free flight • vol libre

3/92
June/July

cover photo unavailable

POTPOURRI

I am unhappy to inform you that there has been a fatality in the gliding community. Dave Woodcock of the Blue Thermal club was killed in the crash of his Scheibe motorglider southeast of Medicine Hat.

Deepest sympathies are extended to his wife and family.

We are well into the soaring season and some clubs have yet to send in their membership enrolment and fees. If members from last year start missing their issues of free flight, they should check with their club executives to see if their membership for 1992 was sent in.

By the time this issue reaches you some of the provincial meets and contests will have taken place, and everything should be in "go" condition for the Nationals. I wish everyone good soaring conditions and successful events. Thank yous go to all those volunteers who organize, run, act as crew, and do the other countless jobs necessary to have a successful meet — the pilots would not have a contest without you.

A new 1992 Sporting Code will soon be available from the Aero Club of Canada but it does not come into effect until the end of the season, so that means the new edition 6 of the SAC guide to badge and record flying has a little time to be prepared also. Both should be on sale in July. All Official Observers, be alert for the adoption of this new Sporting Code as it will affect the processing of claims. (A preview of some of the changes are on page 22.)

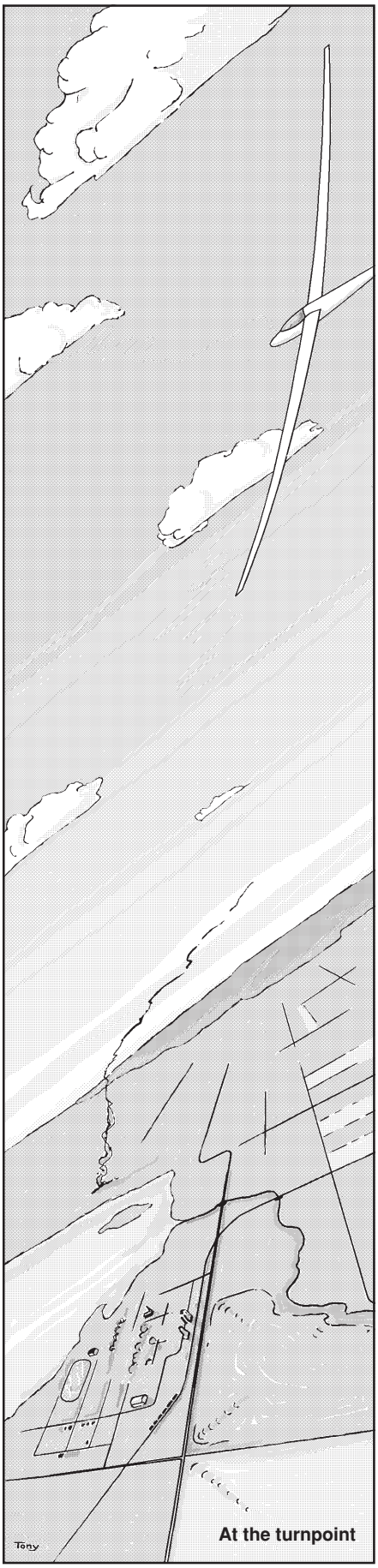
I wish to commend the Cu Nim club for their program of encouraging neophytes to enter contest flying. An experienced contest pilot combines with a beginner to form a team entry in a club two–seater at the Provincials. He then shepherds the beginner through all the intricacies of contest flying. I think this is an excellent idea and hope more clubs and contest pilots will consider this type of encouragement.

I still haven't heard any news from clubs of further members for the "geriatric" association. Ursula has been sending letters to the oldtimers that she is aware of and is pleased with the response she has been getting to requests for histories. We thank those that have replied to the requests.

It appears that we will be welcoming a new club into the SAC community. The Gravelbourg Gliding and Soaring Club Inc. have applied for membership and are in the process of enrolment. They are located in south–central Saskatchewan and will be in the Prairie Zone. Every success to you, the Gravelbourg club, in your future endeavours.

May we all have a good soaring season and few accidents.

Al Sunley



At the turnpoint

free flight • vol libre

Trademark pending Marque de commerce en instance

3/92 Jun/Jul

The journal of the Soaring Association of Canada
Le journal de l'Association Canadienne de Vol à Voile

ISSN 0827 – 2557

Remember, the *free flight* deadline is the fifth of every odd–numbered month for stories, club news, and photos (some extension may be made with prior notice). The next issue should be full of good flight and contest stories if you write them for me.

Cover

A fine day at Hawkesbury. Réal le Goueff soars over the north shore of the Ottawa River at the edge of the Gatineau Hills. The fish–eye lens on his camera lends a little pizzazz to the photograph.

EDITORIAL

Letters to the editor are generally pretty sparse, but every few years all hell breaks loose, usually, as here, on some national organizational matter. The responses to Al Schreiter and Dixon More in this issue may seem like overkill, but the only way to answer the questions and allegations in both letters is with factual detail. However, using *free flight* to correct someone's misunderstanding about how to do their income taxes and bookkeeping does not seem to me to be good use of the available space when a well–placed phone call or letter should have done the trick.

Why do members feel it necessary to write such letters to *free flight* at all? The essence of the problem seems to be that from time to time SAC is seen by some as an unresponsive and impersonal bureaucracy like the government — that personal contact is not possible between members in this quite small association — so concerns must be aired in as public a forum as possible. Perhaps the perception is natural amongst a population of pilots who just want to go flying and see even club organization and duty lists as vaguely onerous; what does surprise me is that the current letters come from old "insiders" in the sport.

Regularly, one reads that SAC is a free association of volunteers working for our common goal, which is soaring in as hassle–free, safe, and enjoyable way as possible; the "you are SAC" phrase. But it seems that this truism sort of fades away occasionally and a sense of detachment grows which is neither in the individual member's or the group's long term interest. There is no question that the Board must be reponsive to question, there is also no question that the people on the Board (and the committees) deserve honest dialogue.

Everyone who does the behind–the–scenes grunt work must extract some personal value in this hidden labour and occasional positive feedback of some kind or say, "what's the point?" This go–round has cost each writer a lot of unnecessary homework, time and psychic credit when I'm sure they could have been doing much more interesting things with their lives.

TB

letters & opinions

QUO VADIS, SAC?

The 1991 SAC AGM took place with little discussion and with great speed. Neither the Board of Directors nor the member clubs had proposed any motions in advance except the routine approval of the budget, the now routine proposal to increase the fees and the approval of actions of the Board during the past year. I was amazed. One can draw only two possible conclusions from this. Either all the clubs and their members are perfectly happy with SAC's status quo, or they just don't care and don't want to be bothered. Conversations with quite a few people across the country lead me to believe that it's the latter rather than the former. Let me propose a few subjects for discussion:

Financial Statements The SAC Financial Statements for 1991 was not made available to the clubs until the morning of the annual meeting. Club voting delegates had no opportunity to study the financial statements, yet were asked almost immediately to approve it and the budget based on it. I was the only delegate who questioned this unusual procedure and objected to it. No one on the Board gave a satisfactory explanation why the financial reports were not circulated to the clubs well in advance of the annual meeting. Since the date of the meeting was public knowledge for the prior 12 months there is simply no reasonable excuse for this procedure. Doesn't anyone care why and how the membership's money is spent?

1992 SAC fees The Board proposed a fee increase of $3 per member. No particular reason was given except that it was only a small increase, and it was to cover "inflation". The fact that the 1990 dues had produced a surplus of approximately $11,000 was ignored. I seemed to be the only club delegate who questioned this and proposed to vote against the increase. The next time anyone complains about the SAC dues, please remember that your club voted to increase them even though there was no real budget proposal to justify the increase. These "small" increases have boosted SAC fees from about $50 to $85 in the last few years, with the result that the Board could place embarrassing surpluses of over $60,000 into the Pioneer Trust fund in the last three years. Doesn't anyone care why and how the membership's money is spent?

Pioneer Trust fund The basic idea of the Pioneer Trust fund is excellent, and I am all for encouraging people to make voluntary contributions to this fund. But do you realize that the Board of Directors over the past few years have made it a practice to put any

The SOARING ASSOCIATION OF CANADA

is a non-profit organization of enthusiasts who seek to foster and promote all phases of gliding and soaring on a national and international basis. The association is a member of the Aero Club of Canada (ACC), the Canadian national aero club representing Canada in the Fédération Aéronautique Internationale (FAI), the world sport aviation governing body composed of national aero clubs. The ACC delegates to SAC the supervision of FAI– related soaring activities such as competition sanctions, issuing FAI badges, record attempts, and the selection of a Canadian team for the biennial World soaring championships.

free flight is the official journal of SAC.

Material published in ***free flight*** is contributed by individuals or clubs for the enjoyment of Canadian soaring enthusiasts. The accuracy of the material is the responsibility of the contributor. No payment is offered for submitted material. All individuals and clubs are invited to contribute articles, reports, club activities, and photos of soaring interest. A 3.5" disk copy of text in any common word processing format is welcome (Macintosh preferred, DOS ok). All material is subject to editing to the space requirements and the quality standards of the magazine.

Prints in B&W or colour are acceptable. No slides please. Negatives can be used if accompanied by a print.

free flight also serves as a forum for opinion on soaring matters and will publish letters to the editor as space permits. Publication of ideas and opinion in ***free flight*** does not imply endorsement by SAC. Correspondents who wish formal action on their concerns should contact their SAC Zone Director whose name and address is given in the magazine.

The contents of ***free flight*** may be reprinted; however, SAC requests that both the magazine and the author be given acknowledgement.

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President Alan Sunley
Vice President Harald Tilgner
Executive Secretary Joan McCagg
Corporate Treasurer Jim McCollum
Corporate Secretary Joan McCagg

SAC National Office
Suite 306, 1355 Bank Street
Ottawa, ON K1H 8K7
(613) 739-1063 Fax (613) 739-1826

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Les épreuves de photos en noir et blanc ou couleur sont acceptables. Les négatifs sont utilisables si accompagnés d'épreuves. Nous ne pouvons malheureusement pas utiliser de diapositives.

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Les articles de ***vol libre*** peuvent être reproduits librement, mais la mention du nom de la revue et de l'auteur serait grandement appréciée.

Pour changements d'adresse et abonnements aux non membres de l'ACVV ($20 par an, EU$22 dans les Etats Unis, et EU$28 outre–mer) veuillez contacter le bureau national à l'adresse qui apparait au bas de la page à gauche.

EDITOR
Tony Burton
Box 1916 Claresholm, Alberta T0L 0T0
tel & fax: (403) 625-4563

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SAC surplus into the Pioneer Trust fund? In other words we have all made contributions to the Pioneer Trust fund without having any choice about it. No small sums, either. Over $60,000 just in the last three years. Because of the way the fund is set up SAC cannot withdraw capital from it for any reason. While this is right and proper for the fund, it makes it an unwise business decision to put all surpluses into the fund, instead of keeping at least some of it available to SAC for a "rainy day". When I moved that in future the Board should propose the disposition of any annual surplus to the membership at the AGM, and have the disposition voted on by the club delegates, the motion lost by a wide margin. Doesn't anyone care why or how the membership's money is spent?

Allocation of SAC funds Perhaps we should take a closer look at how the SAC money is allocated. In 1991, 48% of all expenses covered administration, ie. salaries, rents, phone, postage, etc. Meetings and travel took up 16%, *free flight* another 16%. Only 5% of expenses were allocated to Flight Training & Safety, and only 1–1/2% to publicity. Is it right that administrative costs eat up about half of the total revenue, when the "product" gets only 6–1/2%? Now that the insurance administration has been returned to the insurance company, and the membership and accounting records have been computerized, is the Ottawa office still a full time job? Can more cost effectiveness be achieved by more sharing with the Aero Club? Would a greater allocation of funds to Flight Training & Safety perhaps produce substantial future savings in insurance costs? Does anyone care how or why the membership's money is spent?

Free Flight I have no doubt that the majority of the membership wants, and will pay for, periodic information about soaring in Canada, club news, club chit chat, technical information etc. But is it necessary to produce a glossy magazine of the highest print quality, or could the basic purpose be achieved by simple desktop publishing and the cheapest method of reproduction? The five print runs produced in 1991 cost over $21,000, or about $3.25 per copy. A standard newsletter could probably be produced for half of that. Has anyone investigated the idea of producing a publication for the Aero Club of Canada, along the lines of the German Aerokurier? I understand the combined membership of the Aero Club is approximately 25,000. That should attract enough advertising to make a combined publication self-supporting. Does anyone care what we could do with the extra $20,000 to $25,000 per year if *free flight* were self-supporting?

These are just a few of the SAC budget items which deserve closer consideration. Surely other people have other ideas to propose for discussion. Do we expect the Board of Directors to operate in a vacuum? Do we just "do what we have always done"? Why does a growing number of members think that the SAC membership is a waste of money? I think it's high time for each of us to give serious thought to what we think SAC should be and do, and to communicate with our directors, so that the SAC of the future will be a stronger and growing organization.

Al Schreiter, SOSA

A response from the SAC President

I welcome the opportunity to reply to Al Schreiter's letter, "Quo Vadis, SAC?" I believe Al has made some valid suggestions and comments in his letter and hope some improvements to SAC's operation and input from other members are the result. I will take the subjects in order:

Financial Statements It would certainly be of value if we could get the financial statements circulated to the clubs well in advance to the AGM, but do not consider that public knowledge of the date for the prior 12 months has any bearing on the issue. The problem is, there is just over two months of time available from when the books are closed at the end of December until the date of the AGM. For the clubs to receive the information in time for any reasonable study and discussion on it would cut the available time to at most five weeks, in which time the office staff (one person) would have to finalize the accounts, the Treasurer examine the statement, the auditor to come in and examine the books and prepare his statement, and have the printing of the total financial report ready to be mailed.

That's a tall order when other work also has to be accomplished. I wish we could do it.

1992 SAC fees The $3 increase in fees was explained in the Treasurer's report under 1992 budget. It was proposed to offset lower revenues in other areas, namely investment income and sales, as the Board considered that interest rates could be considerably lower in 1992. By the way SAC fees have been over $50 for the last ten years. I don't know where Al got his sum of over $60,000 surplus in the last three years. The surplus in 1989 was $23,241, in 1990 – $15,163 and in 1991 – $11,944 for a total of $50,348. None of these surpluses were budgeted. In 1989 and 1991 they were due to cancellations of the October directors' meetings and cancellation of an issue of *free flight* due to an appearance in August of a severe reduction in expected income, and because the Board did not believe in creating deficits. There would not have been a surplus in either year if the Board had continued on with budgeted expenses. They did not consider it prudent to do so. As hindsight shows – and is being capitalized on – it was a definite error on the conservative side. The surplus in 1990 was due to a cancellation of two years of insurance Payables which the insurance company declared we did not owe.

Pioneer Trust fund I agree with Al, the idea of the Pioneer Trust fund is excellent. We need it to cushion the vagaries of income from membership fees and investment income. It needs to be built up to allow this. If Al had checked the financial statements for the last three years, he would have noted that SAC has kept about $60,000 in term deposits in the general account available for a "rainy day". I also consider it a good suggestion for the Board to bring up for discussion at the AGM the disbursement of any significant surplus and their recommendations for such. I only hope it would not develop into an all day debate as each delegate and member gave his views on how it should be accomplished.

LETTERS & OPINIONS continued on page 20

SKYWATCH

A beginner's guide to clouds

Tom Bradbury
from Sailplane & Gliding

IF YOU HAVE TIME TO SPARE waiting for a launch or walking over open fields, try watching the development of individual clouds. The pilots who regularly make long flights and compete successfully are usually very good at reading the sky. Beginners may not notice all the indications of lift or sink. Once airborne it is much harder to see what all the clouds are doing so it is worth watching them from the ground to learn their ways.

What thermals may look like before a cloud forms

Experiments in a glass sided water tank made the thermal bubble a popular model. Liquid thermals do look very like inverted cumulus clouds, but the model cloud is initiated by inverting a cupful of denser liquid and thus starts with a hemispherical shape.

Most real thermals start from a fairly flat surface. The warm air can be thought of as forming a wide but very shallow disc; the height may not be more than about 20 metres. If one specifies an excess of temperature of 2°C this disc should accelerate upwards at 0.067 m/sec^2. This value is derived from the density difference multiplied by gravity divided by the absolute temperature (9.81 x 2/293 assuming a surface temperature of 20°C). At first glance this seems unimpressive acceleration but if there was no mixing or drag to slow it down it would reach a speed of 40 m/sec (nearly 80 knots) after ten minutes.

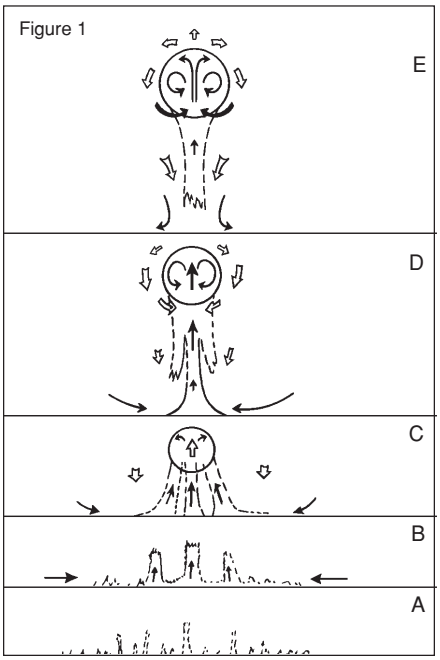


Figure 1 shows some of the stages in transforming a flat disc into a tall thermal. The disc cannot lift off vertically like a flying saucer; the form drag would be enormous. What seems to happen is that little tendrils of air start rising like steam from a hot bath (A). One can sometimes see these misty thermals after a forest has been drenched by rain. When the sun comes out again the forest sometimes sends off tendrils of mistiness which rise very slowly. They show no sign of changing into bubbles before the mist evaporates. Presumably the process is much too gentle. Another example is "arctic smoke"; wisps of mist or fog rising off warm water during a very cold spell.

Until these tiny wisps become more organized they cannot rise far. To form a thermal the tendrils must amalgamate into small plumes which in turn join up to form wider columns (B).

Plumes which combine to make a good sized cylinder usually go on to form a dome shaped top (C).

As the air is gathered up into the thermal the original disc shrinks and there is an indraft of surface air. This is sometimes strong enough to produce a change of wind on the ground. When it is almost calm windsocks or smoke from bonfires may show this inflow as the thermal takes off.

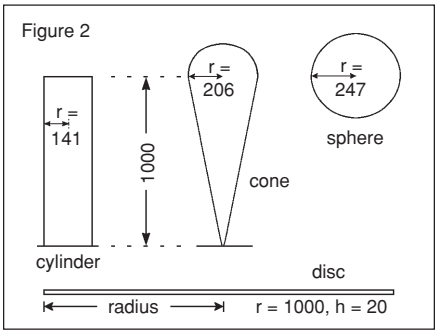
The dome eventually forms a thermal bubble (D) linked to the dwindling reservoir of hot air on the ground. Finally the link is broken and one is left with a sort of ice–cream cone shape. The air in this cone is eventually absorbed into the bubble.

Columns, cones or bubbles? The smoke from a stubble fire suggests how thermals may behave. At full strength when there was a continuous supply of heat, the smoke formed a cylinder with almost parallel sides reaching from ground level to the bubble of cloud at nearly 5000 feet. When the fire went out, the cylinder changed into an inverted cone, and higher up most of the smoke spread out into a roughly spherical shape. The stubble fire is an exaggerated heat source but the smoke gave a good indication of how less violent thermals behave.

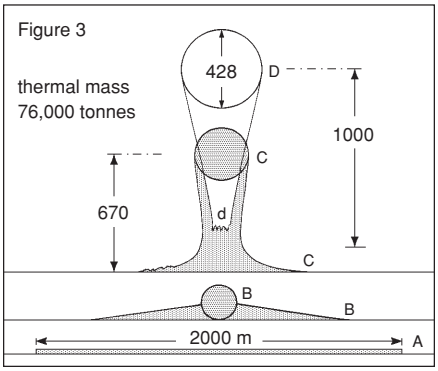
Thermal bubbles do not seem to form in all cases. They need enough temperature difference to accelerate the thermal to sufficient speed with enough mass to form a good sized bubble. Some plumes do not grow into thermal bubbles at all, or not until they pass the condensation level and get a boost from the cloud. If the plume has little energy left when it reaches the condensation level it just drifts on to form a ragged puff. Flying through such puffs shows very little turbulence and no sign of a bubble.

Putting numbers to the imaginary thermal

If we start with a disc 2000 metre across (about the size of a big airfield) with a depth of 20 metre the total mass works out to about 76,000 tones. Ignoring any expansion with height this disc would provide a thermal cylinder 1000 metre high by 141 metre wide, or a shape like an ice–cream cone 1000 metre high with a top radius of 206 metres, or eventually a sphere radius of 246.6 metres. Figure 2 shows this series of options.



Large and powerful thermals probably do produce a tall cylinder of lift at least for a time. When the heat source is exhausted the cylinder changes into an inverted cone. Finally the



cone is drawn up into the expanding bubble. When there is only a finite source of heat which soon becomes exhausted the thermal shape probably goes through the stages in Figure 3. This shows a simplified version in four stages, A to D. Each is a cross–section of a circular volume of air, starting with a shallow disc and ending up with a sort of ice–cream cone. The cross–sections are drawn to contain the same mass of air throughout. B shows the region where a bubble might start off with a very flat cone of warm air feeding it. C shows the expanding bubble at the top of a cone with its centre at a height of 670 metres (about 2200 feet). D shows the whole mass now detached from the ground. The reservoir of hot air is exhausted and has been converted into a bubble and cone about 1000 metre tall. The bubble itself has expanded from 200 to over 400 metres in diameter.

Do gliders weigh down a thermal?

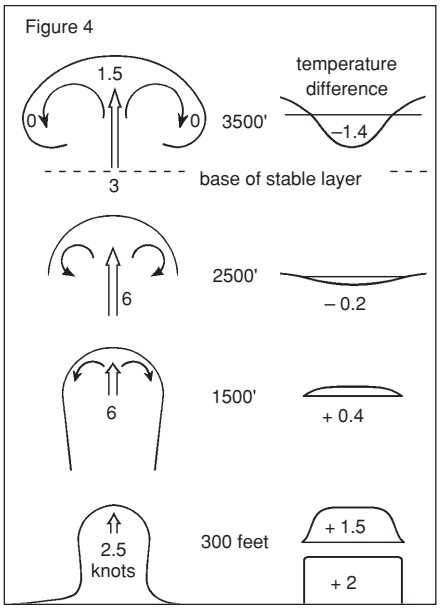
If the thermal is as massive as suggested its ascent is not likely to be seriously hindered by a few sailplanes circling inside it. However, when circling in a rather weak thermal one does wonder if it will really support any more sailplanes. I had great sympathy for the 15 metre pilot circling in a tired thermal when he was pounced on by a gaggle of Open class monsters. Picking up his microphone he said "Go away! This is only a Standard class thermal".

Entrainment The example in Figure 2 is not the full story. Water tank models show that thermals grow in size by being diluted with the environmental fluid. This process is called "entrainment". The tops of big cumulus consist of a large dome which is made up of hundreds of smaller domes. This region of different sized domes is where the environmental air is folded into the thermal. At first most of the entrainment occurs at the cap but as the bubble grows some of the outside air sinks round the side and is pulled into the bubble from underneath as well.

Entrainment cools the thermal

Entrainment makes the bubble expand and dilutes the warm air, so reducing the difference in temperature. When a thermal rises into a stable layer the temperature contrast is changed. The outside of the thermal is warmed by mixing but the faster rising core continues to cool at the original rate. This produces the unexpected result of the fast rising air in the core becoming cooler than the slower rising, or even sinking, edges of the thermal.

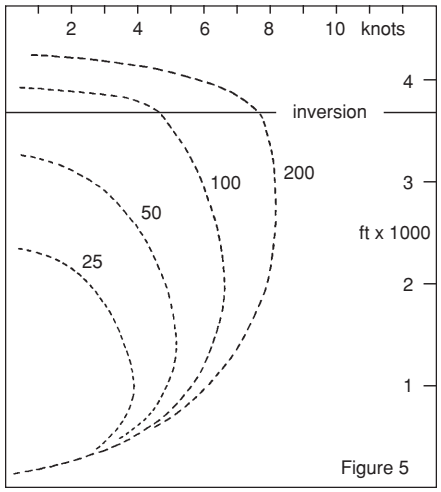
So attempts to detect thermals by measuring temperature differences usually fail except near the bottom. Only in the first few hundred metres is the rising air significantly warmer than its environment. In the middle levels there is little difference in temperature and at the top the best lift is actually in colder air. Figure 4 shows the bubble rising on the left with speeds of 2.5 knots strengthening to 6 knots between 1500 and 2500 feet. On the right is the temperature profile through the thermal. At ground level it is 2°C warmer. By 300 feet this is down to 1.5°. In the range from 1500 to 2500 feet it goes from fractionally warmer to a tiny bit colder than the environment. Then at the top where it reaches the inversion the lift drops off rapidly, but the temperature profile shows the core to be 1.4° colder than its surroundings. (This is just one of a number of



numerical thermals. One can have different figures and in extreme cases the thermal core was 4° colder than the environment before being halted.)

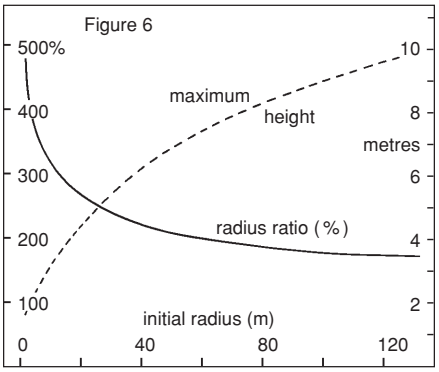
Little bubbles or narrow cylinders are diluted quicker than wide ones

The rate of entrainment depends on the surface area of the bubble but the dilution depends on the internal volume. As the radius of a bubble grows the column increases faster than the surface area. Figure 5 shows how entrainment can stop little bubbles from rising far. Initial bubble sizes are marked against the curves. They show that the height reached depends on the initial radius. In this calculation each bubble started with 2°C excess and ascended through an environment which cools off at 8°/km (less than a dry adiabat). As a result thermals smaller than 100 metres initial radius failed to reach the inversion. The larger bubbles rise much further and faster and penetrate the inversion. The curves also show the rate of ascent (marked in knots along the top).



Little bubbles expand more than big ones

Figure 6 shows two curves. The solid one is the ratio of initial to final radius. The dashed line shows how high bubbles might go. The initial radius is shown along the bottom ranging up to 140 metres. The maximum height reached is marked on the right and the percentage increase in radius on the left. The solid line shows that the smallest bubbles may have a 500% (or more) increase in radius while the larger ones increase by less than 200% even though they have risen further.



Penetration into stable air When a thermal goes through an inversion and starts to push into stable air, the penetration depends on both the temperature difference and the speed of the bubble on entry. Fast moving thermals can go a surprisingly long way before the deceleration caused by the temperature difference overcomes the momentum. Sometimes his carries the bubble high enough for a puff of cu to form well above the original base of the inversion.

First thermals are usually feeble The effect of entrainment probably explains why the first thermals of the day are apt to be disappointing. These thermals are short lived. It seems as if they lift off before they have a big enough reservoir of heat to draw on. They form small bubbles which are quickly diluted and seldom reach the top of the unstable layer.

The appearance of the first clouds Once the rising thermal has passed the condensation level extra heat is put into it by the release of latent heat of condensation as cloud forms.

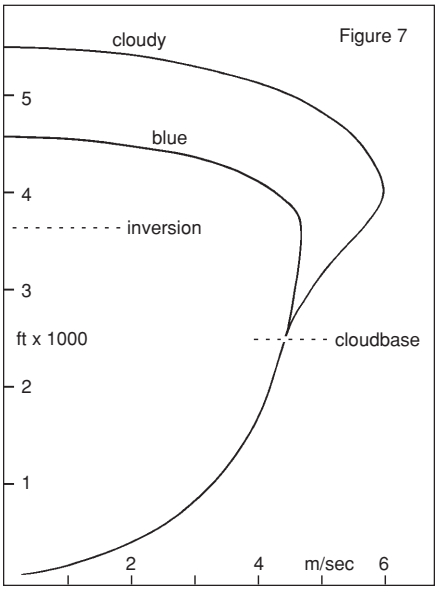


Figure 7 shows how this may change the rate of ascent. The curve marked "blue" represents air too dry for clouds. The upper curve marked "cloudy" branches off the blue curve when the thermal passes the level marked

"cloudbase". The heat released by condensation makes the thermal warmer and more buoyant so it accelerates. Being warmer it rises further into the inversion layer. Because it is moving faster it has more momentum too so (in the conditions selected for this example) it ends up about a thousand feet higher. On days of stratocumulus spread out one may climb in a growing cumulus and come out into the blue well above the 8/8 sheet which marks the inversion. Cumulus which penetrate like this seldom survive long. The air aloft is often so dry that evaporation soon cools and destroys them.

Starting puffs Little bubbles which barely manage to reach the condensation level produce short lived shreds of cloud. These do not seem to have any bubble shape when they appear. If a bubble had existed lower down it would have been too diffused by entrainment to retain its shape and circulation. Don't trust such clouds as thermal indicators. By the time they make these puffs almost all their energy has gone and there is no cone of lift beneath. One can tack back and forth trying every cloud in sight and never finding any which work. It is possible to stay up however, because one bumps into blue thermals in between. Early in the day thermals may be small but they are often fairly close together.

Thermals when there is a light wind

A light breeze often stimulates the release of thermals. In really still conditions quite large reservoirs of warm air can build up before something sets off a disturbance large enough to produce a good thermal. If there is a light breeze the warm air is pushed gently across the ground until it reaches an obstruction. Figure 8 illustrates two possibilities. The lower section shows the shallow disc of hot air bumping into a line of hangars and being triggered into releasing a series of plumes which grow into bubbles higher up. As time goes on the entire reservoir is used up and the thermal dies out. The repetition rate depends on how fast the airfield heats up again. It may be a long time when the sun is low.

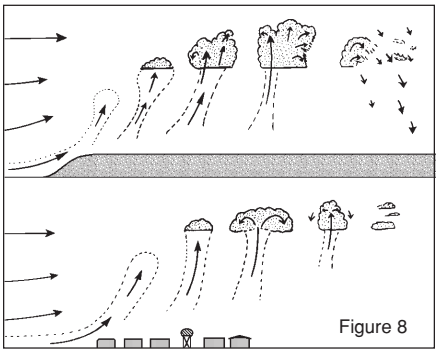


Figure 8

The upper section shows the sloping edge of high ground acting as the trigger. This is often better than a low level obstruction. The slope lift gives the embryo thermal a boost to start it rising and the high ground (being dry) heats up quicker and provides a good reservoir for the thermal to feed on as it drifts along.

An initial boost does not make the thermal much better

One might suppose that being given an initial boost up the hill side would make the thermal grow faster and extend higher. This does not seem to be supported by calculations. The entrainment process depends largely on the rate of rise of the thermal. When it rises faster the entrainment is greater. The result is that the excess speed is soon lost once the thermal has risen clear of the hill side.

The vacuum cleaner effect Some flat regions can build up a huge area of hot air just waiting for a trigger to release a thermal. Once a thermal has lifted off it is drifted along by the wind picking up more warm air. The air may rise as an almost continuous column or in a series of closely spaced bubbles plucked off by the thermal passing above. The result is a very long lasting thermal. The inward flow towards the base of the thermal can bring in air from several directions. If the surface air has a slight rotation initially the concentration under the thermal greatly increases the spin. Eventually this sets off a whirl visible as a dust devil. In desert regions dust devils can amble across the ground for many minutes and extend up to 7000 feet or more. In the UK where solar heating is less powerful most dust devils are very short lived and rarely go up high. I have known them appear before anyone had realized it was soarable.

Strong winds Strong winds cause turbulence which diverts the horizontal flow so that some of the fast moving air comes down to the ground. Then thermals seem to be torn off the ground before they are really ready to go. As a result they seem unable to get properly organized until much higher up. There are very narrow and irregular bits of lift low down but seldom anything useful. Higher up thermals are apt to be narrow and usually rough too. Up at cloudbase thermals may be just as strong as on light wind days but low down they are too broken for circling. Sometimes flying straight into wind gives better results than turning.

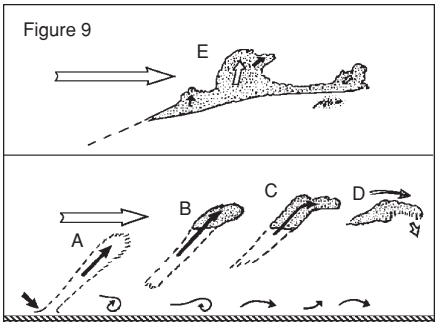


Figure 9 shows thermals being pulled off the surface by the turbulent flow near the ground. They do not seem to form bubbles, at least not low down. The air goes up as a ragged column, much too narrow for circling. At B it produces a scruffy patch of cloud. At C it loses momentum and the cloud is bent over and at D it decays. In the upper section cloud E has passed the condensation level with more energy and been revived. The odd bubble may push up from this cloud. With early thermals it is quite common to find the cloudbase slopes upward. On the windward side a tail marks the end of the plume. Tails are a feature of strong winds and weak thermals. I have not found any useful lift in these tails.

Life span of a cu cloud There are a number of garrulous glider pilots who delight in telling their companions how good the lift is. Information about a particular thermal may boost the morale of the pilot astern but is seldom of practical use unless the two can see each other. Few thermals last long unless they are capped by big clouds which everyone else can see. On blue days a call saying "There is 8 knots over Cowley" is seldom much help to the pilot leaving Didcot. This splendid thermal will usually have departed long before you get there.

How long a cumulus lasts seems to depend on several factors:

1 Volume of the cloud. The bigger the cloud the longer it will last.

2 The aspect ratio, or cloud height divided by width, low aspect ratio clouds last longer. For example a tall thin cloud with an aspect ratio of 4 tends to have only 1/4 the active life of a flat cloud with much width but little height. If you contact a thermal feeding a high aspect ratio cloud just as it starts you may be quickly whisked up several thousand feet, but only if you can stay in the bubble.

3 The time of day. Clouds have a shorter life in the morning than in the afternoon and the longest lasting thermals seem to be found in late afternoon.

4 The cloudbase. The bigger the thermal bubbles and the cone of lift underneath the higher it can go. High cloudbases usually go with tall cones of lift and big bubbles on top. If the cloudbase is below 2000 feet, as it may be when the first early morning cu appear, the bubbles are usually small and the clouds have a brief life. Little clouds may be dead in a couple of minutes. (But you will still see the remains five minutes longer.) On summer afternoons when the cloudbase is more like 5000 feet the cone of lift can often be found a long way below cloud and the bubble on top is much larger than in the morning. Such large thermals have a long life — a quarter of an hour or longer.

Towards evening, even on days when the cloudbase is so close to the inversion that the cloud itself is very shallow, one may find small flat cumuli working for half an hour or more. At this stage of development, the active clouds are nearly always much further apart than in the morning.

Group effect When talking of cloud life one needs to distinguish individual cells from the groups or lines of clouds which last very much longer. Large clumps of cloud consist of many cells. The outside ones have a short life because they are exposed to erosion from the surrounding air. Cells near the middle of the group live a more sheltered existence. The outer ring of clouds protects them from erosion by contact with dry air so they can grow much larger. One can usually head towards a large cluster of cu with confidence that there is bound to be lift somewhere underneath, even if it takes fifteen minutes to get there. Isolated clouds are far less reliable. They may look good from a distance but too often start to expire just as you reach them.

Semi permanent thermal sources

Another system of clouds has a very long life. These have an underlying supply of warm air which doesn't become used up. In fairly calm

weather a group of cu anchored to a mountain may stay there for hours, often until the sun goes down, provided the cloud does not grow so big that it puts the mountain slopes in shade. However, if you watch these orographic cu you will usually find that the individual towers have a short life; the bank of cloud remains active because it consists of a large family of cu all growing over the same region. As one tower collapses another rises nearby to take its place.

Cumulus streets These usually have a long life too, but this is due to the special circulation where the air follows a helical path. Once again individual cells do not last much longer but the street is continually replenished by new cells so that its effective life is long.

Signs of active cumuli One should look for two features:

1 A well defined domed top with little domes superimposed on larger ones shows that there has been a good thermal underneath. (But it may not be still working below cloudbase.)

2 The appearance of the base usually shows if a thermal is still feeding the cloud. An almost level base, flat for several hundred metres, nearly always shows that a thermal is still entering the cloud from below. Soon after the thermal has ended the base loses its level appearance. The top may continue to grow for several more minutes after the base has begun to decay.

Steer well clear of any cu when the top breaks off and the base turns ragged. There may soon be a waterfall of invisible sink.

Single and multicell clouds
The first puff of cu in the morning is often formed from a solitary thermal which just managed to reach the condensation level. The original thermal may only have a life of ten minutes from start to finish. These puffs of cloud are often dead within a minute and vanish within two or three minutes. Even a large single cell cu has a short life, probably not more than fifteen minutes. Once the cloud has formed it may persist twice as long but unless it is refreshed by the arrival of more active cells the lift soon dies out.

Later in the day the majority of cumulus clouds are formed from several cells (bubbles, columns, etc). Some follow up the same path as the original bubble but others rise on either side and combine to form a wider cloud.

Figure 10 shows calculated climb rates (the left hand curve) and a time/height curve for a very large single bubble. After cloud has formed the rate of climb shows a big increase reaching a max. of about 12 knots in the upper half. The time/height curve shows the maximum lift occurred just after a 10 minute ascent. This bubble stopped rising just before 14 minutes had elapsed. These figures are for one set of lapse rates and temperatures. By altering the initial conditions one can find a whole series of different curves. The results are similar for quite a range of starting values.

Figure 11 shows six outlines of a growing cloud with the time/height curves for five successive bubbles following up to boost the original one. Each added more mass to the cloud so that it grew both upwards and sideways. Most bubbles tend to turn away from the vertical as they lose energy. In some cases one may be able to see part of the cloud edge turn downwards and begin to descend.

Looking for lift under cu One can fly a long way looking for lift under a large multicelled cumulus. Even though it has a good looking flat base and a well domed top the lift only enters over a small area. Thermals feeding the cloud do not all follow the same track and the flat base does not decay the instant the lift ceases. Wispy bits (tendrils) below the main base are one sign of lift and a step in the cloudbase is another. The best lift is usually found very close to, but not actually in the tendrils or step.

Tendrils The longest tendrils appear when two airmasses converge as at a sea breeze front. Figure 12 shows A, a cross section of a sea breeze front with cool moist air coming in from the left. One does not see thermal bubbles in this damp air; when it rises it produces ragged tendrils well below the main cloudbase. Bubbles form in the warmer and drier air on the landward side. B is a sketch looking at a convergence line with patchy tendrils beneath. The dashed line shows a winding route following the lift. Heavy dots show where the main lift was found.

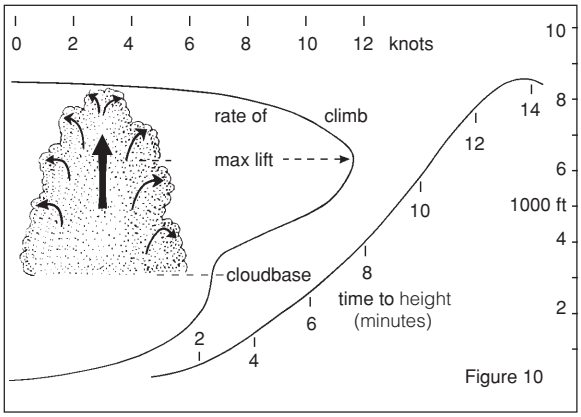
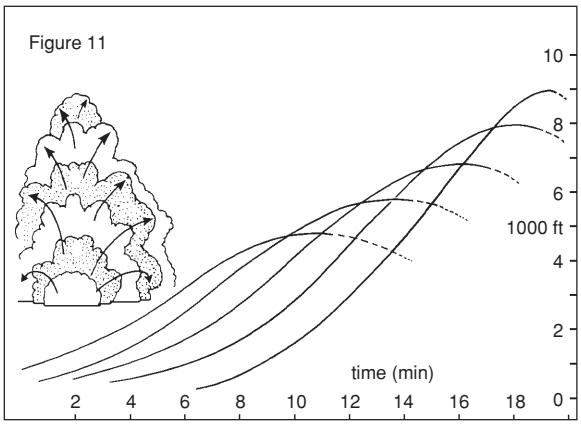
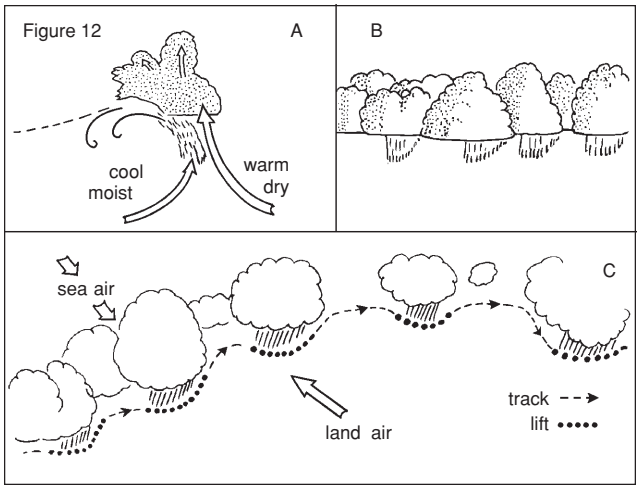


Figure 10



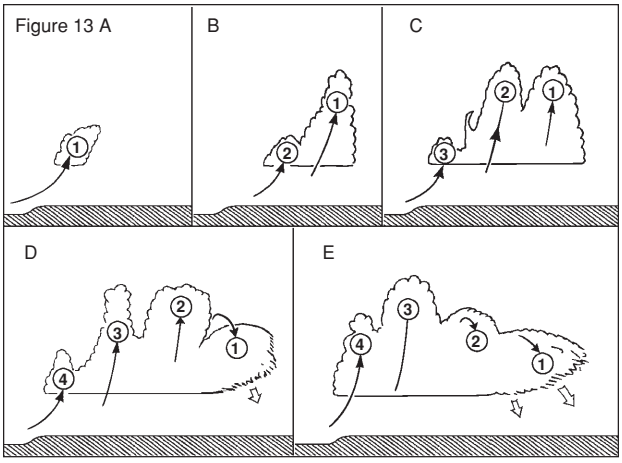


Tendrils often occur under clouds which have nothing to do with sea breezes. If you approach a big cloud from several miles away you may see small tendrils hanging from the cloudbase. One needs to look for these whiskery bits long before reaching the cloud. At a distance they may be silhouetted against brighter objects but they are much harder to see when looking up towards the grey base. The tendrils frequently (but not invariably) mark the edge of strong lift. The best lift is usually a short distance away. Tight circles which graze the tendrils seem to give the best rate of climb. If the tendrils stretch for some distance horizontally you may do best by flying along the line making tight turns either end. If you find sink try the other side.

Steps in cloudbase Occasionally the level cloudbase is interrupted by a step. Steps come in a wide range of sizes. The most impressive occur under cu nim. (The Americans sometimes use the term "pedestal clouds" for the stepped down section under a thunder cloud.) The best lift is almost always close to the step and under the higher base. One reason for the step may be that two airmasses, one warmer and drier than the other, have joined to set off a cloud. The warm dry air usually produces the larger plumes or bubbles of lift. On the dry side the thermal rises higher before forming cloud. The lower cloudbase may also give some lift but it is usually much weaker. Do not waste time circling in weak lift if the base steps up nearby. Head for the higher base.

Large variations in cloudbase occur when weak cu starts to rise out of a damp valley while the hills alongside set off stronger and much drier thermals. In some extreme cases the tops of the valley cu are level with the base of the hill cu. Valley cu are rarely much use at this stage. They may look acceptable but are dismally devoid of lift. Later in the day when the two cloud systems meet to form a single cloud one may see the step marking the change in lift.

It is generally true that the higher the cloudbase the stronger the lift. Like most rules in meteorology there are exceptions which are mentioned later on. When heading from one cumulus to the next you may run through a strong blue thermal. These are usually worth investigating. Quite often the lift is much better than under older cu and the new cloud (when it forms) has a higher base.



Successive cloud cells Some clouds grow on the upwind side and decay at the other end. Figure 13 shows a series of cells which developed over the Cotswold edge (about 800 feet asl) and grew as they travelled downwind. A shows the original cell. B through to E show how each cell rises to a peak and eventually collapses near the downwind end. The diagram shows only four cells but long lived cloud banks are built out of many more. On days like this it pays to head for the upwind end of each cloud and keep well clear of the sink near the downwind end. Topographical features are not essential for starting a cumulus line. Some grow very well over the ocean.

One often finds that nearly all the cumulus have their best lift under a particular side of the cloud for much of the day. The windward end is often the best end to head for; if it happens to be the sunny side too there is an even better chance of finding lift there.

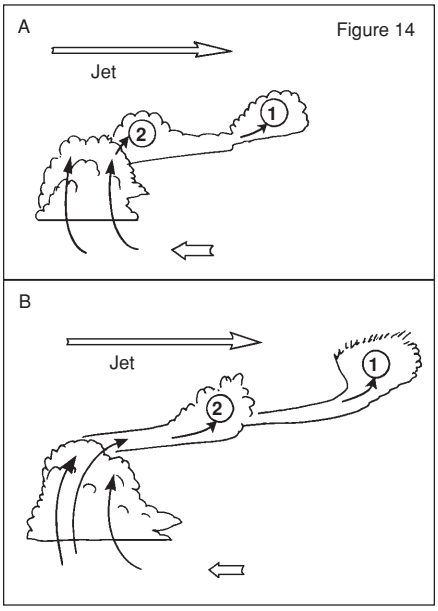


Figure 14 shows an extreme example of what can happen when the tops of cumuli push up into a much stronger wind aloft. As the bubble loses momentum the jet stream whisks it off downstream, still bubbling weakly. The same effect may often be seen with lesser cumuli in smaller wind shears. The sheared off section maintains its domed top and for some time there is a flattish base too. This is one case where the higher cloudbase is not the one to head for first. The lift beneath it has usually been cut off. Look for the main cloud mass from which these cells have been detached. The best lift should still be there under the more solid part.

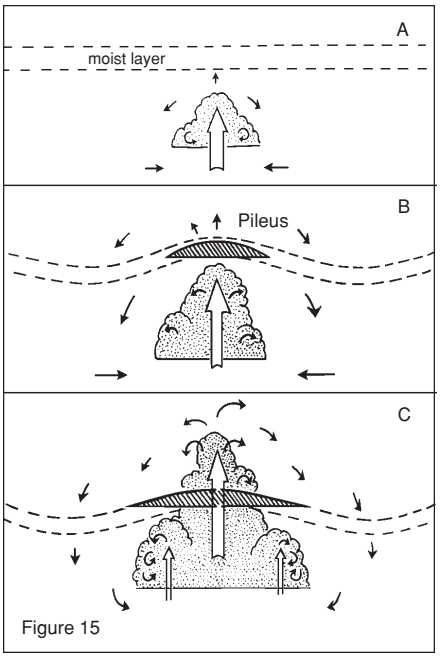
Wind shear and cloud hooks Thermals may often rise into a stable layer which slows them down and eventually kills all lift. Inversions are powerful thermal stoppers and there are often layers where the wind changes too. The wind shear above an inversion distorts thermals which rise into it. A strongly rising thermal may have its top bent over into a hook like shape. The hook is usually very short lived but the best lift is nearly always below the upward pointing part of the hook. Avoid the area where the point of the hook starts to turn down. That is where the sink develops. Hooks show you where wind shear has been concentrated. Little backward curling hooks sometimes briefly appear on the upwind side of a growing cu. These hooklets show local shear produced at the boundary between fast rising cloud and slow moving air outside. It can be a sign that there is strong lift just inside the cloud.

Hoops Occasionally, when a small cloud has produced a hook, the main body of the cloud evaporates leaving just the remnant looking like a croquet hoop. These strange formations rarely last long. If you pretend you are a croquet ball and go through the hoop nothing much seems to be going on. All the energy has been exhausted by that stage.

Pileus Figure 15 A, B and C shows the formation of a pileus cloud. Pileus means a cap and these clouds look like little lenticular caps. They first appear above the top of a growing cumulus. A large rising bubble may behave like a barge with blunt bows pushing some of the air ahead of it. The lift above a bubble is normally very weak so the fact that pileus forms at all with such weak lift means that the air was already very moist before thermals began. Powerful cu can grow straight up through the pileus which is left behind as a collar around the cloud.

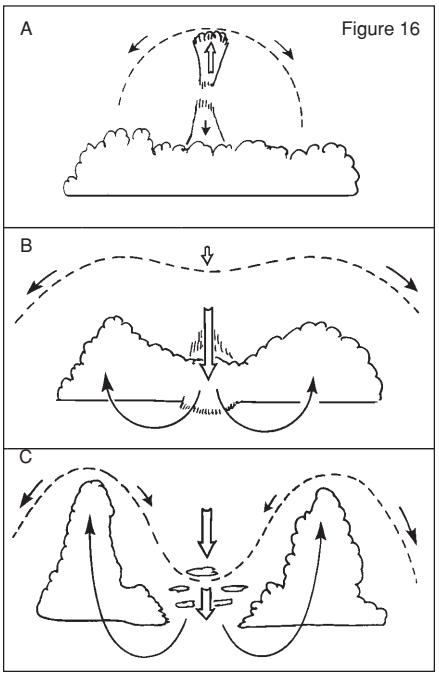
Pileus is a warning of possible spread out of the cumulus. It suggests that the air is so damp aloft that cloud cover may become 7/8 later on. Cumulus tops take much longer to evaporate when surrounded by damp air; with slow evaporation much of the ground remains under shadow and the good thermals are then much further apart.

Wave like effect of pileus
Pileus may be evidence of weak wave like lift



just outside the growing cumulus. Even when there is no visible pileus one can occasionally experience very smooth lift in clear air alongside a growing cu nim. A line of heavy cu may also produce a similar effect.

Lift alongside big cu lines On most occasions one only finds lift under or inside a line of big cu. The clear air outside is usually sinking but there are days when the convergence produces very weak lift just outside the cloud. The lift is apt to be too weak to give a worthwhile climb but it does allow one to go many miles into wind without circling, keeping close beside the cloud. On rare occasions one may even be able to go over the top. This kind of lift is deceptively like a lee wave, but since it extends many miles into wind the wave is probably due to the growth and expansion of the cu line. One usually has to fly very close to the cloud to keep in this weak lift. Pilots in a hurry may not notice it at all.



Cloud collapse and rebuild

There are some days when the air aloft is very unstable but also very dry. One or two cloud cells then shoot upwards with extra speed so fast that they break off from the main body of cloud. The detached bubble evaporates quickly in the dry air. Figure 16 shows three stages in the process. A is the break off of a bubble. The pecked line marks the expanding wave produced by this rocket like ascent. Rapid evaporation in the dry air soon dissolves the detached bubble making the air much colder. Then the whole column falls back producing holes and sometimes a wide gap in the underlying cu. The wave effect spreads outward (B) and new cells start to grow on either side of the gap (C).

Castellanus This word just means turreted, like the popular idea of a castle. The term can be used for cloud turrets which rise very fast out of a cumulus as in Figure 14A. Castellanus clouds do not necessarily have any connection with the ground. The lift may be started by high level convergence and boosted by the extra energy released when clouds form. If so there is no lift beneath them. Ordinary cu have invisible roots formed by thermals coming off the ground. Castellanus may not have any roots. During a hot spell in summer little puffs of castellanus sometimes appear at 10 to 15,000 feet. These little puffs are called “floccus”. They are a reliable indication of thunderstorms within 24 hours. Few people are fooled when they see these tiny puffs. They look far too high to be due to thermals. When they come from Europe across a cool sea it is obvious they cannot have thermals underneath.

I have found castellanus confusing when the base is 6000–8000 feet and the clouds look substantial. I have wasted aerotows below such clouds only to find the air at 2000–3000 feet totally inert for many miles.

Cumulus lines and streets Many cumulus clouds tend to form up in lines. Some lines may be an isolated phenomenon, caused by a group of mountains or a peninsula extending into wind, but an orographic source is not essential. Lines of cumulus also form over the sea. If these broaden to downwind and end up in clumps of stratocu they are not true streets. Proper cloud streets form a regular pattern which can cover vast areas with evenly spaced parallel rows of cloud. These streets are formed when there is fresh convection under a well marked inversion. Streets can develop in cloudless conditions too.

When there are streets the airflow develops a helical pattern. The air goes up under the clouds, spreads out sideways under the inversion and dips down in the gaps. At low level there is an inflow towards the street to complete the circulation. The air is also moving downwind so the motion forms a helix. The important thing is that a complete circulation develops. This makes cloudstreets a fairly long lived phenomena; some extend hundreds of miles.

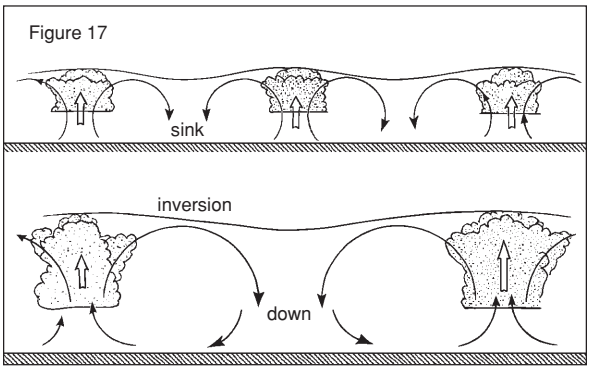
Cloud streets are aligned parallel to the wind at cloudbase; the spacing is about three times the depth of convection. Thus with 5000 feet tops the streets will usually be about three miles apart (sometimes a bit less). The gap is kept clear by the sink between cloud lines, sink which is distressingly strong. One usually needs to cross gaps as fast as possible and at right angles to the lines.

Change of spacing by the suppression of some streets

If the depth of convection increases cloud tops go higher and the spacing has to alter. This occurs not by the streets fanning out but by suppression of some streets and strengthening of those remaining.

Streets are splendid for making progress into strong winds but one usually has to jump across to another street to keep on track or avoid controlled airspace. Watch that you do not head across to the downwind end of a dying street. Choose an unbroken street to cross to. If suppression is taking place the circulation is changing, going higher under the growing street and descending further out into the clear lanes. As the sink spreads out it kills off intermediate streets.

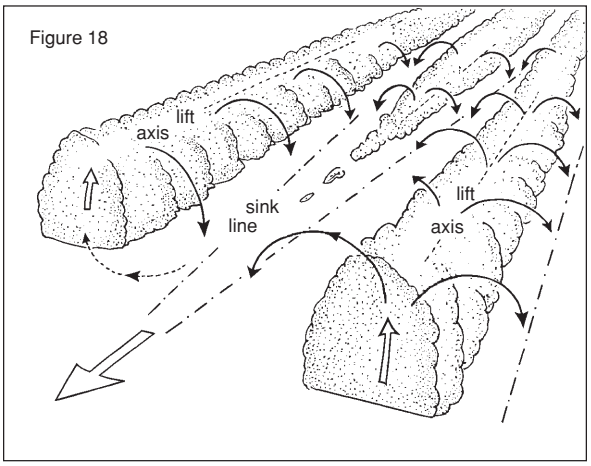
Figure 17 shows a cross–section with three streets forming part of a well developed circulation giving lift under the clouds and continuous sink between the streets. The lower diagram shows what happens when the inversion rises. The circulation widens and the middle line becomes squashed by the outward spreading region of sink from either side. Figure 18 shows a 3–D sketch of the process. The downwind end of a street may lie under this widening region of sink. If you go across at this point there may be only sink under the cloud street. It is heart breaking to have to work miles upwind through miserable broken bits of decaying lift to reach the active part of the street.



Satellite pictures indicate that a stage is reached when the inversion is too high for streets. This can happen in a short distance. Cumulus streets forming near the west coast of Wales and Cornwall can be broken up when the air goes over high ground which sets off shower clouds.

Wave suppression of streets

When the wind speed increases with height it is common to have lee waves at right angles to the cloud streets. The waves often occur in air too dry for any lenticular to appear. Where the wave flow is going up the streets below become stronger and the cloud line may widen too. In wave sink the streets may stop working or even decay. Thus one can find great variations in lifting up a cloud street on a wave day.



Miscellaneous signs of activity

Colour changes

When vigorous thermals first push through the condensation level the cloud droplets are very small and very numerous. They reflect the sun strongly so the fresh new clouds look clean and bright. After a time droplets coalesce, they grow larger but less numerous and reflect less light. The older clouds begin to look a big grimy in comparison to the new cells. Off white clouds are apt to have lost most if not all their lift. However, their appearance also depends on the angle of the sun.

Problems of perception

After flying for a long time in the same direction one becomes used to heading for a particular part of the clouds where there is nearly always good lift. Rounding a turning point alters the appearance of clouds and may spoil the ability to go straight to the best lift.

Cardboard cutouts

Flying down sun it is easy to be fooled by a bright looking cumulus. Arriving underneath one finds the cloud has no depth to it; it is little better than a bit of stage scenery, only convincing when viewed from the auditorium. Looking into sun one can pick out these fakes because they look too transparent.

Fretwork clouds When cumulus clumps start to decay the rot may start internally; from a short way off they still present a respectable front. The trouble may start from the collapse of a turret which shot up too high and evaporated, or it may be some much smaller feature. On some days very small holes form because the entrained dry air has begun to evaporate the middle of the cloud. Evaporation produces cooling and sink. Sink sets off more evaporation and the cloud begins to fall to bits. Watch for the shadow on the ground. If it starts to look like a piece of fretwork steer well clear. The whole cloud is ready to dissolve into a region of sink. It may still be worth flying round the perimeter to see if the central sink has triggered off some peripheral lift. •

Playing for High Stakes in Nevada

– a newcomer tries the Minden wave –

Tillmann Steckner
London Soaring Society

THE FIRST TIME I GOT INTO WAVE was in the fall of 1990 at the "Ridge" in Pennsylvania. At first I did not even recognize it for what it was. It was fairly late in the afternoon and I was desperately trying to cross the four mile wide Altoona gap going northbound. On a really good ridge day the gap is effectively seven miles wide as one has to first penetrate deeply upwind into the densely populated valley, and then, smack over the city of Altoona, change course by about 90° to high–tail back to the north side of the gap. I hung around at about 2000 feet agl, roughly 2500 feet short of what I needed to make the crossing safely in a medium performance plane (a Schweizer 1–34). The prospect of an outlanding loomed ever larger.

I finally made one last attempt to find some lift very close to the south side of the gap. In fact there is a tiny secondary gap nearby with what seems to be a cement factory on the lee side of the ridge. It was on the windward side of the little gap where I suddenly picked up some weak lift, around two knots or so. I used different bank angles, but no matter how hard I tried, I could not centre on the thermal. No sooner would the audio indicate a little lift, I fell out of it again. Yet every single time I passed the same spot on the ground, there was this darned lift again! Was it some kind of localized funnel effect generated by the small gap? It certainly could not be the heat from the factory downwind. I finally decided to stop circling altogether in order to find out just how long I could actually stay in lift by flying straight into the wind. I could barely believe my eyes: first a timid two knots, then three, and finally four knots! Alas, only moments later I was in sink again and lost everything. I did not find any lift on the right or the left either. I promptly turned back and to my surprise the whole cycle started all over again. I now tried to stay in lift as long as possible by flying straight into the wind at minimum sink speed. To slow my forward progress, I even executed some gentle "S" turns. Suddenly it got eerily silent and I was lifted up as if captive of a magic force. Not a quiver, smooth as silk! By then the proverbial light went in on my head. But wave at only 2000 feet? I made that Altoona crossing pretty quickly after this!

Ever since I wanted to fly the "Big One". I had heard much about Minden, and so finally this year I decided to go there myself. On 10 February I boarded an AA flight from Toronto to Reno via Dallas. As I was looking at the clouds deep below us, I heard the captain announce, "Cruising altitude 27,000 feet." Would it not be nice if just once I could fly this high in a sailplane? By the time we landed in Reno it was well after midnight. Even from way above, the place looks absolutely garish. I clearly could make out some of the big gambling casinos, the brightly lit twin towers of Circus Circus and the pink coloured Flamingo. Well, I was after a very different kind of stakes. ... A fellow glider pilot from my club in Canada, who happened to be on a holiday down there, picked me up at the airport. He invited me to stay with him at his hotel overnight and he graciously offered to drive me out to "Soar Minden" in the morning. I was dead tired — after all I had crossed three time zones on the long flight — and I was very grateful to him.

> I am now very calm... I also feel quite lonely, but it is a loneliness unburdened by fear or sadness.

Soar Minden operates out of the Douglas County Airport (4718 feet msl), about 37 miles to the south of Reno and 11 miles east of Lake Tahoe. Soar Minden is owned by Tony Sabino, and they presently have a fleet of eight sailplanes, three Grob 103s, a Grob 102, a Mini–Nimbus, an LS–4, a Standard Cirrus, and a Schweizer 2–32. (Those of you who are not familiar with the 2–32 may be interested to hear that this glider can accommodate two passengers side by side in the rear seat.) Towing is done by two sturdy 260 hp Pawnees. In addition to Tony there are two instructors, Joe Rasymas, the CFI, and Harvey Clarke. Harvey's wife Margaret looks after the office and with much aplomb attends to every whim and wish of some pretty weird folks, collectively known as glider pilots. The main towpilots are Paul Clark (no relation to the Clarkes) and Dick Flanagan. They are very competent and you can totally depend on them even when the going gets rough — sooner or later it invariably does. There is also Hod Taylor (of Black Forest fame) who works there part–time to give glider rides. Although he is in his seventies, he is reputed to fly his Polish Cobra upside down most of the time. When studies permit, Tony's eldest son, Tony jr, takes up customers for sightseeing tours.

On my first flight with Tony I got lucky, because we quickly managed to work our way up to 20,000 feet. We cruised around in one of his Twin Grobs for about two hours. He told me before takeoff that I was the pilot in charge and that he would only advise me as the need arose. His comments during the flight were very much to the point, creating the pleasant illusion that I could have done it all by myself. The sight over the Sierras and Lake Tahoe was so awesome that Tony had to remind me to slow down my breathing! Later during the same day we made two further flights together of about twelve minutes each so that I would become better acquainted with the general layout of the many runways and the proper takeoff and landing procedures.

In addition to gliders, the airport handles all types of aircraft — piston powered, turbo–props, jets, and helicopters. I even saw two vintage Grumman Albatross flying boats, one of which practised takeoffs and landings. The airport, which originally was designed as a bomber base, has four active runways with a common centre intersection: runways 16, 30, 34 and 12. The main runway (16/34) is 200 feet wide and 7400 feet long. In addition to runways 12/30 and 16/34 there are several landing alternatives for sailplanes at the airport. There are runways 21 and 30R (a dirt strip) and if need be, most taxiways can also be used. During circuits, power planes stay to the west of the airport, sailplanes to the east of it. The Douglas County Airport Unicom is 122.8 MHz and glider pilots are expected to call in twice during the circuit — once when entering the downwind leg, and once on the base leg. Needless to say, for a weekend glider pilot normally flying out of a small grass strip in rural Ontario, the whole situation is somewhat unsettling at first.

Good fortune would have it that only three days later I should get a chance to ride the "Big One". At first things did not look too encouraging. The surface winds were from 180° at 30 knots and gusting. A few local pilots had taken off from runway 16 and reported very rough conditions. Tony came to me and said, "I don't advise you to go, but I am not telling you not to go either. The choice is really up to you!" I finally decided to go as I could not be sure if the weather would give me another chance in the days to come. In any event, I put on the flight suit, stuff a chemical heat pad into each of my boots, get the oxygen mask, strap on the parachute, and collect two barographs — one of them is a Replogle, the other a Winter instrument modified for altitudes exceeding 30,000 feet. I have a last minute briefing with the towpilot. Paul agrees to waggle the rudder as a signal when in his judgement it is best for me to release. I slowly do my walk around and carry out the preflight check. Tony tugs me into the Twin Grob, while Harvey ties up some loose ends

in the empty rear seat and gets the oxygen ready. The gauge of the big 38 cubic foot bottle shows 1800 psi, good enough for about three hours at 30,000 feet. Tony retightens the five–point harness so hard that I can barely move. Is this going to be a rodeo ride? I am fairly calm, at the same time I am aware of the risks. If I have a towrope break at low altitude, I shall not be able to make a downwind landing with a tailwind of 30 knots, gusting, and 20 degrees off the runway to boot! A straight–ahead landing into the sage brush does not look inviting either. Tony gives me some final instructions, "If you lose sight of the towplane, up or down, or one of the two planes starts to flip over, release immediately!" I feel like a rooky astronaut on the launch pad.

Tony does not give me much time to leave me to my useless thoughts and pulls the Grob from the staging area directly into the runway intersection. I am going to take off from runway 16. I once more go through the preflight check, including a towrope release check. Thumbs up and the towrope begins to tighten. I waggle my rudder and off I go! I quickly get the nose wheel off but try to stay on the main wheel as long as possible. In these gusty conditions it could be a punishing experience to be slapped back onto the runway. The fun starts almost right away, and as we go through the rotor of the primary wave, we are knocked about quite a bit. The large wing span of the Twin Grob and its relatively high inertia soften things to a manageable level. Several times I crack the spoilers open to take out some excessive towrope slack. Paul is taking me through several turns and we gain altitude at a steady four knots. After a while things start to settle down and there is a marked increase in the rate of climb: five knots, six knots, and seven. I expect Paul to waggle his rudder any moment now.

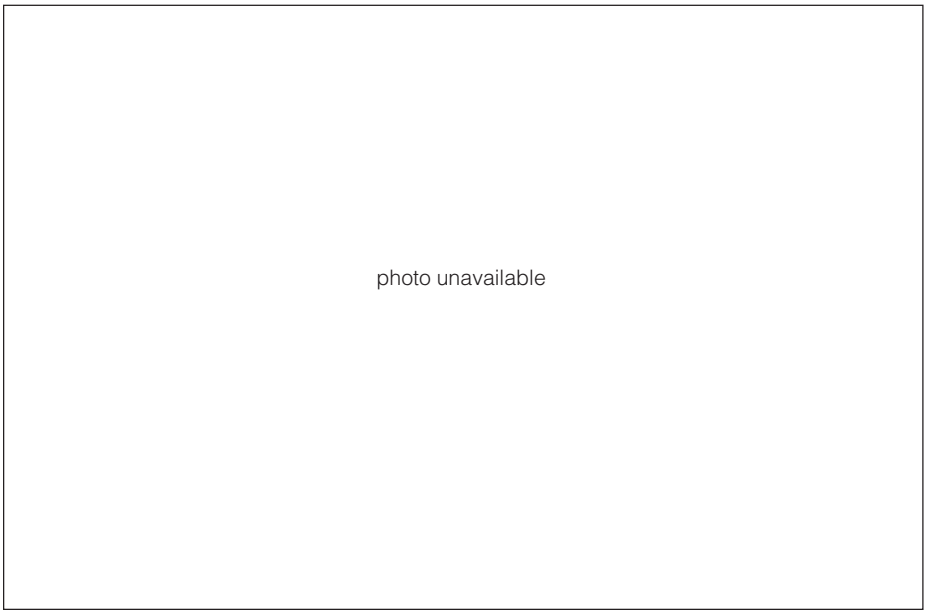
At eight knots we part company. The Pawnee makes a steep dive to the left and quickly disappears. This allows me to make only a token turn to the right, as I am anxious to stay in wave lift. The variometer almost immediately pegs at ten knots. I look to the left and to the right to pick my reference points on the ground below. At around 11,000 I fully extend the spoilers to notch my barograms. Descending at a fair pace I slowly count to 30, and then retract and lock the spoilers for good. Unfortunately I forget Tony's patented method of notching the barogram. Because the stylus of the barograph sometimes tends to stick or lag behind, he advises pilots to hit the side of the cockpit with the left fist just before retracting the spoilers. This technique leaves a more definite break in the tracing so as to mark the low point of the flight more clearly. The low point on my own graph, although quite acceptable, turned out somewhat less than exemplary.

I am now well established in the primary wave roughly three miles south of Soar Minden and three miles east of the mountain ridge. I average nine knots of lift and approach the 18,000 feet level rather rapidly. Perhaps at this point I should interrupt the account of this flight to clarify some procedural and technical aspects related to it.

At 18,000 (preferably before) the pilot must call base to get permission to climb to the desired flight level. (The same thing should be repeated before exceeding FL300). Tony or Margaret then get in touch with the Oakland Flight Centre to get clearance for the requested "wave window". There are three such windows reserved for Soar Minden, each measuring roughly 13 by 23 miles. The west window, whose long centre line lies along the ridge of the mountain range reaches to the east shore of Lake Tahoe. The primary wave is typically located within the west window and most of the time lies slightly to the east of the ridge. Similarly, the secondary wave is usually found in the central window adjoining the west window. The most common reason for using the central window is to avoid the more severe turbulence of the rotor associated with the primary wave. In other words, the pilot may choose to have himself towed through the less turbulent rotor of the secondary wave, and once sufficient altitude is gained in the weaker and lower secondary wave, transitions to the more vigorous primary wave located in the west window. The east window is rarely used and normally clearance for wave soaring is only requested for the west window and the central window.

Let me now return to the flight at hand. As I reach 18,000 I continue to go up like a homesick angel. I no longer even bother to look at the variometer, as the altimeter winds up like the second hand of a clock. At 20,000 the sight of the Sierras and Lake Tahoe once again puts the spell on me. I get so carried away that my heart suddenly starts knocking as if it was running on low octane. I look at the blinker and see that my breathing rate has gone up dramatically as well. (The "blinker" is an oxygen flow meter mounted on the instrument panel. The device looks like an oversized cat's eye turned sideways. When inhaling its yellow iris closes and the black pupil contracts, conversely, when exhaling, the iris distends and the pupil widens.) I realize that if I continue to hyperventilate, I shall soon be in serious trouble. I manage to settle down and things quickly return to normal.

Around FL260 I decide to take some pictures. The panoramic view around me is breath–takingly beautiful — pun intended. To the west the Sierras stretch out before me as far as the eye can reach. Lake Tahoe below appears like a huge aquamarine set in hard rock. Even though the skiers were complaining about poor conditions, there is still a lot of snow higher up in the mountains. I also turn the camera on myself, as well as take a shot of the instrument panel. Unfortunately, the latter photo was completely washed out, as I was flying directly into the sun at the time. After I am finished taking pictures, I notice that I have drifted too far forward and out of the wave. For the first time I register some sink. I swiftly circle around, just as I did at the Altoona gap 1–1/2 years ago, and quickly re–establish myself in the wave. However, the lift now gets noticeably weaker and as the wind seems to have backed, I head into a slightly more southwesterly direction.



A happy Tillmann after the flight in the Minden wave which completed his second Diamond.

The sunlight is the most intense I have ever experienced. A cotton–like layer of cirro cumulus slowly drifting over the Sierras below me is as white as snow. The visibility from this altitude must be close to 200 miles.

Judging from the terrain directly under my wings, I am standing still. If someone were to watch me from the distance, I would appear like a dragonfly on a clear autumn day, totally motionless, basking lazily in the sun, and without apparent purpose. If I was very excited just moments earlier, I am now very calm and at total peace with myself. I also feel quite lonely, but it is a loneliness unburdened by fear or sadness. I guess the word is "serenity". I cannot help but hear JS's Air on the G–string. Those who know the "code" will understand, those who do not, would take me for crazy — and probably be right. Whatever my state of mind, I am most certainly not suffering a case of hypoxia! At no time in my life have I been so conscious of the fact that our

existence is but a fleeting moment when measured against the greater scheme of things. I look down at myself and see the oxygen supply hose dangling from my face and curve around my body. It disappears behind me in the bowels of that white fragile eggshell in which I find myself. The vision of being connected to a life sustaining umbilical cord and of floating in the womb of space are images too powerful to suppress.

At FL290 the left side of the canopy starts to freeze over. A glance at the temperature gauge tells me that the outside temperature has sunk to a chilling –50°C. My feet get quite cold as the aluminum rudder pedals draw more and more heat out of my body. Suddenly the big white bird begins to shudder and quiver, although I am well above stall speed. Either it also is starting to feel cold, or we finally have reached the top floor of the grand elevator. I am now just under 30,000. I fish around for a little more, but to no avail. I have really no cause to complain, because on my first attempt I have enough altitude to clear Mount Everest and still have about 750 feet to spare. Besides, the wave window over the Carson Valley starts to close in to the north of me. I have been told that the opening and closing of the window on days like this usually cycles every twenty minutes or so, but I would be a fool to count on that.

I take one last long look around for I know that I shall treasure this view and the experience for as long as I live. I caught a glimpse of an indefinable realm that seems neither quite of this world, nor of heaven either.

I slowly open the spoilers, and flying out of the wave lift, I rapidly descend at about ten knots. I closely watch the airspeed indicator and take care not to exceed 60 knots — allowing for the altitude error, my true airspeed at this altitude is around 95 knots. If I hit any turbulence on the descent, I do not wish to overstress the plane. Surprisingly the long ride down is much smoother than expected. Before I get far enough down to catch the effects of the primary rotor, I shift over to the central window. I set myself up for the circuit and go through the prelanding check. Coming from the southeast, I reach the IP opposite the runway intersection at 5600 feet and call in, "Douglas County Traffic, glider one–zero–three–mike–golf entering left downwind, runway one–six, Douglas County!" I call in again as I head into the base leg and then make my last turn onto final.

The Grob gently settles down on the long runway, and at the intersection I veer off into the staging area where the flight began about 1–1/2 hours earlier. To me it seems that an eternity has passed! Mother Earth has claimed me back, umbilical cord and all. For awhile I sit totally still. I feel a strange mixture of elation, of relief, of being emotionally drained, and last but not least, a sense of pride and joy of having accomplished what I set out to do. Yet there is some nagging doubt that the whole strange experience was for real. Only after Tony shows me my barogram a few hours later and congratulates me on having achieved Diamond altitude are these doubts completely laid to rest. The barogram looks more like the Rock of Gibraltar than the tracing of a flight, almost straight up and down with a little hump on top.

After this memorable flight we had several days of good wave conditions, and finally on 21 February, there was the biggest boomer of them all. The day began in a strange way. In the morning the altimeters of all planes were found to have dropped from the field elevation of 4718 feet to about 3900 feet. Wind conditions were almost ideal, but it was so dry there wasn't a single cloud in the sky. Tony was one of the early birds up and called in that he had hit 2000 ft/min lift!

The temptation for me to drop everything and go up myself was terrific, but I was doing some ground school work and I did not wish to break the commitment. A little while later someone calls me to the window to witness a strange phenomenon. There are dust clouds swirling about all over the place, around the runways as well as beyond the airport to the east. The rotor has hit the deck! The guy beside me, a power pilot, says to me, "If you ever see some of those dust clouds from above, be sure you pick your way around them, and if you can't, land some other place!" I felt like replying, "That's easy for you to say, all you need to do is shove your throttle forward!" In the afternoon someone actually makes it up to 32,000 feet! I console myself with the thought that soon there will be another day for me. I was sorely mistaken.

The following week was only good for some thermalling — which provided me with a splendid opportunity to get acquainted with Soar Minden's LS–4 — and then I became quite sick. It was one of the most serious cases of the flu I have ever encountered, and even now as I write this about two weeks later, I still can feel the aftereffects. For two days I mostly lay in bed and could barely eat or keep my food down. Joe looked at me, shook his head sadly and said that even if the wave arrived, I would hardly be in shape to take advantage of it. I knew he was right and it was time to leave ...

Those amongst you who have never flown in wave may be interested in the following observations. Since three wave flights between 20,000 and 30,000 feet hardly make me an expert on the subject, I checked these points out with people who unquestionably are.

- Wear some cap or hat with a large brim. While the lined leather cap I used kept my head warm quite nicely, it proved woefully inadequate in providing good vision when looking into the sun. Sunglasses are, of course, a must.

- Apply some sunscreen cream even for flights of short duration, because the radiation is very intense up there.

- Unless you have footwear capable of withstanding temperatures as low as –50°C, stuff one chemical heat pad (sold on site) right under the front of each foot.

- Babbling on the radio is frowned upon anywhere, but at high altitude it may also prove to be hazardous to your health unless the mike is built right into the oxygen mask. Even brief moments of removing the oxygen mask in order to speak into a mike could get you into serious trouble. Without oxygen at 30,000 feet you become extremely tired within 15 to 30 seconds. In about 45 seconds you will be incapable of making any useful response, physically or mentally.

- At high altitudes trim the plane to around 50 knots. This allows for a 2% error in IAS for each 1000 feet in altitude. If something does go wrong, you can simply pull out the brakes or spoilers, and remove both hands and feet from the controls. This will cause most gliders to enter a "benign spiral" dive. It may give you a chance to take some more decisive action at a lower altitude. (At very high altitudes, the bailout option should only be considered if a bailout oxygen bottle is available, and/or the procedure was discussed with an expert prior to takeoff.)

- If you suffer spontaneous nose bleeds on the ground, you are very much at risk at altitude. Already at 18,000 feet, atmospheric pressure is only half of what it is at sea level. The air in Nevada also tends to be extremely dry, causing the blood vessels in the nose to rupture more easily. (In my own case my fingernails started to crack after a few days.) If you do get a nose bleed high up, you are probably going to panic which, in turn, will drastically increase your breathing rate and heartbeat, thereby compounding the problem. Any blood accumulating in the oxygen mask is likely to badly foul up the valves. At this point you have only one viable option left — quickly remove the oxygen mask, disconnect it at the connector, and breath directly from the oxygen supply hose coming from the pressure regulator. Hold the hose with your free left hand. Although I do not suffer nose bleeds myself, I tried this technique for different reasons right up to 20,000 and back down again, and had no trouble with it at all.

- As you descend above the airport, watch closely for signs that the wind has shifted (directions of planes taking off and landing, the windsock or the tetrahedron). You can also call in and ask for the wind conditions. I found that at Minden wind speed, wind direction, gust conditions, as well as atmospheric pressure, can change more quickly than at any other place I have been. (In Hungarian the word "minden" means "everything"!)

- Because of the rotor it is not uncommon at Minden for the surface winds to be stronger than the winds at the ridge level.

- At Minden ideal conditions are encountered when a stable airmass moves across the Sierras from about 230° (ie. at right angles to the ridge) and when there are steady winds of 25 knots or more at the ridge top level. Such conditions are typically associated with a low pressure area moving in from the west coast. The winds will be found to back as altitude increases.

I would be very much amiss if I were to close this article without acknowledging my debt to Tony Sabino and his capable staff. Tony was kind enough to provide me with a room in his house and offer me the use of his second car. This allowed me to stay longer at Soar Minden than would otherwise have been possible. I also wish to thank Joe Rasymas, with whom I flew on several occasions, partly for the sheer fun of it, and because I very much wanted to subject myself to the critique of a highly experienced pilot, and this he did with a great deal of grace and effectiveness. •

Blowing your own canopy

With a little care you can save thousands!

Helmut Wieland
Rideau Gliding Club

MY ZUGVOGEL NEEDED A NEW CANOPY, the old one was showing its age and gave a restricted view of the sky. A replacement, well! A new one from the manufacturer either can cost too much or may not be available. Why not try to blow a new one?

There are some articles on canopies in old magazines (see SOARING, Sep 79 and Oct 79). In addition, books on plastic construction handling techniques provided enough information to the point were I felt the job could be done with homemade equipment. The bubble form does not have to be exact though — when the bubble is trimmed, it is very flexible and will conform to the frame under a range of shapes. However, the "loft" should match the top curvature of the fuselage as closely as possible to look good. Things didn't go all that well at the start and it took me four attempts to form an acceptable bubble.

Beginning with a sheet of 1/8" plastic mounted in a plywood sandwich with the top ply sheet having a cut out derived from the canopy frame, the whole assembly is heated and a bubble is blown in the sheet. This sandwich can be mounted on a 2x6 frame complete with heating elements, air connections, and a height gauge, enabling the whole assembly to be slid into an oven and removed once the bubble is blown.

Cut two sheets of plywood about 2x8 feet, trace the shape of the base of the canopy onto what will be the top sheet. Extend the front and back curve to achieve a closed elliptical shape. Make the cutout 1/2" larger than the shape derived from the canopy frame and round the edge.

Separate air supply and manometer lines are attached through the bottom sheet. (A manometer is used to monitor the pressure inside the bubble. This is a U–shaped tube filled partly with water, mounted vertically on a piece of wood, and gives a pressure read–out in inches of water.) These sheets and the plastic form a sandwich attached at about 1.5" intervals with bolts about 1" from the cutout edge. To achieve a relatively airtight section, use silicone sealant between the bottom plywood and the plastic sheet where the many bolts hold the sandwich together.

The oven can be built out of plywood or sheet metal, with about 4" of insulation. It must be relatively airtight to reduce cold air drafts and heat loss. For an oven of about 40 cubic feet, 5000 watts of heating elements are required to bring the whole works up to temperature in about 15 to 20 minutes (old oven elements work fine). Included in the oven is a window, a thermometer, a fan, something to function as a door, and a baffle to deflect air from the fan away from the bubble as it is being formed.

Test the oven with the form but without the plexiglass to make sure it does come up to the required temperature of about 150°C. It may be advisable to turn the elements off intermittently to achieve more even heating.

During the heating stage, maintain air pressure of about 1/2" of water on the manometer within the sandwich to slightly raise the plastic off the lower sheet of plywood to prevent it from being blemished. When the temperature is about 150°C, increase the air pressure to about 2" and observe the symmetry of the shape — if good, go for it — if not, turn off the heat for a few minutes to let the work become more evenly heated.

Once the bubble has reached the desired height (allowing for trim and some shrinkage), maintain enough air pressure to keep its shape, open the oven door and let it cool. As soon as it can hold its own shape, quickly remove the many bolts forming the sandwich.

When drilling or cutting plastic, use relatively high speeds, a slightly dull drill, and very slow feed rate. A drill bit having a 0 degree lead angle is recommended. To develop cutting and drilling techniques practise on some scrap pieces. I am not courageous enough to make any recommendations as to how to cut the required canopy shape from the bubble form.

All I can say it is very fragile at this point and I almost had another piece of scrap. One is required to develop their own method of cutting and working with sheet plastic. I had some success with an electric hand planer.

Plexiglas versus polycarbonate or Lexan? A good quality acrylic is easier to work with, Lexan is considerably stronger and will take more abuse, but it requires a higher temperature to soften enough to blow a bubble. A wooden oven may catch fire before the required temperature for lexan is reached, this is about 200°C+ versus 150°C+ for acrylic.

A silicone type glue can be used to mount the canopy to your frame. Flexible epoxy does a good job cosmetically to refair the outside part of the canopy frame.

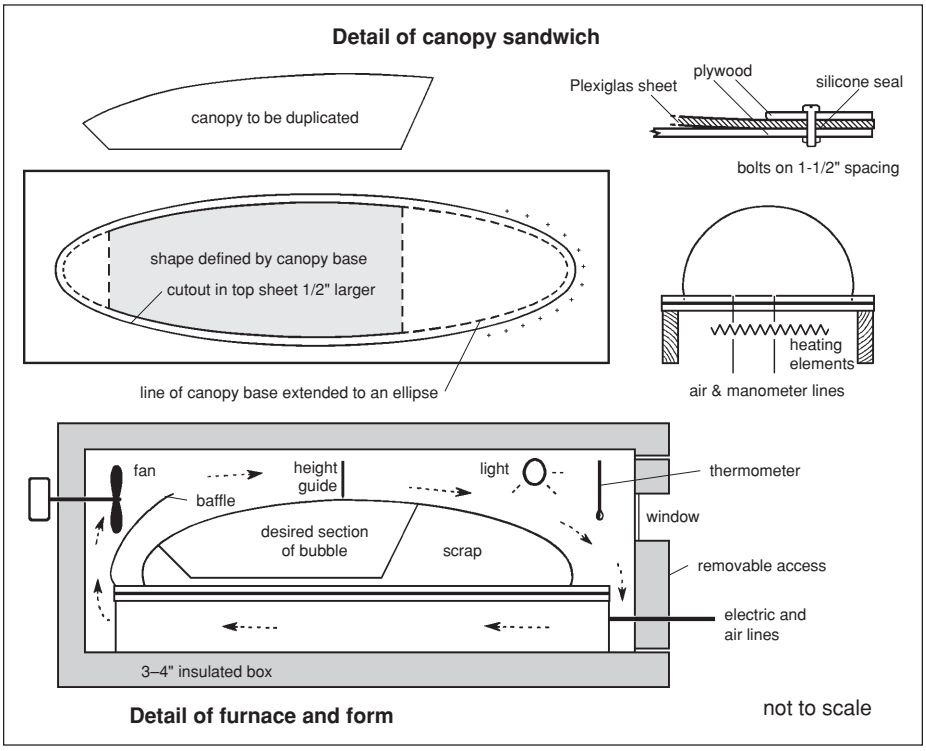
Things that can go wrong — 1 to 100

If a crack develops in the plastic while preparing the sandwich, get a new sheet.

You only get one try per sheet. If the oven fails to get to the required temperature, the plastic will crack on cooling.

If it doesn't go well the first time, try again. Total cost was about $200.

Good luck. Boy, it was nice to be back up in the air with a perfect canopy! •



training and safety

HOW TO BUY YOUR BEST SUN PROTECTION

Janis Campbell MD, dermatologist
from Pulse
Sport Medicine Council of Alberta quarterly

Excessive sun exposure without appropriate protection is known to be harmful. Not only can it cause sunburn and drug induced photosensitivity reactions, but its cumulative exposure causes photoaging (skin wrinkles, broken blood vessels and freckles), development of basal and squamous cell carcinoma and melanoma in the skin, cataract in the eye, and alterations of the immune responses. With the gradual depletion of the ozone layer, sun protection will become even more important.

Sunscreens are chemical agents that work by absorbing, reflecting, or scattering of the solar rays that reach the skin. They affect the UVB and UVA spectra of ultraviolet light. The UVB band extends from 290–320 nm and is often referred to as the sunburn rays. This band of ultraviolet light is the primary promoter of light induced skin cancer. The UVA band extends from 320–400 nm and causes tanning reactions. UVA can also cause sunburn and is considered to be a co–promoter of skin cancer but is much weaker in this capacity than UVB light. However the amount of UVA reaching the surface of the earth is about ten times greater than that of UVB. Thus, it too can have significant impact on the skin over time. UVA light is the primary cause of photoaging, which is also referred to as dermatoheliosis, and of photosensitivity reactions (due to drugs or internal disease).

The most commonly used chemical sunscreens contain para–aminobenzoic acid (PABA) and its esters, benzophenones, cinnamates, salicylates, anthranilates and Parsol 1789. Most sunscreens are a combination of several ingredients.

To measure the effectiveness of a product, the sun protection factor (SPF) was devised. It is a measure of the effectiveness of blocking UVB. An SPF of 15 allows an individual who might burn in one half hour at noon to stay out 15 times longer, ie. 7.5 hours, before they burn. An SPF sunscreen of 15 blocks 95% of the UVB reaching the skin. Using an SPF of 25 will reduce the UVB by an additional 3% only, or give 98% protection. Thus, unless a person is very sensitive to the sun, a 15 SPF is adequate.

At present there is no standardized method for measuring a sunscreen's ability to protect against UVA. Measurement techniques are being developed and will soon be known as the phototoxic protection factor. For individuals who have photo aggravated illnesses or who are on medications that cause photosensitivity, this will be the factor to consider.

Most sunscreens on the market block UVB sunlight equally well. The main difference between sunblocks is the vehicle (alcohol based, cream, gel or spray), water resistance and UVA protection. If an individual has acne, then alcohol based lotions or creams rated as noncomedogenic are preferred. Sprays are popular for easy application to extremities and to scalps of men with hair loss.

"Water proofness" is the resistance of a product to being washed off while still maintaining a good SPF. Even if a product claims to be waterproof, it is recommended that the formulation be re–applied after excess sweating or swimming. Re–application does not further extend the original SPF rating time.

The latest improvement in sunscreens is Parsol 1789. Most sunscreens that provided UVA protection, until recently, blocked UVA from 320-360 nm only. Parsol 1789, a new agent, blocks UVA through the entire UVA spectrum of 320-400 nm. Two brand name products, Photoplex R and Ombrelle R, have Parsol 1789 as one of their ingredients. They both have a sun protection factor of 15 and are waterproof. Photoplex contains PABA to which some individuals may react allergically. Ombrelle does not contain PABA.

Sunscreens should be applied 30–60 minutes before physical activity or sun exposure. This allows for adequate absorption into the skin for maximal effectiveness and reduces burning and stinging that can occur around the eyes with any type of product. If there is a concern of being allergic to a product, apply it to your forearm for 2–3 days and see whether a rash develops. New additions to sunscreens in the future may include such ingredients as aquaeous Vitamin C or pigment stimulating compounds. Vitamin C is not a sunscreen but it blocks the chemical reaction that occurs when UVB light hits the skin. Pigment stimulating compounds, which may increase skin pigment, filter sunlight entering the dermis of skin, reducing the total amount of ultraviolet damage to the skin.

So, be sun smart and sunscreen up. •

NATIONAL CFI SEMINAR SLATED FOR 1993

The Soaring Association of Canada and the Ontario Soaring Association are planning to co–sponsor a CFI Seminar on Safety and Instruction in 1993, possibly in conjunction with the SAC AGM. Provincial Associations have been asked to assist in funding CFI delegates to the seminar through their safety programs. More information will follow at a later date.

JUMP!
the statistics on bailing out

Tony Segal
from Sailplane & Gliding

Midair collision and the subsequent escape of the pilot from the glider cockpit is a very emotional subject. Before he can use his parachute, the pilot has to get clear of the glider. Professor Dr.-Ing. Wolf Röger of the Technical College, Aachen, has analyzed German accident figures and has prepared a full report analyzing all the midair accidents in Germany from 1975 to 1988, and has carried out experiments on the factors affecting successful escape from the cockpit. This article is based on data from his report.

Damage to the glider Serious damage to gliders in midairs involved the fuselage being broken into two, damage to part of the wing or damage to part of the tail. Damage of this severity was followed by a total loss of control and a very high rate of descent. The glider either entered a vertical dive, a spiral dive, or rotated around one or more of the three glider axes. The time between collision and ground impact was very short. The pilot experienced g loads that in some cases helped him escape, and in others prevented escape.

Pilot's psychological state Following a midair collision with subsequent complete loss of control, the pilot must bail out immediately. The pilot will be highly aroused, with impairment of his thinking ability and memory. A standardized emergency system is therefore of great importance.

Fact and figures There were 34 midair accidents, involving 58 gliders. Six of these gliders were two seaters. Many of the accidents were between two gliders that collided while circling in thermals. Of the total of 64 aircrew involved, 36 survived and 28 died. Thirty-two were known to have tried to jettison their canopy and bail out. (In some cases there were no witnesses and no evidence as to whether an attempt was made to jettison the canopy.) Of the 32 pilots who attempted to bail out, 19 lived and 13 died. This gives a success rate of 60%. This can be compared with the 90% success rate in military aircraft. Military aircraft have ejection seats, of course, but their escape envelope is far more stringent than that of gliders.

The height at which an escape was attempted had a great effect on the chance of survival. Most of the accidents occurred below 4000 feet. Below 4000 feet there were many accidents in which the pilot was killed because the time was too short to jettison the canopy and leave the cockpit. Above 4000 feet, there was only one such fatal accident. The lowest height at which aircrew survived an attempted escape was 650 feet. This involved a two–seat glider equipped with automatic parachutes operated by a static line. Without an automatic parachute, the lowest height at which anyone survived was 1600 feet. Clearly, this is a cause for great concern.

In four accidents, the pilots had difficulty operating the 3-lever canopy jettison system. The percentage of pilots killed in gliders

equipped with a 3–lever system was higher than for those equipped with a 1 or 2–lever system.

Canopy jettisoning systems The systems vary greatly in different glider types, as the following list shows:

- Shape Some systems used operating levers, some used knobs.
- Situation The control could be above, or below the instrument panel. It could be on the right or the left side of the canopy, or the cockpit wall.
- Number 1, 2, or 3–lever systems may be found.
- Operation This may be one or two handed. The levers may need to be pulled or pushed. Unbelievably, in one 2–lever system, one lever must be pulled and the other pushed!

Instrument panels In the case of a fixed instrument panel passing between the cockpit walls, the pilot will have to draw up his legs before he can bail out. With a mushroom shaped panel in the centre line of the cockpit, the pilot can easily swing his legs over the panel when escaping. This clearly is the preferable shape. A further problem is that the cockpit sill may contain protruding pins or levers that may hamper rapid escape.

Factors affecting escape time
An LS–4 cockpit was used in a study to determine escape times which involved 25 pilots aged between 20 and 60 years. In the experiments, the time taken to jettison the canopy and open the seat harness was measured.

Number of levers
A 1-lever system took 1–2/3 seconds
A 2-lever system took 1–3/4 seconds
A 3-lever system took 2–1/2 seconds

Canopy If this was pulled clear by the airstream, and the canopy did not have to be pushed clear by the pilot, then one second was saved.

Pilot age This had no effect on the time taken to release the canopy and seat harness.

Time taken to leave the cockpit
In the next experiment, the time taken to leave the cockpit after release of the seat harness was measured. The time was recorded under two conditions, under 1 g and under 1–1/2 g. The condition of 1–1/2 g was simulated by attaching lead weights to the pilot's body.

A well trained, fit young pilot
at 1 g: 2.6 sec
at 1–1/2 g 3.5 sec

A pilot over 40 years
at 1 g: 4.5 sec
at 1–1/2 g 7.2 sec

Some older pilots were unable to get out of the cockpit at all under conditions of 1–1/2 g.

Instrument panel Only fit young pilots were involved in this study. The time taken to leave the cockpit after release of the seat harness was measured:
- With no instrument panel 2.4 sec
- Mushroom type panel not tested
- Fixed panel across the cockpit 3.4 sec (The pilot had to bend and then withdraw his legs)

Height of the cockpit wall This test also used fit young pilots. The time taken to leave the cockpit after release of the seat harness was as follows:
Low cockpit wall (22 cm) 2.7 sec
High cockpit wall (52 cm) 4.5 sec
(presumably, these are heights above the seat pan).

Canopy behaviour following release
Two series of tests were carried out by Wolf Röger. One used a wind tunnel; in the other, a glider fuselage was mounted on the roof rack of a powerful car which was driven at speed down a runway. A chase car filmed the behaviour of the canopy. A forward opening canopy was used.

With the canopy closed, but the canopy release open, the aerodynamic forces resulted in the canopy experiencing a nose down moment. As a result the canopy was pressed firmly down on to the fuselage. If sideslip was used, the canopy lifted off the fuselage, but at a risk of striking the pilot or getting caught by the instrument panel.

With the canopy opened slightly, by less than 6 cm, the following sequence of events occurred:

- The front of the canopy lifted up off the fuselage. Owing to the nose down moment, the rear of the canopy then lifted off the fuselage.

- Due to a tangential force, the whole canopy then moved forward.

- Finally, the canopy pressed down firmly on the cockpit, preventing exit of the pilot.

With the forward opening between the front of the canopy and the fuselage greater than 6 cm, the effect of the aerodynamic forces on the canopy changed. The canopy lifted off the fuselage, and moved backwards. If the rear of the canopy was attached to the fuselage by a hinge that disengaged at a canopy angle of between 30° to 40°, the canopy then flew off clear of the pilot and the tailplane. Wolf Röger suggested that for a successful escape, with the canopy hinge fitted, the pilot should raise the front of the canopy to the full extent of his outstretched arms. In the absence of these measures, the canopy frequently struck the pilot and the tail of the glider.

A point of practical importance shown by the tests was that if the cockpit ventilation was open, and the clear vision panel closed, the pressure inside the cockpit was increased, so assisting the jettisoning of the canopy.

Recommendations

To increase the likelihood of successful escape of the pilot from the cockpit in an emergency, I suggest the following features should be incorporated in new glider designs:

- The cockpit sill should be as low and as long as possible, consistent of course with the strength and crashworthiness of the fuselage. The cockpit sill should be free of protruding pins and levers.

- The instrument panel should be of the mushroom type, situated on the centre line of the fuselage. Alternately, it could be replaced entirely by a Head Up Display.

- The canopy should be attached at its rear end to the fuselage by a hinge that disengages at an angle of 30° to 40°. When the emergency release is operated, a system of gas filled struts or springs should raise the front of the canopy as high as possible into the airstream.

- The emergency activating handle should be situated between the pilot's legs, as in military aircraft. This position should be standardized in all gliders. In this position, it will be easy for the pilot to reach the handle under conditions of g loading. The handle should require a double action, to prevent inadvertent operation.

- On operation of the handle, the canopy should release. After a short time delay (to allow the canopy to clear the cockpit), the seat harness should automatically release, possibly at the attachment point of the harness to the fuselage. The pilot would then be free to roll out over the cockpit sill and escape from the glider.

Further research Wolf Röger has commenced a study as to the value and practical problems involved in the lowering of the entire glider by parachute in an emergency. •

club news

SNOWBIRD SOARING

It's December, the gliders have been stored, and you're buried in snow. You wish you could be flying beneath the cumulus. Well, if you're lucky you can be in Florida where people have been soaring in the winter for years.

Of the several gliding fields Mary and I have found in Florida, the best is the Seminole Lake Gliderport. Located on route 33 about 15 miles south of Clermont (west of Orlando) in orange grove and pine land country, it is a friendly, well–run, safe place to fly from. Turning off the pavement onto the ochre entry, you drive to the office past a wide grass runway, 25 or so trailers and two hangars. Everything is well kept. Even the pine and cyprus forest stands discretely back from the 3000 feet strip hiding the swamp where the alligator loafs. (The Kjenslie kids can show you where he lives if you really want to know.)

As at most glider fields the early morning here is quiet. Knut Kjenslie, owner and manager, is preparing the Pawnee for a sounding. There's time to talk with Ingrid Kjenslie in the office beside the pool and learn about the requirements for flying (a US licence and a check flight) and where you can park your RV or pitch your tent. A few rooms are available for rent also. We were charged $5 a day for a site with electricity, with a toilet and shower nearby, and excellent drinking water. A checkout flight costs about $45. After this and instruction on local conditions you have the option of renting a modern glass single seater, or a Grob II, or flying your own ship of course.

Besides a good field you are looking for soaring weather. In central and southern Florida soaring is possible year 'round with conditions improving as the winter advances to summer, and varying as the fronts pass, with some years better than others — much like here in Canada. Knut reports generally sunny Januarys and Februarys, with 4–5 soarable days per week on average. In February flying is often excellent, comparable to good Canadian summer standards: cloudbases at 5000 feet or more and average lift 3–400 fpm early in the month. Taking advantage of this, Seminole hosted for the second time the Annual Seniors Soaring Competition from February 3–8. Speeds up to 70 mph on the first two days and about 50 on the last won the event for Ontarion Walter Weir with wife Barbara as crew. The number of entries, twenty–five, including several transplanted northerners and visitors such as George Moffat, speaks for the flying conditions.

Later, on the fifteenth, Mary and I returned to find gliders at 6500 feet over the field in windshear wave, and cumulus at 5400 feet. Cross–country flying was easy with lift as far as you could see. At least ten gliders were up, most well out of sight, including a Pilatus, a rare Sagitta which circled under lovely cumulus beside me miles from the field in lift up to 800 fpm over the landscape. Below small blue lakes are scattered, but they do not affect the thermals because, as Walter explained, they are shallow and warm. None of us worried about outlandings, and anyway there are farm fields and small airports nearby.

While pilots find this gliderport a fine place to fly from, the other reason we liked it is because it is an enjoyable place for wives. Mary compared it to the many other fields she's visited and says it is by far the best. There are often other friendly women accompanying their husbands, and Ingrid makes special efforts to see that they are welcome. Besides this and the family atmosphere created by the Kjenslie family of parents, grandfather and several very active children living in their home beside the runway, Mary appreciated the shopping available in nearby Clermont, and commented that visitors could easily drive to Orlando or even Tampa on the gulf.

You can see that a winter vacation can include soaring if you go to Florida. To locate Seminole and other fields you can buy aeronautical charts of the region you'll be visiting which have these sites identified, and obtain a copy of the April 1992 SOARING magazine which reports on all US locations. Besides simply dropping in to rent a glider for a flight or two, pilots with longish holidays and access to a glider can consider towing it south for several weeks of flying. Whatever you do next winter, keep in mind that there are plenty of northern glider pilots happily soaring down south. You could be amongst them.

Kemp Ward, Champlain

LSS GETS TOWPLANE AND TRUSS

Although 1991 was not a spectacular soaring year here in London, we did decide to buy a second towplane to allow us to use our accumulating number of gliders more effectively. SOSA was offering one for sale, and we are quite happy with our new yellow bird. With two towplanes we were able to do 1447 flights, more than any other year in our history.

In addition, we had a very successful "fix the hangar" day. One corner of the roof had sagged over the years and definitely needed some major repairs. Our new and very energetic field manager, Andy Gill, drew up a repair plan and organized the day, the roof was jacked up, the weak trusses cut out and new sections bolted in. Six hours later we held our breath as the jacks were released. The roof line barely dropped a millimetre against the guide line that was strung up! It was heartwarming to see all the club members pitching in and working so hard on the repair. Everyone had fun and many told me how much they had enjoyed the occasion, even though we virtually shut down the flying for the day. The Moral is: major non–flying events can generate a great deal of club enthusiasm if they are well planned. Another corner of the roof gets done this year.

Michael Steckner, London Soaring

SAC Directors & Officers

PRESIDENT & ALBERTA ZONE
Al Sunley (1992)
1003 Keith Road
Sherwood Pk, AB T8A 1G2
(403) 464-7948 (H & F)

VP & PACIFIC Zone
Harald Tilgner (1992)
50090 Lookout Road
RR2, Sardis, BC V2R 1B1
(604) 858-4312 (H)
(604) 521-5501 (VSA)

MARITIME Zone
Gordon Waugh (1991)
5546 Sentinel Square
Halifax, NS B3K 4A9
(902) 455-4045 (H)

QUEBEC Zone
Pièrre Pepin (1991)
590 rue Townshend
St–Lambert, PQ J4R 1M5
(514) 671-6594 (H)

ONTARIO Zone
Ulli Werneburg (1991)
1450 Goth Ave
Gloucester, ON K1T 1E4
(613) 523-2581 (H&F)
(819) 994-1969 (B)

PRAIRIE Zone
Paul Moffat (1992)
1745 King Edward Street
Winnipeg, MB R2R 0M3
(204) 633-5221 (H&F)
(204) 947-9400 (B)

Director–at–Large
George Dunbar (1991)
1419 Chardie Place SW
Calgary, AB T2V 2T7
(403) 255-7586 (H)

Director–at–Large
Chris Eaves (1992)
185 Canterbury Drive
Dorchester, ON N0L 1G3
(519) 268-8973 (H)
(519) 452-1240 (B)

Executive Secretary
Joan McCagg
306 - 1355 Bank Street
Ottawa, ON K1H 8K7
(613) 739-1063 (B)
(613) 739-1826 (F)

Treasurer
Jim McCollum
6507 Bunker Road
Manotick, ON L0A 2N0
(613) 692-2227 (H)

Committees

Insurance
Richard Longhurst
100 – 1446 Don Mills Road
Don Mills, ON M3B 3N6
(416) 391-2900 (H)
(416) 391-3100 ext 250 (B)
Mbr: Doug Eaton

Air Cadets
Bob Mercer, Box 636
Hudson, PQ J0P 1H0
(514) 458-4627 (H)

Airspace
Dave Baker
12546 - 22 Avenue
Surrey BC V4A 2B7
(604) 535-0507 (H)

Contest Letters
Robert Binette
1034 St–Denis
Montreal, PQ H2X 3J2
(514) 849-5910 (H)

FAI Awards
Walter Weir
24 Holliday Drive
Whitby, ON L1P 1E6
(416) 668-9976 (H)

FAI Records
Russ Flint
96 Harvard Avenue
Winnipeg, MB R3M 0K4
(204) 453-6642 (H)

Flt Training & Safety
Ian Oldaker, RR 1
Limehouse, ON L0P 1H0
(416) 877-1581 (H)
Mbrs: Mike Apps
Ken Brewin
Geo. Eckschmiedt
Fred Kisil
Paul Moggach
Richard Vine
Harold Yardy

Free Flight
Tony Burton, Box 1916
Claresholm, AB T0L 0T0
(403) 625-4563 (H&F)

Historical
Christine Firth
23 rue Barette
Hull, PQ J9A 1B9
(819) 770-3016 (H)

Medical
Dr. Peter Perry
64 Blair Road
Cambridge, ON N1S 2J1
(519) 623-1092 (H)
Mbr: Dr. W. Delaney

Publicity
Pièrre Tourangeau
6672 Molson
Montreal, PQ H1Y 3C5
(514) 722-2085 (H)

Radio & Comm
Paul Moffat
1745 King Edward Street
Winnipeg, MB R2R 0M3
(204) 633-5221 (H&F)
(204) 947-9400 (B)

Sporting
Charles Yeates
110 - 105 Dunbrack Street
Halifax, NS B3M 3G7
(902) 443-0094 (H)
Mbrs: George Dunbar
Robert DiPietro

Statistics
Randy Saueracker
1413 – 7 Avenue
Cold Lake, AB T0A 0V2
(403) 639-4049 (H)
(403) 594-8673 (B)

Technical
Chris Eaves
185 Canterbury Drive
Dorchester, ON N0L 1G3
(519) 268-8973 (H)
(519) 452-1240 (B)
Mbr: Herb Lach

Trophy Claims
Harold Eley
4136 Argyle Street
Regina, SK S4S 3L7
(306) 584-5712 (H)

INTERNATIONAL GLIDING COMMITTEE

Report on the March 1992 meeting

Colin Bantin
SAC IGC representative

The 1992 meeting of the IGC was held in Paris on March 13th and 14th, 1992. The meeting was well attended by the delegates and alternates, and included two observers from Lithuania which has applied for membership. The minutes of the March 1991 meeting in Paris were approved. We then established several working groups, as is becoming standard practise. The groups this year were:

Rules (ie. Sporting Code) – Tor Johannessen, Norway
Use of GPS equipment – John Roake, New Zealand
Competition philosophy – Alvaro de Orleans–Borbon, Monaco
Airspace – Tom Zealley, UK

I spent most of my time in the first two.

FAI matters IGC President Peter Ryder summarized current FAI matters:

The movement to restructure the FAI is ongoing, and a study called "FAI 2000" has been undertaken which is in favour of including voting rights for the various commissions. This received unanimous IGC support.

In an effort to raise more money, the FAI has given a Japanese marketing firm the rights to market goods with the FAI emblem.

Soaring still does not exercise its new right to impose sanction fees for soaring contests, although other disciplines are doing it.

There is a new magazine called Air Sports International. It is produced by the FAI and is intended for general distribution (ie. sale to the public). The Aero Club of Canada is handling the distribution in Canada.

Applications for FAI membership have been received from Russia and the three Baltic States.

I was pleased to announce the intention of Canada to make an offer to host the 1995 FAI General Conference in Calgary.

Committees

These highlights from the committee reports include the results of the working group deliberations:

Rules The Rules group went through the final draft of the Sporting Code Section 3. Copies of the final version should be available for purchase through the Aero Club in a couple of months. Key adjustments that are being included are:

- there will be no provision for hand–held cameras, and cold soaking barographs for calibration will not be required.
- there is no change in the position on electronic barographs except to extend the temporary provision to allow them for internal (national) records.
- the new (again!) requirement for wingspan measurement is for the glider to be on level ground with no ballast. It was noted that there is a tacit implication that the wingtips could be lifted (this is to allow ASW–20s to be legal).
- an FAI proposal to redefine an OO in the General Section of the Code to preclude relatives of the pilot was soundly rejected. The Sporting Code Section 3 will override this definition if necessary.
- claim sheets for badges and records must be submitted as a single sheet of paper. It's up to us (Aero Club or SAC) to produce these multipage forms on one piece of paper.
- as a result of the working group decision, the Sporting Code will now permit unlimited use of navigation equipment by the pilot. So get ready to buy your Omega, Decca, Loran-C, VOR, DME, ILS, MLS, Navstar/GPS, Glonass, Tsikada, Starfix, Geostar/Loctsar, or Navsat system at your local friendly instrumentation store.

GPS The use of GPS for flight verification was the hot subject for this meeting. The intentions of Sweden and New Zealand to use them instead of cameras and start/finish times have been stated. In order to control the process, a committee was formed, chaired by Bernald Smith, to investigate the issues involved with GPS (and other navigation systems) as far as flight verification is concerned. I am a member of this committee and will keep you informed of progress. GPS units from Cambridge Instruments have already been tried out in New Zealand. A report on the results shows some spectacular printouts of the glider position during a particular contest task.

Motorgliders The Motorglider committee is proposing that the term motorglider be replaced with "powered sailplane" since the category now includes all types of sailplanes with onboard power source. There is still an urgent need for reliable instrumentation that will monitor engine use. The German aeroclub will allow powered sailplanes into their new 18 m class in competitions starting in 1995.

World Class Glider The entries for the world class glider contest are being prepared for the flight evaluation phase in October of this year. A request for a delay by one entrant was not accepted. The evaluations will be held at the gliding centre run by Klaus Holighaus. It is the intention of the IGC to have the winning sailplane accepted and ready for contest use in time for the World Air Games in 1995. It would be the ideal class to use for these games.

I took this opportunity to read to the meeting, on behalf of SAC, a statement of support for the contest and an expression of interest in an ongoing effort that would consider a low cost two–seater trainer for a future design contest.

World Air Games Fred Weinholtz is one of the advisors to the Greek organizers of this event. The success of these Games in 1995 depends on the availability of money to the Greek aeroclub, which remains an unknown factor at this time. There was no progress made on how entries would be invited or what the format of the contest will be. It is hoped that the world class glider will be available for this event.

International Events

22nd Worlds A report was given on the 1991 Worlds at Uvalde and included a financial summary. Following some discussion on the escalating costs of world championships, I seconded a motion that was presented by Dick Bradley (South Africa) which requires a host country to submit a detailed budget in their bid for a world contest and further to be accountable to the IGC for any changes that affect the cost to the contestants. The motion was carried with a large majority.

23rd Worlds We had a brief further update on progress for the 1993 Worlds at Borlange, Sweden. There were no problems identified at this time, and several major sponsors have signed up including SAAB, the Air Force and an insurance company. It is intended to do a full scale trial of GPS units for this contest, with equipment supplied by the organizers. The dates are: training June 6–11, contest June 13–26. The "Sweglide 1992" contest is still on but it was reaffirmed that is was not recognized by the IGC as a pre–worlds. The dates are training June 4–7, contest June 8–17.

24th Worlds A report was given on progress at 1995 Worlds at Omarama, New Zealand. They hope to use GPS equipment at this contest for flight verification. It would be up to the pilots to use photo evidence as backup if they wished. The organizers also hope to use in–cockpit camcorders and are guaranteeing scores within 90 seconds of a finish. There was also a proposal to introduce a world cup contest during the event as such a contest would be important for attracting sponsorship. It would be a team contest, by country, with the winner determined by aggregate scores from the top pilot in each class. Details are to be worked out but the concept was favourably received. Note: hot tip, there will be no POST tasks at the Swedish or New Zealand worlds!

Other items

The Lilienthal Medal was awarded to Ray Lynsky and the Pelagia Majewska Medal was awarded to Gisela Weinreich.

The President and vice-Presidents remain the same. The next meeting of the IGC will be held in South Africa in 1993, with Chicago as a possible venue for the '94 meeting. •

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SAC revenue allocation I disagree with the "implied" definition of "product". Why is *free flight* eliminated from the "product"? Is it not of as much value, if not more value, to the membership as publicity? Is not postage and some of the phone costs part of the "product" in communicating with the members? Is not the cost of printing part of our "product"? Are not the costs of travel, phone calls, postage, meetings etc. of our committee chairmen, members and directors part of our "product" in obtaining better insurance rates, working with DoT to obtain type approval of imported sailplanes, trying to clear up the conflict of use on our radio frequency, clarifying rules and procedures for contest pilots and cross country enthusiasts, registering badge and record claims?

Al, I agree entirely with your last two paragraphs. More thought, communication and proposals are necessary. However, for most members that takes away time, time with their families, from business, and from other recreations. And it comes down to the "bottom line", is it worth it? I believe it is.

Alan Sunley

the editor responds

Perhaps I can contribute a few basic facts about producing *free flight*. Besides my impression that our members do not want a magazine of lower quality than they are getting, it would not be any cheaper to produce in some newsletter style anyway. The current printing industry technology is page imaging to plate direct from a computer disk of the layout. It is cheaper and faster for the printer than the old system, and glossy paper is not much more expensive than bond to print on and gives much better picture quality. Getting the magazine onto disk is achieved right here in my office by exactly the "simple" desktop publishing technology that Al suggests — which is why the layout cost to SAC has decreased in the last three years after commercial phototypesetting was eliminated.

Taking *free flight* ad revenues into account, each issue cost about $3860 to get into your hands in 1991 and $4140 in 1990. However, it is actually cheaper than that because the cost of the Soaring Stuff sales flyer is included (which should be a sales expense), and the 12 page AGM report in the second issue is a large cost administrative expense ($1723 in 1991) but saves money over the prior system of printing and mailing individually bound copies of the reports to all members. I understand that these expense items will be separated in future financial statements. Lastly, regardless of the magazine's format, it still costs about $1200 an issue to mail.

The concept of a national aeroclub magazine has been successful in some European countries where a large market exists for a full blown commercial colour publication. I don't think such a magazine would be viable in Canada, and if publication expenses came out of membership fees, the opportunity Al sees still isn't there. In any case, if the content of such a magazine were even loosely tied to the membership numbers of the contributing associations, it would be 80% full of model airplanes!

Tony Burton

MORE ON TRUSTS & MEMBERSHIP

Dear Tony,
I read with interest Jim McCollum's article in your issue 1/92. As you know, Tony, it is quite unlike me to question the pronouncements of my betters but some of Jim's statements deserve a second look.

Jim states that "The after tax cost of belonging to SAC will be lower in 1991 than in 1990". Well, let's just have a look. In 1990 a full membership costs $78. The tax receipt for $66 generates a tax credit of $11.22, so the after tax cost was $66.78. In 1991 a full membership costs $82 and a tax receipt for the full amount was issued. That gives a tax credit of $13.94, so the after tax cost of belonging was $68.06 — the after tax cost of belong went up by $1.28.

Jim goes on to say that, "The discounted present value of this change to the Canadian soaring community is between $100,000 and $150,000. I'm not sure what that means. Tony, but it sure sounds good. The phrase "claw back" is familiar to old age pensioners. The arithmetic in the previous paragraph shows that SAC has already clawed back any savings made in 1991 and your readers can be sure any further savings will go to SAC and not to the member.

Jim then displays a neat bar chart to support his claim that it gets cheaper to belong to SAC with every passing year. Sure enough, those jet black bars get shorter and shorter as your eye moves across the page. The bars that represent the actual out of pocket dollar cost get longer and longer. Those are the white bars that are kind of hard to see against the white background but I'm sure that was pure coincidence.

Grouchy old cynic that I am, Tony, I assumed as I read this article that it was a diversionary tactic. So I asked myself what sort of new mischief Jim and his pals on the Finance committee are up to that they don't want the members to notice.

When issue 2/92 arrived I immediately turned to the yellow insert portion and looked for Jim's report. It seems Jim's report was presented by André Pepin who states, "part of this surplus was $4000 taken out of the Pioneer Trust Fund." Say what? Then I looked at the balance sheet on page seven. Under the heading of "Trust Fund" there is a line "due from General Fund $6847, and under "Liabilities" there is another line, "due to Trust Fund $6847." So the SAC Board have been dipping into the Pioneer Trust fund again.

As you know, Tony, trust funds are created precisely to prevent the beneficiary from squandering the money. SAC's trust funds have carefully worded trust deeds designed to prevent the SAC Board from getting its hands on this money. It seems clear that the SAC Board does not feel bound to honour these trust deeds. Not only that, the SAC Board is in the process of changing the wording of these trust deeds "to give them a consistent approach in day to day handling." I'm not making that up, Tony, I'm reading it on page 16 of issue 2/92.

I think it is time to take a different approach to these trust funds and I suggest:

- These proposed changes to the wording of those trust deeds be explained in f*ree flight.*
- Any such changes be put to an annual general meeting for approval.
- All of these funds be deposited "in trust" (along with the trust deeds) in one of the larger trust companies — Royal Trust, Canada Trust, whatever. Trust companies are in the business of administering trust funds. They will follow the wording of the trust deed to the letter. They will turn over to the SAC Board no more than the Board is entitled to receive and we can all sleep soundly knowing that the principal will remain intact.

Dixon More, SOSA

Jim McCollum responds

Mr. More raises two main issues. He suggests that the after–tax cost of being a SAC member went up in 1991 rather than down, and that the SAC Board has been taking money out of the Pioneer Trust fund contrary to the terms of its trust deed.

Let me begin with the tax issue. For starters there is some arithmetic to correct. Calculating the tax credit at 17% (Mr. More used the lowest rate) of the donation component of the membership fee gives a credit of $10.20 in 1990 (0.17 x ($78 – 18)), not $11.22. More importantly, Mr. More forgot about provincial income taxes. In Ontario, where he lives, the rate was 53 percent of the federal tax in 1991. Taking this factor alone into account, the after–tax cost of belonging to SAC went down in 1991 compared to 1990.

But there are also federal and provincial surtaxes and these are reduced as well. Finally, many (most?) SAC members make total charitable donations in excess of $250 per year. In this situation, the marginal rate for charitable donations is 29 percent rather than 17 per cent, which also reduces the amount of federal and provincial taxes and surtaxes. The upshot of all of this is that, for almost all members, the after–tax cost of belonging to SAC fell in 1991, with the decline ranging between slightly under $2 to about $6. The precise amount varies according to province of residence, overall level of donations, and level of taxable income. Detailed calculations, using an actual tax form, can be obtained from the SAC office by writing.

Turning to Mr. More's third paragraph, it must be remembered that the benefits of having the full membership fee tax–receiptable are not limited to 1991. They will occur year after year. Taking the number of members into account and a realistic discount rate, the range for the present value of the stream of tax liabilities that would have otherwise been incurred by SAC members is more or less as I stated in 1/92. Again, detailed calculations are available on request, from the SAC office.

I fail to understand the argument about the bar chart. The argument seems to be that the

white bars are difficult to see and this was no accident. I can only point out that I had nothing to do with the chart; it was produced by the Editor of *free flight*. But, I don't believe he was trying to mislead anyone, nor do I believe that the chart is difficult to read.

Mr. More suggests that the Pioneer Trust fund is being mishandled and that the SAC Board is somehow inappropriately taking money out of it. Under the terms of the Pioneer Trust fund, in any given year, the Board can elect to transfer up to 50% of the fund's investment income from the previous year to the general fund. It so elected in 1991. In previous years the Board was giving the fund a chance to build up. By 1991, however, the fund had built up to a respectable level and, given the weaknesses in other sources of revenue, in the Board's opinion this seemed like an appropriate time to let the Pioneer Trust fund begin do its work. As 1991 drew to a close, however, it became clear that SAC would end up with a surplus in the operating account. Underlying the surplus were expenditure cutbacks; these occurred in the fall when the financial picture looked less healthy. The funds that would have been transferred (quite legitimately) from the Pioneer Trust fund, were instead retained in the fund, since they were not needed. The terms of the trust deed were scrupulously followed.

The expenditure restraint program also explains the $6847 amounts "due" that Mr. More cites as evidence of the SAC Board "dipping" into the Pioneer Trust fund. As a result of the cutbacks, SAC had a surplus, and this was used to build up the fund. The physical transfer did not occur before the end of the year, as not all of the financial information needed to do so was available at the time, and this explains why SAC appears to "owe" money to the trust funds at year's end. The amounts "due" reflect money going into the fund, not money that came out of it. There was no borrowing of any kind from the trust funds. Contrary to the impression that Mr. More is trying to convey, the Board has consistently tried to foster the growth of the trust funds.

Mr. More suggests that the SAC Board is tampering with the trust deeds and that all of this is very sneaky. The deeds that he is referring to are for three small funds (the Balint, the Glynn and Wolf Mix funds). Certain aspects of the wording had become obsolete; for example, they included references to the Executive Director of SAC, whereas SAC has not had an Executive Director for a number of years. The changes were of a house–keeping nature and the discretionary power of the Board was not increased. Copies are available from the SAC office, for any member who is interested; they are self–explanatory and you should find the wording reassuring.

In conclusion the issues that Mr. More raises appear to be based on misunderstandings on his part about income taxes and bookkeeping.

A Board member responds

I have just read Dixon More's letter to *free flight* in which he accuses the Board of Directors, the Finance committee, and particularly the Treasurer of deliberately misleading the membership and misusing money from the trust funds. Of course these accusations are false, as explained in Jim 's response.

I am very surprised that Dixon would use this "shoot from the hip" style of argument. I cannot imagine why he did not bother to contact Jim or any of the Directors first before making these sorts of statements. I find it disturbing that Dixon should resort to this sort of strategy since there is clearly nothing to be gained but a lot to be lost in baseless attacks on Board members and officers of SAC.

As a former Director of SAC, Dixon should know that in recent years much has been accomplished in building up the trust funds, particularly the Pioneer Trust. The Board has made exceptional efforts in this direction with a view to replacing government funding with income from the Pioneer Trust to ensure the viable operation of SAC in future years. It is interesting to note that at this year's AGM in Calgary, the Board was criticized by another former director (from the same club as Dixon) that it had put too much money into the Trust!

What particularly concerns me about Dixon's letter is the personal attack on Jim McCollum. The fact is that since Jim has been involved with SAC, our finances have taken a very significant turn for the better. From next to nothing, the trust funds have been built up to sizable amounts, the general financial affairs of SAC are run effectively and competently, and office operations have improved significantly. No SAC member has worked harder, more diligently and willingly than has Jim. In many ways, Jim has provided the motivation and expertise to put SAC's financial house in order.

Dixon More's groundless attack does nothing for SAC generally, but does a lot of harm to volunteers' willingness to help out. SAC is all of us, and it is time to stop circling the wagons and shooting inwards.

Ulli Werneburg, Ontario Zone Director

SOARING FATALITY

Dave Woodcock of the Blue Thermal club in Medicine Hat, Alberta, died in the crash of a Scheibe SF–29 motorglider C–GLWK on a solo cross country flight 17 May. Eye witnesses to the accident, near Irvine, east of Medicine Hat, indicate that the aircraft entered a spin while thermalling, recovered, then entered a secondary stall which was followed by impact.

Coming Events

Jun 14-20, **SAC eastern instructor course**, Gatineau Gliding Club. Call National Office.

Jun 27-5 Jul, **ASC Mountain Soaring Camp**, Invermere, BC. Call Tony Burton (403) 625-4563.

Jul 6-19, **Student ab-initio flight training course**, Edmonton Soaring Club. A few slots for visiting pilots. Call Garnet Thomas (403) 484-7242.

Jul 20-24, **Advanced cross country clinic**, Rockton, ON. Call Ed Hollestelle (519) 461-1464.

Jul 25-3 Aug, **20th Cowley summer camp**, Cowley AB. Come to Canada's best soaring holiday. Call Tony Burton (403) 625-4563.

Aug 1-3, **Ontario provincial soaring contest**, Toronto Soaring Club.

Aug 10-14, **Cross–country clinic**, Ottawa area. More info later. Call Ulli Werneburg (613) 523-2581 or Robert DiPietro (514) 659-9991.

Aug 16-22, **SAC western instructor course**, Cu Nim, AB. Director Mike Apps (403) 436-9003.

Aug 17-21, **Beginner's cross–country clinic**, Rockton, ON. Paul Thompson (416) 387-4222.

Oct 3-12, **Cowley fall wave camp**, Cowley, AB.

INCIDENTS & ACCIDENTS

3 April – Champlain, Jantar Std, C–GUJF. One wing holed during transport when trailer undercarriage failed at 100 km/h.

20 April – Vancouver, Grob 102, C–GVSN. Stalled into trees on local ridge. Wing damage.

23 April – SOSA, Cirrus–75, C–GLHG. Canopy cracked when blown open on ground.

10 May – Cu Nim, Jantar Std, C–GFBG. Canopy hinge severely bent when uninformed student forced it closed without releasing the canopy latch. No claim, but a warning to other Jantar owners.

SAC SUPPLIES

Note that many forms are available at the National Office at no cost. CFIs and SOOs should check their club stocks and order if out or low. Forms available are:

- Flight trophy application form
- SAC Sailplane handicap list
- Badge application form
- Record flight application form (separate forms for distance, speed, altitude or height gain, and motorgliders)
- Contest organizers checklist
- OO application form
- OO questionaire

Check the Soaring Stuff flyer in this issue for current sales items.

The Office also has a new great looking multicoloured soaring T–shirt from the Rocky Mountain Soaring Centre in Golden, BC. Cost is $17.50 + ON tax (if applicable) + GST.

FAI badges

Walter Weir, 24 Holliday Drive
Whitby, ON L1P 1E6 (416) 668-9976 (H)

The following Badges and Badge legs were recorded in the Canadian Soaring Register during the period 1 March to 30 April 1992.

DIAMOND BADGE					
79	Tillmann Steckner	London			
GOLD BADGE					
262	Tillmann Steckner	London			
SILVER BADGE					
832	Francisco Diaz	Champlain			
DIAMOND GOAL					
	David Key	–	304.3 km	Grob 102	Julian, PA
	Francisco Diaz	Champlain	306.0 km	Jantar Std	Julian, PA
DIAMOND DISTANCE					
	Tillmann Steckner	London	505.9 km	ASW–15	Julian, PA
DIAMOND ALTITUDE					
	Tillmann Steckner	London	5776 m	Grob 103	Minden, NV
GOLD ALTITUDE					
	Tillmann Steckner	London	5776 m	Grob 103	Minden, NV
GOLD DISTANCE					
	David Key	–	304.3 km	Grob 102	Julian, PA
	Francisco Diaz	Champlain	306.0 km	Jantar Std	Julian, PA
SILVER ALTITUDE					
	William Tom	Erin	1631 m	2–33	Sugarbush, VT
	Francisco Diaz	Champlain	2100 m	Jantar Std	Julian, PA
SILVER DISTANCE					
	David Key	–	304.3 km	Grob 102	Julian, PA
	Francisco Diaz	Champlain	306.0 km	Jantar Std	Julian, PA
SILVER DURATION					
	Francisco Diaz	Champlain	6:15 h	Jantar Std	Julian, PA
C BADGE					
2340	Francisco Diaz	Champlain	6:15 h	Jantar Std	Julian, PA

Francisco Diaz of CVV Champlain completed his entire Silver badge, Gold distance, and Diamond Goal in a single blue thermal flight out of Keystone Gliderport on 29 April. Thermals were strong but there was no ridge lift. Congratulations, Francisco!

OOs DROPPED IN CLUBS NOT RECERTIFYING THEM

Many clubs have not sent in their list of current OOs in spite of several letters from Larry Springford. As of now those clubs do not have any OOs and will not until their list is sent in to me.
Walter Weir

1992 SPORTING CODE READY

Tony Burton

A completely revised (and much improved) 1992 Sporting Code for Gliders is now being reproduced for sale by the Aero Club of Canada and becomes effective in October. Much of the old, dense legalistic style has been rewritten into plain English by International Gliding Committee member, Tor Johannessen of Norway, and a large new index has been added which can actually be used to navigate through the contents. The "final" draft was presented to the IGC meeting this March for comment. Interesting changes from the current version are:

Return to the departure point When a return to the departure point is required in the rules (ex. a Diamond Goal flight or other closed circuit task), the declared finish point may now be up to 10 km from the departure point. The essence of this is that a goal flight may begin directly from a tow release in the vicinity of the airport (assuming the airport is the finish point) or a remote departure point may be declared and photographed. The 10 km tolerance is related only to the definition of 'closed cuircuit', not to the distance flown, which remains the distance from the departure point round the appropriate turnpoints to the finish point.

The Sporting Code has also removed all reference to achieving the goal if landing within 1000 metres of it. If the goal is an airfield, it is now considered to be reached if the glider lands within the perimeter of the airfield.

Distance calculation When exact calculation of distance is not required (ex. a badge distance has been exceeded by an indisputable margin), other measurement methods than Great Circle may be used by OOs — the Sporting Code gives direct measurement off the map and measurement using Pythagoras' theorem as examples. (This 'square root of the sum of the squares' method gives the same result as the Great Circle over normal courseline distances and is a whole lot easier to use on a hand calculator.) The new FAI Badge & Record Procedures SAC guidebook will expand on this.

Photographic control Only mounted cameras will be accepted. (Now is the time for clubs to get mounts built for their club cross–country ships.) Every frame must show the wingtip. The OO must mark the canopy with a random line in front of the camera lens, and the first photograph must be of the flight declaration. (Such a black line from a marker or grease pencil doesn't block any part of the image, it appears as a faint dim band on the print.) If the camera mount is on the canopy frame, you may not be able to see through the viewfinder with the camera in place, so you will have to experiment with the position of the flight declaration to ensure that it is close enough to be readable on a print without having a part cut off.

If only one OO is controlling the camera and the film processing, the camera doesn't have to be sealed, but for record flights the camera must be sealed to the mount. (Also, there is no longer any reference to requiring unused film or that the OO must load the film.) The last frame of the photo sequence may now be of either the declaration board or the tail of the glider at the landiing place.

Record distance penalty Excess distance over 1000 metres between the departure and finishing point is now multiplied by 200 before subtracting from the course distance.

FAI Badge & Record Procedures – edition 6

The latest edition of the SAC guidebook to badge and record flying and officiating is in preparation and will incorporate all changes in the 1992 Sporting Code. All OOs are required to have both the current Sporting Code and the SAC guidebook as a condition of the important position they fulfill, and they are highly recommended for hopeful badge and record pilots. See the back page supplies list for details. **Note**: Beth McCollum in the Aero Club office told me that she has not been selling many Sporting Codes in the past. This indicates that many OOs have been working with out–of–date, borrowed, or no Sporting Code at all in hand. This is not an acceptable state of affairs. SAC will be examining some way of ensuring better distribution (perhaps by mailing copies and billing to clubs in bulk according to their OO list). If anyone has a better idea for ensuring compliance, tell the office. •

FAI records

Russ Flint, 96 Harvard Avenue,
Winnipeg, MB R3M 0K4 (204) 453-6642

Notification of record claim

100 km Speed to goal – Open, SAC, not FAI, citizens, 147.7 km/h, 2 Apr 92, Walter Weir, ASW–20B, C–GGWW. Flown from Whitwell to Crab Orchard, Tennessee. Kevin Bennett holds the current territorial record of 118.7 km/h.

Trading Post

SINGLE SEAT

1-23G, C–FZDO, $12,000 firm. Basic instrumentation, electric vario. Contact Kurt Hertwig (519) 686-0332 or Andy Gill (519) 660-0523.

SKYLARK 4B, 18m, O2, T&B, radio, chute, trailer, very good condition. Soars on a puff – the best L/D for your dollar. Bev or Dave Lewtas (514) 455-7786.

MONERAI "S" MAX, C–GOLL, 350 h, extended tips, spar mod, enlarged tail, Cambridge audio, TE, enclosed trailer. Call Vtek (519) 743-7474.

M100-S, #059, C–FBNG, 540 h, white with red trim, never damaged, recovered & Imron paint in 1987. Standard instruments plus Ball 401 TE vario/audio, chute, wing/canopy covers, wing stands, encl metal trailer. $8,700. Mike Perrault (514) 331-9591 eves.

ZUGVOGEL IIIB, 760 h, good condition, new canopy, complete with instruments, audio, radio, chute, barograph, trailer. L/D almost 40/1. Helmut Wieland, Kingston, ON (613) 548-7564 (H), 541-6606 (W).

PIONEER II, C–GLUV, in mint condition, new canopy, standard control stick mod, elec. vario. Alum trailer can be towed by small car. $9000. Paul Daudin (514) 621-2535 or Albert Sorignet (514) 331-4614.

HP-11A, C–FUKB, 518 h, all–metal, standard instruments, CB radio, open trailer available. The highest performance for your dollar — has completed Gold and Diamond flights! Must sell quickly, only $13,900. Bob Patterson (416) 457-5238 (9 to 9).

JANTAR STD 2, C–GGFG, 130 h, excellent condition, 360 chan radio, Cambridge & PZL varios, barograph, trailer. John Kollar (416) 625-7095.

JANTAR STD 3, US$24,200. **SZD–55–1**, US$36,900. New, basic instruments, special finish, fob Poland, end '92 delivery. Call (403) 488-4446, fax 488-7925.

LARK IS29D2, C–GBEQ, about 1000 h, excellent condition, never spent a night outside, C of A to Aug '92, Radair 360, Cambridge elec. vario, O2, instruments, chute, metal encl trailer. Asking $22,000. Denis Gauvin (418) 842-6456.

MINI-NIMBUS, C–GLDR, 1978, about 700 h, Terra 720 radio, Pirol vario & speed director, chute, O2, encl fibreglass trailer. Call Guy Peasley (403) 281-4626 (H) or Al Stirling (403) 242-1191 (H).

ASW-20, C–GTRM, 447 h, one owner, no damage, pristine condition, all ADs done, mylar seals, Smiley bags, tail wheel, O2 with A20 reg, Dittel radio, Winter vario with Cambridge netto, Ball vario with audio, Cambridge Mk IV & speed director, 50,000' Kollsman altimeter, turn coordinator, Bohli compass, Comet trailer. Rick Matthews (604) 538-5382.

TWO PLACE

BLANIK and LARK, SOSA, contact Fred Hunkler (416) 470-2612.

BLANIK, C–GVXS, 2470 h, clean with basic instruments both cockpits. Asking $10,000. Gordon Hicks, (514) 625-7335.

GROB 103, C–FAML, 830 h, all ADs completed, standard instruments, custom dollies & fuselage cradle, etc. for trailer. $37,000. Alberta Soaring Council, (403) 625-4563.

MISCELLANEOUS

Glider Tow Hitch for Supercub, $100. Len Schmaltz (604) 590-6450.

Barograph, Replogle, seldom used, like new, $350. Chris Staines (519) 473-0640 after 7 pm EST.

Winglets. Kit for HP–18 or HP–16/RS–15 without aileron counterweights. Four molded fibreglass skins and materials. $500. Ed Hollestelle (519) 455-3316.

Towpilot and instructor wanted, part or full time at the Rocky Mountain Soaring Centre, Golden, BC. Contact Uwe Kleinhempel (604) 344-6665.

Blanik Parts, canopy and frame, swivelling tailwheel assy, wheel assy. Marty Slater (403) 427-7612 (W), (403) 481-3866 (H).

Gliders wanted for leaseback, one or two seaters, fibreglass preferred. Who can help? Contact Uwe at Rocky Mountain Soaring Centre, Box 1306 Golden, BC V0A 1H0 (604) 344-6665, or fax (604) 344-2229.

Sage SV vario, Schuemann box for ASW–20, Winter barograph 12k scale. Bryce Gormley (613) 692-3107.

Trailer and fittings for a Grob 103. Chris Eaves (519) 268-8973 (H), (519) 452-1240 (W).

MAGAZINES

SOARING — the journal of the Soaring Society of America. International subscriptions $US35 second class. Box E, Hobbs, NM 88241 (505) 392-1177.

SOARING PILOT — bimonthly soaring news, views, and safety features from Knauff & Grove Publishers. $US20, add $8 for foreign postage. RR#1, Box 414 Julian, PA 16844 USA.

NEW ZEALAND GLIDING KIWI — the official publication for the 1995 World Gliding Championships at Omarama and the bi–monthly journal of the N.Z. Gliding Association. Regular updates on preparations for the 1995 event. Editor, John Roake. $US25/year. N.Z. Gliding Kiwi, Private Bag, Tauranga, N.Z.

SAILPLANE & GLIDING — the only authoritative British magazine devoted entirely to gliding. 52 pp, bi-monthly, and plenty of colour. Cdn. agent: T.R. Beasley, Box 169, L'Orignal, ON K0B 1K0 or to BGA, Kimberley House, Vaughan Way, Leicester, LE1 4SG, England. £12.40 per annum (US$20) or US$30 air.

AUSTRALIAN GLIDING — the journal of the Gliding Federation of Australia. Published monthly. $A38.50 surface mail, $A52 airmail per annum. Payable by international money order, Visa, Mastercard. Box 1650, GPO, Adelaide, South Australia 5001.

SUPPLIERS

REPAIRS & MAINT.

Sunaero Aviation. Glider repairs in fibreglass, wood, & metal. Jerry Vesely, Box 1928, Claresholm, AB T0L 0T0 (403) 625-3155 (B), 625-2281 (F).

Vankleek Sailplanes Ltd. Specializing in sailplane repairs in wood, metal, or composites. Call Günther Geyer-Doersch (613) 678-2694.

XU Aviation Ltd. Repairs in wood, metal and composites. C. Eaves (519) 452-1240 (B), 268-8973 (H).

INSTRUMENTS & OTHER STUFF

Barograph Calibrations, most makes and models. Walter Chmela, (416) 221-3888 (B), 223-6487 (H), #203, 4750 Yonge Street, Willowdale ON M2N 5M6

Bug Wipers. Mechanical device for in-flight wing LE cleaning, newly developed in Europe after 10 years of R & D. Widely used at world contests. Cdn$690. **Mylar seals**, Cdn$190. Peter Masak (Performance Enhancement Inc.) (713) 579-2254.

Variometer / Calculator. Versatile pressure transducer and microprocessor based vario and final glide calculator. Canadian designed and produced. Skytronics, 45 Carmichael Court, Kanata ON K2K 1K1. (613) 820-3751 or 592-0657.

Firmal Electronics. Cambridge variometers and flight computers, including new L-Nav. TE probes, netto filters and gust filters (clearance sale on nettos and g.f.s). Cambridge warranty service and repairs. Call for details, (613) 731-6997.

MZ Supplies. CONFOR foam, Becker radios, most German soaring instruments. 1450 Goth Ave, Gloucester, ON K1T 1E4 tel/fax (613) 523-2581.

PROVINCIAL ASSOCIATIONS

NOVA SCOTIA SOARING ASSOCIATION
5546 Sentinel Square
Halifax, NS B3K 4A9
President: Gordon Waugh

FEDERATION DE VOL A VOILE DU QUEBEC
1034 St–Denis
Montréal, PQ H2X 3J2
President: Robert Binette

ONTARIO SOARING ASSOCIATION
94 Willcocks Street
Toronto, ON M5S 1C8
President: Lorna Novosel

MANITOBA SOARING COUNCIL
67 Granada Cresc
Winnipeg, MB R2Y 0P9
President: Lloyd Davies

SOARING ASSOCIATION OF SASKATCHEWAN
3823 Bow Bay
Regina, SK S4S 7E1
President: Ray Richards

ALBERTA SOARING COUNCIL
Box 1916
Claresholm, AB T0L 0T0
President: Marty Slater

BC SOARING SOCIETY
9280 – 168 Street, RR 10
Surrey, BC V4N 3G3
Secretary: Christine Timm

MARITIME ZONE

BLUENOSE SOARING CLUB
Box 843, Station M
Halifax, NS
B3J 2V2

QUEBEC ZONE

AERO CLUB DES OUTARDES
CLUB DE VOL A VOILE
11360 Pasteur
Montréal, PQ
H3M 2N9

AERO CLUB SPORTAIR
c/o Denis Trudel, 1120 Wolfe
St-Bruno-de-Montarville, PQ
J3V 3K5

CLUB DE VOL A VOILE
APPALACHIAN
Box 271
Sherbrooke, PQ
J1H 5J1

ARIADNE SOARING INC.
415, 1000 St.Antoine W
c/o Peter Trent
Montreal, PQ
H3C 3R7

ASSOCIATION DE VOL A
VOILE CHAMPLAIN
30 des Orties
La Prairie, PQ
J5R 5J3

CLUB DE VOL A VOILE
DE QUEBEC
Box 9276
Ste Foy, PQ G1V 4B1

MONTREAL SOARING
COUNCIL
Box 1082
St. Laurent, PQ H4L 4W6

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MONT VALIN
3434 Ch. Ste Famille
Chicoutimi, PQ G7H 5B1

ONTARIO ZONE

AIR SAILING CLUB
c/o 100 - 1446 Don Mills Road
Don Mills, ON M3B 3N6

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10 Courtwood Place
North York, ON M2K 1Z9

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c/o OC Rec. Platoon, CFSPER
CFB Borden, ON L0M 1C0

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Box 394
Thornbury, ON N0H 2P0

BONNECHERE SOARING
Box 1081
Deep River, ON K0J 1P0

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SOARING ASSOCIATION
Box 762
Peterborough, ON K9J 7A2

ERIN SOARING SOCIETY
Box 2284
Bramalea, ON L6T 3S4

GATINEAU GLIDING CLUB
Box 883, Station B
Ottawa, ON K1P 5P9

GUELPH GLIDING &
SOARING ASSOCIATION
183 Norfolk Street
Guelph, ON N1H 4K1

KAWARTHA SOARING
CLUB INC.
Box 168
Omemee, ON K0L 2W0

LONDON SOARING SOCIETY
Box 773, Station B
London, ON N6A 4Y8

RIDEAU GLIDING CLUB
Box 307
Kingston, ON K7L 4W2

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SOARING SCHOOL
Box 1164
Manotick, ON
K4M 1A9

SOSA GLIDING CLUB
96 Heather Avenue
Cambridge, ON
N3C 3C2

TORONTO SOARING CLUB
c/o S. Foster
10 Blyth Street
Richmond Hill, ON
L4E 2X7

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Box 2172
Walkerville, ON N8Y 4R8

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10 Courtwood Place
North York, ON
M2K 1Z9

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& SOARING CLUB
219 Scissons Court
Saskatoon, SK
S7S 1B7

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Box 4093
Regina, SK S4P 3W5

SASKATOON SOARING
CLUB
Box 7943
Saskatoon, SK S7K 4R6

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Box 850
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Box 1255
Winnipeg, MB R3C 2Y4

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Box 2108
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Calgary, AB T2P 2M6

EDMONTON SOARING CLUB
Box 472
Edmonton, AB T5J 2K1

GRANDE PRAIRIE
SOARING SOCIETY
Box 446
Grande Prairie, AB T8V 3A7

PACIFIC ZONE

ALBERNI VALLEY
SOARING ASSOCIATION
Box 201
Port Alberni, BC V9Y 7M7

ASTRA
c/o Christine Timm
9280 - 168 Street, RR 10
Surrey, BC V3S 5X7

BULKLEY VALLEY
SOARING CLUB
Box 474
Smithers, BC V0J 2N0

MILE ZERO CADET SOARING
ASSOCIATION
Box 603
Dawson Creek, BC
V1G 4H4

VANCOUVER SOARING
ASSOCIATION
Box 3251
Vancouver, BC V6B 3X9

SAC SUPPLIES FOR CERTIFICATES AND BADGES

1	FAI 'A' badge, silver plate pin	$ 5.00	Insigne FAI 'A', plaqué argent
2	FAI 'B' badge, silver plate pin	$ 5.00	Insigne FAI 'B', plaqué argent
3	SAC BRONZE badge pin *(available from your club)*	$ 5.00	Insigne ACVV BRONZE *(disponible au club)*
4	FAI 'C' badge, cloth, 3" dia.	$ 4.50	Insigne FAI 'C', écusson de tissu
5	FAI SILVER badge, cloth 3" dia.	$ 4.50	Insigne FAI ARGENT, écusson de tissu
6	FAI GOLD badge, cloth 3" dia.	$ 4.50	Insigne FAI OR, écusson de tissu
	Items 7–12 ordered through FAI awards chairman		*Les articles 7–12 sont disponibles au président des prix de la FAI*
7	FAI 'C' badge, silver plate pin	$ 5.00	Insigne FAI 'C', plaqué argent
8	FAI SILVER badge, pin	$39.00	Insigne FAI ARGENT
9	FAI GOLD badge, gold plate pin	$35.00	Insigne FAI OR, plaqué or
	Items 10, 11 not stocked – external purchase approval given		*Les articles 10, 11 ne sont pas en stock – permis d'achat externe*
10	FAI GOLD badge 10k or 14k pin		Insigne FAI OR, 10k ou 14k
11	FAI DIAMOND badge, 10k or 14k pin and diamonds		Insigne FAI DIAMAND, 10k ou 14k et diamands
12	FAI Gliding Certificate (record of badge achievements)	$10.00	Certificat FAI de vol à voile (receuil des insignes)
	Processing fee for each FAI application form submitted	$10.00	**Frais de services** pour chaque formulaire de demande soumis
13	FAI badge application form *(also stocked by club)*	n/c	Formulaire de demande pour insignes *(disponible au club)*
14	Official Observer application form *(also stocked by club)*	n/c	Formulaire de demande pour observateur officiel *(disponible au club)*
15	SAC Flight Trophies application form *(also stocked by club)*	n/c	Formulaire de demande pour trophées de vol de l'ACCV
16	FAI Records application form	n/c	Formulaire de demande pour records FAI
17	FAI Sporting Code, Gliders, 1992 *(payable to **ACC**)*	$ 5.00	FAI Code Sportif, Planeurs, 1988 *(cheque payable à l'**ACC**)*
18	SAC guide "Badge and Records Procedures" ed. 5 (sold out, ed. 6 coming)		ACVV guide des procédures pour FAI certificats et insignes (éd.5)

ARTICLES ACVV POUR CERTIFICATS ET INSIGNES

Please enclose payment with order; price includes postage. GST not required. Ontario residents, add 8% sales tax (items 15–17 tax exempt). Items 1–6 and 13–17 available from SAC National Office.

Votre paiement dévrait accompagner la commande. La livraison est incluse dans le prix. TPS n'est pas requise. Les résidents de l'Ontario sont priés d'ajouter la taxe de 8% (les articles 15–17 exempts de taxe). Les articles 1–6 et 13-17 sont disponibles au bureau national de l'ACVV.

SAC National Office, 306 — 1355 Bank Street, Ottawa, ON K1H 8K7 tel (613) 739-1063 fax (613) 739-1826