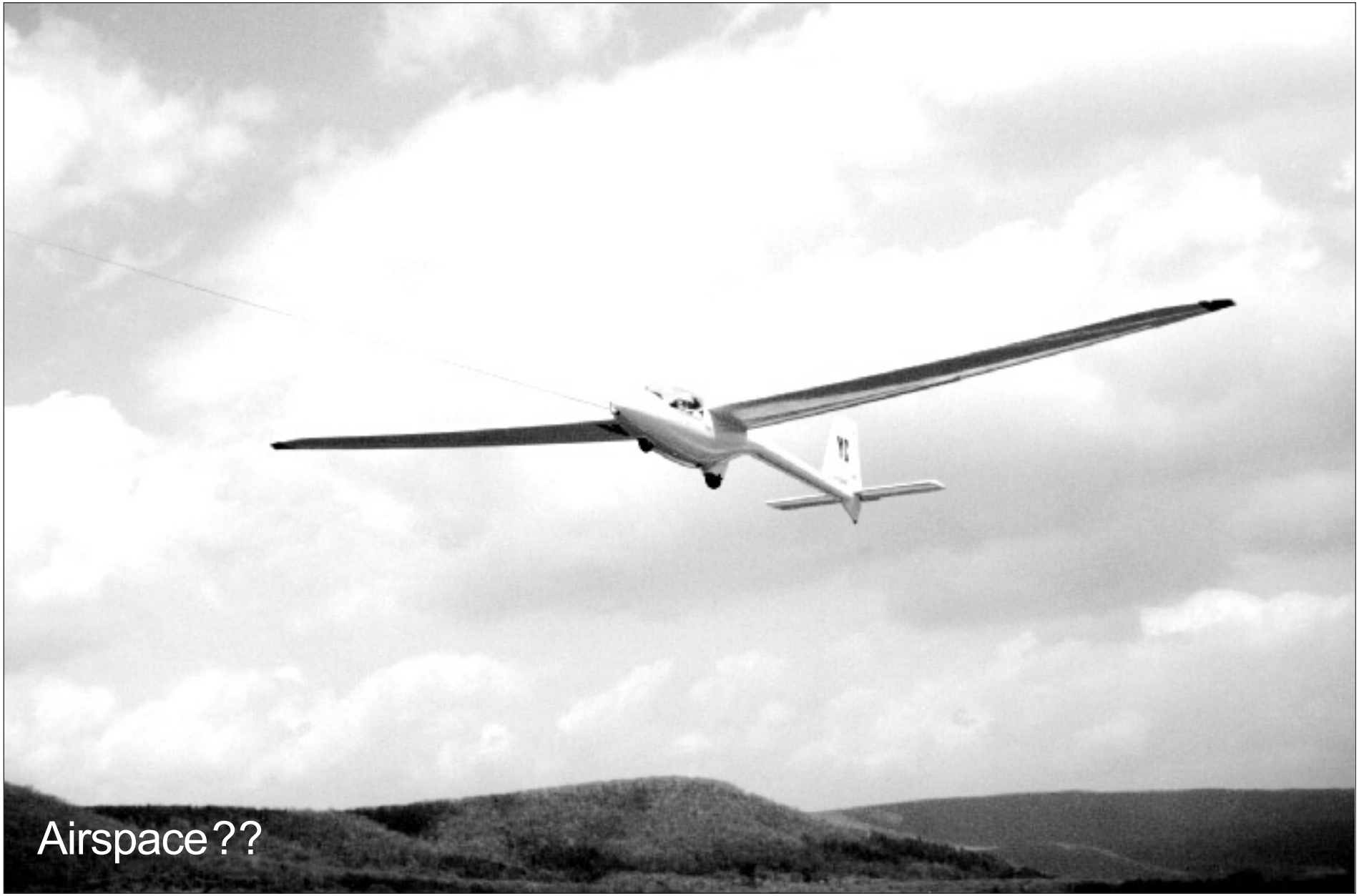
4/97
Aug-Sep

free flight · vol libre



Liaison

AIRSPACE I want to extend our appreciation to the BC Soaring Society for their public-spirited and generous gift of $1500 to help defray costs arising from the intensive pace of activities of our Airspace committee this year. At the time that the budget was constructed it was difficult to forecast the scale and cost of the work. Airspace issues are likely to remain a priority item for the next few years.

RECRUITING Does your club have an active recruiting campaign? Some clubs have been doing a super job this year and their membership is on the rise. This is encouraging for them and for the soaring community at large. There also appears to be an increased awareness about the importance of membership retention. Have a look at the membership meter in this issue. So far, we are slightly ahead of last year.

INSURANCE It has come to my attention that some clubs delay in registering new members and sometimes not-so-new ones. Their treasurers become preoccupied with other matters or just forget. Others seem to wait until they have a number of new and renewed memberships in hand before they advise the SAC Office. Remember that the SAC insurance plan only applies if the pilots are bona fide SAC members. If an accident occurs and the members involved are not registered with SAC, a claim could be called into question. It is easy to advise SAC of new members; this can be done by telephone, fax, e-mail or regular mail. Do not wait for an accident to happen before you discover that the relatively minor paperwork has been neglected.

AERO CLUB of CANADA The Aero Club of Canada, which is our link to the Fédération Aéronautique Internationale (FAI), is under financial pressure. Government funding has been cut off and the cost of Canada's contribution to the FAI has been rising. In 1995 our contribution to the Aero Club was $5600. In 1996, at the Aero Club's request we raised that temporarily by 70 percent to $9500 ($7.56 for each member) to give the Aero Club time to get its financial house in order. In 1997, we committed $7500 (about $6 per member), this is still high and a significant portion of our overall budget — and the Aero Club has been requesting more. In our judgement SAC's share of the Aero Club budget is too high, Canada's share of the FAI budget is too high and the Aero Club needs to do more to broaden the basis of its financial support. Canada's subscription to the FAI is more than one third of the USA's and the same as France's. Clearly, this is not equitable and we want the Aero Club to make stronger representations to the FAI to reduce Canada's share. We also want the Aero Club to encourage the FAI to be more creative in dealing with its own financial situation. We provided the Aero Club with some suggestions in these regards; however, our correspondence was never acknowledged. Given its financial circumstances and effects of this on its member organizations, I was most surprised to see little mention of financial issues in the minutes of the Aero Club's last AGM. There was a discussion of a possible name change to the Royal Aero Club of Canada; it was suggested that this may have some financial benefits. I am not convinced.

Fly safely and be happy.

Si vous désirez participer au cours d'instructeur qui sera donné en septembre, SVP communiquer avec moi via le bureau national. Marc Lussier doit me confirmer sous peu les dates. Vous pouvez le faire via fax, e-mail ou courrier.

Je parcours depuis peu l'Internet et j'ai pris un intérêt à regarder les interventions dans le babillard de discussion. J'ai été surpris de voir comment peu de francophones participent. Jean Richard est l'exception qui confirme la règle. Denis Pepin de CVVQ et Jean Lapierre de Champlain sont les autres rares exceptions. En fait, il y a peu de Québecois inscrits dans la liste des adresses Internet des membres de SAC/ACVV. Si vous êtes branchés, laissez le savoir au webmaster. Merci.

Bon vols, soyez prudents.

Pierre Pepin president

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4/97 Aug/Sep

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

ISSN 0827 – 2557

Cover

David Habercom took this photo of Charles Yeates being launched at the first PW-5 competition in North America, at Mifflin County Airport, PA in mid-May.

SPORTS AND TORTS

These notes were taken during a sports seminar on liability law and sports associations. Has your club taken even the minimum steps to determine airfield risk and then to "manage" it both practically and legally? editor

- *Negligence & Liability* — know what they mean
- *Risk Management* — the application of this knowledge in planning
- *Tools & Techniques* — waivers, contracts, informed consent, etc.

LIABILITY — to be legally bound, obligated, subject to, answerable for.

NEGLIGENCE — a lack of proper care.

To be legally negligent, four elements must be met:
1 a *duty of care* is owed,
2 an established *standard of care* has been breached,
3 a harm or loss is then suffered,
4 the breach of care substantially contributes to the harm or loss suffered.

"Duty of care" means you can foresee that your actions (or lack of them) will have an effect on a person/group; you ought to know who will be affected; and a reasonable, average, similarly situated person would also see an effect is foreseeable.

"Care standards" are defined as:
- written standards – job descriptions, checklists, government standards
- unwritten standards – airfield safety, a windsock, etc.
- past court decisions – precedent
- common sense – natural justice

If a "standard of care" is met, the law will protect you if your actions cause injury, IF the risks have been properly managed AND the care is reasonable in the circumstances.

RISK MANAGEMENT Risks can be minimized but not eliminated. Risk is the chance of damage or loss occurring.

Risk magnitude = severity x frequency

RISK MANAGEMENT PLANNING
All planning takes the following steps, but using different language perhaps:

- establish risk management GOALS (this is the first step in legally demonstrating that a club has met a reasonable standard of care)
- inventory possible risks (to equipment, members, strangers)
- find a means of controlling the risks
- evaluate control means in light of care, risk magnitude, resources available,
- select an appropriate mix of risk management measures
- put the measures into effect
- monitor your risk management system (repeat the cycle)

RISK CONTROL
- to people:
  – eliminate the risk (close airfield, remove campground toys)
  – reduce risk (management, training)
- to finances:
  – retain the risk (absorb losses, self-insure, deductibles)
  – transfer the risk (insurance, contracts, waivers, lease of facilities) ❖

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 is ok in ASCII text). All material is subject to editing to the space requirements and the quality standards of the magazine.

Prints in B&W or colour are required. No slides or negatives please.

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 listed in the magazine.

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

For change of address and subscriptions for non-SAC members ($26/$47/$65 for 1/2/3 years, US$26/$47/$65 in USA & overseas), contact the National Office at the address below.

Deadline for contributions:

5 January, March
May, July
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.

vol libre est le journal officiel de l'ACVV.

Les articles publiés dans *vol libre* sont des contributions dues à la gracieuseté d'individus ou de groupes enthousiastes du vol à voile. Le contenu des articles soumis est la responsabilité exclusive de leurs auteurs. Aucune compensation financière n'est offerte pour la fourniture d'un article. Chacun est invité à participer à la réalisation de la revue, soit par reportages, échanges d'opinions, activités dans le club, etc. Le texte peut être soumis sur disquette de format 3.5" sous n'importe quel format de traitement de texte bien que l'éditeur préfère le format Macintosh (DOS est acceptable). Les articles seront publiés selon l'espace disponible. Les textes et les photos seront soumis à la rédaction et, dépendant de leur intérêt, seront insérés dans la revue.

Les épreuves de photo en noir et blanc ou couleur sont requises; pas de diapositives ni de negatifs s'il vous plaît.

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.

Veuillez vous adresser au bureau national à l'adresse indiquée à gauche du bas de la page pour tout changement d'adresse et abonnement à *vol libre*. Les prix des abonnements à cette revue sont les suivants: au Canada $26, $47 et $65 pour 1, 2 ou 3 ans et aux Etats Unis et outre–mer les mêmes montants mais exprimés en $ américains.

EDITOR
Tony Burton
Box 1916 Claresholm, AB T0L 0T0
tel & fax (403) 625-4563
e-mail ***free-flt@agt.net***

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Preventing midairs between gliders and heavy aircraft

Jim Short

from the Soaring Society of America website. It is equally relevant to many Canadian clubs.

Today we cannot deny that parts of the airspace are crowded. Particularly around terminal airspace (Classes B and C) we find more heavy aircraft operations than ever before. We find more airline activity dedicated to moving more people more quickly and more economically. We can't deny these facts or the safety challenge they represent to recreational forms of aviation such as soaring! As glider pilots, we are proponents of the "See and Be Seen" principle.... If we want to protect our right to fly in certain airspace and our privilege to carry less sophisticated navigation and surveillance equipment than other forms of aviation, we are going to need more vigilance and more responsibility in sharing airspace with our commercial brethren. At a recent meeting of the General Aviation Action Plan Coalition in Washington, SSA (along with other associations) was directly challenged by EAA Administrator Hinson to "Find a way to achieve a goal of *no midairs*". Later in the meeting Hinson stated, "If you (general aviation societies and associations) don't find a way to do this, we will find it for you". In 1997 that is a fact, not a threat.

The purpose of this letter is to raise our levels of consciousness of this problem. It is also to lay out a method for each local soaring operation to develop ways to reduce conflict in areas of glider/heavy aircraft interface. Finally, it is to enlist everyone who reads this letter to think and act to reduce conflict which could lead to that worst of catastrophes — a collision between a glider and a commercial or military aircraft....

SSA asks each site, club, or school to appoint an airspace chairman Appoint a club member who is aware of the approach, departure and enroute patterns of other categories of aircraft within 30 to 40 miles of your normal soaring areas. This member could be an IFR rated power pilot, an airline pilot who is familiar with sailplane flight routes as well as ATC procedures, or a glider-only pilot who just wants to get involved.

What should the airspace chairman do? Start by diagramming the busy corridors in which heavy and high speed (ie. commercial, military or business) aircraft operate. For instructional purposes, these diagrams could be made on sectional charts or on other maps which are illustrative for glider pilots flying locally or cross-country. The diagrams should show, among other ideas:

1 approach and departure routes for commercial (or high activity) airports.
2 altitudes at which aircraft typically operate on these routes.
3 busy IFR intersections and reporting points, VORs and other hazardous areas such as parachute jumping zones, known aerobatic practise areas, etc.
4 typical glider operating areas and cross-country routes.
5 conflict and danger areas for soaring operations.

What then? Hold regular briefings as part of ground schools, area check-outs or local safety meetings, to make sure that everyone flying at your site knows of the danger areas. Seek input from everyone at your meetings; for starters, discuss these topics:

- areas and altitudes to avoid in order to relieve potential interface with high speed metal.
- how to reduce conflict when flying through danger areas on cross-countries.
- the absolute need to adhere to standard cloud clearances and possibly even double them in high traffic areas. Adherence to other traffic and airspace responsibilities.
- what areas should be avoided in times of reduced visibility.
- published and observed changes in the large aircraft approach/departure behaviour.
- how glider pilots can report traffic to each other on glider frequencies.
- how gliders in some areas can contact Approach Control when a need arises.

Disseminate the results of these meetings in mailings and newsletters. Post your maps showing areas of potential conflict on your club bulletin board. Concentrate on traffic procedures and collision avoidance during Biennial Flight Reviews. Plan a briefing on local and cross-country soaring operations for local air traffic personnel. Build a team relationship with ATC personnel so you can work together to alleviate problems before they occur. Take ATC personnel for glider flights so they know what we do... Let's work together to save our skies through safety, education and responsible use. ❖

Crossing Divides

Mike Glatiotis, Cu Nim

THE first glider I ever saw flying was in the mountains around Banff where I grew up, and the impression it made followed me for 25 years before I was finally able to begin learning the skill which might allow me the freedom and joy that I knew that pilot many years ago had felt.

I'd spent the intervening years scrambling and climbing in the Rockies, thinking that no other endeavour could match the thrill of cresting a snowy ridge and climbing to an alpine summit. Many of the great peaks fell to the enthusiasm of youth, but finally work and career turned me away from the mountains. But the dim memories of a sailplane silently drifting down to land on a grassy strip at the base of a waterfall-graced cliff prompted a new challenge, to learn to fly on nature's terms. And so my apprenticeship began, and continues today.

From the very first soaring flights, alongside bald eagles and red tail hawks, I was always drawn to the mountains, circling ever higher the more distant from home field, calculating safe glides back home, and cautiously edging westward while Diamonds fell to venturesome pilots who explored the vast prairie sky.

Slowly, I learned the skills that set me free and which opened a whole new world of exploration, soaring cloud to cloud, crossing improbable blue seas to uncertain lift beyond. Always though, the mountains called, and on the best of days I would tiptoe out to sample the first ridge of rocks, or drive to the Columbia River valley in BC and taste the heady thrills of circling peaks and racing along mountain ridges, contouring the slopes, hooking the boomers to "twelve five", or searching for sheep and goats grazing the high country.

Eventually, I flew over the first of the peaks that I had once climbed. Well above. Palms sweating as I turned at cloudbase in weak lift, gazing down long valleys that stretched interminably towards my landable fields far below. The lift is there — you always have to judge it carefully, but on the good days, it is there. Otherwise, you spend the day polishing rocks close to the Columbia, with hay fields and airstrips close to hand. The local masters show you the way, flying fast, thousands of feet below, teaching in flight as you watch from above.

Slowly, a plan formed to attempt to explore in the air all of the peaks once climbed, culminating in that improbable crossing of the Great Divide, bridging the prairies to the Columbia. Not that this hasn't been done before, but soaring is an intense personal experience, and regardless of the pioneers before, each flight is new, and each range a new exploration.

Dick Mamini made the first crossing, some 27 years ago, from the David Thompson country through the Howse Pass to Golden. Maybe it was his ship I saw as a kid. He celebrated the event a couple of years ago with another crossing, this time from Golden, soaring south to Fernie then crossing through the Crowsnest Pass to meet us all in Cowley. His advice and insights on picking the day and the route stuck in my mind, and I patiently waited my turn.

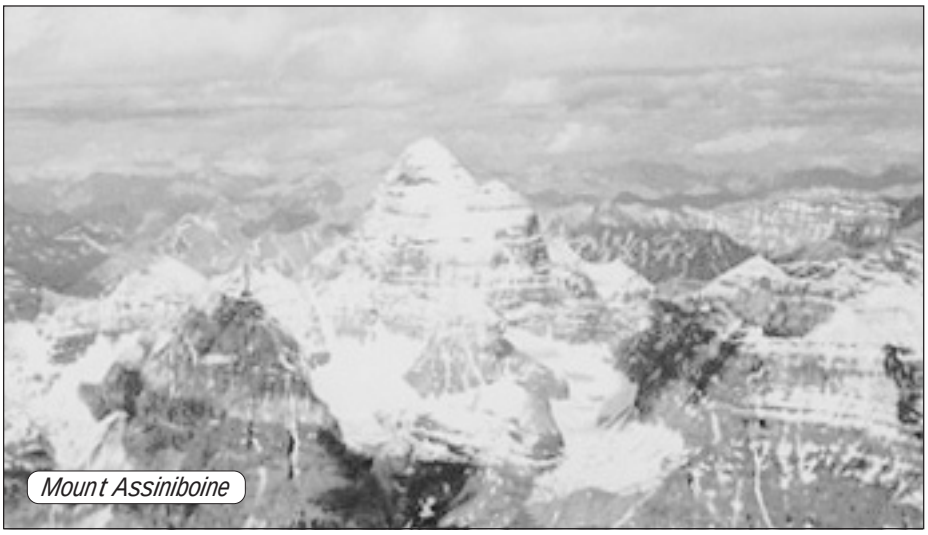
June 28 arrived with little promise for a great soaring day. My birthday ensured a day out at the airfield, and instability leading to thundershowers over the foothills promised a small window of opportunity for some fun, but the low cloudbases that formed barely enabled a climb out of the alert area over Cu Nim. I rigged *Jolly Miller* anyway, and provisioned it well with water and food, sticking my shoes and socks along with long pants and a jacket behind my head in case I needed to walk out through some stubble field. I casually informed deputy CFI Dave Fowlow that I might be heading westward if conditions permitted, so he could inform the terminal controllers that we might just been leaving the airfield alert area today.

I seriously doubted that I could even get away from the field. It was a day to just

On the way across the "Rocks", facing east. Under the wing, note the lower cloudbase of the cumulus on the east side of the mountains.

follow the clouds, so shortly after release I flew west and headed up Quirk Creek under a rapidly building street with a base at about 8000 feet. TCA requested I stay under 9000, so that part was easy. Continuing into the foothills at this altitude is somewhat unnerving, as forested terrain rises up to meet you. Cloudbase rose to 9, and as I passed over Quirk, I turned to see the overdevelopment beginning to rain in behind me. Anxious to avoid returning through that, I pushed a little further west where suddenly the clouds became very raggedy and the Rockies spread out before me. Like a razor line down the front range, this wispy edge of cloud gave way to another airmass with beautiful flat-bottomed cu having bases at 13,000 over a sea of snowy peaks. Just a little more ..., and I was lifted gently above the old cloudbase, transitioning to the new. The front ranges were mine to explore.

Gingerly pressing westward another range, it became apparent that the lift was strong, and very consistent. Unstable, but not too unstable, even the glides between thermals were smooth, and I was able to establish a healthy lift band between 11,000 and 12,500 feet. Cloudstreets lead me northward through Kananaskis Country, and as I passed over Mt. Sparrowhawk and Lougheed peaks, I crossed more summits off my list. As per my usual impeccable planning, I started to get a bit cold, but was once again happy to be a Schempp-Hirth owner. The Standard Cirrus allowed me to take off the sandals, and put on the socks and shoes, after contorting myself into my long pants. Nothing graceful, but try that in your Jantar!



Mount Assiniboine

The sloppy turning drifted me further west over Spray Lakes, and directed my gaze to Mount Assiniboine (at 11,870 feet, the highest point on the Divide south of the Columbia Icefields).

Eighteen years ago, on my eighteenth birthday, I climbed that peak, and recalled the feeling of cresting the summit ridge, and looking out over the sea of mountains. A crystal clear day, we were able to see out to the flatlands. I pointed the nose down and headed peakward. After all, it was my birthday. What could go wrong?

Not much, as it turned out. Dolphining over to the peak was deceptively easy, traversing seemingly unlandable terrain, but keeping options open either at the reservoir, or ridge running up to the Canmore golf courses or to Banff or Nakiska. Thirteen thousand feet gives plenty of options. On reaching the summit, I found good strong lift coming up the south and west sides, so I brazenly popped the spoilers out and dropped a thousand feet to bring me face to face with my youth. Circling the summit, I was able to inspect the route up that I had taken and scan closely for unsuspecting mountaineers. Seeing that I was alone, and revelling in the moment, I swept along the north ridge, pulling up just at the main summit to watch the vista unfold as it had so long ago, but this time circling and climbing yet higher and higher.

The rest of the flight was anticlimatic. A final glide, dolphining down the Mitchell River to the Radium gap, meeting the pilots soaring out of Invermere, and making a speedy ridge top run to Golden and returning to Invermere is a blur. Landing in the hot Columbia Valley air, I climbed out of the ship with a satisfied smile — and was greeted by friends and cold beer. None other than Dick Mamini came on my retrieve; it was a gratifying return across the Divide.

It's hard to describe even the most common soaring encounter to those who have never sensed the freedom, escaping on silent wings. Harder yet when the experience is a very personal one that transcends years and other pursuits. Other flyers, though, can share in the joy of these flights, wherever their challenges are sought. Mine are in the mountains, and this was a flight of my dreams. I may or may not have other crossings, but the memory of this one will always remain as new dreams arise. ❖

Mike, in Invermere, sandal-shod again.

Don Evans

1997 nationals

Sports class winner, Adam Zieba

Edna Cavicchioli

Dave Springford
SOSA

THE 1997 Canadian National Soaring Competition was hosted by the SOSA gliding club from 8-17 July. There were 38 competitors in three classes. Five American competitors registered for the competition with one, Russ McAnerny, coming from Phoenix Arizona. Pilots, crews and gliders started to arrive at SOSA on Saturday and were greeted with great soaring conditions. There was even some frontal wave over the field allowing one pilot to reach 10,000 feet. There was a wide and varied fleet of gliders on the grid, including all the standard competiton gliders in the FAI classes. The Sports class even included two PW-5 World class gliders. They are a great climbing airplane, and with their 1.20 handicap are very competitive in the Sports class.

Sunday 6 July, Practise Day 1
The forecast for the day called for a weak cold front to pass through the flying area later in the afternoon. A short task of 185.6 kilometres was called for the 15m and Standard classes with turnpoints at Stratford airport and Arthur East airport (York Soaring). The Sports class was assigned a task of 138.5 kilometres with turnpoints at Plattsville, Conestoga Lake and Reid's Field. The grid was launched at 1230.

After the start gate opened and the gliders were out on course the sky started to darken as the front moved into the area sooner than expected. Only two pilots from the FAI classes, Tim O'Hanlon (TJ) and Dave Springford (S1) completed the course. In the Sports class there was one finisher, Alan Wood (AR). There were eight landouts on the day, with the remaining pilots calling off the task and returning home commenting that they really didn't need the practise landing out.

Monday 7 July, Practise Day 2
The forecast for the day was much better after the passage of the cold front on Sunday. The weatherman (Ted Froelich from the Gatineau Gliding Club) predicted 3-4 knots lift up to 6000 feet. Since this was a practise day and everyone had to be back for the pilot's meeting at 1900, short tasks were set for the day. For the FAI classes a 146.7 kilometre task was set (Woodstock/Stratford) and a 124.6 kilometre task was set for the Sports class (Plattsville/Woodstock/Reid's Field). The grid was launched at 1315.

The fastest speed of the day was recorded by Ed Hollestelle (A1) in the Standard class (92.4 km/h) and the fastest speed in 15m class was Dave Springford (91.9 km/h). Scott McMaster in the SOSA Hornet (DW) recorded the fastest speed in the Sports class (75.4 km/h).

After the pilot's meeting a wine and cheese social was held in the clubhouse. It gave everyone a chance to meet newcomers and catch up with old friends.

Tuesday 8 July
The weather map for the opening day showed a low pressure system moving into the area in the afternoon with severe weather warnings and the possibility of hail in the Lake Erie vicinity. At the 1000 pilot's meeting, the Competition Director Larry Springford called for another meeting at 1200. The opening ceremony took place at 1030 following the meeting. About a hundred people gathered in front of the clubhouse to watch Oscar Boesch fly his ASW-15 "Wings of Man" sailplane to the sounds of *Born Free* and *High Flight.* As always, Oscar's performance was magnificent. After the performance the competition was opened by local MP John Dryden, as well as a representative from the local MPP Toni Skarica's office who read a letter from Premier Mike Harris.

At 1200 the day was scrubbed, but a couple of publicity flights were flown for a news crew from the local Kitchener CBC station.

Wednesday 9 July, Contest Day 1
After the passage of a cold front overnight, it looked like the weather for the day would be good. Despite the low postfrontal clouds a 214 kilometre task (Arthur/Reid's Field/Conestoga Lake) was set for the FAI classes and a 152 kilometre task (Arthur/Conestoga Lake/Reid's Field) was set for Sports. As predicted, around 1130 the low cloud started to break up. By 1300 there was sustainable lift and the grid was launched. There was reasonable lift in the 3-4 knot range for most of the day except for a weak spot on the leg in and out of the Conestoga Lake turnpoint. It turned out that the task for all classes was too short and the scores derated since many pilots got around the courses in less than 2.5 hours.

Wilf Krueger flew the course at 103 km/h, but due to camera problems the flight could not be verified. Wilf commented that his flight computer showed an average climb rate of 4 knots and that he had thermalled for only 22% of the flight. He was able to use cloudstreets for the trip north to Arthur and then back south to Guelph. He arrived low at Reid's Field, but found a 6 knot thermal that got him to Conestoga.

Thursday 10 July, Contest Day 2
The weather for the day looked super so the CD called for a pilot's meeting an hour early at 0900. The task for the FAI classes was set at 375.5 kilometres (Tillsonburg/Priceville/Woodstock). The task for the Sports class was a 194 kilometre triangle (Woodstock/Arthur) — relatively short given the soaring conditions, but out of concern for the performance handicap of the PW-5. The grid launched at 1200.

In the Standard class Ian Spence (WW) flew the course without seeing many other gliders. He was a little worried that he was a long way behind the rest of the pack. As it turned out he was ahead of everyone and won the day. Once again, the Sports class scores were derated when the winner (in fact, all but five) finished in under 2.5 hours.

In the 15m class, Heri Pölzl held the day by flying the task 28 seconds faster than Walter Weir, but Walter moved into the overall lead over Ulli Werneburg by just 2 points (this class was to see a tight race between these pilots). In Standard, Ian Spence was two for two and leading Jörg Stieber, the almost perennial winner of past competitions in this class. Ahead in the Sports class was a pilot unknown to most competitors, Adam Zieba. A Polish sailplane pilot now at SOSA, he was flying a Jantar well — one he had rented from a club member for the summer.

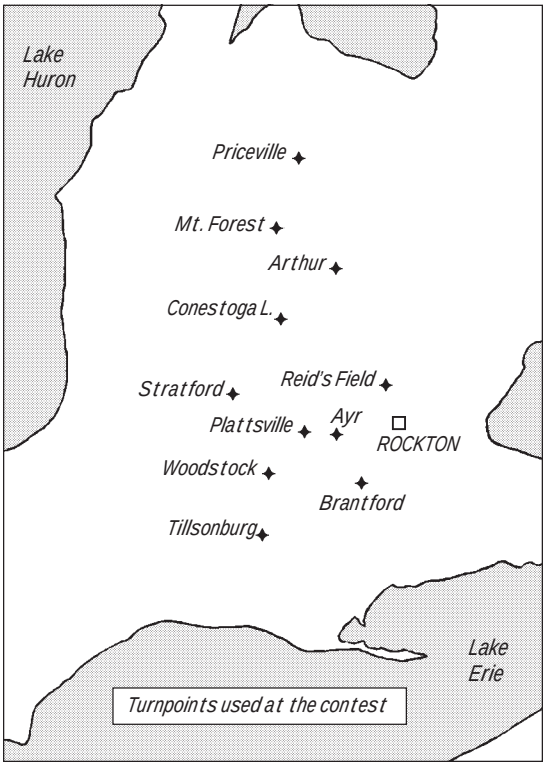
After everyone returned home a BBQ was held, allowing everyone to relax a little and talk about the last few days of great soaring.

Friday 11 July, Contest Day 3
A high pressure system dominated the weather picture for the day allowing another good day of soaring. The CD again advanced the pilot's meeting to 0900. The task for the FAI classes was a quad (Mount Forest/Brantford/Arthur) of 327 kilometres. The Sports class was given a 4 hour PST task with three mandatory first turnpoints (Arthur/Plattsville/Rockton). The good soaring conditions to date were reflected in the relatively high average speeds in all three classes for the day.

The task committee decided to combine mandatory turnpoints with a PST in the Sports class to allow the pilots to fly a basic speed triangle, and if they finished early enough they could continue to fly the PST portion to increase their points. It was found that this system worked quite effectively with the large spread in the handicap values between most of the sailplanes in the class and the two PW-5s.

One of our American competitors, Ray Galloway (P1), landed out inside the town limits of Elora. Before he was able to open the canopy, a young man arrived to inquire about his condition. Within a few minutes, two pickups arrived and more people were gathering at the field. Before long there were two ambulances, two fire trucks, and several police cars (including the Elora Chief of Police). A reporter for the Elora paper then arrived followed by another from the Guelph newspaper. Ray's landout was the news event of the year in Elora and was featured on the front page of the paper.

Saturday 12 July, Contest Day 4
The high pressure system that dominated the weather over southwestern Ontario over the last two days stalled, providing another soaring day. Unfortunately, it was weaker than the previous days. The task for the FAI classes was a 185 km triangle (Stratford/Arthur). The Sports class was given a 4 hour PST with four mandatory first turnpoints (Plattsville/Conestoga Lake/Ayr/Rockton).



The lift was weak as expected, and then turned blue. Most of the competitors gaggled around the task. On the way back from Arthur, a reasonable thermal over a lumber yard south of Fergus was found. This gave the gaggle the height necessary to get home, which was fortunate as there was a steak BBQ planned for the evening.

With a first and a second place on the last two days, Adam Zieba was solidly in the lead in the Sports class. Ian Spence gained a second yesterday, but with a sixth place finish today in Standard class, he passed first overall to Jörg by 69 points. In 15m, Heri also had another win yesterday and a second place today but could only squeeze a third overall out of these flights for a 3798 point total. Walter's third place finish dropped him out of first overall with 3808 points, and Ulli's win today moved him up to first with 3834 points. A difference of 36 points between the three was not much!

Sunday 13 July, Contest Day 5
The same high pressure system remained stalled, giving soarable blue conditions over the contest area. The FAI classes were given a 138 kilometre task (Woodstock/Brantford/Reid's Field). The Sports class got a 4 hour PST with three mandatory turnpoints (Brantford/Reid's Field/Rockton).

As on the previous day the lift started out weak, but improved later in the day. On the first leg to Woodstock, haze domes were clearly visible flying towards the sun, allowing pilots to follow the blue cloud streets. After Woodstock, with the sun at your back, it was more difficult to pick up the haze domes but flying with a 15-20 knot tailwind made the going a little easier. It took me 1:10 hours to fly the 52 kilometre first leg and then only 48 minutes to fly the remaining 86 kilometres!

The short task resulted in devalued scores for both FAI classes, and both leaders had a bad day, particularly Ulli who had a disaster by landing only 30 kilometres out which dropped him back to eighth in the 15m and handed the lead back to Walter again. Jörg's slow eighth place for the day allowed Ian to regain the overall lead by 50 points.

In Sports class, and flying in the Nationals for the first time, Scott McMaster managed to accomplish one of his goals. After more than 900 glider flights, he had never had the pleasure of landing out and meeting the fine, hospitable Ontario farmers. So on Day 5, despite winning Day 4, Scott was able to achieve his long anticipated dream of pulling a glider out of a farmer's field. Adam won the day again, his consistency further increasing his lead.

Monday 14 July
The Hot, Hazy, Humid weather took over, forcing the day to be scrubbed. After five straight days of flying, and seven flying days out of the last eight (including practise days) everyone welcomed the break. The airfield was deserted as everyone headed for swimming pools and air conditioning.

Tuesday 15 July
The HHH weather continued forcing the day to be scrubbed again.

Wednesday 16 July
A weak cold front passed through the area Tuesday afternoon clearing the humidity and leaving the possibility of good soaring

Day 5 — How to lose a contest by one mistake *Jörg Stieber*

IT WAS HAZY, with weak blue thermals to 3500 agl, broken up at lower levels — a great day for the beach. After the experience of the previous day, which had started to die around 3:30, I decided not to waste time in the start gate and started early. A substantial gaggle followed about five minutes behind which put me at a disadvantage in trying to defend a small points lead.

The first leg into the wind was difficult with 2-4 knot blue thermals and a very shallow working band. Below 2500 agl the wind broke up the thermals and made them very hard to work. There was no room for mistakes.

Together with A1, PX and DB, we found weak but reasonably consistent lift under haze domes. Fortunately, we managed to keep our lead on the gaggle which was too big for its own good. Approaching the turnpoint, DB and I decided to better be safe than sorry and climb before the turn. PX, obviously in racing mode, proceeded straight into the turnpoint with the intention of climbing out with a tailwind in our thermal. Unfortunately for him, the lift was not workable at his level when he came in below us. Witnessing his slow demise made me even more cautious.

Reaching the turn I saw A1 500 feet below. Coming out of the turn A1 flew over the city of Woodstock where he found good lift (as Ed told me later). Instead of doing the same I made the crucial mistake of staying north of Woodstock reservoir, essentially backtracking on the first leg. It is clear that in windy conditions like this towns work much better than open fields. Woodstock also has a "house thermal"; everybody knows this, I should have known too. My decision was probably influenced by two factors:

1 We had found fairly consistent thermals on the first leg. By backtracking on this leg I expected to find the same. After all, the tough, into-wind leg was behind us; the rest should be easy.
2 I expected to meet the gaggle behind us marking a thermal. In addition this would have given me the opportunity to check who was in it. I met the gaggle alright, but they were cruising, not thermalling.

After having flown half way to Brantford without hitting lift it became evident that we (DB was with me) had made a big mistake and would meet a farmer soon unless we found a thermal. Being low and with the sun in our back we were also unable to see haze domes. In the distance we could see two gliders circling down in the trees (they eventually landed out) — not very encouraging.

I decided to try a small town and hit a ripple. Searching around, I felt a strong core but it was too narrow and broken to give us (DB had joined) much more than half a knot. As we kept losing it, it took us what seemed forever (10 minutes) to gain 300 feet. We were going nowhere. Looking west into the sun, I noticed a haze dome developing. Going there would have meant backtracking three kilometres on our course into the wind. I was reluctant to do this and decided to watch the situation for a little while. When a tiny cu developed on top of the haze dome it was clear, this was our ticket back into the race. Fortunately, we found the thermal without much searching and it got stronger as we climbed.

Finally after 20 minutes we were back in the race and headed for Brantford. The strongest thermal of the day welcomed us over the city (cities really work in these conditions!). Cambridge provided the top-up thermal for final glide to the last turnpoint and home. Still shaky from the almost-landout, I wasted another two to three minutes by adding too generous a reserve. With four days left in the contest I expected to have at least one, maybe two flying days to make up for today's mistakes. As it turned out, this was the last contest day.

I always find it fascinating after a contest day to review my decisions and to see what worked and what didn't. As a result of the wrong decision at the first turn I got low and lost about 20 minutes against A1, who after having found good lift over Woodstock proceeded without problems to the boomer thermal over Brantford to win the day. It's that simple.

conditions. At the morning pilot's meeting a 330 kilometre task was set for the FAI classes. The launch proceeded on schedule at 1300, however the lift was weak and broken up by the wind. Several people had to land for relights. The task was scaled down to a 185 kilometre triangle after the task committee advised the CD of the weaker than expected conditions.

Then, during the pre-start period, a *"MAYDAY"* was called, followed by the word, *"MIDAIR"*. The Competition Director cancelled the tasks, and ambulances were dispatched. Heri Pölzl directed the ambulances to the crash sight from his glider. One of the pilots involved in the midair managed to make it back to the airport and landed safely. The other pilot crashed into a Christmas tree farm about five miles from the airport, was hospitalized for two days and released.

A more complete account of the accident will appear in free flight following the investigation. ed.

Thursday 17 July
The conditions were again forecast to be weak with a strong westerly wind. A 130 kilometre task was set for the FAI classes and a 2 hour PST was set for the Sports class. Two sniffers were launched at 1300, but found only marginal lift. They were barely able to maintain position over the airfield against the strong wind. At 1400 the day was scrubbed.

And that was the contest. A strong beginning with good weather that unfortunately couldn't sustain over the last four days. The contest saw a long entry list with lots of competition for first place in Standard and 15m class. Congratulations to Walter Weir who didn't win a day in 15m but took it on consistently good flying, and to Ian Spence who is the giant killer in unseating Jörg from the Standard class throne he has held since 1993. (Ian last won in 1984 — a long wait to regain the crown.) As in Red Deer in 1996, an "unknown" and very good pilot from Poland ran away with the Sports class — we have to check up on this invasion— congratulations to Adam Zieba! A special mention also goes to Calvin de Vries, winner of the Novice trophy in 1995, who placed a strong second under Adam with his HP-14. ❖

THE TROPHY WINNERS ARE

MSC Trophy – 15m class champion
4497 points of a possible 4613
Walter Weir (2W)

Wolf Mix Trophy – Std class champion
4521 points of a possible 4692
Ian Spence (WW)

CALPA Trophy – Sports class champion
4543 points of a possible 4592
Adam Zieba (MF)

Dow Trophies (best assigned task flown)

15m class – 375.5 km @ 98.9 km/h
Heri Pölzl (KC)
Std class – 375.5 km @ 92.1 km/h
Ian Spence (WW)
Sports class – 194.1 km @ 84.8 km/h
Udo Rumpf (ET)

SOSA Trophy – best novice
Scott McMaster (DW)

O'Keefe Trophy – best team
Carsten Schraeder/Pat Templeton (PC)

1997 CANADIAN NATIONAL GLIDING CHAMPIONSHIPS

				DAY 1			DAY 2			DAY 3				DAY 4				DAY 5				total	
				day pos	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	pts	pos
15 METRE CLASS				214.2 □			375.5 □			327.4 □				185.7 △				138.2 □					
1	Walter Weir	ASW–20B	2W	3	93.8	870	2	98.7	997	2		89.4	992	3		67.7	949	2		74.0	689	4497	1
2	Heri Pölzl	LS–6b	KC	4	91.6	844	1	98.9	1000	1		90.0	1000	2		68.0	954	5		64.4	590	4388	2
3	Dave Springford	ASW–20	S1	5	87.4	795	7	92.5	914	5		87.1	958	5		66.8	930	3		70.1	649	4246	3
4	Chris Eaves	ASW–20	XU	6	82.7	740	5	94.2	p936	3		89.3	990	7		62.8	856	4		68.6	633	4155	4
5	André Pepin	DG–600	DB	7	82.5	737	4	94.9	945	7		84.3	916	8		61.5	p830	6		60.0	545	3973	5
6	Ulli Werneburg	ASW–20B	MZ	1	95.8	894	3	96.7	971	4		87.8	969	1		70.4	1000	8	30.2	0.0	70	3904	6
7	Peter Masak	Scimitar	PX	2	94.9	883	7	92.6	914	6		85.5	934	6		63.4	866	7	57.8	0.0	134	3731	7
8	Wilf Krueger	LS–6b	K2	9	(0.0)	p0	6	92.9	918	8		82.8	894	4		67.6	945	1		76.8	719	3476	8
9	Hans Juergensen	ASW–20B	J3	8	64.0	p520	9	80.2	p748	9		75.0	778	9		54.2	692	8	30.2	0.0	70	2808	9
STANDARD CLASS				214.2 □			375.5 □			327.4 □				185.7 △				138.2 □					
1	Ian Spence	ASW–24	WW	1	91.9	933	1	92.1	1000	2		86.5	969	6		61.5	875	2		71.6	744	4521	1
2	Jörg Stieber	LS–4	JS	2	87.8	880	3	90.6	979	1		88.6	1000	2		67.9	987	8		62.0	625	4471	2
3	Jim Carpenter	Discus	ZZ	3	91.9	p833	2	90.9	984	3		86.4	967	1		68.6	1000	10		53.3	516	4300	3
4	Ed Hollestelle	SZD–55	A1	6	75.6	720	5	87.4	934	4		82.9	916	4		65.8	951	1		72.8	759	4280	4
5	Colin Bantin	Std Cirrus	3B	7	70.7	656	6	80.8	843	5		81.3	893	11		53.7	739	5		66.8	684	3815	5
6	Dave Mackenzie	SZD–55	DM	13	54.8	449	7	80.5	839	8		77.5	828	10		54.8	759	7		63.2	p639	3514	6
7	Kerry Kirby	Std Jantar	69	8	70.6	p604	12	74.6	756	12		71.0	744	9		56.9	796	9		60.8	609	3509	7
8	Andy Gough	SZD–55	44	14	(156.0)	p243	4	90.2	974	11		71.3	748	7		60.9	865	6		64.5	656	3486	8
9	Paul Thompson	LS–4	T2	4	82.3	808	9	78.9	816	7		77.4	838	5		65.4	p918	12	34.0	0.0	75	3455	9
10	Richard Longhurst	SZD–55	4Q	9	65.0	582	10	78.8	814	9		76.1	819	13	140.6	0.0	303	3		67.7	695	3213	10
11	Kurt Meyer	Discus B	AL	12	60.9	p528	8	79.1	818	6		79.8	871	8		60.2	852	14	dnc		0	3069	11
12	Ray Galloway	ASW–24	P1	5	81.8	802	14	(179.1)	170	14	124.0	0.0	135	3		66.4	962	4		67.5	693	2762	12
13	Fred Hunkeler	Std Jantar	1M	10	64.2	571	11	77.6	798	13		68.4	707	12		44.6	580	13	19.4	0.0	43	2699	13
14	Tim O'Hanlon	SZD–55	TJ	11	61.2	532	13	70.4	697	10		75.5	810	14	62.8	0.0	135	11		43.3	p343	2517	14
SPORTS CLASS				152.0 □			194.1 △			4 h PST				4 h PST				4 h PST					
1	Adam Zieba	Std Jantar 2	MF	1.00	1	85.7	p709	2	87.9	856	1	298.1	77.8	1000	2	211.0	58.9	p978	1	206.0	51.5	1000	4543	1
2	Calvin Devries	HP–14+	LT	1.00	6	70.9	531	4	86.6	808	3	273.7	68.4	797	5	176.6	49.6	709	2	154.8	58.8	994	3839	2
3	Charles Yeates	PW–5	YC	1.20	3	56.4	p568	10	51.9	553	5	216.3	55.4	776	3	147.0	47.6	877	5	110.4	34.9	610	3384	3
4	Newfield/McMaster	Hornet	DW	1.00	2	73.3	578	3	85.5	822	6	236.7	68.5	p750	1	224.4	58.6	1000	14	32.4	0.0	81	3231	4
5	Al Wood	1–35	AR	1.01	8	58.1	p424	6	73.0	662	9	264.1	68.9	p633	7	147.0	49.4	683	4	154.8	40.8	658	3060	5
6	Udo Rumpf	HP–18	ET	1.05	4	66.6	554	1	84.8	883	2	274.1	74.2	p977	10	195.4	0.0	p388	12	73.6	0.0	p184	2986	6
7	Len Dolhert	DG–200	LD	0.97	7	62.8	438	7	76.1	653	3	252.1	71.4	797	6	147.0	53.0	700	9	77.4	38.7	374	2962	7
8	Schraeder/Templeton	G103	PC	1.11	10	47.3	384	5	67.6	706	10	188.1	50.5	549	4	147.0	48.7	791	7	77.4	34.2	411	2841	8
9	Tracie Wark	ASW–19B	SQ	0.98	11	52.6	340	14	63.1	490	7	256.5	64.1	711	9	147.0	41.8	506	3	154.8	46.4	736	2783	9
10	Hans Berg	Std Cirrus	HB	1.00	5	69.6	538	11	71.5	p528	8	242.8	62.8	698	14	106.3	0.0	211	6	128.8	42.2	609	2584	10
11	Gino Cavicchioli	Libelle 301	14	0.98	9	57.8	395	8	73.0	624	11	209.9	54.8	510	12	176.6	0.0	344	11	77.4	27.9	p191	2064	11
12	Chuck Keith	SZD–55	55	0.96	13	44.4	p243	9	71.6	580	12	215.5	53.9	482	11	140.5	35.1	p350	13	62.6	0.0	p151	1806	12
13	Tom Coulson	Mosquito	W2	0.98	14	(50.4)	82	13	64.2	505	13	158.5	56.0	456	15	79.9	0.0	156	8	77.4	38.7	384	1583	13
14	Dugald Stewart	Cirrus 75	HG	0.98	12	52.4	338	12	65.4	522	15	124.6	0.0	173	13	115.6	0.0	225	10	77.4	32.1	p247	1505	14
15	Russ McAnerny	PW–5	PW5	1.20	15	(4.4)	9	15	(0.0)	0	14	152.9	38.2	362	8	147.0	38.9	677	15	10.0	0.0	30	1078	15

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

The nature of flight limitations

The following discussion on design philosophy may help pilots to better appreciate the limitations of their machines.

H.A. Tarode
Chairman BGA Technical Committee
from *NZ Gliding Kiwi*

WHO NEEDS design standards anyway? In contrast to vehicles and boats, aircraft have only emerged as a means of transport in the last 90 years. From early days the risk associated with their operation was so obvious that design was regulated with a view to protecting pilot, passengers, and the public at large. The prime aim of requirements is to define a necessary strength minimum giving due regard for the imprecision and tolerances of the design and construction processes. These limitations should also enable the designer to provide an attractive and performing product with maximum commercial efficiency and not overburdened with unnecessary capabilities and complication. Consider that when you discuss the merit of a particular new acquisition with your partners, the conversation is generally confined to the finer points of performance and handling. The airworthiness of the basic design is taken for granted. This confidence demonstrates that the airworthiness design codes are in good shape.

UK gliders used to be designed to British Civil Airworthiness Requirements (BCAR) Section E Gliders. This was superseded in the 60s by the work of OSTIV, which went on to form the basis of Joint Airworthiness Requirements (JAR), Part 22 which was adopted by the European Community in the early 1980s. Today virtually all sailplanes, including those from eastern bloc countries, are certificated to JAR 22.

Setting a boundary to the problem

The core of any design code is its formulation of a 'design envelope' which specifies a range of flight conditions within which a sailplane can operate *and* remain safe and secure. This envelope is bounded by combinations of airspeeds and load factors ('g') which provides the designer with a closed problem of safety validation. Some boundaries are natural, like stalling which limits the amount of air load that an airframe can generate on itself. Other limits must be judged on the basis of providing an airworthy vehicle.

The most evident limit is that of a maximum speed, in designer's parlance the design dive speed. It is well known that, all other things equal, air loads vary with the square of airspeed, so setting an upper limit on speed goes a long way towards creating a definable problem. Obviously we must provide for adequate maneuver capability at higher speeds, but there is some opportunity to optimize the structure if it is accepted that the pilot will react to noise and heavy control forces and use only limited control movements when at high speed.

The requirements define design maximum load factors, in both positive and negative senses. For semi-aerobatic sailplanes a positive 'g' design limit of around 5 has proved to be adequate for general use. Higher factors are required for fully aerobatic types. At low speeds it is impossible to achieve such loads since stalling limits the airframe loads, but at higher speeds (above 2 to 2.5 times level flight stall speed) very high load factors can occur before stalling. At cruise speeds we must choose between a radically over-strength airframe or select a limit load factor boundary above some specified airspeed. To the designer this speed is known as *maneuver speed* or to the pilot, as *rough air speed*, since below this speed an extreme gust will stall, not break, the airframe. Additionally, requirements stipulate that the airframe should be capable of withstanding full, instantaneous application of any or all controls at the maneuver speed. If it is not already obvious, these two requirements in combination offer you, the pilot, a remarkable safeguard:

Below rough air speed it is not possible to break your sailplane either by encountering a gust (no matter how severe, since it will stall you) or through your own use of whatever combination of control movements.

At the higher design dive speed, the limit load factor is normally accepted as somewhat lower (4 'g' in JAR), and only limited control applications (one third movement) are catered for. To close the envelope completely, similar arguments can be applied to flight under negative 'g'. It is appreciated that high speed negative 'g' stalls are not everyone's cup of tea! This closed envelope of flight conditions can be characterized by a number of key 'corner points' which will create differing load conditions on all structural components of the airframe.

Where does it hurt (and how much)?

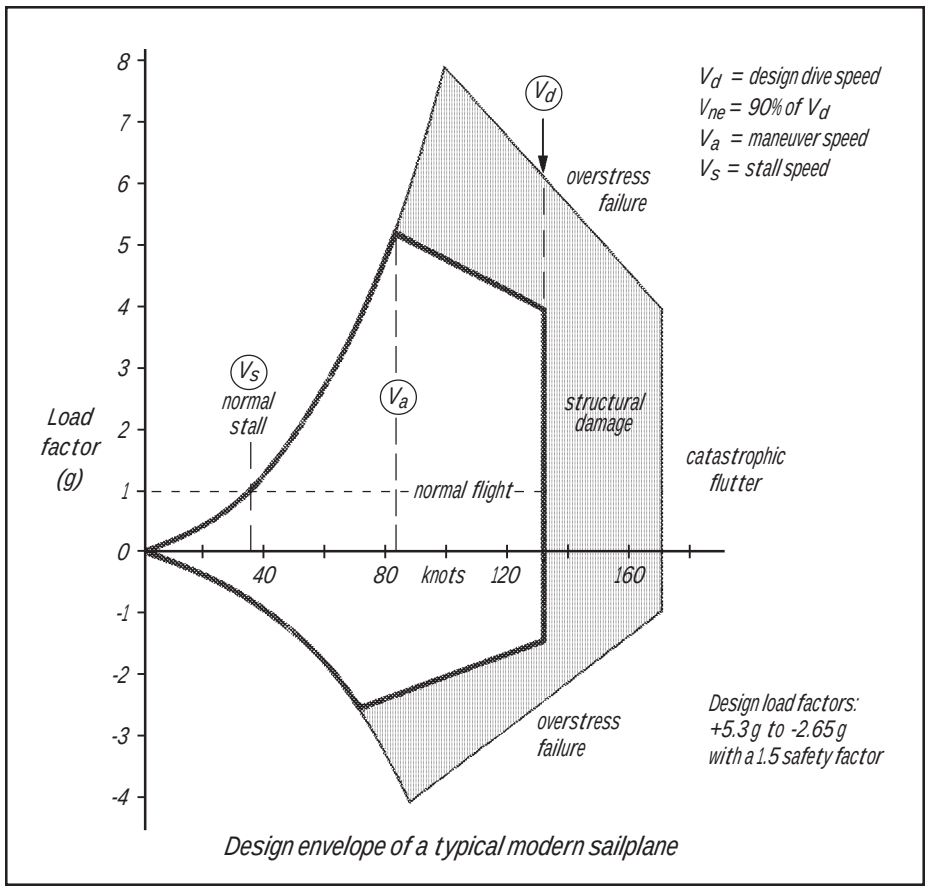
The designer meets his obligations by evaluating the loads experienced by all structural components at all the design envelope's corner points to determine which cases are critical. To do this he will already have had to define the overall configuration of the proposed sailplane to the extent of its external shape, its expected weight and weight distribution (including water ballast if planned). This is the nitty-gritty of design and comes after all the fun bits like picking the best wing section or a new planform to increase performance. The work is basically aerodynamic in nature, and a good alround insight is useful in spotting the critical cases. It is worth noting the diverse contributions on such flight loads:

1 Loads required to hold the glider in trim (*balance* loads).
2 Loads introduced by the pilot through specified combinations of control demand (*control* load).
3 Loads created during maneuvers as a result of the distributed mass of the sailplane (*inertia* loads).
4 Loads imposed on the sailplane when it encounters rough air and turbulence (*gust* loads).
5 Point loads applied to the sailplane for the outside, eg. during landing impact, or from towropes (*external* loads).

In some conditions a single contribution can be dominant; for example, wing bending strength is almost invariably designed by the maximum 'g' pull up maneuver speed. In other situations the various contributions cancel each other out; wing twisting loads are actually reduced as you pull up from a steady high speed condition. The designer is looking for the critical combinations of loadings from these various sources to establish which will limit any particular structural component.

There are several lessons in this for the average pilot. Firstly, the airframe loads to trim (balance loads) are only one part of any critical combination. Thus it is unlikely that a sailplane will fly apart just because you are at a limit condition. On the other hand it is not unlikely that in gaining or recovering from that limit condition some particular component will encounter its critical load combination particularly in rough air. *For your own part as pilot, the best way of reducing this risk is to minimize the not insignificant contribution of control loads (and inertia loads) by handling with care.*

Secondly, the maneuver and gust loads are the only loads which are experienced by the pilot (because they maneuver him too). All other loads are reacted within the airframe and are *not* manifested as 'g' load. Unless the pilot has specialist knowledge he will not necessarily appreciate these. This has been realized to be a particularly important issue in the recent review of winch



Design envelope of a typical modern sailplane

launch safety but there are parallels in other flight cases too.

Bend or bust?

Once the critical loads have been determined the glider can be designed in detail. Simple calculations are often used to confirm that a noncritical component is well within limits. But for major issues, such as wing bending strength, the calculation will be carried out with some precision since excessive strength will result in a significant weight penalty. Designers are generally cautious chaps, but what about the choice of materials and the construction processes? Is it possible that nonconservative assumptions could be undermining our security?

Structural materials vary in their failure characteristics. Under high loading some distort permanently while continuing to function in a degraded manner. Others, albeit equally as strong, fail in a sudden manner without any prior signs of suffering. Crystalline materials such as metals fall into the first category; fibrous materials such as wood or composites fall into the second. Design practises take this into account.

Materials with good yielding properties are required to withstand their critical design load without suffering permanent distortion, the so-called *proof* design case. This aspect is usually critical for the majority of metal fittings in a glider. Materials which fail abruptly are required to be exercised to only two-thirds of their ultimate failure load within the flight envelope, the so-called *ultimate* case. In cases of new or untried materials, special lab tests are required to define which is the critical issue.

With untried materials an extra factor of safety may be demanded; this was the case when glass reinforced plastic gliders were first developed. With experience these factors can be reduced, which is why later generation glass gliders exhibit much greater structural flexibility and lighter weight than earlier designs.

So what does this mean to the pilot?

The good news is that there is conservatism built in at all design stages: your sailplane is *probably* even stronger than the designer thinks. But the message to the pilot here is: hands off. These margins, which protect us from design approximations and construction tolerances are the designer's and constructor's built-in insurance policy. They are not easily quantified and may vary with the glider's condition. Exceeding envelope limits is irresponsible and taking serious liberties with the terms under which your sailplane is supplied, quite apart from being personally dangerous. Your insurer might also be interested.

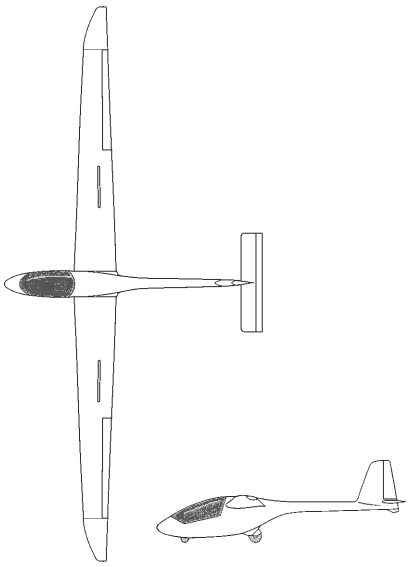
Strength alone is not sufficient

Considerations of structural stiffness are additional to the above. Even given the latest generations of stiffer fibres such as carbon and aramid derivatives, many parts of a modern sailplane's structure are still dominated by stiffness considerations rather than strength. The wide differences in the stiffness characteristics of the various structural materials also complicate matters. Now, not only sailplane wings but all structural elements must possess the appropriate stiffness and mass distributions.

The word 'flutter' is often used out of context to describe any form of in-flight vibration. This confusion would not exist if actual flutter were a common experience! Flutter is a mutual resonance between two modes of flexibility which spontaneously occurs once a critical airspeed is reached. Most forms of genuine flutter (and there are many) break out with no warning and are extremely destructive. Recent accident investigations involving overspeed cases in composite sailplanes have always shown evidence of failure induced through flutter. It is likely that once the oscillation has erupted there is little a pilot can do about it. All current requirements demand a 25% safety margin over the design speed if clearance is sought by calculation alone.

Technology marches on – at a price

These days there is a continuous demand for higher performance and better handling qualities, so few stones are left unturned to achieve an edge. In new gliders much of the conventional design conservatism has been removed in a controlled way in the optimized design. This leads to a situation where there are fewer or no 'soft' limits. If you ride beyond those limits you will come to harm. Maybe not this weekend but sooner or later. ❖



PW-5 impressions

Charles Yeates & **George Graham**
Bluenose Soaring

The Minister of Transport signed Type Approval Certificate G123 on 4 June, covering the PZL-Swidnik version of the PW-5. Canada became the nineteenth country to issue such a certification. Perhaps it's time to note that the World Class glider has evolved from an idea into a movement. PZL-Swidnik, the Polish manufacturer, is shipping sailplanes as quickly as they can be built. Apeks Aviation in the USA is teaming up with a keen manufacturer in the Phillipines who is building a new factory to become a second source of the PW-5. The USA anticipates having 48 flying by year end, while New Zealand will have 27.

I bought and registered N202HB early in April and in two months have enjoyed over a hundred hours of delightful flying. Most of that time was spent trying to learn how to fly effectively along and over the ridges of Pennsylvania, starting at Tom Knauff's Keystone site and ending up in the first PW-5 Nationals at Mifflin Co airport.

Today the little ship with a big future is winch launching out of the Bluenose Soaring site in Nova Scotia. Pilots find the sailplane appealing. George Graham recently wrote after his first flight:

"I have flown the future and it's all we need.

Staring over the instrument panel of a new glider at the winch over 4400 feet away, you realize that you're about to embark on a steep learning curve. From ground at zero to stable in the full climb will take less than ten seconds in this lightweight PW-5. Into that short time you will have to compress all the control feedback information on pitch, roll, and yaw regarding this new glider needed to stay out of the weeds and to prevent either an overly steep climb or the kind of nose down reaction that would cause the parachute to billow dangerously beneath you. Had you had been generously afforded the opportunity by Charles Yeates to fly his neat new machine, a tad of moisture might have brightened your brow too.

Not to worry. The tandem wheels of the PW-5 track straight on roll out, and, as Charles promised, the powerful trim helps tailor the profile of the early launch climb within safety limits. Once in the full climb, it's much a matter of hanging on, as the stabilizing physics of the winch launch and good launch-hook location allow the pilot to settle back to eyeball the airspeed and the angle of climb.

I had worried that the light weight of the PW-5 would lead to overspeed conditions, but the combination of a generous winch V_{ne} of 65 knots and skilled winch driving cancelled that concern. I had time to look out, which I could hardly help doing, so spectacular is the visibility afforded by that canopy (mind you, instructors who live in the back seats of K7s are easily impressed). Like never before I got to admire the rapidly widening landscape, in fact too long so, to be somewhat caught by surprise when the click of the hook told me that the winch driver had dropped me off the wire.

Nothing at the glider end affects launch height like weight, and with the PW-5's trim figure, I saw what looked like 2000 feet both to the eye and on the altimeter — I can't say for sure because the altimeter was a bit of an oddball in that each rotation of the big hand indicated a climb of 3000 feet rather than the 1000 we expect. Apparently the instrument maker had simply calibrated the altimeter face in feet on top of innards designed for metric markings. I didn't take time to sort it out because the vario was screaming at me to pay attention.

Dutifully wrapping the PW-5 into the uncommonly turbulent thermal, I found the ailerons quick in effect but a touch heavy to hand compared to my experience flapping those of Ka6E CF–VKA in a recent flight. The rudder also felt a tad heavy, but I had not given myself quite enough forward seat adjustment, and so was working at the extreme end of leg travel even with full back rudder adjust. Once I moved the trim back, I quickly realized that I could let the trim do the talking as far as pitch control was concerned. Good thing. The averager proclaimed 7 knots plus, while the torn turbulence provided a wild ride, and by the time I sorted out the thermal and the radio, switching to Halifax Terminal on 119.2, I was well above our 2900 foot ceiling and into "their" airspace.

They were happy to have me run up to cloudbase (maintaining the proscribed separation of course) and it didn't take long as clouds were flattening their bottoms on the 4700 foot riser level of the great grandstand in the sky. Before I had a chance to rack the PW-5 over to the opposite turn to try out the 45 to 45 degree banking time, I had to lower the nose to stay VFR. I headed down to tackle other thermals in the playing field below.

The performance during the run was eye-opening, especially when I eye-balled the wingspan. How could the relatively short wings of this "Dash 5" cut such a flat slope through the sky? Dash indeed. Not only do you cover the country in jig time (80 knots is jig time to someone of my age) but, because of the PW-5's low mass, you get dancing up a jig in strong short cycle turbulence. With the air going up and down at 8-10 knots, being egg-beatered together by 20 knot winds, the PW-5 gave a busy ride. It's not that the pilot is kept busy on the controls — the glider simply reacts quickly to air going up and down, and so while it's quite yaw and roll stable, and the super-effective trim locks the horizon onto your selected level of the canopy, on this wild day the tidy PW-5 provided a sport's car ride.

Compared to the British sport cars of my college days, the PW-5's cockpit is ever so much more comfortable (did I mention that the slipstream noise truly is of the level we so often lie about when we call our hobby "the silent sport"?). Everything "falls readily to hand", as the British say. Then there's that view. Hail Britannia! Why are not all canopies created equal?

The rest of the hour I played power pilot, running about the sky with no need to thermal (a "real" power pilot called to tell me that the PW-5 in profile looked like a miniature Bell Jet Ranger). The penetration performance was such that, the more I flew, the more convinced I became that the performance of the PW-5 is all one needs to discover the joy of soaring; all one needs

to know for the lasting satisfaction of adventurous cross-country flight. Finally remembering I had been flying someone else's glider for almost an hour, I found a sink hole and spiralled down. While so doing I got to rack the PW-5 over from 60° to 60°. It moved adroitly, but you did have to put your wrist into it. The yaw string stuck where it should better than what usually happens when I try such maneuvers in other aircraft. Perhaps it was beginner's luck.

I couldn't ask for better behaved divebrakes. Their light operating force did not change over the speed range I investigated on by two-mile long downwind (45 to 70 knots), and in combination with that effective trim, the PW-5 pretty well looked after the approach speed on its own despite the strong lift and sink encountered during final. The landing did not make undue skill demands despite the turbulence. Once both main landing wheels came down, however, the glider went where it was pointed. Clearly you had better be going in the desired direction on touchdown, for where you're pointed is where you're going. If you don't get it right, the combination of low mass and effective wheel brake allows you to stop short of undesired consequences.

Have you ever derigged a glider with 80 pound wings? Why didn't someone make this machine 20 years ago? The World Class PW-5 provides us with the ease of rigging we all long for, and bestows the kind of classy performance and price that shows off our sport to the world."

. . . . . .

Here is a sailplane with a max L/D of 33 and a cruise of 85 knots at the 2 m/s sink rate, that seems ideal for clubs and is very appealing for economical competition flying. Eight of the type flew at the first US World Class Glider Nationals. It was a serious event because the winner and runner-up pilots will compete at the World Air Games in Turkey in September. Pilots who regularly appear at the top of the 15m and Standard classes flew PW-5s. After six competition days in a week, often in winds of 20-30 knots, Clem Bowman and Bill Bartell won the coveted trip to Turkey. Karl Striedieck was appointed by the SSA to fill out the three pilot team. They will provide other countries with stiff competition.

A surprising and unexpectedly positive aspect of the competition came from the use of lead shot bags under the cockpit seat pan to ensure all ships flew at gross weights within a range of twenty pounds, ie. between 640 and 661 pounds. You *knew* that differences in daily standings were a result of pilot skill rather than who could afford the latest expensive equipment. The final day was a good example. There were strong ridge winds and 8-10 knot thermals producing cu with bases at 7500 feet. The fastest PW-5 flew straight at ridge top, except for two transition thermals and averaged 56 mph. I stayed higher about half the course and averaged only 44 mph. That was a lesson learned.

Costs in Canada? A fresh quotation from PZL-Swidnik offers a group of six PW-5s shipped in one container for delivery in March 1998, ex port of Gdynia, for CHF23,800 each (US$16,500 or Cdn$ 22,700). The cost of transporting a container to Halifax, plus port charges, divided by six, would bring the landed cost to about Can$23,500 before taxes.

The ship comes instrumented, ready to fly and the PZL variometer is total energy compensated. Only a radio ($400 – Delcom to $3000 – Dittel FS71M) needs to be added. Trailers must be built or bought from one of three sources in the USA. Detailed copies of the PZL-Swidnik quotation are available from me on request.

Summarizing some of the things you would appreciate as an operator:

- Light weight for easy one or two person assembly,
- Sitting on two fuselage wheels, even when empty, is a blessing when ground handling or working on the instrument panel,
- One person can easily trundle the ship around the airfield if a wing wheel is mounted,
- The excellent clearance of tail and wingtips guarantees no trouble, soft off-field landings,
- The cockpit size and comfort is super — as big as an Open Cirrus — a 6'-4" pilot from Maine was amazed at how comfortable it was for him,
- The visibility when flying is as George said — great,
- The two wheel arrangement means a low angle of attack at start of takeoff that gives immediate aileron control,
- Relatively small size and weight make off-field landings in the east a low energy matter,
- Airbrakes can control L/D from 33 down to 6.5 to 1 and then you can sideslip to further steepen any approach over trees or other obstacles,
- The positive trim system can give you hands off speed control from 40 to over 90 knots,
- Stick forces are always light and the roll rate is good,
- It will outclimb anything but another PW-5 and run at 85 knots in 6 knot thermal conditions.

You can find more information at the following web sites:

World Class Soaring Association
http://www.wcsa.org
PZL-Swidnik
http://www.brk-gov-pl.or.at/oferty/pf000010.htm
Uvalde Soaring Association
http://www.glider.com/pw-5/
Apeks Aviation
http://www.mindspring.com/~apeksav/
Pictures
http://www.geocities.com/CapeCanaveral/7112/pictures.htm ❖

Do winglets work?

Steve Smith
from Pacific Soaring Council *West Wind*

WELL, in a word, yes. But don't they hurt high speed performance? Not necessarily. It seems I'm often discussing winglets with glider pilots. So I'd like to try to provide some technical framework for understanding what winglets do.

Sources of Drag First, in order to understand winglets, you need to understand drag. Airplanes have three primary sources of drag. The first source is often called parasite drag or profile drag, and this has to do with the skin friction created by airflow over the aircraft surface. The second source is called induced drag, which is a result of generating lift with a finite wing span – an infinite wing would be nice, but it won't fit in your trailer! The third drag source is caused by compressibility effects on aircraft that fly nearly as fast as the speed of sound, or faster. Except for John McMaster's *Altostratus*, we don't need to worry about compressibility drag. The primary effect of winglets is to reduce the induced drag.

Parasite drag is naturally affected by the amount of wetted surface area. It also depends on whether the boundary layer is laminar or turbulent – but that's another story. For now, you need to know that parasite drag increases in proportion to the square of the airspeed. This turns out to be sort of universal – most aerodynamic forces increase in proportion to the square of the velocity, because the ability of the air to produce forces is related to the kinetic energy in the flow:

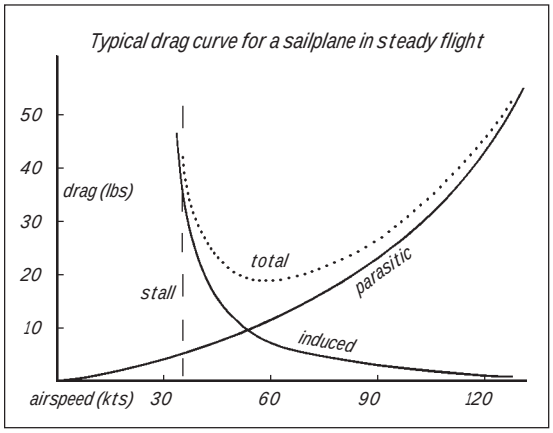
$$D_{parasitic} = k\mu V^2$$

Induced drag is a bit more complicated. A finite wing ends with a wingtip, where the higher pressure air under the wing can leak around the end and fill the low pressure area on top of the wing. This flow around the tip forms a vortex that trails off downstream. The flow around the tip also reduces the lift in the area near the tip by tending to equalize the low pressure above the wing. The vortex contains energy in the form of the swirling flow velocity. We call the force required to pull the wing along to produce these tip vortices "induced drag". The mechanism through which the wing "feels" the presence of the tip vortices is the downward velocity induced on the wing by the vortices. It is as if the wing is flying in a self-generated region of sink.

This concept is very oversimplified – a more realistic explanation requires a fair bit of math and physics. What really happens is that vorticity is shed all along the trailing edge, not just at the tip. The distribution of lift along the span of the wing determines how much vorticity is shed along the trailing edge. It can be proven that for a planar wing (no winglets), the induced drag is the smallest when the spanwise distribution of lift is shaped like an ellipse. This lift distribution produces the vorticity distribution with the minimum energy. In steady flight, induced drag varies in proportion to the square of the weight, and inversely with the square of the wingspan and velocity:

$$D_{induced} = k\mu(W/bV)^2$$

If the aircraft is heavier, it needs more lift, and so produces more induced drag. If the lift is distributed over a longer wingspan, the trailing vorticity is spread out more as well, dissipating less energy. If the aircraft flies faster, it produces the same lift with less angle of attack, less disturbance to the flow, and creates weaker vorticity in the trailing wake.



For a given aircraft weight, the total drag is the combination of the parasite drag and the induced drag. Looking at the above diagram, you can see that a minimum drag point occurs where the parasite drag and the induced drag are equal. At lower speeds, the parasite drag is small, but the induced drag increases very fast. At higher speeds, parasite drag increases but induced drag becomes small. This trade-off between parasite drag and induced drag is what makes the design of winglets interesting.

How do winglets reduce induced drag?
Adding a winglet to a wing has a similar effect to adding wing span. By providing more length of trailing edge, the vorticity is spread out more for the same total lift, so the energy loss is less. The detailed interactions between the wing and winglet are a bit different than a simple span extension, but the effect is similar. In both cases, the induced downwash is reduced. A well designed winglet is equivalent to about half its height in span increase. At the same time, the winglet adds much less additional structural load to the wing than a tip extension does. Detailed studies of the combined structural and aerodynamic effects of winglets on transport aircraft show that they are not quite equal in overall performance to a simple span extension. Current conventional wisdom states that winglets should only be used in cases where there is some limiting constraint on wingspan. Applying these results to sailplane design would indicate that winglets should not be used on Open class sailplanes, but should be used on 15 metre and Standard class sailplanes.

What about high speed performance?
Looking at the figure, you can see that induced drag becomes unimportant at high speeds, whereas the parasite drag becomes dominant. A crossover point occurs where the induced drag benefit of the winglet is outweighed by the increase in parasite drag.

Here's a realistic example. Suppose a winglet is installed that reduces the induced drag by 10% and adds 1% to the parasite drag. At the speed for best L/D, where induced drag and parasite drag are equal, the net improvement would be 4.5% (.5 x .1 – .5 x .01 = .045). This amounts to about 6 ft/min for a typical 15 metre sailplane. At a speed of 1.73 times the best L/D speed, parasite drag is 90% of the total, and induced drag only 10%. At this speed, the net improvement is almost zero (.1 x .1 – .9 x .01 = .001). For a sailplane with a best L/D speed of 60 knots, the theoretical crossover speed for these winglets is 104 knots. Above this speed, these winglets degrade performance.

But overall cross-country performance is a balance between the low and high speed performance. Classical MacCready theory indicates that 50% of the time is spent cruising and 50% climbing. In this case, the break-even speed would occur where the disadvantage at high speed equals the advantage at low speed. Because the actual drag is much higher at cruise, we can't compare on a percentage basis. The comparison must be made based on actual sink rate. Since half the time is spent cruising, the break-even cruise speed occurs where the increased sink rate equals the reduced sink rate at low speed. In other words, how fast do you need to fly so that the sink rate with winglets is 6 ft/min greater than without winglets? For the example used here, this occurs at 2.3 x best L/D speed or 138 knots. It's pretty rare that your MacCready directed speed to fly would be this fast!

You might point out that as soaring conditions become stronger, the MacCready model doesn't apply: the fraction of time spent circling becomes much smaller. But that doesn't necessarily mean that the time spent flying slow (near best L/D) also becomes small. Efficient use of cloud streets still dictates flying slowly in good lift. So,

suppose you never fly slower than 70 knots. At this speed, the winglets improve your sink rate by almost 4 ft/min. You would need to fly 118 knots in order for the winglet penalty to be 4 ft/min, negating the benefit. About the only situation where soaring speed is consistently high enough that winglets would actually hurt overall is ridge running. Even in ridge soaring, there may be long gaps to cross where the benefit of the winglets would offset any cruise penalty.

Can the same argument be applied to tip extensions?
Well, that depends on the structural limitations on the sailplane. First of all, for the same improvement in induced drag, a shorter span extension will be required (about half, right?) but the tip extension has more wetted area, so more parasite drag. This added area is needed to prevent the tip extension from stalling at low speed. The reason winglets don't need the same area to prevent stalling will be explained later.

Anyway, a tip extension equivalent to the winglet example might improve induced drag 11%, but add 2% in parasite drag. At the best L/D speed: .5 x .11 – .5 x .02 = .045 (once again). But there is a crucial assumption hidden in these examples. The comparison is made at constant weight. If you install your tip extensions, are you allowed to ballast the sailplane to the same weight? If so, then the example is still valid. Now compare the performance of this tip extension at 1.73 times the best L/D speed, where parasite drag is 90% of the total, and we find: .1 x .11 – .9 x .02 = -.007. So, now the tip extension that appeared to be equivalent at low speed degrades high speed performance 0.7% at the speed where the winglets still provide a 0.1% benefit. One way to explain this is to say that the tip extension reduced the wing loading. What is really happening is that the parasite drag was increased for the same weight. What if you must reduce the gross weight when you install the tip extensions? In that case, the tip extensions hurt even more. This also illustrates why high wing loading is so important for Open class sailplanes.

The results here depend on many assumptions, but they do challenge the conventional wisdom that winglets are not as good as tip extensions. One major difference between sailplanes and transport aircraft is the range of speeds over which they perform. Transport aircraft adjust their cruising altitude so that they cruise only slightly faster than the best L/D speed, but sailplanes are expected to perform well at almost twice the best L/D speed.

What about stall? I mentioned that tip extensions are prone to tip stall, but winglets are not. Two effects come into play here. First is that fact that as you scale down an airfoil, the critical angle of attack for stall is reduced. This is called a "Reynolds number effect". In essence, the basic character of the flow is affected by the size of the wing. To achieve the desired elliptical lift distribution, you would like to make the tip chord very small, but if the chord is too small, it will be prone to stall early. So, now you want to put a tip extension on the wing, and you still try to achieve that elliptical lift distribution, but the tip chord must not get too small. So, you maintain more surface area and compensate by reducing the airfoil camber or twisting the wing slightly to reduce the tip angle of attack.

The added wetted surface area increases the parasite drag. The second effect explains why winglets can have such a small chord (and therefore smaller wetted area) without stalling. As the sailplane slows down and the angle of attack increases to maintain the lift equal to the weight, the tip extension experiences the same angle of attack increase, but a winglet does not. The flow angle experienced by the winglet is determined by the strength and distribution of the trailing vorticity, which is indirectly influenced by the increased angle of attack. The net result is that the effective increase in angle of attack for the winglet is much less than the increase in angle of attack on the wing. So, the lift doesn't build up as fast on the winglet and the wing stalls first. In practise, this effect is exploited to reduce the wetted area of the winglet as much as possible to the point where, ideally, the wing and winglet would stall at about the same time.

Other good things about winglets
Aside from the performance improvement offered by winglets, there are other benefits. The most notable of these are the increase in dihedral, increase in aileron effectiveness, and the reduction of adverse yaw. The increase in effective dihedral improves handling in thermals. There is less need for "top stick" to prevent a spiral dive. The impression is that the aircraft "grooves" better in a turn. The increase in aileron effectiveness and the reduction in adverse yaw both come from the lift of the winglet when the aileron is deflected. When the aileron is deflected, there is less "tip loss" of the added lift. There is much less of an increase in the tip vortex strength, again because the vorticity is spread out along the longer trailing edge, and the tip is further away. As a result, adverse yaw may be eliminated. For heavily ballasted sailplanes, the increased control and safety offered by the winglets may be a big advantage, regardless of any improvement in glide performance.

Other bad things about winglets
One disadvantage that is not often discussed is the reduction in flutter speed. Classical flutter occurs when the natural frequency in bending and the natural frequency in torsion get too close together. The torsion frequency is always somewhat higher than the bending frequency. By adding weight above the plane of the wing, the torsional moment of inertia is increased, which reduces the torsion frequency of the wing. Of course, tip extensions also reduce flutter speed. Both can be compensated for by clever addition of balance weights to the wing, but this is a complex problem requiring sophisticated analysis.

Conclusion I hope I've answered more questions than I've raised. I'm happy to discuss winglets in more detail with anyone, feel free to contact me by email at *scsmith@mail.arc.nasa.gov* ❖

Steve Smith is a Senior Aerospace Engineer at the NASA Ames Research Center. A full discussion of winglet design concepts can be found in "free flight" 2/92 p6.

SAC news

AIRSPACE NOTES

Some good news has come from the Ottawa Aeronautical Study. At a meeting at Ottawa airport on 14 July, NavCan announced that an interim TCA would be implemented at Ottawa by NOTAM effective 19 July. The interim TCA is a 24 nm radius circle with floors variously between 1500 and 4000 feet asl, within which Class D rules apply. The airspace from 24 nm to 35 nm and between 6500 to 10,000 feet asl is designated Class E airspace (transponder required), which in effect puts no restrictions on gliders outside the 24 nm radius circle. The interim TCA is essentially identical to the recommendation of the Ottawa Aeronautical Study at which SAC and Ottawa area clubs participated. Furthermore, NavCan has committed to review the design of the TCA in the fall, and in particular to study whether further reductions in size to 22 or even 20 nm radius are feasible. After spending about a person-month on meetings since April, the Airspace committee, SAC office, and local clubs are pleased to see their labours bear fruit.

The Airspace committee has been in contact with Cu Nim Gliding Club reps with regard to the recent Calgary Aeronautical Study, from which additional positive results will hopefully emerge.

All glider pilots should note that they are legally obliged to conform to the Air Regs and should therefore comply with the rules for the airspace when entering a TCA. The TCA's are here for good. Acting as if they weren't, does other pilots, the travelling public, and soaring a disservice. The risk of a collision between a glider and an airliner is small, but any risk caused by irresponsible action on the part of a glider pilot is unacceptable. Furthermore, in Canada there have been recent, well documented sightings of gliders by airline pilots. The gliders all were flying legally and still the airliners didn't like it. If sightings continue and the gliders are flying illegally, then all glider pilots will pay a heavy price. Read the article on preventing midairs between gliders and heavy aircraft by Jim Short, the SSA's government relations officer on page 5.

Ian Grant
member SAC Airspace committee

photo unavailable

FIRST CORLEY SCHOLAR

SAC is pleased to announce that Andrea Kuciak has been selected as the first recipient of the Corley Memorial Scholarship. Andrea is at the University of Waterloo, where she is in second year Mechanical Engineering. She enjoys both the theoretical and practical aspects of engineering and her plans include graduate work. Andrea has been an active member of the SOSA Gliding Club for the past three years.

1997 SAC "MEMBERSHIP METER"

Club	Membership (31 July) 90-96 avg	1997 total	% avg
ASTRA	5	7	140
Air Sailing	29	18	62
Alberni	12	12	100
Base Borden	15	13	87
Beaver Valley	11	14	127
Bluenose	39	25	64
Bonnechere	9	9	100
Bulkley Valley	12	3	25
Central Alberta	10	11	110
Champlain	56	47	84
CVV Québec	37	49	132
Cold Lake	26	17	65
COSA	43	30	70
Cu Nim	62	59	95
East Kootenay	5	13	260
Edmonton	66	45	68
Erin	32	29	91
Gatineau	87	84	97
Grande Prairie	9	13	144
Guelph	30	20	67
London	42	41	98
Mont Valin	5	3	60
Montréal	103	89	86
Outardes	29	23	82
Pemberton	9	8	89
Prince Albert	10	12	120
Regina	33	28	85
Rideau	16	9	56
Rideau Valley	38	23	61
Rocky Mountain	3	3	100
Saskatoon	13	17	131
SOSA	124	109	88
Swan Valley	6	6	100
Toronto	19	16	84
Vancouver	98	79	81
Westman	4	1	25
Wheatbelt	6	5	83
Windsor	11	8	73
Winnipeg	69	57	83
York	88	74	84
Non–club	11	11	100
totals	*1340*	*1140*	*85*

Directors & Officers

President, QUEBEC & ATLANTIC Zones
Pierre Pepin (1997)
590 rue Townshend
St–Lambert, QC J4R 1M5
(514) 671-6594 (H)
(514) 761-7015 (B)
(514) 768-3637 (F)

VP & ONTARIO Zone
Richard Longhurst (1997)
100 – 1446 Don Mills Road
Don Mills, ON M3B 3N6
(416) 391-2900 (H)
(416) 391-3100 ext 250 (B)
(416) 391-2748 (F)
richard_longhurst@mintzca.com

PRAIRIE Zone
Howard Loewen (1996)
233 Lamont Boulevard
Winnipeg, MB R3P 0E8
(204) 489-1148 (H)
(204) 489-3086 (F)
loewenhw@mbnet.mb.ca

ALBERTA Zone
John Broomhall (1996)
1040 - 107 Street
Edmonton, AB T6J 6H2
(403) 438-3268 (H)
(403) 423-4730 (B)
(403) 423-4734 (F)
john@cips.ca

PACIFIC Zone
Harald Tilgner (1996)
50090 Lookout Rd, RR2
Chilliwack, BC V4Z 1A5
(604) 858-4312 (H)
(604) 521-5501 (club)

Executive Director & Treasurer
Jim McCollum
6507 Bunker Road
Manotick, ON K4M 1B3
(613) 692-2227 (H)
(613) 829-0536 (B)
(613) 829-9497 (F)
sac@comnet.ca

Committees

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

Airspace
Bill Green
2181 West 22 Avenue
Vancouver, BC V6L 1L4
(604) 737-1136 (H)
(604) 886-8981 (cottage)
Mbrs: Ian Grant
grant.i@atomcon.gc.ca
Scott McMaster
scott@mcmail.cis.mcmaster.ca

Contest Letters
Robert Binette
5140 St–Patrick
Montreal, QC H4E 4N5
(514) 849-5910 (H)
(514) 362-7363 (B)
(514) 362-7365 (F)

FAI Awards
Walter Weir
3 Sumac Court Burketon
RR 2 Blackstock, ON
L0B 1B0
(905) 263-4374 (H)
waltweir@inforamp.net

FAI Records
Dave Hennigar
404 Moray Street
Winnipeg, MB R3J 3A5
(204) 837-1585 (H)

Flt Training & Safety
Ian Oldaker, RR1
Limehouse, ON L0P 1H0
(905) 877-1581 (H)
(905) 823-9060 ext 4526 (B)
(905) 822-0567 (F)
oldakeri@aecl.ca
Mbrs: Ken Brewin (Safety)
Geo. Eckschmiedt
Fred Kisil (Training)
Marc Lussier
Paul Moggach
Richard Officer
Karl Robinson
Terry Southwood

Free Flight
Tony Burton
Box 1916
Claresholm, AB T0L 0T0
(403) 625-4563 (H&F)
free-flt@agt.net

Historical
Ulli Werneburg
1450 Goth Avenue
Gloucester, ON K1T 1E4
(613) 523-2581 (H&F)

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

Medical
Dr. Peter Perry
64 Blair Road
Cambridge, ON N1S 2J1
(519) 623-1092 (H)
(519) 740-6547 (B)

Meteorology
Bernie Palfreeman
266 Place de Brullon
Boucherville, QC J4B 2J9
(514) 655-5935 (H)

Radio & Comm
David Morgan
223 Pump Hill Rise SW
Calgary, AB T2V 4C8
(403) 252-3717 (H)

Sporting
Charles Yeates
110 - 105 Dunbrack Street
Halifax, NS B3M 3G7
(902) 443-0094 (H)
yeatesc@ra.isisnet.com
Mbrs: Colin Bantin
ccbantin@globalserve.net
Tony Burton
free-flt@agt.net
George Dunbar
dunbar@freenet.calgary.ab.ca

World Contest vacant

Statistics
Randy Saueracker
1413 – 7 Avenue
Cold Lake, AB T0A 0V2
(403) 639-4049 (H)
(403) 594-2444 (B)
(403) 594-4977 (F)
ifs@ccinet.ab.ca

Technical
Paul Fortier
RR2, Mountain, ON K0E 1S0
(613) 989-1369 (H&F[call 1st])
ae605@freenet.carleton.ca
mbrs: Chris Eaves
Herb Lach
Glenn Lockhard

Trophy Claims
David McAsey
47, 2300 Oakmoor Dr SW
Calgary, AB T2V 4N7
(403) 281-7962 (H)
(403) 281-0589 (B&F)
mprsoar@agt.net

COWLEY THE FIRST NATIONAL SOARING SITE

On 2 August, John Broomhall, the SAC Alberta Zone Director, was present at the 25th Cowley Summer Camp wind-up barbeque to formally name this historic wave soaring area the first SAC national soaring site. The dedication took place in front of the new native limestone cairn at the campground which honours the wave soaring pioneers in southern Alberta. With over 110 pilots, friends, and local dignitaries on hand, the mayors of Cowley and Pincher Creek were presented with framed certificates recognizing the significant support given by local people to soaring ever since the 1950s.

The plaque text duplicates the text on the cairn which was built by Steven Weinhold in 1989 at the top of 8364 foot Centre Peak in the photo background (the account of which is in *free flight 5/89*), and who flew in from Colorado to attend.

Tony Burton

Tony Burton

hangar flying

10 RULES OF AVIATION

I Remember, we are here to fly gliders and have fun.

II Do NOT bust your backside.

III Do NOT let anyone else bust your backside.

IV The pilot is always the first to arrive at the scene of an accident.

V Permission is easier to obtain than forgiveness.

VI Thunderstorms and ice are just like being pregnant – there is no such thing as a little.

VII Remember, airplanes fly because of Bernoulli, not Marconi.

VIII If a crash is inevitable, hit the softest and cheapest thing you can find as slowly as possible.

IX It is much better to be on the ground wishing that you were in the air than in the air wishing that you were on the ground.

X Don't forget Rule #1

from *Vancouver Soaring Scene*

THE VALUE OF WING PROFILING

I recently put my ship into the shop for wing refinishing and "profiling". I want this to be done correctly and need the specific details on locating the templates and/or coordinates for reprofiling. Where can I get the templates and/or coordinates for the reprofiling work?

Bill Evelyn

.....

Having profiled and contoured more wings than I care to remember, some observations:

Contouring: Fairing (removing the surface irregularities from) an existing shape. This is a proven and labour-effective way to improve the aerodynamics of a wing! This is what most shops perform during refinishes. Contouring coupled with correcting the leading edge shape on the wings yields good results.

Profiling: Shaping the wing so that it conforms to some specified design. Theoretically, this shape is the wing profile specified by the designer. Realistically, the wing profile on any given ship is likely to be significantly different than the coordinates for the specified airfoil. Why is this ..?

- The designers have different opinions on airfoil shape than Wortmann *et al* and thus modify them.
- The production plugs and molds have, until recently, been handmade and thus varied markedly (there are big differences in wing profile on some gliders from left to right wings).
- The wing halves are glued together along the leading edge, trailing edge and spars. The thickness of the wing can be strongly affected by how much adhesive was placed in the wing and how much pressure was used to squeeze the halves together. Some wings of the same make and model glider are markedly thicker.
- The post-assembly finishing of the leading edge is all hand done. "Hans" may be very adept at keeping leading edges sharply radiused while "Harald" may prefer more blunt leading edges.
- Over time the structure alters shape as it ages. Environmental factors such as heat, humidity, etc influence this.

I have looked at perhaps 10 to 15 ASW-20s using CNC templates and the majority of them are too thick and the LE was too blunt. These are likely caused via production errors. My ASW-12 was similar and was also thickened to accommodate a deeper spar. The thickness is not correctable but the leading edges are easily (relatively) corrected. It is significant that the 20s having the most accurate wings were also the best performers in the field.

In conclusion, making and applying airfoil profile templates is an interesting academic exercise. However, it is not worth the manhours in light of the variables discussed above. It is also not worth doing considering the low percentage of presently available performance most of us extract from the machine and the weather. If you are a Karl Striedieck or similar in flying ability and have the skill and background and a 100 manhours to spare, by all means profile your wings. If not, you are applying "a hardware solution to a software problem".

Dedicated practise is the best aerodynamic improvement we can make on the man-glider system.

Mark Grubb

The Ontario and Alberta XC Soaring Ladders as of July 20 – *Ian Grant*

Below are the current results in the Ontario and the new Alberta Soaring Ladder (which is administered by Terry Southwood). Several more pilots have registered for the Ontario Ladder but have yet to submit flight claims. I would like to remind participants to submit flight claims as soon as possible in order to foster a sense of competition (as in "Good Lord, look what Sue's done! I better fly more cross-country".)

Ladder news on the Net Some of you may be aware of another exciting Ladder on the net, the R.A.S. (as in *recreation.aviation.soaring*) League. For those of you who haven't yet heard of it, here is a brief description. The RAS rules are similar to the old British Gliding Association Ladder, and so is similar also to the OSA Ladder, since we borrowed from the BGA. But the creators of the RAS League have pushed their imaginations further and supply on the net an electronic form for posting flight claims and league tables of current results. The League tables contain links to pilot names and details of every flight. The League rules also contain an ingenious handicapping system for regional and international differences based on the racing speeds achieved in each area. Last time I looked there were well over a dozen pilots from the US, UK and NZ — but no Canadians. The RAS League gives top Canadian pilots a way of informally ranking themselves in the world. I believe that the concept has the potential to give a tremendous boost to the immediacy and enjoyment of provincial ladders such as the Ontario and Alberta models. Look at the RAS League. You will find it at *http://acro/harvard.edu/league* or via the Soaring Society of America home page.

Pilot	*Club*	*Glider*	*Call Sign*	*No. Flts*	*Total km*	*Pts*	*Place*
Sue Eaves	LSS	LS-4	SU	4	736	739	1
Ian Grant	GGC	LS-4	ZT	3	468	463	2
Dave Frank	RVSS	ASW-20	SR	1	355	334	3

Pilot	*Club*	*Glider*	*Call Sign*	*No. Flts*	*Total km*	*Pts*	*Place*
Tony Burton	Cu Nim	RS-15	EE	6	1992	2328	1
Rod Crutcher	Cu Nim	Ventus	26	2	747	1003	2
Buzz Burwash	ESC	ASW-20FP	AB	3	790	807	3
Mike Glatiotis	Cu Nim	Std Cirrus	JM	3	609	795	4
Bruce Friesen	ESC	Std Austria	SL	2	564	786	5
Darwin Roberts	Cu Nim	HP-16	BH	2	503	688	6
Terry Southwood	Cu Nim	ASW-20	PM	2	560	658	7
Gerald Ince	Cu Nim	Mini Nimbus	54	3	509	623	8
Paul Scott	ESC	Pilatus	TA	2	288	351	9
Ken Freeland	ESC	SZD-59	?	1	168	201	10

Book review – Bruce Hea

Stalking the Mountain Wave

ISBN 0-9682005-0-8, 7" x 10" soft cover, 220 pp with index, 44 photos, 21 illustrations and tables. **$20** plus $4 p&h. Orders (403) 625-4563 phone/fax, or *free-flt@agt.net*

After 10 years, *Stalking the Mountain Wave* is back in a larger format. It is a completely revised and improved second edition, a worthy addition to anyone's soaring library.

It is a book of soaring history and politics, of geology, aviation medicine and meteorology, of great campfire tales, and of technique in using a unique phenomenon of nature — the awesome wave that sets up in the lee of the Rocky Mountains in Alberta when a southwester blows in all the way from the Pacific Ocean. To powered aircraft, the wave is often an ill understood danger to be avoided at all cost, but to sailplane pilots who understand and respect the strength of this wind and accept its challenge, it is a source of immense energy that can provide a free ride up to the stratosphere. This edition contains much new material such as the early pre-soaring history of the Cowley airfield, new soaring tales, a new chapter on the safety and medical aspects of high altitude flight, a final report on the "Chinook Project" which used the *Alcor* sailplane for wave research, and a list of every Diamond altitude flight and record achieved in the Cowley wave.

Ursula, who researched, wrote and compiled this book, is a historian for Canadian glider pilots and is a respected sailplane pilot in her own right. She holds several Canadian soaring records and earned the first Diamond badge in Canada to be held by a woman.

Pemberton 1997

The Vancouver Soaring Association club outing to Pemberton, BC was cancelled this year (too bad) but a few private owners still made it out to that beautiful valley just north of Whistler Mountain. My partner Helmut had brought our glider from Ephrata and left it there a few days earlier. I arrived Wednesday after one o'clock. Rudy was flying with a visitor from Germany. After he landed I asked if there was any lift around. Rudy in his happy, friendly and helpful manner assured me that there was lift and he just landed because the last flight was a checkout flight and the visitor was to fly the Blanik *Solo*. I helped them get the *Solo* untied and ready. After he was airborne, Rudy offered to help me rig the glider and afterwards gave me a tow to the Whistler valley entrance. I released at about 4000 feet in strong lift and in no time was up to cloudbase at about 9500. It was 4:15 and I was surprised how strong the lift was.

I was off towards Whistler Village, the wind was from southwest and it took some trying to get to the village. In fact, only after my third try did I reach Blackcomb and the village. Previous attempts ended up in heavy sink with me racing back to the valley entrance to tank up again for the next try. After taking a lot of pictures I headed east right across Mt. Currie towards Lillooet Lake and the mountains northeast of the airport. Lift was okay but it was getting late and I was hanging on more than getting really high. Rudy called to see where I was and if he should get in the towplane and tow me down. He wondered if I was in a wave since all clouds faded away except a few wave clouds straight west of the airport.

After Rudy's mention of the wave I headed over to the west to check it out and there was lift just on the south end of the town. A little lenticular was there as well. One knot increased to two knots of steady smooth lift right above the first few cloud layers. I reached just over 10,000 feet and then followed the lennies westwards towards Meager Creek. There was very little sink and without any turns I made the 50 kilometre distance at Meager Creek at about 9500 feet. It was now after 8 pm and I was getting very cold. Half way back towards the airfield I encountered heavy sink for a short period of time but still got back at the airport at 5000. This was my first wave cross-country flight and I am sure there is lots more to explore in the Pemberton valley.

My partner showed up that night but he wanted to go skiing the next day and was not interested in flying. The next day I started a bit sooner and was in the air about 2. Again over to Whistler and Lillooet Lake and then up to Meager Creek, but in thermal lift on the north side of the valley. The cloudbase was lower, only about 8000 feet and later 8500. North of the Lillooet River/Meager Creek junction there was a nice cu and with the southwest wind I found good lift on the south side of the cu. I used the cloud just like the mountains in Hope and soared in front of spectacular clouds right to the top of the cu to 12,500 feet.

As the valley towards the airport was open, I now drifted towards the airport beside all the cu forming on the north side of the valley. By the time I got to the Gunn Lake road at about 10,000 I found 2 knots in front of a cumulus. In steady lift I climbed

Weight watching for glider pilots

Report on the weight-loss-in-flight research program, summer 1996/97

Maurie Bradney
from *Australian Gliding*

The weight-loss-in-flight data gathering program was embarked upon because we have some concerns that glider pilots are possibly not drinking sufficient water. We have come to realize that hydration plays a major part in keeping a person functioning efficiently. It has also become apparent that dehydration has been a major factor in many accidents.

Work of sports physiologists at the Australian Institute of Sport has shown that it only requires a small amount of dehydration for the logical processes of the brain to be severely degraded. As gliding is essentially a cerebral sport, keeping the brain functioning well is just as important to a glider pilot as having perfect muscle tone and flexibility is to a gymnast.

Most glider pilots can find some occasions where after the flight they have thought, "That was a silly thing to do. I wonder why I did that?" Almost certainly the answer could have been "I did not drink enough water and my brain was not functioning too well."

This project was simply to find out how much water pilots *were* drinking. Some other data flows from the measurements as well. To carry this out, a set of accurate scales were purchased at a cost of about $400. These are digital scales, measuring down to 50 gram units (.05 of a kilogram). This is about half a cupful of water. Scales to do finer measurements cost over twice as much, so that was thought to be adequate.

As well as the time of weighing, for each flight four weights were taken: before the flight, *1 & 2, and* after the flight, *3 & 4.*

1 Pilot weight with any food planned to be eaten in flight, plus containers, etc.
2 Weight #1, plus drinking water to be taken on the flight including the container.
3 Pilot weight with any remaining food (plus any wrappers, containers used)
4 Weight #3 plus the remaining water.

A number of things can be calculated from these measurements :

- Drinking water taken, including the weight of the container
- Drinking water used
- Body weight loss
- Total loss from body, food and water
- Time between weighings, which will be a little more than flight time.

We tried to get the weighing as late as possible before take off and asked pilots to weigh as soon as possible after landing. The scales were placed near to the film hand-in box for the post flight weighing. Also, we asked pilots to drink only from their flight water until this second weighing. Urination was considered as a part of the normal fluid loss for the time involved.

My thanks to the many pilots who cooperated with this project. Over 200 records were obtained. Unfortunately, a number had to be discarded through various errors of recording or incorrect scale readings. Some pilots actually showed a weight increase, but checking showed that these pilots apparently drank more water than they had taken on the flight, so these measurements had to be discarded. Perhaps they drank some from another container.

	body loss	*total loss*	*water used*	*water carried*
Averages	*0.63*	*1.53*	*1.65*	*2.28*
maximum loss or use	*2.15*	*4.10*	*3.50*	*4.15*
minimum loss or use	*0.00*	*0.10*	*0.00*	*0.40*

A number of pilots could not take part in the program as they had their flight water containers to some extent fixed in the glider. I have some concern about this because regular cleaning of the containers may not get carried out. The conditions in water containers are excellent for micro-organisms in water to multiply. Even with great care, without regular cleaning, enough can grow to cause stomach upsets or even illness. Containers should be cleaned with bleach or other antiseptic solution every few days. If you use a sports drink, then clean them every day, as the glucose in these provides food for the micro-organisms as well!

The average time between weighings was 4 hours 45 minutes. All weights in the below table are in kilograms. As it happened I was the pilot who had a zero weight change. Apparently I must have drunk just the right amount. Most times my weight loss is around 0.4 kilograms and I drink about 0.8 litres. Not surprisingly, the pilots who showed large weight losses were large pilots with average weights around 95 kilograms. However, even at that weight over 2 kilograms is quite a lot to lose, especially as the same pilots drank around 2 litres of water.

The average amount of water carried and used shows that most pilots are on the right track. I do have some concern that some pilots are taking only 0.4 kg of water for a likely five hours in the air. This is inviting dehydration and possible undesirable consequences. Similarly, I'm concerned that a few pilots apparently drank nothing at all!

A surprise to me was how few pilots took anything to eat during their flight. A similar effect to dehydration occurs after two and a half to three hours, but from a different cause — reduced blood sugar level. We do not have to research this effect as it has already been long-proven. Otherwise no boss would allow workers to have a coffee break! Productivity is improved as a result.

Sugar in the blood is food for the brain. As gliding is very heavy on brainwork, replenishment will help keep the decisions top rate instead of somewhat less. It does not need a great deal of food — something with a good supply of complex sugars, like fruit or dried fruit. One apple in a four hour flight will do. Some bread or similar food will help make the release of sugar into the blood slower, and hence longer lasting.

It's a mistake to take something loaded with sugar. The surge of sugar in the system causes the body to release insulin which depresses the blood sugar level. This is the opposite of what is intended! Complex sugars release slowly and help maintain a constant sugar level. I shall continue to collect data on this general basis, but I will also try to get data for a number of flights by the same person. ❖

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up to 12,500 feet then checked again my map and found that I was just between two airways in uncontrolled airspace. I now was on top of all clouds with just clear sunny skies above me and I was climbing in steady lift right up to 17,100 feet.

It was just an outstanding view with total cloud cover to the north and west. The valley towards the airport was open and to the south there was broken cloud. I took a lot of pictures during the climb. By the time I reached my maximum altitude I wanted to take a picture of my instrument panel but I ran out of film. The only way to verify my altitude was to take a picture. So I rewound the film in one camera and double exposed the film. It did turn out ok and it was a great flight of over five hours — again very cold.

The next day was my son Neil's turn to fly and I went skiing with Helmut. Great skiing as well for that late in the season. On Saturday Neil and I split the flying. We both had good flights of two hours each and I do have to say it was a great time in Pemberton.

Joe Gegenbauer

FAI badges

Walter Weir

3 Sumac Court Burketon, RR2, Blackstock, ON L0B 1B0
(905) 263-4374 email *waltweir@inforamp.net*

The following badge legs were recorded in the Canadian Soaring Register during the period 17 April to 1 July 1997.

SILVER BADGE

886	Patrick Templeton	SOSA			

DIAMOND ALTITUDE (5000 m gain)

	John deJong	York	5300 m	Grob 102	Minden, NV

GOLD ALTITUDE (3000 m gain)

	John deJong	York	5300 m	Grob 102	Minden, NV

SILVER DISTANCE (50 km)

	Clarence Iverson	Saskatoon	58.5 km	Phoebus C	Birch Hills, SK
	Patrick Templeton	SOSA	62.3 km	Ka6CR	Rockton, ON

SILVER ALTITUDE (1000 m gain)

	Clarence Iverson	Saskatoon	1250 m	Phoebus C	Birch Hills, SK
	Patrick Templeton	SOSA	1580 m	Ka6CR	Rockton, ON

C BADGE (1 hour flight)

2558	Clarence Iverson	Saskatoon	3:50 h	Phoebus C	Birch Hills, SK
2559	Steve Simon	SOSA	replacement of lost Hungarian certificate		
2560	Peter Luxemberger	COSA	1:02 h	2–33	Omemee, ON

FAI records

Dave Hennigar

404 Moray Street, Winnipeg, MB R3J 3A5 (204) 837-1585 H

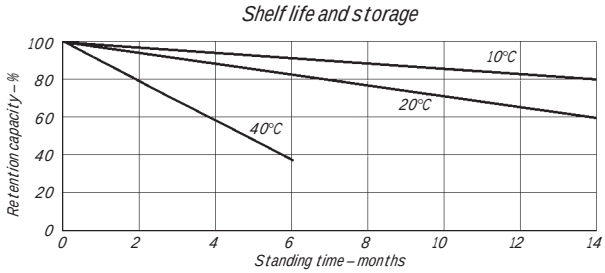
The following record claim has been received:

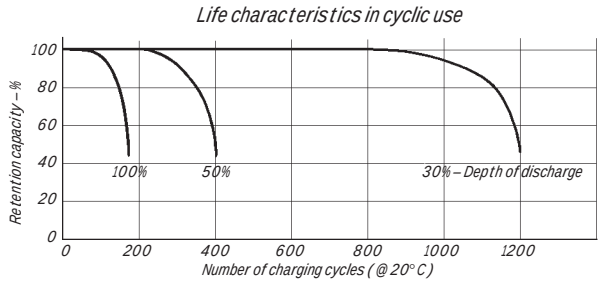
Free Distance, territorial, 542.3 kilometres, 7 June 97, Tony Burton, RS–15, C–GPUB. Flown from Black Diamond, AB with turnpoints of Cowley airfield and the Coutts border crossing, and return to Black Diamond. This new record category is unfilled.

SEALED LEAD ACID BATTERY TYPICAL CHARACTERISTICS

A very common type of battery installed in gliders is the lead/lead dioxide sealed battery. The *Powersonic* 12V, 6.5 ampere-hour (PS-1265) is typical of these and two of its important characteristics are detailed in the below graphs.

The top graph shows that these batteries retain their charge better over the winter when they are kept cool (which is logical when you consider that a chemical reaction is occurring to produce the stored power), and that they should be recharged fully once or twice over the off-season. The lower graph shows very clearly the significant loss of life of these batteries when they are deep discharged. It is much friendlier to recharge them each day rather than wait for two or three flights and they show a drop in output voltage.





SAC SUPPLIES FOR CERTIFICATES AND BADGES

1	FAI 'A' badge, silver plate pin		$ 6.00
2	FAI 'B' badge, silver plate pin		$ 6.00
3	SAC BRONZE badge pin *(available from your club)*	(12 for $55)	$ 6.00
4	FAI 'C' badge, cloth, 3" dia.		$ 6.00
5	FAI SILVER badge, cloth 3" dia.		$ 6.00
6	FAI GOLD badge, cloth 3" dia.		$ 6.00
7	FAI 'C' badge, silver plate pin		$ 5.00
8	FAI SILVER badge, pin		$45.00
9	FAI GOLD badge, gold plate pin		$45.00
	Items 4–12 ordered through FAI awards chairman		
	Items 10, 11 not stocked – external purchase approval given		
10	FAI GOLD badge 10k or 14k pin		
11	FAI DIAMOND badge, 10k or 14k pin and diamonds		
12	FAI Gliding Certificate (personal record of badge achievements)		$10.00
	Processing fee for each FAI application form submitted		**$15.00**
13	FAI badge application form *(also stocked by club)*		n/c
14	Official Observer application form *(also stocked by club)*		n/c
15	SAC Flight Trophies application form *(also stocked by club)*		n/c
16	FAI Records application form		n/c
17	Flight Declaration form *(also stocked by club)* per sheet		n/c
18	**Badge & Record Flying, ed. 7**		$ 6.00
19	**FAI Sporting Code, Section 3, Gliders (rev 1 Oct 96)**		**$10.00**

Please enclose payment with order; price includes postage. GST not required. Ontario residents, add 8% sales tax. Items 1–6 and 13–19 available from SAC National Office. Check with your club first if you are looking for forms.

ARTICLES ACVV POUR CERTIFICATS ET INSIGNES

Insigne FAI 'A', plaqué argent	
Insigne FAI 'B', plaqué argent	
Insigne ACVV BRONZE *(disponible au club)*	
Insigne FAI 'C', écusson de tissu, 3" dia.	
Insigne FAI ARGENT, écusson de tissu, 3" dia.	
Insigne FAI OR, écusson de tissu, 3" dia.	
Insigne FAI 'C', plaqué argent	
Insigne FAI ARGENT	
Insigne FAI OR, plaqué or	
Les articles 4–12 sont disponibles au président des prix de la FAI	
Les articles 10, 11 ne sont pas en stock – permis d'achat externe	
Insigne FAI OR, 10k ou 14k	
Insigne FAI DIAMAND, 10k ou 14k et diamands	
Certificat FAI de vol à voile (receuil des insignes)	
Frais de services pour chaque formulaire de demande soumis	
Formulaire de demande pour insignes *(aussi disponible au club)*	
Formulaire de demande pour observateur officiel *(aussi disponible au club)*	
Formulaire de demande pour trophées de vol de l'ACCV*(aussi disp. au club)*	
Formulaire de demande pour records FAI	
Formulaire de déclaration de vol par feuille *(aussi disponible au club)*	
Vol pour certificats et insignes, éd.7 (anglais seulement)	
FAI Code Sportif, Section 3, Planeurs (rev 1 Oct 96)	

Votre paiement dévrait accompagner la commande. La livraison est incluse dans le prix. TPS n'est pas requise. Les résidents de l'Ontario sont priés d'ajouter la taxe de 8%. Les articles 1–6 et 13-19 sont disponibles au bureau national de l'ACVV.

SAC National Office, 101 – 1090 Ambleside Drive, Ottawa, ON K2B 8G7 tel (613) 829-0536 • fax (613) 829-9497 • email *sac@comnet.ca*

Trading Post

Personal ads are a free service to SAC members (please give me the name of your club). $10 per insertion for nonmembers. **Send ad to editor**, not the national office, Box 1916, Claresholm, AB T0L 0T0 tel/fax (403) 625-4563, *free-flt@agt.net*

Ad will run 3 times unless you renew. Please tell me if your item has been sold sooner. Maximum ad length is 6 lines and subject to some editing as necessary.

single seat

1–26, #122, 2250h, in good shape with basic instruments. $8500. Call Howard (250) 493-1992.

L–Spatz, C–FUJZ, 1966, recent fabric and overhaul, basic instrmts, radio, Varicalc, open or closed trailer avail. $7000 obo. Winnipeg Gliding Club (204) 837-8128 or *wgc-info@lark.magic.mb.ca*

Tern II, 17m, basic instruments incl portable radio. Recently constructed, still in test flight phase at Winnipeg. $4900 obo. Call Jim Cook at (204) 489-6734, outside Winnipeg 1-800-224-7508 or email *accessm@escape.ca*

K8B, C–FZKQ, vg cond, Imron paint, radio, encl trailer. $9000. Contact Ralph Webber (519) 337-2042, Fritz Schreiner (519) 542-2204.

BG12A, CF–RCU, 350 h, flies real well, 34/1, one-piece canopy, reconditioned in '95 - all the work is done. Fibreglass trailer, Security 150 chute, portable radio, wing covers. $4500 obo. Call Norm Wagner (250) 344-6685.

Ka6E, 803h, $11,000. Uwe Kleinhempel (250) 344-6620.

Duster, C–GHEU, 226h, Genave 100 radio, two mech varios, 3-1/8 and 2-1/4 altimeters, ASI, 10ah gelcell batt encl metal trailer. Canopy extended to accommodate 6'-4" pilot & chute in comfort. Asking $5500. Harold Weidemann (403) 474-0139, *weidefam@connect.ab.ca*

HP–18, C–GTRV, completed in '94 with initial flights only. Selling as I'm out of country most of the summers. All drawings, special tooling, spares. All new instruments: CPT50 & CAV50 netto varios with speed ring, ATR 720 radio, new thin pack chute, etc. Maurice Engler (403) 246-6611.

Jantar Std, 1350h, Cambridge MkIV, tinted canopy, EDOAire comm, gear warning, encl trailer. Never broken, make an offer. Greg (306) 586-5493 eve.

Jantar Std 2, C–GHDR, 1/2 share at SOSA, 650h, Imron paint, new Dittel 720 radio, new ILEC SC7 vario, PZL vario, O_2, chute, clamshell trailer. XC & contest ready. $15,000. Tim O'Hanlon (905) 332-1930, *ohanlont@bailey.ca*

ASW–15, 1500h, ADs done, annual due Aug '97, good cond, spare canopy, very nice to fly. $19,500 ($US14,500). Call (519) 471-3203 or (519) 425-1679, *cpg342@oxford.net*

Std Cirrus, CF–DMW, 660h, never bent, excel cond. Radair 360, O_2, 3 varios, metal trailer. Winter and Peravia baros, Radair 10s, Security 150 chute, etc. **'77 Ford Club Wagon**, 3/4t, low miles, excel cond, towing package, AC, wired for ground station. All unused past 7 years. Prefer package sale. Monty Williams (604) 929-1749.

PIK20Bc, C–GXWD, carbon fibre, 820h, very good condition, new paint, Ball 400 c/w netto & cruise, Edoaire 720 radio, chute, O_2, gear warning. Call Lee at (403) 242-3056 or Denis at (403) 526-4560.

KW45, C–FSNZ, 500h, Open Cirrus wings, home-built glass fuselage, never damaged, excel cond. Factory water ballast, tinted canopy, radio, O_2, Ilec vario system, aluminum trailer. Fred Wollrad, (403) 479-2886.

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magazines

SOARING — the monthly journal of the Soaring Society of America. Subscriptions US$43 second class. Credit cards accepted. Box E, Hobbs, NM 88241-7504. (505) 392-1177, fax (505) 392-8154. *74521.116@compuserve.com*

NEW ZEALAND GLIDING KIWI — the bi–monthly journal of the New Zealand Gliding Association. Editor, John Roake. US$32/year (seamail). Private Bag, Tauranga, NZ. *john@roake.gen.nz*

SAILPLANE & GLIDING — the only authoritative British magazine devoted entirely to gliding. Bi-monthly. BGA, Kimberley House, Vaughan Way, Leicester, LE1 4SG, England. £16.50 per annum. fax 01 16 251-5939.

AUSTRALIAN GLIDING — monthly journal of the Gliding Federation of Australia. US$34.80 surface mail, airmail extra. Payable on an Australian bank, int. money order, Bankcard, Visa, Mastercard. Box 1650, GPO, Adelaide, South Australia 5001. fax (08) 410-4711. *AGeditor@gfa.on.net*

miscellaneous

Finders fee will be paid to finder of any of the following items: Fauvel AV36 with or without trailer, any other glider needing tender loving care, ultralight with full cockpit enclosure (ex. Chinook) with or without engine, Jodell 1- or 2-place with or without engine or project. Send card with phone number please. Ed Mux, 1500 E Main St, Merrill, Wisconsin, 54452 (715) 536-7404.

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