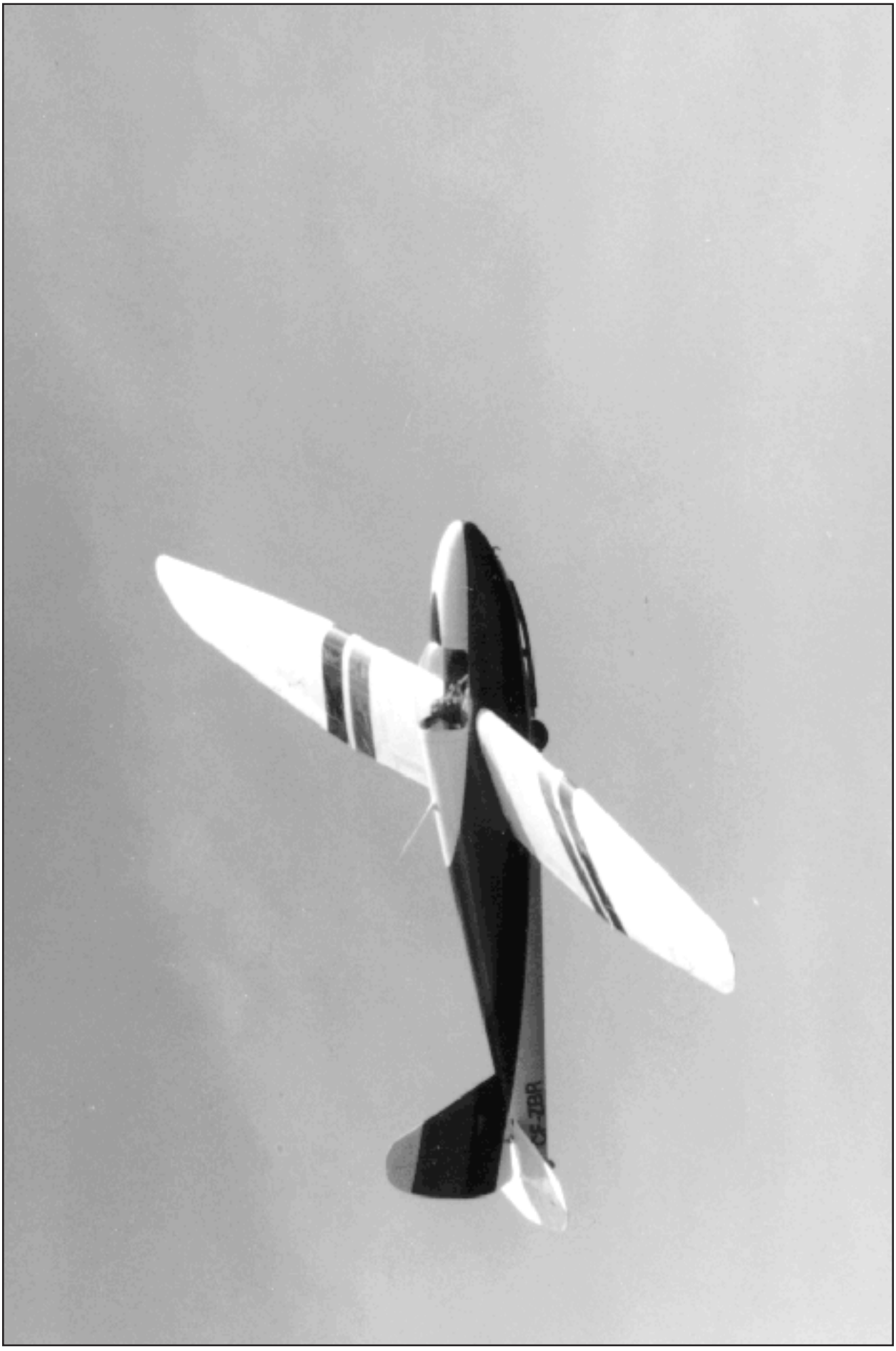
free flight • vol libre



6/99
Dec/Jan

Liaison

Harald Tilgner After 18 years as Pacific zone director, our colleague Harald Tilgner is retiring from the SAC board of directors. During his tenure that spans almost two decades, Harald will have witnessed many changes with the board, evolving to a small hands-on work group. A true gentleman, Harald will be remembered for his passionate support of the issues that were dear to him. A true democrat, he always rallied to support the direction that the board had voted on. I want to personally thank him for his contribution and dedicate to him this last issue of *free flight* of this century.

Safety Another year with very discouraging results I am sad to report. The board spent considerable time at our last meeting in Ottawa. We elected to meet at our office in order to allow SAC's Safety director Dan Cook to attend. Dan took time away from his house building project to discuss how SAC can work effectively to significantly change our record. Safety is everyone's responsibility. In that light, may I suggest that you subscribe to SAC'S safety newsletter. It is free and it is on the Internet at: <*http://lark.gawd.mb.ca/mailman/listinfo/ftsc*>. Also, the board has approved a Y2K budget to enable the presentation of safety seminars across Canada. While your presence is optional, safety is such an important issue that it should be everybody's business to attend.

Insurance Safety and insurance go hand in hand. Please, please take some time to read Richard Longhurst's piece on page 20. The cost of insurance comes out of our collective pocket! We need a global change of behaviour, rapidly. In fact we need for all of us to become change agents in our respective clubs. Otherwise, we will see costs escalate out of hand.

AGM: here and South? The next AGM will take place in Montréal 3-5 March 2000 hosted by MSC. There has been lots of talk about bringing change to this event. One possibility that we investigated is having our AGM in the same location as the SSA convention. They, by virtue of their size, put together a very substantial event. I have communicated with Larry Sanderson, the president of SSA, and he is very open to the idea. This is something we could do every two or four years. We could choose the year they have it in a city close to the Canadian border or in a sunny location. I'm asking for your feedback. E-mail or regular mail is preferred for your reply.

1999 Bye Bye Another soaring season is history, the last one of the century. I hope it has been a good one and that your dreams of flying free have been fulfilled. I am already working on my objectives for the year 2000, with an early start in January at Fayence in southern France. Then it will be ridge soaring in Pennsylvania in April with the hope that I will not lose my barograph trace on the 500 kilometre Diamond distance track.

To all of you, your friends and family, my very best wishes of a healthy, happy and prosperous year 2000. May all your dreams be fulfilled!

1999 Bye Bye Bonjour à tous. J'arrive à l'avant dernier de ces carnets. Vous seriez surpris de voir combien vite la date de tombée revient. Soixante jours coulent entre nos doigts comme du sable sec. L'année 99 a été plutôt positive dans l'ensemble. Les Nationales se sont déroulées sans grands problèmes. Je veux remercier encore une fois MSC et Québec pour nous avoir rendu accessibles un de leurs remorqueurs et les pilotes. Sans vous, le résultat n'aurait pas été le même.

AGM L'assemblée annuelle aura lieu la première fin de semaine de Mars 2000. MSC a accepté la responsabilité d'organiser cet évènement. Les détails des activités vous seront communiqués sous peu. La dernière assemblée tenue à Longueuil date de bientôt six ans. Ce fut une des plus fréquentées des dix dernières années. Ce serait chouette d'obtenir le même niveau de participation. Nous explorons la possibilité de tenir cet évènement conjointement avec la SSA de temps à autre, une année sur deux ou quatre par exemple. Nous pourrions profiter de leur convention qui est des plus intéressantes.

Relève Je voudrais souligner qu'en 2001 se termine mon cinquième et dernier mandat comme directeur de la zone Québec et Atlantique. Dans l'année qui vient, je verrai à susciter, si le besoin en est, les candidatures afin de remplir ce poste. Si vous croyez que vous pourriez servir l'organisation en vous impliquant comme membre du conseil d'administration, je suis à votre disposition pour vous éclairer sur ce que cela implique.

À tous mes amis vélivoles, à vos familles, mes meilleurs veux que l'an 2000 soit rempli de bonheur santé et prospérité. Que vos rêves les plus chers s'accomplissent.

Pierre Pepin president

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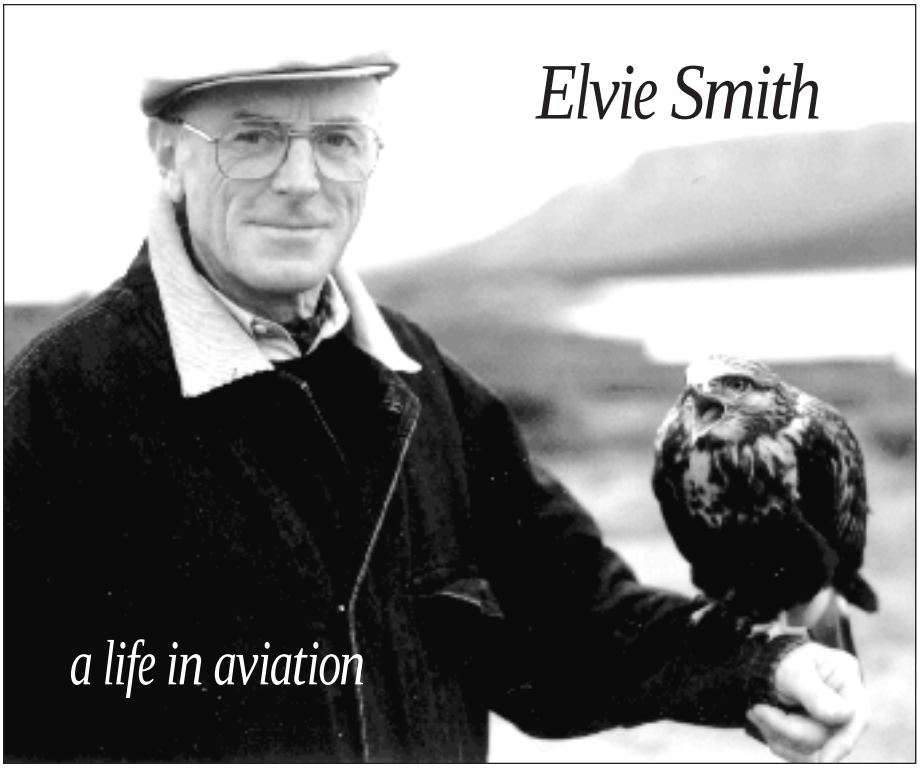
The journal of the Soaring Association of Canada
Le journal de l'Association Canadienne de Vol à Voile

ISSN 0827 – 2557

Cover

Matt Kazakoff of the East Kootenay Soaring Club, in his 1-23, ZBR, near Invermere, BC *photo: Renee Machat*



David Smith

Barrie Jeffery

Elvie Smith, a member of the Gatineau Gliding Club for almost 50 years, passed away peacefully on 4 August at his home in St. Lambert, Quebec at the age of 73.

Elvie was born in Eatonia, Saskatchewan on 8 January 1926. He graduated in Mechanical Engineering in 1947 from the University of Saskatchewan and in 1949 completed his Master's degree at Purdue University, then joined the National Research Council Engine Laboratory in Ottawa.

After eight years of gas turbine research at NRC including valuable developments in afterburner design (demonstrated both in test cells and in a flying test bed), he joined a dozen engineers at Pratt and Whitney Canada — then known as United Aircraft of Canada Limited — to develop a Canadian industry focussed on small gas turbine engines. The first product was the famous PT-6 turbine — 45,000 of which have been produced in several models to date. Elvie rose steadily in P&WC, through chief engineer to vice-president positions, President and CEO (1980) and Chairman and CEO. Throughout the decades, he maintained his love of gliding and recreational flying.

Elvie joined the Gatineau Gliding Club in late 1949 or early 1950 while the club was operating at Carp Airport. He soloed both in gliding and power, training on a Tiger Moth, the club towplane. He received a power licence, gliding licence, and instructor's rating in short order. About 1951, he and another member designed a fixed wheel installation for the club's Grunau Baby sailplane. His fourteen pages of stress analysis were approved by the Department of Transport, and the installation performed admirably.

In 1955 Elvie, as new president of the club, declared the club's No.1 objective was to win Canada's first Gold C badge. On the second day of the season he flew to Belleville, Ontario, not quite far enough. But the objective was reached before the season was over. Elvie completed the fourth Canadian Gold C in 1957 with a 195 mile flight in the club Olympia, from Pendleton to Notre Dame du Bois, Québec on 8 June. He also earned a Diamond for a goal flight of 190 miles from Brantford to Elmira, NY in an Air-100 on 6 August 1957.

In spite of moving from Ottawa to St. Lambert in 1957, Elvie maintained his ties with GGC. Elvie had his summer cottage at Pendleton airport. He and his wife Moy raised four children. Elvie transmitted his love of flying to the whole family and they all, including Moy, trained on a home-made wood and plastic sheet biplane glider, using car ⇨ **p19**

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 Canadian team pilots for 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. An e-mail in any common word processing format is welcome (preferably as a text file), or send a fax. All material is subject to editing to the space requirements and the quality standards of the magazine.

Images may be sent as photo prints or as high-resolution greyscale/colour .jpg or .tif files. Prints returned on request.

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 Zone Director.

Material from *free flight* may be reprinted without prior permission, but SAC requests that both the magazine and the author be given acknowledgement.

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

Deadline for contributions:

5th **January, March**
May, July
September, November

L'ASSOCIATION CANADIENNE DE VOL À VOILE

est une organisation à but non lucratif formée d'enthousiastes et vouée à l'essor de cette activité sous toutes ses formes, sur le plan national et international. L'association est membre de l'Aéro-Club du Canada (ACC), qui représente le Canada au sein de la Fédération Aéronautique Internationale (FAI), laquelle est responsable des sports aériens à l'échelle mondiale et formée des aéro-clubs nationaux. L'ACC a confié à l'ACVV la supervision des activités vélivoles aux normes de la FAI, telles les tentatives de record, la sanction des compétitions, la délivrance des insignes, et la sélection des membres de l'équipe nationale aux compétitions mondiales.

vol libre est le journal officiel de l'ACVV.

Les articles publiés dans *vol libre* proviennent d'individus ou de groupes de vélivoles bienveillants. Leur contenu n'engage que leurs auteurs. Aucune rémunération n'est versée pour ces articles. Tous sont invités à participer à la réalisation du magazine, soit par des reportages, des échanges d'idées, des nouvelles des clubs, des photos pertinentes, etc. L'idéal est de soumettre ces articles par courrier électronique, bien que d'autres moyens soient acceptés. Ils seront publiés selon l'espace disponible, leur intérêt et leur respect des normes de qualité du magazine.

Des photos, des fichiers .jpg ou .tif haute définition et niveaux de gris peuvent servir d'illustrations. Les photos vous seront retournées sur demande.

vol libre sert aussi de forum et on y publiera les lettres des lecteurs selon l'espace disponible. Leur contenu ne saurait engager la responsabilité du magazine, ni celle de l'association. Toute personne qui désire faire des représentations sur un sujet précis auprès de l'ACVV devra s'adresser au directeur régional.

Les articles de *vol libre* peuvent être reproduits librement, mais le nom du magazine et celui de l'auteur doivent être mentionnés.

Pour signaler un changement d'adresse ou s'abonner, contacter le bureau national à l'adresse à la gauche. Les tarifs au Canada sont de 26$, 47$ ou 65$ pour 1, 2 ou 3 ans, et de 26$US, 47$US ou 65$US à l'extérieur.

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Date limite:

5 **janvier, mars**
mai, juillet
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letters & opinions

Glad to be back

As a member of Huronia Soaring, I quit the club and quit flying in 1984 for personal reasons, and the club closed its books in 1986.

Both of its aircraft, a 1-23 (CF-ZBR) and a 2-22 (CF-PLT), were stored in a barn near Midland for a few years until its roof caved in! The 1-23 moved to the west *(recently sold out of Invermere)*, and PLT remained here until Ron Seyffer, Dick Melton and I purchased it from the club in 1993.

What a sorry sight it was to begin with: the bottom of the fuselage was packed solid with racoon crap, the fabric was torn in places, there was a dent in the trailing edge of a wing, and the canopy was crushed.

The fuselage was scraped, scrubbed, fabric replaced as necessary, stripped of paint, then refinished. Nothing more was done from 1994 to 1999. In February this year, I went at the wings — stripping, patching and repainting. The C of A was not a big problem except for a glitchy compass. Getting the C of R was something else, frustrating, as I am sure anyone who has had to deal with Transport Canada will know.

While waiting for the paperwork to come through, Doug Murray proceeded to rub the rust off my flying abilities with a Blanik. I was amazed at the deterioration 15 years of inactivity had brought about.

Finally the paperwork was in the mailbox. Doug test flew the ship for me and gave her a pass. His only complaint was a rattle in the wing joint fairing strip, but he said it made a great built-in stall warning! It has been quietened down since, though.

I may be a little prejudiced but I think the old girl flies better now than she ever did. I won't say the same for myself, but I'm working on it. As much as I enjoy flying with Doug, it was a real treat to take off in PLT by myself again, and once again be a member of SAC.

Daws Campbell
Beaver Valley Soaring

Gliding tales from my father

When I was a boy there were amongst the family photographs several of my father (Douglas Proudfoot) and my uncle (John Hannay) with a primary glider.

Upon questioning, I heard of their ventures with the "Border City Glider Club" in the late '20s in Windsor. Dad had put an ad in the newspaper looking for people interested in starting a gliding club. When the club was formed they bought a *Detroit Gull* primary glider. The factory sent an instructor (a Mr. Duncan, seated on the glider) to start them off. He demonstrated short hops and tutored them for an afternoon.

Father worked for "Dodge Brothers" and had a car. They would autotow the glider on the automobile test track/grounds. Someone coaching would be in the "rumble seat" facing to the rear and would shout instructions back to the student pilot. Flight times were sometimes recorded in seconds. Dad allowed as how on his first flight he had got it all wrong and had a very heavy landing. "I thought I had broken every bone in my ass." These where very shocking words to hear coming from him.

Sometime in their two or three years of flying, they took the glider to the ⇨ **p17**

PLT gets its test flight over Meaford, ON on 30 August.

The Light Sailplane

the path to "microlift" soaring

Bruce Carmichael, *SOARING*

PAUL MacCREADY predicted in 1959 that a sailplane with a minimum sink of 1 ft/sec could stay up anywhere any time of day. Bruce Carmichael in 1962 conducted a study of the design requirements to reach a sink of 1 ft/sec. In 1993, Jim Maupin and Irv Culver created the *Carbon Dragon* ultralight sailplane. By 1995 Gary Osoba had, in a *Carbon Dragon*, repeatedly demonstrated soaring flight in the early morning and late evening and saves from as low as 50 feet. Furthermore, he has gone long distances at altitudes under 1000 feet by S-turning without circling. Gary has named this new procedure "Microlift" soaring. A light sailplane designed to fly in microlift conditions is a very interesting possibility, and is worthy of consideration.

Defining the microlift sailplane The characteristics which distinguish the microlift sailplane from other categories are: low empty weight, low sinking speed and small turning radius. Some light sailplane designs achieve low empty weight due to small size but do not necessarily have low sink or small turn radius.

Assigning numbers to the pertinent characteristics The present interest in microlift soaring generated by Gary Osoba's flights in the *Carbon Dragon* (ref 18 – *all references are listed on page 17)* turns our attention to low wing loading to achieve small turn radii, and to low values of gross weight / wingspan^2 which is a direct measure of sinking speed. We seek wing loadings of 2.5 psf and span squared loadings of 0.2 and hopefully down to 0.1 psf. United States regulations for unlicensed sailplanes limit the empty weight to 155 pounds. The latest light, strong composite materials will be required to meet this weight at sufficient wingspan.

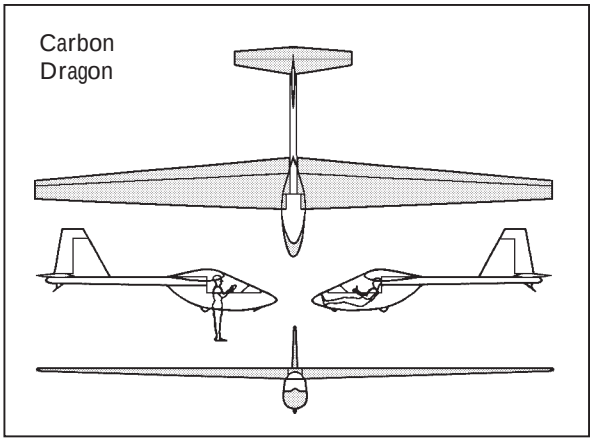
What can we learn from the past? Von Langsdorff's book, "Das Segelflugzeug" (ref 1), presents geometric and weight data on gliders and sailplanes from Lilienthal to the end of 1929. See the table below for data. All of these ships, while fragile, were built before the composite revolution. The 23.5 lb *Pelzner* hang glider, the 41 lb Lilienthal monoplane, the *München*, the *Espenlaub,* and the Darmstadt *Konsul* define the lower boundary of empty weight against span. None of the empty weights exceed 300 lbs, even up to a 61 ft span. The range of wing loadings runs from 1.3 to 2.6 psf independent of span. Span squared loadings (to which we expect the sinking speed to be proportional) were below 0.3 by 36 ft span, below 0.2 by 45 ft span and down to 0.13 by 61 ft span.

More recent approaches to microlift soaring Using composite technology, the Swiss Engineer Farner designed and built a 44 ft span, 98 lb empty weight foot launched canard with 2.85 psf wing loading and 0.145 psf span squared loading. Other recent designs are in the table below. The *Carbon Dragon*, from Osoba's accounts, is sufficiently low in span loading for very interesting microlift soaring. The Dan Howell 15 metre span *Light Hawk* is under construction as the next step beyond *Carbon Dragon*. This composite design is as slick as any racing sailplane, being built in 5-axis CAD/CAM milling machine cut female molds formed at the Raspet Flight Research laboratory in Mississippi.

Characteristic data for old and new light sailplanes Wing loading, empty weight, and span squared loading for a number of sailplanes with empty weight under 300 lbs, wing loadings under 3 psf, and span squared loadings under 0.3 psf when plotted against wing span shows that the span squared loading falls below 0.2 at 35 ft span and below 0.1 at 55 ft span for the best cases. It should be noted that aspect ratio has little effect on minimum sinking speed.

The wing loadings of several light sailplanes from man-powered to the *Phoenix* are compared in upper Figure 1. The lower graph plots their published minimum sink speeds against their span squared loadings. We see a sink of 2 fps at span squared loading of 0.21 decreasing to 1.5 fps at 0.14, to 1 fps at 0.08, and 0.6 fps at 0.014 in the realm of the man-powered machines. If indeed a value of 0.08 is required to achieve 1.0 fps sink, the maximum empty weights with 160 lb payload are very low: 40 lb at 50 ft span, 125 lb at 60 ft span and 250 lb at 70 ft span. Gary Osoba has shown microlift soaring potential at span squared loading of 0.163. It's more important to have good maneuverability and protection against ground rash than to hold out for a 1 fps sinking speed.

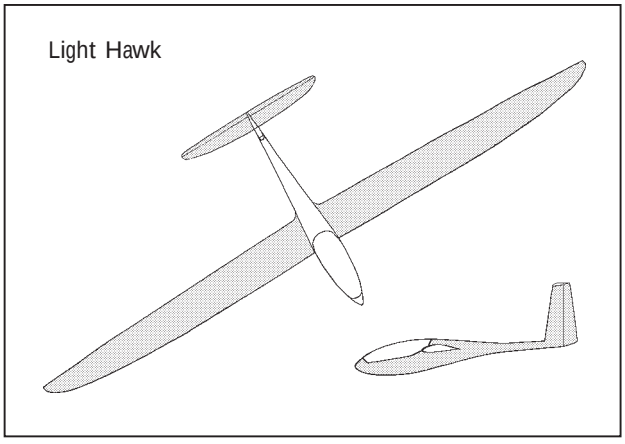
Glider	*a - span (ft)*	*b - empty wt (lb)*	*max wing loading (psf)*	*span loading max (b/a^2)*
Espenlaub	55.7	242		0.135
Konsul	61	285	1.9	0.12
Weltensegler	52.7	95		0.09
Farrar	61	175		0.094
recent				
Avia Canard	44	98	2.85	0.145
Silent	39.4	369	3.42	0.237
RP-1	25	116	2.05	0.163
Tempest	42.5	220	2.6	0.216
Carbon Dragon	44	145	2.05	0.163
Light Hawk	49.2	150	2.78	0.135



Turning considerations The effort to obtain the lowest possible sinking speed inevitably leads to larger wing span with its adverse effect on rapid maneuverability. At a lift coefficient of 1.5 and a 40 degree bank angle, the turn radius decreases from 82 feet at a wing loading of 3 psf to 55 feet at a loading of 2 psf. At a lift coefficient of 2.0, the radius decreases from a value of 61 feet at a 3 psf to 41 feet at a wing loading of 2 psf. The *Carbon Dragon* settled for a 44 foot wingspan and a minimum sink of 1.65 fps. The *Light Hawk* is attempting to reduce the minimum sink to 1.35 fps by increasing span to 50 feet and using the latest composite materials to keep empty weight to 150 lb. For a wing loading of 2.78 psf and a lift coefficient of 1.6, at a 40 degree bank angle, the turn radius of the *Light Hawk* is 70 feet compared to the wingspan of 50 feet. Calculations indicate that the full span flaperons are capable of overcoming any overbanking tendency due to the large differences in velocity along the span during turning flight.

Safety considerations Microlift soaring at low speed and altitude must be approached cautiously. An airspeed which is a low multiple of possible gust velocity may result in an upset beyond the available control power to overcome. This may result in overspeeding beyond redline and the following recovery may result in structural failure. Paul MacCready warned at the beginning of the hang glider development in the early '70s that the turbulence and gust strength is a direct function of wind speed. One should limit the wind speed at which one will fly very low wing loading sailplanes. Sailplane pilots should learn all they can from hang glider pilots who have been flying low and slow since 1970. The microlift sailplane is an attempt to fly as slow and circle as tightly as the hang glider but with much lower sink speed, three-axis control and better penetration. Each of us owes this wonderful universe one death, but it should not be premature. Proceed with care as you develop these more soarable sailplanes of the future.

Forward or backward? Will the present effort result in large scale acceptance of this type of soaring or will it be a giant step backward? Ray Parker, an early soaring pilot in the USA, once said to me (when I first began talking about this type of flight in 1953), "This is sort of where we came from and although pilots walked away from low and slow crashes, they spent a lot of time rebuilding compared to flying. Soaring became more practical when we increased wing loadings." Ray's admonition is haunting but our increased knowledge of low Reynolds number aerodynamics and control systems may answer some of the concerns. The light sailplane is a fascinating new realm in soaring, creating questions and challenges for us all. ❖



Summary of steps leading to microlift soaring

- The Darmstadt *Konsul* of 1924 (ref 1) had many of the characteristics needed for microlift soaring.
- The 1937 Bossi-Bonomi man-powered *Pedialente* with 55.7 ft span, 1.58 psf wing loading and 0.115 psf span squared loading reported a sinking speed of 1.05 fps with the props removed. This and more modern man-powered machines are too delicate and inconvenient for our present purposes but some of the technology can be adapted.
- The 1958 Eppler-Naegele *Phoenix* of (ref 3 and 5), the first composite sailplane, achieved 1.64 fps sink at 3.4 psf wing loading and 0.193 psf span squared loading and was a practical sailplane.
- The 1959 comment by Paul MacCready (ref 4) that a sailplane with a sinking speed of 1 fps could stay up anywhere, anytime, in daylight, led Bruce Carmichael (ref 6) to study the required characteristics. The 1962 study showed that a 56 ft span sailplane with a 1.6 psf wing loading and a 0.07 psf span squared loading would sink at 1 fps.
- Encouraged by this study, Franklin Farrar of Vanderbuilt University built the Bird Flight Research ship (ref 7) in 1966. Calculated sink was near 1 fps, but ground damage prevented full flight testing.
- The philosophy of the light sailplane and "supersoarability" was taken up by Richard Miller in 1972 and then others through to 1998 (ref 8–19).
- In 1972, the Swiss Engineer Farner developed the 44 ft span foot-launched *Avia Canard*.
- In 1995, Gary Osoba reported (ref 18) microlift soaring including noncircling soaring in convective bands using the *Carbon Dragon*.
- The Stan Hall Gust Load Study for low wing loadings (ref 20) was presented to the OSTIV Sailplane Design Board during the September 1998 light sailplane reports at the National Soaring Museum. Construction is proceeding on the very clean *Light Hawk* which is slated for microlift exploration.

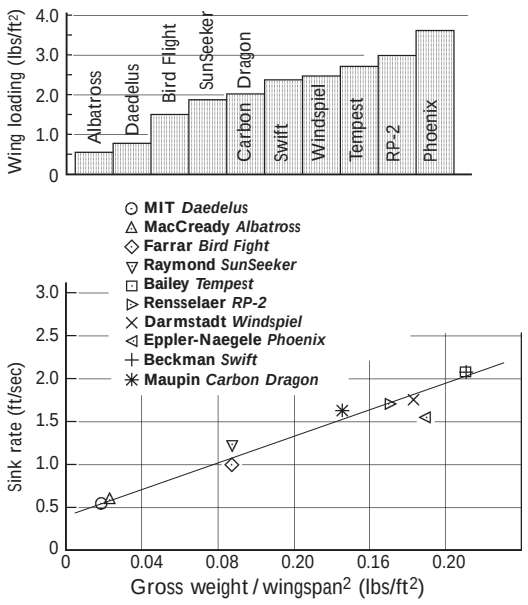


Figure 1 Minimum sinking speed of light sailplanes as a function of span loading squared.

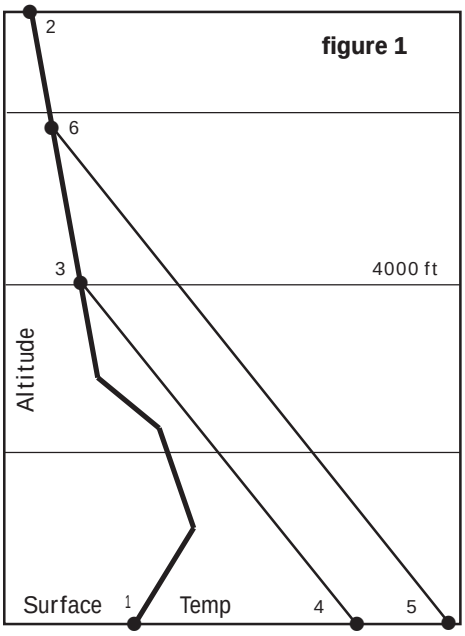
Thermal Forecasting

Frank Pennauer, York Soaring

DUE TO THE DIFFICULTY in obtaining soaring weather forecasts in our part of the world, a knowledge of meteorology — specifically the part that applies to soaring — is an absolute requirement for all glider pilots who wish to get the most out of their flights. At the same time, it's also desirable to be able to forecast the soaring conditions on a daily basis. For this reason, I have experimented for years with established methods but very limited data and made certain assumptions to calculate forecast soaring conditions for my own use. Since the advent of the experiments to obtain sounding data from satellite scans by the National Atmospheric and Oceanic Administration (NOAA) in the USA, giving frequent, precise and readily available data on the Internet, the prediction of soaring conditions has been made much easier. In this article I outline the criteria, methods and tools to forecast soaring conditions that I use, since I have found that the predictions so established were close to the actual conditions encountered.

The development and quality of thermals depends on the instability of the air from the surface upwards (due to surface heating) and the temperature profile of the environmental airmass from the surface to the 600 mb level, including the effect of other environmental factors such as wind, cloud, surface, moisture, etc.

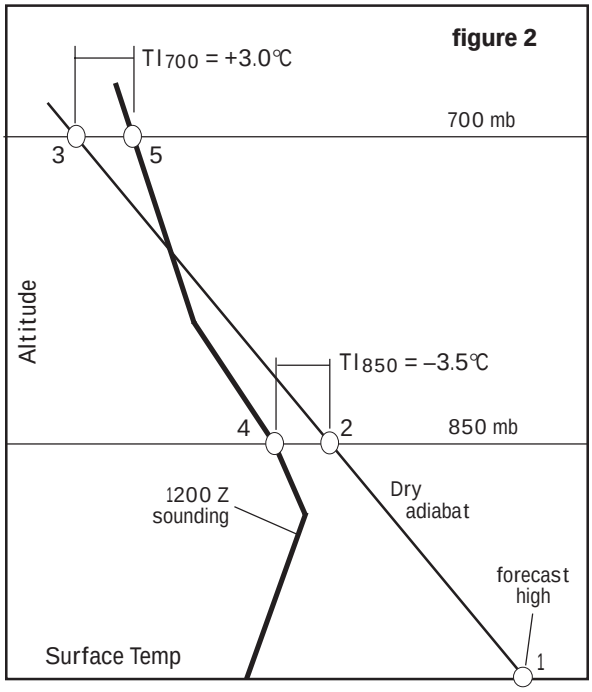
To assist us with the forecasting, we download from the NOAA web page the temperature/moisture and wind soundings of the layer of the airmass for the soaring area we are interested in. In order to obtain the readings that we require, we plot these soundings on a thermodynamic diagram, preferably the Stueve diagram, as this is the easiest to interpret. We will also make use of a psychrometer to measure dry and wet bulb temperature to obtain the air temperature and the dew point. Also a simple wind speed measuring device will be of help.



Thermal trigger temperature – figure 1
Trigger temperature is obtained by locating a point 4000 feet above ground level (agl) on the temperature sounding plotted (1-2) on the Stueve diagram and lowering it adiabatically (along the dry adiabat) to ground level (3-4), and then adding 1 degree C.

Maximum altitude of thermals – figure 1
Obtain maximum forecast temperature for your airfield, locate the airfield elevation and temperature (5) on the Stueve diagram and move upwards along the dry adiabat where it intersects the sounding plot (6). This will be the maximum predicted dry thermal height above ground.

Thermal Index (energy potential) – figure 2
The Thermal Index (TI) is defined as the potential temperature at a given pressure level minus the potential temperature for the expected maximum surface temperature. The greater the negative value, the greater the energy and the thermal strength. The Thermal Index is obtained as follows:



On the temperature sounding plot, mark the temperature at the 850 mb and the 700 mb levels and obtain the maximum forecast surface temperature together with airfield station pressure in millibars. Then plot these as shown on figure 2 on the Stueve diagram. The maximum forecast high temperature for the airfield is moved upwards along the dry adiabat to the 700 mb level. The temperature where the dry adiabat intersects the 850 mb level (2) is subtracted algebraically from the environmental (sounding) temperature (4). This is the 850 mb TI (-3.5). Proceeding the same at the 700 mb level (3), you obtain (5) the TI of +3.0 for this level.

A TI range of 0 to -3.0 indicates weak lift (1-2 knots). A TI of -3.0 or less indicates moderate lift (2-6 knots) and a chance of a sailplane reaching this altitude. A TI of -8.0 or less indicates strong lift which will hold together in strong wind. The TI is only an indicator of dry thermals, the effect of water vapour and condensation is considered in the next paragraph. The TI is not a good indicator for thermal strength in mountain areas as several other factors influence thermal development there.

Data for 3 examples of atmospheric conditions (press, temp °C, and dew point °C). See diagrams.

	Ex #1		*Ex #2*		*Ex #3*	
mb						
957	15.5	14.5	14.8	14.5	16.0	15.0
925	16.5	10.0	16.5	14.2	16.2	14.5
850	10.0	3.1	12.2	11.0	12.0	10.5
825	8.1	0.5	-	-	10.4	9.5
800	10.0	- 2.0	9.3	7.5	15.5	8.5
780	12.0	- 3.1	-	-	-	-
750	9.8	- 5.2	7.2	5.0	12.7	7.0
700	5.0	- 9.2	6.3	-0.5	8.5	3.5

The cloudbase and cloud structure

The forecast high temperature minus the forecast dew point in degrees C multiplied by 400 feet is the predicted maximum cloudbase. But using a thermodynamic, in our case the Stueve diagram, and the morning sounding is not only the more precise method of predicting the cloudbase and cloud tops, but also the trigger temperature, the thermal index and any other factors which might influence the thermal quality.

Example 1 – fair weather cumulus

From the morning sounding at 1100Z we have extracted the data values (Ex #1 in the table) and enter these figures on the Stueve diagram below, and plot the temperature sounding (1-2) and the dew point sounding (3-4). Then we enter the maximum forecast temperature of 25°C on the 957 mb line (the surface at 5) and move it upward along the dry adiabat to where it intersects the surface dew point (3) which has been raised upward along the dewpoint lapse rate line (6). At this level condensation occurs which will be cloudbase. From (6) we continue to move the temperature upward, along the wet adiabat to where it meets the sounding (the inversion at 7) which will be the tops of the cumulus.

We have now determined that the predicted cloudbase at the maximum forecast temperature should be at a height of 4300 feet with tops at 5100 feet agl. As the dew point plot indicates that the environmental airmass humidity is fairly low, the cu should dissipate rather quickly after a warm air supply from the ground is interrupted. This situation will not only provide sufficient clear sky to ensure uninterrupted surface heating and thermal supply, but also enable the pilot to distinguish between developing and dying cumulus. From this plot we can also establish the trigger temperature 22°C and the TI of -4.5 at 850 mb, predicting a moderate thermal strength of 2–3 knots. The cloudbase and tops can be established in the same manner for the trigger temperature and for any temperature/dew point measurements taken with the psychrometer at the airfield by marking the appropriate numbers on the Stueve diagram following the procedure above.

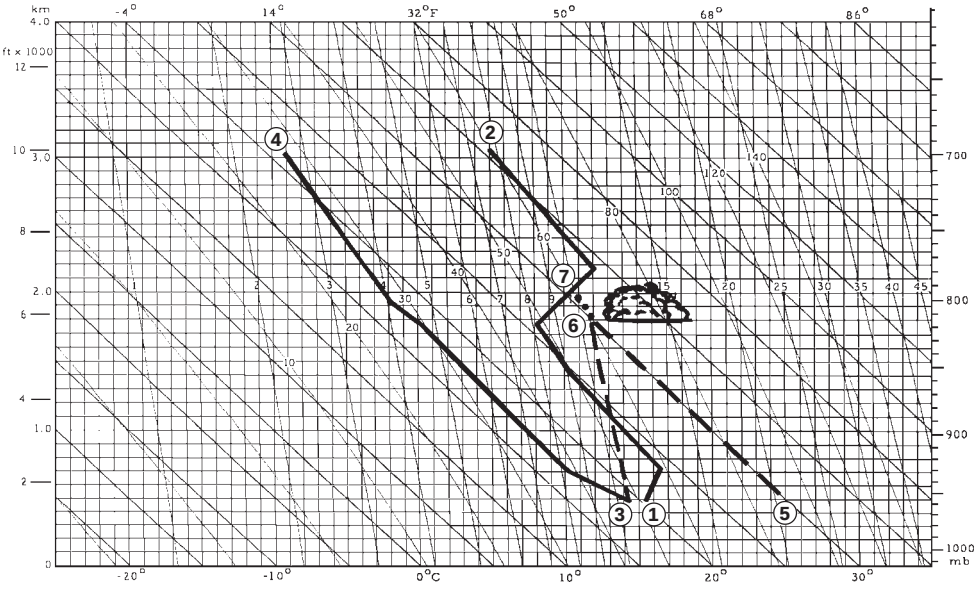
Example 2 – overdeveloping cumulus

From the morning soundings at 1100Z we extracted the data values (Ex #2 in the table) and enter on the Stueve diagram the temperature sounding (1-2) and the dew point sounding (3-4) figures. We see from the dew point plot (3-4) that the environmental humidity is very high and therefore decide to establish first the surface temperature required to form the first cu.

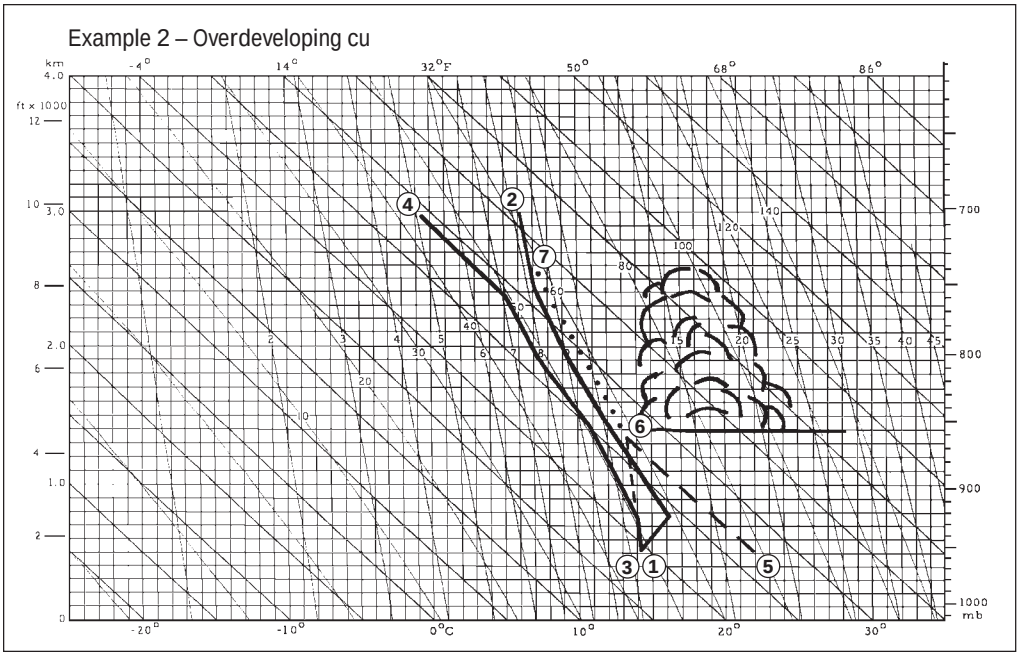
Hence we proceed by extending the surface dew point (3) upwards along the dew point lapse rate to where it intercepts the temperature sounding (6). Extend this point downwards along the dry adiabat to the surface (5) where we read off the temperature of 22°C which will trigger the condensation/cloudbase at 2950 feet agl (6). From this point, following the wet adiabat (dotted line) to where it intercepts the temperature sounding (7), will be the minimum tops of cu at 6900 feet agl. Some cu will be higher as the momentum of the thermal energy will break through the weak inversion.

The high humidity of the environmental air, which will be mixed into the rising air, provides a higher moisture content and potential energy (release of heat due to condensation). This will increase the volume of the cloud and prevent them from drying out. This will create a lot of dead clouds hanging in the sky making it difficult for the glider pilot to decide which cu is still in active thermal development. In the worst case, large cumulus will cover most of the

Example 1 – Fair weather cu



Example 2 – Overdeveloping cu



sky preventing any further surface heating and thermal development. This will not necessarily lead to the dissipation of the clouds but will prevail well into the evening. Although there will be little or no lift coming from the surface, there will possibly still be good lift close to cloudbase.

Example 3 – spreading out cumulus/stratocumulus

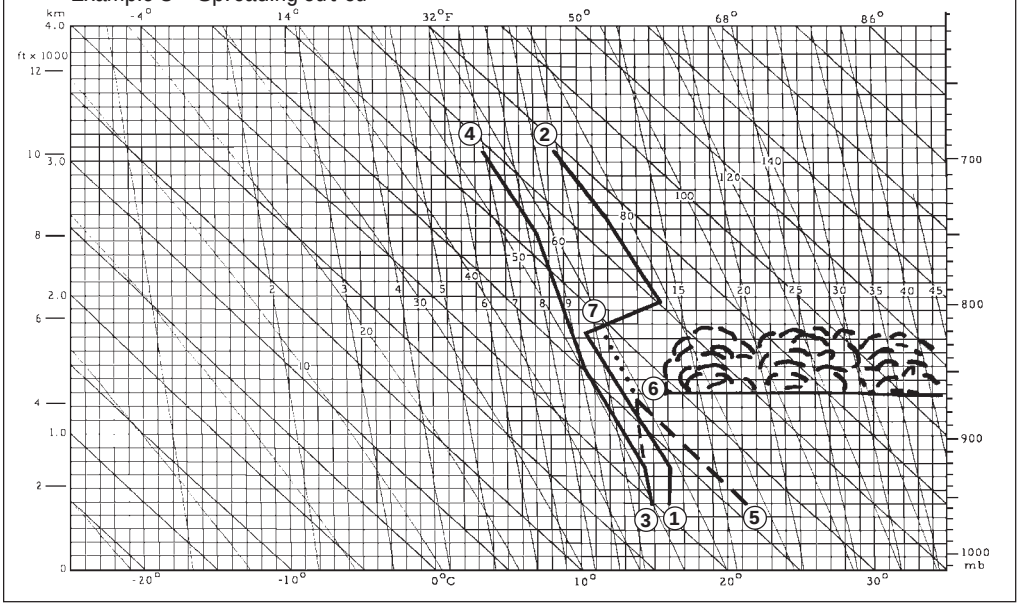
From the morning sounding at 1100Z we have extracted the data values (Ex #3 in the table) and enter these figures on the Stueve diagram below, to plot the temperature sounding (1-2) and dew point sounding (3-4).

Additional data:

Forecast maximum temperature: 24°C
Forecast surface wind: 280° at 12–15 knots.

Due to the high humidity of the environmental air that is indicated by the dew point plot, we can expect an early development of cloud. Therefore we begin by moving the surface dew point (3) upwards along the dew point lapse rate to where it intersects (6) the temperature sounding. From this point we move downwards along the dry adiabat to the surface (5), 21°C. This is the trigger temperature which will result in condensation at 2600 feet agl (6). From there we continue upwards along the wet adiabat (dotted line) to where it intersects the temperature sounding at a very pronounced inversion. This will be the top of the clouds at 4250 feet agl. Due to the high humidity of the environmental air and the strong surface wind, forecasted sufficient low level turbulence will be created enhancing the low level instability to establish a thick layer of stratocumulus below the inversion. This will prevent any surface heating and thermal development.

Example 3 – Spreading out cu



The effect of surface wind and wind shear

When thermal conditions exists, surface wind will effect the thermal quality as follows:

0–10 km/h (5 kts)	Very good
10–20 km/h (10 kts)	Good and usable
+25 km/h (13 kts)	Good but broken up, difficult to use below 2000 feet
+40 km/h (20 kts)	Unusable to 3000 feet, above good and usable

Though a light breeze helps the production of thermals, they will be more numerous but also distorted and narrow close to the surface before they consolidate above 2000 feet into fewer, larger individual thermals.

Vertical wind shear will effect the thermal quality as follows:

More than 2km/100m (1 kt/300 ft)
Badly broken up, narrow and difficult to use
More than 4km/100m (2 kt/300 ft)
No thermals

The effect of recent rainfall

For any amount of moisture on the ground and vegetation, heat energy will be used to evaporate this moisture before the remaining energy is used to warm the air that is in contact with the ground. Therefore if moderate or heavy rain has fallen during the night the production of thermals will be delayed, less strong or, in some cases, completely prevented.

The effect of cloud amount and density

Even thin or broken (patchy) high or mid-level cloud will adversely effect thermal production ⇨ **p17**

Spacial disorientation

Daniel Johnson, MD
Soaring

SOME TIME DURING my sophomore year in college a little incident happened — I won't bore you with the details — that made a deep lesson crystal clear:

I could be knowledgeable, rational, intelligent, and foresighted in my thinking; confident in my conclusions for all the right reasons — and be dead wrong.

A misconception shared by most pilots is that spatial disorientation means that the pilot feels confusion about the orientation of the airplane. The important point about these illusions is that the pilot feels no confusion, no uncertainty about the fact that his or her "seat of the pants" feeling is wrong...

The deep lesson was that it was when we are justifiably most confident that being wrong is most dangerous, as it's then that error takes us by surprise.

This lesson applies to aircraft accidents, and stall/spin accidents in particular. Your senses and mine can and will convince us of a reality that is the opposite of what exists. In fact, what we know about the brain's physiology, about human perception and the powerful reflexes that govern balance and orientation, leads to the conclusion that some accidents are *not* preventable. Some combinations of maneuvers can in some circumstances irrecoverably disable our organ systems (irrecoverable, that is, within the time needed to save the aircraft and ourselves).

However my goal in this essay is not to convince you that your flying ability is likely to disintegrate fatally, unexpectedly and soon, but to show you that subtle illusions can slightly alter what you are actually doing with an aircraft versus what you think you are doing with it.

In the 1930s there was controversy in aviation about whether a good pilot could maintain coordinated flight within clouds. Most pilots "knew" that a skilled pilot could enter cloud, use ball, needle, airspeed, and compass to stay within safe limits and maintain control, and come out the other side intact. Those who didn't lacked ability — those who did had the right stuff. Similarly, in reading accounts of soaring accidents during the ten years I've been involved in the sport, and listening to instructors, there is a clear message that stall/spin accidents should not happen to experienced, attentive pilots. I don't recall any article in which perceptual illusion was claimed to be a major contributing cause of an accident. But an understanding of our balance organ — the vestibular system — leads to the conclusion that sometimes this must happen.

A recent soaring accident reviewed in *Soaring* (December 1998 and February 1999) is an example of one in which a major cause could have been a "vestibular" illusion. I'll show how this could happen to me, or you, or any skilled pilot under the right circumstances.

In the 1930s, good pilots did sometimes fall out of the clouds, and they still do with annoying frequency. In the '90s, even solidly experienced, skilled soaring pilots still get into the occasional stall/spin accident. It's clear from the reports of those who survive that they were usually paying pretty close attention to business, and that the loss of control was a big surprise. There was a fellow in the 1930s, just after Jimmy Dolittle in 1929 demonstrated the feasibility of blind flight, who began to appreciate that these confident, skilled, attentive pilots sometimes were not handling their airplanes quite as they thought they were. He worked hard to persuade the military aviation community that better instruments were necessary for safe cloud flight. But so confident were these skilled, experienced pilots, so sure were they that the crashes were due to lack of skill, inattentiveness, or insufficient discipline, that they felt he was raising a minor issue at best, and some simply thought he was crazy. In fact, he was put through a psychiatric evaluation at one point.

But accidents kept happening and, eventually, enough reasonable people discovered the awful reality — of being confidently wrong in cloud — that even the military was persuaded that this was true, and Col. Joseph Duckworth was permitted to establish an instrument training school. His techniques of attitude flying are still the foundation of such instruction.

In the following decades a great deal of research has been done to discover how we pilots can be confident and wrong. Kent Gillingham and Fred Previc have written about these illusions succinctly in "Spatial Orientation in Flight", chapter 11 of Roy DeHart's *Fundamentals of Aerospace Medicine*, 2nd edition. Their terse account takes up ninety pages. There are many, many ways in which our senses can create an erroneous reality for us, illusions which can maim and kill. Only our awareness of these and our fear of them sneaking up on us can make us cautious about believing we're the hotshot, athletic critters our egos want us to believe we are.

All this accumulated experience and research has paid off. Instrument pilots hear a lot about "spatial disorientation" in their training, and for the very good reason that this phenomenon can break airplanes and kill their occupants. An error that this excellent training may permit is the belief that these phenomena are only important in instrument flight, or in other situations of reduced visibility. True, they are a continual problem in instrument conditions, but vestibular illusions are present full time and fail to delude us only because of redundant, overlapping, corrective information from other sense organs — especially vision — and continually cause control handling errors, most of which are slight, unnoticed and quickly corrected.

A common misconception shared by pilots is that "spatial disorientation" means that the pilot feels confusion about the orientation of the airplane. The important

point about these illusions is that the pilot feels no confusion, no uncertainty about the fact that his or her "seat of the pants" feeling is wrong; the confusion only occurs after the pilot becomes aware of conflicting sensory input. Any instrument-rated pilot has surely had moments of vertigo — troublesome or frightening confusion about which way is up or whether the airplane is turning, but this confusion is normally the beginning of spatial re-orientation. Rarely, the confusion can't be resolved and a crash occurs.

The important lesson about spatial disorientation is that it's most dangerous when there are few cues that it exists, and when the pilot is confident of which way is up and which way the airplane is pointed. Research on spatial senses in man has revealed several interesting ways in which a pilot can be completely confident yet significantly off, sometimes completely backwards, sometimes off just enough to land short. To say this another way, with spatial disorientation, confusion or the sense of disorientation only occurs when the pilot becomes aware of conflicting sensory information. Until this occurs, the pilot believes that the stimulus being attended to is valid and reliable, and feels confident.

When the pilot has conflicting non-illusory sensations, this does not guarantee that re-orientation will occur. Clear and unambiguous visual perception is highest in the hierarchy; but this is not always quickly available to the pilot. It is only when some piece of discordant sensory input is attended to that awareness of disorientation can occur. A proxy for discordant sensory input is the intellectual awareness that the pilot is in a situation in which illusion is likely. This is the basis for and the rationale for physiological training.

Let's re-analyze the key points of the glider accident reported in *Soaring*. Let me be clear that I am not writing this because I have special knowledge of the accident, or to say that all the other analysis is wrong. Accidents are generally due to a combination of factors, as this one may have been. This particular accident is worth analyzing because it illustrates my point that an experienced and skilled pilot could have a "normal" experience that initiated a surprising and painful accident, and because a similar situation could bite you if you are not aware it is possible. First, from the December article:

The pilot of the glider was circling above a ridge searching for lift, and circling beneath a 1-34 in hopes of sharing a thermal. The key sentence is, *"... not finding any lift under the 1-34, he craned his head back to look directly overhead to centre beneath the other glider."* We will assume that he was making left turns, although the direction is immaterial except to make the analysis clear.

Physiologically, the important point is that this pilot, a competent fellow who knows how to fly, was in an established banked turn at the moment he needed to look vertically. This would require him to rotate his head back and turn it to the right. If he had been in the turn for as much as a minute (probable, given that this was thermaling flight), his vestibular system (semicircular canals and otolith organ) would have stabilized. When a pilot in a stable turn rotates his head to the outside and tips it back, an inevitable, strong sensation is created of banking more steeply and diving.

When this pilot looked directly overhead, most of his visual references to the cockpit and to the ground were dramatically changed and diminished. Technically, this is "degradation of visual referents," which is well known to predispose to motion illusions. To maintain a sense of remaining in a stable turn, he would have to pull back the stick and bank toward level. He would have been strongly motivated to obey the seat of his pants by his sense that he was close to the ridge. Whether he was 300 feet as he reported, or 955 feet as the GPS said isn't material; the point is that if the ridge "felt" close, the pilot would have been more motivated to maintain a coordinated-feeling flight than if he had been comfortably high. (Because of dithering, GPS altitude readings are characteristically off ±300 feet or more. The GPS reading does not meaningfully contradict the earlier report.)

This heightened attention to coordinated flight when we feel low is, I judge, an important factor in stall/spin accidents. Up high, we tend to let the airplane wander a little when we get distracted, without worrying; down low, we ride herd on it more closely. Ironically, taking more care may actually raise the risk of an incident. How? Simply this, if we respond quickly to correct the airplane, we will respond to our senses before checking to see if the motion we feel is illusory. Therefore, down low, when we are trying to be more precise, we are more likely to respond to the illusion and be fooled.

It's also important to realize that these illusions feel right. *There is no confusion.* The December article goes on to say, "At that point, he indicated that he might have become disoriented, causing the stick to be pulled back excessively, and for the ship to skid. It immediately went into a spin." Well, this is the language of someone who was surprised, who is looking back at the fact that a spin happened and is trying to understand the cause. It does not say, "The pilot said he became confused." It is the pilot acknowledging that, because the spin happened, the aircraft could not have been in the safe attitude he felt it to be in and which he was trying to maintain.

In this particular case the pilot was flying a glider which doesn't give much warning of a stall, so he had no opportunity to perceive the illusion that injured him. I hope you do not think, just because this pilot crashed, that he was incompetent, poorly trained, careless, negligent, or indulging in deliberately risky thrill-seeking. In fact, the articles cite several signs of careful planning for possible disaster and awareness of its possibility. The fact is that someone as careful and skilled as you could, while intending to be extremely careful, experience exactly the same type of motion illusion and crash, with the same humiliation, the same raised eyebrows, the same adverse presumptions about pilot judgement and skill. Now let's turn to the second key fact of this accident. The GPS data from the flight was analyzed. The pilot says, "The data shows that I was flying straight and level for approximately 1 minute after making the 180° turn in which I craned my head back to look up at the 1-34 .... So, the spin developed from some other reason rather than my distraction with the 1-34."

The GPS data proves that the pilot did respond "appropriately" to his vestibular sense, and did level out and straighten while looking up at the 1-34; the physiological point is that during this time he would have *felt* as

though he was continuing in a stable turn. If he had *not* had this illusion, his vestibular system would not be functioning as designed. Got that, guys and gals? The illusion is inevitable. It occurs because the system is working. It occurs because one's cross-checks (visual and tactile referents) are diminished. Everything feels right. Suddenly something happens that shouldn't — a stall — and the pilot must quickly re-orient. What about recognition and recovery?

As the airplane quits flying, the pilot's vestibular system is continuing to function normally, sending wrong information to his cerebral cortex about the glider's motion. This interferes with his ability to recognize and recover from the spin. From the pilot's point of view, something happens suddenly and unexpectedly. He turns back to look out the front window, and the message that this head movement sends to his cortex is that the glider has pitched up and banked to the right. Meanwhile, the actual movement of the glider has been to pitch his head down, and to turn it to the right or further to the left, depending on the spin rotation — or perhaps the glider is not rotating; his head movement has only given him the sensation of a spin and the glider is actually in a deep stall. In this case, it will feel right to apply opposite rudder, which will actually cause a spin.

Ignoring the vestibular illusions, let's realize that this is not a training session, where we expect a spin for learning purposes. All the pilot knows at first is that the controls are slack and the world is cockeyed. Has he had a mid-air with an unseen glider? Has the elevator disconnected? It will take time to sort this out, time that may not be available, given the alacrity and enthusiasm with which gravity operates. Now holding in mind that such a situation developed because of motion illusions, what will overcome these illusions? Only a stable visual reference. This may not appear until the spin is fully developed, nose down and dropping. Prior to this, the sense of rotation may be either exaggerated or wrong, and the pilot has wrong (inadequate) clues that this perception is wrong.

Let's add one more inconvenient fact into this mix: sudden rotations may induce *nystagmus*, a condition in which the eyes are stimulated to flick rapidly back and forth — what you saw when your friend got off the playground merry-go-round after you and his other playmates had spun it long and hard. If nystagmus develops, the eyes aren't able to fixate on anything, instruments or ground, and control movements will be guided by vestibular sensations — which will be correct only if the highly skilled, experienced, athletic pilot is very lucky.

Therefore, there are circumstances in which a stall/spin might be inevitable, and some instances in which the superb pilot is genuinely incapacitated from recognizing the pitch of the aircraft and its direction of rotation during those few seconds in which recovery is aerodynamically possible, and these circumstances can arise in the *normal* conduct of glider flight: thermaling "low" over ridges or during the approach to landing.

Back to our story. The pilot says, "So, the spin developed from some other reason rather than my distraction with the 1-34." Correct. Is it clear to you what the "other reason" may have been? His sentence contains a common misconception: that it is "distraction" that is the problem. It is not. We must attend to many cues throughout flight, especially in traffic. Every "cue" distracts from every other.

The problem is head movement in turns. Head movement in a turn always creates a vestibular illusion. This illusion is usually overridden by redundant correct sensations, chiefly visual ones. Unfortunately, to avoid all risk of this illusion means not turning the head: not checking for traffic, not checking ground reference points when landing, not visually checking for flap, spoiler, and gear handle positions, not checking charts. That would not be safe either. These illusions then, although they exist in good visual conditions, are seldom a problem because of redundant overlapping perception. They are a special risk for glider pilots because they do occur, they are usually unrecognized, and when they aren't, the pilot is simply mystified about how such a skilled, alert pilot as myself got into trouble.

How can we avoid such accidents? Be aware of the particular situations in which they can occur. When in a turn, tipping your head up or down, or turning it from side to side as we all must do to check traffic and ground references, or to look at charts, notes, and instruments creates false sensations of the glider tipping or turning that can unexpectedly cause uncoordinated flight or slow airspeed. When your head is "on a swivel" discipline yourself to keep the controls stable and do not fly by "feel". Re-establish visual reference with the horizon and the yaw string before "correcting" bank or pitch. ❖

It was a dark and stormy night ...

getting club XC training is not easy

the Bald Eagle, SOSA

I HAVE PREVIOUSLY ALLUDED to programs we are trying at SOSA in order to encourage our newer pilots to try cross-country soaring. I had hoped to present a report on how well our system worked, but instead this is an appeal to other clubs for suggestions, and also it is an effort to raise the collective consciousness.

Regardless of the stated purpose, our clubs are in fact businesses, with budgets to be met, so we need a steady membership and modest growth to sustain us. Fighting attrition is easier than attracting new members, and encouraging pilots to try cross-country is a good way to stimulate and maintain interest in the club and the sport. The question is, how do we do this safely, efficiently, and economically, and how do we stimulate interest and keep the momentum required to get someone contest-ready? I can tell you some of the things we tried, what worked and what didn't, and then ask for your experiences and suggestions.

I assume that most clubs have faced this dilemma at some time or another, and can probably offer some pretty valuable insight. I found that at SOSA I was just the latest in a long series of well-intentioned people who were the aviation equivalent of Sisyphus, doing the same thing over and over. No one had ever written down what (and what not) to do. Can you help? May I suggest writing to me through SOSA, or posting something on the SAC Roundtable, or perhaps writing a letter to *free flight*?

Essentially what one is trying to do is make the best use of club resources to teach some new skills. I believe that a semiformal program should be more effective than simply making resources available. When we teach basic flying we have a set curriculum, and groups of students are supposed to provide encouragement for each other by assisting in launching, discussing progress with each other, etc. At our club, there is no formal basic cross-country skill training, and would-be contest or badge leg pilots are left to fend for themselves. At SOSA, we are fortunate in having a large club with lots of resources, which include high and low performance club ships, and many accomplished cross-country pilots. It's easy for a new member to hear about the exploits of others, and to want to join that fraternity. But how do we make people aware of how best to use our available resources? The fortunate few buy their own glider, then find mentors in the private fleet, then work hard at practising. As an example, it is astounding to watch the quick progress of our own Eric Gillespie, who is only in his second year of flying, and has not only accomplished a great deal, but has become a constant source of articles for the beleaguered editor of *free flight*. At the other end, we have guys with 300 hours, all local, who haven't made enough friends to crew for them, let alone shepherd them around a course.

"... now I know what 'au vache' means ..."

My learning experiences may be typical. For a couple of years, I essentially flew circuits, believing that thermals were a matter of chance. On the odd occasion that I did stumble into lift I resolutely refused to leave it on the principle that it might be the only thermal in southern Ontario, as I feared getting caught out of gliding distance from the club. I managed to get some flights of long duration and decent height, but all close to home.

I noted in a previous article that all clubs have an invisible fence that newer pilots are afraid to cross, generally a few kilometres from the club. So how do we encourage people to push their limits? What I had done was to beg my way into an informal contest with our club 1-26, then again begged my way into our cross-country clinic with our Astir — literally the night before — and when the club saw I was serious, they finally offered me the encouragement that resulted in a successful trip to the provincials (*free flight 6/98*). This was hard to do, and I felt that a well-structured and publicized progression would benefit others trying to do the same.

I was pumped up after my modest success last year, and wanted to share and encourage others. As noted above, I was hampered by not knowing what others had done in the past to form 'support groups', so I covered old ground. I discussed the possibility of setting up a formal program with several potential candidates, got provisional enthusiasm, and requested the approval of our Board of Directors. They did not see any advantage to a formal program, and felt that any pilot who wanted to could ask any instructor for help, and use club ships on a very limited basis. Theoretically, yes, but it was difficult for me to accomplish the results of the previous year. I ended up flying my 50 kilometres in a borrowed Cirrus.

I wanted to form a team of candidates, and get special privileges such as use of some club ships for at least two hour periods to enable effective dual instruction away from the field, which met serious opposition from those who want to promote the flying of circuits. We got so

bogged down in discussions over things like whether the instructor or student would be liable for landout damage that I almost scrapped the program. I finally got a buy-in from the CFI, who made some valuable suggestions. Chris Wilson agreed to do dual cross-country instruction in one of our Blaniks. It was judged more suitable than our Grob 103 or Puchacz, because it is easier to land short off-field and is, well, cheaper if we wreck it. We then spent considerable time repairing the Blanik trailer which had not been used in years. Tony Burton made some suggestions such as make sure you've got a good vario (we don't.) Chris organized a derigging and trailer loading party to see if it could be done, and to train potential team members in the process. The idea was that to be on the cross-country team, you had to be available to crew for the others. This was not only a necessity, but was our idea of a way to build team spirit and momentum. What I was trying to sell to the Board was the notion that this whole progression would be so much easier for someone if three things are in place: one is the clear outline of steps required, along with suitable instruction; two is the availability of suitable club ships; and three is the encouragement and momentum that comes from a group.

We've adopted the Bronze Badge as a requirement for basic cross-country work. We essentially want a pilot to have demonstrated an ability to soar, navigate, and to land short and de-rig if the need arises — or more correctly, if the ground arises. We then allow them to take a 1-26 away from the field and attempt a Silver distance. Some, like "EG" and "RW", either enjoy this exercise a great deal, or misunderstand the expected outcome of the word "attempt" — they are on a first name basis with half the cows around here. I personally retrieved them both in one afternoon. RW was working on doing twelve consecutive landings at an airport, which would have been a personal best for him. So the 50 is a great milestone (kilometrestone?) and helps you get past that invisible fence.

However, 50 kilometres would be less intimidating with a bit more formal instruction and some more semi-local practice. And I perceive a real gap between what is little more than a downwind dash and some real serious work. Hence my quest for an instructional program. Even someone who has just done a 50 (or several 40-somethings) is still not prepared for even a beginners contest such as the May Fly at Pendleton, and will struggle with the CAS cross-country clinic, or the Mud Bowl at SOSA. Excepting of course, RW, who was alluded to in Eric Gillespie's Mud Bowl article in *free flight 5/99*. He was the guy who landed out two days in a row, the second day at an airport, and he got an aero-retrieve and restarted, and beat me! I landed out both days in fields. I truly expected the farmers to say, "So, you're from SOSA. Do you know EG or RW?"

We delayed so long in setting up our modest program that we lost the little momentum we had, along with the aforementioned 'provisional enthusiasm'. You've got to keep up people's interest or they'll promise to show up, then drop out. It's human nature to weasel out of things. That's what sets us apart from all the animals except for the weasels. A few students showed up for Team Blanik, and two guys landed out, so the trailer practice was useful. Eric Gillespie and Nigel Holmes acquired gliders and did very well in contests and badge legs, and Ray Wood made extensive use of the 1-26 (and the trailer) in contests and badge legs.

I don't think we managed to graduate anyone up to cross-country in the club glass ships this year. One of the problems was our failure to communicate the availability of the program to potential students. Toward the end of the season, I met the guy I mentioned above who has 300 hours and I figured, too late, that this would have been a perfect way for him to make enough friends to crew for him as well as giving him some instruction. We should have broadcast our plan better, and we also should have identified more candidates and approached them to ensure a large enough body to get the team spirit we need to drive the thing. Communication problems is a downside to having a large club. Can you from the smaller clubs claim a better result? Let me know.

One of the questions that comes up concerns how high-tech you should be, and this involves both aircraft and nav aids. I believe in the old school of using 1-26s and maps, and there are those who swear by glass vehicles and GPS flight recorders. 1-26s and Blaniks are easy to land and cheap to fix, but can lead to the habit of being too timid. You are encouraged in them to "Get High And Stay High". These habits must be unlearned to fly glass effectively, so some are in favour of starting cross-country in glass. As Andrea Kuciak noted in the CAS clinic article in *free flight 5/99*, a whole new world opens up when you can fly aggressively between thermals. I have thousands of miles in power planes using dead reckoning, and consider it cheating to use even a VOR. One of our members has a Cessna 172 with VOR, Loran and at least one GPS ... he is losing his sense of navigation.

One of my spectacular planning failures was the notion of having more experienced private owners shepherd people around a course. This is one of the key concepts of the CAS clinic, and really helps inspire confidence. I fondly recall the first time Doug Bremner let me tag along with the big people. He convinced me that a glass airplane would be able to make it back from here to there, and pointed out lots of little landmarks that I still use to find my way around. We got lots of enthusiastic volunteer shepherds, but I failed to realize that they were all flying SZD-55s and airplanes of that ilk, and my guys were in club ships with the glide ratio of a piano. Any suggestions as to how this might be made to work?

One part of this project that I failed to organize was to be the revival of a set of local close-in club turnpoints — one of my predecessor's programs that had fallen into disuse by the time I joined, so I was unaware of its existence until too late. (Remember I said at the beginning that this had probably been done before, but not recorded?) The points are within easy range of a 1-26 and, unlike a 50 k, would give great practice in navigation, upwind flying, and turnpoint photos, or at least overflying the target with one of those pesky flight recorders.

We'll try next year to encourage people to vie for a trophy by doing something like accumulating the most of these turnpoints over the summer, or perhaps setting the best time over a course made up of several of them. Sort of an ongoing 1-26 contest, the sort of thing I had in mind to generate and maintain individual and team interest. I mean to say that some competition is good, but I'm wary of those who download exact GPS records of each flight and then try to get better computer printouts next time.

My goal is to enjoy each flight, and perhaps meet some new farmers in the process. ❖

Hard thoughts on an accident

Mike Freeland, ESC past president

This accident occurred last year, but is timeless in its lesson. It is reprinted from ASCent 2/98.

ESC recently experienced the first injury accident in our 40 year history. On 6 September 98, one of our 2-33s was on final with a student and instructor. The wind was straight down the runway and probably close to 25 mph. The turn to final had been made somewhat high. Reportedly the student initiated a sideslip at the instructor's request. (An aside — if you've never slipped a 2-33, they won't maintain one if the airspeed is too high.) The glider ended the slip just over the west threshold at an altitude of 20 feet or so. An eyewitness stated it exited the slip nose-high and promptly stalled. It impacted on the skid, and the fuselage folded upward behind the wings 15–20°. The aircraft was a write-off. Unfortunately, both pilots suffered back injuries, the more serious falling to the student who suffered three crushed vertebrae.

One thing I have admired about soaring and aviation in general is the dissection of incidents and accidents honestly and openly for the benefit of all. It would be more comfortable but a denial to maintain that the cause of this accident to be a freak meteorological occurrence or some such escape hatch. But speaking solely for myself, I do not believe that to be true.

Okay, the student didn't fly well and it was his hands and feet on the controls. If he was that out of control he should perhaps have relinquished it to the instructor — not his responsibility, but definitely his right. By reports he was having a bad day. Only he would know, but I can't help wondering if he was pushing himself too hard. I recall that pilots should disqualify themselves from flight if they don't feel up to the task. On the other hand, students can and will screw things up. We all have to learn and it is simple reality that students make mistakes.

The instructor is the one who is supposed to catch them. He carries that responsibility. This day was windy and the student involved had been experiencing problems with confidence and control of the aircraft. He had not kept this a secret and it was or should have been known to the instructor. In flight, there is the issue of the airspeed; going by the book this aircraft should not have been flown at less than 75 mph. While true that the sideslip dictated a reduction in airspeed, the need for the sideslip itself is debatable.

At this point the responsibility broadens out and while some at ESC may not like my point of view I believe it is justified. So the student didn't fly well, and the instructor was behind events. But the question also remains as to why such a short landing was being attempted? The answer is simple and pervasive: habit, simple habit. And from a broader perspective, the establishment of this habit has been shared by many members and instructors and therefore everyone of them shares responsibility in this matter.

At ESC we have an extremely safe airstrip. Not many hazards and the fields that surround it are almost all landable. So, as we routinely fly in this safe environment, where the standard of pilot skills need not be as high as other fields, the short landing becomes the norm. Why? Because it is more efficient, allowing us to process more flights. It requires less effort — why push the aircraft back to the line when you can land there. And perhaps most insidious — it looks good.

One of the problems with soaring is that most of the really great displays of airmanship that one might make are done out of sight. But short, precise landings in front of the assembly are a clear display of mastery and, to be fair, they have their place. The ability to land short is a necessity for safe cross-country flight. And many have the skill to make precise landings in variable conditions with ease. But this precision that is envied and striven for by students and low time pilots is clearly a trap for the unwary who include the "short" part not out of necessity, but from habit.

There is one more level of influence I can see in this situation. I hesitate to include it for two reasons: it is a bit on the fringe of accepted thought and I was involved in it. But it has the benefit of discrediting myself for those who are looking for an excuse to reject the pointed comments I have made. So here goes. What is strange to me is that I and a group of other "bench pilots" had just heard of a recent accident at another gliderport. Smugly we were shaking our heads over this and happily ignoring some obvious facts such as it was a much more difficult place to fly. We, after all, have been flying for 40-odd years without anyone being hurt. So we were glibly voicing these comments and then the first serious accident in the club's history suddenly occurs. Was it related? Who knows. But definitely this thinking was indicative of an attitude of complacency. So in this regard we are all to blame.

Perhaps other clubs can draw parallels in their flight operations and draw benefit from this airing of laundry. My hope is that the lessons learned will not be soon forgotten and that the injured pilots will make a full recovery. Best to all.

Communicate conditions

I was ready to take off [in Hope] on 26 September. While DI'ing, I was listening to the radio to find out what was going on, also observing some of the takeoffs, noticing some turbulence in the tows but nothing too bad. I never heard or saw anything to alert me to the conditions I would shortly be faced with. The ground winds were virtually non-existent, but not even 200 feet into the tow and all hell broke loose. "Okay. I'm in for a bronco ride, I thought" (tightening the straps even more). Within a few more seconds I hit my first negative "g" bump. I'm using full deflections to just stay behind the towplane. Negative g's again. Then the towplane suddenly drops left and I am being pulled up and to the right. No amount of control input stops my climbing. I pull the release just as I lose sight of the towplane and keep turning to the right to head back to the airport.

We had taken off on 025, and I'm at 1200 feet. With a strong tailwind I edge toward the Bowl (the "house" ridge lift area), hoping to salvage this flight. I hit incredible lift and then sink. After struggling in this mix for about five minutes I call it off, thinking I'll just land and try again. Start downwind at 900 feet, check the windsock — huh? — totally droopy! And I've got at least a 25 knot tailwind up here. Next surprise? Halfway on downwind the bottom drops out and I sink 400 feet within seconds. I opt for a modified circuit and come to a stop at the gas pumps.

While waiting for a retrieve crew I revisit this amazing flight. Looking at my watch, I'd been in the air for nine minutes. I was certainly surprised by the severity of the turbulence since there was still virtually no wind on the ground. I watched a Blanik on downwind but didn't see it hit the sink that I did. They landed normally. As I got back to the flightline, the towpilot came up to me and remarked, "I'm surprised that you were the first to pull off tow." "Have the other tows been that rough?" "Oh yeah." I strongly suggested to another instructor that the next pilot in line (a recent solo student) should maybe wait due to the turbulence. He agreed.

Another pilot flying earlier with an instructor was actually very uncomfortable with his flight due to the turbulence. "I was scared and I don't think I learned very much", he remarked later. Do we need to put students through this kind of experience early on in their training? Not necessarily. Any lessons learned? Let's try to communicate, especially when there are extreme conditions happening up there that aren't all that obvious on the ground. It might mean one less flight for someone, but anxiety and overload make poor co-pilots.

Heidi Popp, CFI, from VSA *Soaring Scene*

Letters & Opinions

from page 5

Gordon Bennett Trophy Races in Cleveland to compete(?) against other glider clubs. From time to time they had several accidents requiring repairs. In the last accident the pilot was killed while trying to do a low level loop. Dad said that he ended up doing a "D". That was the end of the club.

The remains of the glider were sold to a man who taught woodworking at a high school in Guelph. Dad recalled that the glider was rebuilt but subsequently crashed while being launched off the ice on Pushlinch Lake by a pair of horses. The glider was thought to have ended up going through the ice and abandoned (at the bottom of the lake?).

That was the end of the old family gliding tales until the summer of 1998 when an elderly gentleman on a day outing from a seniors nursing home in Guelph showed up at SOSA. Having some knowledge of gliding, he admitted to having rebuilt a glider and flown it off Pushlinch Lake, a long time ago.

Jock Proudfoot, SOSA

A tidy solution

On thinking about your editorial in the last issue, I believe I have the solution to a couple of SAC problems, namely the question of how to get sufficient homegrown material for this magazine, and also the issue of unpaid SAC fees. As often happens, the two are interrelated, and can easily be solved by one combined move.

What you need to do is to encourage more *Letters to the Editor*, say several pages worth, and then check the author's name against the SAC membership list. You can easily create a flood of letters by publishing controversial articles. In the event that letters are few, you simply write them yourself, or have friends do it. It's a well-known fact that all letters to the editor of magazines such as *Penthouse* are fiction. Aren't we as good as them? We would be if Charles Yeates would send in photos to accompany his description of the wee bikini at the contest in Leszno (*free flight* 5/99). And how come there wasn't a Diamant beside the bikini? I thought tradition demanded that (*free flight* 1/99).

On a related note, shouldn't Kris Yeates be editing Charles' stories? But, like Charles, I digress. I strongly suspect that some current letters are fictitious. I believe that Jörg Stieber is sending in letters under assumed names to thank himself for his article last year on "Collision Avoidance". How else would a guy who only writes one article get an award instead of a hardworking regular contributor such as, say, The Bald Eagle, whose articles I personally always look forward to? Keep up the good work, myself and all my alter egos enjoy the magazine.

Sincerely, **A. LeRonne**

Thermal forecasting

from page 10

and quality, in particular if such cloud already exists in the morning and persists until after noon. Then thermal production will be delayed and they are often weak and few in number. On the other hand, if thin high or patchy mid-level cloud only moves in during the midafternoon, the ground will have heated up sufficiently and little adverse effect will be noticed to thermal strength or numbers. But if the convective clouds overdevelop, become abundant and persist, large areas of shade develops which will drastically reduce thermals at low levels, while good lift still exists and is maintained at higher levels closer to cloudbase.

The effect of an inversion

An inversion (a temperature increase with height) can be produced by:

a. *Contact cooling* near the ground
Cooling during the night, in particular on clear nights.

b. *By advection* (transfer of air by horizontal motion) of warm air over cold land or water – surface inversion.
By advection of warm air above – upper air inversion.

c. *By subsidence* (slow downward motion of air over large areas)
Descending air compresses when sinking, the energy so released warms it, therefore the upper levels become warmer and create a temperature inversion. Subsidence occurs in high pressure areas.

Although inversions have a restrictive effect on the convective layer depth and the quality of thermals, a slow subsidence aloft creates a stable layer/inversion which restricts the build up of large cu. As long as such an inversion is more than 5000 feet above ground and the air is fairly dry, then cumulus should be small, closely spaced and should not produce enough shadow to restrict thermal development, therefore giving good soaring conditions. But, if the air in the convective layer is highly unstable and contains a high amount of moisture, cu will overdevelop and spread out below the inversion. This will lead to the creation of a stratocu layer terminating further heating of the ground and the development of thermals (example 3).

Thermal streets

This is a long line of thermals aligned almost parallel to the wind. These can occur in either blue thermal conditions or with the development of cu (cloud streets). The individual streets are about 2.5 times the convection height (surface to top of cu) apart. The potential for the development of thermal streets exist if:

a. the convective layer (surface to top of the cumulus) is limited by a stable layer (inversion).
b. the winds are stronger than average (>15 knots), with the maximum wind speed occurring within the upper part of the convective layer and declining above.

Forms

The Stueve diagram/Forecast Data/Soaring Forecast/Soaring Weather report and drawings/instructions for making a psychrometer and all required addresses for the required met data can be downloaded from York Soaring's website <*www.yorksoaring.com/ysahangar.html*> then click on "weather". ❖

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Getting the word out

Electronic posting of news is becoming more and more important for club current events and is a *very* effective means of spreading the news now that Internet use is becoming pervasive.

A recently developed Cu Nim e-mail list is a perfect example. It started with some messages being posted by someone in the club to all the known Internet owners on, I think, mid-week flying. It was soon discovered that e-mail lists were the business of <*www.listbot.com*> (it's free). A Cu Nim e-mail list was set up that now allows very quick news dis-semination — a single e-mail address will reach every subscriber to the list.

Without this rapid means of spreading the word, it wouldn't have been possible for the club to organize Wednesday night training in such an on-time, go/no-go way. It also allowed a very intelligent and wide-ranging discussion on "new pilot procedures" and on the proposal to build a clubhouse. The full range of issues could be effectively aired which had always proven to be very difficult to do in past newsletters or at the usual club meetings, particularly since the written word allows for additional thought, organizing of ideas and editing while still giving the rapid exchange of ideas provided by e-mail.

I would strongly recommend that all clubs consider using a list server as a fast communication channel to its members — it really works well.

Tony Burton

CAS News

It's the end of the soaring season and time to sit back and reflect on the progress we have made this season. Did you accomplish all the goals you set for the season? If you didn't set any goals for yourself read on, maybe this will give you some ideas.

You read the article in the last *free flight* on one of the CAS cross-country clinics held at SOSA this year. Another CAS sponsored clinic was held at MSC in July. An article should appear in a future issue about the MSC clinic. Between the two clinics, 17 pilots were introduced to the challenges of cross-country soaring. Unfortunately a few people had to be turned away from the clinics due to a lack of the prerequisite soaring experience. For the clinics we insist that students have their Silver badge as a minimum. Now is the time to plan for next summer's clinics. If you don't have your Silver badge, start working on it as soon as the flying season arrives. There will be two clinics again, one in July at MSC and the second in August at SOSA.

I believe that cross-country soaring is one of the keys to membership retention in the sport. It is up to us, the experienced pilots, to pass this along to the newly licensed pilots before the lustre of the sport fades for them. People need a continual challenge to hold their interest in something. In soaring we have the FAI badge system to provide challenges and rewards to all levels of pilots, but sadly many pilots never pursue these badges. In some respects, it should not be left up to the individual to decide whether or not they want to fly a badge leg. The early badges: B, C, and all the Silver badge legs, should be encouraged by the clubs' instructor body.

Our job as instructors does not end when the student has gone solo, or when pilots earn their licence. The instructor should be there to continually provide guidance to the pilots. As the duty instructor, if the weather looks good, find a pilot and suggest to them that they take a ship for 'x' hours to complete a badge leg. While they are trying that, suggest that they also try their 1000m height gain, or 50 kilometre attempt. I don't have the statistics to back it up, but I would bet that most pilots, once they have achieved their Silver badge, stick with the sport.

Beyond the challenges of the FAI badge system, there are Canadian records that can be attempted. The new "Club" category of records is full of blank spaces waiting to be filled. There is also a new CAS Decentralized Nationals, a ladder type contest. All of these systems are in place to encourage all pilots in Canada to fly cross-country. Unfortunately, this year we got off to a poor start with the Decentralized Nationals. We were late to publicize it and as a result have had very few flights submitted. It is still not too late to submit flights. Any flight flown in Canada is eligible for the competition. Rules and details of how to submit your flight can be found on the CAS website. As a New Year's resolution, let's all resolve to fly more cross-country flights next year!

Dave Springford

Total elapsed time scoring

One of the technical papers given at the OSTIV sessions at Bayreuth described a modified scoring system for competitions. Soaring, unlike many other sporting organizations, has not yet standardized on one system for scoring races. This indicates a need for a scoring system analysis and design effort to determine a more accurate system for scoring each pilot's performance.

The author's analysis shows that using the measured performance of each pilot — elapsed time — as his daily score, yields the highest accuracy.

The system would select as champion the pilot with the lowest total elapsed time over the entire contest. This would also be the pilot who flies the total distance of the contest at the highest speed. He illustrated that the 1000 point scoring system does not accurately score the measured performance of pilots in sailplane races. (Anyone wishing to send comments or questions to the author, Dr. Feldmaumer, on this proposal may do so at <*ventusnine@ aol.com*>)

More PW-5s coming to Canada

Trevor Florence has organized a container load of six PW-5s which are now in Vancouver after leaving Gdynia on 8 October. One of these gliders will remain in Invermere for visiting pilots and will be outfitted with a GPS for documenting badge and record flights. The five other ships will be sold.

High quality aluminum clamshell trailers are being fabricated specifically for the PW-5. If you, a club or individual, are interested in a PW-5 or a trailer sized for short-spanned ships, call Trevor at (604) 826-4330 (H) or (604) 838-1780 (cell).

"To the edge of space"

Flight Journal (the official monthly magazine of the Boeing Museum of Flight), October 1999, by Barnaby Wainfan.

This is an excellent article about the X-15 test flights, explaining the program progress, and what the dangers of flying this exotic airplane/glider were. The program spanned ten years (1958–68), and the three X-15s flew a total of 199 flights. The X-15 achieved a top altitude of 354,200 feet, and speed of 4500 mph (Mach 6.7). In its high altitude stability performance, and particularly in its landing characteristics, it provided much of the proof of concept necessary for the Shuttle to fly successfully.

Here's an excerpt from the article, describing what it was like to fly and land it:

"The X-15 would launch from a B-52 mother ship at 45,000 feet and would accelerate and pull up into a steep climb to fly out of the atmosphere into "space-equivalent" conditions. Burnout occurred at about 160,000 feet at about 4000 mph and the airplane would then coast at zero-g to a maximum altitude and then nose over into a re-entry... it was coming almost straight down when it reentered... at 130,000 feet a hypersonic pullout began which was completed at 65,000 feet... after the pullout, it glided to the Edwards dry lake for an unpowered landing... the shape required for hypersonic stability made it very draggy at subsonic speeds, in the approach configuration with the gear and flaps down and the lower fin jettisoned, the X-15 had a maximum L/D of about 3:1... to have energy for the flare, it approached fast at an even steeper angle... a typical approach "glide" was flown at about 300 knots with a sink rate of over 10,000 ft/min... at about 900 feet, a 1.5g flare was initiated and the gear extended... touchdown was at about 200 knots."

And, how about this for control:

"... the X-15 had to fly in five flight regimes during a single flight: subsonic, supersonic, hypersonic, and exoatmospheric... the X-15 had three control sticks... a conventional, fighter-like central control stick was used during the launch and landing and for part of the up-and-away flight... at hypersonic speeds the airplane became very pitch sensitive... and during re-entry it was necessary to pull up to 6g while at hypersonic speed... a right-side stick allowed the pilot to fly the airplane with his forearm supported by an armrest to maintain precise control even while pulling high gs... the airplane was equipped with a reaction control system consisting of hydrogen peroxide fueled thruster rockets that were controlled using a left-hand stick... for use at altitudes above 99% of the earth's atmosphere... this system was later adapted for use on the Mercury spacecraft and was the ancestor of all augmented flight control systems found in almost all modern airplanes.

from Seattle Glider Council *Towline*

What's new in Invermere

Invermere has proven to give great access to the premier mountain, cross-country flying in Canada, but the airport had shortcomings which have now been addressed.

A new Pawnee towplane, C-FDUQ, will be ready by the spring.

Rod Taylor, a club mem-ber, levelled the previously rough infield into a large, smooth rigging and tiedown area. We seeded it with a durable field mix and it will be irrigated with city water which is promised for the spring of 2000. The tenting area has also been levelled and seeded and a couple of RV spots (water, minimum power, no sewer) will be set up. A taxiway has been cleared and levelled the full length of the runway which will allow glider access to the north end of the airfield without blocking the runway. Staging areas at both ends will allow easier access on and off the button.

Trevor Florence

Elvie Smith

from page 4

tows around the Pendleton triangle. Moy soloed in gliders. Ronald, the eldest son, went on to obtain commercial and airline ratings, while Margot in Australia and David became private pilots; Paul is an artist in Lethbridge.

In the early '60s, Elvie and the late Norm Tucker shared ownership in a Slingsby Skylark 3; later Elvie owned for more than 20 years a Glenn Lockhard-built HP-14. Elvie took part in some national competitions. A friend reports he made a Diamond height climb at Sugarbush, VT. Over the years he has been a towpilot and gliding instructor at the club. He was often active in maintenance and construction projects, and helped the club with financial advice. With bull horn and radio transceiver in hand, he acted as field manager for the 50th Anniversary celebrations of the club at Pendleton in 1992.

Early on, his flying interests turned to include personal transportation on one hand and aerobatic flying on the other. He bought a Chipmunk with four others, then a Navion. A Beech Baron that succeeded the Navion took him and family across the Canadian Arctic, to the Cayman Islands via Cuban airspace, and twice across the Atlantic and back. After the Chipmunk, in the '90s, Elvie and his sons replaced it with a Pitts Special biplane and further developed their aerobatic skills. The Pitts was followed by a Steen Skybolt, then a Yak 55M in 1997, one of the top aerobatic craft of the world. As well, he maintained currency on club sailplanes.

As recently as 1998, Elvie was vital and vigorous at Pendleton, taking friends for a jaunt in the Baron, later shooting off at a high rate of climb in the 360 hp Yak for some aerobatics. That fall, he had his second transatlantic Baron flight, a demanding task he wrote up for COPA. His words reflected his continuing love of flight, adventure, and family, as well as concern for younger pilots who might underestimate the difficulties and costs of a crossing of the 'pond'. Elvie accumulated more than 5300 hours of flying and gliding experience.

For all the distinguished career, honorary doctorates, honours and awards from aerospace technical and industry associations, his Order of Canada, and his induction into Canada's Aviation Hall of Fame, Elvie remained friendly and accessible to his gliding associates. He remembered old friends and gave them valuable time and help in dealing with personal emergencies. His son could say at Elvie's funeral that he had never heard him speak unkindly of anyone.

Some words of John Gillespie Magee Jr. from *High Flight* aptly describe Elvie, his career, and his flying ... he "topped the windswept heights with easy grace". ❖

INSURANCE and SAFETY
accidents will cost you more

As another year of extraordinary personal and property losses draws to an end, discussions between the Insurance committee, our insurers, the Board, and the Flight Training & Safety committee turned to what can be done to improve the safety record. Not only is this record poor from an objective review of accidents, but also comparisons with other countries rank Canada very unfavourably.

Accordingly, FT&S will be taking a number of initiatives, the first of which will be the hosting of regional safety seminars over the winter. It is clearly important that clubs take an active role in these safety initiatives. *Interactions with the insurers have moved on from the review to what we as an organization are doing to turn the situation around.*

The "safety audit" is a visible example of one of these initiatives and an important demonstration to the insurers and to Transport Canada that we are serious about safety. The preparation of club safety audits was only recommended in the past, which is perhaps the reason why only a handful of clubs have completed it. This winter, when the planes are stored away, is a perfect time to bring together club members to complete this task.

It is strongly recommended that the audits be completed over the winter and forwarded to FT&S by February 2000 so that we will be able to demonstrate for our insurance renewal that the program is active.

If compliance is not voluntary, consideration will have to be given to making insurance coverage in 2001 conditional on receiving the safety audit report.

Coupled with this, there is a more stringent review of applications from new clubs and private owners to join the insurance plan.

Obtaining coverage will now require an assessment by FT&S and provision of history just as it would in the marketplace.

Concerns over the level of insurance premiums paid by clubs and private owners have been growing, particularly in the last few years as continuing high loss levels have pushed our renewals higher. In the past, our premiums have been calculated without regard to club or individual claim histories. This is not the way that risks are assessed in the market, and causes all of us to pay an equivalent premium that is based on the loss statistics of the whole SAC fleet.

This might be fair if losses were spread randomly among clubs and individuals over the years. However, where extraordinary high or repeated claims are made by a few parties, this policy leads to unfairness to those with a good record effectively being made to subsidize those who are suffering the high losses. The current policy offers no financial incentive to clubs or individuals to enforce or follow safe practices.

The Board, in consultation with the Insurance committee and our agents, has studied this issue, and has arrived at the following modification which will be implemented for the next renewal:

Clubs. Commencing with the year 1999, for every year in the previous three that a club makes claims that exceed 5% of their club fleet insured value, they will be assessed a 5% increase in premium.

Private Owners. Commencing with the year 1999, for every year in the previous three that individuals have made insurance claims, they will be assessed a 5% increase in premium.

It is hoped by taking these initiatives, we can turn around the recent history and demonstrate our priority on safety before Transport Canada or our insurers take action for us.

Richard Longhurst
chairman, SAC Insurance committee

Coming Events

Toronto Area Glider Pilot Ground School
Winter 2000 Session starting week of 10 Jan.

York Soaring is hosting a Glider Pilot Ground School directed at beginning pilots to prepare them both for basic flight training and the Transport Canada examination. The course will be held either Tues, Weds, or Thurs evenings at the U of T Erindale campus in Mississauga. The 10 session Glider Pilot Ground School will be held from 7:30-10:30 pm on the evening, which is best for most students. The Basic course meets Transport Canada's licensing requirement for 15 hours of ground school and to prepare the student to write the Glider Pilot exam. However, other aspects of soaring of a more general nature will be covered as well. The material will be presented in a lecture format supported by videos.

Erindale College is on the east side of Mississauga Road just north of Dundas Street in Mississauga. For registration info or if you have any questions, contact Ulf Boehlau:
(416) 410-3883 (W) <*ulf@problem.org*>
(905) 884-3166 (H) <*cm855@torfree.net*>
York Soaring <*www.yorksoaring.com*> has info.

SAC AGM, Montreal, QC
3-5 March, 2000 – watch the SAC Roundtable for up-to-date info. More in next issue.

2nd Annual CAS Winter Soaring Seminar
Late March – details later
A full day soaring seminar, designed to kickstart the soaring season, will be held in the Toronto area in late March. This seminar is intended as a pre-season refresher for experienced pilots or as an introduction for the new cross-country pilot.

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FAI badges

Walter Weir

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

The following badge legs were recorded in the Canadian Soaring Register during the period 9 Sept to 3 Nov 1999.

GOLD BADGE

286	David Springford	SOSA
287	Peter Foster	York

SILVER BADGE

916	Charles Peterson	York
917	Robert Katz	MSC
918	Rafael Bravo	SOSA
919	Harald Schnetzler	Vancouver
920	Chris Gough	SOSA
921	Alan Hoar	Cu Nim
922	Werner Amsler	COSA
923	Greg Bennett	MSC
924	Walter Clark	MSC

GOLD DISTANCE (300 km flight)

Peter Foster	York	304.7 km	ASW-24	Arthur East, ON

GOLD ALTITUDE (3000 m gain)

David Springford	SOSA	3660 m	ASW-20	Minden, NV
William McArthur	Alberni	4200 m	Astir CS77	Ephrata, WA
Werner Amsler	COSA	3290 m	DG-300	Minden, NV

GOLD/SILVER DURATION (5 hour flight)

Ian Ward	Vancouver	5:10 h	Grob 102	Hope, BC
Robert Katz	MSC	5:17 h	Blanik L-13	Hawkesbury, ON
Rafael Bravo	SOSA	5:22 h	Astir CS77	Rockton, ON
Chris Gough	SOSA	5:13 h	1-26	Rockton, ON
Greg Bennett	MSC	6:10 h	PW-5	Hawkesbury, ON
Behzad Shroff	SOSA	5:16 h	Astir CS77	Rockton, ON
Walter Clark	MSC	5:17 h	1-26	Hawkesbury, ON

SILVER DISTANCE (50 km flight)

Charles Peterson	York	62.1 km	1-23	Arthur East, ON
Robert Katz	MSC	60.3 km	1-26	Hawkesbury, ON
Rafael Bravo	SOSA	62.2 km	1-26	Rockton, ON
Harald Schnetzler	Vancouver	108.0 km	LP-49	Invermere, BC
Chris Gough	SOSA	62.2 km	1-26	Rockton, ON
Alan Hoar	Cu Nim	112.1 km	Std Cirrus	Blk Diamond, AB
Greg Bennett	MSC	65.6 km	1-26	Hawkesbury, ON
Walter Clark	MSC	59.0 km	1-26	Hawkesbury, ON

SILVER ALTITUDE (1000 m gain)

Robert Katz	MSC	1060 m	Blanik L-13	Hawkesbury, ON
Rafael Bravo	SOSA	1254 m	Blanik L-13	Rockton, ON
François Tanguay	Outardes	1230 m	Blanik L-33	Bromont, QC
Daniel Bastien	Outardes	1075 m	Blanik L-13	Bromont, QC
Gerhard Novotny	Edmonton	1200 m	Zugvogel III	Chipman, AB
Chris Gough	SOSA	1250 m	Blanik L-13	Rockton, ON
Jack Sterken	London, ON	1190 m	1-36	Embro, ON
Werner Amsler	COSA	3290 m	DG-300	Minden, NV
Greg Bennett	MSC	1320 m	1-26	Hawkesbury, ON

C BADGE (1 hour flight)

2631	Robert Katz	MSC	1:24 h	Krosno	Hawkesbury, ON
2632	Rafael Bravo	SOSA	3:36 h	Blanik L-13	Rockton, ON
2633	Jacques Faribault	Outardes	1:24 h	Ka-8B	Bromont, QC
2634	Zdzislaw Oczynski	York	1:05 h	1-26	Arthur East, ON
2635	Chris Gough	SOSA	5:13 h	1-26	Rockton, ON
2636	Greg Bennett	MSC	6:10 h	PW-5	Hawkesbury, ON

Congratulations to: Chris Gough who earned his Silver Badge with two flights in July and one in September at the age 15 years – *and to:* Dale Kramer of SOSA, who flew a zig-zag three turnpoint flight of 1001.4 km at Ridge Soaring on 7 Nov. Details in the next issue.

SAC SUPPLIES FOR CERTIFICATES AND BADGES

1	FAI 'A' badge, silver plate pin		$ 6.00
2	FAI 'B' badge, silver plate pin		$ 6.00
3	SAC BRONZE badge pin *(available from your club)*	(12 for $55)	$ 6.00
4	FAI 'C' badge, cloth, 3" dia.		$ 6.00
5	FAI SILVER badge, cloth 3" dia.		$12.00
6	FAI GOLD badge, cloth 3" dia.		$12.00
7	FAI 'C' badge, silver plate pin		$ 5.00
8	FAI SILVER badge, pin		$45.00
9	FAI GOLD badge, gold plate pin		$45.00
	Items 7–12 ordered through FAI awards chairman – see Committees list		
	Items 10, 11 not stocked – external purchase approval given		
10	FAI GOLD badge 10k or 14k pin		
11	FAI DIAMOND badge, 10k or 14k pin and diamonds		
12	FAI Gliding Certificate (personal record of badge achievements)		$10.00
	Processing fee for each FAI application form submitted		**$15.00**
13	FAI badge application *(download from SAC website forms page)*		n/c
14	Official Observer application *(download from SAC website forms page)*		n/c
15	SAC Flight Trophies application *(download from SAC website forms page)*		n/c
16	FAI Records application *(download from SAC website forms page)*		n/c
17	Flight Declaration *(download from SAC website forms page)*		n/c

Please enclose payment with order; price includes postage. GST not required. Ontario residents, add 8% sales tax. Items 1–6 and 13–17 available from SAC office. Check with your club first if you are looking for forms.

ARTICLES ACVV POUR CERTIFICATS ET INSIGNES

1	Insigne FAI 'A', plaqué argent
2	Insigne FAI 'B', plaqué argent
3	Insigne ACVV BRONZE *(disponible au club)*
4	Insigne FAI 'C', écusson en tissu, 3" dia.
5	Insigne FAI ARGENT, écusson en tissu, 3" dia.
6	Insigne FAI OR, écusson en tissu, 3" dia.
7	Insigne FAI 'C', plaqué argent
8	Insigne FAI ARGENT
9	Insigne FAI OR, plaqué or
	Les articles 7–12 sont disponibles au président des prix de la FAI
	Les articles 10, 11 ne sont pas en stock – permis d'achat externe
10	Insigne FAI OR, 10k ou 14k
11	Insigne FAI DIAMAND, 10k ou 14k et diamands
12	Certificat FAI de vol à voile (receuil des insignes)
	Frais de services pour chaque formulaire de demande soumis
13	Formulaire de demande pour insignes
14	Formulaire de demande pour observateur officiel
15	Formulaire de demande pour trophées de vol de l'ACCV
16	Formulaire de demande pour records FAI
17	Formulaire de déclaration de vol par feuille

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

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Personal ads are a free service to SAC members (please give me the name of your club). $10 per insertion for nonmembers. **Send ad to editor**, not the national office, Box 1916, Claresholm, AB T0L 0T0
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Ad will run 3 times unless you renew. Please tell me if your item has been sold sooner. Maximum ad length is 6 lines and subject to some editing as necessary.

single seat

Tern, C-GWKW, 845h, amateur-built in 1978. Always hangared, no accidents, L/D 34:1 @ 54 kts. Basic inst incl Cambridge audio, 720 chan radio, Strong chute. Encl trailer. Several 300 km triangle flights less than 5 hr. More info at *<http://www.accolade.ca/glider/>*. Owner: Wolfgang Weichert, call: Juergen at *<juergen @accolade.ca>* or (613) 746-7685.

L-33 Solo, 40 h, basic instruments, all ADs, beautiful ship (white with red and blue trim). $US20,500. In Pemberton. Rudy Rozsypalek (604) 894-5727, *<pemsoar@direct.ca>*

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Std Jantar 2, C-GFBO, 600TT, Sage mech. vario, Varicalc Vario/FG computer, G-meter, O_2 system, Terra 720 radio. Replogle baro. Minden aluminum trailer. Located in Edmonton. $31,000. John Broomhall, (780) 438-3268 *<john@cips.ca>*

ASW 20, C-FNVQ, ndh, 1160 h, 372 launches, good cond. Cambridge Nav director/vario/audio. Sage mechanical, back-up audio, radio, Smiley bags, solar panel, O_2. Good homebuilt trailer. $43,000. Peter Foster (905) 584-1920 *<pede.foster@ibm.net>*

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SZD-55, C-FTVS, single owner, new in '96, full instruments (excl. GPS), rugged Trailcraft trailer, always kept in trailer, never damaged. Avail now, complete package $70,000, Colin Bantin (905) 469-1980 (H), (416) 543-9222 (B) *<ccbantin@globalserve.net>*

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Chute, Pioneer 26', $250. (519) 354 - 8123 or *<pstrapp@mnsi.net>*

Baro, EW-B electronic barograph & data logger, connects to your portable GPS. Steve Burany (SOSA). $550 (905) 889-5779 or *<steve.burany@utoronto.ca>*

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Y2K Canadian Soaring Calendar

A 2000 calendar has been designed by Kalli Brinkhaus of the Vancouver Soaring Association. It has beautiful pictures taken while soaring in BC and elsewhere. Send $25 by cheque to: "BC Soaring Society", c/o 2336 Marine Drive, West Vancouver, BC V7V 1K8. Ray Richards, ph/fax (604) 926-6354 *<rrichards6332@home. com>*

magazines

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

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

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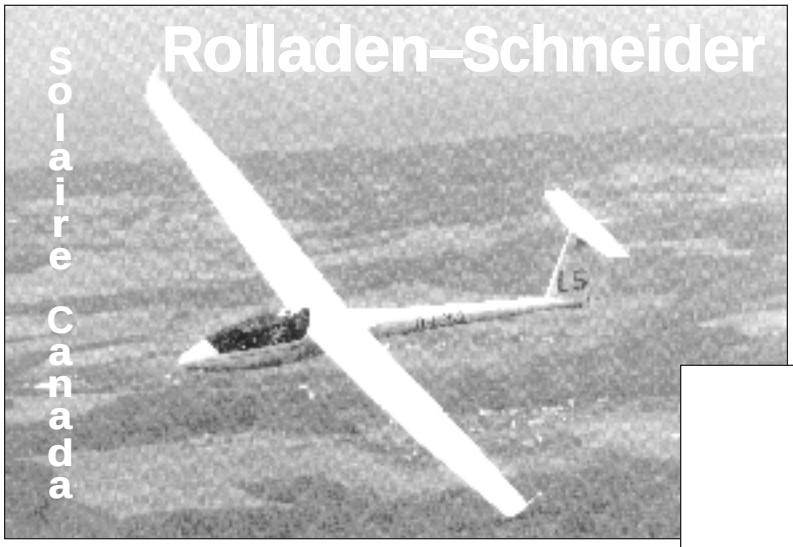
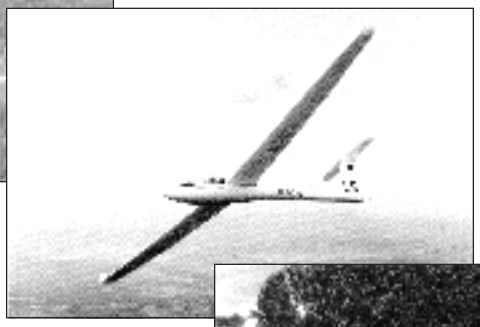
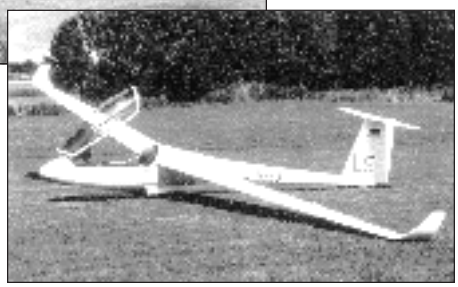


We are pleased to announce **Solaire Canada** as the Canadian representative for our line of competitive racing and club gliders.





• *LS6* The LS6-c can be ordered with many wing configurations: 15 Metre, and now 18 Metre class with full 1156 lb wingloading, both with or without winglets, etc.

• *LS8* The LS8 is not only a winner in the Standard Class, it can now be ordered with the 18m extension tips with about a 48:1 glide ratio at a very affordable price.

• *LS9* The LS9 self-launching 18m glider has reached production status and will satisfy the self-launch crowd with unequalled performance and flight qualities.

• *LS10* We anticipate the new LS10 as the new 15 Metre racer, also available in 18m wingspan in the spring of 2001, and are confident that it will meet or exceed your expectations.

• *LS4* The well-known LS4 is still in production and more than 1000 are built now. The newest version LS4-b now has automatic control system connectors. This glider with its high performance, beautiful and easy handling qualities, together with a very affordable price, makes it the ideal glider for the private owner or clubs alike.

For more information, prices, options, and delivery positions, please contact Ed Hollestelle at:

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