free flight · vol libre

4/93

Aug/Sept

POTPOURRI

At this time we are about halfway through the soaring season. From all reports received the weather has not been outstanding in any part of the country as far as our sport is concerned. The Nationals were held in Swift Current, Saskatchewan, and guess what, the area farmers received some of the best rain showers of the summer in the week before and during the contest. However, we were able to achieve seven contest days which included a couple 300 km ones.

We were made most welcome by the people of Swift Current and area. The local business people donated prizes for the daily winners and a beef–on–a–bun and beer feed one evening which was very much appreciated by all attending.

A special thanks go to the Swift Current Airport personnel for their excellent assistance and cooperation during our stay.

The registration of thirty seven pilots was one of the largest in recent years and all crews and even some pilots were kept busy helping the volunteers on the flight lines. Unfortunately, volunteers and even crew members appear to be on the endangered species list these days as several pilots came without crew, which put even more strain on available volunteers. I believe Jim Oke's letter to the CASA newsletter might be germane to this problem. *It will be reprinted in the next issue of free flight. ed.*

Latest information concerning membership indicates that we should almost be on level with last year. The odd club has shown an increase. I still haven't heard of any club researching the problem of losing members. There seems to be several ideas to encourage new members but none to hold them beyond the first year or so while they are obtaining their licence. Something must be turning them off after that time period and we need the answers. Maybe it is the negative attitude of a portion of our members. Possibly a more positive feeling about the everyday challenges and the satisfaction of achieving these areas of our sport would encourage new pilots to stay.

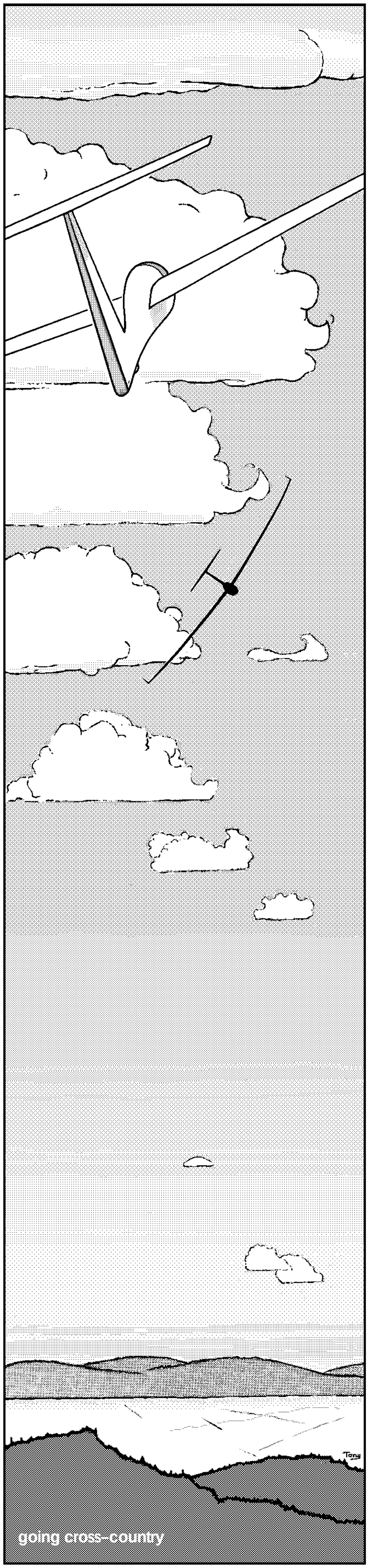
Two or three members interested in the EAA Young Eagles program have sent me copies of the program and are inquiring as to SAC joining the program. I have asked the Directors to obtain local input to the idea as it will depend on the clubs to finance the flights. Also the Air Cadet program, which does not exist in the USA, does provide an opportunity for the young Canadian teenager to get involved in flying. I know (being a member) the Canadian EAA are pushing the Young Eagle program, but they are covered under the parent organization, whereas SAC would be required to sign up under their jurisdiction, and this needs some study. It would be simpler for SAC members on their own to just take an interested youth for a glider ride. I don't think a Canadian teenager is that interested in having her or his name listed among hundreds in a logbook that is kept in Oshkosh WI, that they may never see. But, maybe I'm wrong (again).

Jim McCollum, our Treasurer, has been spending considerable time reviewing and considering ways to upgrade the accounting and membership software to make it more user–friendly for the office use. Some improvements will require much greater hard disk capacity so that Windows can be used in conjunction with newer software. I wish to thank Jim for all the extra time he has been spending on this as well as the time taken up with continuous juggling of our investments to maximize our returns.

Joan has an article in this issue regarding office cost savings. There are some new additions to our SAC supplies — the new Student T–shirt sounds interesting. Look it up.

Please fly safely,

Al Sunley



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4/93 Aug/Sept

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

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DEPARTMENTS

Cover

Walter Weir begins preparation for launch in "Two Whiskey" on day 1 of the Nationals.
Photo courtesy of the Swift Current *"Sun"*.

WORLD FREE DISTANCE RECORD SET

Brian Milner, Canada, and Tom Knauff, USA, June 1, 1993 — 1393.83 km

The flight started near State College PA, went south through the western part of Maryland to the first turnpoint just north of Covington WV, back to northern Pennsylvania to a river junction east of Lock Haven, then south again to a dam just north of the first turnpoint, then back north to a landing at Bedford.

Since the FAI announced the new 'Free Distance' record category, a number of pilots including myself and Walter Weir, have been planning on our computers various tasks that would qualify for this record. Last November we thought the day had arrived and about ten pilots were at Keystone Gliderport to try and set a mass joint record, however the weather did not cooperate (as usual) and none of us flew far that day.

Since then the weather has not been that good for long flights. In April this year Walter Weir finally did his thousand kilometre flight; beating my ten year old record and setting a new Canadian 'Free Distance' record and a 500 km 'Speed to Goal' record on the same flight. Walter and I both flew in the US 15m Nationals at Mifflin County PA, and one of the contest days turned out to be good enough for a distance record; but the evening before none of us thought it would be good enough to miss a contest day. At the end of the contest, we all went our different ways and I went back to work.

On Monday afternoon May 31, my fax machine spat a message out from Tom Knauff that tomorrow looked good and could I make it for the record attempt? After fevered discussions with the weather office and my wife Cheri, I decided to take a chance on the weather and faced the 6–1/2 hour drive to Keystone. Wonders never cease, there were no traffic problems and I was bunked down in our motorhome shortly after midnight, with the alarm set for 5 am.

Depending on which weather source used (Canadian or US), we had forecasts for upper winds that ranged from excellent to pretty shoddy. As usual we wouldn't know until the morning just what the winds were going to do.

At 0530 there was absolutely no wind on the ground at all, which was a bad sign and at about 0545, a glider came quietly in to land at Keystone. It turned out to be Karl Striedieck, who had launched from his Eagle Field on top of the ridge after declaring a 2000 km task and couldn't stay airborne. That's how good the day was looking! Tom and I decided that there was no point in rushing, so would go for breakfast and make our decision to fly after that. After a leisurely meal we decided that we would indeed rig and fill with water but would wait for more positive indications before launching.

At about 9:30 in the morning the wind started to pick up on the ground and cloud movement indicated a workable wind direction so we decided to tow off and see just how well the ridge was working and then make a decision on whether to try for the record. I was airborne at 0955 EDT and found the ridge was working well but not fantastic. Tom and I both agreed that with the current wind direction the ridges should work better to the south. Tom was airborne at 1000 and we both headed south together. We talked about the task and the distance to fly and both agreed that if everything went well, we could just break the record before the sun set, however the chilling fact was that at about 6 pm, (at best) we would still be some 200 miles south of home and over some pretty inhospitable country.

South of Keystone, the ridge is quite low and with the wind at about 45 degrees to the ridge the lift was very weak, in fact at one point we almost landed just short of Tyrone PA, but managed to scrape around the corner where the ridge turns and things became a lot better. At Altoona I was a few minutes ahead of Tom and decided not to waste too much time thermalling for height but just to go into the gap and look for lift. I stayed upwind of the ridge and found that there was a band of very turbulent lift where we sometimes find wave lift, it looked like rotor forming. I climbed about 500 feet and followed the line of lift until I could dive straight downwind to the Bedford ridge. Tom took a little more height than I did and didn't have any trouble crossing either.

continued on page 20

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 in ASCII). 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.

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September, November

L'ASSOCIATION CANADIENNE DE VOL A VOILE

est une organisation à but non lucratif formée de personnes enthousiastes cherchant à développer et à promouvoir le vol à voile sous toutes ses formes sur une base nationale et internationale. L'association est membre de l'Aéro Club du Canada (ACC) représentant le Canada au sein de la Fédération Aéronautique Internationale (FAI), administration formée des aéro clubs nationaux responsables des sports aériens à l'échelle mondiale. Selon les normes de la FAI, l'ACC a délégué à l'Association Canadienne de Vol à Voile la supervision des activités de vol à voile telles que tentatives de records, sanctions des compétitions, délivrance des brevets de la FAI etc. ainsi que la sélection d'une équipe nationale pour les championnats mondiaux biennaux de vol à voile.

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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.

L'exactitude des articles publiés est la responsabilité des auteurs et ne saurait en aucun cas engager celle de la revue ***vol libre***, ni celle de l'ACVV ni refléter leurs idées. Toute personne désirant faire des représentations sur un sujet précis auprès de l'ACVV devra s'adresser au directeur régional de l'ACVV dont le nom apparait dans la revue.

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.

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letters & opinions

THE USE OF GPS AT CANADIAN CONTESTS

In light of the FAI decision to allow GPS at contests, at least four of us in Alberta were surprised and disappointed to learn that we will not be permitted to use our new GPS at contests in Canada this year. I would like to submit the following rationale *(to the Sporting Committee)* supporting the use of GPS, not necessarily for turnpoint proof, but for navigation at all levels of Canadian contests during the 1993 season. I would be grateful if you would pass this letter on to the others involved in forming Canadian competition rules.

Safety and performance GPS does not improve the performance of a talented pilot or his ship. It offers nothing more than a properly prepared map. As positives, GPS reduces the dangerous aspects of in–flight heads down "whiz–wheel" spinning, map folding and map reading. It may also help to level the playing field for visiting pilots who are at a substantial disadvantage to local pilots who have intimate knowledge with the contest area.

Cost The cost of GPS has dropped dramatically over the last six months. In the fall of '92, a Garmin 55 AVS or a Trimble hand–held unit cost about $1500. In April '93, three local pilots (all planning to attend this summer's Nationals) purchased Garmins for under $1000 each. Dealers are expecting yet another round of price cuts before this summer.

GPS is considerably less expensive than winglets, which probably do improve sailplane performance, are not available for all sailplanes, cost thousands of dollars more to acquire than GPS (if you can get them at all), and are allowed by the rules. Even the cost of good varios, some of which definitely act as "navigation aids", is significantly more expensive than GPS and they too are currently allowed.

Current rules also favour the use of very expensive sailplanes. The cost of a GPS is insignificant compared to the cost of upgrading one's sailplane to one of the more competitive ships enjoyed by most of the front runners. Anyone concerned enough with winning to pay more than $60,000 for a used competitive sailplane is not going to quibble about the cost of a GPS. In fact, many of the fast pilots already have one; most of them plan to have one soon.

In any case, the pilots with the most talent and best ships are still going to win our events with or without GPS. Disallowing the use of this relatively inexpensive technology within Canada is only delaying the inevitable at the risk of hobbling our pilots' experience with GPS in the contest environment. Much like proper map reading, using a GPS properly takes time and practise. Not allowing GPS in our contests is forcing our competition pilots to continue using maps for all their flying in order to stay current in this soon to be outdated navigating technique. Shouldn't we be developing the new skills being promoted elsewhere?

Availability Trimble, Garmin, Panasonic and Sony hand–held GPS can all be acquired in under one week and require no installation. Virtually anyone who can afford the cost of participating in the Nationals can have this technology at a moment's notice. The same cannot be said for high performance sailplanes, varios and winglets, all of which ARE allowed within our current contest rules and are difficult to acquire.

Legality Since the FAI has sanctioned the use of GPS at this year's World Championships, it makes sense that competitors on the national level gain working experience with it. In the past, any technology that concerned the FAI on the grounds of "fairness" was restricted to use at the local, regional and national levels before being adopted at the world level. The use of GPS at this year's World Championships signals their enthusiastic endorsement of GPS in the sport. GPS is here, it's now, it's inevitable.

Summary Presumably, the continued disallowance of GPS use at Canadian contests would be to address issues of fairness. Canadian soaring events are constantly billed as "for fun and learning" events. If a competitor is there for fun and experience, it is irrelevant who has or does not have a GPS. If they are there to win, it helps to be well equipped and GPS is one of the cheapest and most accessible components in the current competitive setup. I find it hard to imagine anyone not attending the Nationals because they cannot or do not want to buy a GPS. GPS is available, inexpensive, already in widespread use, offers little competitive advantage, improves flight safety, enhances turnpoint proof and is being allowed by the FAI today. Our regional and national rules should be promoting procedures and equipment that prepare our pilots for competition outside of Canada.

Jay Poscente
Cu Nim Gliding Club

TILLMANN SAYS THANKS

I wish to thank the board members of SAC for having selected my article *"Playing for high stakes in Nevada"* as "the best article in *free flight* in 1992 by a Canadian author". I had completely forgotten the story — though not the memorable flight — and I was most pleasantly surprised when I saw the citation confirmed in the 2/93 issue of *free flight*. I say "confirmed", because I heard of it first from an American glider pilot when I was at the Bald Eagle Ridge, Pennsylvania early in April. However, the individual in question, who had read the story himself, refused to disclose to me his "usually reliable sources". This made me suspect that the whole thing was just a hoax. Now that I know that it really is not, I wish to express my heartfelt gratitude for the honour. I am pleased to tell you, that I have run into quite a few glider pilots who told me

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Monster Cu–nim

Part 2 Last month opened the subject of cumulo–nimbus formation in temperate conditions. This article concludes the topic with a discussion of the monsters all pilots give a very wide berth to.

Tom Bradbury
from *SAILPLANE & GLIDING*

MOST SMALL CU–NIM develop in cold unstable air which has come from polar regions. These clouds depend very greatly on surface heating to set off the instability so they usually die out overland in the evening. Monster cu–nim are features of warm air which has come from regions near the tropics. Although they too depend on surface heating they may develop as a result of two different air masses becoming superimposed, warm moist air moving in under cold and often dry air. A feature of monster storms is that they develop over a wide area and can persist through the night even when the storm cloud is carried over a cold sea.

Warning signs on weather maps

In summer, spells of hot sunny weather often occur when a high develops over England and the near Continent. The centre of the high generally drifts away eastwards and when it goes a southerly airflow starts to bring even warmer air northwards. For three or four days pressure falls and the temperature rises until daily maximums exceed 30°C. These high temperatures encourage evaporation and the dew point rises, partly from evaporation but mainly from the transport of moister air from tropical regions. At the same time a cold front approaches from the west. The front itself may be inactive but it brings an upper trough with much colder air at high levels. Cold fronts are able to generate a line of cu–nim but many severe thunderstorms break out in the warm air a long way ahead of the weak cold front. When such pre–frontal thunderstorms occur the following cold front is apt to become very weak.

Big changes of wind with height

As the high moves away the low level winds start to strengthen from the southeast. Over the top of this hot humid air the winds at 15,000 feet and above are southwesterly. These bring colder drier air over the top of the hot humid air. The whole region becomes progressively more unstable, but for a time nothing happens. At first the hot low level air is capped by an inversion at 4000–6000 feet which stops even small cu forming.

Adding a jet stream

A third factor often appears — the arrival of a southwesterly jet stream associated with the approaching upper trough. Jets ahead of upper troughs nearly always produce widespread ascent of air; most of the frontal depressions start this way. Rising air becomes less stable. The instability can be increased when there is moist air low down and dry air aloft. It produces a situation known as "potential instability". The upper air soundings look stable, but slow lifting turns them violently unstable after clouds form.

The three main factors preceding severe thunderstorms

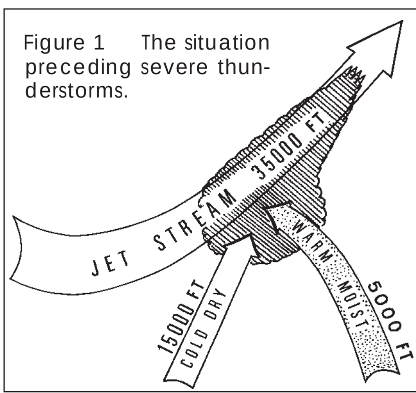
Figure 1 illustrates a situation favourable to severe thunderstorms. The shaded area marks where cu–nim can be expected to grow. Three destabilizing factors often combine to set off severe storms:

1. The spread of hot humid air from the south or southeast.
2. The arrival of cooler and much drier air aloft carried by southwesterly upper winds. The two wind directions, SE below and SW aloft, provide a wind shear which can control the way a cu–nim develops.
3. The development of a jet ahead of the upper trough setting up a widespread ascent of air which results in destabilization aloft and (usually) a fall of pressure at the surface.

An inversion often delays cu–nim formation

The inversion holding down the warm moist air delays any build up of cu–nim until the conditions aloft have become very unstable. When this inversion finally breaks the pent up energy is released suddenly. The inversion prevents the system going critical until there is a vast reserve of energy available to feed monster cu–nim. Thunderstorms can still develop without it but the energy would be released over a longer period and the storm would grow less rapidly.

Figure 1 The situation preceding severe thunderstorms.



Visible indications

Widespread thunderstorms are often preceded by the appearance of altocumulus castellanus. This often looks like a field of small cumulus but the base is far above any thermals. It is often at levels of 10,000–15,000 feet. This kind of cloud shows that the air at medium levels has been lifted above the condensation level and the puffs of very high cu warn you that the air is becoming unstable aloft. (Ordinary upslope lifting of stable air tends to produce a sheet of cloud not castellanus.) Thunderstorms often follow within 24 hours of the appearance of medium level castellanus clouds. Castellanus clouds sometimes grow very large and end up producing their own shower (usually very light) well before the main thundery outbreak. They can be very deceptive if there are no lower clouds. I have been fooled into taking a tow under them, and spent fruitless minutes searching for non–existent lift before realizing the clouds had no roots.

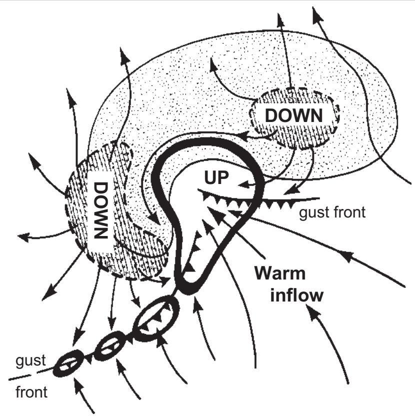


Figure 2 Plan of a severe cu–nim showing inflow and ascent close to downflow, descent and gust fronts.

Visibility

When lesser cu–nim develop in unstable air from polar regions the visibility is generally extremely good. One can see a cu–nim summit more than 100 miles away if there are no intervening clouds. In the hot and humid conditions before the monster storms arrive the low level visibility is often so poor one can barely see the ground from 10,000 feet. Above the haze the horizontal visibility is usually very good so distant cu–nim anvils can still be seen if you climb high enough.

Figure 2 shows a low level plan of a severe cu–nim. The warm inflow comes pouring in from the SE. (The upper flow has been left out.) Thick black lines mark the up currents while hatched lines show the nearby downdrafts. The large area filled with dots is the radar echo. Rapidly descending air is deflected horizontally along the ground and forms a gust front. One gust front undercuts some of the inflow to boost its ascent. A longer gust front grows out on the SW side. New cells build up along this gust front. In

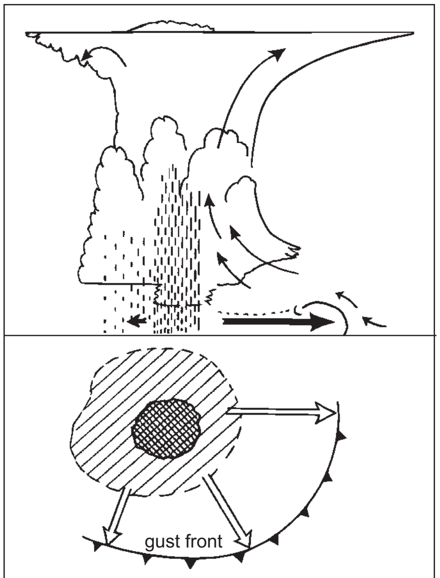
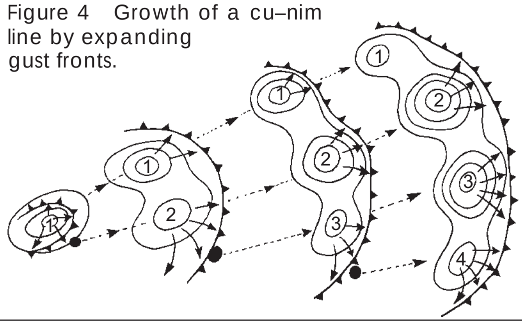


Figure 3 Plan and cross–section of a simple cu–nim with outflow starting to produce a gust front.

Figure 4 Growth of a cu–nim line by expanding gust fronts.



parts of the USA where this process is extremely violent tornadoes may develop along this line. In the UK and NW Europe tornadoes are comparatively rare and do not reach the size and intensity of the American ones. However they do occur, particularly along cold fronts in autumn, and then they may strike during the night.

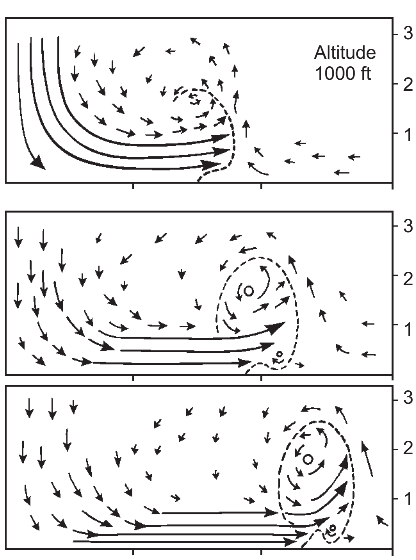


Figure 5 Structure of a gust front spreading out from a downburst.

Figure 3 is a plan and elevation of a simple cu–nim showing the downrush of rain close to the column of lift. The lift is beginning to be deflected over the outflowing gust front on the right.

Figure 4 shows how a single big cu–nim can grow into a long line of thunderstorms. The gust front (marked by spiky symbols usually kept for cold fronts) spreads outwards from the original cu–nim. On the southern flank of the storm it meets the hot and humid SE flow and sets off a new cell. This in turn produces its own gust front. The cells are numbered historically from 1 to 4. Each new cell forms on the right flank of its predecessor.

Structure of a gust front/squall line

Figure 5 shows the evolution of a gust front after an extremely severe descent of air called a downburst. As the downburst hits the ground it is deflected outwards and soon develops its own circulation over the top of the gust front. This is rather like a supercharged sea breeze circulation. It can form part of a ring with an arc of turbulent cumuli over the leading edge.

The three stages in the formation of cloud over an expanding gust front is shown in Figure 6. The first sign may be an outward curve to the rain shaft below the cloud. Next little bits of scud start to form where warm moist air is lifted by the gust front. Third an arc of cloud, often very smooth edges like a wave cloud, forms at low level. Such arc clouds under a cu–nim may mark the main inflow region where the lift can become very powerful. The gust front weakens as it spreads out but it can remain intact for scores of miles.

Other thunderstorm lines

A range of mountains may grow a line of thunderstorms when the surrounding plains are almost cloudless. A chain of thunderstorms often forms along convergence zones; sea breeze fronts occasionally trigger such a line, but more often there is a trough of low pressure lying across the zone of instability. The low level convergence along a surface trough starts the air rising and triggers cu–nim.

Multi–cells or supercells?

The majority of cu–nim are composed of many cells at different stages of development. Multicell clouds may grow to cover a very large area but the lift of individual cells is shortened by the downrush of precipitation. If a mass of rain or hail falls back into the rising air the lift is soon overloaded. The effect is increased by the cooling produced by a mixture of rain, snow or hail falling into the previously "warm" air. If the column of ascent is almost vertical the lift soon turns to sink and

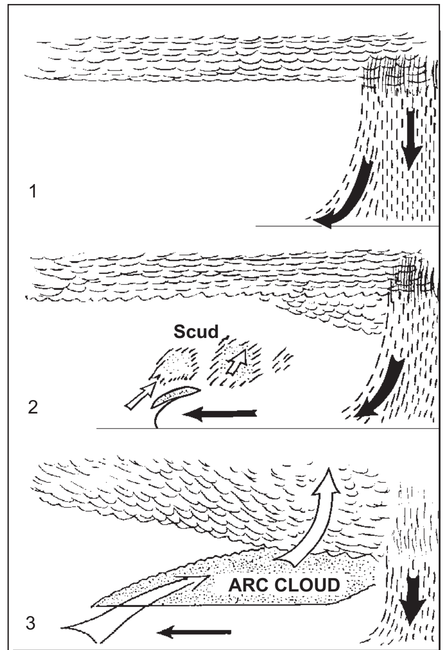


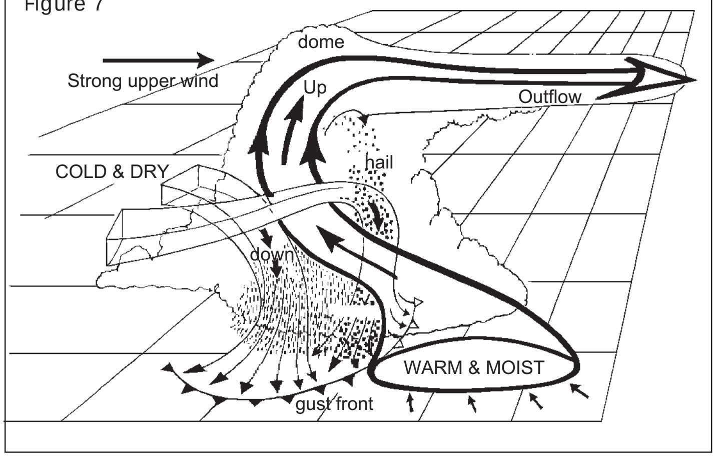
Figure 6 Visible signs of a gust front growing from under a cu–nim.

the cells rapidly fall to bits. One can see this happen to isolated cu–nim but if it is embedded in a vast mass of cloud the process may only be detectable by radar.

Supercells

If the descending rain or hail can be kept separate from the column of lift a huge storm cloud called a "supercell" may evolve. A three–dimensional sketch of a supercell is shown in Figure 7. Before a supercell can form there needs to be a marked wind shear between the base and top of the cloud. This is not uncommon, it is one of the three severe storm factors listed earlier. Multicell storms may evolve into a supercell storm. The

Figure 7



essential feature is a sloping inflow bringing the warm moist air in at an angle. As this air rises the angle becomes almost vertical and the lift increases. Eventually it comes up against the tropopause, the boundary between the unstable troposphere and the very stable stratosphere. Here the inversion is so strong that the cu–nim spreads out forming a very flat top.

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COMPETING ON THE RIDGES

Winning the US 15m Nationals by not losing

Peter Masak

MY PREPARATION for this contest started only a month before the event. I had been putting off the decision of which contest to enter pending the completion of my new supersailplane, *"Scimitar"*. As it became obvious that the ship would not be ready for the US 15–metre Nationals, Adrienne, my wife of three months, encouraged me to think of other options. A glider pilot herself, Adrienne knew that we needed to do a lot of preparation to get ready.

The first problem was that I didn't have a sailplane. Furthermore, there was the question of what contest to fly in: the US or Canadian Nationals. The Canadian contest sounded inviting — good weather would probably be assured in Swift Current. On the other hand, the US contest in Mifflin County, Pennsylvania was also particularly attractive for me because I had spent several weeks in previous years flying in that area while trying to set new records. Besides that, I hadn't flown a US Nationals in five years and there were lots of friends to catch up with. As well, the scenery in Pennsylvania is beautiful and there were many tourist attractions nearby to keep us busy on non–contest days.

Two weeks of phone calling and begging narrowed the options. My friends Fred and Suzanne Schmid from Waco, TX had available their 'spare' ASW–20 for the US contest. I was fortunate that Fred, who was planning on flying his newer Ventus A in the contest, had not found a buyer for his ASW–20. One week before the contest, I had the ASW–20A in hand, but could manage only one practise flight on a windy day with a low ceiling at my home field in Hempstead, Texas. Ken Sorenson and I battled it out a bit in the air, him in his Discus and I in the ASW–20. Flying against Ken was a good test of my skills since Ken was on the US team for Sweden and had been practising intensely for the last couple of months.

I felt comfortable in the new loaner ship despite not having flown more than 10 hours total and 6 flights in almost 2 years. Fortunately, I did have a wealth of experience in an ASW–20 from years past — having set several US and Canadian national records in my old machine, 'PX'.

A few days later, Adrienne and I saddled up and set off from Houston, driving to Pennsylvania non–stop, hoping to get in a couple of days of practise. We alternated at the helm, and the twenty–six or so hours of driving passed quickly.

When we arrived in Pennsylvania, we were greeted by sullen skies and cold temperatures. The only pilots camping in tents at the field were Fred and Suzanne Schmid. They both had colds, and Fred had a bad hacking cough. Adrienne reminded me that I had wanted to camp at the field. We decided to stay at a bed–and–breakfast run by a Mennonite family.

Of the next four practise days, only the second was good enough to permit some flying. An ominous start to the contest.

The first contest day was strong, 5 knot average thermals, occasional overdevelopment, and just enough northwest wind to entice some pilots to 'dive for the ridges'. The course line was deliberately set across the ridges so as to prevent the local ridge runners from having an advantage.

Some big names had trouble this day — world record holder Tom Knauff and Roy Cundiff, past Olympic world sailing champion. They both got stuck low down for a long time, and arrived back home so late that they got very low point scores. Roy later blew away the competition by winning two days in a row with spectacular speeds. Another top seed, Karl Striedieck, made the mistake of turning off his radio after starting his start gate run and didn't hear the word 'bad try — too high'. The gate tried to call him several times later to advise him that he had a bad start but to no avail and this netted him zero points for the day. I placed 10th, but dropped to 22nd after a 10% photo penalty (I resolved to be much more careful after that!). Bill Watson, the first day's winner in an LS–6 was a popular winner — this was his first big success in a Nationals and we were all happy for him.

I don't remember much from the second contest day, except that it was again overdeveloping and one had to be careful. Dave Michaud moved into first with a great performance in another LS–6.

The third contest day really separated the men from the boys. There were occasional stretches of fantastic lift (8–10 knots), then periods of nothing where you had to scratch and press on. I de-

photo not available for pdf file

Peter and Adrienne and borrowed '20 at Mifflin County Airport for the 15m US Nationals.

cided that this was a defining day and pushed aggressively forward through a long stretch of dead air and was finally rewarded with a 12 knot climb after almost 50 miles of 0–2 knot thermals. This got me into the lead, which I again lost when trying to cross the Susquehanna river area. Three good looking clouds in a row dissipated when I got to them and I was faced with climbing in very choppy turbulent thermals at the turnpoint.

The 'pack' caught up with me again, but fortunately I had a lead on all but a few gliders. I set back out across the river and into dead looking skies with a seemingly impossible distance to bridge to get to the edge of overdevelopment and some altocumulus. A 30 minute glide in completely dead air at max L/D to the edge of the altocu and the first sunshine brought me into lifting air. I recalled reading in ex–champ Reichmann's book: *"on an overdeveloped day head for the sun, and/or the edge of the cloud shelf if there is altocumulus".* First 2 knots at 2000 feet, then 4, then 6 knots, and I had final glide altitude. Then a dive through some rain showers and I was home. I didn't win this day, but my performance moved me into 3rd overall as I recall.

The next day was marginal, and contest director Charlie Spratt had us launch as soon as the sniffer could just barely maintain altitude. I headed off late, only after the first cu popped — I think that it was about 3:30 pm. The task was short, Williamsport and return, but it was very tough. It was largely blue thermals, a strong south wind of about 25 knots, and cirrus overcast.

This was a spectacular day for Roy Cundiff. He used only three thermals and was flying to win. As I recall he won with a speed at least 10 mph faster than the second place finisher. It was my worst day. I was indecisive and almost landed out. I spent most of the night sleepless in bed going over and over my mistakes. My overall placing dropped to fourth. Dave Michaud held onto the overall lead with another good performance.

The next contest day started out with an unbelievable wind from the southwest — 50 knots at 5000 feet! They launched us anyway — believe me I practically crapped when the towpilot dropped me two miles downwind of the field at 2000 feet. I complained so loudly that Charlie shut down the launch for a few minutes while he straightened out the towpilots.

In the interim, those of us that had launched spent much of the time prior to the gate opening trying to penetrate into wind. The winds were forecast to diminish and veer to the west. Charlie called a four hour PST task on this day. I recall Karl Striedieck suggesting to the other two task advisors on the radio that the ridge would probably be working between Altoona and Cumberland (where it runs north–south), so I resolved to head to the ridge after the gate opened.

By the time everyone was launched and the gate opened, there were solid cloudstreets all over the place, running SW–NE. The wind seemed to be about 40 knots at cloudbase. I headed out, zig–zagging cloudstreets and staying high, working my way south to a zone where I'd be able to dive for the part of the ridge where it was north–south. This I did and engaged the ridges near Altoona–Blair airport. The ridge was working well enough that one could run about 100 knots in unbelievable turbulence! Despite buckling down hard on the shoulder straps, my head was regularly hitting the canopy — at least once a minute ... Ah, the punishment that we have to endure to win, I thought.

I passed one sailplane who hesitated at one of the gaps. At the end of Tussey ridge, I thermalled several circles, then dove upwind to the ridge which was one downwind of the famous Bald Eagle ridge. I had never used this ridge before, but the map showed it going almost straight towards the most southerly turnpoint at Cumberland, MD. I proceeded with some fear and trepidation, because there weren't many landing fields, and the turbulence was unbelievable (probably because of the proximity of the higher Bald Eagle ridge upwind).

When I got near Cumberland, I took a 5 knot thermal up and glided in for the turnpoint picture. To my surprise, there were four gliders circling upwind of the turnpoint, getting altitude to dive for the Bald Eagle ridge for a northbound run to Bedford. I passed underneath them and was surprised that they were circling, since they seemed to have enough altitude to dive upwind to the main ridge. It was Cundiff, Striedieck and Bill Bartell — three of the most seasoned pilots!

As I passed under them, they gave chase and followed me northbound. Alfonso Jurado was just ahead of me, and as he neared the Bedford gap, he circled to climb for altitude. There wasn't much there in the way of a thermal, so I just zoomed up and headed across the eight mile gap hoping to dolphin across. This worked and I left the other ridge pundits behind. Then it was up to Altoona, back south to Cumberland, and north, zigging and zagging on ridges to the finish gate at Mifflin County. Overall speed, 79 mph for first. Chip Garner had a spectacular flight also, but to his credit did it all by running up and down cloudstreets exclusively. He took second at 74 mph.

Dave Michaud, the previous day's leader torpedoed his score by landing only a few miles out on final glide and I moved into first place overall.

The next day was another four hour PST. Karl Striedieck recommended that everyone just fly upwind to the Bald Eagle ridge and ridge soar all day. We did that — there were only two landouts — to Roy McMaster's chagrin he landed out at the mile wide Milesburg gap only a couple of hours after giving a briefing at the pilot's meeting about how to fly the ridge!

Karl Striedieck smoked everyone with a blistering 99 mph; the point spreads were close however, and there was not much change in the overall scores. Many pilots including myself exceeded 90 mph, and there were a lot of smiling faces at the end of the day.

I faced the final contest day with much trepidation. I had picked up a cold, and was popping vitamin C pills like a drug addict, trying to fend it off. If only I can last one more day I thought! Furthermore, there was no room for mistakes. I was in first place, but Chip Garner was nipping at my heels, and he was only 40 points behind.

Charlie Spratt the contest director was intent on setting a challenging task. In fact it was so challenging no one completed it! A late afternoon cirrus deck moved in along with a lowering inversion which coincided with the approach of a warm front. I recall gliding from one thermal to another, and topping out each one lower and lower. The steady northwest wind didn't help; with thermals going only 500–1000 feet above the ridges, it was difficult to get enough altitude to cross them. Since everyone landed out, the maximum score was heavily devalued and there was little change in the relative positions. I was left as the lucky winner!

My ship was one that many would have considered outdated five years ago. This was no slouch of an airplane though. I remember following an LS–6 on the ridge at 100 knots and not losing an inch. He was 100 pounds heavier, but my sailplane was outfitted with winglets, bug wipers, and my new LD–100 variometer — a difficult combination to beat!

This was the first contest that I flew as a married man. Fortunately for me, Adrienne is a knowledgeable glider pilot and she actively encouraged me to fly this contest. Her support and organization were key factors in my success — my flying was no different than before, but Adrienne was there to lend a shoulder to cry on and worry about all the details when it counted. Thanks, Adi! •

1993 nationals

Tony Burton
EE, Contest Manager

"THE COLDEST EARLY JULY IN 108 YEARS"

THAT'S WHAT THE WEATHERMAN SAID at the closing awards banquet! A long wave trough in the upper atmosphere had looped the jet stream far south of its normal position locking in cool and unstable air across the prairies. So over the course of the competition cloudbases stayed down below 7000 feet much of the time with a lot of mid level cloud and cirrus reducing sun on the ground, and afternoon temperatures never got out of the teens. Given the instability of the atmosphere the shading at least cut down on the thundershowers; and given the instability, pilots were able to fly in spite of overcasts.

However, it was the best card hand we could have been dealt, as the general soaring conditions at most other contest sites in Canada were worse. I got several calls from Calgary saying that if the contest had gone to Claresholm as originally planned it would have been wiped out. Indeed, approaching home the day after the contest, the fields were not only wet — they were flooded!

Swift Current airport is an old RCAF training base with the standard triangular runways, one of which has been widened and extended. Apart from relic roads and building foundations past the entrance, the only remains are two old hangars, one of which held the local flying service, and a Flight Service Station. Larry Kusisto, the airport manager, was very generous of his time and space to allow us to set up the contest operations in the middle of his hangar. Ursula and I arrived on Thursday evening to find that Walter and Barbara Weir were the early birds.

Friday, 2 July Even this early, six pilots had their trailers parked on the ramp. Buzz Burwash and Jay Poscente arrived that afternoon after attempting to fly to Swift Current from Black Diamond the previous day on a 400 km speed–to–goal attempt and claim a case of beer from Tony Burton who challenged Alberta entrants to beat his slow record set in 1991. However, the unstable weather blew up, causing both pilots to land shortly after crossing the Alberta border. The afternoon weather looked deliciously soarable naturally, there being no towplanes on the field yet.

3-4 July Overcast mostly with afternoon rain from a big low stalled in northeast Montana circulating rain into the prairies. Cheers from all when the first towplane landed and taxied into the hangar out of the wet.

5 July The rain finally ground to a halt and moved off to Manitoba where it proceeded to wash out roads and bridges. CBC local news featured rain stories. Over 66 mm fell at the airport over the period, and well over 100 mm further to the southeast ... so much for the practise days. The evening meeting introduced the pilots to two gents from Moose Jaw who rolled out a map showing all the low level jet training routes in the area. The base was happy to curtail a lot of its flying activity immediately to the east of Swift Current though, as well as its instrument approaches to the airport VOR, so we never saw a Tudor.

The FSS insisted on complete reporting of registration letters, on towplanes reporting glider releases, on gliders reporting five miles out, and reporting when down and stopped, etc. It all got to be part of the "aural scenery" after a while, but pretty well clogged the airport frequency during launching. Perhaps it's fortunate that most days did not see mass arrivals back at the airport — on the one day it did occur, the chatter was so dense some circuit position calls got lost in the chatter and there was a tense near miss between two gliders turning short final from opposite directions.

6 July The contest is on. The weatherman had data receive problems, George's scoring computer crashed its hard drive, the Regina towplane was late, the water ballast truck was only trickling the water out, etc, etc. — the usual start–up total chaos.

A weak ridge overhead with light northerly winds and the worst visibility in moisture haze and forest fire smoke ever seen on the prairies. Very weak lift with occasional cu to 7000 feet. A 2–1/2 hour PST task to northeast quadrant turnpoints was called for all classes which was cut to 2 hours, then to 1–1/2 hours for the Open class at the back of the line.

Lots of landouts. It was remarkable that there was any convection at all given the amount of standing water over the countryside. Only the 15m class got a contest day, with Curt Hawkins making 128 km at 64.1 km/h for a derated 480 points. Both the Standard and Open classes required three competitors minimum to fly 50 km, and both had only two. Given the conditions, Jörg Stieber in Standard made an excellent flight of 145 km, followed by Kerry Kirby with 88. Two others got to the close Rush Lake turnpoint and back but only netted 47 km — so, note to competition organizers — it helps to have the closest turnpoint more than 25 km away! In the Open class, Tony Burton flew 91 km and Dick Mamini made 86.

7 July Weather conditions were very similar to the previous day with the prospect that drying ground would improve the lift. The airmass was quite unstable with the possibility of thunderclouds. Saskatchewan was the only part of the prairies with any sunshine. The cu proved to be very tricky with some streets looking great but offering little lift. The visibility was still poor.

The task was a 3 hour PST to southeast quadrant turnpoints. Just prior to launch there were severe weather warnings to the west but nothing materialized there. In fact, soon after everyone started a noticeably cool airmass moved in which killed any lift to the west.

It was a 1000 point day for every class and all three winners had excellent flights which were 300 points better than their peers. In the Standard class, Jörg blew away competition with a 229 km, 76.2 km/h flight, 332 points over second place Paul Thompson. Ulli Werneburg in the 15m class, with a 254 km flight at 84.8 km/h, earned 306 points over Nick Bonnière's 66.4 km/h. Open class went to Dave Mercer with 152 km and 50.8 km/h, again substantially faster than runner–up Mike Thomp-son at 41.8. Outlanded pilots began discovering that Saskatchewan is an empty province, with many farmers having moved off the land. Some phones were a long walk from the abandoned farmsteads they stopped at. (*"Damned government, damned banks,"* swore the man who drove me to the nearest phone.)

8 July
The airmass was still very unstable, and cu were developing by 1000, and showers were beginning by 1100. The task was Gull Lake – Kyle for 15m/Std and Gull Lake – Saskachewan Landing for the Open. Launches were delayed about an hour until conditions over the field improved. As more showers appeared in the west, the direction of the task was reversed with the expectation that it would improve to the west by the time pilots got out to the second turn.

The day turned out well. A major factor was negotiating blue areas from rain showers and a line of weather across the second leg (but you could finally see where you were flying). Some were able to run this line and make good progress, others almost reversed track some distance down the first leg towards Swift Current to get around. A third of the pilots landed out which derated the day in all classes.

Jim Oke won the 15m with a good margin of almost 8 km/h. Jörg again took the Standard honours, and Tony Burton's win in the Open counted this time.

10 July The wind was the active factor today. It was 20 knots plus out of the northwest, and the forecast lift was only 3 knots. Standard and 15m were given a 256 km triangle, Dinsmore – Kyle return, and the Open class was Lucky Lake – Kyle at 221 km. The 15m pilots did well with only four landouts, but the Standard and Open had only 2 each get around.

It was quite difficult to penetrate into wind to the first turnpoint and Diefenbaker Lake was a barrier to progress for many, but if you could connect with the short cloudstreets, the task was "relatively" easy. If you didn't, and especially if you got low, the task was a terrible grind (Dave Springford got a hand the next morning for getting back around 7 pm after a 5–3/4 hour struggle). Ulli won the 15m at 89.4 km/h. Paul Thompson was 8.6 km/h faster than Kerry Kirby in Standard but only gained 35 points on him, and Dave Marsden took the Open.

11 July This was the big day as it turned out. The morning actually started out sunny! Nothing had changed much with the airmass — still cool and unstable but the forecast degree or two increase in maximum temperature drove up the cloudbase to over 8000 feet (still low for the prairies though) and the average lift was well over 5 knots with a modest northwest wind. The sky filled with cu before 1100 but the weatherman predicted that it would go blue by midafternoon. It didn't, and the day was undercalled as a result.

The task was a 3 hour "PST triangle", with Kincaid to the southeast as a mandatory first turnpoint and a pilot selected second turn (one was allowed to photograph more turnpoints and claim the furthest one achieved).

Unfortunately, the unintended consequence of this call by the task committee — since the day turned out very good — was that some pilots got out to their furthest achievable turnpoints with excess flying time remaining for the trip home. The scoring formula then reduced their speed to the distance achieved divided by the 3 hour minimum time which also produced a pair of forced ties in the points. Nick Bonnière and Ed Hollestelle lost over 10 km/h each after blistering around a 305 km course at over 100 km/h!

Beer time discussion of the merits of such a minimum turnpoint PST boiled down to don't do it again or have no less than two pilot selected turnpoints to prevent the possibility of being trapped with nowhere else to go.

Ed and Nick topped the 15m class and Jörg won again in Standard, all by going out west to Tompkins for the last turn. Dave Mercer and Tony Burton in their RS–15s also went to Tompkins, with Dave winning the day by one minute. Everyone remarked on the speed at which Kincaid was reached flying the cloud streets downwind.

> **Ken Wowryk**
> District Officer, AES
>
> I would like to thank everyone associated with the 1993 Canadian National Soaring Championships at Swift Current. Providing weather information services to the contest was an experience; it was very interesting and educational, as well as very enjoyable. The numerous positive comments that I received regarding the quality of the weather service will be remembered for years to come.
>
> Once again thank you everyone for allowing me to be a part of this event.

12 July A small window of opportunity opened today. A low moving across Montana brought a light easterly wind and a solid high overcast in the morning. It looked like there was no possibility of flying but the weatherman said the air was still unstable and a small ridge to the southwest would produce convection if any sun hit the ground.

A second pilot's meeting was held at noon and by golly the sky lightened up a little and isolated cu began appearing. A further hole to the south soon resulted in a very strong line of cu over Swift Current leading north east. A 2 hour PST was called for everyone, which was later shortened 15 minutes for the Open and Standard who launched last.

The 15m ships got airborne and started in time to connect, and later stories of rocketing along right under the cloud deck at 100 kts made later launches wonder what continent this was supposed to be happening on. Once this line and one other further south dissipated, the overcast moved back in and it was gear down to survival flying for them and game over for most pilots in the Standard and Open — only 3 Open pilots got back to the field from a turnpoint and no Standard.

Jörg won in Standard with a flight of 94 km which earned him only 87 points! Dick Mamini won the Open with a 153 km flight at 88 km/h, and Curt Hawkins won the 15m with a flight of 161 km. Two other competitors making it back to the field got fewer points than some landouts. This result sent people scrambling into the scoring formulas to see what was going on, as most pilots had assumed that a nonfinisher would always earn less points than a finisher.

It appeared that the result was an unintended consequence of applying a PST task to a scoring formula which evolved for assigned tasks. The finisher of an assigned task always flies further than a landout, which is not the case with PST. In the not unlikely event that a few struggle back home to finish a PST, while many connect with good conditions further afield but can't get back, there could be a large point bonus for flying for the distance. The scoring formula definitely needs fixing, essentially because the pilot is in the position of having no idea what flight strategy to apply — does he try to get home or go for "free distance"? — the strategy depends on the unknowable number of pilots who get home.

13 July A no contest day. The morning began with light rain and overcast as yesterday with less prospect of clearing. A second pilot's meeting was called for noon with little change so Al sent everyone home. Naturally it did become flyable by midafternoon — you can't win 'em all. The forecast for tomorrow was good, an early pilot's meeting was announced, and the evening campground barbeque crowd placed bets on the size of the task to come.

14 July Another 8000 foot cloudbase was predicted with 5 knot thermals. A low to the southwest was going to push cirrus progressively into the area by midafternoon and the potential for thundershowers was significant depending on whose forecast high for the day one believed. A "real man's" triangle was set to the northeast, 387 km for 15m and Standard (Al Wood, *Agent Orange*, won the pool), and 340 km for Open.

> **THE TROPHY WINNERS ARE:**
>
> **MSC Trophy** – 15m Class champion
> 5890 points of a possible 6229
> **Ulli Werneburg** (MZ)
>
> **Mix Trophy** – Standard Class champion
> 4381 points of a possible 5087
> **Jörg Stieber** (JS)
>
> **Shell Trophy** – Open Class champion
> 4221 points of a possible 5313
> **Dick Mamini** (RM)
>
> Although no trophy was available, **Dave Mercer** was recognized for winning the Open class on a handicapped basis with 4233 points of a possible 5313.
>
> **Dow Trophy** (best triangles flown)
>
> *15m Class* – 305 km at 113.7 km/h
> **Nick Bonnière** (ST)
> *Standard Class* – 305 km at 97.0 km/h
> **Jörg Stieber** (JS)
> *Open Class* – 305 km at 94.4 km/h
> **Dave Marsden** (VR)
>
> **SOSA Trophy** – best novice pilot
> (novice with highest percentage of winner's score in his class)
> **Nick Pfeiffer** (SV)
>
> **Carling O'Keefe Trophy** – best team
> **Dave Marsden / Chester Zwarych**

Oh, oh. Too soon after launches started the cirrus moved in. That eliminated the thundercloud threat, and eliminated any racing, it was survival flying for hours for many pilots. Throughout the day, large areas went dead while some sun slowly got through in others, so luck and a lot of patience earned a lot of kilometres. Also, unknown to the task committee, a lot of rain had fallen to the east of Rosetown, and that didn't contribute much to

continued on page 24 **(SCORES ON NEXT PAGE)**

1993 CANADIAN NATIONAL GLIDING CHAMPIONSHIPS

1993 CANADIAN NATIONAL GLIDING CHAMPIONSHIPS			DAY 1				DAY 2				DAY 3			DAY 4				DAY 5				DAY 6				DAY 7					
			day pos	km	km/h	pts	day pos	km	km/h	pts	day pos	km/h	pts	day pos	km	km/h	pts	day pos	km	km/h	pts	day pos	km	km/h	pts	day pos	km	km/h	pts	total pts	
15 METRE CLASS			2 h PST				3 h PST				213.6 △			256.0 △				3 h PST				2 h PST				387.2 △					
Ulli Werneburg	ASW–20B	MZ	2	125.5	62.8	467	1	254.3	84.8	1000	6	75.1	836	1		89.4	1000	6	276.2	92.1	843	3	153.3	76.6	753	3		65.6	995	5890	1
Jim Oke	ASW–20	77	4	121.1	60.5	444	6	192.0	0.0	445	1	88.2	969	3		79.8	901	5	278.1	92.7	853	5	180.1	0.0	734	1		66.6	1000	5343	2
Curt Hawkins	LS–6b	CJ	1	128.1	64.1	480	4	167.0	55.7	516	2	80.9	895	6		62.7	724	7	271.9	90.6	818	1	161.3	80.7	800	2		66.0	997	5230	3
Walter Weir	ASW–20B	2W	7	52.2	0.0	130	3	198.8	66.3	692	4	77.0	855	2		85.3	958	3	304.7	101.6 p	978	4	183.1	0.0	747	6		(291.0)	636	4996	4
Nick Bonnière	ASW–20	ST	3	122.9	61.5	454	2	199.3	66.4	694	3	77.1	856	12		(29.3)	62	1	305.0	101.7 p	980	7	150.9	0.0	615	4		(379.6	829	4490	5
Ed Hollestelle	Ventus	A1	6	73.6	0.0	184	8	129.7	43.2	309	5	75.7	842	4		67.2	771	1	305.0	101.7 p	980	2	192.2	0.0	783	9		(196.8)	430	4299	6
Colin Bantin	ASW–20	3B	8	47.3	23.6	118	9	99.8	33.3	232	8	74.1	826	8		57.6	671	4	288.4	96.1	908	6	153.1	0.0	624	12		(160.6)	351	3729	7
Terry Southwood	ASW–20	PM	5	93.6	0.0	234	5	210.8	0.0	489	10	(197.0)	481	5		65.6	754	8	269.2	89.7	804	9	97.6	48.8	428	7		(219.3)	479	3671	8
Dave Springford	ASW–20	S1	10	47.3	23.6 p	94	7	144.0	48.0 p	368	9	52.5	607	9		44.5	538	11	241.7	80.6 p	634	8	149.7	0.0	610	10		(182.1)	398	3248	9
Buzz Burwash	ASW–20FP	AB	12	32.6	0.0	81	11	40.1	0.0	93	7	75.0	835	7		59.4	690	9	253.4	84.5	718	13	0.0	0.0	0	11		(171.2)	374	2790	10
Jay Poscente	Mini–Nimbus	54	8	47.3	23.6	118	12	37.5	0.0	87	11	(188.3)	460	10		(128.6)	270	9	253.4	84.5	718	10	96.0	0.0	391	5		(338.0) p	719	2762	11
Alan Wood	1–35	AO	13	0.0	0.0	0	10	98.6	32.9	229	13	(115.9)	283	11		(66.3)	139	13	179.4	59.8	313	11	92.0	0.0	375	7		(219.3)	479	1818	12
Rod Crutcher	Ventus	26	10	37.8	0.0	94	13	20.5	0.0	48	12	(163.0)	398	13		(25.5)	54	12	221.4	73.8	543	12	73.8	0.0	301	13		(140.8)	308	1747	13
STANDARD CLASS			3 h PST				213.6 △				256.0 △			3 h PST				1.5 h PST				387.2 △									
Jörg Stieber	LS–4	JS	1	228.7	76.2	1000	1		80.2	1000	7	(86.7)	294	1	291.0	97.0	1000	1	93.7	0.0	87	1		(386.6)	1000					4381	1
Paul Thompson	LS–4	T2	2	179.1	59.7	668	6		(187.7)	586	1	66.1	1000	4	259.9	86.6 p	801	4	0.0	0.0	0	7		(187.6)	485					3540	2
Nick Pfeiffer	Std Cirrus	SV	5	162.5	54.2	557	2		77.6	978	5	(106.9)	362	5	248.8	82.9	758	3	67.2	0.0	63	3		(261.8)	677					3395	3
Dave MacKenzie	SZD–55	DM	3	175.4	58.5	644	3		71.6	929	8	(50.0)	169	6	231.1	77.0	656	4	0.0	0.0	0	2		(325.3)	841					3239	4
Kerry Kirby	Std Jantar	69	8	124.0	0.0	253	4		66.2	884	2	57.5	965	9	189.3	63.1	417	2	77.5	0.0	72	4		(225.9)	584					3175	5
Chris Eaves	LS–4	SU	7	141.1	47.0	413	4		66.2	884	4	(119.3)	404	2	262.3	87.4	835	4	0.0	0.0	0	5		(219.3)	567					3103	6
Russ Flint	Std Cirrus	JD	4	172.0	57.3	620	8		(112.0)	350	6	(88.6)	300	2	262.3	87.4	835	4	0.0	0.0	0	6		(196.2)	507					2612	7
Richard Longhurst	SZD–55	4Q	6	153.1	51.0	493	7		(114.9)	359	9	(0.0)	0	7	226.5	75.5	630	4	0.0	0.0	0	8		(142.3)	368					1850	8
Chuck Keith	SZD–55	55	10	20.2	0.0	41	10		(66.9)	209	3	(165.1)	559	10	154.9	51.6	220	4	0.0	0.0	0	10		(15.7)	41					1070	9
Dugald Stewart	Cirrus 75	HG	9	83.0	27.7	170	9		(93.3)	291	9	(0.0)	0	8	194.1	64.7	445	4	0.0	0.0	0	9		(62.8)	162					1068	10
OPEN CLASS (handicpd)			3 h PST				178.1 △				221.2 △			3 h PST				1.75 h PST				340.1 △				2 h PST					
Dave Mercer	RS–15	HZ	1	152.4	50.8	933	4		56.7	680	3	(150.7)	464	1	257.8	85.9	1000	2	100.6	57.5	356	4		(191.2)	572	3	83.9	42.0	228	4233	1
Marsden/Zwarych	DG–202	VR	10	dnc		0	2		81.8	733	1	62.6	711	3	283.1	94.4	974	3	120.2	0.0	328	2		71.5	974	1	122.8	61.4	320	4040	2
Dick Mamini	ASW–12	RM	7	45.5	0.0	164	5		80.3	672	2	59.5	658	5	250.3	83.4	700	1	153.2	87.6	498	3		(329.1)	836	2	112.8	56.4	270	3798	3
Tony Burton	RS–15	EE	8	27.5	0.0	116	1		83.7	851	5	(52.5)	160	2	256.5	85.5	976	8	dnc		0	1		(337.3)	1000	5	0.0	0.0	0	3103	4
Mike Thompson	HP–14T	XH	2	125.5	41.8	686	3		64.3	693	4	(73.3)	217	9	179.7	59.9	438	4	96.5	55.1	319	5		(178.8)	515	4	72.6	0.0	164	3032	5
Kevin Clifton	ASW–19	KV	3	98.6	32.9	448	6		(156.0)	452	7	dnc	0	4	244.1	81.4 p	753	7	32.1	0.0	90	6		(178.8)	490	5	0.0	0.0	0	2233	6
Keith Bjorndahl	Std Jantar	AU	5	95.1	0.0	380	11	dnc		0	7	dnc	0	6	221.4	73.8	676	6	48.8	0.0	140	8		(140.4)	396	5	0.0	0.0	0	1592	7
Sylvain Larue	Dart 17	B9	9	11.0	0.0	52	7		(69.9)	244	7	(0.0)	0	7	180.1	60.0	609	8	0.0	0.0	0	7		(145.3)	480	5	0.0	0.0	0	1385	8
Bob Carlson	PIK–20D	T7	4	98.6	32.9	419	9		(57.7)	160	6	(16.7)	45	11	184.6	61.5 p	315	5	68.0	0.0	182	9		(64.0)	168	5	0.0	0.0	0	1289	9
Toles/Armstrong	Phoebus	ZO	6	80.5	0.0	329	8		(57.7)	176	7	(0.0)	0	8	184.6	61.5	469	8	0.0	0.0	0	10		(38.3)	110	5	0.0	0.0	0	1084	10
Bryan Florence	Open Cirrus	OC	10	dnc		0	10		(21.3)	63	7	(0.0)	0	10	179.4	59.8	402	8	dnc		0	11		dnc	0	5	dnc		0	465	11

( ) values in brackets on Day 3 are distances in kilometres if the pilot landed out.
"p" denotes the application of a penalty affecting the daily points.

Because classes had no–contest days at different times, day scores occur on different dates.
The "km" column is empty on Assigned Task days for the class.

THE LIFT STRUCTURE OF TILTED THERMALS

Tillmann Steckner
SOSA

DURING A LONG FLIGHT in June 1989 I observed a most peculiar phenomenon which has occupied me ever since. It was a sunny day, somewhat breezy, and the base of the cumulus clouds encountered during the flight, which began shortly before noon and ended well past 7 pm, ranged from 4000 to 5000 feet. There was a lot of sink between fairly confined areas of lift and I had to pick my way through the sky very carefully.

On extended flights I leave the control of the aircraft, whenever possible, to the "automatic pilot" which practise has implanted into the heads of all of us. This leaves me free to concentrate on what is going on outside the cockpit. Sometimes the only conscious link between myself and the glider seems reduced to the sight of the horizon and the sound of the audio variometer. Even my responses to the yaw string are at the subconscious, reflexive level during these moments. We shall see presently how these seeming irrelevancies relate to my topic.

While I was circling in a thermal during the sixth hour, I became aware that my control inputs had assumed a rhythmic character. I first suspected the movements to be self–induced by the possible onset of general fatigue. However, a quick check of the yaw string ruled out uncoordinated flight as a cause. On the contrary, I discovered that the pulse–like deflections of the control surfaces, those of the rudder in particular, were closely synchronized with brief displacements of the yaw string towards the upper wing. In fact, any attempt to suppress these repetitive control inputs immediately resulted in a marked decrease in the rate of climb. Flying from cloud to cloud I was able to successfully repeat the maneuver — which I have come to call "pulsing" — numerous times for well over an hour.

What was so special about the thermals on this particular day? Are we dealing here with a freak meteorological phenomenon, or can we perhaps derive some principles from these observations which may be applied to good advantage in similar situations? I shall try to answer these questions in much of the remainder of this article.

Let me explain though why it took me a full three years after this flight in 1989 to report my observations. In May of 1990 I submitted my findings in an illustrated article to *free flight*. The article was subsequently withdrawn by me as several points required additional study and refinement. After further experimentation with the technique of pulsing, which proved particularly effective in exploiting thermals on windy days, I was able to drastically increase the range of my flights. I did so despite the fact that soaring weather in southwestern Ontario has been less than accommodating ever since. In the flying season of 1991 I posted seven flights with an average duration of seven hours. Finally, in the fall of 1992, I submitted for critical assessment a detailed outline of my work to the well known sailplane designer, Gerhard Waibel. In a very positive reply he urged me to present my work to the XXIII Congress of the OSTIV, which is held in conjunction with the 1993 World Gliding Championship in Sweden. In subsequent communications Gerhard Waibel stated that I had brought light and order to some aspects of thermalling which, in his opinion, had not been explained adequately by certain researchers dealing with phenomena similar to those reported by me.

Are tall thermal plumes a valid model?

My model of tall thermal plumes is sometimes questioned by those who believe the vortex flow structure of thermal bubbles to be the only true representation of thermal activity. Since most of the concepts advanced in this article (which is based on my presentation to the OSTIV) are derived from the study of thermal plumes, I wish to deal with this criticism at this point.

While I acknowledge thermal bubbles to be quite common, I contend that they cannot be the only form by which warm air rises from the ground. I offer the following three points in support of this view:

1 As it is impossible for a glider to rise above a thermal bubble, only a continuous thermal will allow an initially lower glider to outclimb another one.

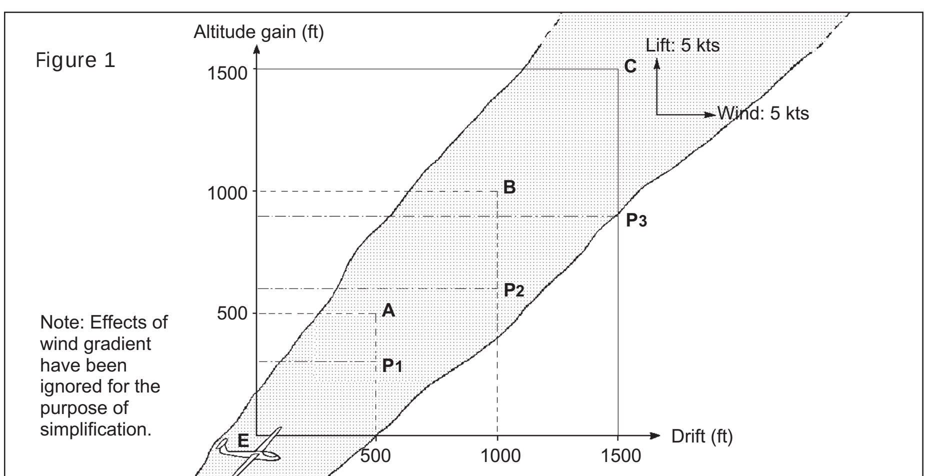
2 When flying from one thermal to another, the pilot may lose several thousand feet in altitude, only to promptly make up for this loss well below the next cloud chosen. What are the probabilities of regularly arriving at the precise moment when a new bubble happens to go by, and to be so lucky for hours on end?

3 Just because the ground source of the thermal is exhausted, the latter does not necessarily turn into a bubble. The ratio of height to width of a typical thermal bubble is roughly 1:2. Unless the remnant plume undergoes considerable contraction, it is likely far too high for a vortex flow to be established.

The lift profile of tilted thermals

Because the sink rate of a sailplane does not allow it to keep up with the rising air around it, it is common practise when flying in tilted thermals to shift one's circle upwind by an appropriate distance on every turn to prevent the glider from being thrown out of lift on the downwind side of the thermal as illustrated in Figure 1. These corrections are one reason why the control movements assume a cyclical character as described earlier. However, to explain the periodic deflections of the yaw string, we must look deeper.

Figure 1



"E" is the entry point of a glider into a thermal tilted at 45° downwind. If the sink rate of the glider were zero, the rising air of the thermal would lift the glider to points A, B, and C each successive minute. Assuming the glider has a sink rate of 200 ft/min, the glider would instead be at points P1, P2, and P3. Therefore if the pilot fails to take action to correct his downwind drift, the glider will be half out of the lift in 2 minutes (P2) and completely out in 3 minutes (P3).

Figure 2 The lift profile of a tilted thermal

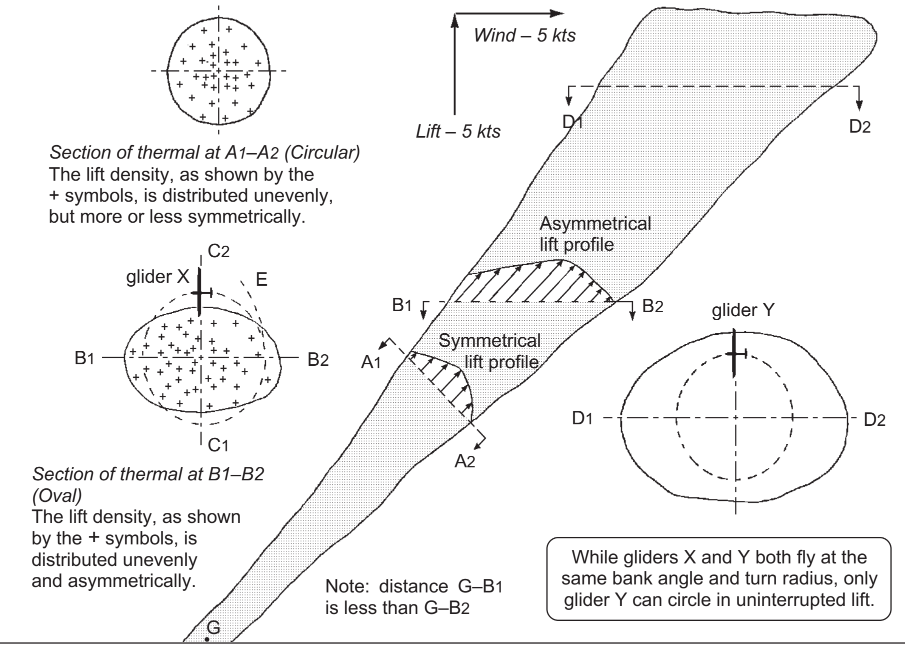


Figure 2 shows the distribution of lift in the thermal depicted in Figure 1. If we dissect the thermal at right angles to its centre line along points A_1–A_2, we obtain a roughly circular cross–section as shown on the left. The lift is assumed to be strongest in the core and gradually diminishing towards the fringes. This is indicated by small + symbols of varying density, as well as by arrows of differing length in the thermal plume itself. We shall call this the "lift density" of the thermal. If we join the points of the arrows in section A_1–A_2 we get its "lift profile".

It is evident that the only way a glider could remain in even lift while flying true circles at a constant angle of bank is if the thermal remained perpendicular to the ground. Even if there is only a light breeze, the glider will traverse the thermal at some angle other than 90 degrees to the latter's centre line (see dashed line B_1–B_2), resulting in an elongated cross–section. The lift profile is now no longer symmetrical as in the previous case. This is because, among other factors yet to be considered, the warm air on the left of the plume has travelled a shorter distance from the ground than the air on the right even though the altitude is the same. Additional distortions of the lift profile occur as the rising warm air causes cooler air to be drawn into the system from the sides. While this entrainment takes place in the absence of any wind, it can be counted on to distort the lift profile even more in its presence.

Whatever the case may be in the light of above findings, the mere fact that the cross–section B_1–B_2 in Figure 2 is oval in shape, dictates that if the pilot wishes to optimize his rate of climb, he must make constant corrections in the radius of turn to remain in the most concentrated areas of lift. It should be noted that a lift profile taken at right angles to section line B_1–B_2, namely between C_1 and C_2, would look quite different from the previous one. In fact if this profile were to be drawn on a baseline as wide as before, it would fall below it at its extremities. This means that if glider X is at a steep angle of bank, it will break out of the thermal at points C_1 and C_2 and get into sink. On the basis of his sharply fluctuating variometer readings the pilot may seek to solve the problem by shifting his circle. If, by applying conventional techniques, he reduces his angle of bank when in lift (positions B_1 and B_2), he will be dumped out of the thermal altogether (point E). Seeing glider Y gaining altitude rapidly above him, he will be misled to believe that his friend latched onto an isolated thermal bubble. Obviously though, the pilot of glider Y is simply circling in the wider part of the thermal higher up and so has no trouble staying in lift throughout the turns.

Figure 3 introduces additional factors for our consideration. On a windy day the masses of warm air rising from the ground are accelerated from a standstill in both a vertical and a horizontal direction. Because this acceleration in two directions occurs at different rates, the thermal is convected downwind in a curve. The wind gradient, as represented by the line graph on the left, will greatly amplify the curvature of the plume. While the wind near the ground attacks the thermal almost at right angles, it tends to reinforce the lift further up as the curvature increases. This may be one of the reasons why the most vigorous lift is usually found on the upwind side of the cloud. All of these factors could contribute to further distortions in the energy distribution in a tilted thermal as suggested in the asymmetrical lift profile B_1–B_2 in Figure 2, and thus be instrumental in the rhythmic control movements observed by the writer.

It may be argued that since we deal with individual particles of air, the wind cannot attack streams of air as it does an airfoil. As the "curl–over cloud" in Detail A of Figure 3 shows, streams of air have a sufficiently cohesive structure to act as an aerodynamic entity, notwithstanding the fact that it also has internal motion. As illustrated by the glider shown on the left of the "curl–over cloud", it is sometimes even possible to climb up on the upwind side of such clouds as if one were flying in ridge lift.

The effect of tilted thermals
on the rate of climb

The points discussed in connection with Figures 2 and 3 raise the question as to how deflected updrafts may effect the rate of climb when we turn within the confines of a tilted thermal. To find the answer, let us trace the path of a sailplane which is held in a narrow vertical thermal at a bank angle of 45 degrees. It will help us to view the glider as flying inside a huge bottomless bowl as illus-

Figure 3 The effect of the wind gradient and other factors on the slope angle of a thermal.

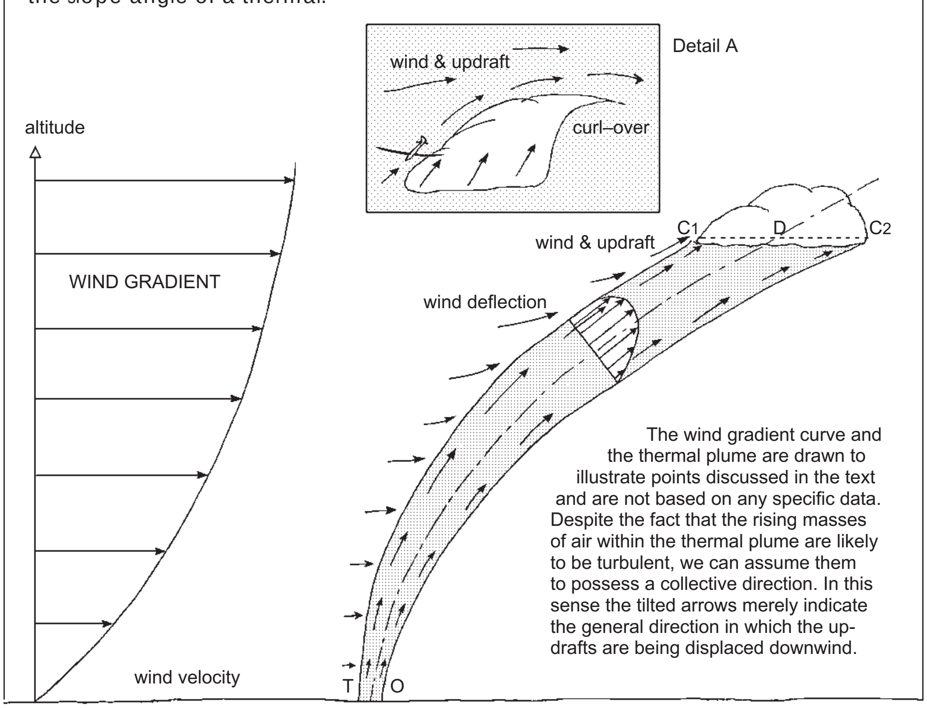
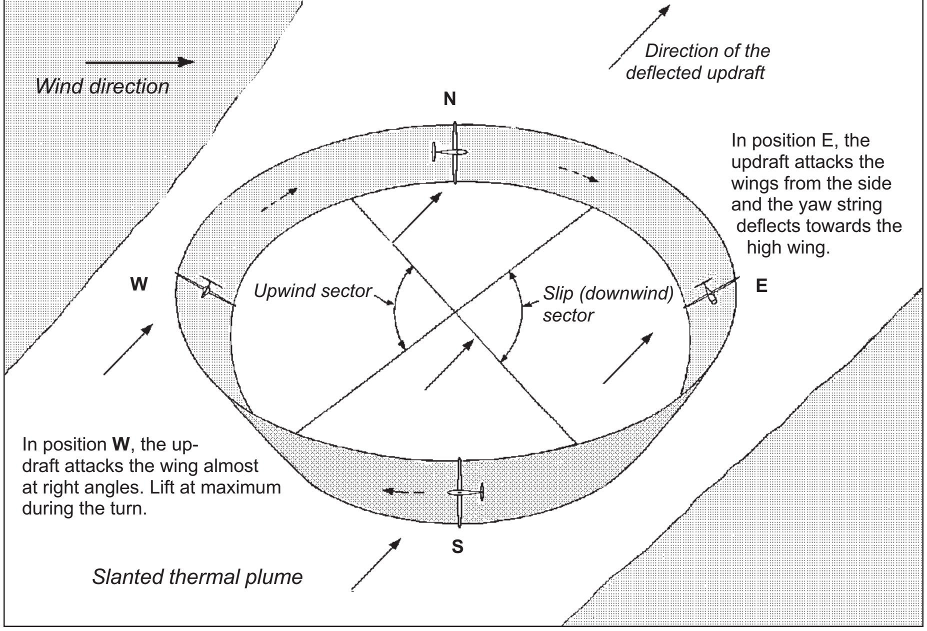


Figure 4 The effects of tilted thermals on the rate of climb



trated in Figure 4. In the absence of any wind, the angle at which the updrafts strike the wings from below would not change regardless of the glider's position. However, what happens if we deal with a thermal sharply tilted downwind as shown? It would appear that with the direction of the updrafts given, the following sequence is likely to unfold:

Position W: The slanted updrafts strike the wings from the left and almost at right angles to them. This will maximize the rate of climb.

Position N: The updrafts strike the wings at a relatively sharp angle from behind, thereby causing the rate of climb to diminish.

Position E: The updrafts strike the wings at a very acute angle from the right of the glider. This will reduce the rate of climb to the minimum during the turn.

Position S: The updrafts strike the wings at a fairly steep angle from the front, thereby causing the rate of climb to increase again.

Therefore we can conclude that, when circling in slanted updrafts of regular lift density, any variometer fluctuations may be caused solely by the position of the glider within the thermal. Under these conditions any attempt to overcome the fluctuations by shifting the centre of the turns will likely prove counterproductive.

I am well aware that the sequence described above is not in agreement with the claim often made in soaring manuals that the turns of an aircraft remain totally unaffected by the wind. While this applies where the entire mass of air surrounding the planes moves in the same direction, the claim does not hold true in situations where the flow of air is disturbed by localized updrafts and other forms of wind shear. This is particularly the case where the glider is circling at steep angles of bank, thereby causing the wings to cut through shifting layers of air several metres apart. The very fact that when thermalling in turbulent conditions, the pilot must constantly move both stick and rudder, shows the "steady drift concept" seriously wanting. On the other hand, the observations made in regard to Figure 4 offer a plausible explanation of why, when flying in a tilted thermal, the variometer often registers varying lift in a cyclical pattern. If we happen to share such a thermal with another glider at the same altitude, we get the impression of being engaged in some kind of aerial roller coaster ride, without either of the two planes really gaining on the other. Moreover, we frequently even hear rhythmic variation of certain air noises which seem to reflect these wave–like movements. We shall return to this peculiar phenomenon shortly as it holds important implications in exploiting tilted thermals to the fullest.

The causes of periodic yaw string displacement

When a glider circles in a thermal at steep angles of bank, the relative airflow could be viewed as having two components, the major one being derived from the forward motion of the glider, the other, although very much weaker, arising from the updrafts striking the glider from the side. The direction of the latter component is determined by the angle of bank and the slope angle of the thermal. Under these conditions the position of the yaw string may be considered as the resultant of these two components. Where the slope of the thermal lies roughly in line with the pitch axis of the banked glider, the yaw string will, unless corrective action is taken, be displaced towards the high wing (position E in Figure 4). Where the bank angle is steep enough, the displacement of the yaw string may also occur in a vertical or near vertical thermal if the lift suddenly increases.

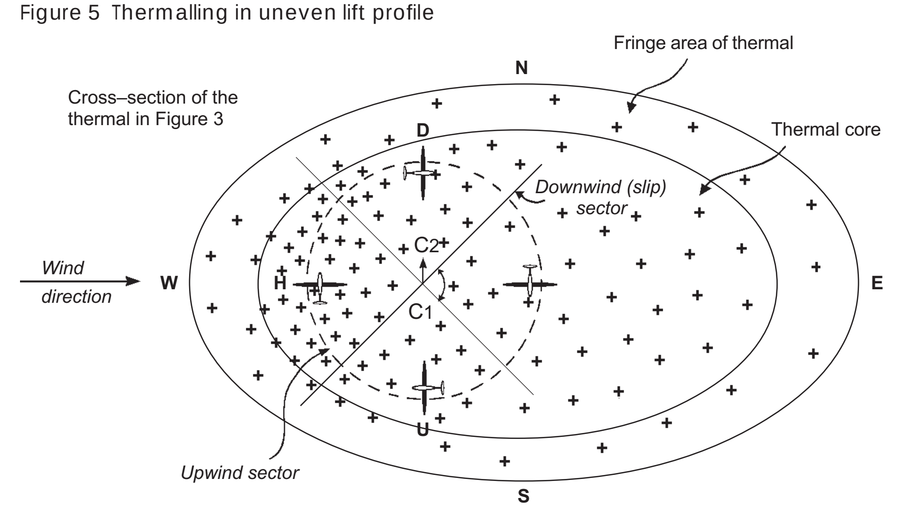
If the pilot upon entering the downwind sector of a tilted thermal fails to compensate for the swing of the yaw string, the glider will tend to momentarily slip into the turn. Since the yaw string usually returns to its centre position after a brief pause on its own accord (somewhat like the aberrant swing of a windsock), the pilot is apt not to react to it. Because the writer considers these cyclical displacements of the yaw string quite significant, he proposes to call this sector of a tilted thermal the "slip sector". In fact, the pilot may wish to better utilize the lift by entering the slip sector with a reduced angle of bank if the thermal is wide enough to allow this. The objective is to position the wings at a more advantageous angle of attack in relation to the slanted updrafts. The principle involved can be illustrated with the following hypothetical case: If we were to release a stream of balloons into the tilted thermal shown in Figure 4, they would strike the wings of the banked glider almost squarely from below in position W, whereas in position E they are likely to miss them altogether.

Lift–related variations in airspeed

There have long been claims by pilots that a glider speeds up in lift and slows down in sink. Regarding this point I queried a number of very competent pilots, among them several aerodynamicists. Some of them were quite sure that such speed changes occur, while others were just as certain that they do not. Very few of them offered any convincing explanations either one way or the other.

To shed some light on this question we could look at our imaginary bottomless bowl in Figure 4 as a continuous airfoil quite apart from

Figure 5 Thermalling in uneven lift profile



the sailplane. Let us assume that we could somehow vary the slope angle of the thermal. If we begin with a completely vertical updraft, the airfoil would, provided it were equipped with some means of stabilization, remain in the horizontal attitude shown. However, if we would change the thermal from its initially vertical position to the tilted position illustrated, the airfoil would, no doubt, realign itself with the flow of air, and thus be lifted up on the side marked W. If this is indeed how a sailplane reacts to the same conditions, it is easy to see why it would be subject to cyclical fluctuations in airspeed. In a situation where the lift equals the sink rate of the glider, the latter will so to speak "run downhill" for the first half turn (W–N–E), thereby causing it to speed up, and then climb "uphill" at a gradually slowing pace through the second half of the turn (E–S–W). If the lift is greater than the sink rate, the picture would essentially remain the same, except that each of the four positions illustrated will be reached at an altitude higher than the preceding one.

There may also be forces at work that arise from the aerodynamic design of a glider. To ensure longitudinal stability at a predetermined airspeed, the nose–heaviness designed into the aircraft is counteracted by giving the tailplane a negative angle of incidence. In position N of Figure 4 the slanted updrafts will attack the tailplane from behind in such a way that the latter's negative angle of incidence causes the tail to be lifted up. If this motion is not corrected, the glider will speed up. In position E the tailplane's angle of incidence has the opposite effect, causing the glider to pitch up and to slow down. In the more general case where a glider is trimmed for a given airspeed and angle of attack, suddenly enters an area of lift, the reaction of the tailplane will be to rise, thereby increasing the airspeed. A further factor derived from Figure 4 is that in position S the pitot tube is poised to pick up the slanted updrafts, whereas in position N it is not. Where the angles involved are extreme enough, it will introduce an error in indicated airspeed just as it does during a side slip.

The technique of pulsing

Whether or not the technique of pulsing is really viable will be decided by other glider pilots. Therefore a brief description of this technique is given below for those who wish to put it to the test.

The first thing one must do is to determine the character of the thermals prevailing on the day in question. If during several well coordinated turns the yaw string remains neatly in place, it would be counterproductive to do anything other than keeping the glider centred. However, where the yaw string refuses to settle down, pulsing is likely to yield good results. This is especially the case where the swings of the yaw string take on a rhythm and the displacements are predominantly towards the high wing. In this situation it is best to move the stick only as much as is needed to maintain constant airspeed and the bank angle chosen. The objective is now to correct all significant deflections of the yaw string with short, energetic pedal thrusts. In response the yaw string should return instantly to its centre position without overshooting. When one does run across the right type of thermal (not all irregularly shaped thermals are suitable) and one manages to establish the right pulse rhythm, the results can be astonishing. To gauge one's success, one need only stop the pulsing temporarily. Once the technique is mastered, it can be refined with additional aileron and elevator inputs, although the emphasis will remain with rudder control. I wish to emphasize that I do not lay claim of having found a universal method of climbing faster in all types of thermals. In fact, I am often outclimbed by others in thermals which seem to elude my understanding.

A word of warning: obviously pulsing at excessively low airspeeds is a sure prescription for unintentional spins. Therefore the airspeed must never be allowed to drop below the minimum sink speed listed by the manufacturer for any given bank angle, a practise which is prudent in any case. Pulsing should be practised at a safe altitude and away from other sailplanes.

> No other statement on the art of soaring has intrigued me more than Helmut Reichmann's astute observation that rough conditions require rough flying.

Do rough conditions require rough flying?

The following example is given to illustrate the technique of pulsing in a practical context and to show how it differs from conventional methods of thermalling. The description will also serve as a summary of the key points discussed so far.

Figure 5 is a cross–section of the same thermal shown in Figure 4. The dotted circle indicates the position of a glider in the most concentrated lift of the thermal. A pilot using traditional methods of thermalling will fly even, well–coordinated turns at a constant angle of bank centred on point C_1. Because of the uneven lift profile (energy density) the variometer may fluctuate, say, between 4.5 knots in the downwind sector and 6.0 knots in the upwind sector. This will cause the pilot to increase the bank angle in the downwind sector (reducing lift) and to decrease it in the upwind sector (increasing lift). While the pilot will likely succeed in levelling the extremes of the variometer readings by shifting the centre of his turns upwind to position H, his average rate of climb will be less than it was before. The pilot will probably conclude quite mistakenly that the lift has generally got weaker in the meantime.

If a pilot were to apply the principles put forth in this article, he would proceed quite differently. To begin with, he would not be fooled by the fluctuations of the variometer — he accepts them as an unavoidable condition of flying in tilted thermals. He will also try to stay as close as possible to the upwind side of the thermal as he can manage, because this allows him to make use of the strongest concentration of lift. When traversing the upwind sector of the turn it will not bother him that he can only do so by flying at a steeper and "less efficient" bank angle. Quite to the contrary, although he will pull up and slow down in this area of stronger lift, he will reduce his angle of bank only as much as is absolutely necessary.

This approach is his first break with traditional practises of thermalling. His reason for doing so is that he seeks to have the slanted updrafts, which come from his left in position W (which lies upwind from position H), strike his wings as squarely as possible. When he flies into the slip sector of the turn, the pilot makes his second tactical change. Rather than increasing his angle of bank in weakened lift, he reduces it. He does so for two reasons:

1 He does not wish to shift the centre of his turns to C_2 as this would force him out of lift later on, probably near point D.

2 He wishes to make the best of the slanted updrafts which are now striking the underside of the wings at too low of an angle as it is.

While going through the slip sector the yaw string will likely be displaced towards the high wing. Because having reduced his angle of bank just moments earlier, the pilot must take care not to be carried outside the thermal at the end of the slip sector. To combat this problem, and at the same time recentre the yaw string, he quickly increases his bank angle again, preceded by a well–timed, energetic rudder pulse to the right. This will result in an almost jerk–like movement of the glider to put it on the right course for the upwind sector of the turn. The obligatory drift correction follows as the pilot heads into the wind. Both actions will set the glider up to fly deeply into the "corner" of the most active part of the thermal along the elliptical path U–W–D. It should be noted that this path is significantly longer than the round path U–H–D. More time spent here means altitude gained. The sharp increase in the curvature will require the pilot to once again steepen the angle of bank which, as pointed out earlier, he ought to do anyway if he wishes to make the most of the slanted updrafts now striking the wings once again squarely from his left. His real test here will be to have the most efficient balance between a low airspeed and a high bank angle.

Proposed instrumentation for thermal detection and utilization

As evolution did not see fit to equip man with natural wings, we did not develop any capacity to instinctively locate thermals, or for that matter, directly judge their concentration when we find ourselves in their midst. When one flies with hawks, turkey vultures, and eagles, especially on windy days, one can observe how these masters of soaring literally feel out the updrafts spilling around their wings by spreading and twisting the outer feathers. I often speculated what it might feel like if, with my arms extended, I could somehow reach into the wings of my sailplane to actually feel the updrafts 7.5 metres on either side of my body and perhaps even twist the ailerons individually by hand. Thus the question I wish to put forth for consideration is, whether it may be possible to extend our senses by suitably designed instrumentation.

Early in 1991 I tried to accomplish this by means of a small mirror assembly angled to reflect each wing which, suspended from the instrument panel, would detect even the slightest lifting of one wing over the other. I thought that the device might give me a more precise indication on which side a thermal was more likely to be found. After several flight trials I abandoned the experiment for two reasons:

HP–18 AILERON ROLL CONTROL PROBLEM IS SOLVED

David Colling
from SOARING

A NEW SET OF AILERONS has increased the roll rate on my HP–18 by 300%. It is a well–known fact that the HP–18 has poor roll control characteristics. Being the proud fifth owner of HP–18 #35, I soon realized the reason for the artificially low cost and why there were so many previous owners of this otherwise beautiful sailplane. My particular HP–18 had suffered major damage in the past by one of its previous owners on their first flight due to poor roll response. After numerous ground loops between my sailplane partner and I, both on takeoff and landing, and very poor crosswind capability, we finally came to the conclusion that something had to be done.

Being an aerospace engineer, I began the task of figuring out the problem and designing a fix. I received lots of advice from other glider pilots. Some claimed it could not be fixed because it was due to the V–tail, others claimed the problem was the side stick. There was a modification in the past which added a section of the flaps to the aileron thus increasing its area. This however does not work since the added section not only interferes with the aileron push rod which binds up the controls, it also increases stick forces because of the increased area.

Figure 1 Straightedge flush with top surface

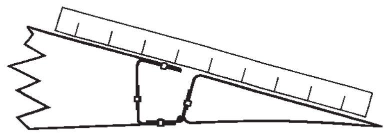


Figure 2 Old aileron design

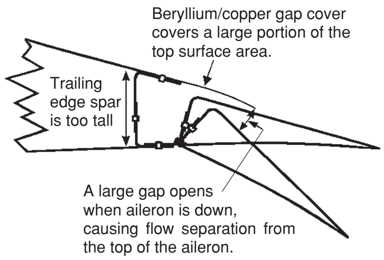


Figure 3 New aileron design

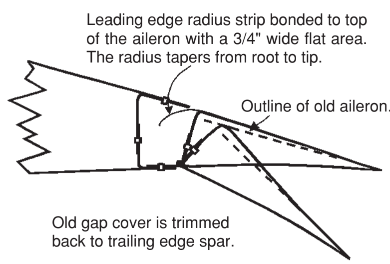
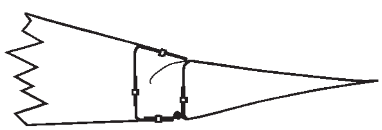


Figure 4 New aileron maximum up–deflection.



The reason for the poor roll response was due to flow separation on the top surface of the aileron. When comparing the dimensions of the actual wing with the blueprints, the problem is obvious. The wing trailing edge spar is about 3/16 inches taller than it is supposed to be while the aileron is exactly the right size, according to the plans. If a straight edge is placed on the top wing skin, the straight edge is supposed to also touch flush with the top skin of the aileron as shown in Figure 1. On my wings, there was almost a 1/4 inch gap between the straight edge and the aileron top surface at the wing tip. Since the trailing edge spar was predrilled at the factory, the flaw was therefore with the HP–18 kits in general. Even though the problem lies with the wings, a new set of ailerons had to be built since it is easier and more economical to replace the ailerons than it is to replace the wings.

The new set of ailerons have an increased thickness to match the thickness of the wing. The beryllium/copper seal was also trimmed back to the trailing edge spar. The seal not only covered about 1/3 of the aileron top surface area, a big gap would also open between the seal and the aileron causing flow separation in all down deflections as shown in Figure 2. The beryllium/copper also stiffens the aileron controls which prevents the proper amount of up deflection. By removing the beryllium/copper from the ailerons, the controls are smoother and more precise, it also recovers about a square foot of aileron area from each wing. The new thicker ailerons have been fitted with a leading edge radius. This allows a smoother path for the airflow at all deflection angles as shown in Figures 3 and 4.

This leading edge radius was bonded to the top skin of the aileron with 3/4 inch overlap. Care was taken to ensure that the leading edge radius can in no way jam or rub against the wing. I used the exact same construction for the new ailerons as specified in the plans. The work was also supervised by an A&P mechanic and the structural epoxy and rivets were purchased from Airmate Co. (Bryan Aircraft) in Bryan, Ohio.

With the new ailerons, roll control is achievable at speeds as low as 5 mph which alleviates the need for fast wing runners. The roll rate has increased from 30 degrees in six seconds to 30 degrees in less than two seconds. The aileron control is smoother and more precise which makes for more enjoyable thermalling and a feeling of control not present before. The new ailerons are only slightly heavier than the old. So far I have had my HP–18 up to 120 mph with no signs of flutter.

In summary I believe the roll control problem with the HP–18 has finally been solved. With the new ailerons, the HP–18 is more enjoyable and less of a challenge to fly. Even though ten weekends of soaring were lost while designing and building ailerons, I feel it was worth the time and effort. Anyone wanting more information please feel welcome to call or write me. Phone (713) 431–1795, fax (713) 431–2228, or write to:

High Performance Engineering, Inc.
Southwest Houston Airport
603 McKeever Road
Arcola, Texas 77583 •

TILTED THERMALS

1 In its original undamped form, the mirror assembly, which was free to swing about the roll axis, was only useable on calm days.

2 The device causes the pilot to concentrate too much on the instrument panel.

Obviously, the problem must be solved by more sophisticated means. The solution I wish to propose is to install highly responsive lift sensors in each wing tip, thereby allowing the pilot to detect even minute differences in lift across the wing span of the glider. If we were to simply expand on the idea of the mirror assembly, the devices in question could take the form of two separate netto–variometers. A much better solution would be to use two air–attack meters instead, which are capable of measuring the actual strength of the updrafts acting on the wings at their outer end.

Whichever of these approaches may prove the most effective, the system envisaged by me would generate two separate audio signals which are picked up by the pilot over a headphone set in stereo. This would enable the pilot — somewhat like our feathered friends — to distinguish between the lift conditions as they exist at any given moment at the left and right wing tips some 15 metres apart. Because the pilot would be hard pressed to constantly decide which one of the two incoming signals heard, left or right, is the more intense, the system should be programmed to suppress whichever signal happens to be the weaker one of the two. In the event that the system were also able to measure the difference in air temperature between the two wing tips, it would be best to have the two inputs (ie. lift + temperature) reinforce each other, rather than confuse the pilot with a separate set of signals for each parameter.

If an audio variometer stereo system as described could be made to work, it would bring the pilot one step closer to physically experiencing the very elements that support his flight. By extending his senses into the wings like a soaring bird, he may even learn to fly like one; by instinct rather than intellect. •

club news

WINNIPEG HAS INNOVATIVE SOLUTION TO THE TC "5 FLIGHTS" PROBLEM

Our season got off to a flying start in mid April with some instructors driving the 200 km west to the Brandon soaring club. On April 18 in their club's Bergfalke we saw some of the early thermals common to the prairies. Weak and not too well developed, they were barely able to give an extended flight. They did however light the fire of enthusiasm with the Brandon group.

The following weekend saw the start of flying at our own club with more instructors receiving their checkflight and then going on to do their required 5 solo flights. Having this Transport Canada imposed restriction really slows down our operation. But in true Prairie fashion, we found a rather unique and speedy solution — touch and goes.

Not possible, you say? Well, we have witnesses and three pilots who have done their 5 flights (5 takeoffs and landings) all the time attached to the towplane. The procedure was developed in '91 and successfully demonstrated in '92 and again in '93. Basically the two aircraft take off and climb out to 500 agl where the towplane slowly reduces power and starts a gradual descent — 2–300 ft/min). The glider (2–33) will have to use some spoiler to keep the rope taut. A wide circuit allows plenty of time to adjust the descent rate while all the time keeping the glider in close enough to release should things begin to look ugly. At 200 feet agl and established on final at 60 mph (full flaps for our Citabria is required) the pair come in for a landing. The 2–33 uses full spoiler and touches down first with the towplane landing further along. After a brief roll–out the towplane powers up and they lift off with plenty of runway remaining. I don't recommend this procedure as a solution but only as a guide, and experienced pilots only should try. (kids, don't try this at home!) For the record, we were able to complete five touch and goes in just under 25 minutes.

We held our annual Open House and informational evening in early February and from this signed on fourteen new ground school students. This was very encouraging until the time came for all those new students to actually sign up for flying and lay down some cash for club membership. Roughly 50% dropped out for one reason or another. This does seem to be high, but compared to other years was on average. Of the remaining 50% or so, most are quite keen and by late May had all started flying. As in the past we are operating Monday thru Wednesday and also Saturday and Sunday mornings. We also have several carry over students from 1992 and should be able to see five or six new licences early on.

On the promotional side of things, we had a very successful mall display in mid April and were encouraged by the number of inquiries. If nothing else comes of it at least we received some excellent exposure for the sport.

Our private glider fleet saw some changes with the arrival of a single seat Lark from Quebec. The new owner is looking forward to some excellent flying in what is hoped to be a banner year for soaring. A banner year that is, if you don't count the snow we had on a Saturday in mid May. Yes, snow in May. The month that is supposed to provide some of the warmest days and best soaring brought snow. Enough to make a snowman on the deck of the clubhouse. This event only goes to reinforce a common saying that Winnipeg really has only two seasons — eight months of winter and four months of tough sledding.

Mike Maskell

VANCOUVER'S MANY CAMPS

The flying season started in Vancouver at the beginning of March in Fort Langley. The first two weekends were very good, with many of the club pilots getting season check rides under sunny skies. The operation in Fort Langley continued until the end of March, when the operation was moved to Hope for the rest of the season. The VSA purchased two L23 Blaniks last fall, and both were up flying during the start–up weekend at Hope. So far this season the weather has not been too cooperative, with several weeks being rained out. We operated three L13 Blaniks in past years, but one has now been sold.

During the first week of May VSA ran an airline pilots course, with four pilots getting glider pilot licences. There have also been three ab initio solos, and several power pilot conversions going solo so far this season.

The club holds a lot of camps away from Hope to allow cross–country flying to be experienced. The first camp was for the last two weekends in May to Pemberton. Pemberton is about a half hour past Whistler, northeast of Vancouver. The conditions for the May long weekend were very good, with several short cross–countrys, and cloudbase over 10,000 feet. Pemberton gets good thermal mountain soaring, being inland enough to avoid most of the ocean influence. The Grob 102, Grob 103, and one Blanik were flying, as well as five private ships. Two of the VSA's members are setting up a commercial glider operation in Pemberton using a Blanik and a Citabria.

The next trip was the two week BC Soaring Safari. Plans were to start at Pemberton on the last day of the camp there, then fly to Cache Creek, Salmon Arm, Golden, Invermere, Grand Forks, and then back to Hope. Again the weather wasn't very good, with only four days of really good soaring occurring during the trip, and the Golden to Invermere leg was the only one actually flown. During the stay at Golden, two 500 km flights were made and several around 150. Lastly, in June VSA held its two week Invermere camp with two club ships and several private ships.

Mike Thompson

† Günther Geyer–Doersch

The untimely death of Günther Geyer–Doersch of the Montreal Soaring Council on May 11th will touch many people in the gliding fraternity.

Günther and his family joined MSC in the late sixties. Having just retired from running his own business and recuperating from ill health, he intended to relax and enjoy himself at a sport he had never had time to do. Parking his house trailer on the field that summer he and his wife Linda and daughter Dagmar were soon involved with MSC. Within five years he had sold his house in Montreal, bought a farm a couple of miles from the gliding field and with the help of his family, built a beautiful house from scratch on a large property which afforded them complete self–sufficiency. The basement was transformed into a workshop and Vankleek Sailplanes Repair Facility was incorporated. Over the years Günther has tirelessly repaired sailplanes, incorporated mods, and provided many of us with workmanship second to none.

His energy and enthusiasm have certainly helped keep MSC a very successful and profitable club, and many improvements can be directly attributed to Günther's dedication while serving as its president.

When not working, Günther was always up there flying with the best. He owned or had shares in various gliders over the years starting with a Muska and ranging through an LS–1 to the DG–200, 300 and 600 aircraft when he took on the Canadian Glaser–Dirks agency.

He was a highly valued member of several Canadian International Gliding Teams due to his fluency in four languages and his work ethic and repair skills. In addition to crewing, he was always willing to assist with emergency repairs to undercarriage doors, or more serious structural problems (often well into the night).

Günther was one of the rare breed who successfully complete every job that they take on and who do it with enviable speed and efficiency. He was a rugged individualist in many ways, but a team player with strong leadership qualities when necessary. His closer friends will find it difficult to fill the void in their lives and the Canadian gliding community in general is poorer for his passing.

He will be greatly missed by all of us and we extend our deepest sympathy to Linda, Dagmar and Krista (his granddaughter).

Dave Webb

hangar flying

TEMPEST LOBS LLOYD'S LIBELLE

1993 looks like being a year of major turmoil for me, with the change of job, change of residence and the loss of my glider.

On February 1st, my Libelle went off on an unpiloted flight, thanks to a tornado which hit Ararat Airfield. I had landed in front of a rain squall but was not able to get derigged before it hit. About four minutes after the rain started, the wind picked up to extreme levels and several gliders were damaged. My Libelle, an Astir and the local club's Blanik were destroyed, a Diamand was blown over but is repairable, while an HP–14 trailer was lifted up about 12 feet, rolled through 360 degrees and dropped down again, finishing back on its wheels according to an eyewitness.

I had been attempting to hold the Libelle down but had to let go or I would have been carried off. The Libelle was blown onto the hangar roof about 75 metres away and then slid over it and dumped across a fence. The Astir went about 300 metres down the cross strip lifting up to about 150 feet and passing over the Blanik as it went by.

After the Libelle impacted with the hangar roof, the wind stripped about half the sheet metal from one side, while the fibre roof of the terminal building literally exploded into small fragments. The tornado went on to knock down a brick wall at the Ararat jail, tear down several eucalyptus trees and demolish a wool shed and machine shop about 15 km away. The blow probably lasted no more than 60 seconds. It appears the tornado started nearby and cut a swath about 200 metres wide of 15 km. At the other end of the strip where a glider was waiting for the storm to blow through before being launched, there was hardly any wind at all. All three gliders which were destroyed were fully insured and the claims were paid promptly. The Diamant and the HP–14 were both uninsured but, fortunately, repairable.

For the first time in almost 18 years, I presently have no glider of my own and it looks like it will stay that way for a while — I'll need the money as a deposit for a house.

Lloyd Bungey
Wollongong, New South Wales

Lloyd, a recent member of the Vancouver Soaring Association, keeps Canadian soaring friends regularly up–to–date on his adventures since moving back to Oz. Tony

BIRDS KNOW WHEN TO QUIT

A recent Saturday at the Starbuck Gliderport found a group of brave and hardy souls flying in not quite perfect weather. All during the day there had been the threat of rain with a 3000 foot ASL stratus ceiling. This did allow many people to receive their check flights, but there was obviously no soaring to be had.

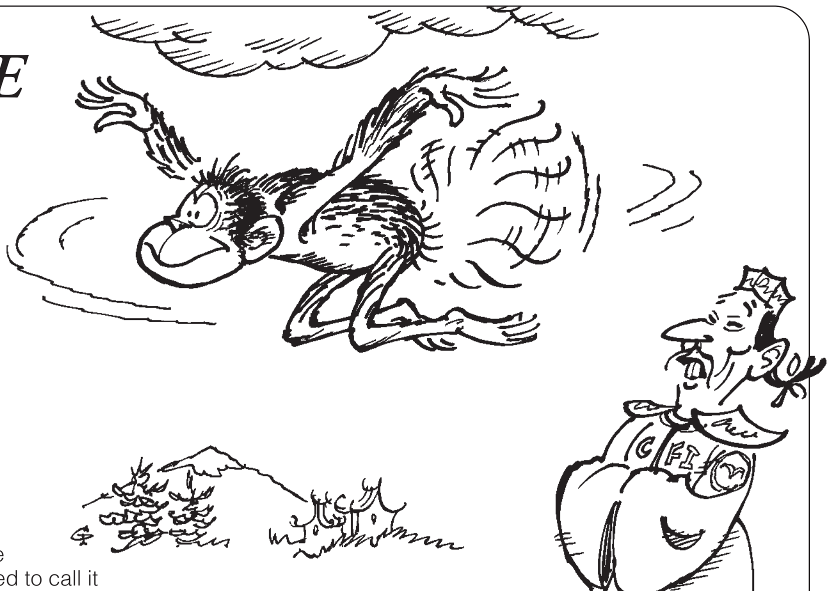
Around 3 pm just prior to a 2–33 taking off, a small bird was observed on short final to runway 30. It was apparent that the bird was NORDO as no call on the base station was heard. The 2–33 takeoff was halted as the bird — now recognized as a pigeon — landed directly in front of the Schweizer. The duty instructor went over to scare the bird away but to no avail, the bird wasn't moving. The pigeon was picked up and moved to the sidelines where it was discovered that it was banded and likely a racing pigeon. We knew that it was a racing pigeon because of its flapped wings and retractable landing gear.

The bird was moved to the training centre and the Manitoba Racing Pigeon Association was contacted and with the number on the band the local owner was advised. It turned out that the bird was released earlier in the morning at Dryden, Ontario, some 400 km to the east. Talk about your quick cross–country. Shortly after this event the weather turned sour and the last flights were made in rain and quickly reduced visibility. The bird was likely carrying on board weather radar and knew to land as soon as possible.

At last report the owner and bird were re–united. I wonder if the bird is responsible for buying his crew dinner.

Mike Maskell
Winnipeg Gliding Club

the CLOUD TRAPEZE



Rudy Allemann
from Seattle Glider Council "Towline"

WE ALL KNOW that the Greeks were interested in flying because we have read of the legend of Icarus. The Chinese also had legends, and I came across one that remarks on soaring in particular.

I've been reading "Journey to the West", one of the great folk tales of China and also a basic document of Buddhism. The journey is that undertaken by a monkey called Tripitaka, and parallels the trips of many pilots to find and attain Buddhahood. "Monkey" was written in the 1500's by Wu Ch'eng–en from more ancient folktales. I was intrigued by the description of his flying:

"I can fly," said Monkey.
"Let's see you do it," said the Patriarch.

Monkey put his feet together, leapt about twenty metres into the air and, riding the clouds for a few minutes, dropped in front of the Patriarch. He did not get more than three leagues in the whole flight.

"Master, that's surely cloud–soaring!"

"I should be more inclined to call it cloud–crawling," said the Patriarch laughing. "A real cloud–soarer," said the Patriarch, "can start early in the morning from the Northern Sea, cross the Eastern Sea, the Western Sea, and the Southern Sea and land again in the forest by the Northern Sea. To do the round of all four seas in one day is true cloud–soaring."

"It sounds very difficult," said Monkey.

"Nothing in the world is difficult," said the Patriarch, "it is only our own thoughts that make things seem so. When the Immortals go soaring, they sit cross–legged and rise straight from that position. You do nothing of the kind, I saw you just now put your feet together and jump. I really must take this opportunity of teaching you how to do it properly. You shall learn the Cloud Trapeze."

The Patriarch then taught Monkey the magic formula. (I wish I had it.)

WORLD RECORD FLIGHT cont. from pg 4

The ridge to Bedford was working well and we held about 120 knots but when we reached the gap there was no workable lift, just severe turbulence. We both tried to work the very broken thermals but were only able to climb to about 400 feet above the ridge. We decided that there was probably wave rotor above the ridge and we may as well head out into the gap but stay upwind, hopefully in the up side of the rotor. This worked and we managed to scrape across this gap with very little circling and made the lowest section of the ridge on the south side. There is a huge new runway being built in the middle of this gap which gives some comfort in not having to use a field, (it's not open yet but is landable).

At the south side of Bedford we could see from the cloud formations that there was definitely wave overhead as the rotor clouds were aligned with the ridge. I slowed up and worked the rotor until I was at cloudbase and then went into high speed cruise. This turned out to be a mistake as Tom went right down on the ridge and beat me to Cumberland by at least 5 minutes. At Cumberland MD, Tom went further along the ridge to Haystack Mountain which can be a very dangerous place to be, as there is absolutely no place to land upwind of it. It was working and Tom transitioned downwind to the back ridge with no problem. I played it a little safer and took a thermal at the quarry until I could glide straight to the downwind ridge (about 5 miles).

Tom was still ahead of me and was heading south and still not able to really climb in any good lift. I found the same conditions and we crossed the Keyser "Knobblies" using ridge lift and some rotor. Our average height across this section was probably only about 500 feet above the ridge.

South of Keyser WV the ridge is quite high, but then as you get to Scherr it becomes very flat and low, so again we bumped across this section in rotor. As we reached the area near Petersburg WV the ridge becomes very high again, but even though this should have been one of the fastest sections, we were still having trouble staying above the top of the ridge, due to the down side of the rotor system.

After Petersburg the wave seemed to disappear and we were able to maintain 120 knots again and had no problems at all and reached our first turnpoint at Mountain Grove, WV at 1223 for an elapsed time of 2:28 hours. This gave us an average speed for this leg of 88.8 mph or 143.0 km/h. We had previously calculated that we needed to average about 95 mph for the whole flight in order to get back to Keystone before dark, so we weren't doing that well.

On the way back north from the turnpoint, we were able to average quite high speeds and had no problems crossing either Scherr or the Knobblies, as there were some well defined clouds and we were finally able to climb in half decent thermals. Tom stayed ahead of me until we reached Cumberland, where he climbed and headed for the upwind ridge that we had come down. I decided to climb a little higher and try for the next ridge downwind, which was about 10 miles across the valley, but it can be quicker to fly up to the north end of the ridge at Lock Haven. Tom bet me that he would get to Bedford ahead of me, but lost and I won dinner that night. At Bedford, Tom transitioned back to the same ridge I was on and he followed me to Lock Haven. This back ridge is almost continuous with only short gaps to cross downwind of Altoona and State College. I reached the turnpoint at Pine Creek PA at 1459, an elapsed time of 2:36 hours and an average speed for this leg of 97.6 mph (157 km/h).

Tom arrived at the turnpoint shortly after I did and decided to run the main ridge back to Bedford. I flew down the back ridge again but had real problems crossing the small gap at State College. The clouds were starting to disappear and at the gap there was no lift to be had at all. After searching fruitlessly for lift for about 15 minutes, I drifted downwind in some zero sink and, halfway across the gap when it turned to sink, dived for the back ridge. This very short gap almost downed me. I reached the ridge about halfway down and struggled for at least 5 minutes to get back to the top. The section of ridge from here to Altoona was almost at 45 degrees to the wind and the lift was marginal now — it was a slow trip to Altoona. Once around the corner however things picked up and I was able to cruise at speeds close to red line again. Tom beat me to Cumberland by about 5 minutes, even though he had two gaps to cross.

From Cumberland south, we both ran into problems. It was obvious that the wind strength was dropping and the sky was going blue as what few clouds there had been dissipated. We ridge soared the Knobblies again (lower than the first time) and both managed to climb a little in a weak thermal to get past the low spot at Scherr. At Petersburg we were both down to cruising speeds of below 80 knots and at times were flying below ridge top as conditions softened.

South of Seneca Rock there is a large mountain upwind of the ridge called "Snowy Mountain". This sometimes causes problems due to turbulence and downwash, although I had never had a problem there before this. Today was to be different. As Tom reached this area, he radioed back that he was having real problems getting past Snowy and that he was halfway down the ridge and he might have to land. He managed to get a save off an outcrop that faced more into wind and climb back up the ridge. I played it very safe as I reached Snowy and took about 500 feet in a weak thermal at the north end of the trouble area and glided through the bad spot with no help at all from the ridge.

From here to the third turnpoint (a large dam in the valley) the lift was very weak and we had trouble maintaining a cruising speed above 70 knots. Tom called to say he was going out into the valley from ridgetop height to take his picture, took his picture right over the dam and had a lot of trouble climbing back up to the top of the ridge. I (knowing this) flew about 3 miles further down the ridge to where a section jutted upwind and I could take a picture of the dam and still be in sector. Even making the turn right at the ridge gave me problems and I seriously wondered if we stood a chance in hell of getting back to civilization. (This part of West Virginia is very remote and there are few roads and even fewer people. There are some small houses out there, but I'm not sure I'd like to knock on the door and bother whoever was inside — shades of "Deliverance".)

This morning when we started, we had calculated that we would be at the last turnpoint at about 1800. It was now 1808 (right on schedule!). Speed for this leg was down to 78.1 mph (125.7 km/h). Tom and I discussed our strategy on the radio and both agreed that we would be lucky to get back to Petersburg, and if we did get that far, would then make a decision on whether to continue homewards.

The return home began badly at the turnpoint and got worse. As we flew north, the ridge lift weakened to the point where I dumped most of my water to stay airborne and was having trouble at 60 knots. Snowy almost got us again but we both used every outcrop facing into the wind and managed to scrape past this section about half way down the ridge. After Snowy, the ridge rises and moves further downwind from the plateau and the strength of the lift increased so that we could cruise at comfortable speeds of 80–90 knots again.

At Petersburg we were still doing okay and decided to continue north and try to get to Cumberland Airport. The good going continued until we reached the low section at Scherr where we came to an abrupt halt.

There were no clouds left to mark any thermals and the ridge lift was not "gusty" which generally indicates that no thermals are kicking off the ridges — just smooth weak ridge lift. We picked up a weak thermal, which gave us a badly needed 500 feet and headed north, losing altitude steadily. At the lowest point of the ridge, we were only 200 feet above the trees, with almost nowhere to make a safe landing although the ridge was still working weakly. There was a section of ridge about 1/2 mile downwind that rose slowly as it went north until it met the main ridge. We decided to make a last ditch attempt to get to this. The problem was that once we committed to turn downwind, there was nowhere safe to land anymore, so it was a real gamble.

We turned downwind and as we reached the small ridge, thankfully felt bumps of lift. We ever–so–slowly drifted north, climbing slowly, and got to the top of the ridge about ten minutes later. Although we had saved ourselves (this time), we knew that we still had to cross the Knobblies. This 15 mile section consists of a series of small triangular shaped hills about 200–300 feet high that generally are considered too small to ridge soar safely. The main problem is that the landable fields are very small and you have to know exactly where they are.

The ridge was still working very weakly, so we both slowly flew north and lost altitude until at Keyser we were no more than 200 feet above the little bumps. This was scary stuff! We both kept a good lookout for the few good spots to land but didn't need them as amazingly the ridge still kept us airborne.

When we got to Cumberland Airport, Tom called them on the radio and told them that we would probably be landing there. The ridge was keeping us airborne and we didn't know exactly how far we had to fly to just beat the

SAC affairs

NATIONAL OFFICE UPDATE

It has been quite a while since a column on what is happening in the office has been submitted to free flight, so this is an update for you on what has been going on since January. I have given myself a mandate to reduce the cost of running the national office while still providing a high level of service to the members. A few of the things that have been changed since my return in January are listed below:

Telephone The second incoming line (which was not being used efficiently) has been cancelled and call waiting has been installed on the 739-1063 line. This results in a savings to SAC of $405.72 annually.

Photocopier The purchase of the photocopier late last year will save SAC some money, particularly since we no longer have any grant monies from the Sports Federation. The amount is difficult to calculate as it of course depends on how much copying needs to be done. To date I have not incurred any costs for copying, although there are some cost at the Sports Federation for the printing of new membership cards and the annual general meeting report; however, these costs are well below the cost on the open market. The new copier has a 10 bin sort feature which also saves a considerable amount of my time that can then be spent on other more urgent items.

Postage meter I have replaced the postage meter with one that can be refilled by phone thus saving time away from the office and also saving SAC $307.28 in 1994. These savings are arrived at because the new rental agreement includes several items that SAC was paying extra for with the old postage meter.

Office Supplies Supplies are now purchased on an as–needed basis (unless there is saving to be had by buying items at a reduced price). There is no stockpiling of supplies. This is easy to do since our supplier now has an outlet at the same place as the bank we deal with and I can pick up supplies when I go to the bank.

French translation One of the most costly items to SAC is the translation of English forms and documents to French. There is also the problem of technical terms not being translated properly.

Pierre Pépin has advised me that Mr. Réginald Spinhayer, President of Aéro Club Sportair, has very graciously offered to translate some of the forms that are not at the present time available in French. Perhaps Mr. Spinhayer could be persuaded to become the "Official Translator" to SAC.

Soaring Stuff The new Student T–shirts are now available. Note the cost is $15.00 (plus PST where applicable) not $12.00 as shown on the last Soaring Stuff list. Although they come in various colours, supply is limited, so please specify your colour choices in order of preference. If the demand warrants it we will of course order more. I think they look great! Some colours are: white, yellow, grey fleck, blue, aqua, and red.

Note that the prices for the 1993 calendars have been cut to about one half to move them. Even though their use as calendars is now limited, clubs will find the colour photos of sailplanes very useful in making up ads for club functions, mall displays, etc. since the photos are very eye catching.

Club mailings The following will be mailed to all clubs in July:

- Annual report (2 copies) – additional copies of the annual report if anyone wants one.
- Membership reconciliation. It is important that all clubs return the membership reconciliation as soon as possible in order that my records can be updated and/or corrected if necessary.

I could ramble on and on about the office but time and space are limited. However, in closing I would advise that the 1994 German calendars have been ordered (a month earlier than last year), so hopefully they will arrive in September.

Safe soaring, **Joan McCagg**, secretary

Trophy time again

Harold Eley, SAC Trophy chairman

It's time again to send me data on your flights for SAC trophies; BAIC – best flight of the year; Canadair — 5 best flights; "200" — 5 best flights by a pilot with less than 200 hours at the start of the year; and the Stachow for the greatest altitude. For you beginning pilots — why not win the Jonathan Livingston Seagull trophy by being the youngest pilot to complete the silver badge in 1993?

The rules for the trophies this year are basically unchanged; FAI type declarations and turnpoint verifications are required, but barographs are not needed except for altitude flights. Certification by an official observer is also required. Flights are scored at 1 point per kilometre with bonus factors as follows:

- PST legs or goals achieved (1.25),
- declared poly, O&R, or triangles completed (1.50);
- speeds greater than 70 km/h (.58 + .006 x speed);
- new record (1.2)
- SAC sailplane handicaps will also be applied.
- A formula is also available to convert height gain into trophy points.

The conditions for PST flights are clarified as follows:

- a PST task cannot be mixed with a declared task. Use either one or the other.
- turnpoints must be from a pre–established list such as those from a contest or at club level. Pilots cannot simply make them up as convenient during a flight.
- where turnpoint/photo target pairs have not been set up for photos, then FAI turnpoint photos are to be taken.
- turnpoints may be used again after using at least two other turnpoints (no out–and–return legs).
- PST tasks flown at contests are acceptable under the rules of that contest.

Entry forms may be obtained from the Trophy and Claims chairman, or from free flight, or the SAC office. The forms also contain additional information. My advice is to document flights as soon as possible after you fly them as it is difficult to get everything together at year's end. We hope you will enter. •

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record — we only knew that if we could get back to Keystone, we had it well–beaten. We decided to try and get as far as Bedford. If we could, we were pretty sure that we would have a record distance. It turned out to be a good decision.

Tom thought that if we could gain about 300 feet, we could make the front ridge at Haystack Mountain. This was quite risky, for if we got too far along the mountain before we found out it wasn't working, we would have nowhere to land. We decided to aim for the southern tip of the mountain, so if it wasn't working we would be able to glide back around the end to some landable fields.

We circled in some very weak thermals but couldn't get as high as we needed. The sun was getting very low on the horizon by this time and we were running out of daylight. We decided to go for it and started out below glideslope for Haystack and managed to bump through some zero sink on the way and just made it over the backside of the mountain. As we came over the top there was a great sigh of relief from both cockpits because this section of ridge was working. Although progress was slow, we made it to Bedford with no further problems. At Bedford, the sun was only about a diameter above the Allegheny Plateau which gave us possibly another 30 minutes of flying time.

We were both extremely tired by this time and knew that there was a real airport underneath us (the old airport) and that there was almost certainly a restaurant and bar close by. Faced with a choice of a field landing at dark and a long retrieve from a farm field, or a relaxing drink and a big steak, we did the sensible thing and landed. The restaurant turned out to be right across from the airport, and after we ordered the first drink we phoned to base.

The speed for this last leg had dropped to 69.2 mph (111.4 km/h) which gives a very good indication of just how weak the conditions had dropped to. The time on task was 10:15 hours and we flew a distance of 1393.93 kilometres. Our average speed was 84.5 mph (136 km/h). If we had been airborne one hour earlier we would have set a 1600 km record. Maybe next time! •

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that they very much enjoyed the personal aspect of my account. It would appear that there are more romantic souls in this tough sport of ours than we care to admit. It is reassuring for me to know, that there are a lot of other glider pilots out there who operate on the same weird wave length that I am on.

Tillmann Steckner, SOSA

WORLD CLASS SAILPLANE

Great hopes are being put forward that the proposed World Class sailplane will be the key to soaring's future by prompting the construction of a fleet of modern and attractive but low–cost sailplanes (editorial — free flight 2/93). One can only wish this will be so, but what are the chances of this really happening?

It seems clear that producing lower cost sailplanes has always been more of a finance and production problem rather than anything requiring special design effort such as the World Class design competition might imply.

In the past, several of the German manufacturers have designed and produced sailplanes quite similar in concept to the proposed World Class sailplane. The Club Libelle, the Club Astir, and the ASK–23 are all fine aircraft but the first two are long out of production and sales of the ASK–23 have been disappointing at best for Schleicher. Then too, if the gliding community was really crying out for an interesting little 13 meter sailplane, the Salto should have sold like the proverbial hotcake; it didn't. The Schweizer 1–36 was also a nice ship and met the World Class design specification quite nicely a decade ago; the Schweizer brothers tried hard but it too is gone. Perhaps the existing manufacturers have quite sound reasons for leaving the World Class glider field to others.

The problem with shrinking a glider design and then looking for a significant cost savings is that raw materials are a comparatively small cost input for a glider. For instance, a World Class sailplane will still require two ailerons, two aileron pushrods, and a control stick assembly. Yes, the pushrods will be a foot or two shorter and perhaps slightly smaller than those of a Standard Class sailplane but they will still require a precision bearing at each end and will take effectively the same labour to produce. The same applies to most other components such as the wheel, canopy, spoiler controls and so on. Corners can be cut such using bushings in the control circuit instead of bearing and using flat wrapped perspex instead of a formed canopy but this is rushing down the slippery slope of trading quality for money. It might also be noted that the more successful World Class entrants all use a tapered "Discus–like" wing planform to get their performance which will not be cheap to manufacture.

What has always really been needed to drive the cost of sailplanes down is an intensive, labour–saving, production line approach to their manufacture. Why not select any of the modern Standard Class sailplanes such as the LS–4 or ASW–19 and arrange to produce 500 a year to achieve real economies of scale in production? This would allow a group of competent sub–contractors to be lined up and allow modern composites fabrication techniques to be employed. This would bring down the direct labour costs which are the main cost in producing any aircraft. The only catch is, who will care to sink say 25 million dollars into such a project to turn out fairly expensive leisure products that can last quite a long time? Could production ever hope to pay off the capital investment required before market saturation is reached plus offer a return on the money?

One of the prime rationales for the World Class is to offer it as a one–design competition class for national and eventually world competition. Unfortunately Len Gelfand (Letters — free flight 2/93) is probably right in placing desire to enter competition as a fairly remote factor in influencing people to take up and continue with soaring. Since the competition community appears reasonably happy with the current glider classes, how creating a new one design competition class to appeal to others will add to the success of the World Class sailplane is unclear. (I believe the purpose of the IGC here was to guarantee a market for manufacturers. editor)

The new designs emerging in the United States that you discuss are encouraging but remain to be proven; it will be especially interesting to see how labour costs are handled. The "American Spirit" at US$19,000 and an advertised 40:1 plus sounds very appealing. However, this is a kit aircraft so one must add probably two years intensive part–time labour and perhaps another US$10,000 for completion (including a trailer). Then too the facts of aerodynamic life are such that only quite a high standard of finish and airfoil shape is going to make 40:1 possible. The mid–thirties for both L/D and a final cost in Canadian dollars seem rather more likely. Add say $10,000 as the cost of your labour for completion as the equivalent to holding a part–time job for two years, and Cdn$45,000 (plus taxes) is just about in sight. This must then be compared against used factory ships selling at about half the cost but with equal performance.

Peter Masak's "Scimitar" project at US$40,000 should do well, but add a trailer, instruments and taxes and Cdn$65,000 is in sight. Assuming that "safe, easy to fly ships with L/D in the low 30s ... for delivered prices in the US $20,000 range" do become available, it must be kept in mind that these sailplanes will be compared to safe, easy to fly LS–4s with L/Ds in the low 40s for not much more money. This assumes that comparable quality of construction and outfitting are actually possible at the stated prices.

It would be nice to finish this rather pessimistic outlook with something positive. However, I am more inclined to repeat that the existing manufacturers have a sound understanding of the market they are producing sailplanes for and know their costs well. There are no secrets involved in designing and building sailplanes, the age old adage that "you get what you pay for" is simply true.

Jim Oke Winnipeg Gliding Club

OBSOLESCENT CONTROL CABLES IN EUROPEAN GLIDERS BUILT BEFORE 1975

This is the text of Service Difficulty Alert AL-93-03 issued by Transport Canada for the attention of owners of affected gliders.

A recent investigation by the Transportation Safety Board of Canada (TSB) into an accident involving a glider built in Eastern Europe in 1968 revealed a serious airworthiness discrepancy which may still exist in a number of similar older gliders. The pilot lost rudder control due to the failure of one rudder cable and the glider was damaged in the ensuing landing. The rudder cable had failed at a worn spot due to prolonged contact with a pulley under the pilot's seat. The other rudder cable from the same glider also failed at the same spot when tested in the TSB lab.

The failed cables are of an old–fashioned DIN specification material composed of six strands, each of seven steel wires, wrapped around a manila cord (also known as 6x7 cable). Generally, cables incorporating manila cord are to be replaced if they show any sign of wear deeper than a polished surface of the wires. Any visible wear significantly decreases the strength of the cable and is cause for rejection.

The inspection techniques applicable to the commonly used seven wire, seven–strand (7x7) cable of snagging broken wires on a cloth or looking for signs of fraying, are not valid checks for the 6x7 cable. This is because the 6x7 cable is made of less brittle material and the wires are not likely to break and fray individually when worn. Therefore, changing of cables based on wire–strand breaks as on the 7x7 cable is not an appropriate criterion for the older 6x7 cable.

Most glider manufacturers have issued maintenance manuals or service bulletins which limit the life of the old style control cables. These life limits must be strictly adhered to (see the Airworthiness Manual, Chapter 571.5(c)(1). In addition, in 1974, the German airworthiness authority (LBA) issued Airworthiness Directive No. 74/323/2, which mandated the replacement of manila core control cables on all gliders of German manufacture.

Transport Canada strongly recommends that the maintenance records of gliders built anywhere in Europe before 1975 be checked for evidence that the control cables have been replaced by all–steel cables. If not replaced, the manila core cables should be inspected for any sign of wear as soon as practicable.

Any defects should be reported by sending a Service Difficulty Report to your nearest regional airworthiness office.

For more information, please contact your nearest Regional or District Airworthiness Office or call directly Mr. Paul Fortier in Ottawa at (613) 952–4357 or facsimile (613) 996–9178.

S.P. Didrikson
Chief, Continuing Airworthiness
for Director, Airworthiness

MONSTER CU NIM

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Overshooting tops
The strength of the lift in a severe storm can be so great that the cloud top overshoots this lid and makes a bulge in the tropopause forming a dome well above the general cloud top. Over the UK some domes have been observed by radar to penetrate as much as 10,000 feet into the stratosphere. In the USA one exceptional cloud penetrated about 17,000 feet. Overshoot domes seldom last long but when one subsides it may be rebuilt by a fresh surge of lift.

Strong upper winds pull out the anvil
If the upper wind is very light the top of the cu-nim spreads out to form an almost circular anvil. More often the cu-nim top goes through a layer of strong upper winds just below the stratosphere. Then a huge anvil of cloud, usually consisting of ice crystals, is carried away downwind. I have seen a tropical cu-nim which grew over Malaya produce an immensely long anvil of cirrus which extended about a 1000 miles in the high level jet stream.

Separating rising air from descending rain keeps the cell going
The supercell can survive far longer than ordinary cu–nim because it keeps the updraft separate from the downdraft so does not collapse from the weight of precipitation. Figure 12 shows how the cold dry air is entrained at middle levels to form separate downdrafts; one part may actually curve over the updraft before descending. This is sometimes where the hail shaft develops. Raindrops carried up freeze at high levels and fall back as small hail. Some re–enter the updraft and are carried up again to grow successive layers of ice. Those large hailstones which fall out into the downdraft often arrive first. At ground level the first precipitation often starts off as heavy hail followed by lighter hail and finally rain.

Monster cu–nim may make monster hailstones
Tiny frozen particles are called ice pellets and these may fall from small cu–nim. The particles are called hail when the diameter exceeds 5 mm. The little balls of ice may grow to a diameter of 50 mm or more. The stronger the updraft the larger the hailstone can grow before it finally hits the ground. Some incredibly large hailstones weighing more than 2 lbs have been reported; one which fell near Manchester had 51 concentric rings suggesting it had made that many up and down trips. A broken fragment from this monster stone was 14 cm long.

Monster hailstones and very strong updrafts
Sailplane pilots have reported lift of nearly 60 knots in the core of a cu–nim. This is much less than the maximum updrafts in some very big storm clouds which passed over southeast England. In one storm the maximum lift at heights around 30,000 feet was calculated to be 67 m/sec (130 knots). The cloud top reached 43,000 feet. Even stronger lift was attributed to an American Cb, 145 knots in a cloud which went up to 58,000 feet. This cu–nim dropped hailstones with a maximum diameter of 10 cm; such big stones should have a fall speed of about 126 knots at the high levels where they form so the calculated lift was probably not far from the actual value.

Long life supercells
Once the supercell is in existence it is no longer dependent on sun–heated ground to keep going. The process is self–sustaining and can easily go on all night. Solar heating certainly plays a part in initiating the storm but when it has become a supercell it can keep active for many hours. These storms can even survive a long journey across the cold waters of the North Sea. All they need is a continued supply of warm moist air at levels up to some 5000 feet and a wind shear with a strong flow aloft.

Cloudbursts
The torrential rain descending from a monster cu–nim is sometimes described as a cloudburst when the heavy rain continues increasing for a long time. The amount of water inside even a monster cu–nim is insufficient to produce the vast amount of rain in a cloudburst. It is necessary for the storm cloud to remain almost stationary over the area while the rain generating process continues at full blast. London had such a storm on August 14, 1975, during the late afternoon. A vast multi–cellular storm developed in a region of considerable vertical wind shear. The downdraft gust front pushing against the inflowing SE winds maintained an almost stationary convergence line above which successive cells developed. The rain generator hardly moved for about 2–1/2 hours and Hampstead had just over 170 mm of rain. Hailstones of 20 mm diameter were reported.

What a cloudburst can do
During the Hampstead storm an area of 15 square kilometres had a weight of 22.5 million tonnes of water dropped on it in about 2.5 hours! This is equivalent to about 2500 tonnes/sec. During another exceptional storm over southern England on July 9, 1959, the influx of water vapour into cloudbase was put at 12,000 tonnes/sec. To carry such a mass of moisture implies a total inflow of about 800,000 tonnes of air/sec. The energy involved is enormous. The rainfall which is measured at ground level is usually less than the amount sucked in by the updraft. This is because the rain eventually spreads over a larger area than the updraft. •

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 9 March 1993 to 24 June 1993

SILVER DURATION

	Werner Amsler	COSA	5:10h	Grob 102	Seminole Lake, FL
	Laurence Vigeant-Langlois	MSC	5:20h	1-34	Julian, PA
	David Key	York	9:15h	Grob 102	Julian, PA

C BADGE

2372	Edmond Duggan	Cold Lake	certified only, did not apply for C		
2373	Werner Amsler	COSA	5:10h	Grob 102	Seminole Lake, FL
2374	Laurence Vigeant-Langlois	MSC	5:20h	1-34	Julian, PA
2375	Chris Luxemburger	COSA	1:38h	L-13	Chemong, ON
2376	Morteza Ansari	SOSA	1:08h	2-33	Rockton, ON
2377	Greg Light	VSA	1:30h	L-23	Hope, BC

photo not available

A quintet of self-conscious young maidens pose for Kerry Kirby after he landed in a Hutterite colony field north of Swift Current during the Nationals.

FAI records

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

The following Canadian and World record has been claimed:

Free distance – Open, citizens, 1394 km, 1 Jun 93, Brian Milner, Ventus C, N520BM. Flown from Keystone, PA with turnpoints at Mountain Grove WV, Pine Creek PA, Sunrise Dam WV, and landing at Bedford PA a/p. This is a new and previously unclaimed FAI record category. The flight, for which a world record is also being claimed, was jointly flown by Brian and Tom Knauff.

1993 NATIONALS

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the soaring along the start of the second leg for the 15m and Standard classes.

Only four pilots of the 33 that started returned — three 15m, Ulli Werneburg, Curt Hawkins, and Jim Oke, and one Open, Dave Marsden — leaving the twenty–nine others with well–earned tales of outlandings and retrieves. At 7 pm there were still three pilots airborne well to the north in the remaining sunshine and last thermals, Jörg Stieber, Nick Bonnière, and Tony Burton. But with the 10 knot headwind home there was just not enough height for the final glides — Jörg landed just a kilometre short, Tony two and a half, and Nick seven. Bingo Larue landed his Dart in downtown Stewart Valley, rolling up the gravel road right to the gas station at the intersection. Jay Poscente landed in a well–visited Hutterite colony on the "wrong" side of Lake Diefenbaker (a long roundabout retrieve) but still got the usual big free meal, songs by the children, a tour of the colony, and wishes from some boys that he crash again there tomorrow. "**I D✣I✣D N✣O✣T C✣R✣A✣S✣H**," said Jay, earnestly.

15 July The morning started with a very low cloudbase. There was a less clouded area around Swift Current that promised a task if the bases raised and some sunlight got to the ground. By the pilot's meeting at 1000 there was enough encouragement from the sky that a two hour PST was called — we didn't want anyone to miss the banquet.

Launches began with the Open class around 1 pm with a 3000 foot cloudbase (5700 feet asl) and 8 tenths cloud cover with 2–3 knots. For a while it looked possible to go somewhere but soon the cu spread and most gliders landed. The Standard class gate was closed before it opened to cancel their task, but two Open pilots were airborne which was enough to make it a day for them. The 15m pilots revolted and refused to launch so they got cancelled too.

Now the day derating rules would seem to give the winner of the two Open pilots, Dick Mamini or Chester Zwarych, about 40 points. That didn't seem like much for the effort, but after an hour the clouds seemed to look a little better so Dave Mercer and Mike Thompson launched again to earn a few points and jack up the winner's maximum a little. Eventually all but Mike Thompson returned, who radioed that he was short of the airport a few miles to the northeast. When he didn't call in, a towplane was about to takeoff to track him down when he got through to a crew heading in his direction ground to ground.

And so the contest ended and everyone got cleaned up for the awards banquet where a great Greek style dinner was laid on by Gus Doulias and his family (every eatery in Swift Current is Greek).

The presentation of the competition trophies was made by the MC and Harold Eley, the SAC Trophies chairman. (The combined trophy for best overall pilot was not awarded as there were only two days in which every class flew the same task.) Dave Mercer did well in the Open Class, winning on a handicapped basis. A Sports Class should definitely continue to be encouraged at future Nationals.

Al Sunley, as SAC president, presented certificates to Walter Weir and Tony Burton for their record flights achieved earlier in the year. The many first–time Nationals pilots were particularly recognized and given the task of spreading the gospel of personal improvement in soaring through cross–country flying.

In this competition, 46% of the flights that got on course landed out, and only two, Ulli and Curt Hawkins, returned each day! The general opinion among pilots was that the contest was tough but enjoyable, with good facilities, and that they would come back in a year Saskatchewan got its usual 12,500 foot, 10 knot thermals. •

The following Canadian records have been approved:

Distance to goal & return – Open, territorial, 652.3 km, 6 June 93, Tony Burton, RS–15, C–GPUB. Flown from Black Diamond, AB with goal of Leader, SK and return. Surpasses previous record of 615 km set jointly by Dave Marsden and Mike Apps in 1983.

The four records achieved by Walter Weir, on his 23 April 93 flight out of Keystone, PA, the details of which appear in *free flight* 3/93.

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continued on other side — voir au verso

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HP–11A, C–FUKB, 518 h, standard instruments, CB radio, open trailer available. Highest performance for your dollar. For quick sale as is, only $10,900 (After spring cleanup with fresh inspection, $12,900. Bob Patterson (416) 457-5238 (9 am to 9 pm).

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OPEN CIRRUS (modified), CF–SNZ, 500 h TT, with homebuilt fibreglass fuselage, retractable gear. Factory water, tinted canopy, radio, O_2, Ilec vario system, encl alum trailer, tail dolly, wing stands. Never damaged, $15,000. Fred Wollrad (403) 479-2886 or Harold at (403) 474-0139.

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TWO PLACE

2–22E, G–FYPC, very good condition, annual May '93, no trailer. Excellent trainer, asking $8000 obo. COSA, c/o Bob Leger (416) 668-5111.

LK10A/TG4, CF–ZAJ. A classic, taught some of the best in Canada how to fly; with trailer and spares. Ben Lochridge (416) 278-4765 work or (416) 271-3097 home.

Grob 103, 920h, all ADs done, standard instruments front and rear, custom fittings for trailer (trailer available separately. Alberta Soaring Council, (403) 625-4563.

MISCELLANEOUS

Winch wanted. A self–contained winch for glider club and a **winch bridal** for a Blanik. Gravelbourg Gliding & Soaring Club, Box 213, Lafleche, SK S0H 2K0 or call (306) 472-5668.

Wing kit wanted for HP14, HP16, HP18, RS15 either untouched or partially complete. Don Matheson (604) 287-3229.

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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. 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. £15.50 per annum (US$30) or US$40 air.

AUSTRALIAN GLIDING — the journal of the Gliding Federation of Australia. Published monthly. $A40.50 surface mail, $A55 airmail per annum. Payable on an Australian bank, international money order, Visa, Mastercard. (No US$ personal checks.) 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).

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

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SAILPLANE DEALERS

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SZD–55–1, Jantar, Jantar 3, Puchacz, Puchatek. For Polish gliders, contact Josef Repsch, (403) 488-4446, fax 488-7925.

Schempp-Hirth. Nimbus, Janus, Ventus, Discus. Al Schreiter, 3298 Lonefeather Cres, Mississauga, ON L4Y 3G5 (416) 625-0400 (H), 597-1999 (B).

Schleicher. ASK-21, 23, ASW-22, 24, ASH-25. Ulli Werneburg, 1450 Goth Avenue, Gloucester, ON K1T 1E4 (613) 523-2581.

Schweizer parts. Walter Chmela, (416) 221-3888 (B), 223-6487 (H), #203, 4750 Yonge Street, Willowdale ON M2N 5M6.

DESIGN CONTEST

members are invited to submit a SAC design/logo for pins, bumper stickers, *free flight* cover page, etc. in celebration of SAC's 50th anniversary in 1995.

Prize – a year's SAC membership.

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SAC SUPPLIES FOR CERTIFICATES AND BADGES / ARTICLES ACVV POUR CERTIFICATS ET INSIGNES

	SAC SUPPLIES FOR CERTIFICATES AND BADGES		ARTICLES ACVV POUR CERTIFICATS ET INSIGNES
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)*
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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)*
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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	SAC Flight Declaration form *(also stocked by club)* per sheet	$ 0.15	Formulaire de déclaration de vol de l’ACCV
18	SAC guide “Badge and Records Procedures”, ed. 6	$ 5.00	ACVV guide des procédures pour FAI certificats et insignes (éd.6)
19	FAI Sporting Code, Sec 3, Gliders, 1992 *(payable to **ACC**)*	$ 7.00	FAI Code Sportif, Planeurs, 1992 *(cheque payable à l’**ACC**)*

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