free flight • vol libre

2/92
Apr/May

POTPOURRI

Spring has sprung, we look at the sun and are ready to run — oops — to soar. But are we?? Have we had our very own spring checkflights, and I mean a meaningful check-flight, not just a circuit around the cabbage patch. You being ready to fly is just as important as your glider being ready.

The AGM is history. There were some lively discussions and some good ideas and recommendations made. The Board hopes to take action on several of these in the coming year. Tony Burton has reported on the AGM in the yellow pages of this issue.

HELLO the Geriatric Club. I know there are quite a few of us in this category, but I am looking for special members. There are at least two who started gliding more than sixty years ago and are still active — Willi Deleurant and Harold Eley. How many more are in this category, and how many in the "fifty plus" group? I would ask each club to delegate someone to send me the names of those in your club who have reached these important milestones. PLEASE.

A special thanks to all the club statisticians who sent the completed stats to Randy Saueracker on time. It was a very creditable performance, only two clubs did not make the deadline, and only some glitch stopped them. Thank you — thank you.

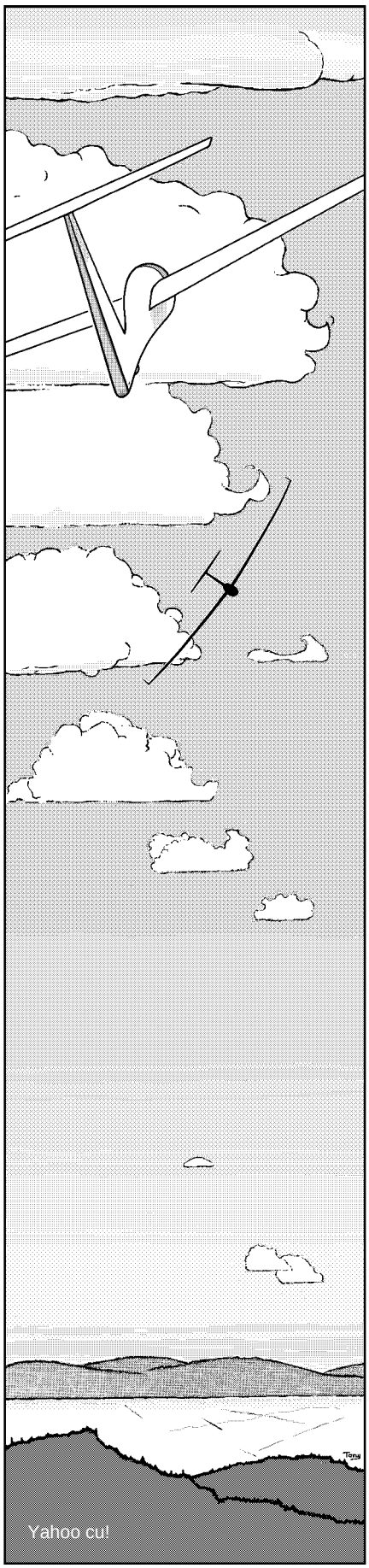
Everyone will be pleased to see that our Insurance Committee was able to negotiate lower premiums for 1992; notice that they are considerably lower. Part of this is due to the lower payouts for accidents last year, so let us all make a determined effort to decrease the claims even further this year. Ways to accomplish this are: doing positive control checks at every DI and rigging, no low and slow turns (below 300 feet), no stretching glides to get back to the home field, and picking the outlanding field long before circuit height. These are not the only problems but are the beginning of several of the accidents we have experienced. Part of good judgement is pre–planning.

As has been reported in other places, in 1995 SAC will be fifty years old and we have to begin planning now to celebrate the occasion in a proper fashion. A special issue of *free flight* or a separate booklet incorporating interviews with charter members and excerpts from early *free flights* has been suggested, a commemorative stamp issue and even first day covers, a Barron Hilton type of cross–Canada safari, or a relay type of tour involving all the clubs are other plans suggested. More ideas and plans are needed, we only have two and a half years to get it all in place. Send your ideas to *free flight*. How about the clubs spending some part of their meeting nights in brain-storming plans for our Golden anniversary.

Tony Burton, our editor, is announcing a scheme to urge more members to contribute articles to *free flight*. Read further (on page 17) to see all about it. We need more input from our own members about their experiences and accomplishments.

Every wish for a successful soaring season, and PLEASE, don't be reckless.

Al Sunley



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Le journal de l'Association Canadienne de Vol à Voile

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DEPARTMENTS

Cover

Somewhere under all this there must be a pilot! Marek Wakulczyk from Cold Lake covers up for a wave flight in the Cu Nim Jantar, "Fruit Juice", at last year's Cowley fall wave camp. Photo by Edmond Duggin.

My first landout

A small dad/teenager duel to the death

Richard Stehlik
York Soaring Association

IT IS SAID THAT NO ONE EVER FORGETS THEIR FIRST LANDOUT. In my case, if by chance the fateful August 7, 1991 should slip my mind, I have a number of people to refresh my memory.

The actual story started a day earlier, on possibly the best soaring day of the year in southwestern Ontario. It looked like a super day from the start, and I was debating whether or not to take a ticking piece of machinery called a barograph along for a trip down to SOSA from my flying home of York Soaring. I had decided weeks before however, that the next good soaring day would be spent doing a fun cross–country with my father, Mirek Stehlik.

Boy, did we ever pick a great day for some fun flying. My dad took his trusty L–Spatz 55 (C–FFAG), while I flew in the club's 1–23 (C–FGXR), in which I had 17 flights, and about 25 hours this past summer (the beauty of mostly weekday flying). When all was said and done at the end of the day, we managed to cover a modest 135 km in 3 hours and 30 minutes, on a trip that took us to Shelbourne, Mount Forest, Drayton, Fergus, and back home to York. I don't think even an ostrich would have had a problem thermalling on this day, and I can't help but think that my last task for the Silver C badge could have been done blind–folded. Ah well. Seeing as how the next day was forecast to have about the same gliding conditions, I reserved a barograph as soon as I landed, and had lots of trouble getting a good night's sleep.

Now this here is where the real tale begins. During the entire drive from our home in Kitchener to the flying club the next day, my eyes, and those of my dad, were focused on the sky conditions. It looked rather promising we thought, as we began planning our flights. Mine was fairly straight forward, as I knew what to look for when I got remotely close to SOSA. My dad on the other hand, had to find a way of beating me there, without leading the way. I didn't really care if dad flew there as well, but this 61 km flight was going to be made by me, and me alone with no help from anyone. (Note: I had been introduced to the sport in 1981, when my dad was taught how to glide at SOSA. I loved running wings, and hooking up the thermal–hungry gliders, but the real fun started when I was finally old enough to start soaring myself in 1988. I was taught by the best at SOSA, and soloed that year, before we made the move to York in 1989.

All our plans were cut short though, as we drove into the town of Arthur. When my dad tried to apply the breaks coming to a red light, the car appeared not to notice what exactly was being asked of it. If it weren't for the hand brake, we would have been in the rear bumper of the car in front of us, much like a bug on the leading edge of a 2–33. We abandoned the @!#$% car at the closest garage, and managed to hitch–hike the rest of the way in minimal time. We got to the field at 11:30, with the weather improving, and the two of us not close to being ready. We brought the Spatz out of the hangar, and got my barograph sealed. We were set to roll at 12:30. Lots of time. I was ready to take off. Due to the altitude difference between York and SOSA, I had to release at 1300 feet agl to make it a legal attempt at the 50 km flight. After a sensational 9 minute adventure, I found myself back on the ground. My dad, with a 2000 feet tow, and in a glider that could stay up if the cow below him has a problem with gas, got enough height, and headed south. It took me an entire hour before I got up on this busy, one towplane day, but I managed to scrounge up adequate height to make a break for it.

I got as far as 25 km away, but after I went through a large blue hole, I could only find clouds that had less pull underneath them than a 30 year old mule. I got down to 3100 feet before I decided to turn back. I knew exactly what field I wanted to get to, but I was eager to find lift along the way. I naturally found nothing, but thanks to

concluded on page 13

The SOARING ASSOCIATION OF CANADA

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

free flight is the official journal of SAC.

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

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

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

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

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

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

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May, July
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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.

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

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

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

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

EDITOR
Tony Burton
Box 1916 Claresholm, Alberta TOL OTO
tel & fax: (403) 625-4563

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letters & opinions

LACKED A QUICK RETORT

While sitting at the SAC Awards Dinner in Calgary, daydreaming about the slide presentation on mountain soaring by Joe Gegenbauer of the Vancouver Soaring Association, I was roused by my name being called. I guess most of us attend these functions to see others receive trophies. I was stunned to say the least, so was unable to think up a response for the Hank Janzen Award which I received. Therefore I would like to take this opportunity to express my thanks to the Flight Training & Safety committee for awarding this trophy to me. The words I might have said are that the whole Flight Training & Safety committee should receive this trophy. I have never met a finer or harder working group who spend so much of their spare time for any organization.

Paul Moggach has just completed a 15 hour Ground School Manual which is available for all soaring clubs and a must for all soaring enthusiasts. It must have taken Paul 1500 hours to put it together. Dick Vine, of Bluenose Soaring Club, along with associates have compiled a book of safety articles from twenty odd years of *free flight* and articles from USA, Britain, Australia, etc. This publication will be available this summer. George Eckschmiedt has, for many years, been reviewing Accident & Incident Reports, trying to make some sense of why these accidents continue to happen. The Flight Training & Safety committee review all accidents and incidents trying to figure out whether it is a lack of training or maybe the wrong training, to blame for accidents. Mike Apps, Ian Oldaker and Paul Moggach continue to run instructor courses to standardize teaching methods. Ian Oldaker and the Committee are presently working on a safety audit paper which some clubs may not like, however everyone must remember that the Flight Training & Safety committee's aim is to reduce our accident rate to zero, anything else is not acceptable.

We have the support of Transport Canada in all our endeavours. We have the mandate from the SAC Board of Directors, but we must have the commitment from all of the soaring community. As the soaring season rapidly approaches, the Flight Training & Safety committee wish each and everyone a successful, safe soaring season.

Respectfully, Ken Brewin

PS The success of a safe soaring season results in lower insurance rates!

SOME WINNIPEG CLUB NEWS

Even in the depths of winter there is much going on with the various committees within the club. Our new Executive is in place and has met twice in the new year to begin organizing the upcoming flying year. The usual task of finding people to fill all the required jobs has been completed and everyone is looking forward to the season. Our President, Jim Cook takes his position for the second year. When Jim is not busy at the helm of the club, he is looking after his own accounting management firm as well as his share of the duties with his wife's pharmacy. In addition to this load, Jim is also busy trying to complete a Miller Tern started several years ago by another club member. At last look the wings were completed and the fuselage about 60% finished.

Our club continues to try and promote the sport as best it can. Our annual Open House and Information Evening drew 60 interested persons. Several showed up the following week to register for ground school. A local TV station requested that we do a short segment with one of their afternoon talk show hosts. About 10 minutes of questions and answers along with several slides were presented. By all accounts the show went over fairly well.

Our Social Director is going to be busy this summer as the Executive has given him the mission to try and organize several functions throughout the season to try and involve members who don't usually stay out at the field after flying stops. Some of the items planned are BBQs and fun–fly events that all members can participate in. In addition it is hoped that other flying groups around Winnipeg will come out to the field and see our sport, even perhaps join our club. We have a fantastic facility at Starbuck and it is a shame that more people don't make use of the site.

One of our members that does make use of the facilities is Neville Robinson. Neville is probably familiar to anyone that attended the Cowley camps during the past couple of years. Since his retirement a few years ago, Neville has been busier than ever. If he is not active at the flight line instructing, he is often found in the hangar with some project on the go. He has been referred to as the resident glider pilot at the field during the summer. During this past winter he packed up his van and left for warmer climes. Around the first snows of December he left without a real destination in mind, just "wherever I end up". Hopefully he will find some flying along the way to stay current.

Our club has seen a noticeable increase in the number of younger students that are joining and taking flight training. Last year we had four students under the age of 18 with the youngest being 14 at the beginning of the season. The 14 year old, Seth Myers, subsequently turned 15 during the summer and shortly after earned his solo A badge. Seth was awarded the Novice trophy at our Awards Dinner and was also featured in the local newspaper for his accomplishments.

Mike Maskell

WINGLET DESIGN FOR SAILPLANES

Peter Masak

IN THE ONGOING QUEST for higher performance sailplanes, winglets have provided a means for improving the performance with only a modest price per L/D point gain. Winglets act to reduce induced drag and act to control the crossflow in the tip region of the wings in such a way as to improve the handling characteristics at the same time.

By introducing a vertical cambered surface at the tip, the downwash field behind the wing is spread horizontally by several inches. Since the induced drag is inversely proportional to the effective width of this downwash field, the winglet therefore acts to reduce induced drag by displacing the vortices outward. Presumably the greatest effect would be obtained by introducing a high lift large surface winglet which would displace more air outward and alter the circulation pattern in a more significant way. However, the design of winglets involves the compromise of maximizing the low speed improvement without sacrificing high speed performance. Pilots will not fly with winglets if they perceive any deterioration of high speed performance.

BACKGROUND

First use of winglets

Winglets for modern aircraft were first proposed by Dr. Richard Whitcomb, at NASA Langley in the mid–1970's. At that time, wind tunnel models and subsequent full size flight tests on a Boeing 707 commercial jetliner demonstrated a significant reduction in total drag at high lift coefficients.

After the publication of the design philosophy, numerous researchers in industry tackled winglet design with varying degrees of success. Most tried to use potential flow methods for predicting tip inflow angles and surface pressure distributions, however given the nature of the flow field at the tip, this has lead many investigators to the wrong conclusions.

Potential flow analysis seems to steer the designer in the direction of excessively large winglets, while experimental data suggests that large winglets pay a greater–than–predicted penalty in high speed performance. Since potential flow methods cannot accurately predict the vortex roll–up at the tip, or the influence of secondary flows on the boundary layer, these methods have not provided the complete picture of the effect of winglets on performance. Also, potential flow methods do not show the significant influence of the effect of the fore–aft position of the winglets.

Experience with sailplanes

In sailplane racing circles, winglets were tried and then dropped by a number of university flying groups (Darmstadt, Braunschweig), and the French manufacturer Centrair. The overriding concern repeatedly expressed by racing pilots was that the winglets, although they were known to provide a significant gain at low speed, would detract from performance at the high speed cruise condition, with a resulting net loss or perhaps no achieved gain in overall performance.

This concern is justified since winglets act to reduce both induced drag and drag due to crossflow at the tip; however, at high speed neither of these effects are large and thus there is some speed at which the overall surface friction drag of the winglet exceeds the induced/interference drag reduction provided by the winglet. The graphs below show this effect with large winglets added to an ASW–19 at Braunschweig. Clearly the key is to provide a minimum drag surface which does not stall at circling speeds.

Prompted by interest from Dr. David Marsden at the University of Alberta, and my own successful experience a decade ago with a homebuilt HP–18, the challenge was struck to design an efficient pair of winglets for a Nimbus III for the World championships in 1989 at Wiener Neustadt, Austria.

Marsden had proposed using an unusual double element winglet on the Nimbus III *(emulating the primary wing feathers of a soaring bird)* which was inspired by a successful version on Marsden's DG–200. His experiments had shown that he was obtaining a significant improvement in lift capability of a tip section fitted with winglets.

Experiments with dual winglets

The initial promise of dual winglets on the Nimbus III tips did not prove out in either flight tests or wind tunnel tests. Although a gain in lift was measured, the interference drag of the two lifting surfaces caused the airflow across the rear winglet to be separated at even modest lift coefficients. This resulted in the winglet not being effective at either high or low flight speeds. At speeds below 55 knots, the rear winglet would experience massive separation (seen with tufts); and at speeds higher than that, the winglet

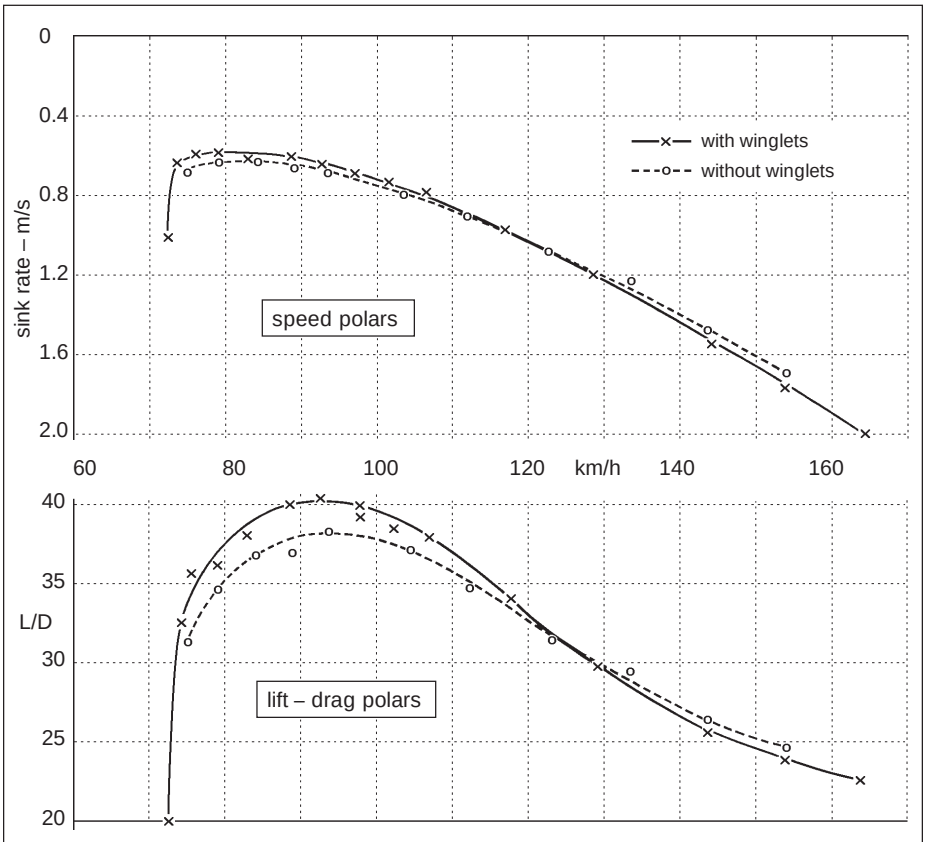


Figure 2 — Influence of winglets on the performance of an ASW–19

friction drag due to the highly cambered airfoils was so high as to cause an overall loss.

Second Iteration
The narrow tip chord of the Nimbus III (9 in) forced an abnormally low chord for the dual winglets (3–4 in). The resulting low Reynold's number of the winglet elements probably contributed to the separation problem and high drag. Thus it was evident that this design could be improved by going back to the conventional single element winglet. *(An airfoil's Reynold's number is related to its size — all else being equal, a small airfoil does not "work" as well as a large one. The R_e of a typical sailplane wing is 1,000,000. ed.)*

DESIGN OPTIMIZATION

Apart from the selection of a winglet airfoil, there were five key parameters that had to be chosen to optimize the design:

- Cant angle
- Twist distribution
- Sweepback
- Taper ratio
- Ratio of winglet root chord to sailplane tip chord

Cant angle
The selection of cant angle evolved from an unusual consideration specific to sailplanes: the narrow and highly flexible wings provide for a wingtip angle in flight which can approach 30 degrees on some sailplanes when flying with water ballast. A more common angle for modern 15 metre ships is 7–12 degrees.

On winglets that are nominally set to a cant angle of 0 degrees (at right angles to the wing), as the wing deflects, the winglet generates a sideload in flight which has a component oriented downward. This is a self defeating situation, since the winglet is generating additional drag by contributing to the weight of the aircraft. Thus a more reasonable approach is to set the winglets at least at a cant angle on the ground of 0 degrees plus the in–flight local tip deflection angle.

Sweepback
The selection of the sweepback angle was based on experimental observations. It was first believed that the sweepback angle for the winglet should be equal to that for the main wing (0 degrees), however experience proves otherwise. If a vertical winglet with no sweepback is built, it will be observed that the root of the winglet will stall first and that the tip will remain flying.

The optimum situation from an aerodynamic standpoint is to have the aerodynamic loading such that the entire winglet surface stalls uniformly. This can be achieved by sweeping back the winglet, which will increase the loading on the tip. Because of the rapid variation in angle of attack of the winglet as a function of height, a large degree of sweepback is required to load the tip correctly. For our winglets, a 30 degree leading edge sweep angle was used to achieve this effect.

Ratio of winglet root chord to sailplane tip chord
It would seem that the winglet might ideally be designed as an extension of the wing, and thus the optimum winglet would be a smooth transition of the wing from horizontal to vertical. Experiments suggest otherwise.

If the root chord of the winglet is equal to the tip chord of the wing, then the inflow angle at the tip will be less than when the winglet is a smaller fraction of the tip chord. The result will be that at high speed, the inflow angle may not be sufficient so as to prevent separation of the airflow from the outer (lower) surface of the winglet. Since other considerations require that a toe–out angle be set (about –3 degrees), it is desirable to allow some vortex induced flow to wrap around the wingtip and provide a positive angle of attack for the winglet at all flight speeds.

For the various winglets fabricated, the following ratios of root chord of the winglet to tip chord of the wing were used:

- DG–600 0.60
- Ventus 0.57
- ASW–20 0.50
- Discus 0.70
- Nimbus III 0.95

The choice of the root chord of the winglet is also constrained by the nominal tip chord of the wing, and by considering Reynold's number effects. Too small a winglet chord can result in extensive laminar separation and high drag. For the Nimbus III and Discus winglets, the small nominal tip chords force the winglet geometry to be smaller than would be desirable from a Reynold's number consideration.

Twist distribution
The twist distribution on a winglet is normally selected so as to provide a uniform load distribution across the winglet span. Since the inflow angle is higher at the base, the winglet is twisted to higher angles of attack toward the tip. This is opposite to the general design methodology for wings, which normally have washout (either geometric or aerodynamic) so as to decrease the angle of attack towards the tips.

The determination of optimum twist for our winglets was made by iterating experimentally. When flight tested, the first set of winglets fabricated stalled at the root first with a progressive stall developing upwards towards the winglet tip. By twisting the winglet to increase the angle of attack at the tip, the entire surface of the winglet could be made to stall simultaneously. Two degrees of twist from root to tip proved to be optimum.

The second benefit of positive twist on the winglet is that the high speed performance is enhanced — there is less likelihood of developing separation on the outer surface of the winglet at low inflow angles (high speed = low coefficient of lift, C_l).

Taper ratio
The effect of taper ratio on inflow angles and the resulting optimum twist distribution was analyzed theoretically by K.H. Horstmann in his PhD thesis. It was shown that as taper ratio increases, the optimum twist distribution for the winglet varies more linearly from root to tip. From a construction standpoint it is also easier and more accurate to build a winglet with a linear change in twist angle along the winglet span. This favours a winglet with a larger tip chord. We also want to try to maximize the tip chord so as to maximize the Reynold's number. Accordingly, a ratio of tip to root chord of 0.6 was selected.

Toe–out
The determination of toe–out was based on the simple consideration that we were trying to maximize the speed at which no further benefit is gained from the winglet, and thus select an angle of attack (α) setting for the winglet that will minimize the high speed drag.

Considering the C_l–vs–α prediction for the PSU–90–125 winglet airfoil, an angle of attack of –3 degrees corresponds to a C_l of 0. Given the fact that even at high speed there is a small inflow component at the tip, the winglet will actually be generating a slightly positive lift, even with the –3 degree root toe–out. Calculations show that when the wing is operating at a nominal lift coefficient of 1.0 (which corresponds to the circling lift coefficient), the lift coefficient of the winglet is 0.6 at the root and reduces to zero at the tip.

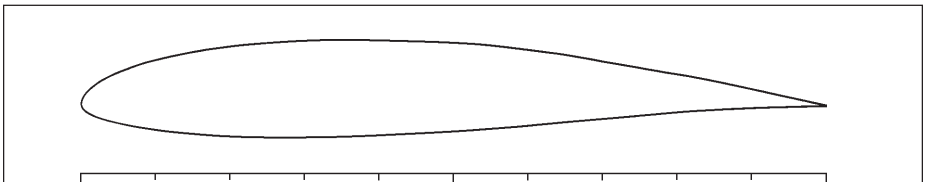
WINGLET AIRFOIL

The winglet airfoil was designed with the following criteria in mind:

- to minimize drag at low C_l conditions
- to design the winglet airfoil to be tolerant of low R_e
- to maximize tolerance to negative α

These design requirements are different than for a conventional sailplane airfoil. The resulting custom airfoil designed by Dr. Maughmer and Mr. Selig of Pennsylvania State University is shown in the figure below. Dr. Maughmer described the airfoil design philosophy as follows:

"The airfoil has the traditional undercamber removed from the lower surface trailing edge area, which minimizes the tendency to form detrimental laminar separation bubbles at low or negative angles of attack. At the price of a little C_{lmax}, which isn't important for a winglet anyway, the drag is lower than other sailplane airfoils everywhere up to C_l = 0.85, as well as



PSU–90–125 winglet airfoil

at negative C_l's, so that sideslips and horizontal gusts can be tolerated. The corners of the laminar bucket have been rounded to avoid unstable yawing moments that would be generated otherwise if the sailplane yawed to angles exceeding those corresponding to the sharp corners of the traditional Wortmann sailplane airfoils. Finally, the airfoil was designed to avoid laminar separation bubbles down to R_e = 350,000."

WING AERODYNAMICS

The change in the lift distribution of a wing with and without winglets is shown below. The boundary condition at the wingtip of the main wing no longer requires that the lift taper to zero at the tip. The assumed lift distribution for a wing with a winglet is assumed to terminate at an imaginary point equal to unfolding the vertical winglet in the horizontal plane. As a result the outer portion of the wing carries a higher load than it does without the winglet. Recent calculations on sailplanes with double trapezoidal planforms such as the ASW–20 or LS–6 suggest that this outer tip loading is more efficient from the standpoint of induced drag.

Secondly, the additional lift capability of the main wing means that the C_{lmax} of the overall wing is increased and the sailplane's circling performance will be enhanced.

Structural Loading
One of the key advantages of winglets is that they provide a performance increase while only fractionally increasing the root bending moment on the spar compared to a span extension. Whereas the moment arm of a span extension is one–half the semi–span of the wing (about 7.5 metres), the moment arm of a winglet is only equal to approximately one–half the vertical span (0.3 m) plus the deflected wing elevation at the tip. For sailplanes which are certified with tip extensions, one can be assured that the winglet will not overload the wing and all standard operating limitations will apply (Ventus, ASW–20, DG–600).

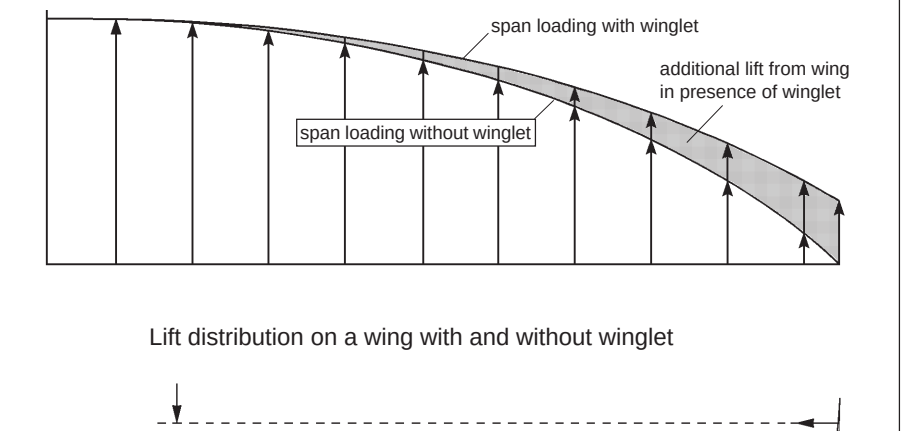
FINAL DESIGN

The final choice of design parameters is reflected in the design of the Ventus and ASW–20 winglets, which have been highly successful in competition. The ASW–20 winglet went through two iterations and the Ventus, three, before it was concluded that the design had reached a high level of refinement.

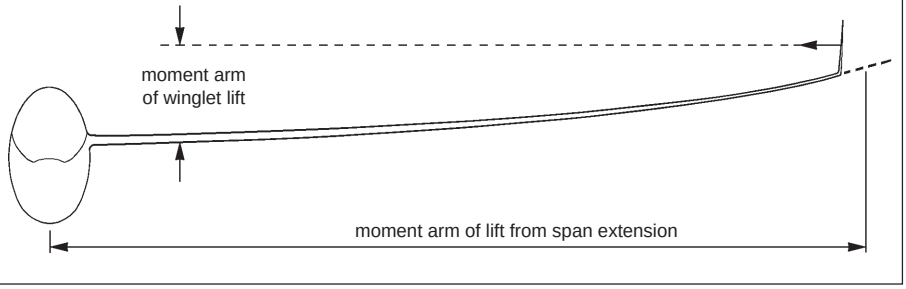
FLIGHT TEST RESULTS

Competition Results
The response of pilots flying with winglets in competition has been very positive overall. Certainly one of the measures of the success of the design is the fact that pilots after a period of evaluation have chosen to fly with the winglets. At the 1991 World contest in Uvalde, Texas, ten pilots chose to fly with our winglets – 8 Ventus, 1 ASW–20B, and 1 Nimbus III. At the end of the contest, a Ventus flying with our winglets had won four of twelve contest days and on the fastest day of the contest, the top five places in the 15 metre class went to sailplanes flying with our winglets. Additionally the trophy for the highest speed achieved overall went to Jan Anderson of Denmark, flying a Ventus with our winglets (his speed also exceeded the highest achieved in the Open Class). Two weeks prior, at the 15 metre Nationals in Hobbs, New Mexico, Reinhard Schramme from Germany established an unofficial record of sorts by flying his Ventus–C around a closed course of greater than 500 km with an average speed of 171 km/h (he would have won were it not for a photo penalty).

Bruno Gantenbrink and Hermann Hajek of Germany chose to retrofit winglets to their Ventus–C's and were delighted with the handling and performance qualities that they observed. Mr. Hajek noted as a particular advantage the improvement in his ability to maintain constant bank angle and speed with a full load of water. With winglets the effective dihedral is increased and the sailplane can be banked steeper while retaining control.



Lift distribution on a wing with and without winglet



The dolphining performance is naturally improved with the winglets since they act to reduce induced drag while pulling positive 'g', and several pilots have perceived their sailplanes to have improved glide performance even at high cruising speeds in strong weather.

Flight Test Data
These positive results are confirmed by flight tests based on three high tows with each sailplane type which show the following performance gains as measured by the two–glider comparison technique.

ASW–20 flight test data:
(pilots –Striedieck, Seymour)

speed	duration	Δ with winglets	Δ ft/min
50 mi/h	5 min	+ 30 ft	6
65 mi/h	5 min	+ 7 ft	1.5
80 mi/h	2 min	+ 10 ft	5
100 mi/h	2 min	0	0

Ventus flight test data:
(pilots –Mockler, Masak)

speed (knots)	flap	Δ with winglets
40 dry, 53 wet	+2	9.1 ft/min
50 dry, 66 wet	0	9.0 ft/min
60 dry, 79 wet	0	9.8 ft/min
84 dry, 110 wet	–2	3.3 ft/min

Maximum performance gains
with Masak winglets

sailplane	winglet airfoil	L/D gain
ASW–20	NASA Van Dam	2.1
Discus	PSU–90–125	2.5
Ventus	PSU–90–125	3.5

CONCLUSIONS

The overall performance gains measured in free flight on sailplanes retrofitted with winglets are impressive and are supported by positive contest results. Handling qualities are improved in all cases, including improvement in roll rate and roll authority at high lift conditions.

The performance measurements have shown a higher gain in performance than would otherwise be predicted by conventional theory. It is believed that major benefits are derived from inhibiting the secondary flow that contaminates the boundary layer near the tip region. Prediction of this phenomenon requires computational power out of my grasp, and the present designs have been developed via experimentation and in–flight testing.

By August 1991, there were over forty–five sailplanes in the world flying with winglets designed and fabricated by the author. No negative reports or dangerous incidents (ie. flutter) of any kind have been reported. As a result of the positive service experience, Transport Canada have recently issued a supplementary type certificate for flight with winglets on the Ventus model, using JAR–22 as a basis for compliance. •

A bibliography is on page 13

Thermal forecasting from upper air soundings

a new approach

Stephen Foster
Toronto Soaring Club

ACCURATE THERMAL FORECASTS are best generated from an on–site analysis of data from a local sounding. However, traditional methods involving manual data reduction and graphical analysis consume valuable time — time that would be much better spent on cross–country flight preparations if excellent soaring conditions are anticipated. A new and more efficient approach has been developed to address this difficulty. An analysis code, running on a personal computer, has been designed to greatly reduce the time and effort necessary to produce a thermal forecast from a local sounding.

Thermal forecasts and effective flight task setting

Cross–country soaring can be frustrating at times. Too often one can spend a great deal of effort preparing for a task only to wait in vain for soaring conditions that do not develop. Sometimes a big task is selected on a day in which cumulus clouds start late and dissipate early. Occasionally, no plans are made for a cross–country flight on a day which later turns out to be a boomer. Typically, such frustrations stem from the time required to make the necessary task preparations, long before thermal activity is evident; the sailplane must be rigged, a task must be chosen, maps need to be prepared, the turnpoint camera must be readied, food and drinks must be prepared, a formal task declaration must be made, the barograph must be set–up, a crew should be organized, etc, etc. This long list makes it almost impossible to prepare for an important task at the last minute. Hence, knowledge of approaching conditions, a few hours in advance, is the key to fewer false starts and more successful cross–country flights. An accurate thermal forecast is of vital importance to the soaring pilot who hopes to get the most out of each soaring day by setting tasks that are commensurate with expected conditions.

The upper air sounding

Although there are many different elements in the production of a soaring forecast, the upper air sounding is of fundamental importance. Data from a sounding consists of temperature and dewpoint profiles. These profiles, which represent the vertical heat and moisture distribution of an airmass, essentially determine atmospheric stability and consequent thermal characteristics. There are numerous texts on the subject, with some of the more noteworthy references by Wallington (1), Lindsay (2) and Bradbury (3). With the traditional method of analysis, temperature and dewpoint data is plotted on an aerological diagram — several different varieties of which are in common usage. Use of the tephigram is widespread in Canada and Britain; but, the pseudo–adiabatic chart is more common in the USA. Aerological diagrams consist of numerous lines which, among other things, represent the change in temperature of either a dry or condensing thermal with pressure (ie. altitude). This allows one to graphically relate the temperature of a thermal with its surrounding environment and thus evaluate stability. A complete analysis can predict the formation of cumulus, the time of cumulus onset, the changes in cloudbases and tops throughout the day, approximate cloud amount (probability of stratocumulus or very thinly scattered and short–lived cu), likelihood of showers or thunderstorms and thermal strength.

The need for a local sounding

Analysis of atmospheric stability is, of course, performed by national weather agencies. In Canada and the United States, rawinsonde observations (upper air soundings) are made from many stations across the continent at 00:00 GMT and 12:00 GMT. However, these stations are generally too sparsely distributed for accurate and detailed predictions of soaring conditions for most soaring sites. Moreover, the 12:00 GMT sounding (08:00 EDT) is too late for pilots in eastern time zones since the data is not made available until about 2 hours after balloon release. This means that a thermal forecast can only be generated from data collected twelve hours earlier, usually from a station far from the airfield. In southern Ontario, data from which thermal forecasts are generated is usually obtained from the USA National Weather Service station at Flint (Michigan), Buffalo (New York) or Sault Ste. Marie (Michigan). In addition to the problem of distance, data quality suffers further from the fact that these stations are located on the wrong side of the Great Lakes.

Obtaining up–to–date data that is most representative of the airmass in which a flight will be made can be an important problem. The solution is to perform a local sounding in the morning using a towplane that is outfitted with an aircraft psychrometer (a pair of wet and dry thermometers) and to perform the analysis on–site. The value of a local sounding is clear; and, to quote Lindsay, “Every soaring club interested in serious competition flying should make local soundings, and learn to use them to good advantage.”

A look at traditional forecast techniques

A thorough analysis of a local sounding starting from raw wet and dry temperature data takes time and effort; but, time is one thing that is in very short supply if one is to attempt a big cross–country task. It is this very point which led me to develop an automated system. Once I had to complete an analysis at the end of a flying day because I ran out of time in the morning due to the pressures associated with the start of a potentially good soaring day! With traditional techniques, it is necessary to manually compute the dewpoint from each wet and dry temperature pair (typically 15–20 times depending on the amount of data), annually plot the temperature and dewpoint profiles on an aerological diagram, estimate ground temperatures at various times of day using graphical analysis; and, determine how the cumuli will evolve in accordance with ground temperature, again using graphical analysis.

Performing such a set of tasks, however, is precisely what a computer does best. Given today’s availability of powerful (and inexpensive) microcomputers, such an analysis can be performed with great speed and efficiency on–site.

Development of an efficient forecast system

A research program was initiated at the Toronto Soaring Club during the 1991 soaring season to investigate the production of thermal forecasts from local soundings. The objective was to develop a means by which accurate results can be quickly obtained with the greatest possible ease, ie. the development of a more practical approach to solving this problem.

The project began with the design and construction of an aircraft psychrometer. The apparatus consists of a two–channel digital thermocouple thermometer (T–type) to measure wet and dry probe temperatures. As the data was corrected for airspeed effects and the probes were shielded to minimize errors due to solar radiation, it is estimated that measurements were accurate to within 0.3° C. Temperatures were manually recorded every 500 feet from a hand–held unit that was connected to a strut–mounted probe assembly. A typical flight to 7000 feet agl required approximately 30 minutes in a 150 hp Citabria. This time includes a 20–30 second delay at each altitude level prior to recording each temperature pair. This was necessary to allow for the lag in probe response.

A personal computer based analysis code was developed to expedite the ensuing analysis. The code requires the raw sounding data plus the date, time, altimeter setting and airspeed flown. Other parameters such as the airfield coordinates, airfield elevation, longitude of the standard time meridian and coefficients governing solar heat flux to the atmosphere are incorporated into the code and are thus not required as regular input. The program calculates the necessary corrections to the input data to compensate for airspeed effects and instrument calibration offsets. Next, the dewpoint and mixing ratio profiles are computed from the corrected temperature data. The ground temperature and surface dewpoint are computed for various times of day from which cumulus base and top altitudes (agl) are evaluated. As shown in figure 1, these results are then displayed on–screen in the form of a pseudo–adiabatic chart along with numerical values for the surface temperature, dewpoint, and cloudbase/top (or top of convection in the event of blue thermals).

The temperature forecast at each time step is determined by a mathematical model of the energy flux balance at the earth's surface. Elements considered by the model are as follows:

1. Changes in the position of the sun throughout the day for a given time of the year.

2. Absorption of incident solar radiation by the atmosphere and reflection from the ground (surface albedo).

3. Net outgoing thermal radiation from the ground (infrared radiation).

4. Energy losses to the soil due to heat conduction and evaporation of moisture.

5. Rate of heat transfer to the atmosphere.

Item (1) is known with great precision from sun/earth astronomical relationships using ground coordinates, date and time. Items (2–4) are given to within initially unknown scaling parameters.

The parameters that scale the influence of (2–3) can be estimated from published data. However, the thermal properties of the soil (4) depend to a large extent on local and regional factors, such as ground moisture content and soil composition. Consequently, the influence of item (4) on the surface heat balance is determined empirically from local observational data. The heat supplied to the air (5) is given by the difference between the total incident energy flux and the aforementioned heat losses.

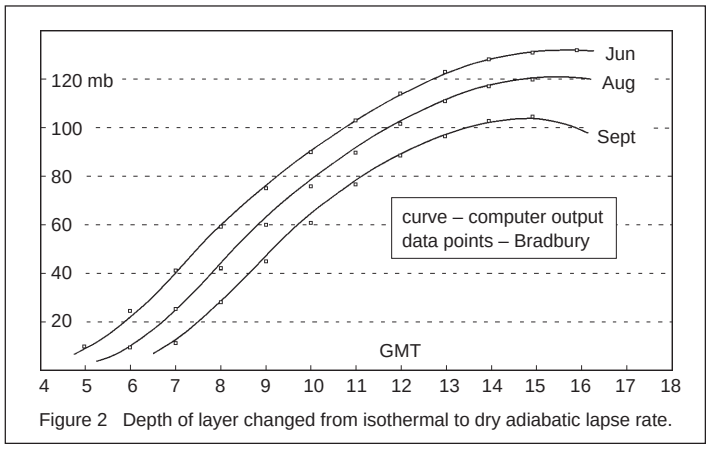


Figure 2 Depth of layer changed from isothermal to dry adiabatic lapse rate.

Data representing the effect of solar heating on the lower atmosphere at 52N, OW (south-central England) have been published by Bradbury (4). The data represents the depth of a layer (expressed in millibars) that is changed from a constant temperature (isothermal) profile to a dry adiabatic profile (3C per 1000 feet). The parameter governing item (4) of the heat balance was selected so as to obtain agreement with Bradbury's data at one point, which is the maximum depth of this layer for mid June. The parameter so determined was used to generate the daytime variation of this layer for June, August and September. Figure 2 illustrates the comparison between the computer model (solid curve) and Bradbury (data points). Agreement is excellent for all times of day including the early morning hours. Note that seasonal variations are captured equally well by the model. The parameters which control the estimation of net solar heat flux are determined only once for a given region (eg. southwestern Ontario).

In summary, a system was developed and successfully tested which greatly simplifies the task of obtaining good data from a local sounding and generating from it a thermal forecast. For a typical sounding, data collection required approximately 30 minutes and the complete analysis took between 5 and 10 minutes. The total analysis time consisted of 2–3 minutes to create the input data file, approximately 1 minute of computer processing time (IBM XT, 8 MHz), and a few minutes to examine the computer output.

Research will be continued in 1992 to further refine the local sounding process and to enhance the computational algorithms. However, one tough problem still remains — and that's how to get up early enough each morning to make these met flights!

A package consisting of a precision digital aircraft psychrometer and an advanced pc analysis code is being assembled at the time of writing and will be available by spring 1992. For further information contact the author at Aventech Research, (416)773-4147. •

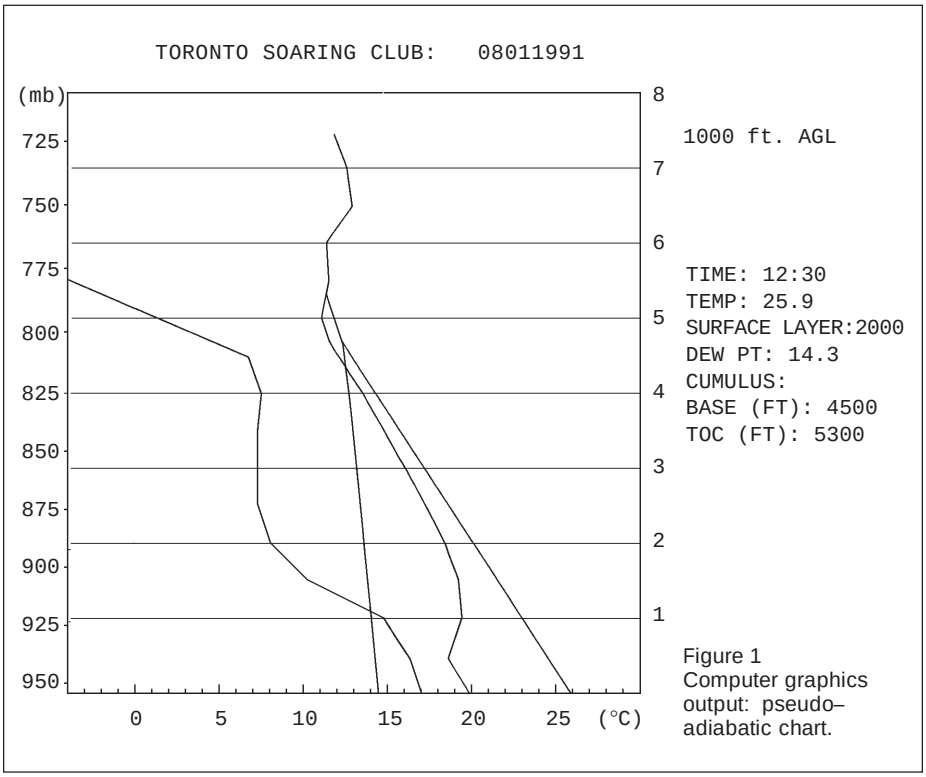


Figure 1
Computer graphics output: pseudo–adiabatic chart.

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1991 ACCIDENT / INCIDENT REPORT and ANALYSIS

George Eckschmiedt
member Flight Training & Safety Committee

THE 1991 SOARING SEASON is finished and once again I have spent my Christmas break in evaluating the Canadian accident reports; the fourth year in a row. The quality of the reports received improved markedly from the previous years. Many were completed with great care, included elaborate diagrams, providing educational material from which everybody could learn. Most all of these reports would be suitable for publication, but most all had a little notation: for your eyes only. The request will be honoured of course, but it is a shame that the information can be used only for statistical data.

My compliments to those people who reprinted the new reporting forms with fancy fonts and pretty printing. It made my work a lot easier. For those that completed the form on a printer: thank you. My admiration also goes out to a gentleman of advanced age, who hand lettered all four pages of the form with beautiful letters.

As we have said it before, the Flight Training & Safety committee is very concerned, and we are trying to do anything possible to improve the picture. That is the reason this report is prepared. This report has no intention of being related to the SAC insurance scheme. The FT&S committee is working independently (believe me, very independently) but we are making use of the one liner notes provided to us by the insurer. I only wish those one liners were a little more detailed.

Here is a list of the known events in Canada in 1991, as gathered from reports to SAC, to the insurer, and obtained by any means.

TABLE OF EVENTS

Age	Description	Hrs
	Aviation accidents not reported to SAC	
36	Uncomfortable on tow, release, land straight, hit mole	32
NR	Hard landing	NR
NR	Canopy flew off aircraft	NR
NR	Canopy flew open on landing	NR
	Aviation accidents reported to SAC	
15	Student let go of the controls, vomits, opens canopy at 2200'	5
33	Ground loop on unplanned outlanding	100
48	Spin on final turn only one spoiler opened	120
56	Hard landing, from unaccustomed wind gradient	120
56	Weld on flap failed in flight	120
62	Unplanned off field landing, stall, spin on final, ground loop	151
32	Tail dolly bounced, holed rudder	350
20	Beat up on road, flock of birds startled, bird strike	450
60+	Ground loop on take off	900
NR	Towplane tipped on its nose on short field landing	4000
NR	Wheel picked up winch cable, pitch uncontrollable to 800 ft	NR
	Non flying accidents not reported to SAC	
NA	While driving, tire blew on trailer, rolled into ditch	NA
NA	Trailer rear ended	NA
NA	Canopy fell over instrument panel	NA
NA	Hail damaged to Citabria	NA
NA	Canopy damage	NA
	Non flying accidents reported to SAC	
NA	While hangaring glider elevator hit post	NA
NA	During trailering the elevator hit a fence	NA
	Aviation incidents reported to SAC	
17	Final turn at low altitude	8
20	PIO on takeoff, release, land straight ahead	15
37	On take off the towplane inadvertently dropped the rope	25
54	Landed short of runway	60
55	Cable released at lift off	62
53	Try to stretch flight, flew wrong–headed abbreviated circuit	177
53	Rudder cable detached from the rudder pedal	217
44	Towplane run out of fuel	450
36	Tow hook released the rope prematurely	560
NR	Near hit as a result of runway changes and unwise procedures	680
39	On landing the gear was retracted, reminder device ineffective	800
59	While in thermal, near hit with towplane towing glider	2500
37	Landed short in gusty wind	6003
51	Alfalfa crop damaged in landing	1900
NR	On landing the gear was retracted, warning assumed wrong	NR

NR: Not reported NA: Not applicable

ANALYSIS

As in 1990, the events were grouped to highlight certain common characteristics. We had 15 aviation type accidents and 7 in which no flying activity was involved! These non–flying accidents with insurance claims could have been caused by anyone, yet they blacken the soaring community. Admittedly, the "act–of–God" type accidents, such as hail damage or tires bursting are easier to accept; canopies dropping on instrument panels and hangaring accidents are a bit more difficult to swallow. However, we have an improving trend on these items, we have much less such goof–ups than last year.

Considering the fatal accident, first our sympathy goes to the survivors of this unfortunate event. The report to the SAC reads that only one spoiler opened on the final turn during a routine outlanding. The insurance company writes simply as the aircraft spun in. Excluding the mechanical implications, the lessons to be learned is a classic and an old one: keep the speed up and don't use the spoilers on the turn to final. Keep that last turn as clean as a whistle.

Of the 37 events, 8 were takeoff related. On three flights the release operated prematurely; one Blanik, one 2-33 and one towplane. I wonder how many Blanik premature releases were not reported. After all these years of operating this glider, many of us are still not familiar with the mechanics of its release, or to the fact that the Blanik release can be activated by a foot in the wrong place in the front seat. A premature release on a Schweizer hook can only be attributed to incorrect hook up. The same goes for the towplane premature release. Fortunately, most of the release mechanism related events were incidents, but each could have resulted in a more serious outcome.

One of the takeoff related incidents must be highlighted, as it could have resulted easily in a fatality. On a winch launch the pilot released because the winch hesitated. The glider then rolled onto the wire, the wire wrapped around the axle, the winch resumed power and the glider was launched. Control was marginal during the tow but the pilot's guardian angel intervened by breaking the wire. Now if that axle was a little further behind the CG or the pilot was a few kilos lighter, not only the pitch but the direction would have been uncontrollable. The result is not hard to imagine.

It is very difficult to understand why people operate equipment that is inherently dangerous. It does not take a Lilienthal to see that a garden hose on the wire could prevent the axle picking up the rope. We human beings are fallible enough without adding to it by not using equipment that is just plain common sense. Then, we can afford many thousands of dollars on gliders, but a few extra hundreds for a radio is just too much.

(I have witnessed a similar event with an Open Cirrus. The release on that glider was attached to the landing gear, so there was not too much C of G problem. The pilot of the Cirrus rode the launch all the way up when the rope was cut, and while remaining within the perimeter of the airport, landed uneventfully. The garden hose was added, but he never flew that Cirrus again.)

More in–flight problems were reported than previously. Note that on the fatal accident it is not known if the spoiler failed in flight or not. On another glider a rudder cable came off the rudder pedal while in flight, and a weld failed on the flap of a homebuilt. All anxiety creating events we prefer to be without.

Landing events reported are the classic ones. Hard landings, so hard that the canopy flies off, unretracted landing gear cycled so the landing is gear up, are all repeats, and are all preventable accidents. Why have a gear warning device if we cannot rely on it? Why can't the lever position be marked as "retracted" and "extended"? Low turns to final, and landing short are all familiar friends by now.

Complacency events are getting more serious. While the unplanned outlandings are still there and should cause serious concern to all CFIs, (one resulted in a write off) the reporting of near hits was very welcome, although it is too bad that they happened. I only wish that they could be written up in *free flight*, de-identified of course, as they do provide a lot of information on operating discipline and procedures.

("Near miss" is a bad expression — I almost missed it means to me that I didn't miss it, I hit it. Near hit means I did not hit it.)

Towplane events were minor in nature, one running out of fuel and one nose over.

CODING SHEETS

The completion of the coding sheets was much improved from the previous years. This year it took only half the time to process them and I did not have to guess so much. Some interpretation was still required as only 22 coding sheets were received, but the improvement is remarkable. The object of the coding sheet is only to identify the factors in the event: items that could have caused the event, the reason, the result, the damaged component, or anything that was directly involved.

The coding sheets are processed by first examining the reported codes. If they make sense, an "x" is placed at the corresponding place in this analysis. Then each and every report, even if it is only a one liner from the insurer, is mentally recreated and examined for possible factors. A painful process, visualizing all the mistakes and damages of our friends and equipment. Some reports were excellently described, leaving very little to assume. On others, some assumptions had to be made, or simply lended themselves to assumptions.

			91	90	89	88
		Number of events	37	41	47	27
1.	TYPE OF EVENT					
1.1	Heavy landing	xxxxxx	6	5	5	6
1.2	Undershoot	xx	2	6	18	5
1.3	Overshoot		0	1	1	1
1.4	Groundloop	xxxxx	5	4	4	3
1.5	Collision (Ground)		0	0	4	2
1.6	Collision (Air)		0	0	0	0
1.7	Stall		0	2	0	0
1.8	Spin	x	1	2	0	0
1.9	Structural Fail	xxx	3	2	1	1
1.10	Blown/Flip Over		0	3	2	0
1.11	Gear up landing	xx	2	0	2	0
1.12	Gear collapse		0	1	1	1
1.13	Takeoff	xxxxx	5	4	2	0
1.14	Other	xxxxxxxxxxxxxxx	16	15	14	8
2.	AIRCRAFT DAMAGE					
2.1	None	xxxxxxxxxxxxx	14	13	17	13
2.2	Minor	xxxxxxxxxxxxxxx	17	10	13	2
2.3	Substantial	xxx	3	9	11	9
2.4	Destroyed	xx	2	5	4	2
3.	PERSONNEL INJURY					
3.1	None	xxxxxxxxxxxx29xx	29	24	43	22
3.2	Minor *non flying*		0	4	1	2
3.3	Serious *reports*		0	0	3	2
3.4	Fatality *excluded*	x	1	4	0	1
4.	AIRFRAME FAILURE OR DAMAGE					
a.	In flight failure	xxxxx	5	-	-	-
b.	Damage at accident	x14xx	14	-	-	-
c.	Handling damage	xxxxxxx	7	-	-	-
4.1	Flight controls	xx	2	3	2	1
4.2	Elevator	xxxx	4	5	3	3
4.3	Rudder	xxx	3	6	2	2
4.4	Ailerons	xx	2	5	1	0
4.5	Flaps	xxx	3	2	1	0
4.6	Wings	xxxxx	5	10	6	4
4.7	Spoilers/divebrakes	x	1	1	2	0
4.8	Wheel/mount.	xxxxx	5	6	1	4
4.9	Canopy	xxxxxx	6	6	7	5
4.10	Fuselage	xxxxxxx	7	5	13	8
4.11	Release	xx	2	-	-	-
4.12	Instrumentation		0	1	-	-
5.	TOWING					
5.1	Premature release	xxx	3	0	0	0
5.2	Rope/Cable break		0	0	0	1
5.3	Winch/Tug failed		0	0	2	0
5.4	Cable snagged	x	1	0	2	1
5.5	Divebrake opened.		0	1	4	2
5.6	Towplane upset	x	1*	0	0	1
5.7	Run out of fuel	x	1	2	-	-
5.8	Taxiing mishap		0	2	-	-
6.	PILOT FACTORS					
6.1	Misused controls	xxxx	4	3	9	2
6.2	Misused spoilers	x	1	2	1	1
6.3	Misused flaps	x	1	1	2	0
6.4	Misjudged distance	xxxxxx	6	4	8	2
6.5	Misjudged speed	xx	2	2	1	2
6.6	Misjudged altitude	xxxx	4	10	13	4
6.7	Misjudged conditions	x7xx	7	8	10	4
6.8	No wind compensation	x5xx	5	3	8	3
6.9	Did not see object	xxx	3	2	4	5
6.10	Did not keep speed	x	1	2	1	0
6.11	Overstressed A/C	x	1	1	0	0
6.12	Exceeded experience	xxxx	4	3	4	1
6.13	Reckless flying	xx	2	4	1	0
6.14	Insufficient training	x	1	2	5	2
6.15	Physical impairment	x	1	0	0	1
6.16	Poor circuit plan	xxxxx	5	11	16	11
6.17	Instructor failed	xxx	3	0	0	3
6.18	Other (complacency)	x7xx	7	9	4	2
7.	WEATHER					
7.1	Low ceiling		0	0	0	1
7.2	Rain		0	0	0	1
7.3	Hail	x	1	3	0	0
7.4	Crosswind	xx	2	3	1	1
7.5	Severe turbulence	x	1	0	0	3
7.6	Wind gradient	x	1	0	1	1
7.7	Wind shift	x	1	0	0	0
7.8	Thunderstorm		0	1	0	0
7.9	Severe sink	x	1	1	0	2
7.10	Line squall	x	1	3	0	0
7.11	Lightning		0	0	0	0
7.12	Poor visibility		0	1	0	1
7.13	Clear (if factor)		0	-	-	-
7.14	No factor in event	xx29xx	29	-	-	-

* Towplane on the ground; a nose over

	91	90	89	88
Flying hours distribution				
0 – 100 hours	7	7	10	1
101 – 300 hours	7	5	11	4
301 – 800 hours	6	5	7	6
801 – above	4	3	2	5
Times hours were reported in flying events	24 of 30	20 of 31		
Reported pilot age distribution				
16 – 25	4	3	7	1
26 – 49	9	9	7	0
50 – 59	6	1	6	8
60 – up	3	3	9	1
Times age was reported (in flying events)	22 of 30	16 of 31		

As can be seen, four previous years data is available simultaneously. The comparison should be made by the readers, as the data is self evident. Any apparent inconsistencies between the number of "x"s and the number of events may be the results of assumptions, and the fact that some events may have had more than one factor.

Similar to last year the striking thing is the relative consistency of the factors, even when considering the variation in the yearly event quantities. Heavy landings and ground loops are up from last year. In–flight mechanical failures are also up, as not many were reported previously. Minor damage increased, but we wrote off only two gliders.

Perhaps we are improving a little. Not much, but at least a little. We are not injuring as many pilots as before. Examining Section 6, Pilot Factors, the sum of the "misjudged xxx" seem to stand out. This is particularly sad, as the FT&S committee instigated just this year a new tool for judgement training, the SOAR system. Perhaps it was a mistake to incorporate it into the Accident and Incident Reporting Form, as only two reports submitted had anything written in this section.

CONCLUSION

The conclusion can differ only very little from last year. The four year data trend shows that Canadian soaring has reached a plateau of accidents and incidents. We seem to have improved a little, but this improvement is still within a normal variation. The presented data still seems to be standard, following a normal distribution.

To improve our record, the norm has to be changed. To change the norm, a system of small but continuous improvements has to be implemented. Last year I stated that to do this will require a cultural change. This change must be a journey of continuous improvements, the end result of which is no accident reports. The journey has begun, but we have a long road ahead of us. Your Flight Training & Safety committee intends to be part of this journey, to provide leadership and training, but it can not be done without commitment from the gliding community. Do we really want to improve the record or are we satisfied with the norm?

What are you going to do about it? •

My first landout

from page 4

some previous personal tests on straight glides in this 1–23, I knew I could get to my picked private airstrip at circuit height. Even so, I must say it was unnerving to be above the town of Fergus at 1300 feet. As soon as I got to the field, I did a proper circuit, and landed safely after an hour and 23 minutes of flying time.

After sulking and cursing for a minute or two, I walked to the farm house, past the owner's private C–172, and got a warm greeting from their not–so–tiny dog. Although company was coming to see my unsuspecting hosts Ellen and Glynn Broderick, they invited me in, gave me a drink (water of course), and asked whether or not I would like to join them for a steak dinner. If this is how every landout ends, I just might make a habit of it. Before any eating or drinking was to be done though, business had to be looked after. It was time for the dreaded phone call to York. To put the call off for just another minute, I decided to call home, and tell my mom what was happening. I then called the club, told them where I was, and was told that a towplane would come for me in a few two hours. That wasn't enough time for the steaks to be prepared, but it was enough time to tell the Broderick's the story about how my dad had never landed out yet, how he bragged about it, and how he was going to laugh when he found out I did.

The towplane arrived at approximately 1800. My long face had been returned to normal by the hospitality of the Brodericks and their guests (they even drove me to the glider in their van and helped get me ready!!), but there was no way to prepare myself for the news my towpilot, David Maven, had for me. MY DAD LANDED OUT!! Any son of a father would have excused the delight I felt inside when I realized he wasn't kidding. I think everybody in Fergus, just 3 miles south, heard my shouts of joy. And to think my dad says we never do anything together anymore.

The tow home was pretty uneventful, except for the fact that I couldn't wipe the silly "my dad landed out too" grin off my face. It wasn't until 21:00, with everything tucked away, that I heard the rest of the story. My dad did make it to SOSA, but because of the hour difference in takeoff times, as he headed back, he hit the same rotten weather that I flew into going there. He landed at Reid's Field (just off the 401), after going as far as Guelph. He didn't go down without a fight however, trying to get back up from 500 feet for 45 minutes. At least he kept the farmer below him trying to cut his grass honest, fearing that a great big bird would land and gobble him up, tractor and all.

He finally gave in, landed, and called mom at home. The conversation went something like this:

Mom — Well, what's going on over there with Richard?
Dad — I don't know! I'm at Reid's Field. I just landed out.
Mom — You're kidding. Richard called 15 minutes ago saying that HE landed out.
Dad — Ha! Ha! Ha (told you he'd laugh)

photo unavailable

Richard, on left, and GXR take a rest at "Nearlea–a–Farm" near Fergus.

He then called the field to 'fess up to HIS landout. The field office happened to be packed when his call came, and everybody there knew how my dad had bragged that he had yet to land out. They also knew that he would pester me for landing out when he hadn't. Apparently, after the gang found out it was my dad calling from anywhere other than home, a great laugh was had by all. My dad still insists that he outlasted me on the first landout, which he did by 15 minutes. I'll admit to that. I also heard that you only become a real pilot after you land out. Well dad, it looks like I became a real pilot 15 minutes BEFORE you.

The feuding and the fun will never end, and I wouldn't want it any other way. •

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Coming Events

Apr 25, 1:00pm, **Edmonton Soaring Club Open House**, Chipman, AB.

May 16-18, **Alberta Provincial Soaring contest**, Innisfail, AB. Call Tony Burton (403) 625-4563.

May 19-24, **Alberta Soaring Council cross–country clinic**, Chipman, AB. Call T. Burton as above.

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

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

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

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

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

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

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

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

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

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

SAFETY IN SOARING – A WIDER LOOK

Ian Oldaker
Chairman, Flight Training & Safety Committee

Active safety, passive safety, objective flight safety, what do these mean? We have all too often tended to blame the pilot for an accident, after all he or she is the one ultimately in charge of the machine! Then too we have tended to look at improving safety through better training, whatever that means! Some have wanted to regulate more tightly — "Stop flying altogether and we'll have no accidents". Hah! Politically some people say we must make it safer. Flyers look at the perceived risks very differently from non–flyers, which makes this line of argument difficult to follow, particularly if the do–gooders are not pilots. There is of course the argument that without some risk (or thrill, if you want to put it this way) there is no enjoyment to the sport. However, the thrills that I enjoy are not the avoidance of an accident, but the challenge that the environment or weather presents, the personal achievement of getting round the course, or just the thrill of flying and staying up longer than the next pilot. Who hasn't had that as motivation to pushing it a little further! But is that always safe?

I will look at two aspects of safety in soaring. First the regulatory side is considered, and how we as a group, and individuals too, respond to pressures. Second, a look is taken at how we might approach safety from an injury–reducing point of view, taking what has been done in automotive safety as our model.

Making it safer and keeping our freedoms

Accident prevention can be counter–productive if a decision designed to "make it safer" is based on poor or not enough data. We have to be careful when regulators start to talk of requiring transponders or stiffer regulations. Careful means that we have to be vigilant to ensure that adequate data is available and is used to substantiate our position with respect to a new requirement. We must have good data of our own to argue for the status quo or for a revision to a proposed rule.

Apart from trying to keep gliding as safe as is reasonably possible, good data and objective analysis will be essential to keeping our freedoms, and this goes for all branches of sporting aviation and to soaring in particular. Our efforts at accident prevention have tended to concentrate on the pilot and on the training we provide. While this will have some effect the whole broad spectrum of flying safety is not covered. Accident prevention measures are often lacking in objectivity, for example:

- A person who wants to make gliding safer is a "good guy" while anyone who argues against him is "bad".
- Perceived risk is not sufficient reason for strong action. Many people over– or under—estimate the potential risk.
- Risk analysis is a highly specialized field, as evidenced in the transportation of hazardous chemicals.

Human factors also come into the equation. In discussing perceived risk, people tend to cling stubbornly to a position once they have chosen it. Research has shown that they will go to any lengths to adapt information they receive to fit the position they have already taken, and if not, to reject it.

Two actual "make–it–safer" examples (given by Bill Scull, Director of Operations of the British Gliding Association) which may not achieve their objectives are:

In the UK In a light aircraft engine failure, the pilot survives and the passenger is killed. Data show that 1 in 50 engine failures result in serious injury or a fatality. This followed by:

- Questions about flight safety in Parliament
- In that same year (1987) there were more fatal accidents — 27 compared to the 15 average over 8 years
- The CAA set up a study group on general aviation safety — scientists (statisticians) concluded no conclusions can be substantiated by statistical tests"
- An accident review (CAP 542) had almost four pages of conclusions and one page of recommendations — *based on data that could not be substantiated.*

In Australia there is a proposal to require gliders to call on the radio when climbing through 5000 feet, or descending below 5000 feet, and when requested by ATC, giving height, speed, position and destination. *This could generate about 100+ calls on a 500 km flight.* Would this improve flight safety? Definitely not! Increased reliance on radio or radar to maintain separation would result in poorer airmanship — especially lookout.

Accident trends and safety actions

From the above the need for objective flight safety programs is evident. Objectivity requires good data and careful analysis. The accident trends in Canada are difficult if not impossible to see, as the numbers are too small for statistical analysis. Even with a much larger sample such as in the UK there is no marked variation from one year to the next. However, from very careful analysis it is likely that the accident types that cause serious injury or death could be improved through education rather than by regulation. In past years we have, for example, targeted spin training. This has had a positive effect. However we have all heard of the law of diminishing returns; this, simply stated, means that the first few hours of instruction are much more effective than any later instruction or dual flying, say after 500 hours. So we have to get our instruction right the first time.

Decision making or "judgement" is more difficult to quantify, and if at a later point a pilot remains "unsafe" or still has poor judgement, no amount of extra training will help. If we are going to protect him or her from injury we will have to do it some other way.

Reducing injuries

This idea of trying to reduce injuries (and this includes fatalities) is what soaring safety should be all about, and it could be modelled on public health programs that now talk about *injury control;* they no longer call it *accident prevention.*

Take one of our everyday activities, that of driving an automobile. Huge strides have been made over the years in improving safety, by improved driver training, better cars (ones with "safer" interiors and anti–brakes, better road handling etc). The highways have improved crash barriers, and many abutments have large yellow tubs full of sand to allow for a graduated deceleration if you should hit them. And then there are the paramedics, many of whom have helicopters at their disposal for speedy attention to the injured. The potential for reducing injuries is now much better than in the past. So accident awareness and accents on training are not the sole ways in which we can improve safety in soaring. In soaring we are today where automotive safety was perhaps 30 years ago. In the 1950s it is said that the California Highway Patrol had a list of 18 possible accident causes and 16 of these were some variation of driver error.

Hadden's Matrix

One way that we can view an accident is to borrow a concept from public health workers who will study an epidemic from three factors, the agent (the bug), the host (the human with the disease), and the environment (which helps transmit it). In our gliding scenario these three factors are the human (pilot), the vehicle (the glider), and the environment (everything external to the glider). Combining these two gives "Hadden's Matrix", named after the automobile injury specialist who devised the concept. On the vertical axis are the pre–crash, the crash itself and the post–crash phases. On the lower axis are the human, vehicle and the environment factors. This matrix is shown in the figure.

	human	glider	environment
pre–crash	1	4	7
crash	2	5	8
post–crash	3	6	9

Using Hadden's Matrix we can examine accident prevention measures in each of these

nine "cells". This is not to say that we should reduce our emphasis on instruction. I think we are all aware of the value of good flight instruction, which must continue, but let us now take a broader look at what might be done, taking our automotive experience and Haddon's Matrix as our guide. Each cell represents an approach we can use to reduce injuries resulting from a glider accident.

In fact clubs could fill in the matrix at a safety meeting, or instructors could go through it with students. It will be surprising what comes out of an assessment like this. In the following paragraphs I give some examples, but do add to them yourself.

Cell 1 (human/pre–crash) Improved flight instruction would fit in here. That is, the goal of instruction is to influence human behaviour (the pilot's — in the pre–crash phase. Other examples of what could be done in this cell are to not fly if you are feeling unwell, or are psychologically not ready (just had an argument with the CFI?)

Hey! This leaves eight other cells where we could do something to reduce the potential for injuries. What an opportunity.

Cell 2 (human/crash) The human body can withstand huge "G" forces, provided it is adequately and correctly restrained. In this cell we have seat belts — how good is yours? Slowly loosens or slips does it? Human tolerance is reduced when these devices are not correctly used. And have you thought about helmets. They really reduced injuries in motorcycling.

Cell 3 (human/post–crash) The crash is now over so survival or injury treatment and reduction are important. Good first aid equipment helps here as does an understanding of how to avoid making injuries worse, such as a suspected back injury.

Cell 4 (glider/pre–crash) Is the glider ready, really ready to fly? Okay so you DI'd it and gave it a positive control check. But did you use a checklist when rigging and did you get an independent pilot, familiar with the machine, to check your rigging?

Cell 5 (glider/crash) Here we have the items in the glider that can worsen the effects of a crash, such as protruding knobs and handles which could worsen injury. You could for example specify only energy–absorbing materials in the seat cushions, and many backs would love you for it. And designers are increasingly placing emphasis on improving the crashworthiness for their cockpits.

Cell 6 (glider/post–crash) What aircraft factors might worsen injury? For example, how easy is it to exit the cockpit after a mid–air collision? And how easy is it to get your legs out from under the instrument panel after the dust settles on the ground?

Cell 7 (environment/pre–crash) This concerns how the environment can be improved before the crash. We can bury the power cables off the end of the runway, for example, or attend to the long grass. And what about those bushes on the approach? They seem to be a few feet higher than when I last looked a year or so (?) ago. And of course the gopher holes in the runway can be filled in, to make landings less of a rough ride.

Cell 8 (environment/crash) Essential items such as runway markers or fences that have to be used can be made safer for the actual crash by using break–away posts, no barbed wire or similar boundary fences, and so on.

Cell 9 (environment/post–crash) The post–crash phase needs a good manager. How do you and your fellow pilots respond after a crash? Prompt and effective responses can reduce injuries and subsequent deterioration of the injured. Trained people and equipment such as back–boards and first–aid supplies come to mind here. And an ambulance should find it easy to navigate to the field.

Conclusions

Safety in gliding is achieved through good and effective training, and through a stimulated imagination about the global situation, about the whole operation at a gliding club or event such as a wave camp. Safety involves a look at the pilots, the gliders and the environment to identify ways to reduce risks. Reducing the risks by saying "Don't do this" or "Don't do that either" won't necessarily help. However, the environment or our operations might be alterable so that it would be impossible to do "this" or "that". Robert Weien, in his article, said that it also involves making sure that if "this" or "that" does happen anyway, then nobody gets hurt as a result.

Mostly it means that we should be willing to spend time thinking how we can extend safety beyond the pilot alone. Next we must be willing to take action to implement the ideas.

Our sport can certainly be made a safer activity, both on the ground and in the air. Let us all give it a whirl, it's in our hands. •

W.G. Scull, *Flight Safety Objectives and Objective Flight Safety*, Paper to OSTIV Congress XXI, Wiener Neustadt, 1989.

Robert W. Weien, *Soaring Safety, an Alternative View,* SOARING, March 1988 (and reprinted in *free flight,* 3/88).

NATIONAL CFI SEMINAR SLATED FOR 1993

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

CANADIAN ADVANCED SOARING GROUP NEWS

The Canadian Advanced Soaring Group held a meeting in mid–February to plan for the up–coming season. Workshops and cross–country clinics are planned, dates and location to be announced in *free flight*. The aim of the CASG is to promote and support cross–country and contest soaring from a pilot's first cross–country to world contest level. Already applications are coming in to attend this summer's clinics in Ontario. The new executive is:

Chairman	Treasurer
Ed Hollestelle	Richard Longhurst
Secretary	Newsletter
Alan Wood	Sue Eaves

Steering Committee Ed Hollestelle, Ulli Werneburg, Robert DiPietro

LARK TECHNICAL PROBLEMS

Mike Maskell of Winnipeg has sent *free flight* data on three areas of maintenance concern for the two place Lark (and which may affect single place Larks also).

• An AD (#386) from the Gliding Federation of Australia relates to an incident of a front rudder pedal failing across the bearing support tube, about which the pedal rotates, due to cracks in the tube.

During inspection, dye penetrant should be used in this area. Any cracks found must be repaired by welding or the part replaced. Spare parts can be obtained from SA Brasov, 2200 Brasov, Box 198, Romania, fax 0015 40 21 16938.

• Austalia also has had several reports on interference between the front cockpit rudder pedal adjustment mechanism and the tow release. With the adjustment fully forward it is possible for the release mechanism to be blocked sufficiently to prevent release of the tow rope.

The recommended solution is to file away material at the base of the adjustment yoke at the offending point of interference. This can be done with a 1/4" fine file *in situ*. A clearance in the worst case of 1/8" should be created. (Mike reports that the Winnipeg Lark was found to have this problem 2 years ago.)

• Winnipeg has discovered some cracks on the inboard flap castings. The casting is on the inboard root rib of the flap. The actuation rod from the fuselage connects to it to drive the flaps. The area is difficult to inspect with the wings on.

The left hand side had a 1/2" crack and the right hand side was just starting. The cracks are occurring on the flanges close to the actuation ball. The part should be inspected with a dye penetrant during inspection.

There was no room to give diagrams in this issue. If you have any questions, contact Mike at (204) 831-8746. editor

SAC affairs

Notes from the SAC Winter Directors Meeting

The meeting opened at 0930 on 11 January 1992. Chris Eaves gave a report concerning cooperation with other aerosport bodies in combined approach to Transport Canada (TC) regarding mutual problems. Some organizations were a little too antagonistic towards Transport Canada.

Power pilot exam Vancouver club were happy with the results of running the conversion course but pilots unhappy with extra time and hassle of having to write exam at TC. Ian Oldaker has presented one exam for approval to TC and now has a second exam, as requested by TC, almost ready. If these exams are approved, TC may issue authority for SAC supervision of writing.

123.3 frequency interference
Expect to forward a second letter to TC. There was no response on the first letter.

1992 Nationals Pièrre Pepin presented progress on organizing. A group of clubs are co–operating to handle a bare bones contest at Hawkesbury.

Financial status Jim McCollum presented a report on the results of the 1991 operation. Some minor expenses and revenues are still to be entered but indications are that 1991 operations will show a small surplus due to cancellation of the October Directors meeting. The cancellation of the 6th issue of free flight and some cut back in the Flight Training & Safety committee expenses. Discussion on proposed budget.

Insurance Report given by Ulli Werneburg. Low claims this year could result in no increase in premiums. Discussion by Directors and Treasurer on what changes could be made in the handling of the insurance premiums. Could it be direct to the brokers, instead of coming through SAC and what savings could be accomplished.

Sporting committee Report by George Dunbar on proposed rules for World Team selection. Some sub–committees are to be taken out of the sporting committee and become separate committees. Changes to be noted in the procedures manual, affected chairmen to be notified and listings in free flight changed. George Dunbar reported progress on resolution of scoring problems in 1992 Nationals and proposed change of rules to eliminate problem. Discussion by Directors on implication of rulings and how best corrected. Recommendations proposed.

Trust deeds Jim McCollum will mail to Directors the proposed housekeeping revision of wording in the Wolf Mix, Elemer Balint, and Glynn Trust funds to give them a consistent approach in day to day handling.

World Contest fund Ulli Werneburg to construct a proposed operational manual for the handling of this fund which consists of revenues from the Wolf Mix fund and other donations.

Flight Training & Safety Harald Tilgner reviewed progress since October meeting and there was discussion on the accident and incident report very ably prepared by George Eckschmiedt.

Pioneer Trust fund Requires earlier preparation of material in 1992. Other printers to be contacted. Discussion on trying a yearly entry in free flight explaining the functions of the Pioneer Trust fund and its benefits to SAC. Try a special interest drive each year.

Articles for free flight Discussion on enthusing people to write articles for *free flight*. Suggestions to have editor specifically request articles from members, have certain issues designated for a particular phase of our sport, such as technical, training, cross–country and contests etc, to create an award for the best article each year from a SAC member.

Follow up on Club Statistics Directors to contact delinquent clubs after consulting with Randy Saueracker.

Preparation for 1995 Suggestion to earmark funds for expected expenses which will occur in preparing for the 50th anniversary year celebration. Directors submitted suggestions for event; interviewing pioneer members, collecting historical data, preparing special issue of *free flight* and/or separate book, requesting the Canada Post to issue a commemorative stamp, hold a special contest or a Cross Canada Marathon. Require more suggestions from clubs and members, wanted now. Organization is required now for this event. •

Notes on Meeting of Flight Training & Safety Committee

Calgary, February 28, 1992

Many items were covered, from instructor upgrading to aging pilots, to motorgliders. Some highlights follow; more details will be sent to all CFIs in the next few weeks.

Efforts to obtain an exemption to the five flights solo within the previous six months before carrying passengers (and instructing) continue with Transport Canada; we expect a resolution very soon. The committee have emphasized to TC that our clubs already require (competency) checkflights at the start of each season for pilots, and we expect to achieve better "safety" with continuing the practise, whereas requiring 5 solos will, in some cases, allow the pilot to continue a poor habit unchecked. When discussing our proposal in February, TC indicated that our proposal was being considered favourably. They are expecting to contact us in early March.

The current requirement for power pilots converting to gliders to write one of the "glider" exams as part of the process to obtain their glider pilot licence is being pursued vigorously with TC. The committee has submitted an exam which we propose to be administered by clubs. TC are working on our proposal and we expect word from them, also in early March.

The committee has agreed to details for much simplified instructor upgrades and record keeping. Class III upgrades will be more automatic once the extra flying experience is acquired, the only recommendation being needed will be the CFI's signature. Class II upgrades will require attendance at an upgrade clinic which includes a flying review and seminar where the latest instructing techniques/information and safety topics will be reviewed. This gives instructors the chance to update themselves. In the case of very active Class IIs this will be useful because they will have been to a course a few years earlier. Existing Class I instructors are to be encouraged to attend! Upgrading of Class IIs will be recommended by the clinic director to the CFI who in turn requests the upgrade to the Association. Established Class Is who attend a clinic are encouraged to take part fully and to participate in a flight review, but will not lose their Class I status.

SAC INSURANCE HISTORY, 1984 – 1991

	1984	1985	1986	1987	1988	1989	1990	1991
Insured Clubs	40	38	41	42	42	44	43	38
Total Aircraft	307	294	350	370	356	348	361	370
Hull Value ($M)	5.37	4.80	5.96	6.35	6.46	6.37	6.77	7.33
Hull Premium ($K)	210	185	221	248	249	194	211	193
Hull Losses ($K)	66	161	129	209	177	127	249	53
Hull Loss Ratio (%)	31	87	59	84	71	55	118	28
Total Premium ($K)	220	244	319	363	360	290	312	295
Total Losses ($K)	66	162	137	216	188	143	275	56
Premium/Losses (%)	31	66	43	60	52	49	88	19

The content for these clinics was reviewed and updated with the addition of aerotow, crosswinds and accident/incident reporting. Crosswinds have been implicated, as seen in our incident reporting, so feedback is being provided in these clinics.

The committee is making a concerted effort to reduce paperwork, and at the same time to provide guidelines to CFIs, for example standards for licence checkflights, passenger carrying, safety officer as well as CFI guidelines/ duties and so on. It was agreed that a package would be prepared for later issue. It would be useful to the newer clubs in particular, but is also aimed at being a compendium of current SAC–recommended practises for clubs.

In reviewing the incident reports from 1991 we see a trend towards more mechanical failures in our (aging) fleet. This is being followed up. Aging pilots is also being increasingly discussed. The OSTIV Safety & Training Panel will be discussing this in Oslo in March and the chairman will report back. Dr. Peter Perry is also to be contacted for his input with a view to providing advice to CFIs on the subject. To streamline incident reporting, the new form has been simplified and copies will be sent to all clubs.

A new subject was discussed: operations safety audits by clubs. Based on audits that are done in industry, we have devised a system for gliding clubs. The "checklists" and methodology need some work, but it was agreed they will be offered to clubs for internal use, to evaluate their operations from a safety viewpoint. SAC offers to assist clubs in carrying out these evaluations, to provide the club with an outsider's view or insight.

Motorgliders and pilot licensing for flying and instructing in them were discussed as we are increasingly being queried on their use. The current licensing approach of TC is that all single seaters may be flown by glider pilots. For two seaters which have sustainer motors, a glider pilot licence is applicable, as for pure gliders. Self–launching two–seaters require a power pilot licence, however if the motor is stopped the aircraft becomes a glider and instruction is possible only if the instructor also has glider pilot licence endorsed for instructing. To instruct with the aircraft operating as a power plane would require a commercial licence with instructor privileges.

The TC Aviation Notice dated March 5 concerning a proposal to require 24 month flight reviews was discussed. The committee agreed that we should agree in principle to the concept, but due to clubs now carrying out annual checkflights, we do not see the need for additional regulations for SAC glider pilots. Should TC implement new regs, we would support self–monitoring and minimal documentation as in the Aviation Notice. •

AWARD FOR BEST FF AUTHOR

SAC will be offering a worthwhile prize beginning this year for the best article to appear in *free flight* written by a SAC member. The Board will judge the crop of stories and choose a winner.

hangar flying

THE 2 HORSEPOWER LAUNCH

Ralph Barnaby, who was a notable naval aviator and glider pilot in the early days of soaring in the USA, related this story in 1973 of launching primary gliders by bungee cord, using two horses for the motive power.

"After a day of gliding the two horses hitched to the ends of the glider launching shock cord were coming closer and closer together. It became evident to some of us... that the horses weren't far enough apart to let the glider go between them.

"Once you get the cords stretched there's no stopping. So, everyone started screaming when the glider started to move. The glider hold–back was let go. The boys riding the horses looked back and there was this glider bearing down on them. They both dove off the horses into the sand and the glider went sailing through, between and just high enough to clip each horse on the back of the head.

"I will say this for the young lady pilot, she was unperturbed and landed the glider with no great difficulty. But the two horses ran off in opposite directions, stretching the shock cord between them. The further they went the slower they were going... Finally it got to a point where they were just pawing the ground and not going anywhere. At this point the shock cord broke.

"Have you ever seen a horse turn somersaults? Two of them going end over end! Finally they got up, shook themselves off and lit out.

"That was the end of the operation because it took the rest of the day to find them."

from *NSM,*
the journal of the National Soaring Museum

USING 121.5 IMAGINATIVELY

An unusual tale has come from a German gliding club. There was a working bee all afternoon in the hangar, followed by a club AGM which started at 6 pm. At 8 pm they got a phone call. A Lufthansa pilot over eastern Europe had called the local control tower who rang the club to tell them that they had locked a hardworking member in the hangar. Would they please go and release him. The member used a sailplane radio to call Mayday on 121.5 MHz. Good thinking.

from the *New Zealand Gliding Kiwi*

MINDEN IMPERILLED

A group which is preparing a master plan of the Minden airport is giving thought to banning sailplane operations there.

Canadian pilots who feel they have a stake in this not happening are asked to assist by writing letters of support. A show of international interest will lend added weight. Write:

- Michael Fischer, Chairman, County Commissioner, Douglas County Administrative Building, Box 218, Minden, NV 89423 or to any or all of commission members Richard Gruber (manager), Robert Pruett, Josie Grahm, Bruce Kanoff, and David Pumphrey.

- David P. Dietz, Director of Planning Project, Hodges & Schutt, 5010 Aviation Blvd, Santa Rosa, CA 95403.

A second tack is to join the Minden Glider Club to help build the soaring constituency at Minden. Send $5 to Rick Walters, 1208 Melbourne, Minden, NV 89423.

NEW GLIDER OPERATION IN GOLDEN, RECORDS WILL FALL

Uwe Kleinhempel, a Vancouver Soaring Association pilot who earned SAC's "Instructor of the Year" trophy for 1991, has moved to Golden, BC and has begun a commercial gliding business called the Rocky Mountain Soaring Centre. He has a Blanik, and at last date is leasing a towplane. He is providing mountain glider rides, tows for visiting pilots, and ab initio and power conversion training. For further information on his services, call Uwe at (604) 344-6665.

Alberta and BC pilots have greeted this new operation with enthusiasm as Golden is an ideal point of departure for several record flight categories. In particular, this launch site will allow flights to be made "on demand" rather than only when a group trip can be organized with a towplane. Out and return record attempts south down the mountains towards and into the USA and back are in the works. Kalispell, Montana is the 750 km turnpoint for the only open record category yet unclaimed in Canada — and Invermere (100 km Speed to Goal), Canal Flats (300 km O&R), and Elko (500 km O&R) are naturals. The 1000 km O&R is also being studied, the area south of Kalispell being of concern.

With a lot of pilots planning to fly in the Columbia valley this summer, there is a good chance that Russ Flint will be getting a few claims to process.

SPORTING LICENCE HIKED

The cost of the FAI Sporting Licence has increased to $15 as of 1 March. Note that checks are payable to the Aero Club of Canada, *not* SAC.

FAI badges

Walter Weir, 24 Holliday Drive
Whitby, ON L1P 1A6 (416) 668-9976 (H)

The following Badges and Badge legs were recorded in the Canadian Soaring Register during the period 1 January to 29 February 1992.

SILVER BADGE

831	Robert Snell	Rideau Valley			

DIAMOND GOAL

	Robert Snell	Rideau Valley	315.0 km	PIK20D	Kars, ON

DIAMOND DISTANCE

	David Frank	Rideau Valley	515.0 km	ASW–20	Kars, ON

DIAMOND ALTITUDE

	Rodney Crutcher	Cu Nim	5410 m	ASW–20	Cowley, AB
	Neville Robinson	Winnipeg	5307 m	BG–12B	Cowley, AB

GOLD DISTANCE

	Robert Snell	Rideau Valley	315.0 km	PIK20D	Kars, ON

SILVER ALTITUDE

	Rob Ballantyne	Vancouver	2130 m	Grob G102	Hope, BC
	Robert Snell	Rideau Valley	1620 m	PIK20D	Kars, ON
	Aaron Benke	Regina	1158 m	1–26	Cowley, AB

SILVER DISTANCE

	Robert Snell	Rideau Valley	148.5 km	PIK20D	Kars, ON
	Claude Tanguay	Champlain	60.0 km	Pirat	St–Dominique, PQ

SILVER DURATION

	Martin Hickey	Montreal	5:18	LS–1	Hawkesbury, ON
	Rob Ballantyne	Vancouver	5:12	Blanik	Hope, BC
	Bill Cole	Toronto	5:20	Ka6CR	Conn, ON
	Robert Snell	Rideau Valley	6:32	PIK20D	Kars, ON
	Michel Ravary	Outardes	5:17	K8B	St–Esprit, PQ

C BADGE

2331	Martin Hickey	Montreal	5:18	LS–1	Hawkesbury, ON
2332	Rob Ballantyne	Vancouver	5:12	Blanik	Hope, BC
2333	Bill Cole	Toronto	5:20	Ka6CR	Conn, ON
2334	Robert Snell	Rideau Valley	6:32	PIK20D	Kars, ON
2335	Jean Lapierre	Champlain	1:08	1–26	St–Dominique, PQ
2336	Kevin Van der Meulen	York	1:11	1–26E	Arthur, ON
2337	Arthur Jordan	Base Borden	1:22	1–26	CFB Borden, ON
2338	Mike Palmer	York	1:14	1–26	Arthur, ON
2339	James Perkins	Gatineau	1:09	1–26	Pendleton, ON

This is my last contribution to *free flight* as chairman of the FAI Awards sub–committee. I applaud the effort of all the Senior OOs and OOs who have worked with me to maintain our standard on submissions. Walter Weir has taken over this task, which I appreciate — after 5 years it's time for some new ideas and perspectives. Note there is a new ruling by FAI that OOs may not be relatives or financially involved with the pilot and flight. The SAC interpretation on this is being discussed. For now, I recommend that you avoid using relatives as OOs.

Larry Springford

1992 NATIONALS

The 1992 Canadian National Soaring Championships will be held at Hawkesbury, Ontario, from 23 June to 2 July. Practise days will be 21 and 22 June. These dates have been chosen because of the excellent weather which usually occurs at that time. During this period last year 500 km triangles were flown on four consecutive days. This contest is sponsored by the Canadian Advanced Soaring Group and will be organized jointly by members of four area clubs. Expenses will be kept to a minimum. Crews will be asked to help out with tasks such as running ropes, answering telephone, etc.

Entry fee	$200 if received before 30 May – $250 after 30 May
Tows	$20 to 2000 feet
Film	$3.00 per 24 exposures, available at field
Maps	If possible bring your own, limited number available
Photostart	You must have a data–back camera
Facilities	Camping, club house, & pool at airport, motels in town

Emphasis will be placed on maximum fun for everyone! For more info and registration please contact Vicky Stamison, Box 640, RR 2, Hammond, ON, K0A 2A0, phone (613) 487-2469 after 9 pm.

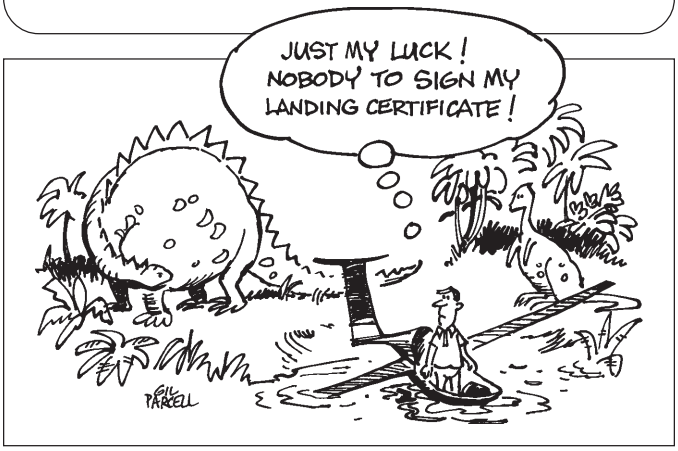
123.4 MHz

THE NEW SOARING FREQUENCY

The Minister of Communications, in a letter to the past SAC Radio committee chairman, Oscar Estebany, confirmed that it has assigned a dedicated frequency for soaring activities.

He writes, in part: "I am pleased to advise that frequency 123.400 MHz has recently been allocated exclusively for soaring activities, which includes hang gliding, manned balloon flights, and ultra light aircraft. This frequency replaces 123.300 MHz currently assigned to members of your community. Members may apply to their local district office of the Department of Communications for amendment to their licences..."

This is going to require new crystals for all those Radair 10s, Baysides, Genaves, etc. that are all over the club scene. Paul Moffat, our new Radio chairman, has a source who can provide them at a reasonable price given a bulk order. Everyone interested is asked to call Paul as soon as possible at (204) 633-5221(H) so that he can work up an order for each type of radio.



Trading Post

SINGLE SEAT

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

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

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

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

TERN, 17m, 80% complete, standard instruments. For details call Jim Cook (204) 452-2506.

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

HP-14, CF–WHZ, 350 h, over 40:1, excellent condition, always hangared, filled wings, single hinged canopy, mechanical and electric varios, audio, chute, covered trainler. $12,000 obo. David Smith (514) 671-7526 (H), (514) 744-1511 ext 1850 (W).

KW-45, CF–SNZ, 880 h, Cirrus wings, excellent condition, ILEC vario system, radio, oxygen, ballast, enclosed aluminum trailer. Fred Wollrad (403) 479-2886 (H).

STD CIRRUS, C–GJRW, Radair 10s, chute, glass trailer. $22,000. Hans Berg (519) 734-8922.

PILATUS, 216 h, latest model, excellent condition, never bent, retractable gear, radio, chute, metal encl trailer, factory starburst epoxy paint. Fully aerobatic, large cockpit, little maintenance required. $24,000. Jim Koehler (306) 374-1499.

GROB 102, C–FIUR, ser # 1171, radio, Ball vario, water, alum trailer, 720 chan hand–held radio. Excellent condition. Andrew Galanter (803) 288-1171 (H), (803) 599-3163 (W).

LARK IS29D2, C–GBEQ, about 1000 h, excellent condition, never spent a night outside, C of A to Aug '92, Radair 360, Cambridge elec. vario, O_2, instruments, chute, metal encl trailer. Asking $22,000. Denis Gauvin (418) 842-6456.

ASW–19, C–GJOH, 850 h, good condition, near London, ON. Call Christopher Staines (519) 473-0640 after 7 pm EST. SOLD

MINI–NIMBUS, C–GLDR, 1978, about 700 h, Terra 720 radio, Pirol vario & speed director, chute, O_2, encl fibreglass trailer. Call Guy Peasley (403) 281-4626 (H) or Al Stirling (403) 242-1191 (H).

ASW–20, C–GTRM, 447 h, one owner, no damage, pristine condition, all ADs done, mylar seals, Smiley bags, tail wheel, O_2 with A20 reg, Dittel radio, Winter vario with Cambridge netto, Ball vario with audio, Cambridge Mk IV & speed director, 50,000' Kollsman altimeter, turn coordinator, Bohli compass, Comet trailer. Rick Matthews (604) 538-5382.

TWO PLACE

2-22CK, stored 2 years, in good condition, $4400. Schweizer trailer, $300. Kemp Ward (514) 297-3268 or Yvan Chassé (819) 564-4472.

BERGFALKE II/55, C–FZCM, best L/D 28:1, current CofA, excellent cond. $6,500. Contact Toronto Soaring Club (416) 773-4147, fax (416) 773-9573. Arrival of new fibreglass ship forces sale.

RHÖNLERCHE II, #108, open trailer, no CofA (it's in storage). $3500. Call Mark of Gravelbourg Soaring Club, (306) 472-5668.

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

GROB 103, 400 h, excellent condition, privately owned since new, encl trailer. Chris Eaves (519) 268-8973 (H), (519) 452-1240 (W).

MISCELLANEOUS

Parachutes, Niagara Chairchute 150 slimpack with carrying case, 26' steerable canopy, never jumped, new June 1990, cost $1247 – sell for $900 firm plus shpg. Also USAF 1965 with 28' canopy, $100. Larry Nicholson, (519) 472-8909 eves.

Barograph, Replogle, seldom used, like new, $350. **Parachute**, Niagara Chairchute 150 slimpack with carrying case, 26' steerable canopy, never jumped, new 1986, sell for $650 plus shpg. Chris Staines (519) 473-0640 after 7 pm EST.

Radio, Terra TX-720, wt 1.25 lbs, H 1.62", W 3.20", L 10.62", panel mnt. $900. A Scott (416) 668-3073.

Trailer, 15 m, enclosed, sound fibreglassed wood structure, looks good, new tires, tows well. $999 or best offer. Call Udo (613) 475-4009.

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

Blanik Parts, canopy and frame, swivelling tailwheel assy, some instruments, wheel assy. Parting out remaining components of crashed Blanik. Marty Slater (403) 427-7612 (W), (403) 481-3866 (H).

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

K7 Canopy, call Marek (403) 594-5525 – Cold Lake.

MAGAZINES

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

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

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

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

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

SUPPLIERS

REPAIRS & MAINT.

Sunaero Aviation. Glider repairs in fibreglass, wood, & metal. Jerry Vesely, Box 1928, Claresholm, AB T0L 0T0 (403) 625-3155 (B), 625-3871 (H).

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

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

INSTRUMENTS & OTHER STUFF

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

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

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

Firmal Electronics. Cambridge vario systems and flight computers, TE probes, gust filters, and nettos. Barograph calib. Warranty service and repairs. 542 Coronation Ave, Ottawa K1G 0M4 (613) 731-6997.

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

SAILPLANE DEALERS

Blanik L-23. Blanik L-13 parts. Mark Petru, Zlin of Canada, 11 Plaisance Road #17, Richmond Hill, ON L4C 5H1 (416) 884-4686 Fax 884-3595.

Glaser-Dirks. Vankleek Sailplanes Ltd, since 1978. 332 Pleasant Corner Road, Vankleek Hill, ON K0B 1R0. Günther Geyer-Doersch (613) 678-2694.

Jantar, Puchacz, Puchatek. For Polish gliders, contact Josef Repsch, (403) 451-2020, fax 452-3669.

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

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

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

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President: Lloyd Davies

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Ottawa, ON K1P 5P9

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Guelph, ON N1H 4K1

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Omemee, ON K0L 2W0

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Box 773, Station B
London, ON N6A 4Y8

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Kingston, ON K7L 4W2

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N3C 3C2

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10 Blyth Street
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L4E 2X7

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Box 2172
Walkerville, ON N8Y 4R8

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

VANCOUVER SOARING
ASSOCIATION
Box 3251
Vancouver, BC V6B 3X9

FAI SUPPLIES FOR CERTIFICATES AND BADGES

1	FAI 'A' badge, silver plate pin	$ 5.00	Insigne FAI 'A', plaqué argent
2	FAI 'B' badge, silver plate pin	$ 5.00	Insigne FAI 'B', plaqué argent
3	SAC BRONZE badge pin *(available from your club)*	$ 5.00	Insigne ACVV BRONZE *(disponible au club)*
4	FAI 'C' badge, cloth, 3" dia.	$ 4.50	Insigne FAI 'C', écusson de tissu
5	FAI SILVER badge, cloth 3" dia.	$ 4.50	Insigne FAI ARGENT, écusson de tissu
6	FAI GOLD badge, cloth 3" dia.	$ 4.50	Insigne FAI OR, écusson de tissu
	Items 7–12 ordered through chairman FAI awards		*Les articles 7–12 sont disponibles au président des prix de la FAI*
7	FAI 'C' badge, silver plate pin	$ 5.00	Insigne FAI 'C', plaqué argent
8	FAI SILVER badge, pin	$39.00	Insigne FAI ARGENT
9	FAI GOLD badge, gold plate pin	$35.00	Insigne FAI OR, plaqué or
	Items 10, 11 not stocked, external purchase approval given		*Les articles 10, 11 ne sont pas en stock, permis d'achat externe*
10	FAI GOLD badge 10k or 14k pin		Insigne FAI OR, 10k ou 14k
11	FAI DIAMOND badge, 10k or 14k pin and diamonds		Insigne FAI DIAMOND, 10k ou 14k et diamands
12	FAI Gliding Certificate (record of badge achievements)	$10.00	Certificat FAI de vol à voile (receuil des insignes)
	Processing fee for each FAI application form submitted	$10.00	**Frais de services** pour chaque formulaire de demande soumis
13	FAI badge application form, rev. 6 *(stocked by club)*	n/c	Formulaire de demande pour insignes *(disponible au club)*
14	Official Observer application *(stocked by club)*	n/c	Formulaire de demande pour observateur officiel *(disponible au club)*
15	FAI Sporting Code, Gliders, 1990 *(payable to **ACC**)*	$ 5.00	FAI Code Sportif, Planeurs, 1988 *(cheque payable à l'**ACC**)*
16	FAI Sporting Code, General, 1989 *(payable to **ACC**)*	$ 5.00	FAI Code Sportif, Général, 1986 *(cheque payable à l'**ACC**)*
17	SAC guide "Badge and Records Procedures" ed. 5	$ 5.00	ACVV guide des procédures pour FAI certificats et insignes (éd.5)

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

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

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