5/91
Oct/Dec

free flight • vol libre

POTPOURRI

This will be the final issue of *free flight* for 1991. You may have noticed that it did not arrive at its scheduled time and it is covering three months, October to December. The reason for cancelling issue 6/91 was budgetary problems.

All the Financial Committee can do at the beginning of the year is try to make intelligent estimates of the expected income for the year and plan expenditures accordingly. This year our income has not achieved expected levels, and some of the expenses have been greater than anticipated, particularly for the AGM. Therefore, to try and keep within our budget, it was decided to cancel the October Directors' meeting and replace it with a conference phone call, to request the Flight Training and Safety Committee to restrict some of their 1991 expenditures and, with some disappointment, to cancel issue 6/91. Issue 1/91 will cover January to March and get *free flight* back on track.

The request for funds to assist the World Contest pilots this year got off to a slow start so I think we should continue to assist them in meeting their expenses. Send in your orders for golf shirts or donate to the Contest fund.

Ella Gormley is no longer working part time in the National Office. Ella, I wish to thank you for all your support in past years, and doing all those extra things, and to wish you enjoyment in your retirement and future endeavours. Joan will now be handling the office duties by herself, so please remember this if responses are not quite as fast as you expected.

Most clubs will now have finished flying for this season and will be busy organizing winter maintenance schedules. NOW is the time for clubs to consolidate their flight statistics and to insist the private owners hand in their flight times *and* to send in the information on the forms which have been sent to all the clubs to Randy Saueracker, our SAC Statistician. Please remember, we need that data when talking to Transport Canada and for considering future proposals. All Zone Directors will be receiving lists of delinquent clubs and will be taking action.

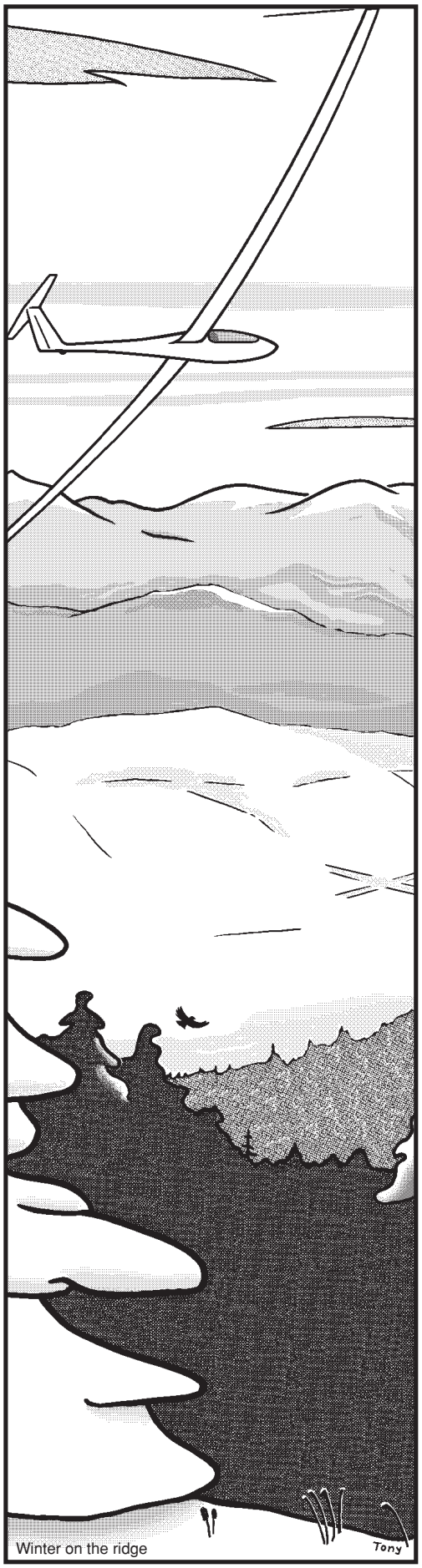
Also, now is the time for pilots to review logbooks and send the data on their best flights to Harold Eley for consideration in the awarding of our various SAC flight trophies.

I wish to congratulate all pilots who competed in the Worlds, the Nationals, and provincial and local contests — particularly those pilots who are new to cross–country soaring (I know that the experience of getting away from home will be a great encouragement to your progress in the sport). I'm sure you all enjoyed competing, but it also took determination and some sacrifice to enter these contests, and you are to be commended for it. However, a greater sacrifice by the crew members enabled you to compete, and I wish to personally thank all members of our Association who acted as crew, whether it was in the Worlds or assisting in the recovery of a fellow member on a badge try. Our sport would die a quick death without all the volunteers in the many non–flying activities.

I thank you all.

Have a merry festive season and happy soaring in 1992.

Al Sunley



Winter on the ridge

free flight • vol libre

Trademark pending Marque de commerce en instance

5/91 Oct/Dec

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

ISSN 0827 – 2557

... Notice on next issue ...

The next issue will cover January to March and will have a special deadline of 15 December

DEPARTMENTS

Cover

Launch time at Cowley — about a microsecond after the student flight with the Blanik is seen to be thermaling, the launch line grows to 15 sailplanes! At the front of all the activity is Jerry Vesely in his VES–1 homebuilt. Photo by Gerald Ince

Let us remember our roots

Gerhard Waibel
from the 1991 OSTIV Congress

This year aviation history remembers 100 years of flight. Many nations claim flying pioneers who attempted to fly; some may have succeeded but those people were ignored or laughed at and not sponsored in their difficult work. There is no fixed date when Otto Lilienthal did his first "flight" in 1891. The French aviation pioneer Ferdinand Ferber assigned the summer of 1891 as the period when men learned to fly with a heavier than air apparatus. Ferber's criterion was that Lilienthal frequently "flew" in a controlled glide over a distance exceeding 15 metres.

As young men, Otto and Gustaf Lilienthal experimented with airfoils using a carousel type machine where they could determine lift and drag of different airfoils and wing shapes versus speed. The experimental results were published in Otto Lilienthal's book *"Der Vogelflug als Grundlage der Fliegekunst"*, first issued in 1889. The Lilienthal brothers discovered two basic aerodynamic facts which still apply to gliding today:

- a thin and slightly cambered profile section produces a high lift to drag ratio,
- a high aspect ratio of the wing is also favourable for a high lift to drag ratio.

However, Lilienthal's explanation of the "induced drag" (as we say today) was wrong or the phenomenon was not completely understood. In 1890 Otto Lilienthal built a glider and tested it in his garden by heading it into the wind. He found that he needed a weathercock on his plane and thereby invented the vertical tail for lateral stability.

It is agreed by the historians that it was important for Lilienthal's breakthrough that just at this time the fast shutter was invented for cameras. The inventor of the "Schlitzverschluss" shutter took photographs of Lilienthal's flights; these are still available today in good quality. According to Lilienthal's own words more than a thousand foot–launched flights were done during the first years. In 1892 Lilienthal made several flights with different gliders from the 10 metre high edge of a quarry allowing 80 metre glides (L/D about 8) and varying the gliders: big span, high wing area for low wind speeds; low span and higher wing loading for stronger wind speeds. Viewing the multiple photos of the flights, one sees that Lilienthal started from the beginning with sufficient lateral stability, but had to continuously increase tail volume of the horizontal tail by increasing both the vertical tail area and tail arm.

Comparing the 1891 glider model with the 1893 model shows that Lilienthal used mostly a low CG relative to the wing to get longitudinal stability for his first flights. This may explain the poor performance of only 25 metre flights as a maximum. The gap between the wings must have produced high induced drag on the 1891 glider model and may also explain why he could fly only 20 to 25 metre distance for a height difference of 5 to 6 metre (L/D about 4).

Spectators reported that they had a good feeling of safety when seeing Lilienthal or his crew fly, and that there was definitely some "elegance and lightness" in this type of flying, especially when the big model (10 metre span, 16 square metres wing area, gross weight 104 kg) was used. We know that "non flyers" say the same when they look at our sport today.

In 1893 and 1894 he moved to a better suited terrain at Rhinow and made many flights exceeding 30 seconds duration and achieving 250 metre maximum distance. In those days he developed his standard model (the Normal–Segelapparat of 13 square metre wing area) of which he sold eight from 1894 through 1896. A total of 10 were built.

continued on next page

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 which represents Canada in the Fédération Aéronautique Internationale (FAI), the world sport aviation governing body composed of national aero clubs. The ACC delegates to SAC the supervision of FAI related soaring activities such as competition sanctions, issuing FAI badges, record attempts, and the selection of a Canadian team for the biennial World soaring championships.

free flight is the official journal of SAC.

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

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

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

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

For change of address and subscriptions to non–SAC members ($20 per year, US$22 in USA, and US$28 overseas), please contact the National Office, address below.

Deadline for contributions:

5 January, March
May, July
September and
November

L'ASSOCIATION CANADIENNE DE VOL À VOILE

est une organisation à but non lucratif formée de personnes enthousiastes cherchant à développer et à promouvoir le vol à voile sous toutes ses formes sur une base nationale et internationale.

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

vol libre est le journal officiel de l'ACVV.

Les articles publiés dans **vol libre** sont des contributions dues à la gracieuseté d'individus ou de groupes enthousiastes du vol à voile. Chacun est invité à participer à la réalisation de la revue, soit par reportages, échanges d'opinions, activités dans le club, etc. Un "courrier des lecteurs" sera publié selon l'espace disponible. Les textes et les photos seront soumis à la rédaction et, dépendant de leur intérêt, seront insérés dans la revue.

Les épreuves de photos en noir et blanc ou couleur sont acceptables. Les négatifs sont utilisables si accompagnés d'épreuves.

L'exactitude des articles publiés est la responsabilité des auteurs et ne saurait en aucun cas engager celle de la revue **vol libre,** ni celle de l'ACVV ni refléter leurs idées. Toute correspondance faisant l'objet d'un sujet personnel devra être adressé au directeur régional de l'ACVV dont le nom apparait dans la revue.

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

Pour changements d'adresse et abonnements aux non membres de l'ACVV ($20 par an, EU$22 dans les Etats Unis, et EU$28 outremer) veuillez contacter le bureau national.

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Any service by Canada Post to above address. Commercial courier service, c/o "Claresholm Local Press". Fax by request only to (403) 625-4114, day.

COMMERCIAL ADVERTISING
National Office (613) 739-1063

Date limite:

5 janvier, mars
mai, juillet
septembre et
novembre

letters & opinions

MORE ON NON–SAC INSURANCE

A friend of mine once said, "Everyone is entitled to their own wrong opinions." I believe that this is the case with the controversy over those pilots who did not insure their sailplane through SAC. Those who chose the SAC scheme believed it was the best plan for them (or were not aware an alternate plan was available) and those pilots who chose not to insure with SAC did so because they thought the alternate plan was better.

I have a 50% share in a Mini–Nimbus which my partner and I insured for a coverage of $30,000. We chose an alternate plan not to jeopardize the SAC scheme but because it offered the coverage we required and was $200 less than what it would cost through SAC. Granted, we do not get 12 months of coverage and named pilots are required on the policy. However, we do not need coverage for the entire year as the months from November to March do not offer sufficient soaring days to justify paying the extra premium. On the other hand if it appears that good soaring weather is approaching, a phone call to the broker is all that is needed to include coverage for a day or weekend. This was done on one occasion last year and there was no extra premium incurred. Also, having named pilots on the policy is not a burden because our ship is privately owned and we do need a policy that allows all pilots to be covered while flying our sailplane — because they won't be.

Mr. GS Robinson of Sedgwick James, Inc. in his letter under "Letters & Opinions" in the Aug/Sept issue of *free flight* indicates that the problem of insurance "drop outs" is a minor one confined to a limited number of individuals in a given geographic area. Later in his letter, Mr. Robinson also states, "the drop out problem has not occurred to any great extent this year. In fact we have added 22 new gliders this year." If this is the case, then why does Mr. Sunley in his comments under POT-POURRI in the same issue of *free flight* state that this minor problem will be the ultimate cause of increased insurance rates? Does it not seem more logical that accidents resulting in claims against the SAC plan will be the primary reason for increased premiums?

As a private owner I do not feel obligated to insure my sailplane through SAC. Essentially as a private owner I am paying for insurance twice. Once for my own ship and once for the club ships through club membership or tow fees. If the premiums of club ships increase because of reduction of participants to the SAC scheme it is likely to be minor compared to the increase due to accidents. In any event, I will be paying my proportional share of these increases as these costs will ultimately flow back through to all the club members including the private owners. They should not have to pay increased premiums for coverage they will not likely require in order to subsidize the premiums on club equipment.

What benefit will the proposal to limit people who "drop out" from returning to the SAC program have for anybody? If for some reason, the SAC plan becomes a better choice than any alternate plan, why should individuals be "penalized" for paying their premiums to SAC? Isn't that what SAC ultimately wants in any case? It appears to me that far too much time and effort has been spent on trying to figure out what to do with the small "drop out" group. Could not a lot of this time and effort be channelled into other areas such as flight training and safety? Only by reducing the number of accidents we have in this sport can the insurance premiums be kept at a reasonable level regardless of what insurance plan is adopted.

Al Stirling, Cu Nim Gliding Club

Let us remember our roots

From newspaper articles we know that Lilienthal's efforts in flying were regarded mostly as a show type of attraction by the press and the public, a phenomenon which was repeated with the Wright Brothers. Very few people realized the scientific aspect and breakthrough.

Lilienthal did not explore ridge lift but did controlled turns and S–type flight paths. In 1894 and 1896 he experimented with movable control surfaces, but did not achieve a breakthrough. He managed to cope with higher wind speeds and better CG control.

He finally had his fatal crash caused by a "sun gust" (we would call that a developing thermal which he could not control with the CG shift). The several hundred people at his funeral demonstrated that Lilienthal was recognized as a scientist and an inventor, and also an important person in the public life of Berlin. The Wright Brothers were so grateful to Lilienthal that they paid an annual pension to his widow until she died. •

NATIONALS 1991

Five days of competition and some good soaring

INTRODUCTION – *Christine Futter*

Despite the original dates changing, and then breaking tradition by starting on a Wednesday, and then attracting only 22 pilots, the 1991 Canadian Nationals went off well.

There were actually only five flying days during the contest period, but for those pilots who were able to come to Pendleton the weekend before, it seemed like a lot more. On the Saturday, three pilots flew a 500 km triangle faster than the Canadian record for that distance. Unfortunately, they were flying for fun and no one carried a barograph. Next day, Walter Weir flew the triangle again, this time with a barograph, and broke the record officially. The other pilots contented themselves with just a 300 km triangle.

Of course, the fantastic weather didn't last for the actual competition, but at least this contest didn't attract days and days of rain. With the help of "live" satellite information, early morning tephigrams, and relatively local weather office briefings, the task committee did their best to fit the task to the day. The first day, when only three pilots made it back, may have been overcalled — though one of the three was a member of the task committee. Day three, with the double triangle, was probably undercalled, with sailplanes swooping in after about only two hours, and one of the pilots even radioed in after he finished to say he was thinking of making another start. (He didn't, but he probably could have done).

Overall, it was a good contest, and a safe one. The main participants — pilots and crews — seemed to enjoy it. Of course, having five good flying days helped, but an efficient ground operation was also important. Sailplanes got out on the line and were launched smoothly. Results appeared promptly so that everyone knew what the standings were. Communications were good so that crews could be dispatched as quickly as possible for those who didn't make it back. There were also willing volunteers to help pilots who couldn't find a crew prior to the contest.

Thanks to the hard work by the organizing committee there were lots of prizes. Almost everybody got something and Canada Post's generous contribution helped offset some of the costs of the contest. There were a number of social events, including a local Chinese meal with pizza and fish and chips! The host club, Gatineau, also put on a couple of dinners and even a fireworks display. Another night there was a paper airplane competition which made you realize it is fortunate that glider pilots don't have to design and build their own ships.

Of course, the competition was the central part of the two weeks at Pendleton, but there are other snippets that come to mind and colour the memories:

- There was the 6–year old Westerner who was overheard telling his sister that he had met a girl, "And guess what! She speaks Ingwish!" (This must be a Western version of French because this is what the little girl in question speaks).
- Or the pilot overheard to say, "They've changed the radius of the earth", and when asked who "they" were, replied, "The FAI". Now there's power for you.
- Or the pilot who radioed in that he was making a rolling finish and then proceeded to make a flying finish, and not only that, flew over the field *parallel* to the finish line, until he finally acceded to the finish gate's anguished demand to "turn right, NOW!"
- Or the glider that almost made it back and could be seen getting closer and closer, and lower and lower over the trees until the pilot, at last, gave way to common sense and landed a kilometre short of the field.
- Or the novice competition pilot who radioed in from 5 km out — but didn't make it clear that this referred to the height, not the distance — and this from a pilot with a final glide computer in the cockpit.

The 15 metre class had a returning champion, Ulli Werneburg, in an ASW-20. In fact, the 15 m class could almost have been called the ASW–20 class. Andy Gough, in an LS–4, won the Standard class. The Standard class entrants also included a Ka6, which just goes to show that you don't have to have a sleek fibreglass ship to take part in the Nationals. (If you want to win you do, but you can still have fun with much less).

Even the members of the club seemed to enjoy playing host to the Canadian championships and maybe in another twenty years or so, when we have all forgotten how much work went into it beforehand, Gatineau will offer to host the Nationals again.

DAY 1 – *Robert DiPietro*

Pendleton – Kars – Alexandria 183.9 km

Day One launched the competition on the downside of the high and speeds would surely be affected. Altitudes of close to 4000 feet were available to make a decent start, and I think most competitors had it in mind to play a cautious game. As the gate was declared open, most quickly opted to start early. I headed towards the bog where thermals are normally better. I found a thermal not too far from the start and since it was steady, worked it up to the top of the workable lift band to 4000 feet. Walter Weir joined me initially but decided to press on as I continued to climb. It paid off well since it kept me high to avoid the problem area around Russell.

I still avoid gaggle flying since it hampers decision making, and wondered if today it would not play in my favour. I decided to fly alone and not too many sailplanes were to be seen. The town of Limoges worked well and sent me on my way south of Russell airport. This is a tricky area that locals have dubbed the "Russell hole" and it did, in fact, claim a couple of competitors. Climb had precedence over speed and sailplanes were already grouping together for fear of not finding the lift. Dave Frank was close by and we played cat and mouse pushing on and bumping through lift in different areas to keep moving. To be below 2500 feet meant trouble so the working band was tight. Sailplanes were observed below at the lower end of the working band which made their progress difficult.

The turnpoint at Kars was not too far away and the few sailplanes that managed to pull ahead were out of view. Kars was rounded in fair fashion but the second leg to Alexandria taxed most pilots' patience. Progress was extremely slow with many fruitless bumps of lift. Conditions had really deteriorated and climbing 300 to 500 feet before pushing on was considered a gift. Ground features that would normally assist in thermal forming were not functioning. Alexandria was in reach, but I was at 2200 feet and I definitely had to find some lift. The last leg for the finish gate was directly into wind. Only one other sailplane was in sight a short distance away, also in search mode. Finally — something workable to gain enough height to round the turnpoint and head northerly into wind.

But turnpoints cost altitude and the narrow lift band played heavily with decisions as to cruise or climb. Climb won out and within minutes a gaggle formed near the turnpoint. The game was on. Who had taken the picture or had not? Can you climb high enough for a final glide? How strong is that headwind? The final leg is 40.5 kilometres.

The thermal topped at 3200 feet and Nick Bonnière, Dave Hogg, and I moved on ahead. Others had to either climb, go to the turnpoint for a picture, or both. The glide calculator demanded more height and although only 300 to 400 feet were required, the wooded area just prior to the finish gate dictated another climb. There it was and the trio circled — it was poor, but at least it was lift! The climb was short–lived but just enough height was won to squeeze through. In hindsight, this may have been the last workable thermal in

the area. Nick, still having some water ballast, charged ahead. Visual reference confirmed our glidepath to safely cross the wooded area, enabling us to land to a rolling finish, one behind the other. It was to be our day as no other sailplane appeared over the treeline, with some falling short by only one kilometre.

DAY 2 (POST task) – *Andy Gough*

Day Two arrived three days late on June 30th, four hot, humid and stormy days after day one. That morning I had been awakened in my tent by the cold confirming a definite air mass change and some promising weather for a reasonable task. The club house was abuzz with talk of 500 km tasks and the probability of record weather the same as experienced last weekend. My thoughts were that if the task committee was going to do its job it would call a POST as this is the favoured task for good conditions and produces the longest distances and fastest speeds.

At briefing my thoughts were confirmed, a primary task of a 3 hour POST and a secondary 2 hour POST were set. Although the weather was going to be good we would have to cope with a strong northerly wind and the air would dry out leaving us in the blue with an early deterioration in soaring conditions. During rigging cu formed to the north over the Gatineaus and I started to look at the possibilities of flying north of the river, however the cu was in a band and never widened and by the time we were on the grid the clouds had drifted way to the southwest and left the rest of the area in the blue.

At about 13:30 I took my start picture at 4500 feet agl and set off with some determination to reach the fleeing clouds. If I could reach Brockville in fifty minutes or less I would go on to Gananoque and then fly home, about a 300 km round trip. En route I found myself circling over Winchester and as this was a turnpoint, I snapped a picture as I drifted by. This was a small bonus, as had I needed to make any kind of detour I would not have bothered — taking turnpoints exposes one to hazardous height losing conditions and the resultant loss of time.

About 20 miles from Brockville I was finally flying under well spaced cumulus when I met up with Ed Hollestelle in A1; he went south as I pressed on to the turnpoint. I rounded Brockville in just over an hour so Gananoque was out and I set a new goal, east along the St. Lawrence east of Cornwall to Summerstown. This would still net close to 300 km, but conditions would have to remain strong in the blue beyond Prescott. I again found myself sharing a thermal with A1 and when we set our courses Ed took the southerly route around the edge of the cloud and I took to the northerly. By the time it came to take on more height I could see Ed a good 500–700 feet above me, if only etc. etc.

As we pressed on up the St. Lawrence into the blue we encountered very strong lift, but the headwind slowed progress and by the time I reached Iroquois I had changed my goal to Morrisburg. At Morrisburg I planned my route home and with fifty minutes to go decided to head for Maxville rather than make a bee line straight for Pendleton. North of the

				DAY 1 (Speed – 183.9 km)			DAY 2 (POST)			DAY 3 (Speed – 279.6 km)			DAY 4 (Speed – 178.5 km)			DAY 5 (POST)				
	15 METRE CLASS			day pos	km/h	pts	day pos	km	km/h	pts	day pos	km/h	pts	day pos	km/h	pts	day pos	km	km/h	pts	total score	handcp results
1	Ulli Werneburg	ASW–20B	MZ	4	(177.3)	598	2	306.1p	91.2	913	1	93.2p	980	1	96.3	742	2	375.2p	106.4	998	4231	4203 (1)
2	Walter Weir	ASW–20B	2W	5	(170.8)	573	1	279.9	101.4p	980	3	81.9	894	2	94.7	723	4	360.8p	102.6	961	4131	4131 (2)
3	Robert DiPietro	ASW–20B	DZ	2	67.7	766	5	236.5	87.6	854	2	90.6	976	4	89.8	666	10	281.3	85.3	775	4037	3962 (3)
4	Nick Bonnière	ASW–20	M7	3	66.3	760	6	233.3	84.5	833	6	77.3	851	8	78.9	541	3	356.7	103.8	963	3948	3897 (4)
5	Dave Hogg	ASW–20	VQ	1	67.8	767	7	220.9	75.3	766	10	(268.5)	538	7	90.2p	631	5	345.8	101.9	939	3641	3616 (7)
6	Dave Frank	ASW–20	SR	6	(163.9)	547	4	272.2p	85.7	884	11	(255.1)	509	3	90.9	679	1	379.5p	106.3	1000	3619	3642 (6)
7	André Pepin	DG600	DB	10	(27.4)	28	8	236.3p	71.5	710	4	80.5	881	5	89.5	663	8	312.3	90.5	841	3123	3041 (10)
8	Ed Hollestelle Sr	Ventus	A1	12	0	0	3	261.9p	86.4	891	9	(273.7)	550	6	87.9	644	7	316.2	95.8	871	2956	2911 (13)
9	Buzz Burwash	ASW–20FP	AB	10	(27.4)	28	9	159.8	58.6	574	7	64.4p	584	11	63.9	367	11	236.1	70.2	644	2197	2151 (19)
10	Wilson/Coulson	Mosquito	W2	9	(36.8)	64	10	76.4	30.7	288	5	77.9	856	12	47.9	185	9	292.5	87.7	801	2194	2286 (17)
11	Karl Doetsch	ASW–20	EB	8	(38.5)	70	11	116.5	0	208	8	(278.5)	560	10	69.7	434	6	334.8	99.8	914	2186	2162 (18)
12	Bob Gairns	ASW–20	TZ	7	(59.8)	151	12	111.8	0	200	12	(236.4)	469	9	74.3	487	12	287.2p	76.5p	565	1872	1857 (20)
1	Andy Gough	LS–4	44	4	(149.2)	603	1	243.6p	77.0	1000	1	69.2	1000	1	90.9	786	1	379.5p	100.6	1000	4389	3870 (5)
2	Ian Grant	LS–4	ZT	1	(172.5)	712	4	178.6	63.2p	750	2	68.9	997	4	90.4p	623	2	304.6	94.0	899	3981	3495 (8)
3	Paul Thompson	LS–4	T2	2	(153.8)	624	3	203.0p	66.3p	838	10	(250.2)	554	3	81.8p	652	3	308.5	90.2	887	3555	3257 (9)
4	Stewart Baillie	Cirrus	B1	9	(27.4)	35	2	200.2	71.9	892	3	60.4	905	2	82.5	677	4	305.2p	84.1	840	3349	3014 (11)
5	Ed Hollestelle Jr	Hornet	DW	3	(152.2)	617	8	207.6	0	454	7	(260.5)	579	5	79.5p	622	5	292.6	87.9p	832	3104	2999 (12)
6	Vicki Stamison	ASW–19	SQ	6	(119.6)	465	7	119.5	43.0	533	4	59.4	894	10	57.8	356	9	159.2	51.5	481	2729	2391 (16)
7	Longhurst/Kirby	Jantar	69	8	(36.8)	78	6	120.9	64.7p	538	6	(263.0)	585	6	77.8	616	6	280.9	80.4p	779	2596	2897 (14)
8	Kirby/Longhurst	Ka6E	K6	10	dnc	0	5	153.5p	50.3	649	5	51.6	809	9	66.2	465	7	233.5p	64.9	647	2570	2448 (15)
9	Jim Feyerer	Jantar	MF	7	(41.8)	102	9	78.3	0	171	7	(260.5)	579	7	71.7	537	8	184.3	52.8	524	1913	1831 (21)
10	Dugald Stewart	Cirrus	HG	5	(142.9)	574	10	19.7	0	43	9	(259.0)	575	8	69.5	508	10	38.2	0	56	1756	1629 (22)
	STANDARD CLASS																					

( ) values in brackets are distances in kilometres if pilot landed out
"p" denotes the application of an overtime distance penalty and/or a points penalty

St. Lawrence the conditions were not as consistent as they were flying along it and I lost a considerable amount of height and composure wrestling with a leaky pee bag. At forty minutes to finishing time I was down to 2000 feet, the lowest I had been since release and about 30 nm to go if I rounded Maxville. Putting my faith in Mr. Micawber ("... something will turn up ..."), I pressed on undaunted as all I needed was one more thermal. My faith in Micawber's philosophy hung on, but with considerably more daunting, as I struggled in what seemed like a dozen thermals to take me to my final glide height, which came at last at 1700 feet nine miles out.

My inability to get up high again in a timely manner had cost me ten minutes overtime and I pondered the devastating results it would have on my score. As it turned out my distance of 243 km was well ahead of my nearest rivals and the resultant penalty was only 9 km netting me first for the day and a more than one hundred point lead overall. Ulli Werneburg in the 15 m class did over 300 km but the strong headwinds and deteriorating conditions close to home cost him dearly in overtime and Walter Weir smoked the 15 m class with 280 km and a speed of over 100 km/h finishing off with a climb in a seven knotter.

All the highest distances of the day were achieved by pilots selecting Brockville or Gananoque as their first goal. These turnpoints were downwind and at the extreme edge of the contest area and were definitely in much better soaring conditions than the rest of the contest area. Flying the close in turnpoints may seem safe but in fact in most situations this strategy is exactly the opposite because every time you go to take a picture you risk flying in areas of sinking air whilst performing a height losing maneuvre, the fewer turnpoints the less exposure to these risky situations. The same situation occurred on day five, pilots flying a few far out turnpoints encountered the least problems and flew considerably further and faster than those staying closer to home.

DAY 3 – *Ulli Werneburg*

Pendleton – Lachute A/P – Winchester – Summerstown A/P 279.6 km

Cumulus were developing nicely while we were waiting for the start to begin and I was getting lift of 3–4 knots average. I therefore considered the task for the day — a 279.6 km "bow–tie" course — to be relatively short and decided to delay my start as much as I could. By about 1:30 the cumulus looked good towards the first turnpoint — Lachute — and I climbed as much as possible for the start.

I started at about 1:40 at 6000 feet and proceeded on course under some good looking cumulus. Most of the others had already started. The flight to Lachute was very easy with good thermals and very little turning. Near Lachute the cumulus began to thin out but thermals were still good. I didn't see very many other gliders so they were still ahead of me.

The second leg towards Winchester looked good with some cumulus ahead. Near Vancleek Hill the cumulus lined up roughly in two rows, one south of course and the other north. The southern one looked a bit better but because of the fairly strong northwest wind I chose the northern one to avoid being drifted too far off course when thermaling. Near Casselman I hit a good 6 knot thermal (average) to 6500 feet. I saw very few sailplanes along this leg but pushed on aggressively, knowing that if I was going to catch up to people, I would have to do it on this leg since the next leg from Winchester to Summerstown was completely blue. About 20 km from Winchester the cumulus stopped but blue thermals were still around. Near the turnpoint I began seeing other sailplanes again including Walter Weir and Nick Bonnière.

The next leg, to Summerstown, was more or less downwind and I resolved to stay as high as possible and get around Summerstown high. The last leg from Summerstown to Pendleton was into a fairly strong wind and had also caused problems for me in the past. I managed to get around Summerstown with 5000 feet and found nothing until Loch Garry, southwest of Alexandria. There I wasted some time finding decent lift but decided to try and climb high enough for final glide. This was finally accomplished and when 5 km out I heard Robert DiPietro announcing his finish to the gate. The two of us were the first sailplanes back with speeds of over 90 km/h. Apparently many of the others had major difficulties on the last leg, which actually claimed about half the field in outlandings.

> "... something will turn up ..."

For me the day had been a good Eastern Ontario soaring day, one of many this year.

DAY 4 – *Ulli Werneburg*

Pendleton – Alexandria – Maxville twice around the triangle 178.5 km

This day started off looking rather poor with much mid–level cloud in the area. In order to get a competition day in and make it an official contest, the task committee chose a short triangle with Alexandria and Maxville as turnpoints but twice around for a 178.5 km.

When we got launched under the mid–level cloud we were surprised to find good thermals to over 5000 feet. Wolfgang Thiele, our excellent sniffer with the DG–400 had already given encouraging reports and this was now confirmed. Because of the short distance I knew that a good start at the best time would be of greatest importance on this day. Before starting I carefully observed the task area. There was a lot of middle cloud to the southwest which was threatening to move into the area. Alexandria itself was still covered by thin middle cloud. However to the northwest the sky was relatively blue. I thought that, if anything, the blue was coming closer and the middle cloud to the southwest was not. Just before 12:30 I got to 5500 feet and decided to make a start. However, I resolved that if I didn't hit a good thermal fairly soon I would turn around for another start. Also, Alexandria was still partially covered with cloud.

Soon, I decided to make another start and headed back to Pendleton. Finally, at about 1:00 I got high again and started, once again behind almost everyone. With the blue thermaling I expected a lot of gaggling and that's how it turned out. Thermals were averaging about 4 knots but I left most of them as they weakened at about 4500 feet. When I got to Pendleton on the first circuit I had caught up with many sailplanes and conditions were getting better and better. Obviously, my late start had been a good idea.

The next circuit was very easy with good thermals and gaggling. When I finished, I pulled up into a thermal and proceeded to climb away again. Because of the good conditions I considered starting again and actually did. However, my water ballast was gone and I soon realized that without it a faster speed was unlikely.

The top speeds were well over 90 km/h so the day was devalued. Almost everyone finished around 3:00. In retrospect the day had been significantly undercalled. None of us, however, would have had the nerve to call much more based on the forecast and the look of the sky in the morning.

DAY 5 (POST task) – *Dave Hogg*

The last day of the contest looked good. A fresh airmass had established itself and the sky had that crystal blue colour which promised a full soaring day. The task committee chose a four hour POST, soon truncated to three and a half. Pilots began strolling out on the runway to peer over the trees towards the Gatineau Hills to the north and by 10:30 the first white puffs of cumulus appeared.

When flying from Pendleton, one is faced with contrasting areas to fly over. A great triangular swath of land full of landable fields interspersed with occasional blocks of forest lie between the Ottawa River to the north and the St. Lawrence to the south. The country here is flat to rolling, and navigation is often difficult as all towns look the same to the newcomer. Roads, rivers, and fields are admixed in crazy criss–crossed fashions which would be familiar to southern Ontario pilots. The thermals are generally of moderate strength and rarely rise above 7000 feet. North of the Ottawa River the terrain changes dramatically. The Gatineau Hills leap out of the floodplain, thickly forested and cleft with numerous rivers cascading towards the Ottawa valley. Lift is much stronger here on a good day — but so is the sink. There are long stretches of country where no landing fields exist; instead the pilot sees ridges covered with trees cupping lakes and rivers, sheer outcrops of rock, and occasional winding highways following the narrow valleys into the distance. To fly over the hills is a wonderful feeling — if you get high, stay high, and always leave a "backdoor" open to a safe area. Being low over this country is seldom a pleasant experience.

Shortly after noon gliders started launching and soon after that a few pilots began experiencing problems. The lift around Pendleton can be spotty and treacherous at times — despite the presence of solid looking cu ther-

continued on page 13

Ka6 — THE LITTLE PLANE THAT WOOD!

Richard Longhurst
Air Sailing

EARLIER IN THE YEAR while practising hard for the Nationals, I was apprehensive about entering my Ka6E as flying lumber in a field of overweight glass buzz–saws. The first days of my first National contest had done nothing to allay these fears, although when I awoke on Day 3 to moderate dew and went out to wipe down the plane, I was hopeful for a day of good soaring. At the morning briefing, the contest committee announced from the results of their combined intelligence, prescience, and mystical communications, a 280 km zig–zag course to Lachute, Winchester, Summerstown and (hopefully!) back to Pendleton. The first thing I noticed was that the course was all downwind, with the wind out of the northwest — 345° at 18 knots.

Cu started to form early, with a base of 5000 feet awaiting our noon launch. The Standard class was launched first to give the 15 metres something to aim at, and with the Ka6 fully loaded with two litres of water (for drinking!), I launched and was one of the first at cloudbase. Since I figured the course would take me up to six hours, I went through the gate at 12:41 immediately it opened.

Trying not to think about being a marker for following ships, which had significantly frustrated me in the previous days, I set off to Lachute on my own, and found the first leg easy going. I was flying across the streets so the distance between the clouds was greater, but there was some lift in between. I was concentrating on staying north of track, knowing that with the performance of my ship, I would lose much time if I allowed myself to drift downwind.

I soon discover that if I pull up to 35 knots and turn left into wind upon hitting lift, I can kite up for a considerable time then, once through, do a diving turn right back onto course. I repeat this tactic all the way to Lachute and reach it after circling only once, having covered the 60 km in only 47 minutes. Even so, the first loaded glass ships have caught me and Dugald and Eddy and I start the run southwest to Winchester together. As on the practise day, the cu are forming better north of my track, and since I want to stay upwind anyway, I follow them. This only works for the next 30 km and then there is only blue between me and the turnpoint.

Before takeoff, Kerry, my partner, had told me Winchester was easy to find because of two sewage lagoons nearby. I can see these reflecting from a long way out, but my pace has slowed significantly, and I have turned down the MacCready as lift becomes less predictable. I have to thermal numerous times to maintain height, and cross Eddy's path three times during this run as he has picked a more southerly course and I am being drifted by the wind. I reach the turnpoint having covered this 99 km in 114 minutes but set off more optimistically southeast to Summerstown as I know I will have a tailwind component.

The third leg starts better, and by now other sailplanes, mainly the 15 metre gang, are overtaking me to help show the way. I get down to the St. Lawrence shore east of Morrisburg and push on until I get 10 km from Cornwall where the lift really drops off. I can see several ahead of me thermaling at the turnpoint, but that is too far for me to reach and now I am falling below 2000 feet.

Just north of Cornwall, I find 1–1½ knots and stay in hoping it will develop as I am down to 1400 feet. The wind is blowing me towards the town and the St. Lawrence and I become concerned about having enough height to reach a reasonable outlanding spot. I allow the plane to drift further over the town, hoping that I will find better lift, and realizing that my best landing spot now is one of the reservation islands in the St. Lawrence. Just as I'm musing about the fun my crew will have with a retrieve from the island, I hit 4 knots and ride it all the way to 5000 feet.

As I look down, I find my working of the lift has put me directly over the turnpoint! It took me exactly one hour to cover the 60 km and now I am faced with a final 60 km track northwest into wind in the blue, or to go east of track to follow a cloudline that looks to be weakening. Several gliders already to the east in the distance make my mind up for me, but as I reach each decaying cloud, it does not seem to be pulling. I push on from cloud to cloud expecting to hit good lift sooner or later, but nothing develops.

Just east of Alexandria, I drop below 2000 feet again and start searching the ground. Using only 1–1½ knots, I make little headway and soon I am at 1200 looking for landing spots and progressing slowly from field to field. I remember from the Provincials that the swamps were working better than the fields, and decide to try one more forest swamp before landing out, and connect with 2½ – 3 knots. I am 30 km from home and landout calls start coming over the radio. I am spurred on when I hear Paul Thompson, who was stuck at 800 feet for 20 minutes, has decided to land. Now I *must* make it back. Crossing highway 417 just 20 km out, I need one more thermal to make it as I hear Kerry landing out just short of the field. I find 2 knots but my computer tells me I still do not have final glide. I then remember a technique Walter Weir used to get home, and reduce the distance to 18 km and headwind down to 8 knots and I just have enough. By now I am getting too tired to think of thermaling again and am flying with the MacCready on zero.

On the final glide, the forest around Pendleton starts rising to obscure the field, and I know that soon I will have to decide whether to land before the trees as there is no choice later. Although it looks very close, I hope for at least zero sink over the forest and continue on. From 5 km out the treetops seem to be on the horizon as I call out on final and hear Christine acknowledging my call with a surprised edge in her voice.

To the southwest end of the field the treeline is lower and I put the nose down and head for the gap. I clear the trees on the edge of the field by only 50 feet, and come in to a short landing just as our crew departs to pick up Kerry. When I get out of the plane, I cannot help but start jumping up and down with the sudden elation of completing the task.

That day, half the Standard class landed out, and when the handicapped results were posted that night, the Ka6 had come in 6th overall and first in class. The little plane was quite the talk of the clubhouse that night, and earned me several barley sandwiches. I had a particularly interesting discussion with Walter Herten who had flown my club's sister Ka6E in earlier contests. Although the weather provided the best soaring on Day 5 of the contest, the completion of the course this day was particularly memorable.

Thanks to my partner, the officials, helpers, and fellow contestants all of whom were open and helpful, and made my first contest much more fun and less intimidating than I had ever expected. •

Wind Shear and Waves

Part 1

The wind velocity nearly always changes with height; this change is called the vertical wind shear. Whenever the shear is strong enough some wave activity is possible. This is an account of some of the effects.

Tom Bradbury
from Sailplane & Gliding

THE WAVES WHICH PROVIDE LIFT for soaring are a type of gravity wave. Their oscillations depend on the buoyancy of the air and the pull of gravity. Buoyancy is another way of describing stability. Factors controlling the waves are stability and wind speed.

Stability Much of the atmosphere is stable if we exclude the lower layers where thermals occur. Even when there are huge cu–nim clouds the clear air in between is usually stable. If a parcel of this air is displaced it tends to return to its original level. In doing so it usually overshoots and oscillates up and down. The time for one oscillation is called the Brunt–Vaisala (B–V) period Figure 1. The more stable the air the stronger is the restoring (buoyancy) force and the shorter the B–V period. If the air becomes less stable the restoring force is reduced and the B–V period becomes longer. With a standard atmosphere the B–V period works out to be nearly 10 min-utes per cycle. If there is an isothermal atmosphere the period is reduced to about 340 seconds. Where there are lots of thermals rising from the surface the air has zero stability and no restoring force. The period becomes infinite and there are no regular waves.

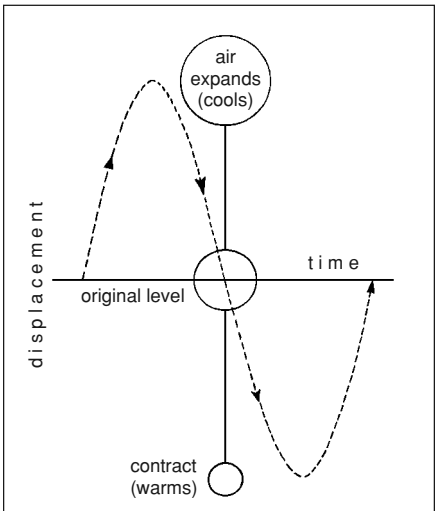


Figure 1 B–V period

Wind speed The B–V period is used to find a "natural wavelength" for a standing wave in a particular layer of the atmosphere. In American technical papers this is often called the "vertical wavelength."

If we take the B–V period for a standard atmosphere (594 seconds) and specify a wind speed of 10 m/sec (nearly 20 knots) we find that the air will have been carried 5940 metres during one cycle. In other words the standing wavelength is nearly 6 km. If we take the isothermal atmosphere where the period is about 340 seconds, a 10 m/sec wind only gives a 3400 metre wavelength. This leads us to a simple generalization:

- If the wind speed is constant — the more stable the air the shorter the wavelength
- if the stability is constant (the B–V period stays the same), the stronger the wind the longer the wavelength.

What happens when the wind speed increases with height?
The longer the wave the faster it can travel through the air. When waves travel against the airflow they are slowed down. When the wind speed matches the wave speed they become stationary relative to the ground and are called standing waves or lee waves.

When the wind speed increases with height the rays of wave energy become bent over as they rise into the strong wind level — Figure 2 illustrates this. Since the long waves travel faster they can extend higher than the short waves before the energy is turned back downwards. The rays of short wave energy are bent over lower down. This reflects the energy back towards the surface and so traps the shorter waves below the level of strongest winds. This situation is called a duct. It channels wave energy for long distances; some wave trains stretch hundreds of miles.

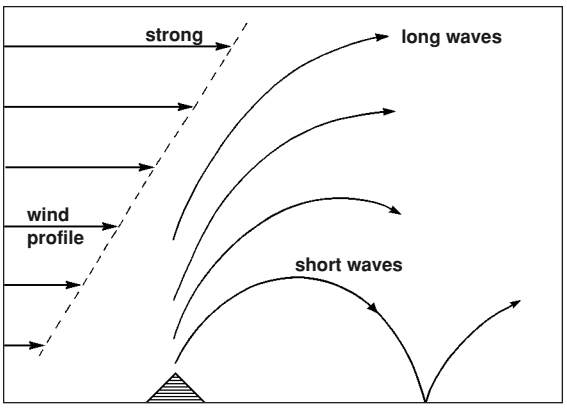


Figure 2 Wave energy bent over within a duct

Trapped waves
In an atmospheric duct the wave energy is said to be "trapped". Where the reflected energy is out of phase the waves will be dissipated. Where it is in phase the waves will be amplified. This tunes the atmosphere to resonate at a certain wavelength.

Trapped waves are good for cross–country flying because the wave pattern is usually more stable and there is reliable lift a long way from the mountains.

The "leaky mode"
In most cases some of the long wave energy leaks out of the duct. This is called the "leaky mode" and these waves decay downstream as the energy gradually leaks away. The length of the wave train depends on how big the leak is. On some days the lee waves disappear within a couple of wavelengths of the mountains. Such days are not good for cross–countries but they may offer high climbs in the first wave of the system.

Figure 3 shows the "natural" wavelength increasing with height. The horizontal arrows represent the wind speed at different levels. The arrows grow longer up to the 32,000 feet level where there is a maximum of 110 knot through the layer. The tropopause (TROP) is marked at 36,000 feet. In this example there is no inversion below the tropopause. The temperatures aloft are those of the standard atmosphere whose lapse rate is 6.5°C per kilometre up to the tropopause. The lenticular shading shows the natural wavelength for each layer — only alternate waves are shaded in. It increases from 6 km at the bottom to 30 km at the level of maximum wind just below the tropopause. Above the tropopause the wavelength decreases rapidly because the air becomes much more stable and the wind speed declines. With such a wind profile almost all the wave energy would be turned back as it approached the jet stream aloft and little would go through into the stratosphere.

What determines lee wavelength?
We found a "natural wavelength" by multiplying the B–V period by the wind speed. Unfortunately this only applies to one particular layer of air. The lee wavelength depends on how all the different layers interact. Some very simple situations can be solved using a graphical method but on many days a computer is needed to handle the complex equations.

The lee wavelength is usually found to be between the longest and shortest of the "natural" wavelengths in the various layers. In Figure 3 the range is from 6 to 30 km and a rough graphical solution suggests the wavelength to be about 13 km with the maximum amplitude around 7000 feet. This implies that when the upward going wave energy is turned back by the strong winds aloft the system should resonate at 13 km. However, with no stable layer the tuning would probably be very flat and many different waves would appear, each associated with a different mountain. The wave bars would tend to move erratically with complicated interference patterns. There might be two wavelengths, a short one low down and a much longer high up.

The importance of inversions or stable layers
Although lee waves can develop without the presence of a mid–level inversion the good wave days almost always have a stable layer. These layers act to "bend" the rays of wave energy downward, much as a layer of strong wind does. Deep stable layers have a greater effect on lee wavelength than shallow layers. A really strong inversion can trap all the short wave energy. When this happens the waves have large amplitudes at the inversion level but dwindle rapidly above it. Though the lift is very strong in the stable layer it decreases rapidly when you climb higher. Changing the level of the inversion can make a dramatic difference to the wave pattern; some of the effects will be described in Part 2.

Strong inversions sometimes trap low level waves produced by the gust front of a thunderstorm outflow. Then a small number of waves will ripple along under the inversion and may travel far before being dissipated. They are not standing waves and there are usually too few to be much use for soaring. Sometimes they set off several undulations in a stratocumulus layer similar to the waves of a tidal bore.

Deep stable layers favour a regular wave pattern
When there is both a big increase of wind with height and a deep stable layer at mid–levels, the airmass will tend to resonate at a steady frequency and lee waves are very stable. They will extend a long way downstream and are not greatly influenced by irregular mountains underneath. This is usually good for cross–country flights in wave, but not necessarily good for great gains of height.

Numerical estimates
Researchers use a complex set of non–linear equations that require a powerful computer to solve. These sometimes show that the waves can change considerably with time even when the upstream airflow stays the same. By greatly simplifying the wind and temperature profiles aloft, using linear equations, and assuming the pattern is unchanging, one can get approximate results even with a programmable pocket calculator (though the process is rather tedious).

However, calculated wave amplitudes are suspect. Although the lee wavelength depends on the character of the airstream, the amplitude of the wave depends on the height and shape of the ridge underneath. For simple sums one assumes a smooth ridge with a bell–shaped cross–section. The lowest layer of air is supposed to follow the shape of the hill which is defined by its height and half–width.

The biggest wave occurs when the ridge and wavelength are the same size. Water tunnel experiments show that the flow breaks away on the lee side if the wavelength is greater than the width of the ridge. In practise one never does know how well the low level air flow follows the terrain, so amplitude calculations are suspect. The lift depends on the slope of the streamlines; if these always had uniform undulations like a sine wave, the lift would depend only on wind speed, wave phase and amplitude. Unluckily, real waves are not always so symmetrical, some become very steep indeed on the forward side.

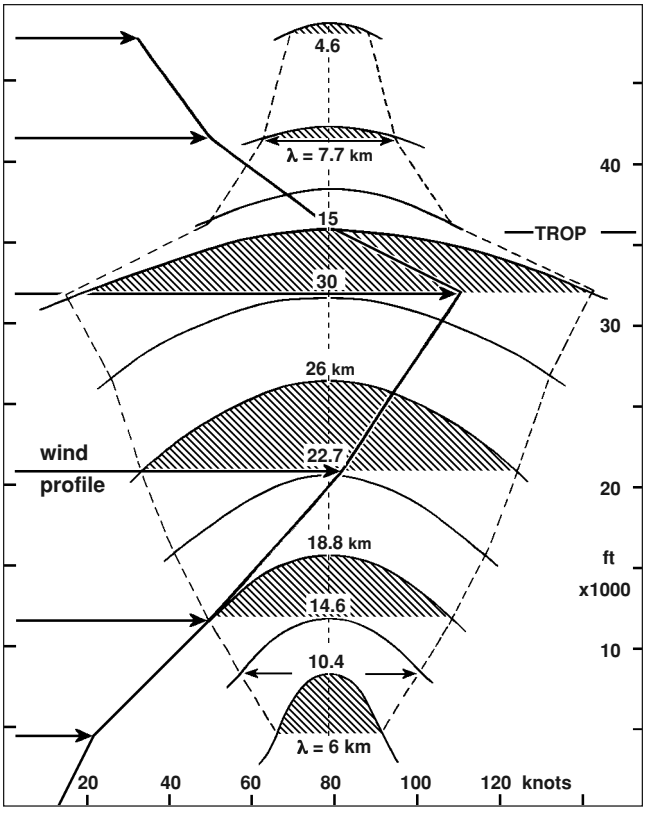


Figure 3 Increase of the "natural wavelength" (λ) with height

What if the wind remains constant with height?
A ridge can trigger off waves even if there is no change in the "natural wavelength" aloft. However, there is nothing to reflect any energy back so there would be no wave train low down. This wave could in theory go up to vast altitudes because the amplitude grows larger as the air density decreases. If density was the only factor the wave amplitude would become enormous at high levels. Figure 4 shows an example where there is a uniform lapse rate and no wind shear so that the natural wavelength is constant at all levels. The small bottom wave quickly dissipates but at the top a much bigger wave appears.

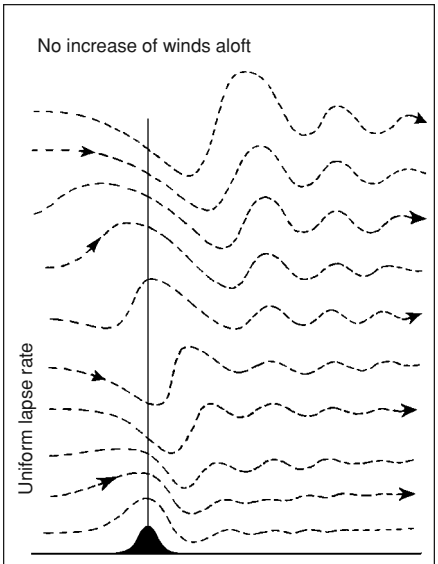


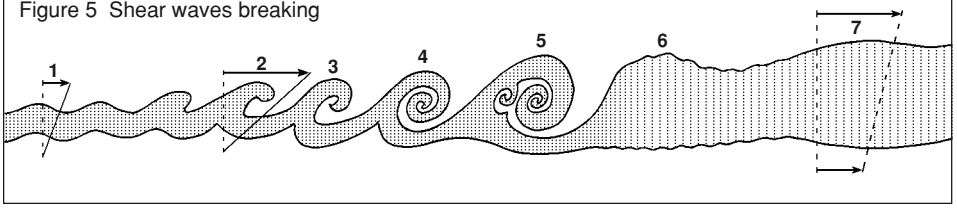
Figure 4 Wave structure if the natural wavelength remains constant with height.

Winds which decrease above a certain level
It is common for the wind speed to increase up to a certain level and then drop off. A sudden decrease or reversal of wind aloft may make the wave break and cause turbulence. When the reversal happens low down where the wave is strong there can be severe turbulence. Higher, where little wave energy remains, turbulence may be only moderate. Do not rely on this, however, as waves of very large amplitude can make the stratosphere very rough.

The critical level and rough air
If the wind speed approaches zero, the natural wavelength at that level also approaches zero. Linear theory predicts total absorption of the upwelling wave so that wave energy cannot get through this layer. If you fly through the critical level the air becomes extremely rough. Wave energy is being dissipated as turbulence here. However, some theorists, using non–linear equations, say that after a time the critical layer starts to act as a reflector of wave energy.

Waves due entirely to wind shear
When the wind shear is very strong it tends to wrinkle a shallow layer into a series of very short waves called "billows". Billows are sometimes marked by a series of ripple like clouds. These, unlike lee waves, are not attached to any ground object. Billows are often seen in

Figure 5 Shear waves breaking



thin altocumulus layers. They are usually at right angles to the shear vector.

Weak fronts and shear waves
A frontal surface nearly always has a wind shear across it. In Australia, where cloudless fronts are much more common than over the UK, pilots claim to have soared these waves to 20,000 feet. I imagine such soaring needs an advanced technique. Shear waves are not fixed in space and their alignment is often uncertain. They may be set off by vigorous thermals bumping into the inversion much lower down. (See section on cumulus waves.)

Curl up and break of shear waves
Very strong shear can make these waves curl over and break into confused turbulence. This is likely to happen when the wind shear is increased in a layer which is not very stable to start with. The process is illustrated in Figure 5 above.

At (1) the shear is enough to cause billows, at (2) the shear is stronger and the billows start to curl over. (3), (4) and (5) show how they twist up and break. (6) shows just confused turbulence which spreads the shear out over a deeper layer. (7) shows the deep layer with much reduced shear. This is how much of the clear air turbulence (CAT) is generated up at jet stream levels. On rare occasions one can actually see a line of cloud behaving like this.

How lee waves can alter the shear
The growth of large amplitude waves makes a big difference to the wind shear. The ascending wave crest can lift slower moving air up to a level of much stronger winds. The wind shear, originally quite small, is intensified over the wave crest. When this effect is weak all one sees is a series of tiny ripples on the top of a smooth wave cloud. Occasionally the ripples grow into billows which later break producing turbulence. Reports from airliners flying at heights of around 35,000 feet showed that CAT was much more common when flying high over wave producing mountains than it was over flat land. Gliders do not often reach these turbulent levels, but one may occasionally find that where the smooth wave lift drops off there is a slight cobblestone effect.

Waves generated by cumulus
Waves are not produced exclusively by mountains. Anything which obstructs the airflow can set off a wave. The first suggestion that such waves could occur appeared in a book on cumulus dynamics in 1960. A slow moving Cb growing through the shear into a faster low aloft was predicted to set off waves.

An early report of waves over cumulus appeared in the *Meteorological Magazine* in 1963. The *Swiss Aero Revue* in 1968 carried a report of waves over cu streets observed by a German pilot who turned aside to avoid being sucked into a cloudstreet. Instead of meeting sink he continued in lift which took him several thousand feet above the cloud tops. In this case the wind shear was directional with the low level wind blowing along the cloudstreet and the upper winds blowing at right angles (Figure 6). It seemed clear that the streets were acting like lines of hills producing waves where the upper winds blew across them. In this case the wave lift was parallel to the streets below.

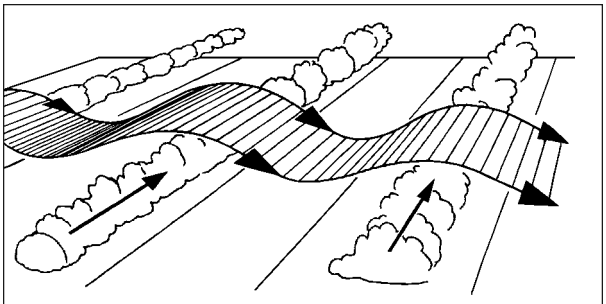


Figure 6 Parallel waves over cloud streets

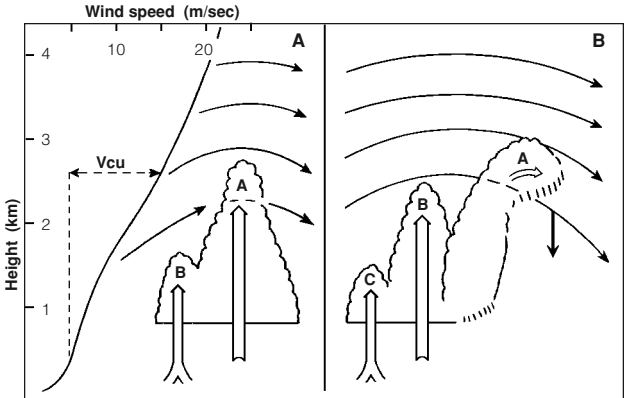


Figure 7 Waves over isolated cumulus

Isolated cumulus waves
It was soon found that streets were not essential — even isolated cumuli could set off a transient wave. All that was needed was a wind shear over the top. The shear could be as little as 3 kts/1000 ft though waves are more likely when the shear is stronger. Figure 7(a) shows the wind profile on the left and the flow over the cloud on the right. V_{cu} indicates the difference in speed between cloud and the wind over it. Figure 7(b) shows how the original cloud (A) collapses and topples while younger clouds (B) and (C) grow on the up–shear side.

Transverse waves
English pilots found waves would develop across the line of cloud streets rather than parallel to them (Figure 8). The first wave was often found at the upwind end of a cloud street. The air may be too dry for wave clouds to appear; the broken line shows where a lenticular might appear. Wave crests produced local thickening in the streets below. The essential features were:
• winds which increased with height while remaining constant in direction and
• a stable layer in middle levels to limit cu tops and enable streets to form.

Powered aircraft exploration
The National Center for Atmospheric Research (NCAR) made a survey of waves above cumulus streets over Nebraska, USA in a region 250–450 km east of the Rocky Mountains. They were surprised to find that these streets could give wave lift extending up to the ceiling of the research aircraft (about 30,000 feet). The wind shear on these occasions always exceeded 2 kt/1000 ft and the wavelength ranged from 5 to 15 km. The difference in speed between the cloud tops and the wind blowing over them was sometimes nearly 20 knots. A mathematical model was run on a computer. This showed that the best organized waves should occur when the wind blew across cloud streets but waves would still appear when the wind was parallel to the streets, or even if the cu were scattered.

How thermals and waves interact
The ideal conditions are: first a fairly shallow unstable layer low down where thermals form when the sun's heating warms the ground; and second an inversion or stable layer in which there is sufficient vertical wind shear for waves to develop later on. Figure 9 shows the sequence; time is represented along the baseline.

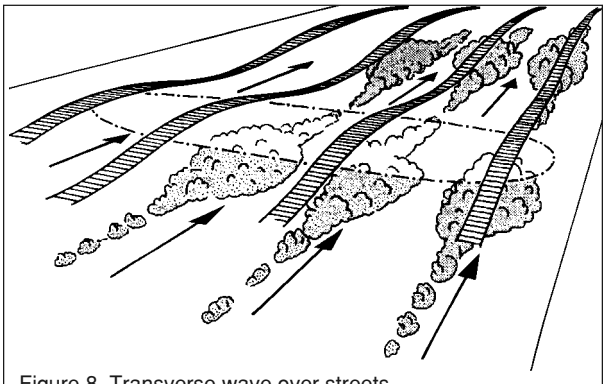


Figure 8 Transverse wave over streets

At (A) surface heating sets off thermals which rise up to the inversion. At (B) a stronger thermal produces a hump on the inversion. Since the wind speed is stronger aloft the air flows over the thermal hump and develops waves. At (C) the waves propagate upwards; they can rise at 8–10 knots and reach the tropopause in less than an hour. It may take several hours for a steady state to develop.

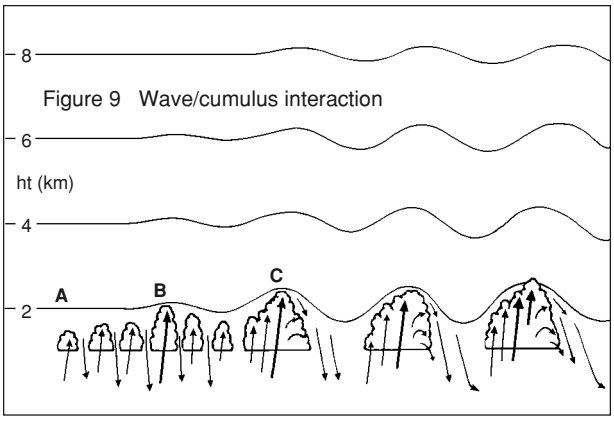


Figure 9 Wave/cumulus interaction

Then a feedback process starts. The internal waves, which had originally been set off by the cumulus, start to control the thermals below. On the rising side of each wave, thermals get a boost and grow more vigorously. On the sinking side of the wave, thermals are suppressed and clouds dissolve. Since the upper wavelength is usually longer than the original spacing of the cu the thermals become more widely separated. Whole groups of clouds that find themselves in sink disappear, other groups grow larger as the convection is rearranged to suit the waves above. The wave feedback can produce much bigger cu than would have grown if there was no wind shear aloft.

Observation by VHF radar

A VHF radar has recently been developed in the United States which is able to detect air motions even in a cloudless atmosphere. The system uses two upward facing beams tilted at an angle to the vertical. The Doppler principle allows the operators to measure the air velocity along each beam; and by combining the two they can get profiles of the winds aloft.

In mountain regions they find waves occur whenever the wind blows. Over the plains waves are much less common. Two of the conditions which produce flatland waves are: low level instability allowing convective clouds to grow and, a jet stream aloft producing a marked vertical wind shear.

These points strongly suggest thermal or cumulus waves. Some were found to go as high as 59,000 feet which is well into the stratosphere. These must have been waves which were not completely trapped by the strong winds usually found around 35,000 feet.

Summary

One of the essentials for gravity waves is an atmosphere with a vertical wind shear. This occurs when the wind speed increases with height, for example if a jet stream is overhead. With enough shear some or all of the wave energy can be reflected back. Energy returning in the right phase amplifies the wave. Waves can be triggered in several ways:

- By the airflow over a ridge.
- By stronger winds rising over slower moving cumulus, or
- By particularly strong shear in a narrow layer of air, perhaps near a frontal surface.

Sometimes all three may be combined. •

NATIONALS 1991 continued from page 8

mals may be weak, difficult to centre, and just generally nasty. I heard Ed Hollestelle and Walter Weir fighting it out at low altitude close to the pattern while at least two others landed during the launch sequence. I had better luck, hooking a solid three knotter right after release which I clung onto stubbornly until I was 6000 feet over the field. From this altitude the clouds over the Gatineaus appeared to be forming well and were already streeting from west to east. Shortly after 14:00 I rolled over to snap my start photo and then dropped the nose of the '20 and cruised off towards the hills. A few miles further on I topped up to 6500 in a good thermal with Ed Hollestelle Jr. before heading out over the Ottawa River.

Entering the hills can be a problem if there is any northerly component to the wind as strong sink may be encountered near the river as air spills down off the nearby ridges. As I crossed the river my varios began to show a disheartening pattern of sink which increased rapidly as I neared the first high ground. (If the air is moving down at 400 ft/min, all gliders fall, no matter what their L/D.) I gritted my teeth, dropped the nose further and hoped lift would soon arrive. Well into the hills I finally was rewarded with a blip to the audio and found a very narrow, broken thermal which got me back up to 5500 feet. A bit more struggling got me to my first turnpoint, St. André d'Avelin, where another sailplane thoughtfully marked a 4 knot thermal back to 5000 feet. As conditions seemed likely to improve, I headed off west in order to use the stronger afternoon thermals to beat against the wind.

The clouds were now thick and full of promise, but as I flew towards Ottawa I couldn't seem to connect with the thermals. A lot of sink was still present, and I watched unhappily as the altimeter wound down with the smug satisfaction these bloody instruments seem to develop in adverse circumstances. The terrain was now very rough and if things did not improve I was simply going to have to beat it out to the valley and accept the resultant loss in points. As I passed through 3000 — not a lot when one considers the topography — I felt that peculiar kick in the seat that signifies things are looking up. I cautiously pulled the '20 into a climb and was rewarded by a steadily increasing tone on the audio. Looking about, my eyes caught a flash of red a half mile away to the right and I rolled towards a speck which resolved itself into a red–tailed hawk circling to the left. I did the same, settled back, and watched the Cambridge climb to 800 ft/min on the averager. After a thousand feet the hawk, who had gained height on me, drifted off, apparently satisfied with its superior flying ability. I was unashamed — the hawk had more hours than I and was flying better equipment. Besides, I was grateful.

As I climbed higher and the country unfolded below me, more and more hills appeared, the lakes popped into view where they had been nestling amongst the ridges, and my view increased until I was sure I could see well over sixty miles. My memory of the flight is dominated by images of colour. The clouds alternated white, grey and dark, while the wing of the '20 was a startling white against the deep blue sky. Below, the green of the trees was broken by the blue of the lakes and rivers and the white of waterfalls cascading down the mountain slopes, and the whole landscape was dappled by the cloud shadows drifting slowly past.

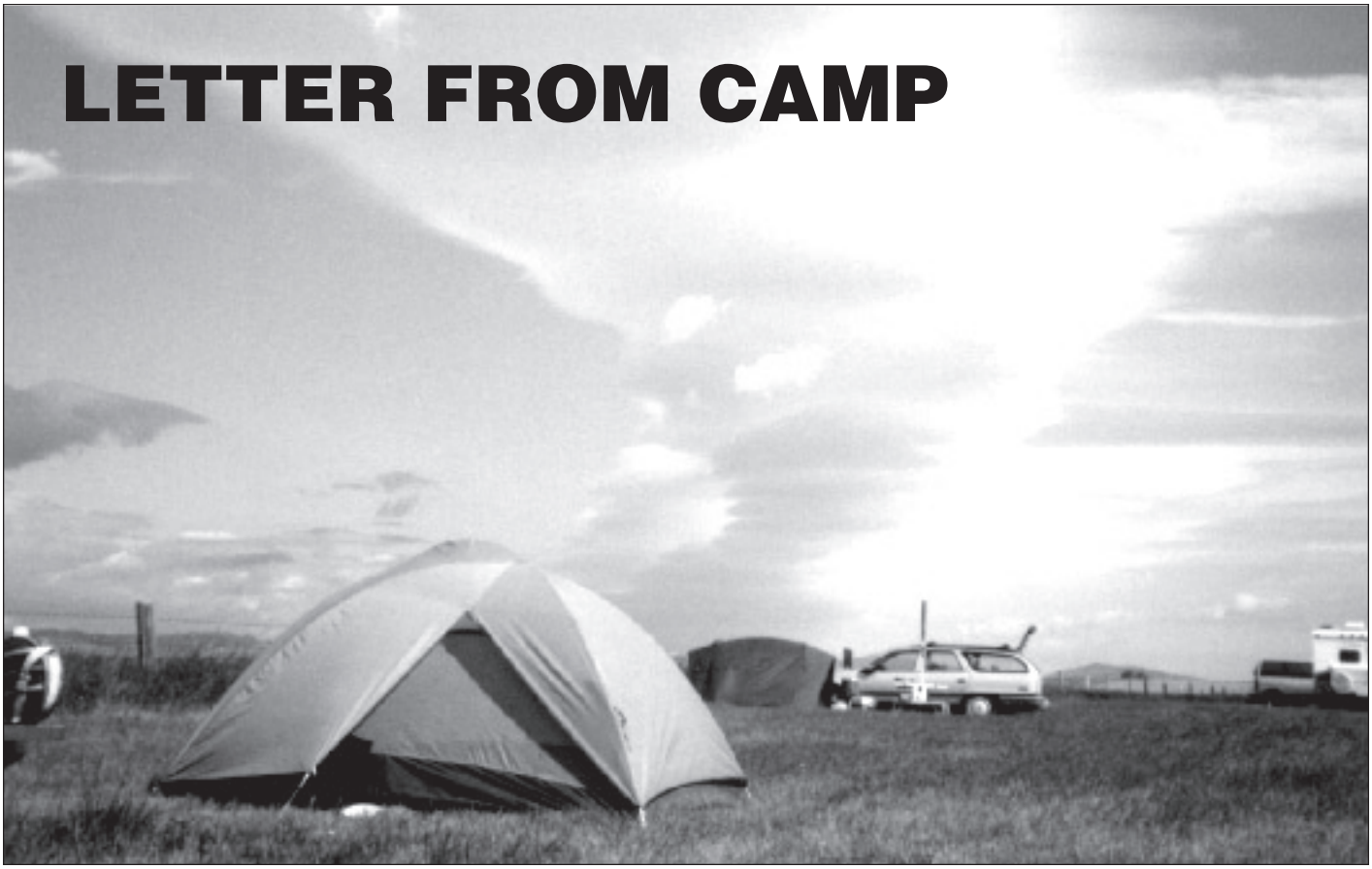
At 7000 feet I rolled out of the thermal and followed the streets west. The '20 was in her element on a day like this, turning side to side in patches of lift, dropping sharply and knifing through the sink between streets. I took very few thermals as I slipped past Buckingham, past Ottawa, and came to Wakefield. Here I took my second photo and headed back east, reluctantly deciding to pass up Shawville for fear of losing the streets away from the high ground. (In fact, the pilots with more resolve who went on found that it paid off handsomely in the end.)

Throughout the day I saw other gliders from time to time, circling in thermals or flashing by with a combined speed well in excess of 160 knots — a close lookout was always necessary. At times I would share a thermal for a brief period with another pilot and then we would dart off in different directions. Most of the time I flew alone, pressing on towards Lachute. Two streets led to the turn and I chose the one which seemed to be longer and was rewarded as it lengthened and strengthened, leaving me in a six knot thermal five miles from the airport. I dove in to the turn just as a cu formed over the field, took the picture, climbed again and drove back into the hills. Another five miles from Lachute I found my best thermal of the day under a ratty–looking cloud which took me to 8000 at 800–1000 ft/min.

Full of altitude and ambition I flew back to St. André, finding little on the way, and then gingerly picked my way towards Buckingham. The day now seemed to be dying rather quickly at 17:00 and I was a trifle worried about getting back. Gatineau airport beckoned about 10 miles away, but I knew that I couldn't make it there in these conditions and get back home in time, so I slowly climbed in a last thermal out of Buckingham to final glide height and set off in grim anticipation.

Lift, nothing but lift south of the river. In fact, I couldn't get the '20 down. As I progressively dropped the nose and let the speed build, the lift simply kept getting stronger. At 90 knots (my personal redline in the '20) I resigned myself to another patented U2–type finish. I hooked around the finish line at 800 feet and 90 knots in a satisfying high–G turn. Gliders were arriving from all points of the compass at all altitudes, and my pattern was correspondingly a little extra careful. As I touched down and rolled out I couldn't help smiling — whatever the final scores, this was certainly the most beautiful contest day of my short flying career. The memories of the sky, the land, and my friend the hawk will serve to warm many a cold winter's day to come. •

LETTER FROM CAMP



Sylvain Larue

Dear Uncle Al,

WHEN I WAVED GOODBYE to mom and dad from the bus I had no idea if it was going to be as much fun as last year or even if my regular camp friends were going to show up again. Well, I shouldn't have worried!

The weather was real good, it only rained on one day out of the ten. The swimming hole down on the Oldman River was looking fuller than usual. The Kamp Kommandant (that's what some of us called the CFI Steve Weinhold when he wasn't around) said the water was "fresh" at one of the morning pilots' meetings. Well, we had that codeword figured out pretty quick as you can imagine. Lucky for me it never got so hot and sweaty I was ready to jump in no matter what!

The food was real good again too — like, it's hard to complain when they make you cook it yourself, eh? The ladies did lay on a couple of camp dinners during the week though. There was even a special one for the small kids which included games and everything for them. That was a decent thing to do for the little rats, I guess.

None of my pilot friends came up from the States this time, I don't know why. Anyway, 86 pilots signed up for camp, all the way from Winnipeg and Prince Albert out to Vancouver Island. There were 38 gliders and 8 power planes altogether. One of the guys from BC had this giant husky tied up next to his van — it was real friendly and especially liked demolishing our leftover steaks, bones and all. It sure hated other dogs though, and went after them like they were breakfast — I was sort of hoping that this stupid little mutt called Taffy would get one step closer to the end of the leash than really necessary.

Sylvain Larue

After we finished flying for the day, some of the guys got out their RC gliders — we called them the tiny flyers — and sometimes flew loops and everything until after sunset. I waited for someone to do a neat crash, but they only got groundlooped in the long grass.

Anyway, I guess I'm getting ahead of the story here. The very first morning when we all woke up, there was this radical wave cloud overhead, up high and going for miles! Nobody was ready for it at all, and by the time the pilots' meeting was over and everyone got their gliders together and put oxygen in and everything, it had gone. You can see from the picture how super it looked. It turned out that there was still some wave lift around out in front of some cus if you got high enough — you couldn't tell where it was from looking at all the clouds though, except there was so much cloud after lunch (sorta like when I was at Camp Sugarbush) that the wave was usually where the cloud wasn't. Bingo Larue and I got into the wave right over the yellow bridge north of camp on the edge of the Porcupine Hills. He made it to 18,000 feet and I got to 23,000, a Diamond climb if I had needed it.

One thing was funny. For some reason ATC in Edmonton wanted us to be in radio contact with them past 18,000 feet that day instead of the normal 28,000 feet. OK; so I called them up and asked for 25,000 feet for one hour. A little bit later I saw Bingo down below me and he asked for clearance too. Well, the controller on duty obviously had no experience with

Sylvain Larue

Tony Burton

Wave over thermals on second day

glider pilots or the Livingstone Block because he called me and said that another pilot wanted to enter the block and could I handle that?! I said yes, and he said OK if we could maintain visual separation. Boy, I guess I'm glad I'm not an IFR pilot.

The wave stayed around on top of the thermals for three days, it was really cool — well, great I mean, not like actually cool, because it was a lot warmer than doing it in October.

The next day, Sunday the 28th of July, Jay Poscente got his Diamond climb just by hanging around. He said he remembered reading about being patient if the wave stops for a while, and it worked. Lee Coates went to 27,800 and Bingo went to 23,300 for fun. The cus looked pretty good too, so I set off on a 320 km triangle. First I got into the wave over the yellow bridge again and climbed up to 15,500 before heading off northeast to the first turnpoint at Vulcan (everyone was wearing Spock ears there as a tourist attraction this summer). I didn't get below cloudbase until I was well past Claresholm — that was fun, 'cause it was the first time I started a cross–country flight from a wave. Didn't make it back though, it was too weak and windy later on, so I had to get an aerotow back from Pincher Creek airport. Close, but no cookie.

Bingo was real determined to get his Silver badge in his Dart this camp. On the 31st he took off after lunch and stayed up eight hours until sunset! He spent a lot of time in thermals, then ridge soared along the Livingstones for a while, and finally flew around in 20–30 feet per minute evening valley lift. That was the duration, then he finally got his distance with a 75 km flight up to the Chain Lakes on the second last day after three tries. He said this was a great camp. He is really learning to fly good, even if he does get his allowance from driving CF–18s.

A bunch of campers were trying to fly 300s up and down the valley, first up to Longview or Black Diamond, then down to Waterton. The trouble was that the weather was real good only over the mountains most of the time, and the lift quit early more east. Guys got up to Longview OK, but then were lucky to make it back to Cowley. It was interesting trying — but it did get a little boring listening to the guys over the mountains babbling on the radio about 13,000 foot bases and 10 knot thermals when you were happy to get another thousand feet under some junk in the valley on the struggle home.

Oh, I almost forgot — you know how guys keep on calling our camp Grob 103 the Plastic Pig? Well, Regina brought their Grob along too, and its registration is GSLG for Strawberry Lakes Gliding because that's where their club is. Everyone called it "Slug" though, which I don't suppose pleased the Regina guys very much. Anyway, camp was excellent this year, that's why I thought I'd write to you about it and send these pictures.

All the best from your nephew, **Tony**

Tony Burton

Over the Divide at 13,500

UVALDE

Impressions of a Texan World contest – where we were and where we are –

Dave Webb

While being informally interviewed by Marion Barritt (editor of the Uvalde Express, the competition newsletter) before the start of the 22nd World Soaring Championships at Uvalde, Texas, the information emerged that I had participated in ten previous world championships, starting in 1963. This led to speculation that the eleventh would create a record. After a brief investigation, it turned out that Henri Stouffs of Belgium had also flown in eleven world contests and Hans Nietlispach of Switzerland had flown in no less than twelve. However, being only second best apparently still qualifies me to write briefly about the differences in the contests over the years (according to our editor at least).

Two selected contest days will serve to illustrate the main differences from the pilot's point of view. At the world championships in Junin, Argentina in 1963, one of the best soaring days was roughly equivalent to Texas conditions. A 322 km task was set for the Open class, which the fastest aircraft (a Polish Zefir) completed in 3 hours 23 minutes. This is about 95 km/h. The American Sisu was second and made about 90 km/hr. These aircraft were the most advanced machines at that time and the pilots were Jerzy Popiel and Dick Johnson respectively, two of the best in overall soaring ability. The winning time was near the (then) world record for a 300 km triangle.

In 1991 at Uvalde, a 602 km triangle (technically a quadrilateral) was set for the Standard class. This was flown at 145.4 km/h by an ASW–24, and 35 of the pilots on the task made over 130 km/hr. These were not unusual speeds at Uvalde and it must be noted that the first third of this task was flown with relatively low cloudbases around 5000 feet agl Uvalde and over hilly country up to 2000 feet higher than Uvalde.

Of course, the two championship days compared were not exactly equal, but the lift rates were the same at 3–4 m/sec and the cloudbase in Argentina was higher. Also, to be absolutely fair, the turnpoints in Argentina had to be turned at under 1000 metres (which required three accurate final glides), but only the best part of the day could be utilized.

In 1963, I doubt if any soaring expert would have predicted that in the next quarter century, a 53% increase in speed over almost double the task distance would be achieved. This would have seemed almost inconceivable, especially for a Standard class aircraft, based on the technology of the time. (In fact, some of us are still not sure how the Uvalde winning speeds were achieved even after participating!)

The ballasted fibreglass sailplane plus finely honed flying techniques and computerized on–board task management are obviously the major technical differences making these greater achievements possible. However, another factor is the increasing amount of flying time and competition practise being obtained by the top world class pilots. This is slowly but surely excluding what I would call the real amateur pilots (ie. those who only fly one or two contests a year as part of their limited annual vacation) from the top half of the placings.

During the almost 30 years between Junin and Uvalde, the most notable secondary features of the competition scene have been the increasing size of the competitions, the smaller point spread between contest positions and the ever–increasing inroads of computers. For instance, there were twice as many competitors at Uvalde than there were in Junin, with three classes instead of two. In Junin, Chuck Yeates and I both came in 9th in the Open and Standard classes with 75.9% and 77.2% of the winners' scores respectively. At Uvalde, Peter Masak led the 15 metre Canadians with a 26th position and 89.3% of the winner's score. The best Canadian position in the Standard class was 36th, with 83.4% of the winner's score.

In 1991, not only was the scoring computerized, but the task setting was done by computer analysis, the photo analysis for aircraft position was dependent on a computer program and every competitor's aircraft had the latest task control computers on board. Global positioning of sailplanes via satellite is said to be next.

Looking back, it has been a pleasure and a privilege to have flown in so many international competitions during this long and interesting period which encompassed such tremendous technological development in our sport. Over the years, it has required a lot of organization, work, expense and time.

It has also been a lot of fun! •

Peter Masak

I had mixed emotions after returning from Uvalde and flying for Canada in the Worlds. First of all disappointment for not finishing higher (26th out of 44) and secondly, elation at having participated in an event which brings together the world's best soaring pilots and having a chance to learn from them. It's rewarding to meet the personalities behind the sport and to share ideas on tactics, flying techniques, and equipment. Having done this once already however in Austria in 1990, I was hoping to place higher rather than lower!

Some people might question what benefits Canadian participation in world events bring, and it's true — the benefits are superficial. In theory, the new soaring techniques that Team pilots learn are passed on, but never in any systematic way that filters down to club pilots in a useful format. However, the continuing evolution of the science of the sport, ie. the understanding of the meteorology and the aerodynamics are generally first demonstrated and used to advantage at the Worlds. For example, we were treated to a spectacular lecture on dynamic soaring at one of the pilots' meetings. Had I not been there, it would have probably taken years to find out what the state of the art in these new techniques might be. It was also exciting to see one of the new revolutionary high performance sailplanes built by the Poles — the SZD–56. With an empty weight 100 kg lighter than other comparable 15 metre sailplanes, and outstanding performance to boot, this sailplane will make a mark on soaring history.

My overall concern is that the sport is getting far too expensive at the international level, and it was disappointing that Team Canada was the only "Western" team present that had no government or corporate sponsorship to speak of. I can no longer afford to compete effectively without some sponsorship. This sounds like sour grapes, but consider for a second: would you lay down US$2000 for the entry fee just to get into a contest? The economic problems facing many countries' competitors have clearly been a low priority of recent World contest organizers.

I don't think that anyone expected the Soaring Association (which always has a marginal budget) to put up much money, but it did surprise me that our delegate to the International Gliding Commission made no protest over the fees. Not only is there lack of financial support from any source, but the moral support that one might expect from SAC was also non–existent. I personally have concluded that there is no point continuing any involvement at the world level unless there is a reasonable level of sponsorship.

In future, I question the rationale for carrying the banner of the Canadian flag if there is no Canadian sponsorship. If the pilots are going there essentially self–financed and are qualifying by virtue of an enormous personal commitment, then it makes more sense for them to fly as "Independent Entries", as did the South Africans and the lone Ecuadorian pilot. Isn't this really what the Canadian pilots are anyway? •

Top 10 Results

15 metre (44 pilots)

1	Brad Edwards	Australia	LS-6	11041
2	Gilbert Gerbaud	France	LS-6	11001
3	Doug Jacobs	USA	LS-6	10950
4	Robert Prat	France	LS-6	10939
5	Stefano Ghiorzo	Italy	Ventus	10919
6	Bruno Gantenbrink	Germany	Ventus	10809
7	Simo Kuusisto	Finland	Ventus	10632
8	Justin Wills	Great Britain	LS-6	10602
9	Jan Andersen	Denmark	Ventus	10540
10	Jan Goudriaan	IE*	ASW-20	10464
26	Peter Masak	Canada	Ventus	9861
36	Kevin Bennett	Canada	Ventus	8980
42	Heri Pölzl	Canada	LS-6	6903

* Independent entry (ie. South Africa)

Standard (46 pilots)

1	Baer Selen	Netherlands	Discus	11216
2	Janusz Trzeciak	Poland	SZD-55-1	11040
3	Eric Mozer	USA	Discus	11034
4	Jacques Aboulin	France	ASW-24	11018
5	Thomas Badum	Switzerland	ASW-24	10995
6	Marc Schroeder	France	ASW-24	10904
7	Peter Fischer	Germany	Discus	10881
8	Stig Oye	Denmark	Discus	10861
9	Andrew Davis	Great Britain	Discus	10847
10	Claus Triebel	Germany	LS-7	10755
36	Dave Webb	Canada	DG-300	9353
37	Jörg Stieber	Canada	LS-4	9142
41	Ed Hollestelle	Canada	Discus	8773

Open (24 pilots)

1	Janusz Centka	Poland	ASW-22	11111
2	Holger Back	Germany	Nimbus 3	11101
3	Gerard Lherm	France	Nimbus 4	10987
4	Klaus Holighaus	Germany	Nimbus 4	10965
5	Jean-Claude Lopitaux	France	Nimbus 4	10959
6	Ingo Renner	Australia	Nimbus 3	10938
7	Ray Gimmey	USA	Nimbus 3	10937
8	Gerard Kurstjens	Netherlands	Nimbus 3	10829
9	John Buchanan	Australia	Nimbus 3	10710
10	Stanislaw Wujczak	Poland	ASH-25	10637

Daily Tasks and Achievements

Day	Task	top dist (km)*	top spd (km/h)*	#10 spd (km/h)	#10 points
1	468.2 km polygon		128.7	124.2	932
2	3.5 hour POST	520.7	151.8	138.3	912
3	432.8 km triangle		142.0	139.1	959
4	4 hour POST	599.5	150.2	147.7	953
5	617.6 km polygon		141.9	135.3	906
6	616.8 km polygon		156.6	150.1	918
7	5.5 hour POST	726.5	147.4	137.9	907
8	3 hour POST	364.2	117.2	107.0	[1] 901
9	531.1 km polygon		120.1	114.1	907
10	586.3 km polygon		122.6	112.1	856
11	5 hour POST	652.9	136.4	121.7	905
12	428.8 km polygon		137.4	131.1	908

* Top distance or speed not always earned by #1 pilot in POST
[1] max points 975 (winner under 3 hours)

1	4 hour POST	548.6	135.5	123.4	913
2	431.0 km polygon		138.5	132.7	920
3	3.5 hour POST	499.2	142.9	137.9	961
4	560.4 km polygon		142.8	139.6	958
5	601.3 km triangle		145.4	140.0	929
6	5 hour POST	732.9	143.9	133.5	931
7	580.9 km triangle		120.9	(567.6)	933
8	3 hour POST	322.2	107.2	96.5	[2] 801
9	499.6 km triangle		119.8	116.5	950
10	5 hour POST	627.2	126.2	116.8	911
11	570.9 km polygon		115.4	111.2	935
12	422.0 km polygon		128.4	122.1	902

[2] max points 899 (winner under 350 km)

1	502.9 km polygon		126.8	122.9	941
2	3.5 hour POST	527.1	156.4	144.2	894
3	476.4 km polygon		141.4	137.9	951
4	634.3 km polygon		153.6	148.7	935
5	5 hour POST	766.9	154.6	146.2	933
6	679.1 km polygon		153.7	149.1	940
7	632.8 km polygon		(627.8)	(364.9)	581
8	3 hour POST	369.5	118.5	106.4	[3] 904
9	5.5 hour POST	699.1	128.3	123.1	946
10	612.3 km polygon		130.4	124.7	917
11	579.2 km polygon		120.8	115.6	925
12	487.9 km polygon		146.9	137.9	878

[3] max points 983 (winner under 3 hours)

Under the achievement section, the speed and the points earned by the 10th placing pilot has been given in order to emphasize the very small differences in performance of the top pilots, and how much scores depreciated for each kilometre per hour flown too slowly.

Some things these scores don't tell you. . .

• By Day 9, Klaus Holighaus had a strong 185 point lead in the Open class. It is reported that the two other German pilots offered to team fly to help him maintain the lead, but the offer was refused. I'm sure he would have wanted to advertise the newest Nimbus 4 as a world contest winner. Unhappily, Holighaus, who had finished 8th or better on seven of the previous days was 18th on the following two days, finishing 4th.

• Halfway through the competition, it looked like the French could take all the prizes: they were 1st and 2nd in 15 m, 1st and 4th in Standard, and 3rd and 4th in Open. They had been practising team flying for several weeks at Uvalde prior to the contest and doing very well. They lost ground on the back half of the competition however, admitting to fatigue from all the flying and the heat.

• A contest where as much as eight places were separated by 2 km/h, or fourteen score 950 points or better on a day demonstrates the general consistency of the weather. Losing a place or two was determined by an extra turn, or missing one good thermal over several hours.

• On Day 5, the three classes flew a total of 73,000 km — nearly twice around the world!

Task setting at the contest was assisted by a sophisticated computer program designed by Peter Ryder of Germany. By first loading an estimated speed for the day, wind direction and strength, the task setter can select any number of turnpoints from a screen map of the competition area. A route line between turnpoints is drawn on the screen with leg and total distances, and estimated times and compass headings are derived from the wind data loaded. It is simple to reselect turnpoints, and the program provides fresh new calculations immediately. It's a task–setter's dream.

Tony Burton

OSTIV Notes

OSTIV is the FAI body which deals with the technical, scientific and sailplane development aspects of soaring. Its biennial Congress is always co–located with the World Soaring Championships.

Dave Marsden and Peter Masak had papers at the technical session of the Congress. Dave spoke on winglet design and on a new 15m variable geometry sailplane with slotted flaps he names the Mini–Sigma, and Masak's paper on winglet design was presented. Improvements of 2 to 4 points in glide ratio were possible by reducing induced drag and there was also a better roll rate demonstrated for several sailplanes.

Ulrich Kopp showed that in Germany the number of accidents due to hard landings increased more than 300% over the last 10 years and that within the last 3 years nearly 94% of the injuries had been to the spine. Gerhard Waibel showed how landing gear energy absorption can be improved to lower the peak g–load acting on the spine and proposed some changes to the airworthiness requirements.

G. Sachs took the audience through the theory of dynamic soaring using wind shear, and then showed a fantastic video of mixed animation and real life starting with a computer–generated albatross which became a real albatross which turned into a glider piloted by — an albatross!

Igor Gapanovitch (USSR) cut the final glide a little fine on Day 8 and elected to make a rolling finish. He was hot on final and then really had to plant his Discus to get it on the ground and rolling. He bounced, the gear retracted, and when he touched down again he was on the fuselage. Luckily, he was able to toboggan through the finish line.

The OSTIV sub–committee studying glider crashworthiness had a two day meeting with proposed changes to sailplane design standards concerning:

- attachment points for seat belt straps to reduce the probability of pilot "submarining" in a crash,
- headrest specification related to size, strength, and energy absorbing material,
- shape of seat back to prevent adverse curvature of the spine,
- strength of forward fuselage to ensure progressive collapse and energy absorption.

Improvement to canopy jettisoning systems was discussed with a view to amending the standards. One of these improvements is the recommendation to adapt two levers on the sides of the canopy for emergency opening and a hinge between the top of the canopy and the fuselage. The hinge must release at an opening angle of 30–40° to initiate a flight path for the canopy which clears the rudder. An exciting series of pictures of jettison tests were shown using a sailplane fuselage mounted on top of a car.

The last three days were devoted to meteorological and medical sessions. Met topics included structure of the convective layer, airflow over mountains, and an "ice–breeze" phenomenon. Ray Lynskey of New Zealand gave a particularly well illustrated talk on mountain waves and long distance flying utilizing waves. A paper on hyperventilation effects and risks was presented with great clarity for laymen.

extracted from the OSTIV bulletins in the *Uvalde Express*

The Infamous Day 7

The skies over Uvalde had been giving popcorn cumulus and great lift day after day. Then rain and thunderstorm activity in the contest area associated with a sea breeze front produced havoc on Day 7.

All the Open class landed out with half the class being washed out of the sky at the second turnpoint of Pleasanton (!). All but three in the Standard class outlanded, most on the last leg within 40 km of home. (Jörg Stieber was 4th, landing only 4 km short and earning the highest daily placing by the Canadian team in the contest.) Most of the 15m class got back as they had the advantage of a POST task and were able to avoid the worst of the weather.

Patrick Stouffs (Belgium) was forced to make a rolling finish in a strong tailwind and when his forward speed and the tailwind equalized, he ceased being a pilot and became a passenger. He was able to avoid one runway light but did some damage to a wingtip. He said that he was approaching the field during the dust storm and for a while could not even see the runway. One pilot reported that he had over 100 knots on his approach to the field and still almost undershot with wind gusts to 40 knots on the runway.

A crew member for Doug Jacobs (USA) saw the approaching dust storm and ran to the van to radio information. As he reached for the squelch control a quarter inch spark arced across to his fingers. He said the hair was standing up on his arms and everything felt tingly.

Stig Oye (Denmark) was missing the next morning but he had landed safely. With a wall of water between him and home, he looked for a place to put down. He rejected a road because it looked too narrow but had no time for a good search. He landed on a short field and continued the rollout over an embankment and into a "stock tank" (a dugout), almost making it across. He jumped in and paddled the Discus to shore, then managed to get the nose out of the water but the tail submerged. Before the radio quit immediately after landing he was able to transmit one "I'm down OK" message which was relayed and saved everyone a lot of anxiety during the night. Stig's crew found him the next morning with the help of a flare, and two of the towplanes that had been searching for him landed on a nearby highway to assist.

Ake Petterson (Sweden) outlanded his Nimbus 3 and called on 121.5 MHz, getting a reply from Lufthansa Flt 459 overhead. He gave them his coordinates and the Uvalde retrieve office phone number. Flt 459 radioed the data to Houston Centre who called Uvalde. It was a great double play combination. •

The next Worlds are in Sweden — the countryside is said to be similar to Timmins in northern Ontario — all lakes and forest, even worse than the Finnish contest area was for decent areas to land a glider. It looks like a fine inducement to get home, or at least to any airfield anywhere.

World contests always seem to warp organizers' perceptions of what is reasonable or safe in task setting (Châteauroux, France in 1978 had long tasks in too weak conditions that only the help of random stubble fires made possible at times. Vrsac, Yugoslavia in 1972 was a horror story of task setting — pilots sent past the Belgrade airport in thunderstorms, for example.

What was actually being tested at Uvalde when pilots were required to fly 5 1/2 hour 700 km tasks (plus an hour of soaring prior to start) in 100°F cockpits with a warm–up of an hour of 120°F on the grid, their physiological fatigue and heat tolerances or their soaring skills? It makes Contest Director orders for caution at the finish line a little self–serving. I wonder how bright–eyed the pilots were finishing on Day 12?

Tony Burton

Crew memories of his first World contest

Ten minutes to first launch.

In the sun, on the runway, it's 122°F. One hundred and fourteen sailplanes sit on two parallel grid lines. Their crews attend to last minute details, their pilots lounge under a forest of colourful umbrellas. Perspiration flows freely. My eyes sting, my feet burn, but I find solace here. There is direction, there is purpose, there are no choices — all is focused.

Kevin straps in. I wipe off a last layer of dust from X1. Final checks are completed. It's almost too painful to kneel on the scalding asphalt and hook up the towrope.

A cloud of dust and noise drifts down the grid as sixteen towplanes fire up. And then . . . magic!

A sky full of sailplanes on tow. The efficiency of the launch sequence. Crew choreography. The towpilots dive–bombing a barrel in a field with their ropes. The singular world that all competition pilots enter just before launch. Above, a gaggle grows 20 ... 30 aircraft. The radio comes alive with quiet humour and query chatter.

The start gate opens. The sky empties. The radio is silent.

Crews gather in team rooms and make occasional forays to the weather office but generally time slows. Tension prevails. The air is mute with waiting. An outsider would assume that pilots are flying into a war zone — perhaps they would be right. A terse comment from the radio speaks volumes about how the flight is progressing, but information wanes as the hours pass.

Spontaneous cheers as a pilot announces final glide. And then . . . more magic!

An overcast of fibreglass at redline, ballast streaming, inches above the cactus, reaching for the finish line. The calm of Charlie Spratt announcing: "Stand by ... Mark ... Good finish." The pull–ups. The amazing circuits. The chirp of a tire at touchdown. Frantic crewing to move aircraft off the active runway. The pop of a cold beer can. Excited stories of the flight.

Tie down. Wash. Ready for tomorrow.

Dave Fowlow

If you are going to land gear up, do as a Polish pilot did on one of the practise days during heavy rain and lightning over Uvalde. The runway had so much water on it that the glider hydroplaned and slid off the runway and into the mud. Practically no damage done.

Viewing Uvalde from afar

"Platypus"

(Platypus is a regular contributor to Sailplane & Gliding magazine. He was flying with Robin May in the ASH–25 as fixed ballast before a family emergency called him back to England mid–contest.)

Cooling off

Coming home from afar, you see your own country with new eyes. Texas skies are lovely, but the terrain is fairly drab. In England it is the other way round — so green and undulating the land; so grey and flat the clouds. The European Women's Championships are currently taking place in the Midlands and they all have my deepest sympathy. The only consolation is it's great for your complexions, ladies! ("Thanks for nothing," they all chorus.) After the rectangular fields, grid–plan towns and arrow–straight roads of America, I was vividly reminded on the approach to Gatwick that most fields in England are any shape but rectangular, towns are a disorderly muddle and no British–built road is straight. I once said this to a Canadian airline pilot sitting alongside me in a Caproni Calif [I once owned]. He contradicted me: "There's a straight road from horizon to horizon." "That," I said, "was built by the Romans two thousand years ago, and since then someone has lost the piece of string."

Judgement of Solomon II

Should pilots and their hairy–armed crews be allowed to simulate the bending loads incurred at 200 km/h when pushing the 15 (or 15-and-a-tiny-bit-more) metre gliders between two measuring posts at 2 km/h? The controversy is not new. It came up at South Cerney in England at the 1965 Worlds. The decision was that if the pilot could fly his glider through the two posts (not poles — the editor doesn't want any more Polish jokes) then the aircraft would be admitted. A new American proposal is more practical: just push it between two chainsaws ...

Is there a substitute for span?

I read a book of summaries of the OSTIV lectures on the way home and, despite the best efforts of the cleverest brains in the glider movement to render their papers totally incomprehensible, I actually understood some of it (or think I did). By the number of papers, I guess a lot of theoretical work is going into the World class glider of 13.4 metres, no flap, and a fixed wheel. I look out from my study and shudder at the 13.4 metres. To keep such a device airborne in northern Europe would require not just the combined talents of Heide and Holighaus at the drawing boards, but a world class pilot at the controls. For Texas, yes, terrific! But in Texas, wings are just ornaments — one of those ten gallon hats would do the job. •

It should be noted that Platypus is a long time Open class ship owner and firm believer in the "TANSFS" principle — there ain't no substitute for span. editor

SAC affairs

Joan McCagg

SAC Executive Secretary

I would guess that by now everyone is aware there is a new executive secretary at the National Office. My name is Joan McCagg, I'm a former radio–control pilot, and an avid supporter of Women in Sports, working with volunteers, committees and executives through my association with women's sports and my work experience. However, I am new to soaring and would ask the members to bear with me a while longer until I get my feet firmly on the ground.

If you are accustomed to getting certain things from the National Office and they have not been forthcoming — please — call me. A lot of what I'm learning about running this office is by trial and error and there is certainly no intention on my part to alienate anyone.

There are a few items that have come to my attention since I have occupied this chair: I have noticed that, overall, the memberships have come in on time and in an orderly manner — there are of course, the exceptions. As of now (27 August) I have reconciled the membership data of all but one club and have sent club Treasurers SAC membership cards along with an official copy of the AGM report for 1990. (By the way, anyone who wishes a personal copy may contact me for one.) If your club's executive has changed and the National Office has not been advised, please do so at your earliest convenience.

LETTERS, WE GET LETTERS! Actually, it's returned mail — I'm astounded by the number of *free flights* that are returned to this office as "address unknown, moved, not at this address". Since the April/May issue was mailed I have had 23 copies returned. This amounts to $18.40 in wasted postage plus another $18.40 to mail them out when and if I ever get the correct address. At this time of financial constraint, please make an extra effort to keep the office advised if you change your address.

At this time I am still looking for the addresses of the members listed below:

Yvan Beaucher	Appalachian
William O'Brian	Champlain
Martin Brugger	Air Sailing
Michael Heald	Guelph
Charles Pastor	London
Eric Jackson	London
Paul Chafe	SOSA
Graham Payne	Toronto
Helga Stumpf	York
Werner Stadler	York
Robert Cooper	York
John Kincaide	York
Tim Bourgeault	Winnipeg
Rick Sponder	Cold Lake
Tom Chester	Cold Lake
Ian Frei	Edmonton
Peter Elms	Vancouver

If these clubs can help with this please call or fax the office with your information.

SUPPLIES Although calendars are listed on the latest "Soaring Stuff" that came with the last *free flight,* they haven't arrived yet. Your orders are being taken and will be filled on a "first come, first served" basis. We are also ordering a large quantity of Tost rings, they'll be on sale at a competitive price soon.

OFFICE HOURS Ella, who has worked part time in the office for several years, will be retiring as of September first and I will be alone in the office. If you stop by and find the door locked please wait a few minutes — I have probably just stepped out to get a coffee. I generally take my lunch between 1 and 2 pm (though I still rarely leave the office) in order that those of you who can come in on your lunch hour can be looked after. However, as there are always times when I will be absent from the office for an extended period, the best way to be sure that I will be around is to call first and let me know when you plan to arrive.

ACCIDENT CLAIMS WAY DOWN Our insurance agent, Sedgwick James, reports that total claims paid out or reserved as of the end of September are only $48,300 compared to over $200,000 the same time last year — the best showing in over a decade. Let's not have any late–season write–offs, OK?

I guess that is all for now. If you are in town drop in to see me.

Coming Events

Feb 28 - Mar 1, **SAC AGM**, rescheduled for Calgary. Co–located with the Aero Club of Canada AGM. More information later.

Jan 15, **Toronto area glider pilot ground school**, Bathurst Heights Secondary School, 7-10 pm for 10 weeks. Call (416) 789-0551 to register, or Paul Moggach (416) 656-4282 for content info.

several ads omitted

PSYCHOLOGICAL FACTORS AFFECTING CHECKLIST USE

Asaf Degani and **Earl Wiener**
from the *ICAO Journal*

To perceive something is to be conscious of it and to pay attention to it. Perception is a dynamic process. It changes constantly depending on the physical stimuli and on the way in which the brain blends incoming information with information already stored in memory. Therefore, the mere existence of a physical stimulus obtained by a receptor (eg. the eyes) is not an absolute predictor of what the pilot will perceive and act upon while performing a task or checking a list, for example.

When a certain task is performed repetitively in the same manner, operators become experienced with the task. In a sense, they actually create a "mental model" of the task. With experience, the shape of the model becomes more rigid, resulting in faster information processing, the ability to divide attention and, consequently, a reduction in workload. In return, however, this model may adjust or sometimes even override the perception of physical stimuli coming from the receptors and create a bias in the brain (causing one to see what one is accustomed to seeing).

Many of the pilots interviewed by the authors stated that at one time or another they had seen a checklist item in the improper status, yet they perceived it as being in the correct status and replied accordingly. The flap handle, for example, could be positioned at the zero–degree slot (physical stimulus), but the pilot may nevertheless perceive that the handle is on the five–degree position, and call out "flaps – five" because he expects the handle to be there. This incorrect reply is based on numerous similar checks in which the flap handle was always in the proper setting during this stage in the checklist. Often, this phenomenon is coupled with unfavourable psychological and physical conditions such as time pressure, high workload, fatigue, and noise. Nevertheless, the result is a human failure.

Most automobile drivers have had the experience of driving along a familiar route and suddenly realizing that they have travelled some distance without being aware of it. The driver ceases consciously to process information for a significant length of time. As a previous human factors study determined, "the highly practised skill of driving can be controlled by the output of the brain's pattern analyzing mechanisms without conscious perception." There was almost a consensus among the pilots interviewed that at many times checklist procedures become an automatic routine (or "sing–song," as some called it). The pilot would "run" the checklist, but the reply would be done from memory, and not based on the actual state of the item. The authors believe this is controlled by the output of the brain's pattern analyzing mechanism, and that the check procedure is done without conscious perception.

Reversion to older habits is another common phenomenon in aviation, and its extreme usually occurs following a pilot's transition from one aircraft to another. This can also affect checklist performance. An example is evident in the 1987 crash of a Jetstream 31 following an aborted takeoff; the flight crew did not advance the RPM levers to 100 percent as called for by the operating procedure and checklist. The captain and first officer had a limited amount of time on the aircraft (47 and 15 hours, respectively), but both had considerable experience in a Beech 99. The operation procedure and checklist of the BE–99 require that the RPM levers be set to takeoff position before taxiing. The Jetstream 31 procedure requires that the same levers be set just prior to takeoff. Therefore, the item was the last on the before–take–off checklist. The National Transportation Safety Board concluded that under urgency and stress imposed by the controller, the pilots may have reverted back to recent habit patterns and began the takeoff believing that the RPM levers already had been properly positioned.

Another psychological factor that effects checklist performance is the relationship between the speed of performing the checklist and the accuracy of the check. Laboratory research has revealed a very definable relationship between response time and error–rate. Therefore, if the pilot scans the appropriate panel(s) rapidly because of time pressure, the accuracy of his perception will suffer and the probability of error will increase.

The relationship between a task and its expected outcome is another factor that affects checklist use. Without the crew witnessing its apparent effectiveness, the redundant function of the checklist can sometimes lead to a decline in the perception of the task's importance. This is somewhat analogous to the use of seatbelts in a car: although most experienced drivers are aware of the consequences of not wearing a seatbelt, the individual's personal experience about the likelihood of an injury while not wearing a seatbelt is relatively low. The same applies to checklist use.

In summary, the combined effect of expectations, experience, and the pattern–analyzing mechanism is a double–edged sword. On one hand, this ability makes the user flexible and faster in responding to multiple conditions. On the other hand, it can lead the operator to make a disastrous mistake just because part of the information which was collected quickly or without sufficient attention appeared to match the expected condition. •

This article is adapted from the summary of a human factors report which appeared in NASA's Aviation Safety Reporting System monthly safety bulletin. The study also covers social and procedural aspects of checklist performance. A free copy of the study (CR# 177549) may be obtained by writing to NASA Ames Research Center, Mail Stop 262–4, Moffett Field, CA 94035. Research on this study began with a focus on checklist typography and design. The research goals changed however, as the authors interviewed airline pilots, observed cockpit procedures from the jumpseat, and studied incident and accident reports. They began to realize that pilots' misuse (or non–use) of the normal checklist could be attributed mainly to other factors. For example, they found that "company culture" (read club safety attitudes) is an important influence on pilot attitudes towards checklist use.

The study tells glider pilots to use a checklist, to take time completing it, and to do more than look at a control and say "open" but to also physically test its movement and observe that, for example, the spoiler is indeed out — because if we hurry, our eyes and brains will tell us bare–faced lies. Tony

GETTING THE BEST FROM OURSELVES

Is your flying in a rut, or do you end each year little better than you were at the start of the season?

James Allen, from *Sailplane & Gliding*

IMPROVE YOUR FLYING, advance rapidly and learn more effectively at no extra cost. Enjoy your flying more. Does this sound like a commercial? Having been involved in flying training in several forms, I am certain that many, if not most of us, do not progress as well as we could or should. My experience with pupils has shown me that the successful ones are not always the most gifted pilots. Naturally, our sport requires a certain skill level, but aside from that, what makes some pilots progress better than others, and what can we all do to be one of those faster learners?

Most of us have met the character who is "not too worried about flying today" or, "has a bit of a cold". He/she simply does not want to fly, despite having given up a large amount of spare time, or having travelled for over an hour to reach the airfield. The same character will have a ready list of reasons to hand as to the slow progress. "Bad weather, slow launch rate" etc. (this is not to say that some reasons are not genuine). Most importantly, the pupil misses out the one thing that is holding them back more than anything else — themselves.

"What me, me fly it ... you must be joking?!" is not an unfamiliar remark to hear from an early student at the first suggestion of them actually handling the glider themselves for the first time. Their lack of confidence does not stop there, it may continue for a long while. Some people never do settle down into flying, and, if honest with themselves, dislike it (and this even includes high ranking military pilots I have been aquainted with).

I do not refer to apprehension or nerves that we all may have from time to time. These feelings are a natural part of our survival apparatus and can help us if channelled properly. A pupil's state of mind is by far the most important factor that will govern his or her progress. A positive attitude towards yourself and your potential is crucial if you are to accelerate your learning curve. Ask yourself what these fears are and confront them. "I don't like winch launches, cable breaks frighten me" someone once confided. Despite being well beyond the solo stage, he had disliked his cable break training pre–solo and had lingering worries since. A good solid session of all types of cable break cured his problem; but the point is how long had this been holding him back?

We should all ask ourselves if there is any aspect of flying we fear. If there is, then we should take positive action by confronting the problem in a similar way. Problems with fears about landing out, or navigation can be helped by visiting a club that uses a motorglider and flying with them. Fear of turbulence or extreme attitudes is best addressed by gently progressing into aerobatics.

Understanding maps is obviously essential before flying cross–country; having borrowed a chart for one of my first such flights in 1975, an instructor said to me "Don't use that, that's one in a million." I thought, well if it is that valuable, why is it lying around and not locked up in the safe instead? I still got lost even when flying with the quarter mill that I eventually used. I had passed the Bronze badge some months before, but most of the knowledge had evaporated by then. I hadn't the maturity to realize that it was largely up to me to ensure my own preparation was complete.

This leads me to my next point that many people I fly with often suffer from the same problem in a less serious form. Many pupils fail to understand that their learning is more in their own hands than their instructors. By that, I mean our pupils should be encouraged to read–up on the basics of gliding and aerodynamics. They should ask questions more and have elementary points clear in their own minds, ie. heights/position in the circuit. We instructors at times don't help matters by being *too* helpful, which only reinforces the students' false belief that their progress is totally up to us (the instructor). Instructors should not be afraid to be positive with pupils about what is expected of them. "By your next flight, please have the checks memorized", or "before tomorrow, read up on spinning."

Often I see pupils struggling to reach the rudders because they have not brought their cushion with them. Beforehand, maybe a kind soul ran and got one for them; but the point is that if you need the cushion, make sure yourself that it is available. That goes for ballast weights, maps and anything else too. By arriving at the cockpit prepared, you will be surprised at how much quicker you will progress — you and your instructor will both enjoy the flying much more.

Many excellent club members fly rarely, if at all; my ideas are not to make gliding compulsory, or regimented, but rather to encourage the people who are learning to get more out of the sport. Pupils, especially early pupils, need to be given every assistance possible in their first few days. So, such assistance techniques as the mentor/sponsor system, together with the one–sheet handouts to newcomers, should be adopted as normal policy by all clubs. The effect will be immediate. In summary, for pupils to make better progress:

- Get airborne at every opportunity.
- Have a positive attitude towards your own ability — you can fly if you believe in yourself.
- Place the onus on yourself to be prepared — have elementary things such as CISTRCS memorized, have your cushions and ballast to hand, and have an idea of what you are trying to achieve on each flight.
- Ask questions — there is no such thing as a silly question when learning to fly.
- Appreciate that apprehension is normal and to be expected from time to time. Discuss any major worries with your instructor. •

THE MISSING FACTOR IN SPIN TRAINING

Eric Boyle, from *Sailplane & Gliding*

OVER THE YEARS one gets the impression that everything possible has been written and rewritten about spinning. However, many years of testing pilots for full ratings has shown up one glaring fault. In all the lectures and writings on spinning one point is not going home. In a normal year two or three pilots are killed in the UK spinning in. In a bad year it is a few more and the position isn't improving. Now if spinning is so dangerous, even a killer, how is it that good instructors spend a lot of time spinning yet don't kill themselves? There you have the omission. They leave enough height for a safe recovery.

In all my years of testing only about 25% of candidates stress that the dangerous thing about spinning is the sudden and rapid loss of great height. A few make casual reference to the altimeter, but most concentrate on getting into and out of a spin. This is a skill learnt quickly and in all honesty most pupils recover quite quickly, so this part of the instruction is going over reasonably well.

When spinning is taught as a sort of aerobatic maneuvre — you know the sort, one to the left, one to the right, one more for luck, all done at 2000 or 3000 feet with quick recoveries — this is no protection for the would–be solo pilot. When he does hurt himself spinning in off a slow low turn he will never associate his loss of control with those high level aerobatics. Why not bring some reality into the lesson. Arrange a "ground level" at say 2000 or 2500 feet then start a slow turn at 2100 or 2600 feet, ie. 100 feet above ground. Now show that 5 or 6 seconds later we are 200 feet "below ground" after several turns of a spin. This shows the real danger of spinning. On the second or third practise, you can show the pupil that at the same time you would hit the ground you would be almost vertical and descending rapidly. Those instructors of the plain–talking variety could then paint a sorry picture of how you would both finish up.

Should we not therefore give much greater emphasis to the massive rapid height loss in spins and let our motto be high and slow is safe, low and very fast is safe but low and slow is disaster? The same sort of expectation of a spin below 500 feet and a few knots above the stall should be present in our pupil's mind, as much as the expectation of a rope break on tow.

... Come on instructors, tell the whole story. I know some don't. •

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club news

SOSA 4-BLADED PAWNEE The SOSA Pawnee, the first one we acquired, shows off its four–bladed Hoffman composite propeller. It reduces noise substantially with acceptable loss of power (though still enough to continue a tow — with some anxiety — of a Blanik with divebrakes partially extended!). The more solid prop disc also hastens let down. The aircraft has a loud buzz/hum on takeoff instead of a snarl. SOSA also has a second Pawnee now — 260 hp with a fixed two–blade prop which has the Pawnee snarl but is still quieter than a 180 hp Citabria.

CU NIM AND THE "DROP OF DOOM"

It was carnival time at Cu Nim the day after the Cowley Summer Camp. A lot of work had been done to organize a day of glider rides for 31 Venture Scouts and their leaders on 6 August with support from Cu Nim and the Alberta Soaring Council. For the Scouts, it was the last day of a week–long camp which included many adventure activities such as canoeing and rapelling down cliffsides.

The weather was very overcast which seemed to argue against the hot forecast. By 9:30 all the Blaniks were out and DI'd, and Fred Guest, Jay Poscente, John Grieco, Rod Crutcher and Tony Burton were waiting for the show to start. When the Scouts drove in, Darwin Roberts gave them a pep talk on soaring (including how many fatalities we had had — which made one wince but didn't seem to deter any of the kids). The operation was still lacking a towpilot though, so backup Hans König was called and he arrived around 11:30. That left us time to talk about the sport, and groups of kids split up and had many of their questions answered. Jay rigged his ship to demonstrate how sleek a fibreglass ship is and how easy it is to assemble — naturally Murphy arrived and Jay had a real struggle to get the wings to go together!

Tony talked about different kinds of lift, and hawks, and how gliders are made. He was having a bit of difficulty on sandwich construction when someone mentioned that the remains of "24" was over in its trailer. The wreck really impressed the boys, there was the sandwich construction open for all to see, and discussion got around to the best way to crash a glider ... you'd never do this to a normal intro!

Now the rides began. It was a real efficient operation — in five hours they flew 30 flights with three Blaniks and one towplane (and this included two refuelling breaks). Click, click, click — too bad turnarounds aren't always that well managed.

After a few trips some low wisps began forming under the overcast at 1900 feet and soon it was possible to do a little reduced–sinking and get each flight up to the twenty minute cutoff needed to get everyone airborne. The overcast slowly cleared during the afternoon and cloudbase moved steadily upwards to 4000 feet agl by 5:00 pm. And after the talk about soaring with the birds, they obliged, and many turns were done with a hawk off a wingtip — that was a nice plus.

After the boys watched one of the first flights do a stall and a wingover, none of them wanted any straight–and–level after that! It was carnival time at Cu Nim ...some thermaling to get a little height; then wingovers, deep stalls, zero–g arcs, and steep turns right down to the circuit. Some had never been in an airplane, but they *had* caught floating Smarties in their mouths at the bottom of the "Drop of Doom" at the West Edmonton Mall, and were busy comparing notes after each flight on the best day of their camp! All the back–seaters allowed that they were having fun too, and had never done so much maneuvering in so few flights — Tony couldn't remember the last time he got so vertical after a stall, and John started to get himself green. Only one boy got sick. John was sort of embarrassed about that until one of the Scouts said, "Ah, he even pukes in cars ... we call him Chuck."

Now, all you intro pilots out there, never do this to your normal passengers, okay?

from Cu Nim *Barograph Traces*

hangar flying

THE IMPORTANCE OF TEST FLIGHTS

Test flying any new model of aircraft, even sailplanes, is critical. An incident involving the Pirat carries a message that should not go lost, particularly nowadays as computer–based flight simulation is pushed further and further. The message is that test flying a ship is paramount to fully assessing its characteristics, and that this is true irrespective of the sophistication of the theoretical analysis tools and simulation techniques.

The Pirat sailplane destined for the Swedish market featured a more forward CG than the original model, thus it was submitted to test flying. The first prototype of this version was lost, claiming the life of its Czech test pilot. Apparently the sailplane could not recover from a spin, but this was thought inconsistent with flight mechanics as it should have been more spin resistant because of the new CG location. Anyway, spin behaviour was checked on the second prototype and found to be correct.

The engineers responsible for the project started thinking that the defect must have been ascribable to the prototype itself, not to the design. Another test pilot, Stanislaw Wielgus, continued testing: he wanted to understand, to be thoroughly sure.

During another flight the defect manifested itself and an explanation was found — in a very steep spiral at high speed, the wing deformed sufficiently to lock the aileron at full deflection. (This fault was cured easily by widening the gap between the wing trailing edge and the aileron leading edge by 2 mm.) Meanwhile, Wielgus was flying an uncontrolable ship and he couldn't bail out because of the high g–load caused by the severe bank.

Knowledge, skill and experience played their role: he knew he would have to break up the ship. Exceeding Vne, he pulled sharply and tore the wings apart. He then attempted to bail out but one leg remained trapped between the control stick and the instrument panel. With much effort he freed himself and deployed the parachute just in time before hitting the ground.

It is worth mentioning that a helicopter was used as the tug on the test flight as no other towplane was of sufficient power to take the sailplane to a high enough altitude. The liftoff must have been strange!

from *Volo a Vela*

BUY ONE, GET ONE FREE

If you are a glider pilot, are looking for a new sailplane, and you just happen to work for an airline that's upgrading its jet fleet, pay close attention to this story.

The Polish airline, LOT, recently negotiated with Boeing for purchase of their new fleet of 767's. With the deal bogged down in details of conditions and price, the Boeing salesman asked what could be done to sweeten the deal, hoping to get it closed faster. The LOT representative, a glider pilot and innovative thinker, responded, "Buy us an ASH–25 sailplane, and we'll take your gas–guzzlers." The deal was closed!

A week later, the Alexander Schleicher factory in Poppenhausen received a phone call, "Hello, this is the Boeing Company representative calling. I have two questions: first, what *is* an ASH–25. Second, what does it cost?" Apparently the price was within budget. The ASH–25 was flying at Uvalde at the World contest sporting the contest number LOT as a sign of its lineage.

Ron Ferguson
from the *Uvalde Express*

INSTRUCTOR NEWS

Ground School Manual now available
The first edition of the SAC ground school instructor's manual is now available from the National Office (check them for the price). It consists of a set of lecture notes and an appendix of material suitable for making overhead slides on a photocopier. If you use this manual, I would appreciate your comments as I know it will be improved and revised in the future.

SAC Instructor Database assembled
I have completed the initial entry of instructor information into the new SAC instructor database. We should be able to keep track of everything a bit better from now on. CFIs should be getting a report of the instructors in their club in the near future from the National Office. If there are additions or corrections, it is up to you to sent in this data as soon as possible so that the 1992 membership cards will have correct information. At present there are about 400 "active" instructors in Canada. With this many on the books, there should be little excuse for a student to go wanting for instruction.

Eastern Instructor Course a success
The SAC Eastern Basic Instructor course, held at York Soaring, has come and gone again. There were fourteen trainees on board and all passed. Some of the new instructors have by now already made substantial contributions to their clubs. I know personally of a few who have done more than 100 back seat flights since the course — that's putting all that theory into action! I would like to thank Peter Foster for his help on the course, and the result of his efforts has been an upgrading to a Class 1 rating.

Paul Moggach
member Flight Training & Safety committee

† HERMANN KSANDER

5 March 1927 — 1 September 1990

Hermann started flying with the Central Ontario Soaring club at Fowler's Corners over twenty years ago. We, his flying friends, have fond memories of those years. As a founding member of the Omemee Gliding and Country Club, Hermann was a driving force behind the club's growth. At various times secretary, treasurer, president, chief flying instructor, and towpilot, Hermann has left an indelible mark on the club. The camaraderie of the club, its two first class runways, comfortable clubhouse, fine aircraft and hangars are due in no small part to his efforts.

Half of Hermann's 1500 flying hours were spent teaching others the pleasures of unpowered flight. He sought new knowledge and experience, and inspired others to do the same. He flew gliders in Poland, Austria, Switzerland and the United States. He flew his own high–performance sailplane on many cross–country flights, and his skill was rewarded by the FAI Gold Badge with one Diamond.

We miss Hermann's fellowship, his selfless contribution to our club and our sport, and his guidance and friendship.

photo unavailable

Left to right standing: Dave Gibb, Glenn Ritchie, Keith Billings, Don Parker, Geraldine Balint, Max Castiglia, Barry Usprech, Tom Jerrard, Tim Paul, Witek Prucnicki, Gary Wolniak, Gerald Bunder.
Left to right kneeling: Peter Foster, Sue Eaves, Paul Moggach.

FAI badges

Larry Springford, 45 Goderich Street
Kincardine, ON N2Z 2L2 (519) 396-8059

The following Badges and Badge legs were recorded in the Canadian Soaring Register during the period 1 July to 30 September 1991.

DIAMOND BADGE

78	Samuel Whiteside	York

GOLD BADGE

252	Samuel Whiteside	York
253	Uwe Kleinhempel	Vancouver
254	Jörg Stieber	SOSA
255	Nick Pfeiffer	Vancouver
256	Jay Poscente	Cu Nim
257	James Fryett	York

SILVER BADGE

817	Jay Poscente	Cu Nim
818	Claude Bisson	Quebec
819	Nick Pfeiffer	Vancouver
820	Allan Gillis	Bluenose
821	Raymond Richards	Regina
822	Norman MacSween	Vancouver
823	Lloyd Weber	SOSA
824	Terry McElligott	SOSA
825	Mark Voysey	?
826	Harry Peters	Vancouver

DIAMOND GOAL

Samuel Whiteside	York	511.5 km	Mini Nimbus	Minden, NV
David Maven	York	302.0 km	Std Libelle	Arthur, ON
Terry McElligott	SOSA	306.0 km	Club Libelle	Rockton, ON
Jörg Stieber	SOSA	500.8 km	LS 4	Rockton, ON
Nick Pfeiffer	Vancouver	306.0 km	Std Cirrus	Ephrata, WA
David Baker	Vancouver	567.5 km	ASW-20CL	Invermere, BC
Keith McKenzie	COSA	306.5 km	Std Cirrus	Chemong, ON

DIAMOND DISTANCE

Samuel Whiteside	York	511.5 km	Mini Nimbus	Minden, NV
David Maven	York	510.5 km	Std Libelle	Arthur, ON
Jörg Stieber	SOSA	500.8 km	LS 4	Rockton, ON

DIAMOND ALTITUDE

Jay Poscente	Cu Nim	6210 m	Mini Nimbus	Cowley, AB

GOLD DISTANCE

Jay Poscente	Cu Nim	303.0 km	Mini Nimbus	Invermere, BC
Samuel Whiteside	York	511.5 km	Mini Nimbus	Minden, NV
David Maven	York	302.0 km	Std Libelle	Arthur, ON
Terrry McElligott	SOSA	306.0 km	Club Libelle	Rockton, ON
Uwe Kleinhempel	Vancouver	303.0 km	Grob 102 III	Invermere, BC
Jörg Stieber	SOSA	500.8 km	LS 4	Rockton, ON
Nick Pfeiffer	Vancouver	306.0 km	Std Cirrus	Ephrata, WA
Keith McKenzie	COSA	306.5 km	Std Cirrus	Chemong, ON

GOLD ALTITUDE

Jay Poscente	Cu Nim	6210 m	Mini Nimbus	Invermere, BC
James Fryett	York	3380 m	Mini-Nimbus	Minden, NV
Mark Voysey	?	3080 m	IS-29	Tocumwal, Australia

SILVER ALTITUDE

Jay Poscente	Cu Nim	2670 m	Mini Nimbus	Invermere, BC
Jean Papillon	CVVQ	1220 m	Grob G 102	St-Raymond, PQ
Allan Gillis	Bluenose	1220 m	K8	Stanley, NS
Raymond Richards	Regina	1928 m	DG-300	Cudworth, SK
Norman MacSween	Vancouver	2590 m	Grob 102	Invermere, BC
Mark Voysey	?	3080 m	IS-29	Tocumwal, Australia
Harry Peters	Vancouver	1340 m	ASW-19	Ephrata, WA

SILVER DISTANCE

Jay Poscente	Cu Nim	115.5 km	Mini Nimbus	Invermere, BC
Claude Bisson	CVVQ	71.8 km	Pilatus B4	St-Raymond, PQ
Nick Pfeiffer	Vancouver	56.0 km	Std Cirrus	Ephrata, WA
Allan Gillis	Bluenose	53.0 km	K8	Stanley, NS
Raymond Richards	Regina	80.5 km	DG-300	Cudworth, SK
Norman MacSween	Vancouver	103.0 km	Grob 102	Invermere, BC
Lloyd Weber	SOSA	60.0 km	Ka6CR	Rockton, ON
Terry McElligott	SOSA	92.6 km	Club Libelle	Rockton, ON
Mark Voysey	?	51.8 km	Jantar Std	Tocumwal, Australia
Harry Peters	Vancouver	87.0 km	ASW-19	Ephrata, WA

SILVER DURATION

Jay Poscente	Cu Nim	5:24 h	Mini Nimbus	Invermere, BC
Kimi Tsuchiya	Vancouver	5:12 h	Blanik	Hope, BC
Allan Gillis	Bluenose	5:08 h	K8	Stanley, NS
Raymond Richards	Regina	5:20 h	DG 300	Strawberry Lake, SK
Norman MacSween	Vancouver	5:04 h	Grob 102	Invermere, BC
Jean Papillon	CVVQ	5:29 h	Grob 102	St-Raymond, PQ
Michael Schirl	York	5:50 h	1-26	Arthur, ON
Robert Bell	Champlain	5:40 h	Libelle 201	St-Dominique, PQ
Carole King	Champlain	6:25 h	Libelle 201	St-Dominique, PQ
Pierre Bertrand	Outardes	5:37 h	K8	St-Esprit, PQ
Eric Rominger	York	5:15 h	1-26	Arthur, ON
Sylvain Larue	Cold Lake	7:55 h	Dart 17R	Cowley, AB
Mark Voysey	?	5:23 h	Jantar	Tocumwal, Australia

C BADGE

2285	Jay Poscente	Cu Nim	5:24 h	Mini Nimbus	Invermere, BC
2286	Nikola Preradovic	SOSA	1:42 h	1-26	Rockton, ON
2287	Kimi Tsuchiya	Vancouver	5:12 h	Blanik	Hope, BC
2288	Bill Jerrard	York	1:10 h	1-26	Arthur, ON
2289	Thomas Jerrard	York	1:03 h	1-23	Arthur, ON
2290	Allan Gillis	Bluenose	5:08 h	K8	Stanley, NS
2291	Raymond Richards	Regina	earned in 1986		
2292	Aaron Benko	Regina	1:10 h	1-26	Strawberry Lake, SK
2293	Andrew Vilkas	York	1:10 h	1-26	Arthur, ON
2294	Norman MacSween	Vancouver	5:04 h	Grob 102	Invermere, BC
2295	Michael Schirl	York	1:10 h	2-33	Arthur, ON
2296	Edward Krajewski	Air Cadet	1:26 h	2-33	Arthur, ON
2297	Gerald Ince	Cu Nim	1:02 h	Blanik L13	Black Diamond, AB
2298	Tania Willems	MSC	1:15 h	1-26	Hawkesbury, ON
2299	Yvon Langlois	CVVQ	2:24 h	1-26	St-Raymond, PQ
2300	Pierre Bertrand	Outardes	5:37 h	K8	St-Esprit, PQ
2301	Thomas Harling	York	1:10 h	2-33	Arthur, ON
2302	Todd Steenburgh	Air Cadet	2:31 h	2-33	Arthur, ON
2303	Eric Rominger	York	5:15 h	1-26	Arthur, ON
2304	Allan Wan	Edmonton	1:15 h	2-33	Chipman, AB
2305	Mark Voysey	?	5:23 h	Jantar	Tocumwal, Australia
2306	Brandon Shilson	Air Cadet	1:18 h	2-33	Arthur, ON

SIGNIFICANT FLIGHTS

Nick Bonnière, Walter Weir, and Ulli Werneburg, 23 June 91. 504.5 km triangle flown from Pendleton with turnpoints at Mallorytown and Bonnechere airport. Course flown at about 106 km/h.

Ulli Werneburg, 24 June 91, ASW–20B. 340.1 km triangle flown at 123.3 km/h from Pendleton with turnpoints at Brockville airport and Shawville. This is the fastest speed achieved in any task category in Canada to date. (This is the same day that Walter Weir is claiming his 500 km triangle speed record. Eight pilots completed this triangle during the Nationals practise, five of whom exceeded 100 km/h — great soaring weather for any part of Canada, let alone for eastern Ontario.)

Stewart Midwinter, a soaring, hang glider and paraglider enthusiast living in Calgary, flew all three legs of the Silver badge with a 5:06 hour, 72.5 km, 14,000 foot *paraglider* flight out of Golden BC on August 4, and has now earned the FAI Silver badge in all three soaring disciplines — a very rare achievement. (No concessions are made to performance in the Silver badge for hang gliders, but Silver distance is reduced to 30 km for paragliders.) Stewart earned the "Delta" Silver for hang gliders in 1982, being the second person to do so in Canada, and the soaring Silver in a Blanik at Cu Nim in 1989. He believes that very few persons worldwide likely have the three Silvers, but cannot be sure of this as there is no cross–referencing of achievement between the FAI aerosports.

FAI records

Russ Flint, 96 Harvard Avenue,
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Record claims

200 km speed to goal – open, 109.6 km/h, 27 June 91, Walter Weir, ASW–20B, C–GGWW. Flown from Pendleton airport. Exceeds previous record of 93.6 km/h set by Tony Burton in 1989.

300 km speed triangle – open multiplace, citizen, 128 km/h, 30 July 1991, Ian Spence (passenger J Renaud), ASH–25, N725H. Flown from Uvalde. Exceeds previous citizen's record of 79.4 km/h set by Charles Yeates in 1989.

Rejected. 300 km O&R – multiplace, citizen, flown by Charles Yeates on 1 January 1991 in Australia has been rejected for technical reasons. Record of 65 km/h set in 1976 stands.

* Trading Post page and back cover deleted (27 & 28)