of a cold front is not always very good. The wind is apt to be rather strong and the air too moist resulting in either showers or spread out of cloud. The best day is often when the rising line on the barograph flattens out and begins to dip. Of course this usually corresponds to the passage of a ridge line; it may also precede the arrival of the next front. Some of the finest days occurred the day before a front moved in.

Wind speeds

In spite of the improvement in sailplane performance strong winds are still a major handicap for closed circuit flights. One can make a preliminary estimate of wind speed using the forecast surface chart for midday. The BBC usually show this the previous day. To get the best results one needs the MetFAX copy to measure the geostrophic wind. Geostrophic winds are not always very accurate but they are a useful guide. Set a pair of dividers to span 5° of latitude (300nm) and use this setting to find the pressure change at right angles to the flow. Multiply the pressure drop by 2.5 to get the speed in knots.

Most charts from the British Met office use a 4mb contour interval. Hence if your dividers exactly span the distance between two isobars the wind is 4 x 2.5 or 10kt. You can get a better value from the AIRMET or Spot Wind Charts which come out on MetFAX before breakfast time.

How wind speeds influenced the number of badge flights

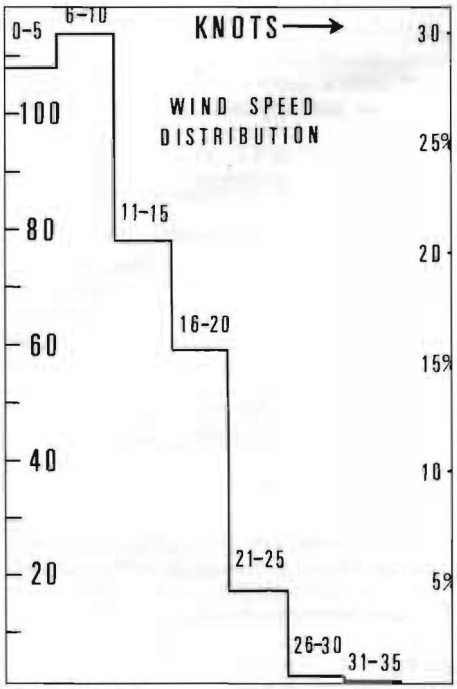


Fig 5. Block diagram showing the frequency of badge days with different wind speeds.

Fig 5 is a block diagram showing the percentage frequency of Diamond goal or distance flights related to the geostrophic wind speed over the area. Sometimes a high or strong ridge moving across the area produced marked changes in wind direction over the route but these systems usually had such light winds that the net effect was small.

On really splendid days the wind speed was 10kt or less. The majority of badge flights were made on days when the wind was not more than 15kt. Relatively few were successful with winds of more than 20kt. There was a tiny percentage made in strong winds. On these days cloud streets probably reduced the difficulties usually found on long into wind legs. (Or perhaps the pilot made a downwind dash. There were more wooden gliders during the early years of this survey.)

Wind directions

Fig 6 shows the number of days for each wind direction. The number within the central circle shows days with light variable winds of 5kt or less. The most favourable direction was from 330° and a large number of days had winds between 260 and 010°. In spring and early summer winds between east and north-east also give good days, but in some years the spring north-easterlies are rare. In spring the best direction seems to be from 060° because this brings very cold air which comes across Scandinavia and has had a short sea track. Winds from 030 have usually passed between Norway and Scotland before turning over England. The long sea track makes the air too moist.

The diagram suggests that winds in the S and SE sectors are of little use; this is not necessarily true; the small number of good south-easterly days is partly due to the lack of winds from that direction. South-easterly winds have the advantage of being drier than from most other directions.

In summer, winds off the cold North Sea need a long time over warm land before they produce decent thermals. East coastal areas are apt to be useless all day; if the wind is strong the inversion may remain low for more than a 100 miles inland. The bad effect extends even further if sea fog has reached the coast overnight; then energy is wasted burning off the fog or stratus.

With south-westerly winds, sites within 50 miles of the windward coasts rarely get good soaring. However, the air often dries out further inland; then the cloudbase rises and central and eastern areas can have strong thermals.

Maximum and minimum temperatures

The BBC TV weatherman almost always displays a pair of charts giving the minimum temperatures overnight and the maximum for next day. A good spread of temperature is often a sign of good soaring. Unusually low night temperatures often precede a particularly good soaring day. Overnight air frost in April and May is good news for pilots, though gardeners may be less pleased. These low temperatures occur when the air is fairly dry, the winds are very light

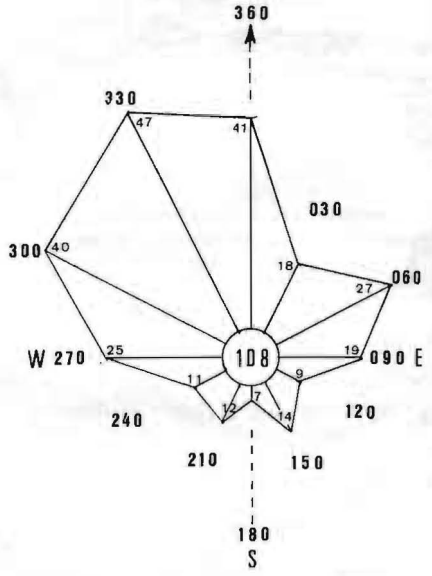


Fig 6. Distribution of wind direction on badge days. The figure inside the circle shows winds of 5kt or less.



Tom took these photographs last summer. Above: Cirrus ahead of an approaching front.



Above: A cumulus line.



Above: Blocked by a front. Below: A line of big cu from South Wales to Stroud.



Above: Lively cu. Below: Another example of being blocked by a front. ➡





and the sky clear. Dry air usually means a high cloudbase later in the day. A high maximum temperature usually means lots of sunshine so is quite a good indicator of many thermals but very hot days seldom coincide with long distance flights. On such days thermals start later than usual.

The range from minimum to maximum is a useful guide

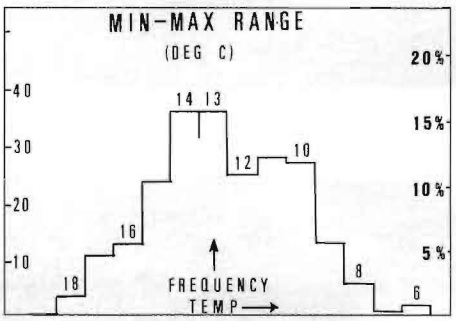


Fig 7. The temperature range between min and max on badge days.

The most important factor is not the actual temperature but the difference between minimum and maximum. Fig 7 is a block diagram of the Min-Max range of temperature on Diamond days. It shows that values of 13 to 14°C scored highest but any value from 10 upwards was adequate. The frequency drops off with differences of 16° and more. Such high values are likely on hot blue days when the inversion may be rather low and slow to break.

This is not an infallible guide. If overnight cloud is slow to clear the night minimum may not fall much. There are a few cases of good days with only a small temperature range. These can be sorted out by finding how much the temperature falls between the surface and 5000ft.

Temperatures aloft

If you dial up the Spot Wind Charts on MetFAX you can see both the predicted winds and temperatures aloft. A large temperature drop between the surface and 5000ft is a useful guide to thermals.

TEMPERATURE DROP FROM SURFACE TO 5000ft

Temp Drop (°C)	20	19	18	17	16	15	14	13	12	11	10
F/cy (%)	1	7	15	22	21	12	12	3	4	1	2

On most badge days there is a difference of 14-18°C between the maximum temp recorded at ground stations and the temperature at 5000ft. If the surface pressure is about 1020mb a difference of 15°C represents a dry adiabatic lapse rate; this means a thermal should rise to at least 5000ft even if no cumuli form.

In April, when the average 5000ft temperature on badge days is –4°C, the ideal temperature drop is just over 14°C. In July when the 5000ft temperature is about +7°C one needs a 15°C temperature difference. Anything more than this shows a superadiabatic lapse rate near the surface. The superadiabat can add 2 or 3° to the maximum temperature in England, and more in hot dry conditions on the continent. Thermals are often strong when the lapse rate goes well into the superadiabatic range.

MONTHLY 5000ft TEMPS ON BADGE DAYS

	Apr	May	Jun	Jul	Aug	Sep
Highest	+04	+09	+12	+17	+17	+07
Average	-04	+01	+05	+07	+07	+03
Lowest	-08	-07	-02	00	+01	-01

Conditions on 29 days when at least ten Diamonds were gained

Looking through the list of badge days one always finds a few when the Met charts look so awful that one wonders if the pilot was particularly good, very lucky, or the printer slipped up and gave the wrong date. This problem never arises when a lot of badges were all gained on the same day. An arbitrary limit of at least ten Diamonds on a single day was set for selecting specially good days; 29 of these were picked in the period 1981-91. Here are some statistics.

TABLE FOR "TEN DIAMOND" DAYS

	Pressure (MSL) (mb)	Wind (Kt)	H-L (%) ratio	Hours Sun	Temp Diff (°C) (SURF-5000)	T/Range (%) (Max-Min)
Highest	1030	16	100	14	21	17
Average	1023	8	86	12	16	13
Lowest	1012	<5	58	9	10	10

The figures listed against highest and lowest show how far from the average one can go and still have a top class day.

TABLE OF CONDITIONS FOR ALL BADGE DAYS

	Pressure MSL	Wind (Kt)	H/L (%) ratio	Hours Sun	Temp Diff (°C) (Surf-5000)	Temp Diff (°C) (Max-Min)
Highest	1037	32	100	15	21	19
Average	1021	10	75	10.5	16	13
Lowest	1004	0	10	5	10	6

Note: (1) This table includes some days which looked hopeless on the Met charts. These days were retained because it is reprehensible to discard any data, however improbable.
(2) Some frequency distributions are skew so the arithmetic average may differ from the mode (which is where the frequency of occurrence is greatest).

SUMMARY OF MET CONDITIONS ON MOST BADGE DAYS

1. The most important feature is strong anticyclonic curvature when the area is not far from a high. This usually occurs when there is a marked ridge of high pressure and the High/Low ratio is more than 60% (preferably 75% or more).
2. The geostrophic wind is less than 16kts.
3. There is a low night minimum and the difference between night minimum and day maximum is 10°C or more, preferably 13-14°C. Air frost is a good sign in April and May and so is ground frost in June.
4. The max temperature is about 16°C warmer than at 5000ft, (never less than 10°C).
5. The pressure is around 1024mb; anywhere between 1017 and 1028mb is good. Higher values occur in spring but pressures over 1031 may mean blue days in mid-summer.
6. The ground is dry with no significant rain the previous day. Some of the best days occur when there is an official drought.
7. There is good visibility.

APPENDIX: METFAX NUMBERS

To get telephone data by fax dial: 0336-400 and add one of the numbers below.

501 Index page.
502 Surface analysis and T+24hr forecast chart.
503 F214 spot wind chart and F215 Low level weather chart. The morning F215 gives fronts and isobars for 1800.
504 Surface T+48 and T+72 forecast charts and planning text.
505 Explanatory notes for F215..
506 4 tephigrams temp/height chart.
507 Airmet South text.
508 Airmet North text.
509 Airmet Scottish text.
510 Airmet index page.
511 Airmet UK Weather text.
512 Airmet UK Upper Winds text.
513 Airmet UK Update and Outlook text.
514 Airmet area South West England text.
515 Airmet area South East England text.
516 Airmet area Central England text.
517 Airmet area Cross Channel text.
520 TAF and METAR index page (METARs are "actuals").
521 METAR South England, South Wales
522 METAR SE England, Midlands, E Anglia,Wales.
523 METAR N England, Scotland, Ireland
524 METAR SE England, Channel Islands, France.
525 METAR Europe.
530 18hrs TAFs UK and Europe (TAFs are airfield forecasts).
531 TAFs S England, S Wales.
532 TAFs SE England, Midlands, E Anglia, Wales.
533 TAFs N England, Scotland, Ireland.
534 TAFs SE England, Channel Islands, France.
535 TAFs Europe.

There are many other non-aviation services, for index dial.

401 for shipping forecasts.
480 information for schools and colleges.

This version corrected up to 1240hrs on December 18, 1992.

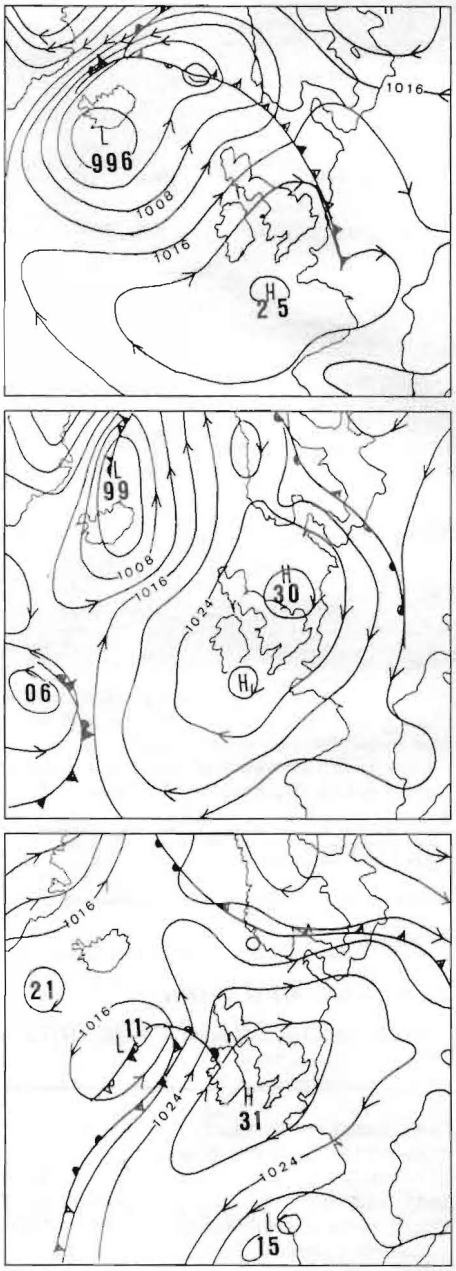


Fig 8. Midday charts on three of the highest scoring days: 1985 May 28, 29 and July 7.

ARTWORK

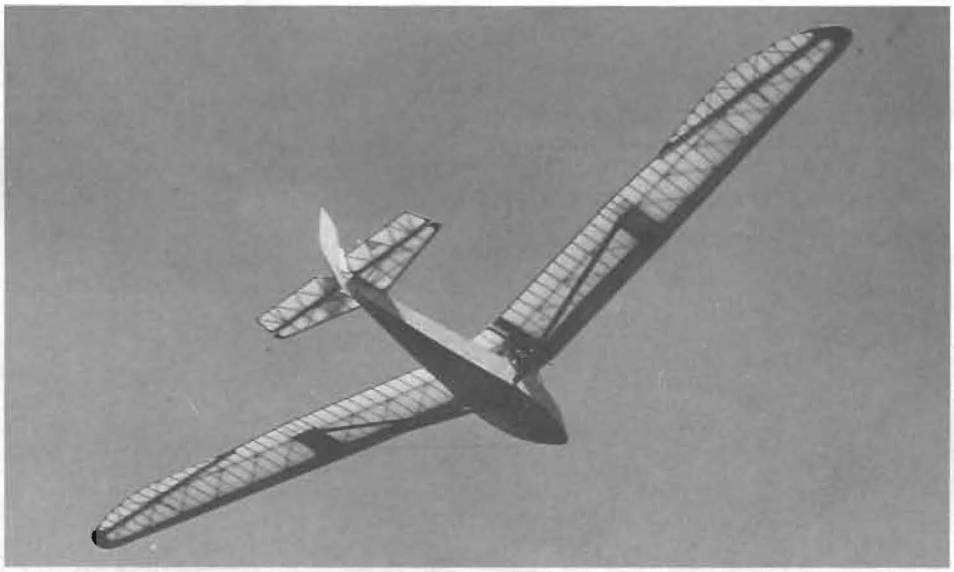
- graphics
- leaflets
- brochures
- packaging
- logo design
- airbrush artwork
- photo retouching
- advertisements
- technical illustrating
- corporate image

PETER FULLER
081-977 4053
27 Langham Road, Teddington, Middlesex TW11 9HF

DEREK PIGGOTT

LOOKING BACK

Derek recalls some of the years and the aircraft, from the Hotspur to the Cayley replica, he will always remember



A Falcon 3 photographed by Charles Brown.

It is supposed to be a sign of old age when you begin to look back and enjoy recalling the early days and it is surprising how you remember small details from 40 or even 50 years back when you cannot remember where you put your glasses a few minutes ago.

My first real acquaintance with gliders, other than models, came when I saw in the newspapers that a two-seater glider had made a flight of 22hrs soaring along the Dunstable Downs. This was during the National Gliding Championships in 1938 and realising that the Championships were going on for the rest of the week, I played truant, borrowed a tent, got on my bike and cycled the 70 miles or so to Dunstable. My recollections include seeing the early Kite, the beautiful Rhönsperber and the Falcon 3 being winch launched and soaring on the hill. Just a few times during that week, I watched as the experts thermalled their way up to cloudbase before drifting away out of sight on their cross-countries. The clubhouse was new then, but being too shy to talk to anyone, the nearest I got was to look into the hangar.

My next acquaintance with real gliders came in the war when I found myself in the front cockpit of a Hotspur at Shobdon. By this time I was a qualified pilot and instructor on powered machines so keeping behind the Miles Masters on aerotow came very easily. Here my main recollection is of steep turns on tow, whereas in our gliders we are still almost directly behind the tug when circling in thermals on tow. With these, perhaps because of the much longer ropes, the position was with the Master looking almost in plan view as it roared round the very steep turns. It was always a contest between the tug pilot and us glider pilots to stay on without having to release.

Night landings were also very memorable since no one had taught us about aiming point judgment. With no moon, it was very black and after release there were only two lead-in lights and a short flare path for the touchdown. More by luck than judgment we all got down on the airfield, although one Hotspur landed wide and skimmed across an emergency water tank tearing the bottom out of the glider. During the landing run we rolled past all the flares into the darkness hoping that we would not hit anything and then waited for the retrieve vehicle to come and tow us out of the way.

It was when I was stationed at Little Rissington in 1948 on the staff of CFS that once again I had ➡

the chance to fly gliders. I had been inspired by two of my students (David Dick and Ian Ladley) with their stories about soaring and took the opportunity to go on a week's visit to Detling, then the Gliding Instructors' School for the ATC.

My first flight in the Sedbergh (as the ATC called the T-21B) was memorable. It was a cable break on a winch launch at about 100ft. My instructor flew it straight down to a very fast and heavy touchdown. The noise of the impact was incredible but apparently it was not too bad because there didn't seem to be any damage.

Little did I know that I was going to spend many years flying these lovely old aircraft. Several years later I was posted to Detling and had the opportunity to fly in the Nationals at Camphill and to make a number of interesting cloud climbs in the T-21s. It was on one of these that I learned the need for a good flying helmet and face mask, in addition to the goggles that I always wore for cloud flying.

We covered our heads and faces but the pain from being hit by the hail was grim

Coming down from just over 10 000ft in a very large cu-nim, it started to hail. We both covered our heads and faces as best we could but the pain from being hit by the hail was grim and we were both very glad to get down out of it. Then the disappointment. The barograph ink had stopped flowing before the top of the climb and it could not be claimed as a two-seater height record after all. I never used ink for my barographs after that!

I now look back on my T-21 days with awe. How did I ever manage to keep flying, year in year out, even in the snow and still apparently enjoy it. Now I love a short soaring trip in one, but I want to come down and get warm again after a short time. From the training point of view it is still a good machine. You have to learn to co-ordinate well and the side-by-side seating is ideal for the early flights. The low speeds make it very forgiving. Of course it has some shortcomings which might have been overcome. Just moving the release hook back to the next frame would have worked wonders for the winch launching and more height on every launch would have been very welcome.

After leaving the RAF, in the early days at Lasham the Surrey club had a Weihe for the instructors to fly. How I use to envy them and the flights they made. Eventually I was to get my Gold distance in it on a dog leg flight along the South Downs to Lewes, on to beyond Salisbury and back again to the foot of Ditchling Beacon. I intended to use the hill lift in the northerly wind and then to thermal soar the second leg to pick up the sea breeze front on the last leg. In the event the wind dropped, the thermals were very weak and the sea breeze front failed to appear. I said afterwards that I could have walked quicker. I landed late in the evening, absolutely exhausted after battling with the Weihe for 9hrs 40min. But for its excellent low speed performance, I would have landed long before.



The Horsa, another type flown by Derek. Photo: Charles Brown.

One glider I never want to see or fly again is the little American Eaglet built from kit by Mike Garrod and Barrie Moore at Dunstable. This is the one with an inverted Vee tail and a pod and boom type of fuselage. The unusual feature is that it uses spoilers in place of ailerons. The main advantage is that the wing does not have to be so tortionally stiff and this saves weight and building time. Unlike ailerons which always cause some adverse yaw, the extra drag caused by the spoiler as the bank is applied is in the direction of the turn so that very little if any rudder is required. However, they have to be held closed by springs or an over centre lock or they will suck open a small amount in flight, ruining the performance.

Mike had the honour of doing the first hop in the aircraft as he had done most of the work and then I was to take it up on aerotow and see how it flew. I soon discovered the initial movement of the stick to apply bank involved unlocking the spoiler and that this had no banking effect. Moreover there was a "break opening force", much lighter but rather like unlocking an airbrake. Then the further opening of the spoiler required much lower forces which in this case were not increasing appreciably as the spoiler opened. The net result was an aircraft with a large dead movement on the control when the stick was near the central position and with very little feel.

As the stick was moved over, the initial rather high load disappeared and this gave rise to a feeling of being balanced on a knife edge and about to go out of control at any moment. The spoilers did in fact work, but the feel was awful and, to be honest, the only reason I continued the tow to 3000ft was that I was too scared to pull off before. Now I often wonder what happened to the Eaglet. Was it sold or will it turn up in a farmer's barn in a few years time? It is certainly an aircraft I will always remember!*

When the Platypus was designed in the early 1980s it was years ahead of its time

An aircraft I really would like to fly again is the Australian Platypus. Designed and built by Harry Schneider, the Platypus is a side-by-side two-seater intended to be an all glass-fibre advanced trainer. When it was designed in the early 1980s it was years ahead of its time and even today it performs at least as well as two-seaters like the Grob and K-21. But the handling is as light or even lighter than most modern Standard Class machines, making it ideal for training with a view to converting straight on to a high performance single-seater. Of course being a prototype there are a few things which would need to be changed before production, but I still look back on my flights in it with nostalgia.

But if you ask me what I look back on as the most interesting project I have been involved in, I would still have to choose the Cayley replica. Originally built for Anglia TV, to find out whether Sir George Cayley's designs could have flown back in the 1850s, this was a replica built by John





Above: The Cayley with Derek at the controls photographed during the filming of "On the Wing" IMAX film. Below: The Eaglet built by Mike Garrod and Barrie Moore photographed by Mike just before its first aerotow at Lasham on July 12, 1981. ➡



Sproule and Ken Fripp at Lasham in 1972. The initial test flights were all cartows and apart from one memorable occasion when it got out of control and climbed to about 70ft before diving into the ground, the flights were all low hops to find if the control influencer really worked and to get some experience before taking it to the original flying field at Brompton Hall near Scarborough.

Would often end up diving into the ground instead of levelling off for a landing

Although it was laterally stable, (old Sir George knew all about dihedral) it always appeared to be longitudinally unstable and would often end up diving into the ground instead of levelling off for a landing. The thrills and spills flying for the TV film were nothing to the adrenalin flow of flying it again some 20 years later for the IMAX film "On the Wing". By then the risks involved had become clearer and some of the landings, perhaps better described as well controlled crashes, were very exciting stuff indeed. One flight I will always remember was when the control became jammed.

The control on the Cayley consisted of a long oar, hinged with a universal joint and with a cruciformed tail unit at its end. Moving the handle up deflected the tail down giving a nose down effect; sideways movements applied rudder. On the ground the down elevator movements were somewhat restricted by the tail hitting the ground and a much larger movement was in fact possible in the air. There was no direct lateral control and to bring the wings level or to apply bank required making a skidding movement to make the dihedral do the work of banking. With no aileron control it was vital to take-off directly into the wind as any crosswind was bound to result in rolling and turning further out of wind.



The Falcon 3. Photo supplied by Chris Wills.

Of course, I had a yaw string on one of the many bracing wires ahead of me and we used another on the towcar to check he was facing directly into wind before starting any take-off run. On this occasion the wind was very light but persisted on blowing across from my right. We could not move round further into the wind because there wasn't room to tow in that direction. Eventually what little wind there was dropped and both yaw strings hung down and we could start the take-off.

As she left the ground and started to gain height, we probably flew into an increasing crosswind and this started a bank. But at the same time I was trying to level out from the climb with the boom held very high to apply full down elevator. Applying full rudder against the swing, the aircraft started to nose down and so of course I tried to pull the boom right down to stop the inevitable dive in.

I then realise that I couldn't get the boom down as it had got caught in a side bracing wire. So I had to go back to the full up position, reduce the sideways movement and then bring the boom down again. By this time we were in a 20° bank diving turn and we hit the ground very hard, smashing the spokes out of a wheel. Actually it was just what they wanted for the film and no one was very worried about the damage. But it was a crash that I will always remember.

* Mike Garrod says the Eaglet is cluttering up his garden in its trailer and he would be glad to give it away!

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SKID ROW

Sometimes I can feel quite sorry for the rich. Not sorry enough to reprieve them when the Day of Reckoning comes and the guillotine works like a busy semaphore at Hyde Park Corner, but I do feel sorry for the simplicity of their lives, separated by the insurmountable barrier of money from the colourful but grubby tapestry into which the rest of us are bound. For example – a wealthy pilot feeling the need of some new component for his already perfect soaring machine merely punches a few buttons on his yuppie-phone, quotes a series of numbers which guarantee instant respect from RD Aviation, and the thing is done.

For the hoi polloi, however, it's all very different, more complicated, but much more interesting. And you meet more people.

The rubber tail bumper on my Iris was broken. I did what most of us at HusBos do in times of trouble and went to see Lou-the-Glue. Lou understands about my poverty and doesn't waste time offering to sell me new parts. He dug around in the great heap of unidentifiable bits that looks like the aftermath of an airship disaster, but which Lou refers to touchily as his "stock", and dragged out another tail skid – also broken, but not as broken as mine. It could be fixed, he thought, and I could have it as a gift if I'd go away and let him get on with earning his living. I took it gratefully, studied it carefully when I should have been concentrating on other matters, and finally produced a dimensioned sketch showing (a) the method of repair, (b) a subtle modification to the metal baseplate of my very own design, and in which I took great pride, and (c) the materials to be used. Then I looked for a suitable jobbing engineering works to execute the project. Cheaply.

The company I selected had premises in one of those quiet, red brick, terraced streets in the back of our county town where cats sleep in windows and Cortinas rust in the gutters. Dusty lace curtains twitched as I walked down the street looking for No. 84 The Works and carrying the tail skid before me like some exotic ochre vegetable. Eventually I discovered The Works behind a low anonymous archway – a couple of large wooden sheds which had apparently developed amoeba-like from an outdoor privy. I could hear the screech of lathes and smell the cutting-oil which shone greasily on the small, iron framed windows.

Two men in overalls colour-coded by age and toil to harmonise with the mottled workshop floor, and a red-headed youth in jeans, looked up from their machinery as I pushed through the doorway. They stared in silence at me, then at the pinstriped three-piece and the lace-up Oxfords, and finally at the tail skid. None of it seemed credible to them.

I proffered the skid. "This needs fixing," I said.

The larger of the two men stepped over to me and took hold of my offering, curiously gentle, as if it was something small and fluttering. He rubbed a grimy professional thumb over it. His hands seemed to tell him more than his eyes.

"It's damaged," I said helpfully.

"Busted, more like."

"It's a glider tail skid," I pulled out my diagram. "This is what needs doing. See? This wedge-shaped bracket goes inside, the bolts are spot-welded here, and I want a new mild-steel sole plate which ends up at the front like a ski. Stops the grass getting caught in it." Modestly I added, "Thought of that myself."

He nodded slowly. "Off a glider, you said?"

"With hindsight I admit I might have been a little too emphatic"

I explained about the function of tail skids on gliders. I was very careful with my explanation because I felt that this character might not be familiar with the high standards of craftsmanship called for in aviation work. I assumed that most of his business came from the owners of the rusting Cortinas made desperate by the annual threat of MOT certification. With hindsight, I admit I may have been a little too emphatic regarding the care and attention that I felt my tail skid demanded, but aviation isn't just general engineering and I wanted to feel confident that my requirements were fully understood.

The big man said that he thought that despite the stringent conditions I had outlined, he could cope with the job. The red-haired youth sniggered and the other man smiled knowingly.

"Come back tomorrow," said the man – it was now clear that he was boss of The Works. "And I'll have it done. It may be I can improve on this sole plate. Mild steel, you reckon . . . if I used . . . Well, we'll see. Call the whole job a fiver? Cash?

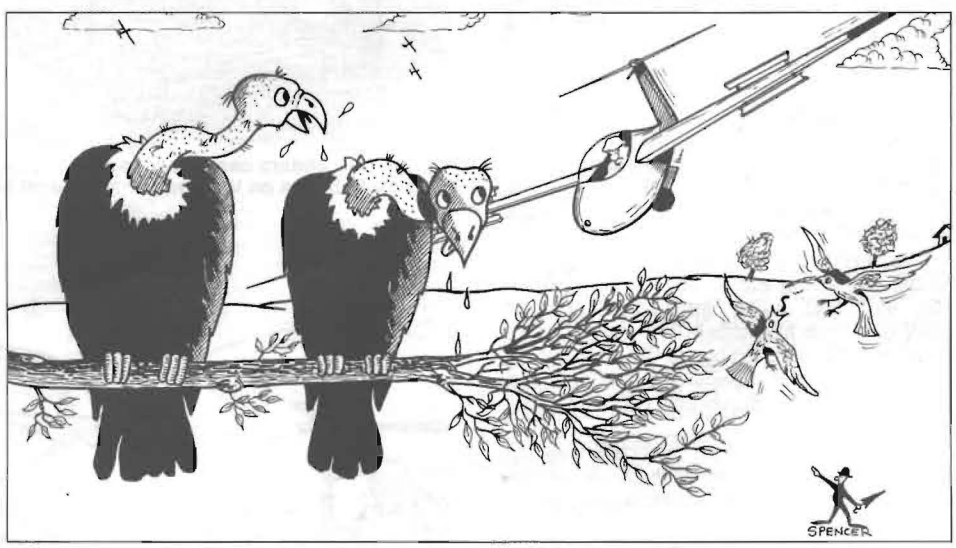
My sort of entrepreneur. In a fit of generosity, and feeling I ought to clinch such a favourable deal immediately, I took the money out of my pocket and gave it to him on the spot. It was an expression of the confidence I felt in those hands which years of work had evolved into tools as practical as a badger's forepaws.

He folded my fiver into a roll the size of a cricket ball. "Jason!" he commanded the youth, "Show the gentleman out through the back door. It's a short cut," he added to me. I said goodbye and let the heroically named youth lead me past the three lathes with their bins of tangled metal waste piled like fodder for some metal monster, and out through a small door at the back of the shed. This opened into another building, gloomy and silent, where a shaft of dusty sunlight laid a complex pattern of shadow across the stained concrete floor. I could see that the shadows were thrown by a tubular network of steel laid across trestles. At first I thought it was some artistic creation – Tate Gallery material. Then I realised.

"That's a fuselage," I said, astonished.

Jason grinned happily. "Yup," he said. "The boss does a bit of flying and in our spare time we're building one of them Yank aerobatic biplanes." He opened the door to the street, a comedian relishing his punch line. "And that's really got a complicated tail skid."

I walked slowly back to my car, wishing that I hadn't been quite so pedantic in my explanation of just what a tail skid was. I wished I'd asked questions first. I wished I'd chosen another firm to do the work instead of this bunch of practical jokers. I wished I didn't have to go back there on the tomorrow. But when the tomorrow came I found that having had their fun they were generous in their victory. They had done more than I had asked and paid for. They had fabricated the new skid, not from dull mild-steel, but from pure stainless steel that glittered like a knife blade. They said it would enable them to recognise me next time I thermalled above the town. And you can't buy that sort of involvement for cash, nor even with American Express.



"Forget meals-on-wheels Elsie – it's coming by air!" Drawing by Mike Spencer.

TAIL FEATHERS



Restricted almost entirely to crashes.

Glidergate, or, Soar Throat & the Dirty Tricks Scandal

Editor's note: Any resemblance between the characters in this narrative and people alive, dead or on gliding club committees is totally inadvertent.

The public has been astounded at the recent bitter legal dispute between British Airways and Virgin, in which amongst other allegations it was revealed that BA had offered inducements to Virgin ticket-holders to switch airlines. It is just as well that the public's interest (or rather the national press's interest) in gliding is negligible and restricted almost entirely to crashes, otherwise the equally unsavoury goings-on between two rival gliding clubs might have brought our great sport into disgrace. The fact that the two clubs are located far from our metropolis was also a help in keeping the court case out of the headlines of any newspaper but the tiny *Loambury Bugle Advertiser*.

The rivalry between the old-fashioned but socially OK Loamshire Bungystretchers and the brashly up-to-date Skyriders GC, only 15 miles apart, was a legend, or at least a standing joke, amongst the rest of the gliding movement. The Bungystretchers were a hill site, and their name was literal truth. Indeed the only reason they no longer used a horse to drag their fleet of wooden gliders to the top of the ridge for launching was the protests of the chairman's wife, who was a vociferous opponent of anything resembling cruelty to any creatures except humans. An unreliable engine for retrieving the gliders had been installed, and frequently the members' own muscle power had to be substituted. One small side benefit of this exercise was the Skyriders' members did not openly make fun of the Bungystretchers' quaint ways in the confines of the local half-timbered pubs.

The Skyriders could not have been more different. All training was on self launching ASH-25s and first solos were on motorised ASW-22Bs, from magnificent three mile long runways, recently vacated by the US Strategic Air Command, so that expensive overshoots and undershoots by the pupils only occurred about once a month.

The catchment area for members was not large, and there was eager rivalry to recruit new blood, either amongst fresh faced school leavers or, much preferably, from the rich Londoners who settled in the peace of the countryside after making their pile in the City. However, there was



Fresh faced school leavers.



Above: Two gliders carelessly parked too close together along my accustomed path. Below: Read more books on law and constitutional history than was healthy for a bricklayer.



some sort of unwritten code of conduct in their rivalry. Actively poaching the other club's existing members was not done. At least not till the sensational Bungystretchers vs Skyriders' court case.

Three Bungystretchers' members admitted that a mystery phone caller, who earned the soubriquet "Soar Throat" during the course of the scandal, had offered bribes they could not refuse if they would join Skyriders. When they duly switched clubs, the proferred sums did indeed arrive in their bank accounts, paid in by an untraceable source. The Skyriders' chairman Alf Mason hotly denied the charge, but even his own members were unconvinced. He seemed doomed, especially as he had attempted to keep his costs low by hiring his daughter, Portia, as his defence counsel for her very first case as a fledgling barrister.

The first witness to be cross-examined by Portia was a Miss Daisy Cheyne, who had accepted free membership of Skyriders for one year.

"How many solo flights did you have at Bungystretchers, Miss Cheyne?"

"Five"

"And how many crashes did you have, Miss Cheyne?"

"Five"

"Thank you, no further questions. Next witness, please"

A mutter ran round the court. No attempt to rebut the bribery charges? Portia Mason was a disaster!

"Bert Bladder, you are justly proud of your piloting skills. You have done 15000kms cross-country a year for ten years without scratching a glider. So you would clearly be an asset to Skyriders GC, would you not?"

Bert beamed smugly and agreed.

"Tell us about the incident on Easter Monday at Bungystretchers, shortly before you were persuaded to join Skyriders."

Bert's face darkened.

"Well, I was towing one of the club two-seaters back to the hangar with the tractor along the exact same route I've always taken since the 1960s. I remember I was trying to compose a poem for the Club Gazette, and trying to think of a rhyme for *Soaring*, and all I could come up with was *Boring*, which wasn't quite right, when I realised, rather too late that two other gliders had been carelessly parked too close together along my accustomed path."

"What do you mean by 'rather too late' Mr Bladder?"

"I mean I'd just written off three club machines."

"It's just as well you weren't trying to think of a rhyme for *S&G* or you'd have written off the whole fleet, Mr Bladder!" interjected the judge, and the courtroom dutifully fell about with laughter, until gavelled back into silence.

Portia Mason returned to the attack.

"Was this the first incident of its kind, Mr Bladder?"

"Er, a couple of years ago I couldn't find a usable rhyme for *bird* . . ."

"With the same result?"

"It was all the fault of those young members parking gliders in the wrong place, you know . . ."

The evidence of the third and last witness, Cato Slowbottom, is much too lengthy to relate here. Despite the joint efforts of Portia Mason and the judge he was so pedantic, nitpicking and full of expressions like "it all depends on what you mean by . . ." and "on the one hand, but on the other . . ." and bits of legal Latin, that most of the spectators went to sleep. He had clearly read more books on law and constitutional history than was healthy for a bricklayer, which was his occupation when not arguing with people. Yes, he had accepted a bribe of free membership and free launches after switching to Skyriders GC, but his motive was not money, of course, and on he droned, explaining in excruciating detail his real reasons, about which a now somnolent court could not have cared less. Eventually he was allowed to depart the witness-box. Nobody could understand why Portia had asked him to appear at all. Alf's head was buried in his hands.

Suddenly Portia awoke the court by crying out "I regret I must now reveal the true identity of Soar Throat!"

Consternation.

"He is here in this very room!"

Pandemonium.

"This man, whom I shall presently name, not only tried to ruin the Skyriders by falsely charging them with stealing Bungystretchers' members, but did something even worse – he planned to wreck Skyriders' efficient operations by foisting on them a trio of pests. Yes, it is you, Aloysius Cardew-Smythe." Her accusing finger pointed at the tweed-clad, red-faced chairman of Bungystretchers, who recoiled in shock and fury.

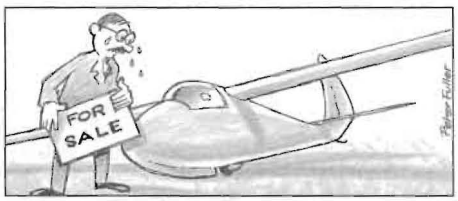
"It's a filthy lie!" he croaked hoarsely. "You bitch, I'll see you in court!"

"You are in court, your silly man!"

Before Cardew-Smythe could croak again the three witnesses leapt to their feet. "That's him!" piped Daisy. "That's Soar Throat" snarled Bert "even if he tried to disguise his voice on the phone!" Cato was so staggered that for once he said nothing, but just nodded dumbly in assent.

The Bungystretchers' chairman looked wildly and defiantly about him. "All right, all right, it was me. I couldn't go on. It was worth a thousand pounds of my own savings to do it. Not just the lousy training – low hops in Daglings, would you believe – or the chaos on the ground, but worst of all that lunatic on the committee who prevented us ever doing anything to improve the club by dragging out meetings and reading memoranda of encyclopaedic length – his *Fight against Glass-fibre*, his *Campaign against Carbon*, his *Tirade against Towplanes* – I'd have strangled him with my bare hands if he hadn't been persuaded to leave . . ." He began to sob.

"Then why didn't the members vote him off the committee at an AGM?" asked Portia.



Sell the Puce Peril! Drawings by Peter Fuller.

"Because whatever time it came around for the election of committee members, he'd drag out proceedings with points of order and amendments and justifications of what had happened in 1935 until past midnight; all those who had families had gone home, and only one or two reactionary cronies stayed on to make sure he paralysed the club for yet another year. Next year I was going to sell my Olympia so as to buy those old blighters out, too."

Surely not sell the Puce Peril! A wave of sympathy went out to the now broken figure of the Bungystretchers' chairman.

The judge intervened. "Mr Mason, what action do you wish to take against Mr Cardew-Smythe?"

"Well, Daisy may be redeemed by proper training, we'll get Bert into competition flying and off tractors, and we have had for years an anti-fillibustering rule at meetings which is rigidly enforced: anybody who talks for more than five minutes is charged ASH-25 flying rates for every minute in excess – two pounds every 60 seconds. It works just fine. I'm happy to drop any charges."

Cheers rose to the rafters. The judge rapped his gavel for order. "Aloysius Cardew-Smythe, I bind you over to be of good conduct on condition that you submit yourself to the supervision of our probation officer for the next two years. Do remember, it is the word of this respected official alone that stands between you and jail."

The county probation officer stepped forward, looked Cardew-Smythe firmly, and a little menacingly, in the eye and took him by the arm. "Come on, Aloysius."

"Yes, dear" he said in tones of deep misery. "I'll come quietly."

Low hops in Daglings.



GLIDER OXYGEN INSTALLATIONS

Ken's comprehensive article should help anyone wanting to get their glider primed for wave flying

Ken first sampled gliding in a Kranich at Güttersloh in 1956 and he and his wife fly at both the Portsmouth Naval GC and the RAFGSA Centre at Bicester.

BGA recommended practices suggest that supplementary oxygen should be used above 10000ft amsl. This recommendation contains a generous degree of latitude, permissible because of the low physical work rate in a glider cockpit, but note that physical impairment starts as low as 4000ft, with diminution of night vision, and mental acuity starts to degrade at 8000ft; by 10000ft night vision has gone and impaired judgment is apparent to an observer.

The physiological reasons for this are explained in detail by Peter Saundby following this article, but suffice it to say that exposure to oxygen deficiency leads inexorably to unconsciousness and finally death. An article "Breathless Over Brecon" by Peter Martin in the October 1988 issue of *S&G*, p231 will remind anyone with lingering doubts what will happen in practice, even at moderate altitude.

The purpose

In essence, supplementary oxygen is carried in a glider to support life, so the gas itself and the equipment to deliver it to the pilot must be regarded as valuable items and treated with care and respect.

The hazards

Setting aside the dangers of flying at altitude, there are hazards associated with oxygen to contend with, even before getting airborne. Oxygen is a basic component of combustion and although the gas itself does not burn, it will vigorously intensify a fire in a combustible material. Furthermore, a material not normally regarded as combustible – steel, for example – becomes so at high temperatures in an oxygen-rich environment. Indeed, small metal particles, such as swarf from a tight thread in a pipe coupling, may ignite spontaneously when exposed to oxygen under pressure, as may the saturated clothing of someone working in an oxygen enriched environment.

Remember also that this apparently benign and life-supporting gas becomes a powerful propellant when compressed, even without any accompanying combustion. The typical working pressure of glider systems in the UK is 1800psi and that of fully charged bulk storage cylinders may well be of the order of 3000 to 4000psi. A badly serviced or mishandled cylinder which ruptures during the filling process, or at any other time, will spray metal shards at high velocity over a wide area, as well as displaying unfriendly ballistic tendencies should it escape from its mounting.

Cylinders

Although there are a number of ways of storing and generating oxygen in flying machines, it seems likely that gaseous oxygen compressed into a steel cylinder at a working pressure of 1800psi will remain the UK gliding standard for the foreseeable future. There are a wide range of cylinders, new and second hand, on the market and three main selection criteria seem to be capacity, weight and bulk. In general terms, the ideal cylinder for the single-seater glider will give a working capacity of between 500 and 750 litres at 1800psi in a convenient shape to suit the narrow configuration of the glider centre-section, for a weight penalty of some 9-13lbs.

In practice, for those wishing to maximise the amount of gas which can be carried, the choice tends to fall between the modern 630 litre cylinder working at 2000psi, and the much older MK V built by the thousand during WW2. The latter can be re-conditioned inexpensively to a MK V* specification (without anti-fragmentation wire binding) and gives 750 litres at 1800psi. Both cylinders originate from the firm of TI Chesterfield. The modern 630 cylinder actually has a 1lb weight disadvantage against the earlier cylinder, for a significantly lower capacity at a higher working pressure.

There are a number of variations of size, shape and capacity, some smaller, some much larger and suitable for a two-seater installation, some manufactured in aluminium, some made in the USA and some made in Germany. German Drager cylinders are likely to work at 3000psi and therefore suffer a capacity penalty when operated at the British standard.

All cylinders for use with compressed gases share one thing in common – they must be inspected periodically to BS 5430. It is extremely imprudent to attempt to fill a cylinder without first ensuring that it is "in date" and that it has been correctly maintained, with a safety pressure. An empty cylinder left idle for a long period may accrue internal corrosion, leaving it seriously weakened.

Methods of dispensing

Gaseous oxygen stored under pressure must be regulated in some fashion to provide the user with the correct quantity of gas at an appropriate rate. Technology has moved forward substantially since WW1, when German aviators were provided with a simple reducing valve to bleed oxygen through a rubber tube to a pipe stem clenched between the teeth, and a nose clip. Such provision was essential because Zeppelin operating ceilings rose to almost 27000ft during that period. But even if the standard of our hardware has improved, the story of the Zeppelin helmsman who inadvertently stood on his captain's supply tube, reducing him to unconsciousness at 20000ft, should serve to remind us that constant monitoring of life support equipment is stock in trade for those aspiring to longevity.

The Germans went on to develop the demand regulator, which only provides oxygen when the user inhales. This usefully economic technique was then copied by both the Americans and the British after WW2, and the ARO Corporation of Ohio and the British Oxygen Company produced three variants in large quantities, all eminently suitable for glider installation – the Types A12, A14 and A20.

The A12 is the simplest, comprising two stages, the components of which are common to the other variants. The first reduces cylinder pressure to a manageable 10psi, and the second provides the correct mix of cabin air and oxygen, in response to the user's inhalation, to maintain the required sea level partial pressure value. By 34000ft, the second stage compensator has shut off air dilution and is providing 100% oxygen, on demand. The Types A14 and A20 have a third stage, manual and automatic respectively, which produces a pressure breathing facility, essential for flight above about 38000ft.

All three devices provide identical characteristics at the altitudes at which most gliding takes place, and may be regarded as fully interchangeable. They are compact and extremely economic in terms of oxygen usage, and weigh about 2lbs. The German Drager equivalent is somewhat bulkier, and earlier versions have a manually operated second stage, which means that the device must be mounted within easy reach of the pilot.

Again, there are a number of variations on the demand theme, some bulkier and heavier, some highly miniaturised, some manufactured in the USA, some in the UK, but the Drager and ARO devices are most commonly found in the glider installation.

The constant flow regulator remained the British military standard until well into the jet age, and I obtained my Gold height using an ex-RAF MK XI which may still be seen in older installations. More recently, the market seems to have settled on the SABRE AAV control head as the UK gliding standard. This useful and compact device incorporates a contents gauge and provides two rates of flow – 2 and 4 litres/min, which must be selected manually. Two versions allow mounting either remote from the cylinder or in the cylinder neck, typically the 630 litre version mentioned above.

The Walker Kidde Company has manufactured a wide range of life support equipment for both the military and civil markets, including constant flow control heads similar to the AAV; the

American version is designated the A8, but neither are now as abundant as the AAV device.

Oxygen consumption

The type of system, constant flow or demand, and its capacity, which ends up in a glider, is determined by the understanding and perception of the requirement by the owner or operator, with duration perhaps being the most significant and easily identifiable factor, from the glider installation point of view. That of the constant flow system is bounded simply by capacity and rate of delivery. The popular 630 litre cylinder combined with the AAV control head will provide a 5hr flight between 10000 and 17000ft, with duration reduced by time spent above the higher altitude, which is the point at which the higher rate of 4 litre/min must be selected. For example, the 630 litre constant flow system would, by calculation, support a 3hr flight, where 2hrs was spent above 17000ft, using the 4 litre/min rate, with 1hr spread either side for ascent and descent, on the lower rate.

But what happens if it is a good wave day, two pilots need to share the same glider and oxygen equipment, and there is no on-site oxygen supply?

Careful consideration of the requirement, particularly if the glider and its oxygen system are to be used collectively, as for a club expedition, may point to the need to store rather more than 600 litres, and may even form a sound argument to invest in demand equipment.

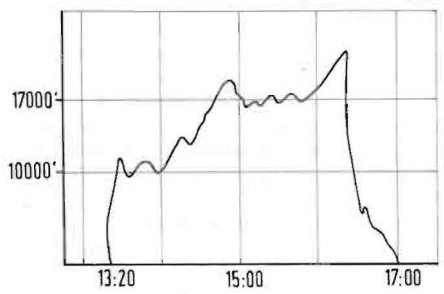


Fig 1.

The duration of the demand system is a much more complex matter, since the second stage of the regulator is responding to depth and rate of respiration as well as compensating for altitude. Nevertheless, empirical results derived from operations over a period of time indicate impressive economy. For example, Fig 1 represents the trace of a Diamond height sortie flown from Aboyne on October 30, 1992. A little over 3hrs was spent above 10000ft, with almost 2hrs above 17000ft, and is close to the hypothetical profile described above. This suggests that the pilot would indeed have consumed of the order of 600 litres using a constant flow system, as estimated earlier.

In fact, actual consumption during this flight, as measured from the contents gauge, was rather less than 25% of a 750 litre cylinder, using an A20 demand regulator. This substantiates observations from earlier expeditions, when this system, and others built with identical components, have yielded two Diamond height sorties in one day, with no end in sight to the contents.

Personal equipment

Gaseous oxygen is piped from the regulator to the pilot, and must be gathered without wastage by some convenient means. Without exception this is achieved by the use of an oro-nasal mask. Such equipment is moulded from soft rubber and contoured to cover the mouth and nose, and is held on the face either by tensioning straps around the head or by attachment to a helmet or headset. The apparatus used with the constant flow system is incompatible with the demand regulator, and vice versa.

In the case of the constant flow installation, it is essential to place an economiser or reservoir between the regulator and the mask, to gather oxygen during exhalation which would otherwise run to waste. The old MK XI device mentioned earlier used a bulky bakelite box containing a rubberised bag. It is now customary to use a reservoir, often a one or two litre anaesthetic bag, attached directly to the mask.

Real danger that the high water vapour content of exhaled breath will condense

There are two important points to note about this constant flow configuration. First of all, it is extremely unwise for the reservoir bag to be used in a rebreathing mode, which involves mixing exhaled air with its high residual oxygen content with fresh incoming oxygen from the regulator. In an unheated cockpit, there is a real danger that the high water vapour content of exhaled breath will condense, freeze and block the bag. A non-return valve must be placed between the mask inlet and the bag to prevent this.

The second point is that all constant flow masks must incorporate a lightly loaded "top up" valve, usually placed on the cheek, which allows cabin air to be drawn into the trachea after the reservoir bag is exhausted, at low rates of delivery. Should the non-return valve protecting the reservoir become impaired by icing, then the user may continue to inhale directly through the top up valve, oblivious to what is happening. Furthermore, if such a mask is used with a demand regulator, this cheek valve may well open before the second stage of the regulator responds to the depression in the mask. The net result is that the pilot breathes cabin air. There is at least one non-fatal accident attributed to this, and FL 200 is not the place to sort out this basic error.

The military H type mask is often advertised by surplus and second-hand establishments, and can be bought new. This mask is worth a second glance because it was developed during WW2 specifically for use in unheated cockpits, with constant flow equipment. It features duplicated exhalation valves and inlet flues arranged to cope with heavy icing conditions. It is comfortable to wear, with a chamois leather lining, and incorporates a miniature microphone. There is a single top-up valve on the left cheek, and the mask is provided with elasticated straps to secure it to a helmet. If you wish to use this mask with a modern constant flow control head, you must adapt a reservoir bag and non-return valve on to the inlet fitting.

Since many demand regulators incorporate a pressure breathing facility, the demand mask is substantially different to that described above. The edges of the mask are always reflected to provide a good seal and the face piece may well be encased in a plastic or glass-fibre exo-skeleton incorporating a toggle assembly to clamp the mask to the face. The inlet valve is non-return, and the exhalation valve is pressure compensated so that when used for pressure breathing the incoming gas is not dumped straight out.

Use of radio

Once a pilot has started to use oxygen during flight, and is wearing a mask, it would seem extremely undesirable for the mask to be removed for any reason, other than safe arrival in a denser part of the atmosphere. Certainly, radio calls do not qualify as good reasons. Some masks have no microphone provision, to facilitate use of radio; most, if not all surplus military masks incorporate a miniature mike and I have found all British versions to be compatible with the TM series and all popular 720 channel panel-mounted radios.

Spending time harmonising the oxygen outfit with the radio installation is to be commended, and this point seems to become even more critical when operating a two-seater machine. Evidently, many two-seater crews get by, somehow, but operating a Twin Astir out of Aboyne some years ago prompted me to conclude that an intercom is highly desirable in a tandem configuration, in such circumstances. This led on to an examination of the sidetone facility of the 720 channel radio, and I would thoroughly recommend that anyone installing life support equipment in a two-seater goes the extra mile, to make use of this feature of the modern radio. Communications are thereby optimised, and the obvious risks associated with removing the mask to converse with one's companion are avoided.

Acknowledgements and further reading

I have drawn heavily on a number of works for inspiration, notably "Civil Aircraft Airworthiness Information And Procedures" Leaflet No. 5-9, July 1, 1990, from which I have quoted some phrases verbatim under "Hazards". Reference to Keith E E Read's **Aeromedicine for Aviators** published by Pitman will substantiate the observations concerning physical impairment at lower altitudes. I also commend the summary contained in an article entitled "Glider Oxygen System" by Dickie Feakes which appeared in the Winter 1988 issue of the RAFGSA magazine *Spiral*. The British Sub Aqua Club Diving Manual has an excellent section entitled "Respiration and Anoxia" written in lay terms. Finally, I regard Peter Saundby's article "Oxygen Equipment in Sailplanes" in the February 1962 issue of *S&G*, p9, as a standard work, and I recommend that anyone whose curiosity is aroused by oxygen matters should start by obtaining a copy.

FLYING HIGH

Peter, a former RAF doctor, explains just what happens to the body during high altitude flight and warns that the great danger of hypoxia is that it is insidious

The upper atmosphere is an inhospitable, cold, dry and rarefied place. Man evolved in the denser, warmer and moister layers and is well adapted to these conditions. Those few who have visited high mountain ranges know their bleak and hostile climate. The highest sites of human occupation are at 17000ft and the inhabitants have had a long time to become acclimatised to the harsh conditions.

Our problem is that, given the soaring opportunity, even the simplest club glider can ascend to these unfriendly levels in less than an hour. Gold height is as far as one can safely climb without consideration, Diamonds require knowledge and equipment. To avoid danger, it is necessary to be aware of the adverse factors, and to understand and use the oxygen system. The hazards arise from low oxygen levels, low temperatures and changing pressures.

Oxygen is essential to support all animal life and the requirements of our bodies are met by the gaseous oxygen that comprises about one fifth of the air we breath. Most of the rest of the air is nitrogen, with small quantities of rare gases, water vapour and carbon dioxide. Because the atmosphere is mixed by winds and convection, the composition of the atmosphere is the same at all flyable heights and places, although cold air will carry less water vapour. Atmospheric density roughly halves every 18000ft, and the oxygen falls proportionately.

Our lungs are the organ which exchanges carbon dioxide for oxygen; internal gases are in equilibrium with the blood. To prevent the lungs from drying out, lung gases are saturated with water vapour at body temperature and air is humidified in the nose, which is the reason our breath steams on a frosty morning. It is also why medical oxygen systems are unsuitable for use in aircraft; the warm exhaled moisture will condense and freeze in the mask.

So long as we are alive, carbon dioxide will be coming out of the blood into the airsacs of the lung, and oxygen will be transferring from the lung into the bloodstream. Compared to air, lung gases are moist, contain more carbon dioxide and less oxygen. At altitude the absolute quantities of water and carbon dioxide will remain the same, leaving even less room for oxygen.

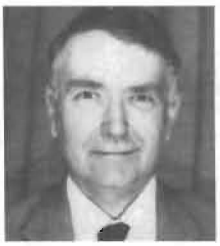
The rate and depth of respiration is driven by the level of carbon dioxide in the bloodstream. Physical exertion increases the metabolism in the muscles, raises the carbon dioxide level in the blood, stimulates ventilation and facilitates the transfer of oxygen from the blood to the tissues, restoring equilibrium. Healthy bodies have a considerable reserve capacity for exertion, therefore when at rest, we can accept a reduction in the level of oxygen of the air that we breath. At 10000ft atmospheric pressure is 65% of sea level pressure, but oxygen in the blood is at 90% of sea level saturation. Even at this level, a small reduction in pilot performance can be demonstrated, but under favourable conditions, ascent to 12500ft by a fit and healthy pilot is safe. This is the limit when breathing air.

Trials in fit young military aircrew showed that between 10000ft and 15000ft the ability to perform skilled tasks is impaired; between 15000ft and 20000ft there is a marked deterioration of performance, with a loss of judgment and willpower. Above 20000ft the symptoms become severe leading to unconsciousness. Above 25000ft the onset of unconsciousness is so rapid the pilot has few warning symptoms. For safety, the cockpits of military fighters are pressurised to 25000ft cabin altitude. The efficiency of the heart and lungs declines with age and fitness. Those of us who find ourselves breathless when rigging the two-seater would be well advised to subtract several thousand feet from all the altitudes quoted.

"Any attempt to avoid hypoxia by deliberately over breathing will be disastrous"

The great danger of hypoxia is that it is insidious and, as with alcohol, the sufferer fails to appreciate the degree of performance deterioration. Experience of hypoxia in a chamber is useful, but is no substitute for following the rules, and monitoring the oxygen system in flight. Any attempt to avoid hypoxia by deliberate over breathing will be disastrous, because it washes out the carbon dioxide in the bloodstream and stops oxygen from transferring to the tissues. One cannot improve on the natural biochemical mechanisms.

In a climb, the effects of hypoxia can be delayed by adding oxygen to the inspired air; this maintains the partial pressure of oxygen in the lungs at altitude by displacing nitrogen. Good demand oxygen regulators have internal capsules which control the mixture automatically. At 34000ft they will deliver 100% oxygen to maintain sea level values. Climbing above this altitude, even when breathing 100% oxygen, will result in increasing hypoxia and at 40000ft is equivalent to breathing air at 10000ft. Above 40000ft the fall in saturation is very rapid and hypoxia can only be prevented by pressure breathing. In gliding usage, masks are seldom free of leaks and it is impossible to assure 100% oxygen; 35000ft is a prudent altitude limit without specialist support.



Peter is a doctor and pilot who spent most of his career in the Royal Air Force. Learning to fly in the University Air Squadron whilst a student at Bristol, he later completed his RAF wings and flew a range of military aircraft. His professional career has been in Aviation, Occupational and Public Health Medicine. Gliding since 1960, he has three Diamonds. A life member of the RAFGSA, he has been a club CFI, secretary and vice-chairman. As well as providing medical advice, he has served the BGA on the Executive Council and Instructor Panel. He was responsible for the present BGA system by which the fitness of pilots is assured. Having retired from the RAF as an Air Commodore, he now works for the NHS in Wales and flies from Talgarth.

Shortage of oxygen in the upper atmosphere is compounded by low temperatures. On average, the temperature falls by 2°C for every 1000ft. In the UK, freezing level is rarely above oxygen level. The experiences of glider pilots resemble those of bomber crews in World War 2. They spent long periods in over ventilated, unheated aircraft at around 15000ft. When the body is both cold and short of oxygen, it will not shiver and body temperature may fall. This hypothermia slows all mental processes and makes frost-bite more likely.

It was probably the mechanism of what used to be called "chronic anoxia". This was distinguished from "acute anoxia" by the failure of oxygen or descent to produce a rapid cure. Because body temperature is slow to rise, the pilot will not recover on the descent, and is vulnerable to flying errors on landing. Oxygen protects against the cold, but keeping the body warm also reduces the oxygen requirement and indirectly protects against lack of oxygen. These are not theoretical hazards. I have seen both frost-bite and landing accidents when on wave expeditions in Scotland. The altitude sickness suffered by mountaineers is secondary to prolonged hypoxia, and is not a problem for aviators.

One can keep warm by the use of suitable clothing; any winter sports shop stocks an excellent range of thermal garments. The practical problem is to dress after the sweaty exertion of rigging and pushing out the glider. Snow boots are cheap good insulators. I have used electrically heated socks, but these consume power. A flying helmet will keep the head warm, as well as securing the oxygen mask. Never ever fly to altitude with wet feet; frost-bite can permanently cripple your activities. The RAF pattern gloves

are the best compromise between insulation and dexterity and green ones are warmer than the white.

Gliders climb relatively slowly, and those who respect their gel coats descend with caution; but even at low levels, pressure changes can cause problems. Air in the ears and sinuses escapes in the climb, and re-enters on the descent. Ventilating one's ears is a matter of practice. If one is foolish enough to fly with a cold, the mucous may block the passages to ears or sinuses leading to severe pain on the descent. If this happens, and the soaring opportunities allow, it is recommended to climb until the symptoms disappear, wait a little, and then recommence a slow descent. Gas is normally present in the gut, and there should be no social inhibitions about releasing flatus from either end!

Prolonged flight above 20000ft brings a theoretical risk of decompression sickness. This is the same disease as can afflict divers, and is caused by nitrogen bubble formation. The older, obese and previously exposed are more vulnerable. It is a serious disease which may show itself by a variety of symptoms; coughing, pains in joints, or the skin can itch. It is cured by immediate descent; compressing the bubbles, will give an instant cure. Self diagnosis is unreliable so that if one is feeling in any way unwell at altitude, whatever the temptation, it is always wiser to descend. With the airbrakes out, few gliders will come to any harm, even with a temporarily incapable pilot.

Above the clouds, there is little attenuation of solar radiation, indeed the sun contributes to keeping warm. Sunglasses are essential but the low density orange ones, so effective in bright haze, are unsuitable for use at high altitude. Darker greener ones are more useful.

The deserts of high altitude are so near, but so hostile. To explore safely, one must dress properly, understand one's oxygen system, follow the procedures and recognise one's personal limitations. When in doubt, descend and fly again another day. In an emergency, just get the airbrakes open.



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GLIDING AND THE HIGH STREET

We may be in a recession but Humfrey, chairman of the BGA Development Committee, says there is no better time to review your club operation and take action

On October 28 Marks & Spencer posted a 20% improvement in pre-tax profits. The following day the *Financial Times* commented "The most striking aspect of Marks & Spencer's interim results yesterday was its ability to raise profits on a static sales base". At a time when most businesses are suffering from the recession and high street sales are down everywhere how does M&S continue to flourish? The answer is quite clear – *good management.*

Many gliding clubs are feeling the pinch but how many are doing something about it? The well managed clubs continually review their operations and adjust to falling demand by making appropriate economies. A live management team is not taken by surprise by the turn of events, rather it anticipates trends and takes the necessary action before damage has been done.

There is no better time than now to take a grip on all the aspects of management and try to ensure that your club starts the season with a well thought out programme. Divide the activities into sections and ensure that well qualified members prepare and present reports to the committee for appropriate action.

Finance

The treasurer has a vital part to play in the very survival of the club. Never was it more important to get the house in order. Where the accounting system is up to it and a computer available, there is no better way to improve cash flow and eliminate delinquent accounts than by instituting a regime where members have to keep a credit balance from which flying fees are deducted. Should the account go into the red, then interest at 2% per month is automatically debited. Those members who need to spread their annual membership over a period of time may do so but it costs 2% per month for the privilege.

Another way to improve the cash position is by the sale of launch vouchers and gift tokens for trial lessons or courses.

The clearing banks seem currently to be engaged in an exercise known as "profitability analysis". Yes, you have guessed, it is designed to extract still more money from the long suffering customers. As a result of this, one customer known to me, is having his charges trebled to nearly £2 per debit or credit item. This means that, in theory, the payment into the bank of a single cheque for £2 would result in the bank taking all the money. Since a credit item is defined as the whole transaction, it behoves treasurers to make sure that each item comprises as many individual cheques as possible. It is also means that cheques under £10 in value should either not be accepted or they should be surcharged. Even if the club account is overdrawn, it may well pay to wait until a substantial sum of money has accrued before paying it in to the bank. A simple calculation will set the level.

As a result of devaluation, spares and other items from abroad have become much more expensive. This will reflect in the maintenance costs of most gliders and tugs and many winches, radios and other equipment. A review of launch and soaring charges should be made now.

All clubs should have a four or five year forward plan which is updated at the end of each season as a result of experience or modified in the light of changing circumstances. This year it may well be necessary to postpone purchases if club finance are not to be over stretched. Better to be prudent than bust!

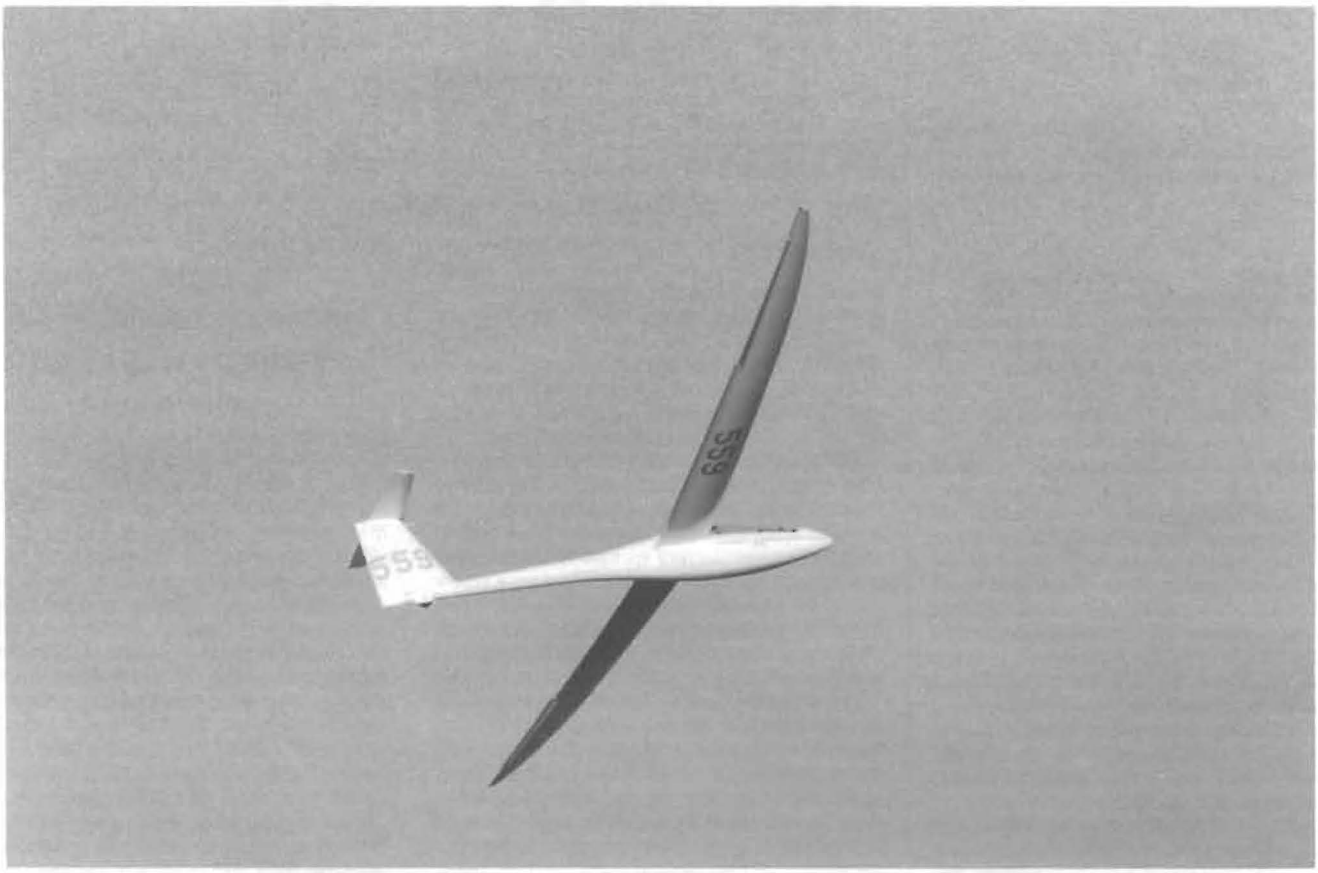
Serious consideration should be given to raising membership fees at least by the rate of inflation and then a bit more to prepare for the inevitable long term effect of devaluation. Even the more expensive gliding clubs are still highly competitive in terms of fees compared with golf clubs and other leisure activities.

Aircraft

There are still many aircraft in club fleets whose C of A falls in the soaring season. What a waste of revenue! Decide to get all repairs and Cs of A done during the winter months. Much of the preparation work can be done by members under the watchful eye of an inspector and there will be no sacrifice of flying time for those so engaged. Next year those aircraft will all be ready to go and start earning, to the benefit of all.

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If a club has aircraft surplus to requirements, now is the time to spruce them up and offer them for sale.

Equipment

What is true for aircraft is equally true for winches, tractors and other ground equipment. Each winter before the frosts come in earnest check the anti-freeze on all liquid cooled engines; cylinder blocks are expensive! And give all the hard worked engines an oil and filter change. Winches should be cleaned, checked and the cables renewed where necessary. A coat of paint works wonders for appearance and for the pride of those operating the equipment.

An analysis of running costs and revenue received can be carried out now before the busy time starts. Many clubs have no idea how much a winch launch or aerotow actually costs. The graph below has been compiled from actual data on a winch costing £6500 with no borrowings and a launch charge of £3.50 including VAT. Graph **a** has assumed that a pair of cables does 500 launches, **b** 1000 launches, **c** 1500 launches, **d** 2000 launches, e 2500 launches. The revenue axis goes down to –£1175 because this is what the winch costs in terms of insurance, depreciation and interest on capital even if it does no launches at all. Graph **a** crosses the zero revenue line at 950 launches, graph **b** at 775 launches, graph **c** at 700 launches, graph **d** at 675 launches and graph **e** at 670. After 3000 launches there is a huge difference between **a** and **b** *ie* £955, between **b** and **c** £300, between **c** and **d** £150 and between **d** and **e** only about £75.

This teaches us that it is very important to try to get at least 1500 launches from a pair of cables but after that it becomes increasingly important to avoid cable breaks and loss of launches. In other words, once a pair of cables has earned its keep they should be changed as soon as cable breaks become a nuisance rather than running them virtually to destruction. The break even point on the graph is of course determined by how much the winch cost in the first place and how much money had to be borrowed. For example a winch costing £42000 on borrowed money would cost at least £4200 a year in interest charges and another £2800 in depreciation over a 15 year period. The number of launches required to break even must be calculated starting with a negative figure of £7000 plus the cost of insurance and site overheads. This clearly means setting a realistic launch charge and maximising the launch rate if the winch is to run at a profit.

A similar exercise can be carried out for tug operation or any other profit centre in the club.

Clubhouse, hangars, workshops and buildings

Maintenance work is within the scope of all members. It is desirable that work be supervised by someone skilled and knowledgeable so that silly mistakes can be avoided and specialist jobs undertaken. This is an area where everybody benefits; the value of the work is seen and recognised. The savings over employing professional tradesmen are very considerable.

Airfield and surroundings

All airfields need regular maintenance. The autumn is the time to put boundaries and hedges in order. The environment now attracts a lot of attention and there is no reason why gliding clubs should not do their bit by some imaginative planting of trees, shrubs and decorative plants. A well kept airfield gives an immediate rebuff to those who would brand all aviators as despoilers of the countryside.

Social activities

Well planned social events interspersed with safety or educational lectures help to hold the membership together during the dark evenings and can be a source of revenue as well as being pleasurable.

Committee meetings

The committee may not meet as regularly as it should during the summer but in the winter there is no excuse and time should be spent working out a plan for the season ahead and the next four years. Information obtained from those engaged in the activities listed earlier should be presented in concise form and should form the basis for planning. It is recommended that the CFI should attend the meetings so that he can give his opinion on flying matters.

Flying committee

It is strongly recommended that clubs should have a small committee to make recommendations regarding operational safety, efficiency and discipline. It should include the tugmaster, senior instructors, safety officer and senior members but not the CFI. It can make recommendations to the CFI and form a useful buffer between CFI and members in disciplinary matters. Before a new season plans should be made to work out how launch rates can be improved and what changes will be necessary in terms of equipment so that the necessary work is done during the winter.

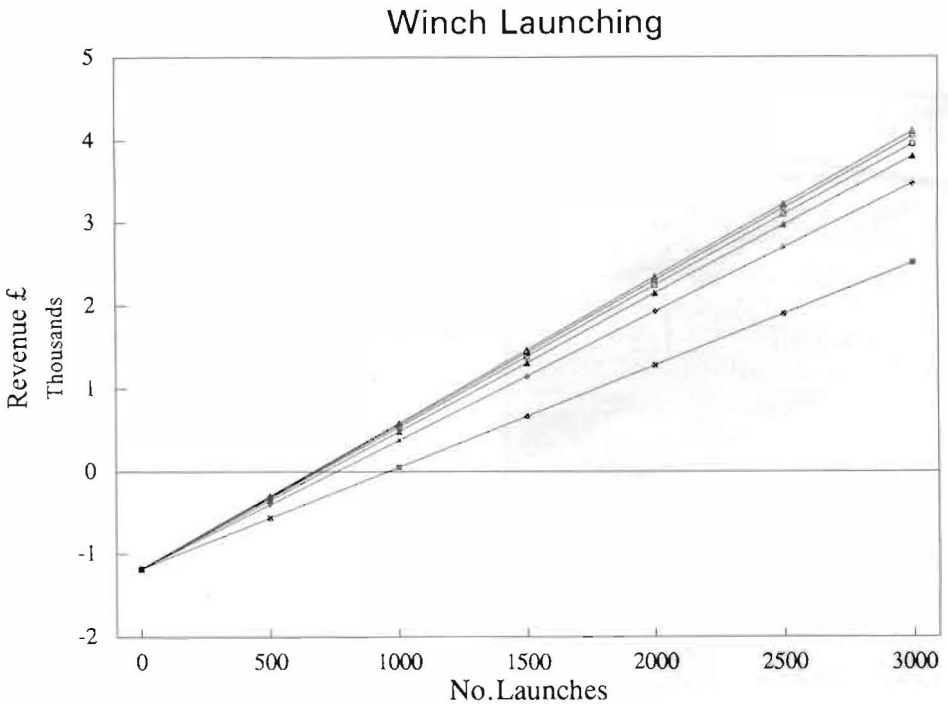
Aims

A club cannot exist without its members and it should be the main object of management to ensure that those members enjoy themselves. The headings above deal with various aspects of running the club in such a way as to provide clean, safe aircraft and the means of getting them into the air efficiently and cost effectively. The members come to fly but they also expect a pleasant environment and a comfortable clubhouse in which to relax when the day is done. All company chairmen end their annual reports by thanking the staff and saying that they are the most valuable asset the company has. Gliding club committees should likewise never forget that the club *is* the members and that they should be looked after and encouraged to become involved with the running of the activities. Only by so doing can that corporate spirit be encouraged which is so essential in times of financial stringency.

Gliding has to compete with other sports and leisure activities, many of which are subsidised to a greater or lesser extent. It is up to club management to ensure that gliding is made as attractive as possible to bring in and retain new members.

Good PR in your area and contacts with the leisure departments of local councils is essential if those younger members are to be recruited who will form the backbone of the gliding movement in the years to come.

Back to the High Street! How would *your club* management show up against Marks & Sparks? ■



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R. B. STRATTON

CONDITION MONITORED MAINTENANCE

In a recession it is even more important to look at ways of cutting costs and Dick Stratton, the BGA chief technical officer, advises taking such good care of your aircraft the annual inspection is seldom a major expense

Over the years there have been significant changes in the world of machinery maintenance driven by the commercial pressures to reduce out-of-service time, to increase utilisation and to minimise expenditure resulting from catastrophic failure.

Aeroplanes are, after all, pieces of machinery and are well suited to condition monitoring processes.

The fixed-time overhaul of aero engines was a typical case where the reliability of a well proven product could be degraded by unnecessary dismantling for overhaul when there were no obvious signs this was needed. The UK may now be unique in that CAA Airworthiness Notice No.35 allows "on condition" overhaul of engines in private category aeroplanes – a concession which took me seven years to negotiate.

Aeroplane structures, whether of wood, metal or GRP can likewise be monitored for their continuing condition.

Wood structures may suffer rapid degradation if they are allowed to remain in damp conditions, metal airframes may corrode and for GRP...(?)

Fabric can have a life in excess of 25 years, but more often excessive layers of paint will develop cracks, and water will penetrate them and concentrate on the fabric below. Fabric can remain airworthy but lose its elegance. More often than not a well used club two-seater will need a major refurbish every five years or so.

The quality of paint and its suitability for application to flexible structures is important. Thereafter the aircraft should be looked after rather like a new motor car.

GRP structures have been investigated in depth in Australia where environmental pollution (acid rain) has been identified as a primary cause of cosmetic degradation. The new car maintenance philosophy should apply with a barrier application of wax at least twice a year.

Wear and tear in the mechanical bits and pieces must be related to the rates of utilisation, periodic cleaning and lubrication and the watchful eye of a good daily inspection.

Some clubs have adopted the good practice of subjecting their heavily used two-seaters to a more than once a year inspection.

Airworthiness audits. The BGA's airworthiness system requires an annual inspection of the condition of gliders and the CAA require maintenance at 50hr intervals with an annual inspection in accordance with their Light Aircraft Maintenance Schedule (LAMS).

Civil Air Publication 520 "Light Aircraft Maintenance" gives guidance on the Maintenance Management of Aircraft not exceeding 2730kg MTWA.

It makes this powerful statement "that the person who is responsible for conducting and certifying the maintenance, must also be responsible for the **depth** of the inspection undertaken, dependent upon the variables existing at the time of such inspection (*eg* use of aircraft, age, previous maintenance, operating environment). The practical application of this philosophy means that the work required by the Schedule must be carried out as relevant to the specific aircraft, taking into account such factors as the systems and equipment installed in the aircraft and its modification standard..."

To summarise. If the condition of your aeroplane (tug, SLMG, glider etc) is monitored and maintained as you use it, then the annual inspection should not develop into an orgy of destructive and costly dismantling, unless of course its poor condition warrants it.

SITE, SECURITY, DEVELOPMENT, PR AND FINANCE

There have been a number of improvements in site security during the past year. But even club owned sites can have problems – a noisy tug or bad PR can have an adverse effect. Here Bill Scull, BGA director of operations, reviews some of the recent developments

The long term future of gliding in the south is secured. Lasham have a 56 year lease, for some odd reason 49 + 7, so someone has to remember to apply for the extra seven in 49 years' time. Lasham's only other problem is to have the reserves to buy the site when, or if, the Ministry of Defence (MoD) decide to sell. The opportunity to buy will only be available for three months. The forward planning group will have to consider the possibilities with care.

At the other end of the scale, with 40 members, the Ulster GC was able to buy a site. The new field is only one kilometre away from their previous site at Bellarena. At least they won't have to change the name, only move the hangar. This development was supported by a grant from the Department of Education for 75% of the cost of the land. The background to getting the grant is interesting. Five years ago there was another site prospect and a 50% grant was approved after a meeting between the then Minister, Nicholas Scott, the club's MP, William Ross, BGA and club officials. The approval for grant aid was kept on file and reactivated for this new site.

Developments

Other clubs are on the move. The Dorset Club have abandoned Old Sarum and moved to MoD land at Bovinton Camp, a site now called Eyre's Field which they had used 28 years ago. Development is proceeding apace with a portable hangar erected (what a good idea that was!) and ground improvements, levelling, draining and re-seeding. With the improved security, a 25-year lease, the club's morale is high. Plans are in hand for a higher performance winch and towplane.

After years of frustration at Keevil the Bath & Wilts GC moved to Kingston Deverill, between Warminster and Mere, in August. They have a 25 year lease with a rent of £7500 a year linked to the RPI. The club had tremendous local opposition at the planning application stage. But this has been largely overcome with good PR. Their PR effort is an outstanding example of "how to do it right" and has been summarised for the BGA Development Committee files (just ask for a copy!). A 1400 yard east-west grass strip allows good winch launches which reduces the need for aerotowing. They plan to replace their two Austers with a Pawnee 235.

The clubhouse, workshops and offices are all in the hangar which is 180 x 72ft. The excavation for the hangar, the lie of the land and a screen of trees make this one of the neatest development seen in a long time. (See photograph.)

The Cambridge University GC have been too busy to write about their developments. At their open day last year I hadn't seen the site since first viewing the prospective site. There are three grass runways, a large hangar, super clubhouse and a stone entrance road which literally fell off the back of a lorry. Well, you can't dump ballast just anywhere, can you? Well done, Bryce! The aerial view shows what a splendid site this is.

The Norfolk GC at Tibenham acquired extra land which has proved to be a tremendous asset. The conversion from what was effectively an all aerotow operation is taking some time; it as after



Above: The Bath, Wilts and North Dorset GC's new site. This view looking north shows the trailer park between the line of trees on the right and the hangar with trees beyond. The lie of the land means that the hangar is virtually below the level of the strip and wholly unobtrusive. Below: Cambridge University GC's new site photographed before the main runway was recently widened by 40 metres and a new trailer park added. ➡



all a change of culture. Nevertheless, the club has done almost as many winch launches as aerotows, almost doubling their annual total.

On the Move

Other clubs are on the move. Marchington GC had sold their site (of the same name) to the Home Office for £750 000. They are now based at Tatenhill but this airfield will be developed as a housing estate in the not-too-distant future. Meanwhile the club continues to search for suitable land and the risk of paying large amounts of capital gains tax looms, unless they can get what is known as "roll-over relief". The development of farming land needs careful planning and costing, hedges to remove, ditches to pipe, power cables to bury, etc.

The Essex GC's move from North Weald to Ridgewell Oatley which they bought last year is an important development. The site has planning approval but the use of more land is sought. This is also a major PR exercise since the club has inherited some opposition to their redevelopment of this site.

Public relations (PR)

Good PR may make the difference between success and failure in either establishing or retaining a site. Two clubs, Stratford and Blackpool & Fylde, are trying to get planning permission to aerotow. In reporting the Blackpool case a year ago it was suggested that their temporary permission for aerotowing would lead to a full permission in due course. Not so, at least not yet. As the only club in the north-west region they got Sports Council grant aid and a loan to buy a tug. The planning refusal to allow aerotowing is now the subject of an appeal, in itself a major task needing the help of a planning consultant, a barrister and, of course, the BGA.

The Stratford club is still at the planning application stage, having gone through noise measurement trials and the essential lobbying exercise to counteract the local opposition.

Other operators with planning permission prejudice their situation by using noisy tugs, without the appropriate silencer or four-bladed propeller. A weekend's towing can have serious long term implications which might never be redeemed. It should be remembered that the Shalbourne site lost aerotowing approval as a result of local opposition after a public inquiry. The first step down this road is breaching planning conditions. You can appeal against the subsequent enforcement notice but there are no guarantees that you will succeed.

Finances

Some clubs have been suffering from the effects of the recession and, one suspects, may continue to do so. The clubs employing professionals seem to have had the worst of it, needing to reduce staff numbers and capital expenditure. The non-professional clubs seem less susceptible but still need to be careful with their forward plans. (See also Humfrey Chamberlain's article, p21.)

With improved winch launching at many clubs by re-engining or buying purpose-built equipment the need for aerotowing may be reduced. The tugs, as a cost centre, may cease to be viable and necessitate a review of policy. Monthly monitoring of the finances is of course made much easier with a computer and a number of clubs have developed their own accounting systems which aid the cost-centred analysis.

The BGA Development Committee has assisted where possible. One approach has been to arrange a visit to "brainstorm" a club's problems, and with a measure of success. If you feel that your club might benefit from such a visit just ask.

HALCYON DAYS

It might be a perfect cross-country day and time to get that anticipated badge leg, but it is not just the flying that is important as this sorry tale emphasises

I am not a good cross-country pilot. In fact I flew more miles in July 1976 than in the whole of 1992, so I am probably getting worse. This story is about the time when I was young and keen to fly, and wanted to do things. As a young sprog, I had been informed by George Scarborough that the whole point of gliding was to get to a fish and chip shop at the seaside at 10 o'clock on a Sunday night! In those days that seemed to be true.

George, and many other experienced chaps could always be relied upon to give lots of advice to one as keen as me. "You will have to be off early, and drift off downwind." – "Don't go too far that way, or you will get caught by the sea breeze front." I did not have to ask for help, it was freely given in greater volume than I could cope with, so when the day came, I was ready.

Copious notes on TP zones gleaned from everyone who had been there

In the preceding weeks, much poring over maps had generated a task for every possible set of conditions. There were copious notes on TP zones, gleaned from everyone who had been there, sketches from the OS maps in the library (no photocopiers!) – everything needed to get there and take the right photograph with my Instamatic.

So the task was set; "Quick, write it on here!" This could have been the first mistake, but Fred offered his blackboard and chalk, and soon produced a legible version of my crumpled paper. (See Note 1.) A conference then produced a local version of the correct time – we didn't think much of the digital timepieces then available, as they needed both hands to show the time!

I expect it is just as difficult to find an official observer (OO) now as it was then. Like policemen, they only seem to be around when you don't need them. Everything having been done except to fly the task, but where was the tug pilot? There used to be a scheme where the two-seaters paid a reduced aerotow fee before 10am, and this seemed to be the time, just after 10, when towing stopped until the prudent decided that they could soar in the improving sky.

Walking back from the loo, hoping no one else had noticed the T-21 was circling over the scrapyard, the anxious feeling began that I still get just before launching. The aerotow was uneventful and I managed to relax a bit, the first circuit of the field bringing us under the T-21, which seemed to be at the top of the only thermal around, so after releasing over the upwind edge of the field, that was where I headed. (Note 2.) Now the tug noise had gone, the reassuring tick of the barograph was audible as we slowly climbed up to the wispy cloud forming above. And it was not the only one! It was not difficult to drift away downwind, climbing high enough each time to easily reach the next cloud. The "boy racers" would think it pathetic, but they don't fly Skylarks anymore.

Something was not quite right about the first TP. (Note 3.) There was the railway bridge, and the station, and the new motorway is still downwind, but that roundabout ought not to be there! Making a mental note to find out why my mentors had not mentioned the new roadworks, I moved towards the right position to photograph the station, to find the sink which had been successfully avoided for the last 2hrs.

The two photographs had 1000ft difference in altitude and were a waste of time as the correct TP appeared a few minutes later, as I started struggling back into wind. With two more pictures taken, and a feeling that a 12 frame film was not really enough for any more mistakes, it was time to think about how to deal with this wind.

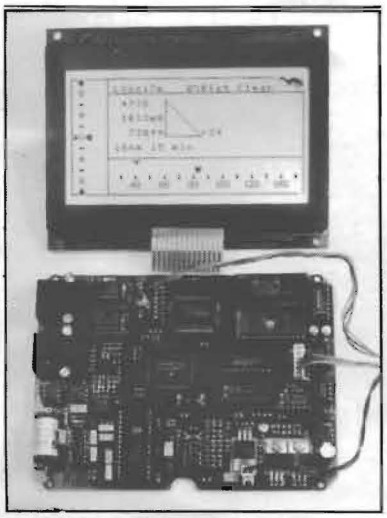
The sky was filled with cloud streets, but not going the way I wanted to go. It wasn't too bad though hard work hauling the Skylark round in the rough air at cloudbase before crossing to the next street. It is surprising how time passes when you are busy. The second TP appeared on schedule, proving that it was the right railway line I had been following, and the smoke from the chimney confirmed the wind was decreasing in strength.

The view from upwind was just like the picture Dennis had shown me, so with two perfect shots, and another trying to fire the shutter before winding the film on, off we went home, noticing that the shadows seemed long. Drifting back to the club was easy, the last ten minutes gliding through calm air to join one of the evening group's training flights in a weak thermal. After a few circles, I turned in to land on the empty airfield.

On climbing out of the glider, the noise of the retrieve tractor affirmed that there was life on the ground. The OO I found to open my barograph reminded me to photograph the glider before my syndicate partners arrived from the bar to help me derig. (Note 4.) They wanted to know where I had been until now, claiming they had been waiting by the phone. Our club photographic enthusiast even volunteered to develop my film, and proceeded to use the remaining frame to record us sweating to remove the wing centre-section. (Note 5.)

After a satisfying flight and a convivial evening, I didn't get my badge. The film didn't come out.

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THE ENSTONE WINCHES

When Enstone Eagles GC started operating on a grass runway in 1991 they bought two RAF Eagle winches and set about modifying them. Dick Stratton considers this venture to be a good example of what can be achieved on a budget

Not being an affluent club we could only dream of a highly powered commercial winch and the answer was to re-engine the two we had bought. Using one of the 98hp Bedford engined winches we were happy with 1400 to 1500ft launches for the Blaniks and 1700ft for the K-8. But it was extremely difficult to get a smooth launch and it was obvious we would have to change the clutch/transmission brake system for a fluid drive gearbox.

After research we decided we needed 200Bhp and as we had two redundant 4.2 litre Jaguar towcars it seemed sensible to use their engines for the winches. We kept our No. 1 winch in service while we fitted the second with the engine and all the attendant ancillaries and restorations. The only alteration needed was to move the radiator forward by some 4in.

We then fabricated side engine mounts. The original drive coupling between the Bedford engine and the winch gearbox was rather large, cumbersome and would probably put too heavy a rotating load on the rear nose of the Jaguar gearbox. Thus the original Jaguar shaft, with its sliding splines and universal joints, was reduced to the shortest possible length to provide the power link between the engine and tranmission brake.

The electrics were completely rebuilt to increase future reliability and the ageing and "over engineered" drum revolution counter drive system was removed. As the speedometer from the car would be directly related to the drum revolution rate, the dial luckily didn't need to be recalibrated as it coincided with the speedometer markings.

The new instrument panel was made using the instruments from the Jaguar dashboard:- engine and winch drum revolution counters, a proper keyed ignition and starter switch, oil pressure, water temperature, battery voltage and fuel gauges. It was also given indicator lights for ignition and oil pressure and large red and green lights showing which drum has been selected together with fused switches for the signalling lamp, a rotating warning light and two radio circuits – CB between the winch and launch point and the other for gliding channels.

Bought a burnt out saloon of low mileage

After much thought we chose a large Rolls Royce engine as ideal for the second winch and were fortunate to buy a burnt out saloon of low mileage. We removed the 6.7 litre engine (which we understand exceeds 350Bhp and uses about the same amount of petrol as the Jaguar), transmission shaft and various other spares.

The Jaguar engined winch has been in use most of 1992 giving very good, easy to control launches capable of exceeding 2000ft when the wind is down the launch line.

The Rolls Royce engined winch should be ready early this year. The drum brakes are being re-engineered to give a more consistent drum restraint on towing cables back to the launch point.

Compared to new commercial winches the expenses have been very modest with petrol consumption at less than a litre a launch.

Robin has written a very comprehensive initial report of the detailed work involved in building the winches which will be available in complete form when the Rolls Royce winch is in operation. If you would like a copy please write to S&G enclosing a large sae.

Comments by Mike Sinclair, until recently the FAI certificates officer

1. The **1992 Sporting Code** requires the declaration to be photographed through the marked canopy and from a fixed mounting. Sec. 2.1.
2. For a Diamond goal claim, the release and finish of the flight must be less than 10km apart. (Previously 1km.) Sec 1.8.7.
3. Observation zone is a quadrant symmetrically aligned on the bisector of the inbound and outbound tracks. Sec 1.7.1.
4. Barograms must identify: pilot, glider, barograph and date of flight. Plus the OO who sealed and opened the barograph.
5. FAI requires an OO to take charge of the film for development. Sec 2.7.3(c).



Coventry GC'S old big diesel sold to Stratford on Avon GC.



The pulley on the Cotswold GC's reverse pulley system.



Above: Twin drum Beaver (Four Counties GC). Below: Buick V8 (7 litre) conversion of an ATC winch which cost about £1500 (Vale of White Horse GC).



R. B. STRATTON

A CACOPHONY OF WINCHES

Dick Stratton, the BGA chief technical officer, writes the introduction to this picture feature showing the diversity of winches used in this country

Gliding clubs are created for the primary function of launching gliders and the most cost effective method is of high performance winch launching.

By high performance we mean a manageable but rapid rate of acceleration of the heaviest type of glider to a safe (minimum) launch speed, and to a safe altitude beyond which an optimum climb technique can be developed to achieve maximum safe height for one's money!

Winch launch related accidents are most frequent in the initial phase when the speed and altitude are minimal and when recovery from a failed launch is most difficult.

In the history of British gliding there has only been one recorded case of structural damage being inflicted by a winch launch. This was to a Cadet MK2 (Tutor) in the late 1950s. Subsequent spar damage found in Cadet MK3s (T-31s) may well have been the cause of this unique accident.

To generate the revenue required to operate a successful gliding club and to satisfy its members you must invest in and maintain good quality high performance launching equipment.

Whereas autotow may be possible on some airfields, it may never be possible to develop a tow vehicle to match the high performance winch. Power to weight ratios are compromised by the need to keep the driving wheels in contact with the runway, whilst reacting to a cable load of some 1000lbs or more.

High performance winches can be acquired for sums varying from (say) £2500 (converted ex ATC twin drum) to £40000plus (Tost and Supacat).



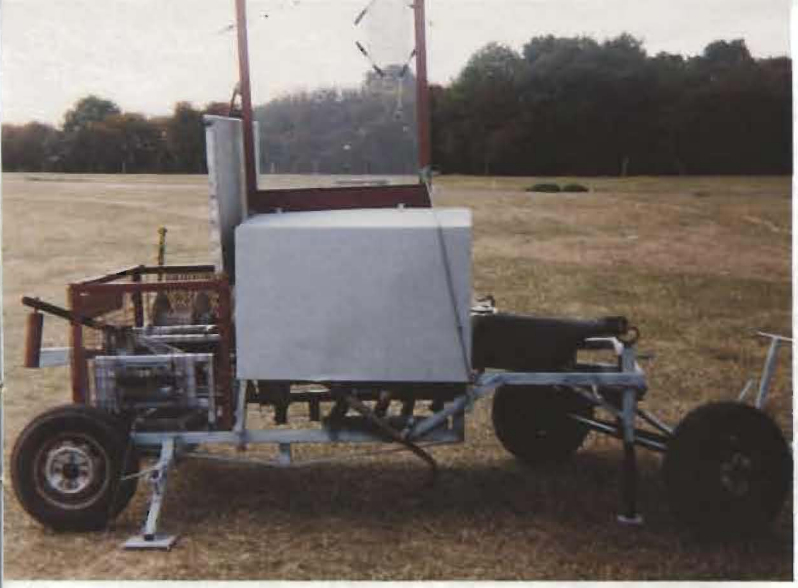
Above: A very smart new Tost winch (Southdown GC). Below: The origins of a heavy diesel winch (Doncaster GC) from the archives.



Rolls-Royce Eagle turbo diesel (Cranwell GC).

Photos by Dick unless stated.





Cable retrieve winch operated by Stratford on Avon GC but now sold.



Mike Cuming's photo of a winch at Blackpool & Fylde GC.



The only combine harvester winch in the world which was used at Ridgewell Oatley GC by the late Freddie Wiseman.



Staffordshire GC's cable retrieve winch which has now been sold.



Above: Newark & Notts GC's heavy diesel winch. Below: The Supacat winch at Glyndwr GC.



Above: The Rover winch designed by Jerry Odell which is now at Hinton in the Hedges. Below: Stratford on Avon GC's winch.





ANNUAL STATISTICS OCTOBER 1, 1991 TO SEPTEMBER 30, 1992

GLIDING CLUBS	AIRCRAFT				ALL LAUNCHES	NO. OF AEROTOWS	HOURS	KMS FLOWN	MEMBERSHIP		
	Club 2s	Club 1s	PO	Tugs					Full Flying	Estimated No. of Temporary Members	No. of Female Members
ANGUS	2	2	4	0	2188	0	338	950	32	231	3
AQUILA	2	2	16	3	1426	1197	690	9490	42	102	2
ARGYLL & WEST HIGHLAND	2	1	1		687	0	358	2000	6	164	1
AVON	4	4	36	5	5934	5934	1700	N/K	247	795	12
BATH, WILTS & NORTH DORSET	4	3	15	2	2555	617	711	6000	71	179	5
BLACK MOUNTAINS	3	1	18	1	2618	2618	3574	1460	60	85	9
BLACKPOOL & FYLDE*	2	4	20	1	4100	4	3500	102	110	100	6
BOOKER	6	18	78	6	10800	10800	10000	150000	370	1846	35
BORDERS	3	1	20		1558	1558	1016	6200	77	279	5
BRACKLEY	1	2	6	–	2321	–	464	400	36	80	1
BRISTOL & GLOS	4	4		2	6350	2600	–	–	274	800	43
BUCKMINSTER	3	2	16	2	3871	2199	1489	6500	84	512	10
BURN	2	5	24	1	5605	2082	1741	1800	133	314	5
CAIRNGORM	1	1	9	0	1072	248	752	2500	32	54	3
CARLTON MOOR*	3	1	3	0	–	–	–	500	21	15	1
CAMBRIDGE UNIV	4	6	44	2	9456	1499	4141	66808	207	915	12
CHANNEL	3	1	5	0	3558	0	634	N/K	43	566	5
CONNEL*	2	2	8	–	600	38	160	250	20	154	2
CORNISH	2	2	7	1	1659	1359	457	1000	35	205	1
COTSWOLD	4	3	45	0	9274	50	3550	34700	195	1319	19
COVENTRY	5	6	83	4	12795	7642	5332	55200	302	1570	21
CRANFIELD*	1	1	11	3	1299	1299	777	2150	39	164	2
DRA FARNBOROUGH	2	3	7	0	2649	71	873	3690	59	0	5
DARTMOOR*	3	1	12	0	3753	0	468	250	82	351	10
DEESIDE	2	3	18	3	5055	4918	4799	N/K	119	711	8
DERBY & LANCS*	5	4	30	0	9166	–	3505	5000	196	1394	17
DEVON & SOMERSET	4	3	36	1	10486	701	3329	7143	193	1090	19
DORSET	2	3	10	1	2530	457	449	2300	61	300	4
DUKERIES	2	1	5	0	2100	0	334	500	31	151	3
DUMFRIES & DISTRICT	1	1	2	0	237	–	127	175	12	9	–
EAST SUSSEX	4	4	12	0	5971	203	853	3960	128	611	10
ENSTONE EAGLES	2	1	6	0	2323	150	834	18000	50	376	9
ESSEX	3	2	28	1	5777	905	1246	11400	144	1122	4
ESSEX & SUFFOLK	2	2	16	1	4371	688	1195	8500	87	650	8
GRAMPIAN	1	–	3	0	572	29	91	0	14	37	4
GLYNDWR SOARING	4	1	11	0	6788	70	1958	4750	66	220	10
HEREFORDSHIRE	1	1	6	1	716	716	712	N/K	35	58	2
HIGHLAND	2	3	7	0	2456	0	504	386	50	186	8
IMPERIAL COLLEGE	1	2	0	–		See Lasham return			50	50	5
KENT	3	2	28	1	7076	1890	N/K	N/K	159	1041	14
LAKES	2	2	4	1	822	822	386	2500	28	132	–
LINCOLNSHIRE	2	2	6	0	2725	0	386	640	34	156	0
LASHAM	11	–	171	5	27960	9782	8500	123270	455	2176	104
LONDON	8	5	85	3	20388	6019	6025	77800	302	4049	21
MARCHINGTON	3	1	10	1	1750	1713	796	N/K	95	187	3
MENDIP	2	2	11	1	3850	159	1048	1640	55	224	5
MIDLAND	3	4	36	1	10528	561	4787	16995	207	521	25
NENE VALLEY	2	2	6	–	2869	23	479	1475	43	228	5
NEWARK & NOTTS	3	3	16	0	2783	42	465	N/K	60	519	6
NORFOLK	4	1	31	2	4730	2516	2160	N/K	184	705	21
NORTH DEVON	1	1	7	1	295	295	130	250	9	35	0
NORTH WALES	2	1	5	0	3428	0	505	N/K	55	164	3
NORTHUMBRIA	4	2	16	1	3682	1029	915	1000	89	257	6
OVER T-21 CLUB	1	0	–	0	95	–	38	0	9	2	0
OXFORD	3	3	16	0	4014	0	1197	14000	74	261	2
OXFORDSHIRE*	3	–	–	–	–	–	1000	28378	40	600	4
PETERBORO' & SPALDING	3	2	15	2	2192	2192	1094	9000	65	170	5
RAE BEDFORD	1	0	6	0	305	0	N/K	N/K	8	24	0

RATTLESDEN	2	2	16	1	3009	205	698	5400	76	275	12
RSRE	2	1	0	0	312	8	42	0	17	29	2
SACKVILLE	2	0	6	1	1068	200	350	N/K	24	16	4
SCOTTISH GLIDING UNION	3	3	35	1	8237	2689	5477	8617	293	938	26
SHALBOURNE	3	1	21	0	3150	0	800	1800	74	400	13
SHENINGTON	3	1	4	1	1740	168	1906	N/K	28	421	3
SHROPSHIRE	0	0	14	1	504	504	1207	N/K	33	0	1
SOUTH WALES	3	2	20	1	3505	1344	1600	9000	90	1025	7
SOUTHDOWN	3	3	31	3	7225	5525	3633	30000	261	810	25
STAFFORDSHIRE	2	2	7	0	3034	0	470	700	74	313	4
STRATFORD ON AVON	2	2	21	0	5438	0	647	3492	106	883	8
STRATHCLYDE*	3	1	5	1	262	118	110	–	24	101	2
SURREY & HANTS*	0	12	–	–	2672	–	5000	–	224	–	
SURREY HILLS	3	3	3	–	4170	–	482		73	686	2
THE GLIDING CENTRE	3	4	0	0	5868	499	960	2600	2	488	0
THRUXTON	3	1	7	1	747	747	297	–	35	96	2
TRENT VALLEY	4	1	25	1	3961	913	1497	3870	65	175	10
ULSTER	2	1	7	1	901	873	526	–	36	175	2
UPWARD BOUND	2	1	3	0	1929	–	274	57	25	264	
VALE OF NEATH	2	1	6	1	896	239	363	–	31	57	0
VALE OF WHITE HORSE*	2	1	11	0	2785	41	507	19500	45	254	6
VECTIS	1	1	6	1	1028	1028	420	0	37	60	4
WELLAND	2	2	14	–	2861	194	907	18175	62	170	2
WEST WALES	2	1	1	0	640	–	103	–	9	0	0
WOLDS	4	2	28	1	11390	985	2212	10000	219	935	26
YORK	4	4	18	1	4891	2386	1412	5900	121	737	7
YORKSHIRE*	4	5	35	3	6260	4478	3942	12500	256	982	9
CIVILIAN CLUB TOTAL	231	187	1491	80	342135	100553	128412	858623	8124	39506	730
ARMY GLIDING ASSOCIATIONS											
KESTREL*	2	4	2	1	3833	117	727	16500	81	230	5
WYVERN	2	4	7	0	3177	0	721	8000	76	60	9
ROYAL NAVAL GSA											
CULDROSE	3	3	1	3	2074	1664	426	N/K	46	215	6
HERON	3	2	4	1	1219	799	460	4500	54	108	8
PORTSMOUTH	6	5	9	6	7086	3763	–	–	175	680	27
RAFGSA											
ANGLIA*	2	3	1	0	3841	149	834	5087	56	–	–
BANNERDOWN	2	3	5	1	5557	264	1190	5890	82	294	7
BICESTER*	7	5	30	4	14119	4808	6350	67015	220	720	–
CHILTERNS*	2	3	7	0	6750	551	1659	7613	77	450	–
CLEVELANDS*	3	4	17	2	4436	1923	2064	20743	107	150	–
CRANWELL*	3	3	10	1	5201	907	1896	27019	67	47	10
FENLAND	2	4	5	0	4465	31	1011	3279	70	150	9
FOUR COUNTIES	4	3	8	0	8325	136	2421	24791	92	234	8
FULMAR*	2	3	0	1	1308	267	298	0	23	94	–
HUMBER	2	4	1	0	2805	35	800	5059	45	90	3
LOMOND*	0	1	0	0	44	5	57	110	10	0	0
PEGASUS	1	5	4	0	3625	0	1009	6522	25	230	5
PHOENIX	3	4	1	–	4090	–	1114	2841	60	130	12
TWO RIVERS	2	3	5	0	4329	100	1376	21720	43	227	6
WREKIN*	3	3	6	1	5158	628	1429	7118	90	206	–
SERVICE CLUB TOTAL	59	69	123	21	91442	16147	25008	233797	1499	4315	115
CIVILIAN CLUB TOTAL	231	187	1491	80	342135	100553	128412	858623	8124	39506	730
GRAND TOTAL	285	256	1614	101	433577	116700	153420	1092420	9623	43821	845

** Incomplete or no statistics received – previous figures used.*



SERENDIPITY

which is defined as the "faculty of making happy discoveries by accident" and the photographs on these pages certainly qualify as they arrived unsolicited



Above: Sally Wells photographed Peter in wave over Balmoral. Below: Tony Smallwood's shot of his Gull 1 at North Hill.

Above: Peter Selinger toc
German, in the backgroun
taken at Lasham.





took this photograph with its fairy tale quality from a Cessna 152. It is of the very first Nimbus 3T circling with the Hohenzollern castle near Hechingen, und. Below left: Stuart Poynton's unusual view of the Portsmouth Naval GC's Astir being stowed into the trailer. Below right: William Barwell's photograph





THE SEA BREEZE AND GLIDING

John Simpson, who has extensively researched the subject over many years and whose book on sea breeze is to be published this autumn by the Cambridge University Press, examines this relatively little used phenomena

The sea breeze is a local wind which does not blow all the time but builds up and spreads inland during most soarable days. It is caused by temperature differences between land and sea occurring mainly in the summer. Its effect can be found over a large part of Britain, and must be taken into account by cross-country pilots (and even by those who still need to keep one foot in the airfield circuit).

First – the Good News!

The sea breeze can produce a line of lift along a sea breeze front at almost any time of day. This is usually recognisable and can be a lifesaver late in the day when thermals are dying.

Now – the Bad News!

Cool sea breeze can spread from the coast and form blue areas with little or no convection. In calm sunny weather large expanses may be affected late in the day as Britain's soarable area shrinks. Furthermore, misuse of the sea breeze front has caused anxiety and distress to some. (Balloonists intensely distrust it!)

How to recognise the sea breeze

When flying near the coast, look out for large blue areas bounded by a continuous line of deeper cumulus. Sea breeze effects over SE England and the French coast appear in the satellite photograph in Fig 1. There is a cloudless strip 10 or 20 miles wide along the French coast where the sea breeze has moved inland. A similar effect is seen over England, and near the top of the picture a large cloudless area surrounds the Wash. Sea fog can be seen forming in the sea breeze on the Norfolk coast. Near the south and east coasts the synoptic winds oppose the sea breeze and form areas of more vigorous cumulus.

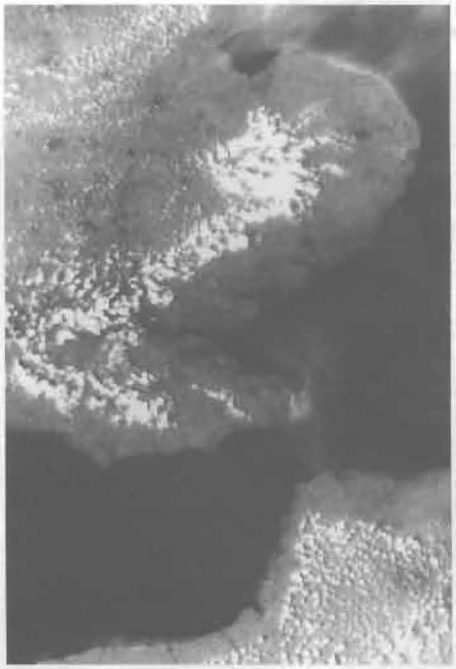


Fig 1. Sea breeze effects marked by cloud in SE England and N France at 1426 GMT on July 8, 1983. Copyright: University of Dundee.



Fig 2. A sea breeze front near Lasham showing low ragged curtain clouds. The sea is on the right. Photo: Lorna Minton.

Sea breeze fronts, formed at the sharp line of convergence between the sea breeze and the opposing synoptic wind, may give useful lift in the rising air on the landward side. These fronts can be identified by the presence of ragged streamers of cloud forming low down and rising rapidly into the general cloudbase. They are called "curtain clouds" and can be seen in the background of Lorna Minton's photograph (Fig 2) which also shows how they slope up in the seaward direction. These clouds do not often form a straight continuous line and their slope depends on the strength of the opposing wind.

Laboratory experiments with "gravity currents" of dense salt solutions flowing into fresh water have done much to explain the nature of flows like sea breeze fronts. Fig 3 shows the shape of two experimental fronts; the flow in (a) is against a slight headwind, showing the flattening of the front and that in (b) is into calm surroundings showing the presence of billows forming behind the head. Glider pilots who use the

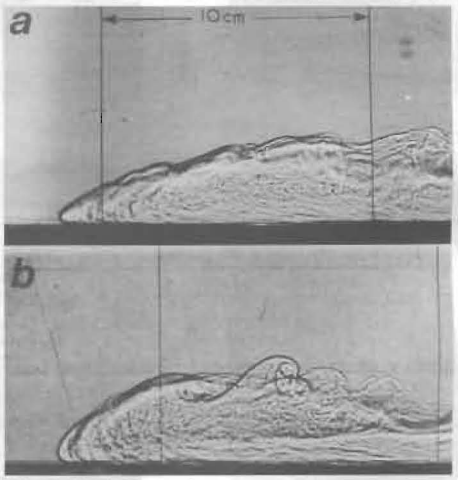


Fig 3. The profiles of two fronts in the laboratory; a) flattened by a headwind, b) in calm conditions showing billows.



John Simpson first flew as a founder member of the Cambridge University GC in 1936. In 1938 he completed his Silver badge in a much loved Kirby Kite; his distance flight ended at the east coast with a downwind landing in the sea breeze (of which he was then ignorant). In 1938 he described the first wave flight at the Long Mynd.

During the Second World War he managed to fly a Chinese built Rhönsperber from the Dragon Mountain near Chungking.

As an instructor, mostly at Dunstable, Long Mynd and Lasham, he became intrigued by sea breeze fronts. These had been described in the 1950s by Wally Wallington and other professional meteorologists who were glider pilots. While still a schoolmaster at Reading he had done some laboratory experiments and published work on their applications in meteorology. He also assembled a T-21, "Min", with aid of the boys at his school.

In 1968, after 1000hrs gliding, he had to give up solo flying for medical reasons. At this time, he joined the newly formed Meteorological Department at Reading University, using an instrumented glider and a Motor Falke to investigate thermals and sea breeze fronts.

After five years at Reading he transferred to Cambridge where he was sometimes greeted by the sea breeze in the evenings. His work there has been mainly about the effects of all kinds of dense currents of liquids and gasses. Further laboratory experiments were used in this work, resulting in the publication of 50 scientific papers. His book, Gravity Currents; in the Environment and the Laboratory, gives an

rising air close to the front are warned to keep ahead of the cold air at all costs. The vast billows which may form behind the leading edge can be violent and reach down rapidly half way to the ground. This explains the folklore which says that if you get too far behind a sea breeze front you will never be able to reach the land air again.

Flight planning and the sea breeze

"A good gliding day is a good sea breeze day" is another reliable piece of folklore. When planning any long distance flight the sea breeze should be expected and must be allowed for.

What wind directions are expected? The answer will suggest where spreading dead areas may be expected, and where sea breeze fronts will form; the former if the synoptic wind blows towards the land and the latter where the wind is offshore.

What time will the sea breeze start to flow? Alan Watts, in his advice to sailors, has produced

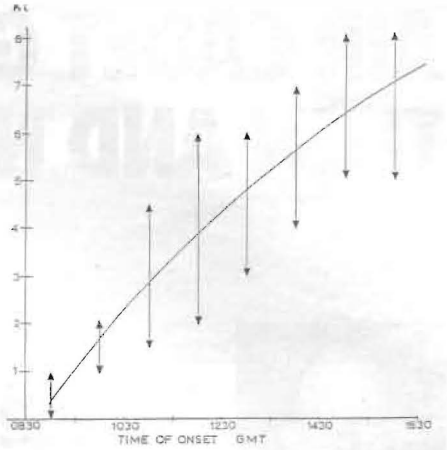


Fig 4. Graph to forecast the time of the onset of sea breeze when the wind is offshore. Vertical lines show the range of wind speeds which have preceded actual onsets. (Taken from the book by Alan Watts, Wind and Sailing Boats.)

a chart to answer this which is shown in Fig 4. The vertical lines show the range of wind speeds which have preceded actual onsets at the period centred at the hour. The temperature difference is much less important than the strength of the synoptic wind before onset.

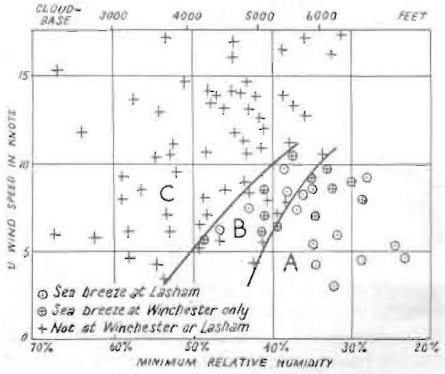


Fig 5. The opposing wind speed U, plotted against the height of cloudbase on sea breeze days in south England, showing days when the sea breeze reached Lasham.

How far inland will the sea breeze penetrate? Sea breeze chasing at Lasham, 45km from the coast, provided the data plotted in Fig 5 in an attempt to answer this question. This is a plot of the strength of the opposing wind against the maximum height of cloudbase reached on days when the sea breeze did or did not reach Lasham. This shows that on the days when the sea breeze front reached Lasham the offshore wind must be less than 10mph, and cloudbase needs to be above 5000ft. This test has the advantage that it can be applied during the actual flight.

A sea breeze bore

In Australia and more recently in Britain it has been found that an advancing sea breeze front sometimes forms an atmospheric bore-wave on the developing evening inversion layer.

Glider pilots have discovered that sea breeze soaring in the evening sometimes provides large smooth areas of lift as found when wave soaring. The front can develop a cut-off head at about this time. Fig 6 shows the way in which this bore develops, based also on data from thunderstorm outflows and laboratory experiments. I offer this picture for further investigation by pilots of an inquiring nature. (Ability to fly at night would seem to be an advantage.)

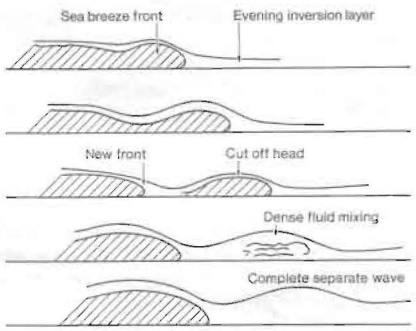


Fig 6. Stages in the generation of an undular bore in the evening inversion layer by an advancing sea breeze front.

Past uncounters with sea breeze

A Good Gliding Day from the past is shown in Fig 7. On this day the first 500km triangles in Britain were achieved; it shows the large extent of the non-soarable area behind the sea breeze fronts at 7pm. In the south, Alan Purnell was able to glide out the last few miles in the sea air which had already reached Lasham, but it also shows the sad case of Ray Foot who reached the sea air too far away from his goal at Compton. (Could he have got nearer by soaring along the front?)

An early use of the sea breeze was made by Philip Wills who soared across Lyme Bay in 1938 (twice!). He did it again in 1949 and 1957.

In a remarkable out-and-return from Lasham to Dunkeswell in 1959, John Corbett used the sea breeze front in both directions.

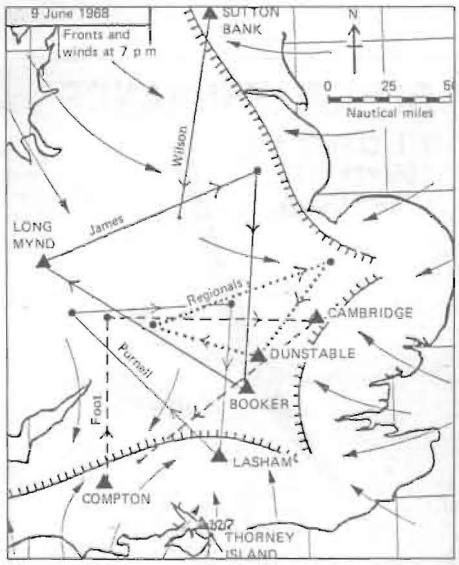


Fig 7. The spread of the sea breeze in England on a day of light winds. The lines show tracks of glider flights in the area which remained convective.

John Williamson used a sea breeze front along the NE coast to complete his Diamond distance flight in 1961.

John Fielden used his wide experience of sea breeze soaring to make two memorable flights in the 1964 Nationals. He flew 176 miles north from Lasham using the sea breeze front along the north-east coast. There were long stretches where he cruised at 800ft in the steady lift along a comparatively smooth, straight line. On the following day convection was much deeper and the sea breeze front formed an irregular line of large isolated cumulus. He made four climbs to 10000ft in these clouds and continued north until 8.30, when it was getting dark and 8/8 low cloud had formed ahead of him.

The first Silver distance on a sea breeze front was flown by Tim Birch in 1965 from Sutton Bank to a point north of the Humber.

The first Scottish Gold distance was flown in 1966 towards the south by Derek Marpole, who gave six references, both good and bad, to the sea breeze in the description of his flight in *S&G*, February 1967, p6.

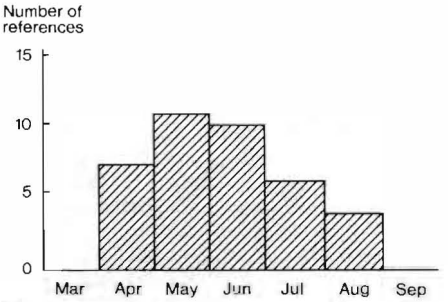


Fig 8. The number of sea breeze fronts used by glider pilots, described in *S&G* from 1938 to 1963.

Finally, Fig 8 shows the number of references to the sea breeze in *S&G* between 1938 and 1963. This covers 25 years – perhaps someone else will extract the data for the following 25 years.

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AIR CADET GLIDING THEN AND NOW



Robin, a Sqd Ldr, is the senior gliding instructor in charge of standards at the Air Cadet Central Gliding School at RAF Syerston. He started gliding as a cadet in 1955 when he was 16 years-old and joined the Centre as a professional instructor in 1967. As he puts it, he became a career Air Cadet. He has completed over 30000 instructional launches in gliders as well as 2000hrs in motor gliders. Robin gained all three Diamonds in 1976, has flown in Regionals and Nationals and holds the UK two-seater 200km goal record with a flight from Syerston to Weston-super-Mare in an Air Cadet Janus C in 1984.

For many years the Air Cadet organisation has been the cradle of gliding in the UK. Civilian and military gliding clubs alike include many pilots who did their first solos in Air Cadet gliders. Now, 50 years since Air Cadet gliding began, Air Cadets have just finished re-equipping with modern aircraft and the time seems right to offer a reminder of the history of the movement and to give a brief description of the new fleet.

As far back as 1939 male cadets were being given gliding training and by 1943 it had become part of the official training syllabus for the then 156500 strong Air Training Corps. Eighty-four gliding schools staffed by volunteer, unpaid instructors were training 4500 cadets to solo standard each year. The aim during those early war years was to encourage air mindedness in Britain's youth. It must have been successful because one in six of all the UK's young men between the ages of 16 and 18 were in the Air Cadets. Most of the gliders that "put the air into Air Cadets" were in fact built by the cadets themselves from plans donated by Fred Slingsby, the founder of Slingsby Sailplanes Ltd. Some other gliders though were acquired or requisitioned from civilian clubs.

At the end of the war the number of Volunteer Gliding Schools (VGS) was reduced to 30 and these still exist today although three, having lost their sites, are currently unable to operate. Whereas in the early years the volunteer instructors were trained at regional centres, which were themselves run by volunteers, today the Air Cadet Central Gliding School (ACCGS) does all the instructor training. ACCGS is staffed by regular RAF officers and professional gliding instructors.

In recognition of the importance of gliding the RAF Central Flying School now has a gliding squadron tasked with monitoring the instructional standards at all Service gliding units. This link with the RAF's premier training establishment is an enormous benefit since it provides direct access to the latest instructional techniques in use in the parent service.

The movement's aim remains much the same today as it was in those early years, but the number of cadets has been reduced to 44000, although this now includes girls as well as boys. This is still a large figure when one considers that the RAF itself has just 87500 men and women in uniform. Other activities attract the cadets as well, but it is gliding that provides the main magnet for the young people that want to find out about aviation.

Until recently gliding training was devoted almost totally to air experience flying and first solo courses, but is now spread over the Air Cadets' time in the Corps. They begin at the tender age of 13¼ with familiarisation flights and then move on to Initial Gliding Training (IGT) when they learn to actually fly the glider, but not to go solo.

It is the first solo flight that provides the greatest step forward for the individual

On reaching their 16th birthday, cadets become eligible for Basic Gliding Training (BGT). This takes them to solo standard in either a winch launched glider or a motor glider. Those who do well may be selected to continue to Advanced Gliding Training (AGT) which culminates in a solo flight of 5hrs and a solo gain of height of 1000m, both counting towards their Silver badge. At present, however, cadets do not attempt the 50km cross-country to complete the FAI award. Since there are so many cadets queuing for courses, the main thrust has to be directed towards BGT because it is the first solo flight that provides the greatest step forward for the individual. Currently up to 2000 cadets go solo each year.

The organisation has come a long way since cadets built their own gliders. In the 1950s a fleet



The Air Cadets operate 100 Grob G103 Viking gliders as a standard trainer.

of 124 T-31 Kirby Cadet MKs, 93 T-21B Sedberghs, 94 Grasshopper primary gliders, ten Prefects and five Swallows were bought for the cadets. These aircraft gave wonderful service but 25 years later in 1975 it was clear that the vintage fleet was becoming too expensive to maintain and replacement began, initially with 40 Slingsby T-61E Venture motor gliders.

In 1985 ten K-21 Vanguards were bought to evaluate the concept of winch launched GRP gliders as *ab-initio* training aircraft for the gliding schools that had not equipped with motor gliders. At the successful completion of the trial and after competitive tender, the Grob G103 Twin Acro was selected as the new standard trainer. One hundred aircraft were bought and the name Viking was given to the type when it entered service.

Two of these Vikings have been modified with canard spin whiskers to permit spin training at ACCGS. The advance training programme too required suitable aircraft and two Janus Cs and five ASW-15B Valiants were acquired for this task.

By 1987 the Ventures were beginning to show their age. This splendid training motor glider had been used to send thousands of cadets soio and although a few were "modified" by their young pilots, not a single aircraft was damaged beyond repair – a remarkable record. However, after 14 years in service they needed refurbishment and this was going to be very costly, so, (again after competitive tender) the Grob G109B Vigilant was chosen as a successor. Fifty-four aircraft were bought for delivery in 1990/91. Air Cadets now had arguably the most up-to-date fleet of train-



The Air Cadet MVG winch.

➡

Below: A Grob 109B Vigilant photographed over Syerston.





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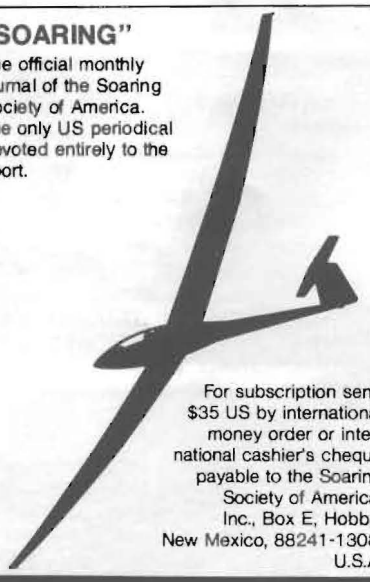
Unlike most civilian clubs, Air Cadets elected not to mix their gliders and motor gliders at individual sites, mainly because of the difficulties of requiring the part-time instructors at the VGS to hold dual instructor categories. As a result, 15 of the gliding schools operate only Vikings while the remaining 12 operate the Vigilant. ACCGS is the sole unit operating both types.

Many people may not appreciate that Air Cadet gliders are just as much Service aircraft as are Tornados and Jaguars, but this is indeed the case. The RAF takes the engineering management of its glider fleet very seriously. All the gliders are serviced by RAF engineers who are based at the Central Glider Maintenance Flight (CGMF) at Syerston. Teams tour the 27 Volunteer Gliding Schools carrying out routine servicing and rectifying defects. That they achieve a serviceability rate of over 90% is a considerable tribute to CGMF and to the manufacturer that designed and made the aircraft.

To ensure that the safe life of each type is known, a Viking and a Vigilant airframe have been set aside for fatigue testing. An instrumented "in service" aircraft is used to provide data on the loads being imposed on the aircraft during typical training sorties. This information is then used to load the fatigue test aircraft in a laboratory test rig and any likely fatigue failures should therefore be detected well before any actual in-flight failure.

The new fleet also brought with it the need for better support equipment. The 30 year-old Eagle winches could not develop sufficient power to give a satisfactory launch to the new Viking. As a result 22 six drum Munster Van Gelder winches were procured and these now give launches to at least 1000ft – even from a short run on a calm day. Each gliding school has been supplied with a modern launch point caravan equipped with all the necessary facilities so that the vehicle can be used as an effective control centre. Glider retrieve trailers have also been supplied to recover the aircraft to base in the event of an away landing.

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All of this equipment is now in service, the Volunteer Gliding School instructors have finished their conversion courses at RAF Syerston and the number of cadets completing their courses on the new aircraft has started to increase. The cadets themselves like both the Viking and the Vigilant and they find each easy to fly. The Viking spends almost three times as long in the air from a typical winch launch as one of the vintage gliders. It also spends much less time being retrieved to the take-off point after landing, with the result that it is a much more efficient training device than the older aircraft.

The only difficulty student pilots experience with the Viking is during the landing, when the aircraft has to be held off in exactly the correct landing attitude to make sure that it does not bounce and start porpoising. That said, the more efficient launch rate permits plenty of landing practice and the increased level of skill for that safe solo landing is soon acquired.

I believe the Vigilant is going to be a very productive first solo aircraft

The Vigilant is also extremely popular with both instructors and cadets. It is comfortable to sit in, which is important if you are going to spend all of your working day in it, it handles well, the controls are well harmonised, it is very forgiving and it is also easy to land correctly. I believe that as far as *ab-initio* training is concerned this motor glider is going to be a very productive first solo aircraft.

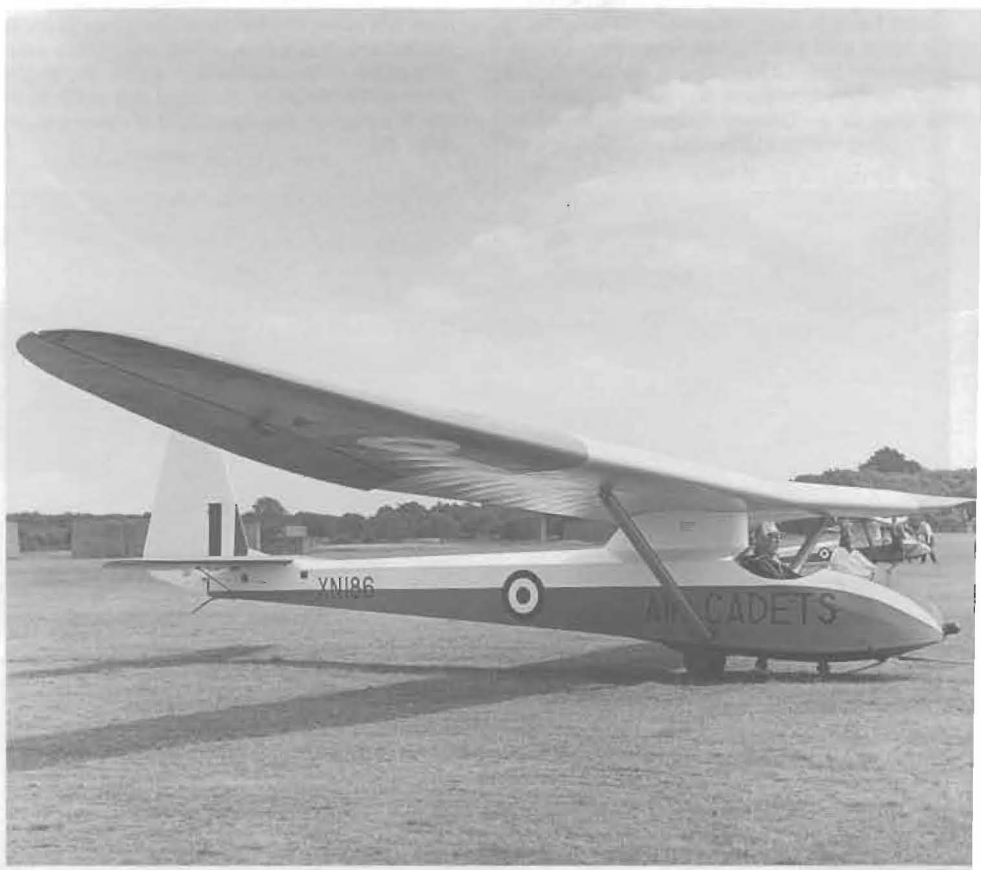
The two Janus and the Valiants have not yet been used to their full potential as ACCGS has concentrated its efforts on Viking and Vigilant conversion training, but 1993 should see more emphasis on advanced training and these two types will start to come into their own. The cadets will be converted to the Valiant for Silver height and duration attempts and will be given cross-country training as second pilot in the Janus.

A few will even be permitted to fly in the two-seater Janus as part of an Air Cadet crew in Regionals and perhaps Nationals. Competition flying will, however, be very much the icing on the cake for the very best cadet pilots since, as was said earlier, most resources have to be directed towards that main task of getting as many cadets as possible to the first solo stage.

Air Cadets are fortunate indeed to have such a magnificent fleet of new aircraft and it is a reflection of the RAF's commitment to modern youth that the Service is prepared to invest so heavily in young people. Whilst over a fifth of RAF recruits come from Air Cadets and 50% of all direct entry pilots have flown Air Cadet gliders, there is no obligation on the cadets to join the parent Service; they are simply invited to come and find out about flying and gliding.

They are encouraged to participate and to become air minded. If the number of ex cadets in the Service, in civilian gliding clubs and in all the various parts of aviation in the United Kingdom is a measure of success, then the aim is being achieved handsomely.





Above: The Slingsby T-61 Venture which was used to send thousands of cadets solo. Below: The vintage T-21B Sedbergh which was in service for 30 years. Photo: David Nicholls.

SOARING IN PARADISE

The ultimate opportunity in gliding must be an invitation to try for records at the Barron Hilton Cup camp in the USA. Julian West (a Brit living in Munich) qualified in the Open Class by flying a 1005km triangle in Spain, as described in the December 1990 issue of S&G, p298. He was joined by winners of the other four Cup Classes plus the current World Champions for a "once in a lifetime" gliding holiday. The July 1992 camp was at Barron Hilton's "Flying M" ranch, which covers 480 000 acres between Walker Lake in Nevada and Mono Lake in California. The ranch house is in a remote valley beneath the 11 230ft high Mt Grant, and has its own airfield at 5000ft amsl. The following are extracts from Julian's report.

Our most generous and genial host, Barron Hilton, originally took up gliding at the behest of Hanna Reitsch, who pointed out the potential of the ranch as a soaring site. Ten years ago, together with Helmut Reichmann, he founded the Cup – a Pan-European competition based on the rules for the German national ladder. At the 1992 camp Hannes Linke and weatherman Dan Gudgel, who together ran the 1991 World Championships, gave a daily briefing, after which the ten gliders were allocated by ballot. By special arrangement I flew the only motor glider, a Ventus CM.

Initially it was more like autumn than summer, with several days of strong winds and wave. This was followed by normal convection weakened by a blanket of cirrus to the south from a decaying hurricane off the Pacific coast. Towards the end of the camp, widespread thunderstorms moved into the area, although it remained completely blue just to the north. Partly because of and partly in spite of this, five new national height and speed records were claimed during the camp.

(Julian has the British National motor glider absolute altitude record of 30 000ft; a gain of height record of 23 800ft; a 500km goal and return record of 103km/h and a 300km goal and return record of 113km/h from the ranch, as well as a 646km distance record from Minden, Nevada. Ed.)

The topography to the west of the ranch is dominated by the massive Sierra Nevada, a chaotic sea of mountains some 80 by 500km in extent with 25 peaks exceeding 10 000ft, the highest at 14 491ft being Mt Whitney. This range runs parallel to and about 250km inland of the west coast of America. However, the best thermals are along the 175km ridge of the 14 256ft White/Inyo mountains, which are on the east side of the awesome Owens valley and begin some 100km south of the ranch. *(It is worth looking at a map to see the extent of these mountains. Ed.)*

The flight area, an arid scrub and rock strewn mountainscape with a few wet and dry lakes and very little civilisation, is almost entirely unlandable. This means that a high cloudbase is essential for flying cross-country and the optimum height band is between 12 000 and 18 000ft, above which glider flights are for the most part forbidden.

Above 12 000ft oxygen is mandatory, but for flights up to 20 000ft a canula is normally preferred to a mask. This consists of a loop of fine neoprene tubing fitted with twin outlet spigots for insertion in the nostrils. As even a slight oxygen shortage, quite unbeknown to the pilot, can result in a marked deterioration in the ability to make decisions, it doesn't pay to be miserly with the oxygen.

Although thermals come from valley floors as well as from mountainsides, at the various ridge top levels they are distorted by wind shear into the form of a crankshaft. These sideways shifts and the strong sink between thermals often make it difficult to escape from low down in a valley. Even well above the mountains there is still strong sink between thermals, due to complex lee or wave effects, which reduces the cross-country speed below that to be expected from the climb rate.

The strong south-westerly airflow at the beginning of the camp provided several high altitude wave days. After the first, with piles of plates stacked over the site, it went completely blue and the crankshaft thermals made it difficult to get up into the wave locally. However, a climb to 11 500ft would generally enable an upwind dash into the next valley, where 8kt of smooth wave lift was to be found in the lee of the 11 673ft Mt Patterson.

Above 18 000ft glider flights are only permit-

A 1935 fire engine with, l to r, Barron Hilton, Erwin Siegler, Kilian Grefen, Werner Scholz, Annette Reichmann, Tonu Prieler, Tom Serkowski, Hannes Linke, Janusz Centka, Brad Edwards (foreground) and Julian West.



ted in an area known as a wave window. The ranch lies under Minden's eastern wave window, and each day Reno ATC gave us clearance up to 30000ft. Although this height was usually adequate, on the best day the wave was still going strong at that level.

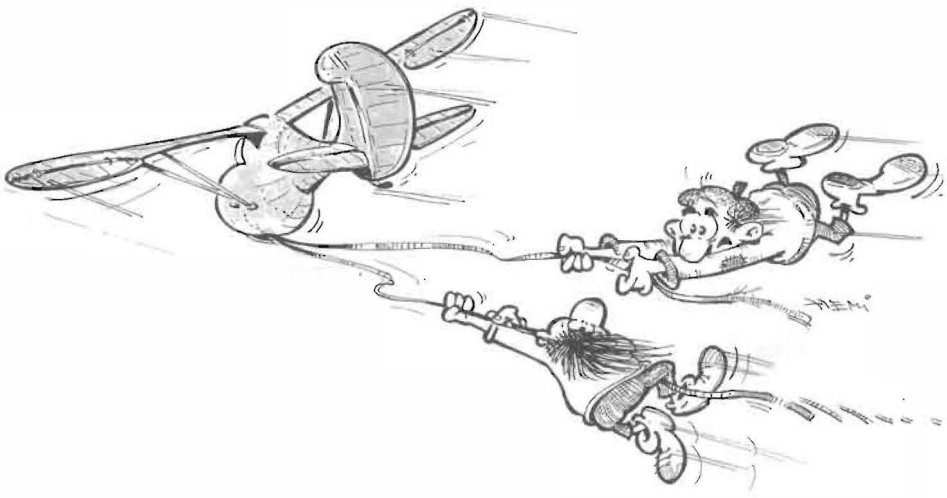
After the weather became less wavy and more convective, the cumulus clouds would first appear over the mountains and over the valleys an hour or so later. However, the valley thermals would remain weak, just 2kt, and reach only 8500ft for the next couple of hours, making it difficult to get into the mountains. At about 1300hrs, after the thermals had punched through the first shear level, climbs would dramatically improve to around 9kt.

For speed records a start gate was set up at 9500ft on a ridge 5km north of Mt Grant, equipment being airlifted there by helicopter. Although the cross-countries were made under thick cirrus cover, achieved speeds were well over 100km/h, the fastest being a Polish National 300km O/R speed record of 133km/h by Janusz Centka, the World Open Class Champion.

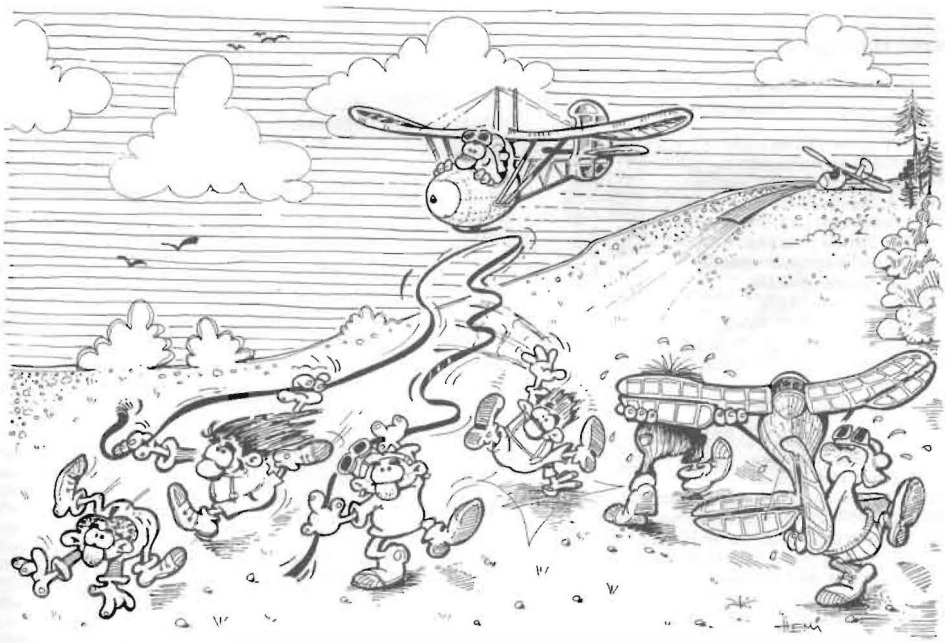
For those keen to win an invitation to the 1994 camp, the rules of the competition, which is open to all, are available from the BGA. It is a lot easier to win this prize than you might think.

HUNGARIAN HUMOUR

These drawings are by Laszelo Hemmert, an airline pilot working for the Hungarian Aeronautical Association.



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Height Gain	12 894m	P. F. Bikle, USA	SGS 1-23E	25.2.1961
Absolute Altitude	14 938m	R. R. Harris, USA	Grob-102	17.2.1986
Straight Distance	1460.8km	H-W Grosse, W. Germany	ASW-12	25.4.1972
Goal Distance	1254.26km	B. L. Drake, D. N. Speight, S. H. Georgeson, New Zealand	Nimbus 2	14.1.1978
Goal & Return Distance	1646.68km	T. L. Knauff, USA	Nimbus 3	25.4.1983
Triangular Distance	1362.68km	T. L. Knauff (Nimbus 3), L. R. McMaster, J. C. Seymour K-H. Striedieck, (USA) (ASW-20B) R. L. Robertson, Gt Britain (in USA)	Ventus A	2.5.1986
100km Triangle	195.30km/h	I. Renner, Australia	Nimbus 3	14.12.1982
300km Triangle	169.49km/h	J. P. Castle, France (in South Africa)	Nimbus 3	15.11.1986
500km Triangle	170.06km/h	B. Bünzli, Switzerland	DG-400 (sealed)	9.1.1988
750km Triangle	158.40km/h	H-W. Grosse, W. Germany (in Australia)	ASW-22	8.1.1985
1000km Triangle	145.32km/h	H-W. Grosse, W. Germany (in Australia)	ASW-17	3.1.1979
1250km Triangle	133.24km/h	H-W. Grosse, W. Germany (in Australia)	ASW-17	9.12.1980

MULTI-SEATERS

Height Gain	11 680m	S. Josefczak and J. Tarczon, Poland	Bocian	5.11.1966
Absolute Altitude	13 489m	L. Edgar and H. Klieforth, USA	Pratt Read	19.3.1952
Straight Distance	1383km	G. Herbaud and J-N. Herbaud, France	ASH-25	17.4.1992
Goal Distance	1383km	G. Herbaud and J-N. Herbaud, France	ASH-25	17.4.1992
Goal & Return Distance*	1260.00km	M. W. Walker and T. Delore, New Zealand	ASW-22	1.12.1989
Triangular Distance	1379.35km	H-W. Grosse and H. Kohimeyer, W. Germany (in Australia)	ASH-25	10.1.1987
100km Triangle	177.26km/h	E. Sommer and I. Andersen, W. Germany (in USA)	Janus C	26.7.1984
300km	170.90km/h	H-W. Grosse and Karin Grosse, W. Germany (in Australia)	ASH-25	8.1.1988
500km Triangle	163.03km/h	H-W. Grosse and Karin Grosse, W. Germany (in Australia)	ASH-25	20.1.1988
750km Triangle	161.33km/h	H-W. Grosse and Karin Grosse, W. Germany (in Australia)	ASH-25	10.1.1988
1000km Triangle	157.25km/h	H-W. Grosse and Karin Grosse, W. Germany (in Australia)	ASH-25	11.1.1988
1250km Triangle	143.46km/h	H-W. Grosse and H. Kohlimeyer, W. Germany (in Australia)	ASH-25	10.1.1987

SINGLE-SEATERS (WOMEN)

Height Gain	10 212m	Yvonne Loader, New Zealand	Nimbus 2	12.1.1988
Absolute Altitude	12 637m	Sabrina Jackintell, USA	Astir CS	14.2.1979
Straight Distance	949.7km	Karla Karel, Gt Britain (in Australia)	LS-3	20.1.1980
Goal Distance*	951.43km	Joann Shaw, USA	Nimbus 2	2.7.1990
Goal & Return Distance	1126.68km	Doris Grove, USA	Nimbus 2	28.9.1981
Triangular Distance	847.27km	Joann Shaw, USA	Nimbus 2	5.8.1984
100km Triangle	145.49km/h	Susan Beatty, South Africa	ASW-20B	24.12.1990
300km Triangle	143.9km/h	Susan Beatty, South Africa	ASW-20B	26.12.1990
500km Triangle	133.14km/h	Susan Martin, Australia	LS-3	29.1.1979
750km Triangle	127.29km/h	Susan Beatty, South Africa	ASW-20B	21.12.1990

MULTI-SEATERS (WOMEN)

Height Gain	8430m	Adela Dankowska and M. Mateliska, Poland	Bocian	17.10.1967
Absolute Altitude	10 809m	Mary Nurr and H. Duncan, USA	SGS 2-32	5.3.1975
Straight Distance	864.85km	Tatiana Pavlova and L. Filomechkina, USSR	Blanik	3.6.1967
Goal Distance	864.86km	Isabella Gorokhova and Z. Koslova, USSR	Blanik	3.6.1967
Goal & Return Distance	673.5km	Katrin Keim, Germany and A. Orsi (in South Africa)	ASH-25	5.1.1992
Triangular Distance	760.4km	Katrin Keim, Germany and A. Orsi (in South Africa)	ASH-25	7.1.1992
100km Triangle	141.89km/h	Adele Orsi, Italy and K. Keim (in South Africa)	ASH-25	10.1.1992
300km Triangle	143.17km/h	Katrin Keim, Germany and A. Orsi (in South Africa)	ASH-25	6.1.1992
500km Triangle	113.87km/h	Katrin Keim and U. Keim, Germany (in South Africa)	ASH-25	3.1.1992
750km Triangle	121.00km/h	Katrin Keim, Germany and A. Orsi (in South Africa)	ASH-25	5.1.1992

BRITISH NATIONAL RECORDS (as at 14.2.93)

SINGLE-SEATERS

Height Gain	10 985m	D. Benton	Nimbus 2	18.4.1980
Absolute Altitude	11 500m	H. C. N. Goodhart (in USA)	SGS 1-23	12.5.1955
Straight Distance	949.7km	Karla Karel (in Australia)	LS-3	20.1.1980
Goal Distance	859.20km	M. T. A. Sands (in USA)	Nimbus 3	23.4.1986
Goal & Return Distance	1127.68km	M. T. A. Sands (in USA)	Nimbus 3	7.5.1985
Triangular Distance	1362.68km	R. L. Robertson (in USA)	Ventus A	2.5.1986
300km Goal and Return	153.3km/h	M. T. A. Sands (in USA)	Kestrel 19	10.5.1983
500km Goal and Return	152.7km/h	M. R. Carlton (in South Africa)	ASW-17	24.12.1980
100km Goal and Return	105.79km/h	M. T. A. Sands (in USA)	Nimbus 3	7.5.1985
100km Triangle	166.38km/h	B. Cooper (in Australia)	LS-6B	4.1.1991
300km Triangle	146.8km/h	E. Pearson (in South Africa)	Nimbus 2	30.11.1976
500km Triangle	141.3km/h	B. J. G. Pearson (in South Africa)	ASW-20	28.12.1982
750km Triangle	109.8km/h	M. R. Carlton (in South Africa)	Kestrel 19	5.1.1975
1000km Triangle	112.15km/h	G. E. Lee (in Australia)	ASW-20B	25.1.1989
1250km Triangle	109.01km/h	R. L. Robertson (in USA)	Ventus A	2.5.1986

MULTI-SEATERS

Height Gain	10 234m	A. E. Kay and K. Wilson	ASH-25	12.10.1990
Absolute Altitude	11 023m	A. E. Kay and K. Wilson	ASH-25	12.10.1990
Straight Distance	472.43km	M. R. Carlton and M. French (in South Africa)	Calif A-21	18.12.1979
Goal Distance	472.43km	M. R. Carlton and M. French (in South Africa)	Calif A-21	18.12.1979
Goal and Return Distance	709.35km	R. C. May and S. G. Jones (in Finland)	ASH-25	11.6.1988
Triangular Distance	825km	B. T. Spreckley and P. Jones (in Australia)	Nimbus 3DT	7.2.1987
300km Goal and Return	138km/h	G. Dale and M. Bird (in Australia)	ASH-25	4.1.1991
500km Goal and Return	113.08km/h	M. R. Carlton and C. Greaves (in South Africa)	Calif A-21	23.12.1978
100km Triangle	137.22km/h	M. R. Carlton and Leonie Lawson (in South Africa)	Calif A-21	27.12.1978
300km Triangle	138.37km/h	B. T. Spreckley and P. Jones (in Australia)	Nimbus 3DT	6.2.1987
500km Triangle	130.56km/h	M. Bird and R. Gardner (in Australia)	ASH-25	3.1.1991
750km Triangle	114.18km/h	B. T. Spreckley and P. Jones (in Australia)	Nimbus 3DT	7.2.1987

SINGLE-SEATERS (WOMEN)

Height Gain	9119m	Anne Burns (in South Africa)	Skylark 3B	13.1.1961
Absolute Altitude	10 550m	Anne Burns (in South Africa)	Skylark 3B	13.1.1961
Straight Distance	949.7km	Karla Karel (in Australia)	KS-3	20.1.1980
Goal Distance	528km	Ann Welch (in Poland)	Jaskolka	20.6.1961
Goal & Return Distance	545km	Anne Burns (in South Africa)	Std Austria	6.1.1966
Triangular Distance	814.01km	Karla Karel (in Australia)	LS-3	9.1.1980
300km Goal and Return	107.5km/h	Karla Karel (in South Africa)	ASW-15B	1.1.1975
500km Goal and Return	102.6km/h	Karla Karel (in Rhodesia)	ASW-15B	16.10.1975
100km Triangle	110.8km/h	Karla Karel (in Rhodesia)	ASW-15B	2.11.1975
300km Triangle	125.87km/h	Karla Karel (in Australia)	LS-3	12.2.1980
500km Triangle	120.69km/h	Karla Karel (in Australia)	LS-3	20.2.1980
750km Triangle	110.53km/h	Pamela Hawkins (in Australia)	ASW-17	17.11.1984

UNITED KINGDOM RECORDS (as at 14.2.93)

SINGLE-SEATERS

Height Gain	10 065m	D. Benton	Nimbus 2	18.4.1980
Absolute Altitude	11 031m	D. Benton	Nimbus 2	18.4.1980
Straight Distance	827.9km	T. J. Wills	LS-6	29.5.1986
Goal Distance	579.36km	H. C. N. Goodhart	Skylark 3	10.5.1959
Goal & Return Distance	801.3km	C. Garton	Kestrel 19	22.7.1976
Triangular Distance	770.5km	C. C. Rollings	Jantar 2A	28.5.1985
300km Goal & Return	114.5km/h	D. S. Watt	ASW-22	18.8.1983
500km Goal & Return	93km/h	M. B. Jefferyes	DG-202	12.5.1984
100km Triangle	123.2km/h	R. Jones	Nimbus 3	13.8.1983
200km Triangle	114.95km/h	D. S. Watt	ASW-24	3.8.1990
300km Triangle	117.14km/h	R. Jones	Nimbus 3	28.5.1985
400km Triangle	114.3km/h	R. Jones	Nimbus 3	1.8.1984
500km Triangle	106.9km/h	R. Jones	Nimbus 2	31.5.1975
600km Triangle	88.8km/h	C. Garton	Kestrel 19	10.6.1976
750km Triangle	77.98km/h	C. C. Rollings	Jantar 2A	28.5.1985
100km Goal	150km/h	T. J. Wills	LS-4	12.5.1984
200km Goal	127.1km/h	A. H. Warminger	Vega	12.5.1984
300km Goal	132.8km/h	A. H. Warminger	Kestrel 19	24.4.1976
400km Goal	98.36km/h	A. H. Warminger	Ventus 16.6m	7.4.1990
500km Goal	90.7km/h	H. C. N. Goodhart	Skylark 3	10.5.1959

MULTI-SEATERS

Height Gain	10 234m	A. E. Kay and K. Wilson	ASH-25	12.10.1990
Absolute Altitude	11 023m	A. E. Kay and K. Wilson	ASH-25	12.10.1990
Straight Distance	421.5km	J. S. Fielden and Valerie Fielden	Bergfalke 3	14.8.1970
Goal Distance	421.5km	J. S. Fielden and Valerie Fielden	Bergfalke 3	14.8.1970
Goal & Return Distance	542.91km	A. E. Kay and A. Kay	ASH-25	12.8.1990
Triangular Distance	770.27km	C. C. Rollings and B. Fairston	ASH-25	3.7.1990
300km Goal & Return	112.2km/h	A. E. Kay and C. Lyttleton	ASH-25	27.5.1990
500km Goal & Return	98.20km/h	A. E. Kay and A. Kay	ASH-25	12.8.1990
100km Triangle	123.99km/h	R. C. May and E. Morris	ASH-25	27.7.1989
200km Triangle	119.07km/h	R. C. May and P. Townsend	ASH-25	18.7.1990
300km Triangle	109.08km/h	C. C. Rollings and G. McAndrew	ASH-25	18.8.1989
400km Triangle	113.70km/h	J. D. J. Glossop and I. Baker	Nimbus 3DT	30.8.1990
500km Triangle	104.74km/h	C. C. Rollings and P. Price	ASH-25	25.5.1990
600km Triangle	94.94km/h	R. C. May and S. Lynn	ASH-25	19.7.1990
750km Triangle	92.34km/h	C. C. Rollings and B. Fairston	ASH-25	3.7.1990
100km Goal	173.32km/h	D. Hill and J. Gorringe	ASH-25	8.4.1990
200km Goal	113.3km/h	R. Miller and B. Tapson	Janus C	11.5.1984
300km Goal	107.4km/h	P. R. and A. H. Pentecost	Janus C	7.5.1984

SINGLE-SEATERS (WOMEN)

Height Gain	7833m	Alison Jordan	Astir CS	8.10.1978
Absolute Altitude	8701m	Alison Jordan	Astir CS	8.10.1978
Straight Distance	454km	Anne Burns	Skylark 3B	10.5.1959
Goal Distance	324.4km	Jane Nash	Ventus B	15.4.1989
Goal & Return Distance	334.2km	Ruth Housden	Libelle	29.5.1982
300km Goal & Return	80.60km/h	Jane Nash	Ventus B	4.6.1989
100km Triangle	80km/h	Anne Burns	Cirrus	14.6.1970
200km Triangle	77.08km/h	Jane Randle	Nimbus 2	12.8.1990
300km Triangle	76.8km/h	Jane Randle	Kestrel 19	18.8.1976
400km Triangle	60.6km/h	Anne Burns	SHK	5.8.1967
500km Triangle	76.1km/h	Anne Burns	Nimbus 2	31.5.1975
100km Goal	135.39km/h	Jane Nash	Ventus B	11.6.1989
200km Goal	85.5km/h	Anne Burns	Olympia 419	2.6.1963
300km Goal	93.16km/h	Jane Nash	Mini-Nimbus	7.4.1990

MOTOR GLIDERS

SINGLE-SEATERS

Height Gain	6710m	A. Mossmann	PIK-30	20.8.1992
Absolute Altitude	8010m	A. Mossmann	PIK-30	20.8.1992
100km Triangle	76.5km/h	I. W. Strachan	PIK-20E	11.8.1984
200km Triangle	48.2km/h	I. W. Strachan	SF-27M	23.8.1976
300km Triangle	83.1km/h	I. W. Strachan	PIK-20E	19.8.1984
100km Goal	85.7km/h	I. W. Strachan	SF-27M	16.7.1971

MULTI-SEATERS

Height Gain	5882m	M. G. Throssell and P. Bartle	Janus CM	27.9.1988
Absolute Altitude	6888m	M. G. Throssell and P. Bartle	Janus CM	27.9.1988
100km Triangle	35.6km/h	P. T. Ross and H. Daniels	SF-28A	27.6.1976
100km Goal	76.2km/h	P. T. Ross and K. Winfield	SF-28A	22.8.1976
200km Goal	66.3km/h	P. T. Ross and P. Fletcher	SF-28A	18.7.1976
500km Triangle	78.45km	B. T. Spreckley and O. Pugh	Janus CM	16.5.1986

15m CLASS

Straight Distance	827.9km	T. J. Wills	LS-6	29.5.1986
Goal & Return Distance	617km	C. Garton	LS-6	28.8.1989
Triangular Distance	609.9km/h	A. E. Kay	ASW-24	9.5.1991
500km Goal & Return	83.42km/h	M. B. Jefferyes	DG-600	25.5.1990
100km Triangle	119.7km/h	T. J. Wills	LS-4	18.4.1981
200km Triangle	114.95km/h	D. S. Watt	ASW-24	3.8.1990
300km Triangle	115.85km/h	J. Gorringe	LS-7	3.8.1990
400km Triangle	99.39km/h	P. Jeffery	LS-7	13.8.1991
500km Triangle	93.1km/h	M. D. Wells	LS-7	26.5.1990
600km Triangle	88.1km/h	A. E. Kay	ASW-24	9.5.1991
200km Goal	127.1km/h	A. H. Warminger	Vega	12.5.1984

STANDARD CLASS

Straight Distance	718km	T. J. Wills	Std Libelle	1.8.1976
Triangular Distance	609.9km	A. E. Kay	ASW-24	9.5.1991
300km Goal & Return	104.09km/h	A. Kay	ASW-24	28.4.1989
500km Goal & Return	75.66km/h	P. Jeffery	Pegasus	3.9.1989
100km Triangle	119.7km/h	T. J. Wills	LS-4	18.4.1981
200km Triangle	114.95km/h	D. S. Watt	ASW-24	3.8.1990
300km Triangle	115.85km/h	J. Gorringe	LS-7	3.8.1990
400km Triangle	99.39km/h	P. Jeffery	LS-7	13.8.1991
500km Triangle	93.1km/h	M. B. Wells	LS-7	26.5.1990
600km Triangle	88.1km/h	A. E. Kay	ASW-24	9.5.1991
100km Goal	150km/h	T. J. Wills	LS-4	12.5.1984
300km Goal	131.1km/h	T. J. Wills	Std Libelle	24.4.1976
400km Goal	73.8km/h	T. J. Wills	Std Libelle	7.6.1976

BRITISH NATIONAL MOTOR GLIDERS (as at 14.2.1993)

SINGLE-SEATERS

Height Gain	7253.9m	J. M. West (in USA)	Ventus CM	5.7.1992
Absolute Altitude	9211.3m	J. M. West (in USA)	Ventus CM	5.7.1992
Straight Distance	652.7km	B. J. Willson (in Australia)	PIK 20E	10.1.1983
Goal Distance	415.1km	B. J. Willson (in Australia)	PIK 20E	11.1.1983
Goal and Return Distance	646.97km	J. M. West (in USA)	Ventus CM	2.7.1992
Triangular Distance	509.46km	J. M. West (in Spain)	Ventus CM (17.6m)	12.8.1992
100km Triangle	119.14km/h	J. M. West (in Spain)	Ventus CM (17.6m)	15.8.1992
300km Triangle	97.96km/h	J. M. West (in Spain)	Ventus CM (17.6m)	16.8.1992
500km Triangle	96.11km/h	J. M. West (in Spain)	Ventus CM (17.6m)	12.8.1992
300km Goal and Return	113.05km/h	J. M. West (in USA)	Ventus CM	9.7.1992
500km Goal and Return	103.77km/h	J. M. West (in USA)	Ventus CM	7.7.1992

MULTI-SEATERS

Height Gain	5882m	M. G. Thorssell and P. Bartle	Janus CM	27.9.1988
Absolute Altitude	6888m	M. G. Thorssell and P. Bartle	Janus CM	27.9.1988
100km Triangle	35.6km/h	P. T. Ross and H. Daniels	SF-28A	27.6.1976

UK 750km DIPLOMA

1. Goal & Return	801.3km	C. Garton	Kestrel 19	22.7.1976
2. Distance	761km	D. S. Watt	ASW-20L	9.5.1980
3. Triangular Distance	770.5km	C. C. Rollings	Jantar 2A	28.5.1985
4. Distance	827.9km	T. J. Wills	LS-6	29.5.1986
5. Triangular Distance	770.28km	C. C. Rollings & B. A. Fairston	ASH-25	3.7.1990
6. Distance	757km	A. J. Davis	Discus	7.8.1990
7. Quadrilateral	753km	B. Elliott & D. P. Francis	Nimbus 3DT	7.8.1990

INTERNATIONAL MOTOR GLIDERS (as at 14.2.93)

		SINGLE-SEATERS		
Height Gain	9935m	M. D. Stevenson, USA	DG-400	25.10.1985
Absolute Altitude	10 408m	G. Cichon, W. Germany	Nimbus 2M	27.5.1979
Straight Distance	826.66km	P. Elkmann, W. Germany	ASW-22M	15.4.1989
Goal Distance	801.5km	F. F. Ott, Germany (in USA)	ASW 22BE	?.?.1992
Goal and Return Distance	1084.94km	O. Schauble, W. Germany (in South Africa)	ASW-22	9.1.1988
Triangular Distance	1115.95km	W. Eisele, W. Germany (in South Africa)	ASW-22M	3.1.1990
100km Triangle	191.19km/h	B. Bünzli, Switzerland (in South Africa)	DG-400	29.12.1987
300km Triangle	165.51km/h	B. Bünzli, Switzerland (in South Africa)	DG-400	22.12.1984
500km Triangle	170 05km.h	B. Bünzli, Switzerland (in S. W. Africa)	DG-400	9.1.1988
750km Triangle	150.81km/h	B. Bünzli, Switzerland (in S. W. Africa)	DG-400	17.12.1987
1000km Triangle	139.96km/h	B. Bünzli, Switzerland (in South Africa)	DG-400	28.12.1984
		MULTI-SEATERS		
Height Gain	5650m	H. Köhler, W. Germany and J-C Batault (in USA)	Taifun 17E	28.4.1986
Absolute Altitude	8000m	H. Köhler, W. Germany and J-C Batault (in USA)	Taifun 17E	28.4.1986
Straight Distance	969.75km	J. W. Wenger and W. W. Aitken, USA	Nimbus 3DM	7.7.1989
Goal Distance	777.81km	J. W. Wenger and D. W. Sitken, USA	Nimbus 3DM	?.?.1989
Goal & Return Distance	1101.44km	W. Eisele, Germany and ? (in ?)	Nimbus 3DM	23.12.1991
Triangular Distance	1256.19km	W. Binder and M. Mertel, Germany (in ?)	ASH-25MB	14.12.91
100km Triangle	179.53km/h	O. Wegscheider and P. Eich, W. Germany (in South Africa)	Nimbus 3DM	5.1.1989
300km Triangle	164.88km/h	H-W. Grosse and Karin Grosse, W. Germany (in Australia)	ASH-25T	9.1.1991
500km Triangle	171.1km/h	H-W. Grosse and J. Hacker, W. Germany (in Australia)	ASH-25T	31.12.1990
750km Triangle	157.27km/h	H-W. Grosse and Karin Grosse, W. Germany (in Australia)	ASH-25T	10.1.1991
1000km Triangle	129.98km/h	E. Müller and W. Binder, W. Germany (in Australia)	ASH-25MB	27.12.1986
1250km Triangle	128.03km/h	W. Binder and M. Mertel, Germany (in ?)	ASH-25MB	14.12.91
		SINGLE-SEATERS (WOMEN)		
Height Gain	8844m	Ingrid Köhler, W. Germany (in USA)	DG-400	12.6.1988
Absolute Altitude	10 245m	Ingrid Köhler. W. Germany (in USA)	DG-400	12.6.1988
Goal & Return Distance	531.10km	Ingrid Köhler, W. Germany (in USA)	DG-400	1.7.1989
100km Triangle	127.49km/h	Ingrid Köhler, W. Germany (in USA)	DG-400	4.7.1989
300km Triangle	87.53km/h	Ingrid Köhler, W. Germany (in USA)	DG-400	4.7.1989
500km Triangle	84.94km/h	Margrit Pantenberg-Becker, Germany	Ventus CM	31.5.1991
		MULTI-SEATERS (WOMEN)		
300km Triangle*	66km/h	Isabell Mittag and K. Walter, W. Germany	DG-500M	27.5.1990

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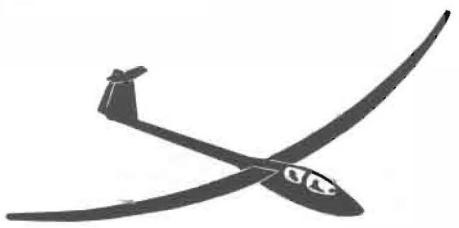
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TO SPIN, OR NOT TO SPIN

That, says Lou Frank, is the question to a life-saving alternative. He thinks it vital to practise until you become programmed to recognise and recover from this potentially dangerous situation

Not *another* article on spinning! Yes, another, because every year too many pilots, some experienced, others less so, are still being injured or paying the ultimate price for somehow failing to recognise or react to this life-threatening situation.

Why is it that despite our best training efforts, world-wide statistics continue to reflect an appalling record of spin-related accidents? We teach the dangers of low and slow flight, we supposedly learn the symptoms of an approaching stall and how to recover from it so how *can* pilots get into this dangerous, and often fatal, situation?

The answer, I believe, lies in an understanding of some aspects of basic psychology; the role of the subconscious mind, stimulus and response, and the conditioned reflex. (Experts in this field will I hope forgive the writer grossly over-simplifying this complex subject; a little bit of knowledge is a dangerous thing, but then so is inadvertent spinning . . .)

Consider for a moment your reaction when driving a car on an icy road. The car starts to slide to the left as you negotiate a bend to the right. Most of us know that the only hope of checking the skid is to steer to the left – *into* the direction of skid. Yet, despite this knowledge, most of us will find ourselves steering to the right! That is unless you are a professional driver engaged in sports such as rallying or motor racing. The difference is not a matter of knowledge, but experience.

The professional driver has developed an alternative subconscious programme, that issues a *different* set of commands in response to the particular symptoms received by his senses. This alternative or secondary programme (which in this case contradicts the primary programme) is kept accessible by constant practice, thereby reinforcing it. It is important to understand that knowledge alone will not provide an automatic response to a particular situation; only practice will provide the skill programme.

We all have "survival programme" imprinted in our subconscious mind. Some are inborn (instinctive), others are learned through experience – like ducking a fast moving object heading our way. Ducking is not a considered conscious decision, but a learned (conditioned) reflex to that particular stimulus. We have little control over such reflexes – try not blinking when someone claps their hands two inches from your face!

When you were learning to fly, you may have been well aware of the principles of controlled flight, but much practice was necessary for you to acquire the skill of co-ordinating the controls before becoming a proficient pilot – before your responses became automatic. As an experienced pilot you no longer need to focus your attention on using the controls to fly straight, turn, climb or dive. Your subconscious programme will look after that, freeing you to concentrate upon thermalling, navigation, and other complex tasks that require judgment and decision making.

Your subconscious programme will react automatically to perception; "nose dropping – pull back on stick" or "right wing dropping – move stick to left" and so on. But as we all know, those are improper responses in semi-stalled flight, and we all know that should we be turning, such a response would be likely to induce an incipient spin . . . We know this because we have experienced it during our training – but did we really *learn* from this? Did we develop an alternative programme in our subconscious that commands **not** to pull back the stick when the nose starts to drop approaching full stall – **not** to attempt checking increasing bank with aileron when about to stall in a turn? The answer all too often is "no".

The development of the alternative programme is dependent entirely on practice – particularly so in this case, as the commands of the alternative programme are opposite to the primary programme! Recovering automatically from a skid in your car is almost impossible without regular practice on a skid pan – ask any police patrol driver! Similarly, regular practice in stall/spin exercises is essential if you are to keep the alternative programme alive and accessible – the automatic response that requires little *conscious* effort.

Pilots rarely get themselves killed spinning in from over 1000ft. They either have time to get the brain in gear – to consciously analyse the situation and correct it – or the inherent stability of the aircraft saves them. Most spinning accidents occur from less than a few hundred feet above ground, usually when the workload of the conscious mind is high – or filled with overpowering apprehension. Without an alternative programme accessible, the primary programme will inevitably take over at the onset of a stall – with predictable, and sometimes fatal, results.

If you doubt the power of your primary programme when flying, there is a simple way to prove it; fly with an instructor in a two-seater and get him to put the aircraft into an incipient spin (stall off a flattish unco-ordinated turn) and ask you to recover. Despite your advance knowledge of what is going to happen, despite you **knowing** that you must not use aileron to check the dropping wing, just how much *did* you move the stick applying opposite aileron? Under such prepared circumstances you probably remembered to relax the backward pressure on the stick, which is all that is necessary. If so, a bit of opposite aileron is not going to make a great deal of difference to the recovery – but how would you respond facing a difficult field landing or similar high workload situation?

Prevention, they say, is a whole lot better than cure. So the best insurance you can have against being included among the stall/spin accident statistics is to first **recognise** the symptoms of an approaching stall – let me remind you;

Stimuli

- Nose too high (in normal flight).
- Airflow noise reduced or changed in pitch.
- Aileron response less effective.
- Indicated airspeed low.
- An increasing need to "hold off bank" when turning.
- Rate of sink often excessive.
- Buffeting of tail surfaces.
- Nose tending to drop despite increasing "up" elevator.

Recognition of one or more of these symptoms should alert your alternative programme (if you have one) and prompt an automatic recovery procedure as follows;

Responses

Lower nose to improve angle of attack. Do not try to lift dropping wing with opposite aileron or opposite rudder.

If the above actions are taken too late, and a full stall (straight) results, then recover from the dive with rudder neutral and wings level, using airbrakes as necessary to avoid exceeding V_{NE}.

Should you fail to take corrective action in response to the symptoms when **turning** you may enter a full spin. Very few aircraft today will spin unless deliberately put into it and held there. Nevertheless it is vital that you know and practice full spin recovery;

1. Full opposite rudder (to direction of rotation).
2. Pause (to allow rudder to take effect).
3. Stick slowly forward until rotation stops.
4. Centralise rudder.
5. Recover from dive, wings level, taking care not to exceed placarded limits; use airbrakes as necessary.

Summary

Knowledge is not enough to prevent you making inappropriate responses in a high workload situation. The development and subsequent reinforcement of a recognition and recovery stall/spin programme can *only* be brought about by regular practice. Just how well are **you** prepared . . .?

BILL SCULL

18 - 28 20 pts / km.

TEACHING STALLING AND SPINNING

Bill says he makes no apology for more copy on this topic. This is the second of two articles in the Yearbook, each dealing with different aspects. Spinning continues to be the main cause of fatal accidents and pilot education and regular practice are the best protection

Stalling and spinning accounts for a significant proportion of gliding accidents. The circumstances leading to the eventual spin may be a winch launch failure or cable break, running out of height in the circuit pattern, field landing or ridge soaring. All, or most, of the accidents are from an inadvertent spin starting at a height from which recovery is unlikely or impossible. Injuries are usually serious or fatal.

So the risks are real but despite increased emphasis in training and additional exercises to heighten awareness of the risk, the accidents continue. What then is the problem?

Most accidents in sporting and private aviation are due to pilot error. This may mean a lack of skill, a failure to manage the workload, a lack of awareness of the risk or simply a lack of imagination. Once a pilot is past the stage of regular checks, maintaining an adequate standard is a matter of regular flying practice and having a personal philosophy to "do it right", that is within safe limits.

Maybe it's the philosophy that slips since a significant number of spinning accidents happen to pilots who are in practice and experienced. This may indicate that a combination of over-confidence and complacency are the root of the problem. Whatever the factors it seems that too many pilots do not appreciate the risks which need to be considered in both the context of dual training and solo flying.

Training philosophy

In regard to stalling and spinning various views are put forward representing extremes of caution and risk taking. This can be best appreciated by considering the height at which such exercises are carried out.

As a young (or new in the job!) national coach I well remember being asked to make a safety audit of a club with a poor record, particularly stall/spin accidents. I flew with most of the instructors, none of whom would teach stalling, let alone spinning, below 1500ft! The obvious implication was that stalling and spinning are dangerous – but we all know that, don't we? Interestingly, although the demonstrations of stall and recovery were satisfactory with good patter etc, they had little or no indication or emphasis that stalling and spinning are fraught when it happens near the ground. The only emphasis was – "we don't do it below 1500ft."

The other extreme is to carry out the training, some or all of it, at a height which really emphasises the message by frightening the student. Obviously this would incur significant risk and, let me stress, I am not advocating such practice. The necessary balance to be achieved must be based on what risks the instructor takes during training with the aim of minimising the overall risk.

Without getting into too much detail I believe the balance is achieved for each individual student by giving him, or her, a "calibrated fright." Let me qualify that point. A calibrated fright will have achieved its objective if at any time a pilot finds himself flying too slowly he recalls the fright; better never to fly too slowly. Generally the training exercise will involve a contrived inadvertent stall in circumstances which will alarm the student sufficiently, despite the fact that there are adequate safety margins.

Calibrated frights

The circumstances may vary, the message should not. A good example might be soaring a ridge. "Fly a bit slower" you may say. Continue beyond the best lift, even into sink. Prompt "turn now", and maybe the turbulence will do the rest. Obviously this only applies if you have enough height above the valley floor and may be more appropriate to hill top sites. Whether the emphasis comes from the altimeter reading or the proximity of the ridge behind you is not important, so long as you get the message across.

Other circumstances are possible – flying slowly in turbulent conditions or thermalling (so long as there are no aircraft below!). In any case there may be a contrived element; afterwards you should point out that flying too slowly is not efficient.

Begging the question!

I have still avoided the $64 000 question, what is the minimum height at which stalling and spinning should be completed? A difficult question because the answer depends on several factors: the philosophy of the instructor (in this context), his perception of his own ability (which may be flawed) and his skill and experience of stalling and spinning, the student's confidence or lack of it, the spin and recovery characteristics of the glider, the weather conditions and even the height available (consider a winch only operation). Each of these factors warrants separate consideration even though they are to some extent inter-dependent.

The glider's characteristics are an important factor. How readily does it spin? What is the height loss per turn? Does it recover on command, that is with good authority? To what extent does an incorrect recovery (say less than full opposite rudder) delay recovery? Do the characteristics differ between forward and aft C of G? The answers vary from type to type and each factor needs to be taken into account. More importantly, these are questions you must answer!

Obviously **minimum safety height** doesn't vary all that much but, based on height after pulling out from the dive, 700 or 800ft for a K-13 but not less than 1000ft for a Puchacz. There, I've put numbers to it, but these will still be qualified by the other factors!

The instructor's **personality profile** can be quite important. The implications of the macho image are obvious. "Impulsiveness", a tendency to act without reflection may be a compounding factor as may "invulnerability" – "accidents don't happen to me!" "Opposition to authority" may lead to flouting any height guidelines or limits. It is hoped that the selection and training of instructors goes some way to avoiding or modifying some of the least favourable traits. In principle letting pilots elect to become instructors is not good practice.

The instructor's philosophy should influence the conduct of the stall/spin exercises. His aim should be to convince the student that the risks are real and serious – like death! To achieve this metaphorical impact requires a good understanding of the hazards and a fine balance to give thorough training and bring the right degree of emphasis to the calibrated fright.

Confidence is relevant to both instructor and student. For the instructor his personality profile will interact with skill and experience. It is interesting to note that the break-off height goes up with age! A significant element in the training is to build a student's confidence.

Confidence should be the determining factor when a particular exercise is taught; stalling and spinning too soon may destroy confidence which can be difficult to restore. In reality a pilot who continues to be nervous (for nervous read frightened) may never be safe in a spin prone glider.

The **weather conditions** should also be considered. There may be adverse factors of turbulence, wind gradient and poor visibility which may affect the conduct of the exercise and even whether you carry it out at all.

The emphasis

Bringing the right degree of emphasis for each individual is obviously not easy and, as was said earlier, has to take the various factors above into account. If the height at which the spin recovery is made was the only factor then it might be relatively simple to give guide lines, such as the heights given earlier. However, spinning low down is clearly a relatively basic approach to bring the right degree of emphasis.

A key factor in determining the minimum height is the fact that the ground looks noticeably closer after the recovery than it did on entry. This is

THE NEW BGA HANDICAP LIST

John, chairman of the BGA Handicap Sub-committee, outlines the major changes

This year there has been a fairly radical overhaul of the handicap list with many individual changes in response to pressure that has been building for some time. In addition we have decided to abolish the differential handicap for waterballast as it it felt that the decision to carry water or not is up to the pilot and is part of competition flying. In general gliders that can carry water have a handicap nearer the highest previous handicap to reflect their ability to cope well with a range of different soaring conditions. It was felt also that it is not desirable to require pilots to fly with inappropriate wing loadings.

For similar reasons it has been decided to do away with the differential handicap for motor gliders. These now have the same handicap as the equivalent glider – the conditions alone determine whether the extra weight is an advantage or a disadvantage.

A total of 70 new or altered handicaps have been awarded. The major areas for change have been:

1. Slight up rating of the newer Standard Class machines together with a slight down rating of some of the 15 Metre Class machines. It is six year since someone first indicated to me that there really wasn't all that much between an ASW-20 and an LS-4. It has been felt generally for some time that the handicap differential between these two groups was excessive and measured performance data supports that view.
2. Compression of the higher handicaps. This reduces the overall spread of handicaps and brings us more in line with the German handicap list. It should make it fairer for these gliders in Regionals where they are excessively penalised at present.

Wherever possible the guide lines relating to wingtip extensions and winglets have been followed – that is a 2% increase/m of increased span and a 1% increase for winglets. Handicapping wing extensions has become harder recently with the proliferation of devices, some of which seem to work whilst others are of more doubtful benefit. No doubt the process of assessing the effectiveness of these attachments will continue during this coming year and further changes in handicap are likely in the future.

sometimes known as the "ground rush effect". Why is this important? Simply because it should make a student or any pilot aware of a serious risk in the inadvertent spin, that is of pulling too sharply out of the spin recovery dive. Of course we all know the risk – a high speed stall.

One final point. Continuous spins have a place in training insofar as they ensure that a pilot is not disorientated or disconcerted during the manoeuvre. A real test of ability and state of mind is to enter and stay in a spin, counting the turns, monitoring the height loss, working out the height loss per turn and then recovering on a heading. **There is no merit in combining this manoeuvre with the low level recovery justified in the previous paragraph.**

Rules

Why not a rule no spinning below "Xft"? In the circumstances who will decide X? Will it be a figure which precludes teaching spinning at winch launch operation except on soaring flights? If there is a rule would everyone comply? We all know rules which are more honoured in the breach than the observance, don't we?

In the final analysis

Philosophies on spinning vary. Is this a counsel of perfection? I think not. The exercise was dropped from the PPL syllabus in the USA years ago and more recently in the UK. It is interesting to note the fresh emphasis on spinning in glider pilot training in the USA. One thing is for sure, despite recent trends towards gliders that seem to spin less readily, most of them will. Accidents still confirm this and no doubt will continue to do so. Your only insurance is good dual training and regular practice, both dual and solo. Or would you rather travel hopefully?

BGA 1993 Handicap List

130	Nimbus 4
129	Nimbus 3 (25.5m)
127	ASW-22 (24m), Nimbus 3 (24.5m)
125	ASH-25, Nimbus 3D, Nimbus 3DM
117	Kestrel 22
116	Glasflügel 604, Jantar 2, ASW-17, LAK-12, Nimbus 2
115	LS-6c (17.5m), DG-600 (18m)
114	Jantar 1, Ventus (17.6m), Kestrel 20
113	ASW-20BL, DG-600 (17m)
112	Ventus (16.6m), DG-500, DG-500M, ASW-20CL, Kestrel 19
111	ASW-20L
110	DG-400, DG-202 (17m)
109	IS-32, LS-3 (17m), LS-6, Vega L (17m)
108	ASW-20B, ASW-20C, Calif A21, DG-600 (15m), Diamant 18, Glasflügel 304, Janus C, Janus CM, Ventus (15m)
107	ASW-20, DG-200, Kestrel 17, LS-3, Mosquito Nimbus 15, Speed Astir, Vega (15m)
106	LS-7WL
105	ASW-24, Discus, LS-7, SZD-55
104	Cirrus 18.8, DG-300, Janus B, LS-4, PIK 20
103	PIK 20E, Pegasus
102	ASW-19, Cirrus 17.7, Phoebus 17
101	Std Jantar
100	ASW-15, DG-100, Hornet, LS-1, SHK-1, Std Cirrus
99	Astir CS, Pegasus Club, Std Libelle, DG-300 Club
98	ASW-19 Club, Diamant 16.5, Marianne, Sport Vega
97	Silene
96	Acro Twin 3, JP15-36A, KH 1, Motor Cirrus, Twin Astir
95	Astir Jeans
94	Acro Twin 2, K-21, K-23, Cobra 15, Libelle Club SFH 34, Viking
93	SZD Junior
92	Dart 17, Foka 5, IS-29D, Torva, Zugvogel 3B, Puchacz
90	Foka 4, K-6E, Pilatus B-4, SD 3/15, SF-27, Sie 3
88	Iris, IS-28B, SF-27M
87	Olympia 419
86	K-18, Skylark 4
85	Skylark 3
84	Dart 15, K-6CR, Olympia 403, Pirat, Olympia 463
82	BG-135, Fauvette, M 200
80	K-14, L-Spatz, M 100S, Mosway 4, Super Blanik
78	Bergfalke 4, Jaskolka, K-8, Mosway 3, SF-26, T-53
77	Eagle
76	Skylark 2, K-13, Sky, Weihe
74	Bergfalke, Blanik, Bocian, Mucha Std
73	Super Falke
72	K-2, K-7, SFS-31
70	Capstan, Meise, Olympia 2, Swallow
68	K-16, Kite 2A, RF-5B, Tandem Falke
66	Kranich, Mü-13
63	Prefect
62	Grunau Baby
56	T-21
52	Falke

S&G *CONTRIBUTORS*

We welcome articles for S&G and good colour and black and white photographs – colour prints are very acceptable. For those of you using word processors we appreciate the loan of the disc. But please write to our Cambridge address and not the BGA office.

MERRI'S TRUE CONFESSIONS

These are the true confessions of a gliding fanatic. Be warned, I name names

How does any one start gliding? I started because I was tricked into it. One Easter Sunday many moons ago, Derek woke up, looked at the sunshine and asked me what I wanted to do. I thought it might be pleasant to take in an antiques fair or visit a stately home. Derek went to make some coffee, and returned smiling broadly – "We'll go to Bicester", he said.

It was not until we were half-way there that I thought to ask what was in Bicester. "Gliders", he replied, gleefully. How can I describe how my heart sank? In the year that we had been married, I had spent more time on little airfields, bravely waving my fearless aviator off in his Pitts than I care, even now, to recall. I could not bring myself to match his enthusiasm as we belted along. Maybe, I hoped, he would change his mind . . . maybe we would run out of petrol.

We arrived at Bicester, which looked big and quite intimidating – all these people doing things to all these white shiny gliders, and all looking very competent to me. I hardly knew where to put myself, as Derek asked to see the duty full Cat (who?). Then, suddenly, one of these large white, winged objects actually took off at the most amazing angle! I, who am afraid of roller coasters had to turn away; I really couldn't bear to watch. Little did I know how many winch launches I'd log in the coming year!

"I just recall how wonderful it felt to be flying without any distracting noises..."

Derek soon sorted me out with a flight, assuring me that launching by aerotow was "the gentlemanly way to get airborne". That was it. I don't remember coming off tow, I just recall how wonderful it felt to be flying without any distracting noise. It's the feeling of gliding that catalysed the addiction.

I did eight launches that day (five of which were winch launches as economy took precedence over fear), and flew three different types, including a Janus with Terry Joint, then Bicester CFI. That flight actually has a lot to answer for as I promised myself that I would one day own a Janus. It was obvious this glider meant business; there were no frills or extra padding to clutter it up and it was so elegant.

Derek couldn't believe the success of this expedition and subbed me to a logbook, a glider pilot Met book, a copy of **Laws and Rules**, and a learn yourself gliding book. I was so knocked out by the exhilaration (the last flight was a begged for aerobatic flight), that I fell asleep clutching these shiny, new books on the way home. We had an early dinner with me bombarding poor Derek with questions and him fending them off as best as he could and an early night so we could get to the airfield early the next day to make my peace with the flying list. Notice all the "early's"? This was to set a pattern for the next few years.

The next morning, and this has gone down as a bit of history in Derek's old squadron, the first words Derek was met with weren't "Good morning darling", or, "Where's my coffee", but "About this adverse aileron yaw thing". I knew I'd married the right guy when he retrieved the day's unread newspaper and proceeded to make an aerofoil out of it.

Once they finally got me to open my eyes on a winch launch, learning to glide progressed smoothly enough. You can ask Ted Richards if you think I'm exaggerating about keeping my eyes shut. The poor fellow had the privilege of sitting in the back while I took control for the first time and found out what a winch launch really looked like from start to finish. It was only when we debriefed that I discovered that the view wasn't supposed to be quite so steep, or "vertical" as Ted put it when he finally found his voice. It was all news to me . . .

Derek left for a four month sojourn in the Falklands soon after I went solo (I remember them all scurrying to push the gliders closer to the bus, freeing as much of the landing area as possible – this did wonders for my confidence). He knew when to make an exit. All the letters I sent him were full of "and did you know that when you do this the glider responds as follows . . .". Not gushes of romantic "missing you" dribble, but blow-by-blow accounts of each and every flight.

He used to respond by analysing each report in turn. I've looked out the correspondence recently and had to laugh: there was the letter from him which predicted my incipient promotion to single-seaters, which I received the day that I was converted to the K-8. That was a shock: finally I was flying something my size, and something which had a rate of roll! Wow.

After that came the newly rebuilt K-18 which I think I literally would have killed for; I wanted to fly it so badly! Imagine, a glide angle! I loved that little glider then, and it is still one of my favourites. I had the first flight after it had been flight tested, and I'll never forget the way it smelled, or how beautiful and neat the black Hammerited instrument panel looked. I have 35hrs in it, and while no one actually resorted to using a crow-bar to get me out of it, that's probably what it would have taken. I firmly believe that all gliders have souls, and this has one of the best. Nothing afterwards, until the Janus, felt as good, and the Janus took some getting used to.

The next step came when Derek left the RAF and it became necessary to buy a glider. Janus C (710) fortuitously presented itself to us and we underwent a fairly agonised period of debate: shall we or shan't we buy it? It was expensive, yes, but then again, it wasn't every day a Janus came on the market, especially one which was in as good condition as this one (thanks, Ralph, it really *is* beautiful). If we put the money in the glider, then we don't have it in savings, and what if something should go wrong? Well, we'll just have to face that when it happens – no use borrowing trouble.

Can you figure out who had which side of the argument, sorry, debate? It was really very good of Derek to agree to this purchase – most wives are satisfied by the odd dinner out, but not this one! It is still to his credit, and to the credit of the syndicate, that they don't shout me down when I call it "mine". I don't even think they grit their teeth anymore.

Owning a glider has brought its own share of "adventure". The village is still talking about the time we (Derek) managed to park the trailer in front of our house on our way from Bicester to Talgarth. I didn't think it was possible, and it was nearly impossible to get it out again – something to do with a lip on the road where it meets our gravel drive (all of 5ft wide) and a defunct brake as I recall the explanation.

I had been very nervous about towing it to Wales, laden as we were with baby, dog and accoutrements (nappies, if you must know), but after man-handling that glider trailer out of our drive and down the track to the road, dog jumping and Izzy yelling, anything would have been easy.

"I'm sure the neighbours think we're involved in some strange religious sect"

The village has also noticed the smells emanating from our kitchen (nothing to do with my cooking). I refer to glass-fibre, lead flashing and aluminium sheeting all mushed together in 710's front seat pan on our kitchen table. Derek turned this into ballast for me to fix to the seat. (I need to carry at least 30lbs.) I'm sure the neighbours all think we're involved in some strange religious sect. When you think about it, though, they're not far wrong.

Of course, as soon as I had built up 40hrs – in three weeks – in 710, events (*eg* morning sick-



Merri photographed at Bicester on home territory.

ness, then a baby who thought she was a marsupial and who never slept) began to overtake me, and the past two years have been a struggle to a) find the time to glide and b) find the energy. Combined daily activities have managed to complicate life considerably. I found myself preferring, on the odd occasion, to stay in bed and get some sleep rather than haul the glider out and hit some sky. It can be a terrible source of conflict.

Now I *hate* being out of currency. Not just currency, you understand, but place-the-glider-anywhere-on-the-airfield, know-exactly-what-it-can-and-will-do currency. It has been the source of more frustration and (in all probability) headaches than anything else over the past two years – and bereavement and redundancy have all played a part. I can honestly say that if I could have flown regularly and been up to (my) standard, then the rest would have been a lot easier. I'd rather not do it, than do it awkwardly.

This year, however, Izzy is bigger and Derek has promised me that he will look after her. And if he should have to work, then Pete Stratten has promised me that *he* will look after her. I'm putting this in writing because I know that promises made in the heat of the glider workshop can sometimes be forgotten, though Strats seems to be sincere! I've set myself goals for this season, and I will meet them. And that will be that!

SHAGGY DOG STORY!

Sam was photographed at the controls of this Grasshoppper some time ago at Bicester by Richard Lovell-Butt and is the first time we've known of a dog involved, even in a tenuous way, with gliding. But there are endless stories in the power flying world of dogs who appeared to have become addicted.

An East Anglian labrador always flies behind the pilots in a Cessna 150 and is carried in and out by her substantially built owner so that she is kept free of the propeller.

If there are animals out there who enjoy a day messing about with gliders, then we'd like to publish their antics in S&G.



THE INTERNATIONAL SCENE

FAI, IGC, OSTIV, Europe Airsports and the European Gliding Union

While the BGA sets most of the rules for gliding in the UK including the early badges up to the Bronze, the rules for the higher badges from Silver upwards (with the exception of the UK Cross-Country Diploma) are set by the International Gliding Commission (IGC) of the Fédération Aéronautique Internationale (FAI). The IGC also supervises the arrangements for all international gliding competitions and approves the rules for these and for all gliding records. The FAI and IGC are primarily concerned with sporting matters, and there are other international bodies dealing with technical and regulatory matters.

The FAI and IGC

The FAI with its headquarters in Paris, was founded in 1905 and is essentially a federation of National Aero Clubs. Membership currently stands at 87 and virtually all countries where any significant amount of air sport takes place are members. Only one aero club or federation from each country can be accepted and this must represent all air sports in that country. The Royal Aero Club of the United Kingdom is the British member and is itself composed of all the different Air Sport Associations in the UK. The BGA is the second largest Association in the RAeC (after the British Model Fliers' Association).



Hanspeter Hirzel.

The president of FAI, recently elected, is Hanspeter Hirzel, a Swiss lawyer and power plane pilot. His term of office is two years. The Secretary General (a paid employee) is also new and is a British glider pilot – Max Bishop (see *S&G* October 1992 p276).

The FAI has a general conference every year and a Council which meets twice a year. These meetings deal with general matters including finance, admission of new members, public relations, international medals and awards etc. To deal with more specific matters, FAI has 11 Air Sport Commissions together with a number of Technical committees such as the Medico-Physiological Committee and the Aerospace Education Committee.

To avoid needless differences, there are common rules that apply to all air sports and these are decided by the FAI General Air Sport Commission (CASI – the initials of its name in French). These common rules are embodied in the General Section of the **Sporting Code**. The General Section also contains the definitions of the different types of aircraft and our sort of glider is termed Class "D".

The ten Air Sport Commissions each specialise in a different air sport discipline. Gliding is looked after by the International Gliding Commission (IGC nowadays, although it used to be known by its French initials – CIVV).

The IGC

Each member of FAI is entitled to send a delegate to sit on each of the Air Sport Commissions. Typically, about 35 countries send delegates to IGC.

The president of IGC is Peter Ryder, a Professor at Bremen University. He has been in office for three years (there is no limit to the term of office in the case of Air Sport Commissions). He was born and grew up in England but has a German wife and speaks German fluently. There are also six vice-presidents of IGC. Collectively with the president they are known as the IGC Bureau and are sometimes delegated to take decisions between full IGC meetings.

The rules which IGC sets for gliding are incorporated in Section 3 of the **Sporting Code** and the layout and content of this has recently been entirely revised. (The new version is available from the BGA office.)

Apart from the rules, much of the time of IGC meetings is taken up with the organisation of International Championships. At present, in addition to World and European Championships, there are Championships for Juniors, Women, Motor Gliders and Club Class Gliders. Each of these Championships takes place every two years. The 23rd World Gliding Championship will be held this June in Sweden and the 24th will be in New Zealand in January 1995.



Peter Ryder photographed by Tom with the Milford Sound, S Island, New Zealand in the background.

OSTIV

This organisation (the initials stand for Organisation Scientifique et Technique Internationale du Vol à Voile) was originally formed before the Second World War and is mainly concerned with technical matters. It is comprised of individual members from all over the world, rather than national representatives.

Manfred Reinhardt is the president of OSTIV and has been for number of years. He also is a German academic – he recently retired as head of the Institute of Atmospheric Physics which is part of the German Aerospace Research Establishment – and in addition an anglophile, taking frequent holidays in this country.

One of the principle activities of OSTIV is to hold Congresses – usually coinciding with World Gliding Championships, at which large numbers of technical and scientific papers related to gliding are read. These papers are later printed and circulated in *Technical Soaring* magazine. OSTIV also has three specialist panels: The Sailplane Development Panel, the Meteorological Panel and the Safety and Training Panel. The chairman of the latter is our own Bill Scull.

There is a close relationship between OSTIV and IGC and IGC takes advice from OSTIV on various matters such as the precise technical definitions of the different Classes of gliders. OSTIV is independent but is affiliated to FAI and attends its general conference.

Europe Airsports

Europe Airsports (EA) was formed about three years ago and its principle object is to deal, on behalf of all air sports, with the European regulatory bodies which are developing harmonised Europe-wide regulations. Initially comprised of representatives from the Aero Clubs of the 12 EC countries, it is now open to the Aero Clubs of the 31 countries which are members of the European Civil Aviation Conference (ECAC). It has no formal relationship with FAI, but the representatives sitting on its ruling Council are mostly the same as those who attend FAI Council meetings.

The president of the EA is yet another Brit – Fred Marsh. Fred is a business consultant in the food industry and many years ago was briefly a member of London Gliding Club. However, he decided that there were easier ways to fly and his main air sport became formula air racing



Fred Marsh in front of a Stampe bi-plane.

(pylon racing). He preceded the writer as the UK representative on the FAI Council.

EA has been recognised by both ECAC and JAA. The latter (full title – Joint Aviation Authorities with headquarters in Holland) comprises the Civil Aviation Authorities of the 12 EC countries plus six other mainly western European countries. Although initially sporting aviation was mostly ignored by these European regulatory bodies, both EA and FAI have recently been invited to send representatives to sit on working groups which are developing harmonised and uniform regulations.

These harmonisation activities are particularly important for Britain because at present we enjoy substantial delegation of authority on regulatory matters from the CAA to individual Air Sport Associations. Gliding is almost entirely regulated by the BGA. In most other European countries the government or National Aviation Authority regulates gliding by issuing glider pilot licences and glider Cs of A.

In addition to its Council, EA has set up a number of working groups specialising in the regulations which effect each air sport. Apart from the British representative, the gliding working group of EA has not been very active.

European Gliding Union

This organisation (EGU) has only recently been formed (November 1992). Its principle aim is to deal with regulatory matters related to gliding in Europe and to negotiate with ECAC and more particularly with JAA and the EC in Brussels, on behalf of European glider pilots. It is an independent body but aims to have close relationships with FAI, IGC, EA and OSTIV. It is likely that EGU will effectively take over the role of the gliding working group of EA.

The president of EGU is a Dutchman – Fransois van Haaf. He is an early retiree with time and enthusiasm to devote to the job. He is an active glider pilot and an instructor.

The headquarters of EGU is in the offices of the French Gliding Federation (FFVV) who have generously offered free office services to the EGU.

It is likely to set up panels of experts to deal with regulatory problems

EGU is open to membership from the gliding organisations of the 19 countries which are members of JAA. It is likely that the representatives on its ruling Council will be mostly the same as the IGC delegates. That will allow its meetings to be held at the same time and place as IGC meetings and so save travel and hotel expense. However, as with EA, it is likely to set up panels of experts to deal with the different regulatory problems, such as pilot licensing, airspace and glider airworthiness matters.

The success of EGU in fending off needless bureaucracy, restriction and expense will be particularly important for British gliding.

TECHNICAL COMMITTEE NEWS

The BGA Technical Committee have found that in spite of the recession more than 112 gliders were added to the BGA register during the last year with new two-seaters from Poland dominating the list of newcomers.

Howard Torode, the chairman of this Committee, wrote in the BGA annual report that the remainder were various types covering a whole spectrum of performance and bought from many sources.

A review of BGA accident statistics showed that technically related accidents remain a very small percentage of the whole. However, there was concern about the failure to connect flying controls properly and to carry out competent preflight inspections.

Value for money

Howard considered that one of the most dynamic developments in the UK gliding scene has been the creation of better value for money launching facilities. They had had applications to winch launch above 2000ft from several clubs.

Up to 400ft extra had been claimed by almost all the clubs who converted from heavy diesels to the more responsive V8 automatic powerplants, often installed in ex Air Cadet twin drum winches bought from the MoD at vehicle auctions for less than £1000.

Bargain price winches

Other clubs had bought used Tost twin drum winches from Germany at bargain prices. Conversion to LPG offers petrol performance at diesel prices.

Dick Stratton, BGA chief technical officer, has encouraged these developments over the last few years (see also p28).

Incidentally during 1992 Dick drove more than 24000 miles visiting clubs, exchanging ideas and giving advice and assistance.

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CLUB DIRECTORY

Compiled by Steve Longland



SCOTLAND

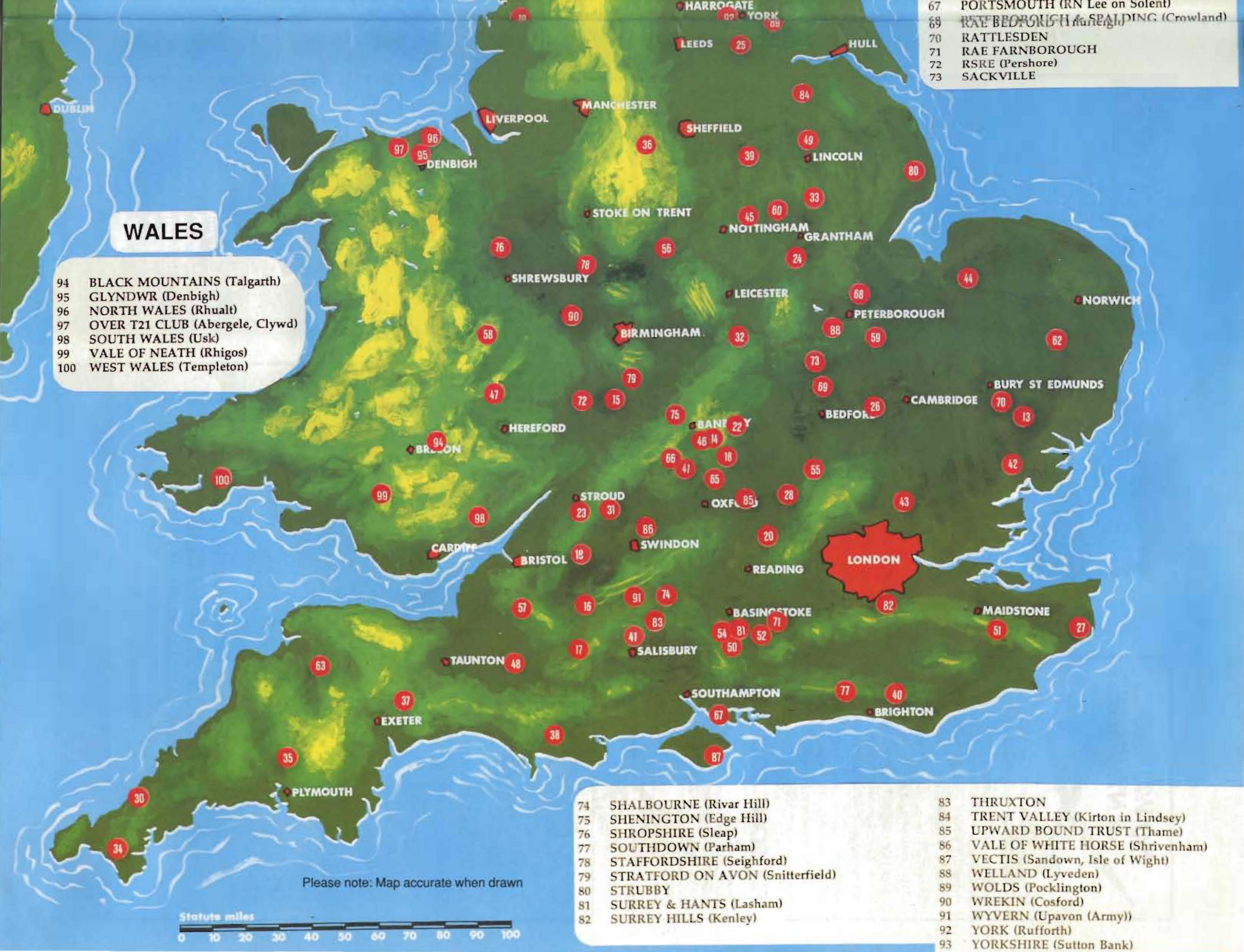
1 ANGUS (Drumshade)
2 ARGYLL & WEST HIGHLAND (Connel)
3 CAIRNGORM (Feshiebridge)
4 CONNEL
5 DEESIDE (Aboyne)
6 DUMFRIES & DISTRICT (Falgunzeon)
7 FULMAR (RAF Kinloss)
8 GRAMPIAN (Laurencekirk)
9 HIGHLAND (Dallachy)
10 LOMOND (Arbroath)
11 SCOTTISH GLIDING (Portmoak)
12 STRATHCLYDE (Strathaven)

IRELAND

01 ULSTER (Bellarena)

ENGLAND

13 ANGLIA (Wattisham)
14 AQUILA (Hinton-in-the-Hedges)
15 AVON (Bidford on Avon)
16 BANNERDOWN (Keevil)
17 BATH, WILTS & NORTH DORSET (Kingston Deverill)
18 BICESTER (RAF Bicester)
19 BLACKPOOL & FYLDE (Chipping)
20 BOOKER (Wycombe Air Park)
21 BORDERS (Galeswood Farm)
22 BRACKLEY (Turweston)
23 BRISTOL & GLOUCESTER (Nympsfield)
24 BUCKMINSTER (Saltby)
25 BURN GLIDING CLUB (Burn, Selby)
26 CAMBRIDGE UNIVERSITY (Gransden Lodge)
27 CHANNEL (Waldeshare Park)
28 CHILTERNS (RAF Halton)
29 CLEVELANDS (RAF Dishforth)
30 CORNISH (Perranporth)
31 COTSWOLD (Aston Down)
32 COVENTRY (Husbands Bosworth)
33 CRANWELL (RAF Cranwell)
34 CULDROSE (RN Culdrose & Predannack)
35 DARTMOOR (Brentor)
36 DERBY & LANCS (Camphill)
37 DEVON & SOMERSET (North Hill)
38 DORSET (Bovington Camp)
39 DUKERIES (Gamston)
40 EAST SUSSEX (Ringmer)
41 ENSTONE EAGLES (Enstone)
42 ESSEX & SUFFOLK (Wormingford)
43 ESSEX (North Weald & Ridgewell)
44 FENLAND (RAF Marham)
45 FOUR COUNTIES (RAF Syerston)
46 GLIDING CENTRE (Hinton-in-the-Hedges)
47 HEREFORDSHIRE (Shobdon)
48 HERON (RN Yeovilton)
49 HUMBER (RAF Scampton)
50 IMPERIAL COLLEGE (Lasham)
51 KENT (Challock)
52 KESTREL (Odiham (Army))
53 LAKES (Walney)
54 LASHAM
55 LONDON (Dunstable)
56 MARCHINGTON (Tatenhill)
57 MENDIP (Halesland)
58 MIDLAND (Long Mynd)
59 NENE VALLEY (Upwood)
60 NEWARK & NOTTS (Winthorpe)
61 NEWCASTLE & TEESIDE (Carlton Moor)
62 NORFOLK (Tibenham)
63 NORTH DEVON (Eaglescott)
64 NORTHUMBRIA (Currock Hill)
65 OXFORD (Weston on the Green)
66 OXFORDSHIRE SPORT FLYING (Enstone)
67 PORTSMOUTH (RN Lee on Solent)
70 RATTLESDEN



WALES

94 BLACK MOUNTAINS (Talgarth)
95 GLYNDWR (Denbigh)
96 NORTH WALES (Rhualt)
97 OVER T21 CLUB (Abergele, Clywd)
98 SOUTH WALES (Usk)
99 VALE OF NEATH (Rhigos)
100 WEST WALES (Templeton)

67 PORTSMOUTH (RN Lee on Solent)
68 PETERBOROUGH & SPALDING (Crowland)
69 RAE BEDFORD (Thurleigh)
70 RATTLESDEN
71 RAE FARNBOROUGH
72 RSRE (Pershore)
73 SACKVILLE

74 SHALBOURNE (Rivar Hill)
75 SHENINGTON (Edge Hill)
76 SHROPSHIRE (Sleap)
77 SOUTHDOWN (Parham)
78 STAFFORDSHIRE (Seighford)
79 STRATFORD ON AVON (Snitterfield)
80 STRUBBY
81 SURREY & HANTS (Lasham)
82 SURREY HILLS (Kenley)
83 THRUXTON
84 TRENT VALLEY (Kirton in Lindsey)
85 UPWARD BOUND TRUST (Thame)
86 VALE OF WHITE HORSE (Shrivenham)
87 VECTIS (Sandown, Isle of Wight)
88 WELLAND (Lyveden)
89 WOLDS (Pocklington)
90 WREKIN (Cosford)
91 WYVERN (Upavon (Army))
92 YORK (Rufforth)
93 YORKSHIRE (Sutton Bank)

Please note: Map accurate when drawn

Statute miles
0 10 20 30 40 50 60 70 80 90 100

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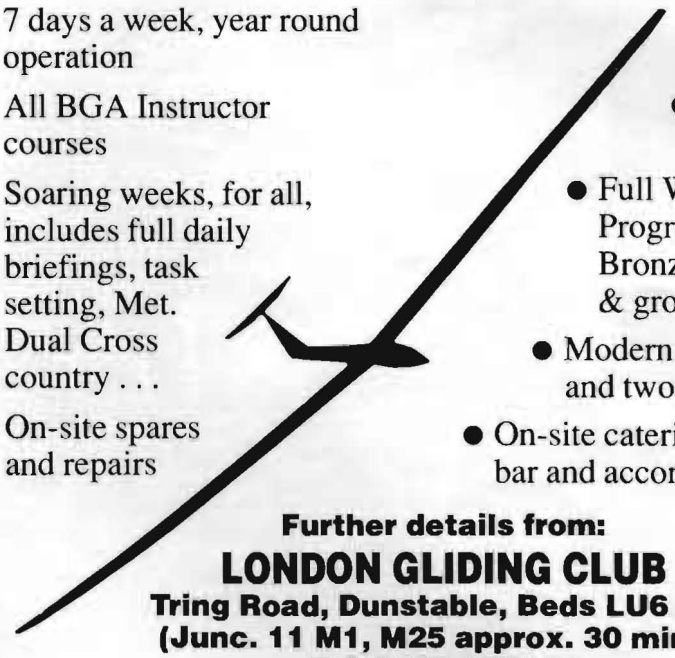
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0874 711254 } (evenings)
or 0874 86619 }

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*ANGLIA	Wattisham	0449 720631 ex299
ANGUS	Drumshade	0241 74001 (sec)
AQUILA	Hinton-in-the-Hedges	0295 811056
ARGYLL & WEST HIGHLAND	Connel	0631 71243
AVON SC	Bidford on Avon	0789 772606
*BANNERDOWN	Keevil	06663 233
BATH & WILTS	Kingston Deverill	0380 870411
*BICESTER	RAF Bicester	08692 43030
BLACK MOUNTAINS	Talgarth	0874 711463
BLACKPOOL & FYLDE	Chipping	0995 61267
BOOKER	Wycombe Air Park	0494 442501
BORDERS	Galewood Farm	06686 284
BRACKLEY	Turweston	0280 704470
BRISTOL & GLOS	Nympsfield	0453 860342
BUCKMINSTER	Saltby	0533 303804/0602 307737
BURN	Burn, Selby	0757 270296
CAIRNGORM	Feshiebridge	05404 317
CAMBRIDGE UNIVERSITY	Gransden Lodge	076767 7077
CARLTON MOOR	Carlton Moor	0642 778234
CHANNEL	Waldershare Park	0304 824888
*CHILTERNS	RAF Halton	0296 623535
*CLEVELANDS	RAF Dishforth	09012 2147
CONNEL	Connel	0369 81256 (sec)
CORNISH	Perranporth	0872 572124
COTSWOLD	Aston Down	0285 760473
COVENTRY	Husbands Bosworth	0858 880521
CRANFIELD	No site	N/K
*CRANWELL	RAF Cranwell	0400 61201 Ex7230
*CULDROSE	RN Culdrose	0326 574121 Ex2275
DARTMOOR	Brentor	0752 862961 (sec)
DEESIDE	Aboyne	03398 85339
DERBY & LANCS	Camphill	0298 871270
DEVON & SOMERSET	North Hill	040484 386
DORSET	Bovington Camp	0202 576467 (CFI)
DUKERIES	Gamston	0909 501032
DUMFRIES & DISTRICT	Falgunzeon	038776 601
EAST SUSSEX	Ringmer	0825 840347
ENSTONE EAGLES	Enstone	0608 72462
ESSEX	North Weald & Ridgewell	0378 822222
ESSEX & SUFFOLK	Wormingford	0206 242596
*FENLAND	RAF Marham	0706 337261
*FOUR COUNTIES	RAF Syerston	063685 300
*FULMAR	RAF Kinloss	0309 72161
GLYNDWR	Denbigh	0745 813774
GRAMPIAN	Garvoch Hill	0241 53232 (CFI)
HEREFORDSHIRE	Shobdon	056881 8908
*HERON	RN Yeovilton	0935 456390
*HUMBER	RAF Scampton	0522 730421
HIGHLAND	Easterton	0343 820834 (treas)
IMPERIAL COLLEGE	Lasham	025683 270
KENT	Challock	023374 307
*KESTREL	Odiham (Army)	0256 703157
LAKES	Walney	0229 471458
LASHAM	Lasham	0256 381322
*LOMOND	Leuchars	0334 839471 Ex7645 (chm)
LONDON	Dunstable	0582 665744
MARCHINGTON	Tatenhill	0283 820009
MENDIP	Halesland	0749 870312
MIDLAND	Long Mynd	058861 206
NENE VALLEY	Upwood	0480 301316 (sec)
NEWARK & NOTTS	Winthorpe	0636 707151
NORFOLK	Tibenham	0379 77207
NORTH DEVON	Eaglescott	07693 404
NORTH WALES	Rhuallt	051 3274760 (sec)
NORTHUMBRIA	Currock Hill	0207 561286
OXFORD	Weston on the Green	086989 265
OXFORDSHIRE SFC	Enstone	0608 677208 (CFI)
PETERBOROUGH & SPALDING	Crowland	0733 210463
*PORTSMOUTH	RN Lee-On-Solent	0705 550502
RAE BEDFORD	Thurleigh	0234 261079
RAE FARNBOROUGH	Farnborough	0252 24461
RATTLESDEN	Rattlesden	0449 737789
RSRE	Pershore	0684 567588 (sec)
SACKVILLE	Riseley	0234 708877
SCOTTISH GU	Portmoak	059284 543
SHALBOURNE SG	Rivar Hill	0264 89204
SHENINGTON	Edge Hill	0295 888121
SHROPSHIRE SG	Sleap	0939 32882
SOUTHDOWN	Parham	0903 742137
SOUTH WALES	Usk	0291 690536
STAFFORDSHIRE	Seighford	053834 369
STRATFORD ON AVON	Snitterfield	0789 731095
STRATHCLYDE	Strathaven	0357 20235
STRUBBY	Strubby	0507 450698
SURREY & HANTS	Lasham	0256 381322
SURREY HILLS	Kenley	081 7630091
THRUXTON	Thruxton	0264 773274
TRENT VALLEY	Kirton-in-Lindsey	0652 648777
ULSTER	Bellarena	05047 50301
UPWARD BOUND TRUST	Thame	0442 61747 (sec)
VALE OF NEATH	Rhigos	0685 811023
VALE OF WHITE HORSE	Shrivenham	0793 783293 (sec)
VECTIS	Sandown IOW	0983 405125
WELLAND	Lyveden	0406 22480
WEST WALES	Templeton	0239 614756
WOLDS	Pocklington	0759 303579
WREKIN	Cosford	0902 372393
*WYVERN	Upavon (Army)	098063 351 Ex386
YORK	Rufforth	0904 83694
YORKSHIRE	Sutton Bank	0845 597237

**=Service clubs.*



1.

VINTAGE GLIDING

We are grateful to Ian Dunkley for this colourful selection of photographs. 1. Ian's Fauvel AV22-SA. 2. Martin Simons and Marieke De Jong in her Dopplerab. 3. Chris Wills flying his Kranich 2B. 4. Michael Maufe's BAC 7. 5. Camilla van Beugen's Govier 3.

2.





3.



4.↑ 5.↓



BRITISH HOLDERS OF ALL THREE DIAMONDS

1955
1. H. C. N. Goodhart

1960
2. G. A. J Goodhart
3. P. A. Wills

1961
4. Anne Burns
5. D. O. Burns
6. J. S. Wiliamson

1962
7. P. M. Scott
8. A. H. Warminger

1967
9. P. S. Dawson

1968
10. A. W. Gough
11. D. B. James

1970
12. B. Fitchett
13. H. F. Jacques
14. J. Cardiff
15. A. D. Purnell
16. A. A. Maitland
17. R. Fortescue
18. M. P. Garrod

1971
19. H. Hilditch
20. C. D. Lovell
21. S. A. White
22. P. D. Lane

1972
23. H. V. Howitt
24. B. F. Dobson
25. L. S. Poulton

1973
26. J. Delafield
27. C. M. Greaves
28. A. Somerville
29. J. B. Goldsbrough
30. T. J. Wills
31. R. Jones
32. H. Orme
33. D. G. Lee
34. C. Garton
35. G. Garlick

1974
36. L. E. Beer
37. T. A. M. Bradbury
38.. F. B. Reilly
39. D. V. Zotov
40. J. D. J. Glossop
41. J. J. Ellis
42. G. R. Paddick
43. P. N. Loewenstein

1975
44. C. R. Simpson
45. M. C. Costin
46. M. J. Cowburn
47. D. W. Lilburn
48. J. D. Pickett-Heaps
49. S. G. Davies
50. W. A. H. Kahn
51. D. J. Robertson
52. A. A. Vincent
53. R. F. Aldous
54. M. G. Throssell
55. B. T. Spreckley
56. C. C. Rollings
57. D. C. Austin

1976
58. H. Cook
59. R. W. A. Miller
60. D. W. Evans
61. H. F. Brown
62. C. J. Woodier
63. F. G. Wilson
64. T. Pentelow
65. T. P. Docherty
66. A. T. Kenworthy
67. C. R. Hurst
68. V. C. Carr
69. P. B. E. Thomson
70. H. R. Dimock
71. D. Cockburn
72. R. A. Sandford
73. L. E. N. Tanner
74. T. J. Ward
75. A. E. Kay
76. A. S. Miller
77. J. H., Bryson

1977
78. A. J. Burton
79. M. Randle
80. R. Q. Barrett
81. H. R. Jarvis
82. D. S. Watt
83. P. S. Whitehead
84. R. Feakes

1978
86. J. Mitchell
87. T. E. MacFadyen
88. A. B. Crease
89. A. B. Crease
89. M. Valentine
90. G. S. Neumann
91. W. E. Malpas
92. S. J. Easton
93. D. D. Carrow
94. D. H. G. Ince

1979
95. I. D. Parker
96. G. C. Metcalfe
97. P. J. Richie
98. G. W. Camp
99. A. R. Hancock
100. C. Dews
101. M. R. Carlton
102. P. Pozerskis
103. P. L. Sears

1980
104. C. J. Blackwell
105. C. D. Rowland
106. L. Bleaken
107. M. Bird
108. D. R. Campbell
109. R. I. Cowderoy
110. A. D. Piggott
111. M. A. Clarke
112. J. H. Odell
113. G. Polkinghorne
114. C. J. Gildea
115. M. T. A. Sands
116. C. G. Starkey
117. P. L. Bisgood
118. A. T. Farmer
119. P. R. Pentecost
120. J. M. Gentry
121. A. F. Gough
122. J. F. Milles
123. M. J. Saunders

1982
124. K. Stewart
125. C. J. Wingfield
126. K. Mitchell
127. J. A. Evans
128. S. T. E. Walker
129. C. Brock
130. L. S. Hood
131. J. Taylor
132. J. N. Ellis
133. R. C. Stoddart
134. N. Gaunt
135. G. McLean
136. R. P. Saundby
137. K. A. Harrison
138. M. B. Jefferyes
139. C. V. J. Heames
140. F. J. Sheppard
141. J. M. West
142. C. Davison
143. P. G. Sheard

1983
144. T. R. F. Gaunt
145. R. C. May
146. J. M. Luke
147. J. C. Bastin
148. R. Penswick
149. B. L. Cooper
150. R. A. Pye
151. B. B. C. Watson
152. P. D. Bell
153. J. M. Bishop
154. K. Hartley
155. S. N. Hutchinson
156. J. D. Benois
157. R. H. Wright

1984
158. E. Richards
159. R. D. Frodsham
160. J. Williams
161. J. E. Hart
162. J. M. Hoye
163. J. R. Barrows
164. G. A. Thomson
165. D. Caunt
166. J. Bridge
167. M. F. Hardy
168. A. D. Cumming
169. A. J. Norrie
170. F. J. Humblet
171. J. R. Taylor
172. G. B. Atkinson
173. Pamela Hawkins
174. T. F. Cockett
175. R. J. Knight
176. G. G. Coppen

1985
177. S. Hymers
178. J. R. Edyvean
179. I. J. Metcalfe
180. M. J. Young
181. K. R. Buckner
182. T. A. Joint
183. S. G. Olender
184. E. Hamill
185. B. Elliott
186. B. C. Morris
187. J. D. Norman
188. G. G. Buckner
189. P. J. Stratten
190. D. R. Stewart
191. N. V. Parry
192. P. G. Cook
193. P. B. Gray
194. E. R. Smith
195. A. H. Mather
196. A. J. Manwaring
197. B. A. Bateson
198. P. L. Manley
199. A. Yorkas
200. S. G. Jones
201. R. B. Walker
202. A. Shelton
203. A. Durbin
204. M. E. Carter
205. C. J. Mayhew

1986
206. C. G. Corbett
207. A. J. Hogg
208. B. D. Scougall
209. J. G. Bell
210. M. F. Cuming
211. G. E. McAndrew
212. D. Hilton
213. K. J. Cadman
214. M. D. Allan
215. J. W. Evans
216. Annabel Lucas
217. R. Cousin
218. R. D. Payne
219. E. W. Richards
220. T. D. Gorley
221. B. R. Wise
222. M. V. Boydon
223. M. B. Judkins

1987
24. A. J. Munro
225. T. H. Brown
226. S. R. Nash
227. S. J. C. Parker
228. A. Crowden
229. C. Hyett
230. R. W. Partridge
231. I. R. Cook
232. P. A. Johnson
233. V. F. Tull
234. P. E. Baker
235. T. W. Slater
236. A. P. Walsh
237. M. S. Hunt
238. G. D. Green
239. E. W. Johnston
240. D. G. Roberts
241. D. J. Langrick
242. E. Specht

1988
242. D. A. Benton
244. C. A. Marren
245. P. A. Swoffer
246. M. C. Foreman
247. D. J. Macpherson
248. B. A. Fairston
249. C. P. A. Jeffery
250. S. N. Longland
251. V. J. Spencer
252. D. L. Pratt
253. M. R. Dawson
254. P. A. Heame
256. P. C. Piggott

1989
257. J. Dobson
258. t. M. Mitchell
259. A. J. Clarke
260. Jane Nash
261. S. C. Bicknell
262. M. J. Sesemann
263. I. M. Stromberg
264. J. T. A. Hunter
265. C. J. Terry
266. A. P. Hatton
267. M. F. Brook
268. E. H. C. Downham
269. I. D. Macfadyen
270. T. C. Harrington
271. D. P. Aknai
272. P. A. Gaisford
273. J. A. Stephen
274. M. I. Hughes
275. T. B. Sargeant
276. A. P. Moulang
277. P. J. Coward
278. J. C. Riddell
279. J. E. Gilbert
280. J. Armstrong
281. D. B. Almey
282. D. K. McCarthy
283. R. M. Grant
284. T. W. Eagles
285. R. H. Dixon
286. D. E. Findon
287. D. J. Eade
288. P. F. Whitehead
289. M. S. Armstrong
290. C. M. Davis
291. W. J. Murray
292. I. W. Strachan
293. M. J. Webb
294. C. Robinson
295. R. Arnall
296. W. G. Upton
297. A. J. Buchanan

1990
298. R. N. Dall
299. R. F. Harvey
300. V. S. W. Dawson
301. S. M. Smith
302. W. Aspland
303. I. Smith
304. P. Stammell
305. J. R. Reed
306. R. C. Sharman
307. C. Morris
308. M. J. Fairclough
309. Jill Burry
310. J. C. Kingerlee
311. R. Parsons
312. D. Starer
313. C. Wilby
314. R. A. Cheetham
315. R. V. Barrett
316. R. Dalling
317. A. J. Davis
318. M. J. Guard
319. A. T. Hirst
320. D. A. Booth
321. T. J. Robson
322. G. R. Green
323. C. E. Collingham
324. A. J. Eddie
325. M. W. Durham
326. J. N. Mills
327. P. J. Woodman
328. A. D. Matyear
329. J. Duncan
330. C. C. Sherlock
331. Geralyn Macfadyen
332. J. G. Arnold
333. W. R. Gibson
334. N. I. Claughton
335. M. Critchlow
336. C. M. Davey
337. S. J. Crabb
338. R. H. Evans
339. Edwina Richie
340. A. M. B. Smart
341. D. J. Phillips
342. A. H. G. St Pierre
343. J. W. Le Coyte
344. E. A. Arthur
345. R. W. Hawkins
346. P. T. Reading
347. J. W. Rice
348. F. G. Bradney
349. A. R. Aveling
350. D. H. Gardner
351. C. J. Hamilton
352. R. Palmer
353. F. Crisp
354. P. G. Crabb
355. J. S. Weston
356. R. Kalin
357. Gillian Spreckley

1991
358. P. D. Craven
359. W. S. Y. Stephen
360. A. L. Housden
361. M. Roberts
362. S. G. Sampson
363. P. R. Hamblin
364. M. A. Whitehead
365. D. J. Thomas
366. Virginia Woods
367. P. Naegeli
368. Ley, J.M.
369. D. S. Innes
370. E. R. Lysakowski
371. P. E. Rice
372. P. G. Webber
373. R. J. Toon

1992
374. G. F. Bailey
375. D. L. Jobbins
376. R. W. P. Allcoat
377. R. Strange
378. C. R. V. Thomas
379. N. A. Weir
380. Julie Angell
381. S. R. Housden
382. A. J. Dibdin
383. M. B. Williamson
384. P. A. King
385. R. C. Wilson
386. E. R. Duffin
387. J. R. Warren
388. N. J. Howes
389. A. R. Levi
390. F. Boyce
391. G. P. Hibberd
392. R. J. Williams

BGA COMPETITION NUMBERS

The following Competition Numbers are registered with the BGA

1. T. J. Wills
2. A. E. Jones
3. J. D Bally
4. W. A. Kahn
5. G. D. A. Green
6. G. H. Herringshaw
7. D. B. James
8. C. L. Withall
9. C. A. P. Ellis
10. P. Newall
11. P. Potgieter
12. AGA
13. R. May
14. J. D. Jones
15. G. D. Ackroyd
16. RAFGSA
17. M. T. A. Sands
18. C. R. Ellis
19. BGA
20. D. D. Carrow
21. M. I. Gee
22. T. S. Zealley
23. P. Redshaw
24. RAFGSA
25. I. C. Woodhouse
26. RAFGSA
27. RAFGSA
28. D. S. McKay
29. J. D. J. Glossop
30. J. E. New
31. C. Garton
32. P. Hawkins
33. H. Johnson
34. T. Murphy
35. J. Kingerlee
36. B. B. C. Watson
37. K. Blake
38. N. Marriott
39. W. Stephen
40. B. Fitchett
41. R. Rutherford
42. G. N. D. Smith
43. J. Gentry
44. A. H. Warminger
45. Lasham GS
46. M. Pope
47. S. Hill
48. D. E. Findon
49. D. C. Austin
50. R. Illidge
51. G. W. G. Camp
52. AGA
53. M. Silver
54. R. Jones
55. D. B. Eastell
56. S. J. Redman
57. M. J. Young
58. E. R. Lysakowski
59. B. T. Spreckley
60. S. H. C. Marriott & Ptnrs
61. C. Borrill
62. J. Kane
63. S. Olender
64. P. Jeffery
65. A. Lincoln
66. J. Delafield
67. K. R. Mansell
68. B. L. Cooper
69. E. Wright
70. R. Knight
71. E. R. Lysakowski
72. S. Sturland
73. B. Chadwick/ K. Scott
74. A. Linee
75. W. Kay
76. A. Blackburn
77. M. Hudson
78. M. Pocock
79. J. & M. Randle
80. A. & D. Davis
81. J. Upton
82. R. Jones
83. T. J. Harrison
84. M. Coffee
85. D. Robertson
86. J. Peck
87. RAFGSA
88. D. G. Roberts
89. J. A. K. Miller
90. Foot & Ptnrs
91. R. K. Hendra
92. T. Perkins
93. Marlow & Synd
94. Nine Four Aviation
95. J. Bell
96. Imperial College GC
97. BGA
98. Grant, Smith, Grainger
99. T. I. Quinn-Hall
100. R. Starling
101. P. Ramsden
102. R. Cousins
103. C. J. Mayhew
104. G. Metcalfe
105. A. P. Moulang
106. A. & J. Garside
107. J. E. Cruttendon
108. C. R. Simpson
109. B. Fairston
110. R. Jones
111. M. P. Seth-Smith
112. J. Ellis
113. G. & A. Johnson
114. S. J. Reynolds
115. J. M. West
116. N. J. Ashworth
117. J. W. Evans
118. D. Byass
119. E. W. Richards & Ptnrs
120. A. Snow
121. W. R. Longstaff
122. Decloux/Welford
123. D. J. Dimmer
124. J. A. F. Barnes
125. R. Lynch
126. J. Dobson
127. P. Trevethick
128. R. J. Marriott
129. A. J. Chappell
130. R. Lemin
131. W. J. Dean
132. T. Harrington
133. Not to be released
134. P. Purdie
135. Coventry GC
136. A. &. J. Miller
137. S. Parsonage
138. C. J. Evans
139. C. M. Davis
140. R. D. Payne
141. R. E. Cross
142. J. N. Wardle
143. T. S. Davis & G. C. Beardsley
144. R. J. Baker
145. N. L. Jennings
146. N. Brown
147. P. Hawkins
148. A. J. Burton
149. K. L. Marham
150. G. D. E. MacDonald
151. B. Marshal & Ptnrs
152. L. S. Hood
153. Surrey & Hants GC
154. R. Andrews
155. J. A. Lewis
156. P5 Sailplanes
157. P. Holland
158. A. L. Harris
159. J. A. Rollason
160. A. Townsend
161. H. Tarnow
162. B. H. Owen
163. N. Goulding
164. G. Dale
165. A. J. Rooney
166. K. Kiely
167. V. L. Brown
168. J. Moore
169. J. L. Smoker
170. G. Corbett
171. M. Thick
172. G. D. Morris
173. R. J. H Fack
174. R. H. Wright
175. J. B. Ransom
176. D. S. Innes
177. M. J. Evans
178. R. H. Prestwich/ L. Kirkham
179. P. Fenelon
180. A. Jacobs
181. R. D. Hone
182. P. L. Poole
183. P. Ward
184. S. E. Evans
185. R. A. Holroyd/F. P. Wilson
186. I. J. Metcalfe
187. A. D. Palmer & Ptnrs
188. I. D. Smith
189. D. Garrard
190. J. Rees
191. A. P. Myers
192. M. Gale
193. Bristol and Glos GC
194. Morris/Warren
195. S. Bicknell
196. Hartley & Ptnrs
197. P. M. B. Jessop
198. C. K. Davis
199. P. H. Turner
200. P. G. Cook
201. C. Lowrie
202. D. A. Hatfield
203. R. Hatwell
204. E. Drew
205. L. G. Callow
206. Yorkshire GC
207. J. W. Wren
208. M. Brockington
209. R. J. Nicholls
210. P. R. Jones
211. R. Housden
212. AGA
213. K. S. Matcham
214. D. Jeffries
215. Angus GC
216. D. Owen
217. Paterson & Ptnrs
218. P. Hurd
219. C. Ireland
220. E. H. L. Shore
221. W. R. Longstaff
222. M. F. Brook
223. B. R. Forrest/A. Hallum
224. G. W. Craig
225. H. Gowdy
226. R. Baines & Ptnrs
227. A. T. Farmer
228. M. J. Sesemann
229. P. H. Fanshawe & E. A. Smith
230. N. H. Wall
231. G. J. Hindmarsh
232. M. F. Cuming
233. Kingswood Syndicate
234. J. Knowles
235. R. C. Bridges
236. M. Clarke
237. R. C. Haddon
238. N. Francis
239. L. Noad & Ptnrs
240. P. J. Haseler
241. A. I. Mawer
242. R. A. Sandford
243. W. M. Kay
244. S. G. Hunt
245. J. L. Bridge
246. J. P. Gorringe
247. B. C. Marsh
248. A. M. Walker
249. R. Harris
250. W. J. Murray
251. Payne/Jenkins
252. Cirrus Group
253. T. A. M. Bradbury
254. D. A. Smith
255. J. Claxon
256. D. S. Towson
257. Yorkshire GC
258. V. C. Carr & Ptnrs
259. T. Dale
260. P. Pozerskis
261. A. French
262. M. C. Boik
263. T. J. Mornin
264. N. Parry
265. A. O. Harkins
266. Highland GC
267. J. A. Johnson
269. T. R. F. Gaunt
270. R. I. Hey
271. M. S. Armstrong
272. J. Patchett
273. J. H. Fox
274. E. R. Duffin
275. M. R. Fountain
276. C. D. Lovell
277. S. J. Ferguson
278. M. Hastings
279. D LeRoux
280. M. Strathern
281. J. Wesley
282. K. Kingsland
283. C. Pike
284. P. Rice & Ptn
285. Coventry GC
286. J. M. Beattie
287. J. W. Murdoch
288. R. Boyd
289. East Sussex GC
290. M. C. Russell
291. J. D. J. Glossop & Ptnrs
292. S. Adlard
293. Z4 Syndicate
294. S. C. Foggin
295. A. M. Raper
296. Imperial College
297. J. C. Bailey
298. M. B. Hill
299. L. J. Hartfield
300. A. Evans
301. J. Burry
302. Polish AFA
303. S. Olender
304. Z. Marczynski
305. M. J. Haslakiewicz
306. A. MacGregor
307. L. F. Parris

308. G. Bennett
309. G. F. Fisher & Ptnrs
310. Sheard & Shawdon
311. Gill & Ptnrs
312. Booker GC
313. Surrey & Hants GC
314. Booker GC
315. Booker GC
316. Booker GC
317. T. Gardner
318. Booker GC
319. G. Bennie
320. D. Hatton
321. M. Wells
322. J. Forrester
323. A. J. Hulme & Ptnrs
324. J. Warbey
325. P. Brice
326. J. A. Denne
327. I. A. Masterton & Ptnrs
328. J. T. Phillips
330. Aquila GC
331. C. G. Taylor
332. M. Newland-Smith
333. P. Stafford-Alan
334. J. R. Ayers
335. C. Morris
336. A. Adams
337. F. Davies
338. S. Turner
339. C. Broom
340. A. D. Purnell
341. C. Cornish
342. R. Partington
343. I. Starfield
344. W. B. Andres
345. I. P. J. Carmichael
346. N. Morgan
347. G. R. Glazebrook
349. P. G. Heptingstall
350. M. Collingham
351. T. Randall
352. D. Roberts
353. L. R. Bennett
354. Surrey & Hants GC
355. M. Eastburn
356. A. Cox
357. M. Uphill
358. P5 Sailplanes
359. P5 Sailplanes
360. C. White
361. J. Beringer
362. D. Steed
363. D. K. Gardiner
365. A. W. F. Edwards
366. P. B. Conyers
367. B. T. Pratt
368. J. Lewis & Synd
369. S. North
370. D. R. Campbell
371. D. Holmes
372. R. F. Tindall
373. M. Birch
374. A. Hyslop
375. V. Chambers
377. A. Doughty & Ptnrs
378. R. Smith
379. J. Wilson
380. A. J. Baldwin
382. C. R. Appleyard
383. M. Foreman
384. L. E. Beer
385. D. Bowes
386. I. Godfrey
387. H. Torode
388. AGA
390. N. Allcoat
391. Surrey & Hants GC
392. A. Baron
393. G. C. Keall
394. Surrey & Hants GC
395. Surrey & Hants GC
396. Surrey & Hants GC
397. Surrey & Hants GC
398. Surrey & Hants GC
399. Surrey & Hants GC
400. Glaser-Dirks UK
401. R. Ward & Ptnrs
402. F. James
403. J. Ayres
404. D. Stabler
405. C. Hyett
406. D. J. Eade
407. McCullagh
408. D. Triplett
409. N. Clements
410. R. Jones
411. Robinson
412. AGA
413. J. & D. Hoolahan
414. R. A. Sandford
415. V. G. F. Tull
416. P. A. Cook
417. J. Bennett & Ptnrs
418. Titterton & Ptnrs
419. M. L. Boxall
420. G. E. McAndrew
421. M. C. Costin
422. P. Gentill
423. P. Hogarth
424. R. A. Hall
425. P. Whitehead
426. H. G. Loftus
427. G. B. D. Brown
428. I. Biggs
430. S. Jobar
431. Uni. of Surrey GC
432. T. Hutching
433. W. Grundy
434. A. P. Walsh
435. F. Platt & Synd
436. L. S. Thorne
437. P. Miles & Synd
438. Woodman-Smith & Ptnrs
439. ASW-15B Synd
440. Boaler & Ptnrs
441. Moses & Synd
442. Southdown AS
443. J. C. Bastin
444. D. A. Benton
445. J. S. Weston
446. R. M. Darby
447. J. Kettelty
449. B. Svenson & Ptnrs
450. P. J. Coward
451. G. H. Costin
452. E. Smith
453. M. Vickery & Ptnrs
454. B. H. Owen
455. R. Pearce-Boby
456. Jefferyes & Synd
458. C. L. Lagden
459. F. W. Pinkerton
460. North Wales GC
461. T. J. Parker
463. J. Cloke
464. R. Ashurst
465. Green/Wills
466. S. Pugh
468. T. W. J. Stoker
470. S. R. Lynn
471. M. P. Dale & Ptnrs
473. J. Nunneley
474. Surrey & Hants GC
475. C. Hughes
476. J. Cowie
477. A. Hobbins
478. P. McLean
479. R. Parsons
480. Heron GC
481. J. M. Woodford
482. R. Jones
483. F. L. Cox
484. L. E. Beer
486. R. Underhill
488. P. A. Taylor
499. D. P. Taylor
490. S. Parker
492. A. White
494. L. Astle
496. A. Henderson
497. N. Stratton
499. D. P. Taylor
500. J. S. Halford
501. A. B. Dickinson
502. R. Aldous
503. E. Bromwell & Ptnrs
504. L. P. Woodage
505. R. W. Harding
507. D. Brown
508. A. Priestley
509. D. Kearns & Ptnrs
510. P. B. Merritt
511. L. A. Beale
512. K. Mitchell
513. D. Almey
515. J. B. Giddins
516. A. H. Baker
517. K. Small
518. Lamb/Busby
519. A. Brind
520. Naegeli & Ptnrs
521. J. Herd
522. G. R. Green
523. C. Townend & Ptnrs
524. I. C. Lees
525. J. Fisher
527. J. Cardiff
528. P. G. Marks
530. A. Maitland
531. A. Pickles
534. Wolds GC
535. D. Gifford-Hull
536. R. Mortimer
537. M. Coffee
540. M. Evans
541. C. J. Clarke
542. R. S. Hawley & S. Y. Duxbury
543. D. C. Phillips
545. C. V. Heames
546. D. Moore
548. M. Taylor
549. M. Wright
550. L. G. Watts
551. P. Duffin
552. P. Burgoyne
555. R. S. Maxwell Fendt
557. Two Rivers GC
559. Anglo Polish
560. J. aCourt
565. P. C. Hassan
566. F. R. Stevens
567. P. A. Bailey
568. A. Johnson
570. H. Kindell
571. Levitt/Fellows
572. Whittaker & Ptnrs
573. Silverstone/Fox
574. C. Warman
575. P. Brightman
576. Devon & Somerset GC
577. Swinton & Ptnrs
579. G. W. Craig
580. W. Aspland
581. P. Worth
582. P. G. Becker
585. Midland GC
587. P. Blackburn
590. K. A. Furley
591. D. C. Rich
593. M. Haidukewicz
594. T. Parker
595. S. W. Bennett
596. D. D. Copeland
597. M. Robertson
599. B. Lumb
600. A. A. Carnegie
601. J. D. Spencer
602. D. Manser
603. M. Gooch
604. F. K. Russell
605. R. Palmer
606. P. Gray & Ptnrs
607. J. E. Cruttenden
608. Gardner & Ptnrs
609. South Wales GC
610. G. R. Seaman
611. R. Johns
612. J. Bradley & Synd
613. R. Putt
614. J. Douglas
616. R. Matthews
617. H. F. Brown
618. P. & D. King
619. A. J. Pettitt
620. D. McCarthy
621. T. Stuart
622. C. Smith
623. P. Wells
624. I. Ashton
625. A. R. Jones
626. L. Bleakin
629. J. R. Reed
630. A. & H. Pentecost
631. F. P. Wilson
632. A. L. O'Regan
633. R. Hayes
636. G. C. Bell & Ptnrs
637. Lovegrove/Dowty
638. M. J. Crocker
639. G. Neill & Ptnrs
640. R. I. Cowderoy
641. E. Fitzgerald
642. Meaker
643. Vacances Estates
644. H. Franks
645. Tanner & Ptnrs
646. C. J. Alldis
648. K. Bruce
649. R. B. Witter
650. C. J. Hamilton
651. R. B. Witter
652. M. A. Fellis
653. J. S. Wilson
654. R. Strange
656. M. B. Jefferyes & Ptnrs
657. Bleasdale & Tribe
658. ACCGS
659. A. Manwaring
660. R. A. Cheetham
661. G. Macdonald
662. G. Lynch
663. H. McEvaddy
664. Crabb
666. M. Kemp
667. T. J. Scott
669. G. Macdonald
670. D. Hill
671. J. Lynchehaun
672. K. J. Towell
673. D. Lilburn
674. D. N. Hayes
675. C. Jones
676. M. Jordy
677. K. Fairness
678. H. Pantin
680. B. Pocock
681. M. P. Weaver
682. R. Dann
683. J. Reid
686. A. S. Edlin
687. D. G. Brain
688. L. Dent
689. J. T. Phillips
690. S. Adlard
691. P. L. Sanderson
693. Whitmore
694. R. Stembrowicz
695. Truman & Ptnrs
696. D. Lilburn
697. P. Ryland
698. C. Overton
699. W. R. Brown
700. S. McNeil
701. L. P. Smith
702. Young/Carnegie
703. Burge & Foster
704. A. J. Watson
705. P. Holland
706. T. G. B. Hobbis
707. G. Lyons
709. J. R. Paskins
710. M. Head
711. R. Johns & M. Chant
712. J. A. Stirk
713. E. Brown
714. T. Hurn
715. C. C. Smith
716. J. A. Holland
717. S. Sampson
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TWITTERINGS

Reading of other fledgling first solos leaves an abiding impression of bells ringing angels singing and even the earth moving! After rather more flights than is considered normal (a sure sign of advancing years I'm told) Sparrow has now achieved that momentous event. The lift off and tow out were fine and, after releasing at 2000ft, I was graced by weak evening wave which enabled me to soar, albeit briefly.

All too soon, the circuit was joined and, oh dear, just as I turned on to finals it happened for me. The earth moved. Several metres upward to be precise!

My instructor/mentor was, at this point, trying to save shoe leather by hopping from foot to foot, or so I was told.

The trees on the boundary were cleared by less than the approved amount and a marginal arrival made with damage being limited to a badly dented ego. Progress is the child of error, so 'tis said and the warm glow/fixed grin was held over till my next flight which was, thankfully, altogether happier.

SPARROW

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Cheshire	Qualified Instrument Technicians	Instrument Section, British Aerospace Plc, Chester Road, Woodford, Nr Stockport, Cheshire
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Essex	E. Richards	22 Hobbs Drive, Boxted, Colchester, Essex
Glos	K. R. Brown	204 Devon Road, Portishead, Bristol BS20 8DG
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	T. E. Macfadyen J. Parsons	Highbank, Selsley Road, North Woodchester, Stroud, Glos GL5 5PH
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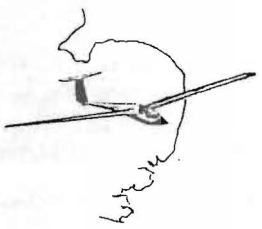
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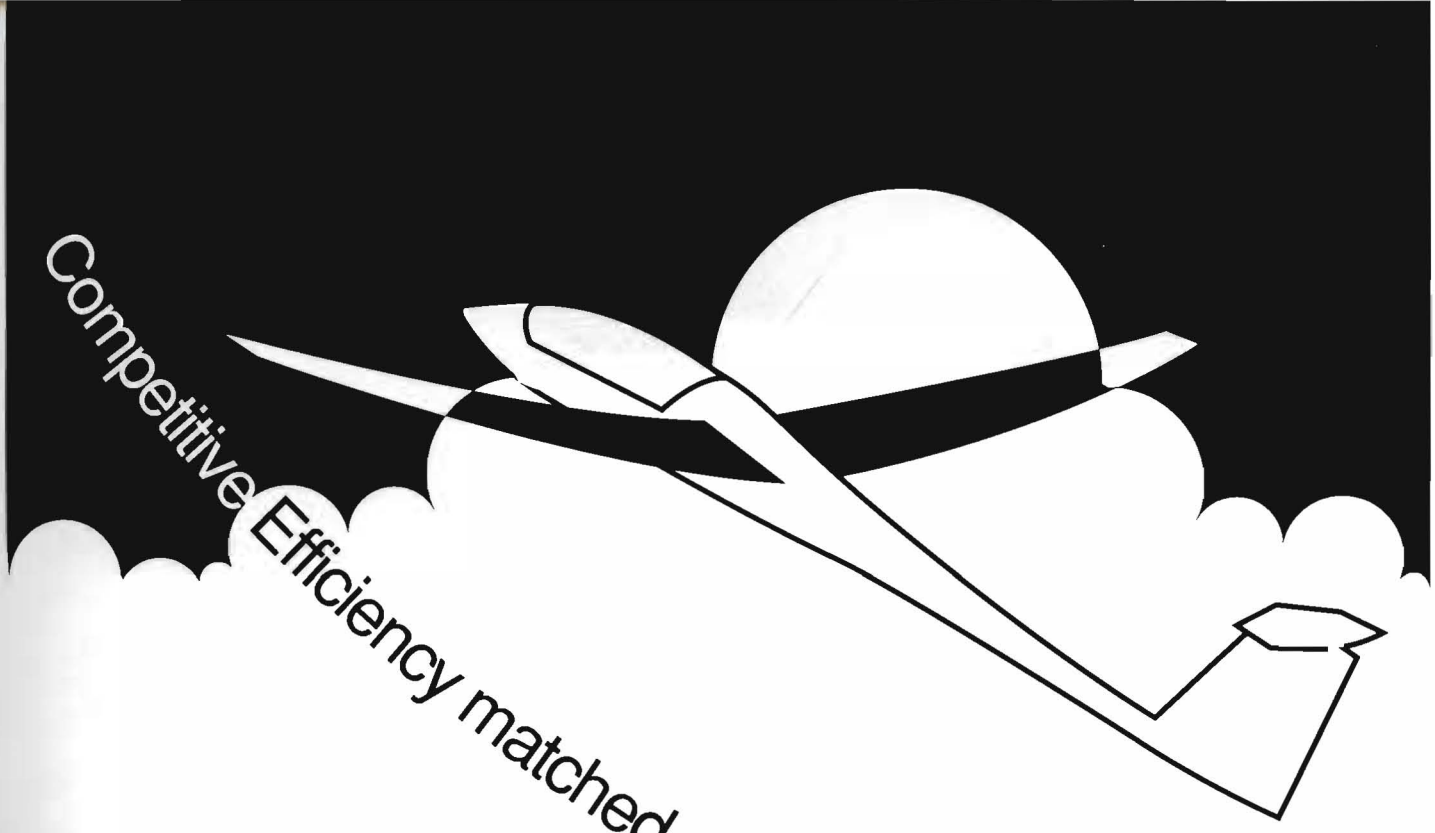
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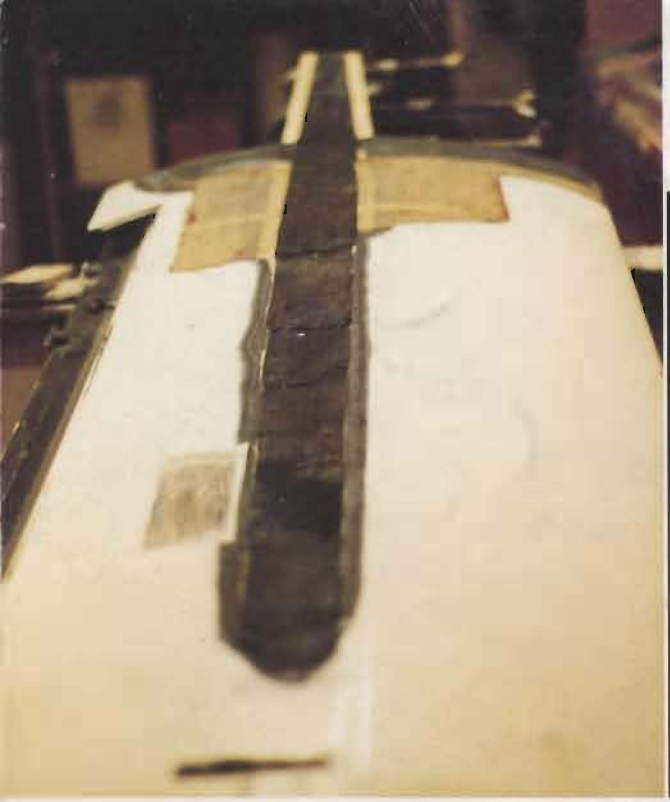
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