free flight · vol libre

1/92
Jan-Mar

cover photo unavailable

POTPOURRI

I hope everyone enjoyed the Christmas festivities and properly welcomed 1992.

I'm pleased to report Joan McCagg, our executive secretary, is recuperating at home after serious surgery at the end of October, and she hopes to be back in the office sometime in January. We wish you a speedy recovery and good health, Joan.

I wish to remind everyone of the upcoming AGM being held at the Palliser Hotel in Calgary on 28 – 29 February, and 1 March. The Cu Nim club has arranged for workshops and other items for those attending. I urge all members who find it within their scope to please attend, particularly those from Alberta.

In spite of the promises from our Segelflug–Bildkalender suppliers that 1992 calendars would be shipped to arrive in Canada in early October, they still did not arrive until the middle of November which caused us much concern. There are still some available at the National Office, so please send your orders in.

You should have all received your 1991 membership receipt, your 1992 membership card, and Pioneer Trust Fund donation card in mid December. We had planned to have them sent out before the end of November, but the printer, who did the cards for us last year, farmed out the job to a printer in Toronto, which caused delays in delivery. 1992 just has to be a better year.

At least it's a relief to see that the accident rate for 1991 is less than for 1990, but it is still disturbing that we had a fatality.

I urge everyone to re–read the accident report compiled by George Eckschmiedt and included with the 5/91 issue of *free flight*. Carefully study them, and note how many of them have not been reported to the SAC office or the Flight Training and Safety Committee, or how many could have been prevented with proper check procedures.

To learn from other pilots' accidents, we have to find out what caused them, and what needs to be done to break the sequence of events leading to them. We all should think of and plan for "escape routes" to get out of situations that lead to accidents. What would we do, if the rope broke at less than 200 feet and there is no safe place to land beyond the runway? There are gliderports with that situation, and it does no good to shrug one's shoulders and forget about it. If we carefully studied the area and planned for the problem beforehand, we might be able to minimize the risk, and walk away after to talk about it.

It's time of the year again to make sure the club flight statistics along with private owner stats have been sent to Randy Saueracker, 1413 – 7th Avenue, Cold Lake, AB TOA 0V2. Your club might just win the Roden trophy, and we need the information for discussions with Transport Canada. Also don't forget to send in your recommendation for the Instructor of the Year award. Pilots with claims for our other trophies (BAIC, Canadair, and "200") should send them at once to Harold Eley at 4136 Argyle Street, Regina, SK S4S 3L7.

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

Al Sunley

Winter on the ridge

free flight · vol libre

Trademark pending   Marque de commerce en instance

1/92 Jan–Mar

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

ISSN 0827 – 2557

DEPARTMENTS

Cover

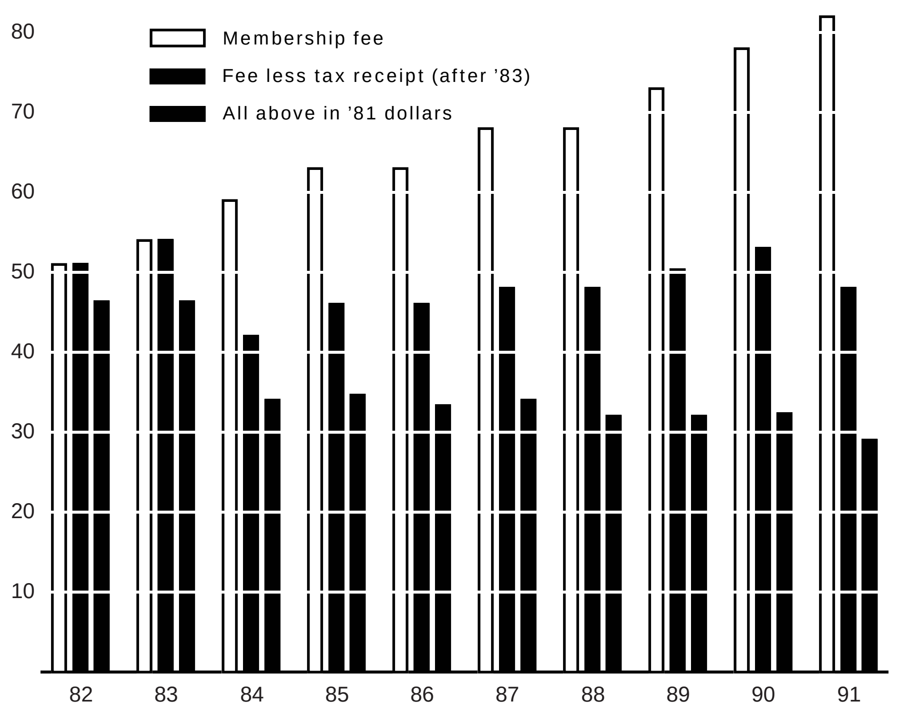
This photograph has a fine seasonal touch to it. The Montreal Soaring Council's Twin Astir poses for the shot.   Photo by Real le Goueff.

BETTER THAN A SHARP STICK IN THE EYE

Jim McCollum, Finance Committee

The after tax cost of belonging to SAC will be lower in 1991 than in 1990. Our Finance Committee has consulted with Revenue Canada regarding the charitable donation status of SAC fees. Henceforth, the full membership fee can be treated as a charitable donation, rather than the fee less the approximate per–member value of *free flight*. As a result of this change for a club affiliated member, a receipt of $82 rather than $66 will be issued this year, for example. The discounted present value of this change to the Canadian soaring community is between $100,000 and $150,000. The bar chart below illustrates that the after–tax cost of belonging to SAC has almost steadily declined during the past ten years when the tax receipt and inflation is taken into account.

SAC fees 1982–91 (regular club–affiliated members)



SEASON GO, SEASON COME

Well, here we go on the first *free flight* of 1992. If you look closely you'll notice that the text is a lot crisper. Our printer cum glider pilot in Edmonton, Dave Puckrin, has switched over to expensive imagesetting gear which puts a lot more tiny dots on the page per inch. So the last two years of 300 dpi LaserWriter output has leaped to 1000+! The other technical improvement in 1991 was a scanner which I now use to input line drawings. This has allowed me to clean up and improve diagrams coming in with articles — all the figures in the last three meteorology articles by Tom Bradbury in 4/91, 5/91, and this issue are an example.

Technical enhancement is just the icing however, a gliding magazine is only as good as the articles, tales and news that go into it. 1991 was a great year for *free flight* in that regard, as just a quick scan through last year's issues will remind you. Please let me give a large thumb's up for all the authors out there who made the effort to sit down, write, and help make *free flight* as good as it is. (I still need more club news from the east though, so each should try and get your gossip or newletters to me regularly.) Thanks also to Gil Parcell who keeps sending me the odd cartoon on demand, and to the photographers who make the extra effort to get that one really good shot for a front cover. By the way, if imitation is the sincerest form of flattery, SAC should be pleased. The Soaring Society of America has just got around to producing a book to assist their OOs in interpreting the Sporting Code, and the New Zealand Gliding Association is instituting a Senior Official Observer system. Well, good soaring to you in 1992. Set yourself a goal and go for it — 50 km or whatever — be a better pilot in September than you were in April!

Tony Burton, editor

SAC

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.

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5 January, March May, July September and November

letters & opinions

L'ASSOCIATION CANADIENNE DE VOL A VOILE

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

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

vol libre est le journal officiel de l'ACVV.

Les articles publiés dans **vol libre** sont des contributions dues à la gracieuseté d'individus ou de groupes enthousiastes du vol à voile. 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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GPS FLIGHT RECORDERS COMING

With the establishment of the full Global Position System and the rapid reduction of GPS receiver costs (now coming into the $1000 range), sailplanes are likely to be using this technology in the near future. The satellite system is able to provide 3D position information to better than 100 metres in its standard mode, and current receivers are now competing with LORAN in the features provided such as built in waypoint databases. Commercial trucking and other transportation companies are now using GPS to track their fleets.

GPS equipment is being developed with memory. This will soon see a flight recorder being manufactured which records height and position and derives such functions as speed and climb rate. The result would be a box that replaces the barograph and turnpoint cameras. With turnpoint positions loaded as waypoints, relative range and bearing can be automatically stored as one approaches and turns, providing verification of rounding them. (These navigational functions, inherent in GPS, but not allowed by the FAI on sporting flights, would not be displayed to the pilot.) Eliminating the massive photo developing and photo interpretation hassle will certainly be a blessing to contest organizers and volunteers, and pilots would be relieved of camera jams and aerobatics over turnpoints. We are quite likely going to see a shift to this new technology as early as the New Zealand Worlds in 1995.

Tony Burton

A NEW ANGLE ON TEACHING JUDGEMENT

It was with special interest that I recently viewed the new Judgement Training video based on Mike Apps' SOAR system, as I helped Mike develop that acronym. Sadly the "talking heads" technique used in this video limits its usefulness as a training tool, and I would encourage Ian Oldaker (and committee) to try again with as many in–air picture sequences as possible.

Lately though, I've had a different thought about how to improve Judgement Training. All instructors can probably relate to that moment when one sends a student on his or her first solo. How, in some cases, a certain apprehension gnaws at the back of one's thoughts. Sure, the student has flown competently the past few flights — been briefed — answered the questions correctly — he or she seems ready ... but .. how can one be certain that this student will react appropriately in an unexpected situation? Can one be sure that they aren't just trained to "answer the exam"?

Of course there is all the experience of earlier flights with this student, but I note that most of the early flights are made with the instructor doing most of the talking and decision making, and as training progresses, the instructor rides in increasing silence watching to see if the student "makes a mistake". I think we need a different approach if it's knowledge about a student's judgement ability that we want to be more sure about prior to solo (and for their subsequent career).

We need to encourage TALK! As soon as a student is moderately competent in handling the glider, the instructor should begin to get the student to talk, a "stream of consciousness" kind of thing, with everything they are seeing, thinking, doing related to the glider's environment. If this technique is begun early enough in training it will become a natural part of the flight. It will be a dialogue most of the time at first, becoming a monologue as the student nears solo. The instructor would then have a great deal of experience in hearing students verbalize their observations and subsequent decisions by the time first solo nears, and I think a much improved idea of whether or not this student is prepared only for the "usual" situation or can think and act creatively regarding the available options.

(One word of caution. Start this method early in a student's career. Trying to get a student that has normally flown pretty silently to yak his/her head off for you as a pre–solo checkflight, etc. can simply add undue strain.)

Garnet Thomas, Training Co–ordinator
Edmonton Soaring Club

A Defensive Driving course I once took used a "turn everything you see down the street into words" activity as a means to really see what one was looking at and thereby to anticipate potential trouble. Tony

AN OVERWORKED BUREAUCRACY MAKES LIFE EASIER FOR PILOTS

Transport Canada announced a major policy shift relating to Canadian type approval of German, French, Dutch and British manufactured gliders and motorgliders.

In the past, a lengthy evaluation process including analysis and test flying was required for each new type and variation. Now the process has been drastically abbreviated, requiring a request for Canadian type approval by the manufacturer and submission of a copy of the Country of Origin type approval and a copy of the flight manual. Turnaround time should be very quick.

This change was brought on by Transport Canada not knowing how to handle the vast array of sailplanes that come as pure sailplanes, sustainers and motorgliders. Now they will be approved on the basis of their Country of Origin approval.

I'll give you more details as I receive them.

Chris Eaves,
SAC Technical Committee

An offer I couldn't refuse

Ian Spence
SOSA

IT WAS A GREAT DISAPPOINTMENT not to go to Uvalde for the Worlds. The SSA organizers discovered that they had erred in allowing four Canadian pilots to fly in one class and informed us about a month before the contest that the International Gliding Commission rules allow only three per class.

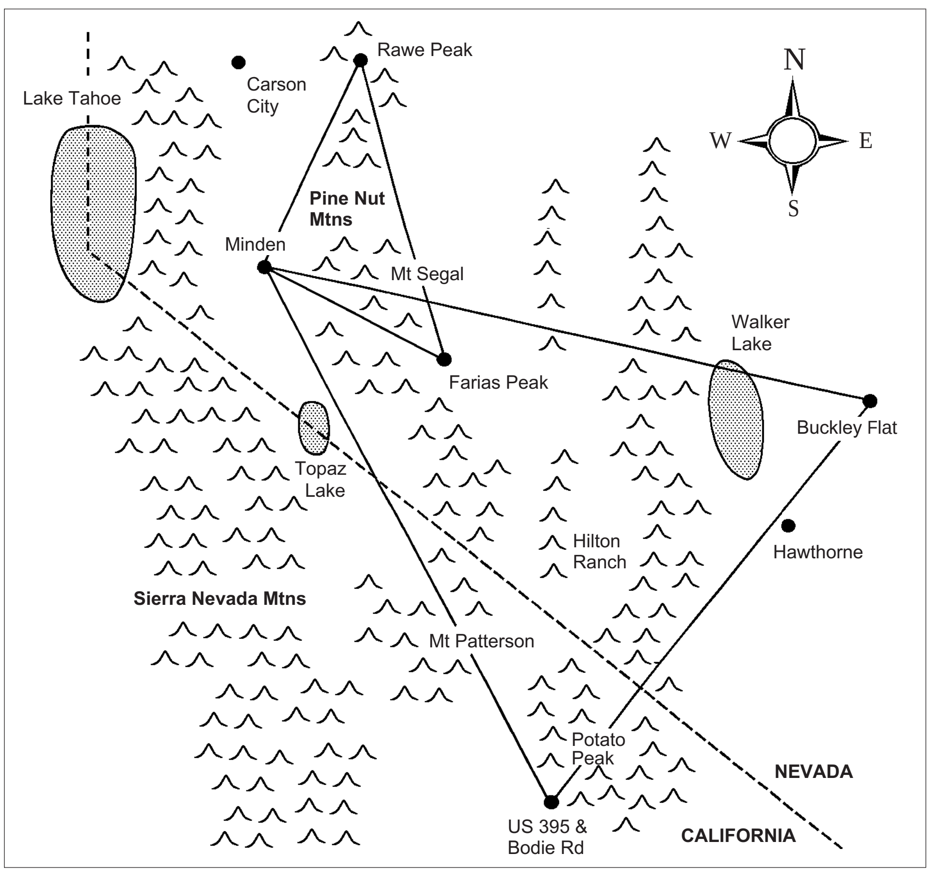
Since my crew, Michael Steckner from the London Soaring Society, and I had both taken holidays and prepared for a month's cross-country flying, we decided to do the next best thing and go to Minden, Nevada instead. Minden had been the original venue for the 1991 World contest before the SSA organizers changed the site at the eleventh hour. I had found Minden a fascinating place to fly during Ameriglide and looked forward to returning. The two commercial operators at the Douglas County Airport (Soar Minden and High Country Soaring) provide excellent service to visiting pilots and have a variety of ships for rent, including high performance glass. During the summer Nevada offers spectacular desert and mountain flying, and since the demise of Black Forest, Colorado, Minden is now probably the pre–eminent North American winter wave site. You can mix in some skiing at Lake Tahoe when the wave is not working or backpack in the Sierras during the summer. The less athletically inclined can lighten their wallets at the many casinos in the area.

We set off with my LS4, Whiskey Whiskey, in tow on the 20th of July and covered the 4000 kilometres in three days of fairly hard driving. Although a little tired, we both flew the LS4 on the following day. The conditions were pretty decent and I flew to Mount Patterson and back in just over an hour, averaging about 140 km/h. But, alas, the following days were not to provide classic Minden conditions. Instead, under the influence of a southeasterly monsoonal flow, we had massive overdevelopment by mid–afternoon each day, producing some spectacular flying but, since the thunderstorms eventually washed everything out of the sky, long flights were simply impossible. Accordingly, I decided to concentrate on shorter flights, and make attempts on some Canadian records, while Michael tried to complete his 500 km Diamond distance.

Minden attracts good pilots from all over the world, hoping to make long flights or break records. This summer was no exception and we were fortunate to meet several interesting people. Among the most memorable were Jean–Renaud Faliu and Lee Hallerberg. The former is a veteran French glider pilot with vast and varied experience and his friend Lee is a California pilot who owns a Schleicher ASH–25. Lee was making attempts on US multiplace records while J–R, as everyone calls Jean–Renaud, was attacking the French records. J–R knows several Canadian pilots quite well; he visited St. Raymond during the Nationals a few years ago. He speaks perfect English, which he teaches in a Paris high school, and has travelled widely promoting the French HUDIS heads–up glide computer system as well as giving talks on many aspects of soaring. He is a born raconteur and I greatly enjoyed listening to his witty and informed opinions on all facets of our sport.

My crew Michael had not flown an LS4. He owns a well travelled Ka6CR, in which he has flown his Diamond goal, but his experience in glass is limited to a few flights in a Grob and his dad's ASW–15. However, Michael had no problems with the LS4, which must be one of the nicest and easiest of all ships to fly, and on his third flight made a creditable attempt on the 500 km. He completed about 440 km on a day that I would not have thought much more than 300 km was possible. If he had been a little more aggressive earlier in the flight he might just have completed. Distance flying is speed flying and we must push early, as well as during the strong part of the day.

I made one interesting long flight which took me south to the White Mountains and then east to Tonopah (they tested the Stealth fighter at the nearby Tonopah Test Range.) The desert and mountain scenery was spectacular and, after a somewhat slow start to the day, I was regularly getting 12 knot lift to 18,000 feet. I had intended to go north to Winnemucca before returning home but the sky started to fall down and I had the greatest difficulty



threading my way around and under giant thunderstorm cells for a direct return to Minden. I encountered rain, sleet, and terrific sink in places, and was quite pessimistic about making it home, but hoped I could get as far as Hawthorne. Fortunately, my luck held and I managed to squeak back. J–R pressed on north in the ASH–25 but could not penetrate the wall of storms to return and decided to put the big ship down on the runway at Winnemucca rather than risk an off field landing.

Because of the daily problems with overdevelopment, I decided to concentrate on the 300 kilometre triangle record, hoping to complete my attempts by early afternoon before the sky blew up. I made two tries at Peter Masak's record of 149 km/h which was set in a Nimbus 3. Although I believe that over 140 km/h is certainly possible in an LS4 on the right day, I could only manage 127 and 121 km/h on my first two runs. Since the weather had not been great on each of these days, I was quite hopeful as I prepared for another attempt on the 30th July.

Sitting in Whiskey Whiskey, just about to be pulled onto Runway 16 for takeoff, I was surprised to see Jean–Renaud Faliu come running up. "Ian," he said, "I am about to make you an offer that I do not think you can refuse. How would you like to fly the ASH–25?" As you may imagine, I was out of the LS4 in record time — I don't expect that I'll get many opportunities to fly what is arguably the best glider in the world!

As we towed Two Five Hotel to the takeoff point, I asked J–R whether he planned a record flight. He said no, he did not think that conditions were good enough and that, in any case, I was not going to be a passenger but was going to fly the ASH–25. An idea immediately took shape in my mind: if J–R was not going after a French record, why not declare a Canadian record? I already had my declaration, maps, and cameras prepared for a 300 km triangle open attempt and so the change was minor to accommodate a multiplace attempt. With Michael's assistance as Official Observer, this was done in a few minutes. Then followed a rapid briefing from J–R on flying the ASH–25 and using the amazing French HUDIS heads–up computer display. I had to borrow an oxygen mask from Soar Minden since my cannula did not have a compatible fitting but in less than fifteen minutes we were ready to take to the air in Two Five Hotel. The afternoon temperature was about 33 degrees Celsius and at the time of launch several large thunderstorm cells were visible along the first leg of the task.

The sailplane was towed on Runway 16, Douglas County Airport by Pawnee 78L. On tow I felt like a rank beginner with Two Five Hotel swaying left and right behind the 260 horse Pawnee. The long 25 metre wings create considerable adverse yaw, requiring a lot of rudder, while the ailerons are incredibly light and sensitive for such a large ship. Although flying the ASH–25 is not difficult, getting used to the coordination of rudder and aileron takes time. Off tow, I had difficulty in suppressing small–glider habits. Attitude changes are necessarily made more slowly in the big ships, and Jean–Renaud had to caution me, "Gently!", several times, as I tended to want to move the glider around like my LS4.

Because of the developing thunderstorms (with the consequent need to get going soon) we decided to forego a speed start through the gate, which would require towing to about 1000 metres, finding lift, and climbing another 500 metres, or more, before calling IP and making the start run. Instead, we released above the gate, using the release time as the start time. We cut loose at 2000 feet (6700 feet msl), rather than higher, so that there would be no doubt about our having started below 1000 metres (as determined from the barograph trace). In any event, at Minden, the ASH–25 usually can climb faster alone than be towed full of water at 6700 feet!

After release we went directly east about a kilometre to a thermal we had noted on tow. We lost no height on the way and contacted about 4 knots which improved to 6 knots as we climbed through 9500 feet, before heading for Mount Segal in the Pine Nut mountains about 18 km southeast of the airport. We took 4 to 8 knot lift to 16,000 feet, over 4000 feet above the highest of the Pine Nut mountains. (This is the standard departure for flights heading south from Minden. In general, you fly the mountains — the valleys rarely provide good lift and you quickly learn to stay over the high ground, even though it often looks quite inhospitable.)

We left the Pine Nuts en route to Mount Patterson, which still had some snow on its summit in late July. By this time we were running under the windward side of some fairly large, black thunderstorm cells. Just before Patterson, near the Three Sisters, we climbed to 16,500 feet under a huge black brooding cloud deck alongside a heavy rain shower. We then faced a problem. There was heavy rain ahead with frequent lightning strikes on Potato Peak, just to the east and north of the turn. So we had to divert to the west, into the valley, around lightning and rain before approaching the first turnpoint at 15:47.

The lightning was striking near Bodie, a ghost town of the Old West which is quite a tourist attraction nowadays. Our turnpoint was the intersection of the road to Bodie and US 395. Cruise speed on the first leg was only 80 knots since we tried to conserve as much altitude as possible as insurance against the heavy down that we knew could be lurking in wait for us under the threatening clouds. After the picture, a detour to the north was necessary to avoid the thunderstorms which had closed out the second leg. Near Sweetwater we could just see some sun on the ground east of Walker Lake and were finally able to deviate due east, past the Hilton Ranch, and eventually cross over just north of Mount Grant, where we took 8 knots to 17,000 feet before heading for the second turnpoint at Buckley Flat. Cruise speeds on the second leg were about 80–90 knots, and we made the turn at 16:26 with 13,500 feet, where we climbed in the best lift of the day at 12 knots to just over 17,000 feet.

The last leg was covered without circling. Michael called to say that, from his vantage point at Minden, the sky looked absolutely dead on the third leg. The sun was totally blocked by blow–off from the cumulo–nimbus anvils and there was a fair amount of mid–level scrappy dying cumulus. I replied that I didn't think there was a problem since the HUDIS promised that we could get home with no further climbs. However, some patches of weak lift were encountered on course and we climbed straight ahead when passing through. The run in over the Pine Nut mountains was quite exciting as we zoomed low over the ridges before coasting the remaining 15 km up the Carson Valley. I flipped the electric switches that control the water ballast dump valves about 2 km out, and we crossed the finish line at about 100 feet before pulling up to 900 for the circuit. The last leg was flown at about 100 knots.

The task took two hours and twenty two minutes yielding 128.6 km/h, which was good enough for a new Canadian record. This speed can hardly be considered spectacular for an ASH–25 at Minden, but given the relatively poor weather and my inexpert handling of the ASH–25, I suppose I should not grumble about the time. On a classic Minden day over 160 km/h should be possible.

A few days later J–R asked me to be the passenger in a 100 km triangle attempt on his own French record of 154 km/h. Again, the weather was not optimal, with overdevelopment threatening, and no strong lift reported by other pilots. I didn't refuse this offer either, and J–R was kind enough to let me do the flying before we made the start gate run. This gave me a chance to get more comfortable with the ASH–25 and I really started to feel at home in this extraordinary glider. I particularly liked the way the long flexible wings took the bumps out of the air, especially when thermalling. The ship grooves much like the ASW–20, requiring little stick attention even during the very steep turns that most Minden thermals seem to require.

The flight was an eye opener. J–R is a master pilot and handles the ASH–25 like a Standard class ship. Most of the trip was at, or below, mountain top height. Jean–Renaud is a true mountain flying expert and it was instructive to observe his decision making and technique during the flight. The first turnpoint was a trailer at Rawe Peak just south of Dayton Valley. We came within a hairsbreadth of having to slide off the mountain and head for the Carson City Airport since we found no decent lift on our glide into the mountain after running the start gate. We were right down to the deck before J–R racked Two Five Hotel into a rather poor thermal several hundred feet below ridge top. He stayed only long enough to get sufficient working height before heading for the turn, where we found a rather better thermal that we rode to 10,500 feet. We left for the second turn, needing several thousand feet, and immediately ran into some bad luck in the form of rain from a dying thunderstorm cloud. Things were not looking good and J–R anxiously asked for updates on our time and likely speed. My replies were not encouraging.

On the second leg under an ominous but largely lifeless thundercloud, that was still dropping rain however, J–R deviated towards the valley to run a secondary ridge, rather than take the high ridge. On the way we suffered heavy sink, losing perhaps 1200 feet. Afterwards, I asked J–R why he dropped to the lower range, since I had been absolutely

concluded on page 13

Wind Shear and Waves

Part 2

> 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*

IN THIS PART are examples of how the wind flows over hills and valleys. The low level flow depends on both the speed of the wind and the stability of the air. At first the waves aloft depend on how well the air follows the contours of the ground but after a time the wave pattern starts to change the low level flow. A small and fairly slow change in one factor may produce a large and rapid change in another.

Figure 1 is a reminder of how the vertical profile of wind (sometimes called the "wind gradient") can vary during the day. Wind speed is shown along the top of each figure, height in thousands of feet is at the side. In the top section there are three profiles. They are all based on a 20 knot wind aloft. The full line (marked "dawn") shows very little wind on the surface but a big increase with height leading to a stronger than normal speed at about 1400 feet (where the top of the nocturnal inversion happened to be). This excess of speed is quite a common feature. In some circumstances the speed at the top of the inversion is far stronger and then it is called a "nocturnal low level jet". Measurements from the top of very tall TV towers in the USA have shown wind speeds of over 50 knots just before dawn. Such nocturnal jets disappear very soon after sunrise.

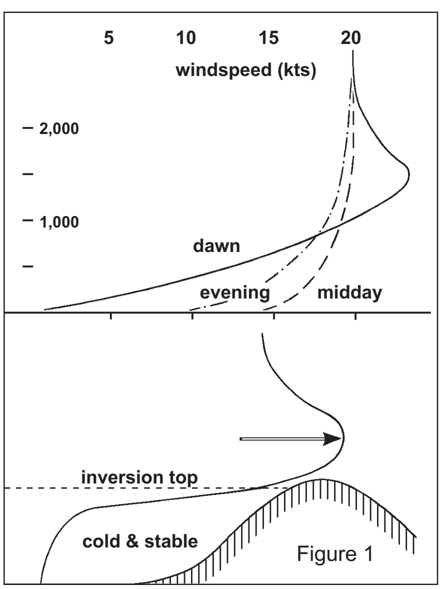


Figure 1

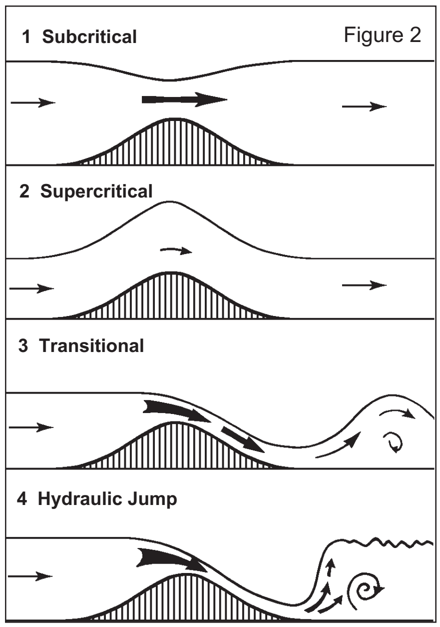


Figure 2

The dashed line marked "midday" shows the normal change of wind speed with height when the atmosphere is being stirred up by thermals. The dot–dash line marked "evening" shows the decrease in surface wind when the sun has set and the ground cools by radiating heat away into space. The colder the ground becomes the greater is this decrease in wind at the surface.

The lower half shows what happens when the inversion reaches almost up to the hill top. Then the air beneath the inversion is very slow moving and being so cold and stable is unable to clamber up the hill. Cold and stable air behaves in a very lazy fashion; it will never flow up the hill side if it can find a way round by following a valley. In this diagram the hill blocks the low level flow. If the low level air moves at all it will follow the line of the valley regardless of the winds aloft. At the hill top, just above the inversion, the wind may blow quite briskly but since it has been travelling almost horizontally above the inversion top there is no hill lift.

Figure 2 shows four types of flow across a ridge; the top example (1) is called a subcritical flow. Here there is a stable layer well above the top of the hill and a strong wind at all levels. The stable layer dips down where the air crosses the hill. It is rather like the aerodynamic flow due to a venturi. There is a fall of pressure and an increase of wind speed over the hill. On the windward side there is a region of higher pressure and a decrease in wind speed. A similar effect occurs on the lee side. The flow often breaks away from the ground beyond the ridge leaving turbulent eddies below the surface of separation.

(2) This is a type of supercritical flow when the air curves high over the ridge line before dropping down the lee side. In this case the wind speed (at ground level) may actually slow down over the hill crest instead of increasing. On one occasion, meteorologists carrying out an investigation at Great Dun Fell on the Pennines found the hilltop wind was less than 50% of the upwind speed.

(3) This is a transitional flow when the air approaches almost horizontally but then dips down over the ridge and sticks close to the lee slope, producing unexpectedly high winds on the lee side. When this happens the flow does not break away beyond the crest line but follows the slope right down to the valley floor. It then swoops up to form the first of a series of lee waves.

(4) is a more extreme example. Here the strong flow becomes very shallow and goes shooting down the lee slope like water down a weir. Then it suddenly leaps up to its original depth in a "hydraulic jump". The hydraulic jump is (as its name suggests) normally seen

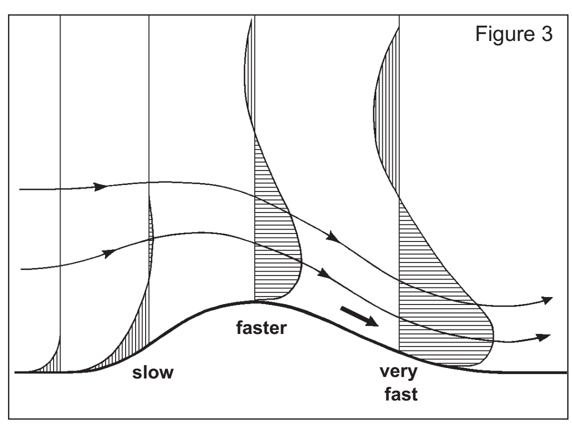


Figure 3

as a water phenomenon but there are times when the atmosphere acts much like water in the way it forms eddies, waves and jumps.

Figure 3 illustrates how the profile of the wind varies when there is a strong supercritical flow. The series of vertical lines represents the normal wind velocity. Where surface drag or hill effects slow the air down the effect is marked by vertical hatched lines. Where the air speeds up, the horizontal hatching emphasizes this acceleration. The main slow down takes place where the air starts to ascend the windward face. Here the usual effect of surface drag is increased; kinetic energy is converted to potential energy as the air climbs the hill. Pressure rises at ground level and the stronger flow lifts above the surface. Over the hill top the speed up is quite marked with a much increased flow. Then down the lee slope the streamlines converge to produce a very fast flow at low levels but a reduction higher up.

On the downward slope potential energy is being converted into kinetic energy as the air accelerates. There is a drop in surface pressure too.

On strong wave days this fall of pressure on the lee side of mountains is great enough to show up as a marked trough in the isobars. When the Scottish or Pennines waves are active one may find this trough on the lee side. When there is a full strength föhn wind over the Alps the lee trough is a major feature.

Valley flow

Figure 4 (upper part) shows how the flow can separate from the sharp edge of a valley and travel straight across without dipping down at all. A separate slowly rotating eddy fills most of the valley. A layer of broken strato–cu clouds can blow across without being affected by the valley. If the flow dipped down into the valley, the descent would tend to break up or disperse this layer as it moved across. The lower diagram shows a slightly smoother rim to the valley with the cross–valley flow dipping down to produce little wavelets on the top of the valley fog. The air beneath the fog is usually much cooler and so stable that it is hardly influenced by the flow above it.

Figure 5 shows a daytime flow. In the upper part the lee side eddy is now much smaller and there is a lift on the windward slopes of the valley. In the lower half the lee slope is in sunshine and thermals have been set off from the sunny lee slopes. These disrupt the flow across the valley. The horizontal flow is intermittently deflected over the valley by these thermals. The downflow from thermals may then kill most of the lift on the shaded windward slope of the valley.

Isolated hills

Figure 6A shows a plan and side elevation of an isolated conical hill. The flow was studied by putting up a number of anemometers on the hill side and by releasing a series of constant pressure balloons upwind. These balloons cannot expand so they tend to fly at a set pressure. They respond quite well to the up and down flow. In this first example the air is stable and the wind profile (shown in the lower left hand corner) has a maximum of 15 or 16 knots over the upper part of the hill. The streamlines show the flow separating to go round the sides of the hill. The flow often descends as it goes round the hill side.

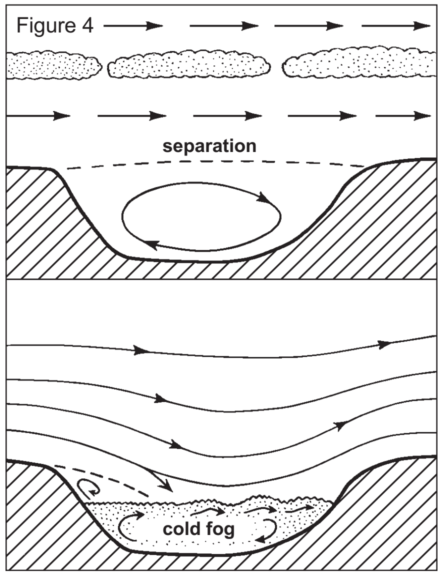


Figure 4

Figure 6B shows the same hill when the air was stable above 300 feet but the wind was much lighter (only 8 knots, dropping off to 5 above the hill). Now there is a well marked eddy downwind of the hill and a line of separation going from side to side of the hill just downstream of the summit as shown by the dashed line on both plan and cross–section.

Figure 6C shows the flow when the air was unstable and the wind speed a good deal stronger. The plan view streamlines suggest a convergence on the lee side. The side view shows that the constant pressure balloons were caught in many rising eddies, probably mainly thermic in origin, and went high above the hill top. There is the beginning of a lee eddy where some of the thermals turned into sink on the downwind side.

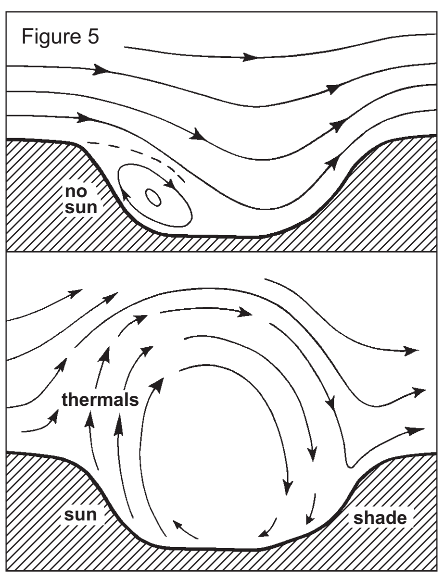


Figure 5

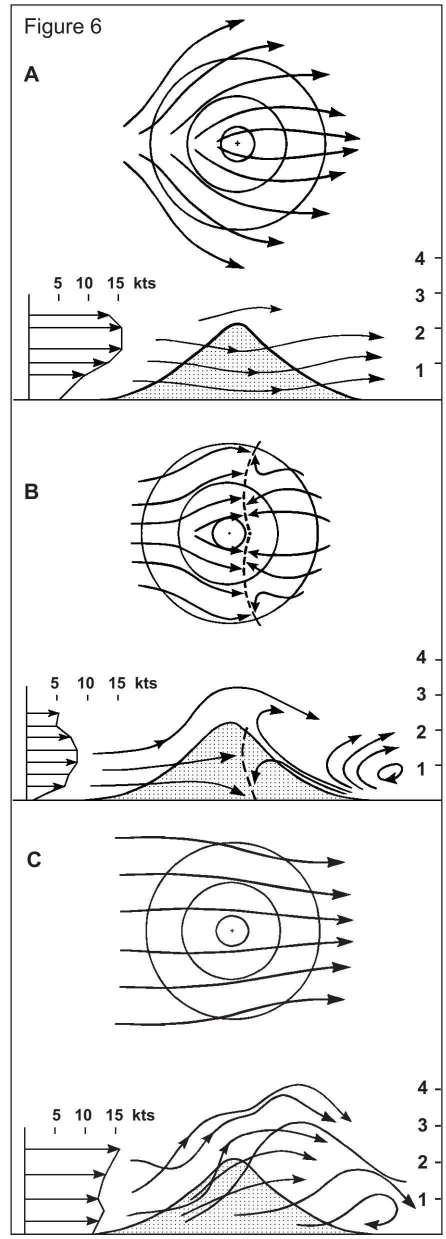


Figure 6

Figure 7 shows a conical island when the wind flow was very strong. Here the upper (plan) view shows the air converging to produce a sort of vortex to lee of the summit. At the foot there is another turbulent region where the various streamlines separate. The side view shows a well developed lee eddy with the probability of some sort of vortex trail spinning away from the convergence zone shown in the plan view. Vortices like these have also been reproduced by laboratory studies of water flow over a similarly shaped obstruc-

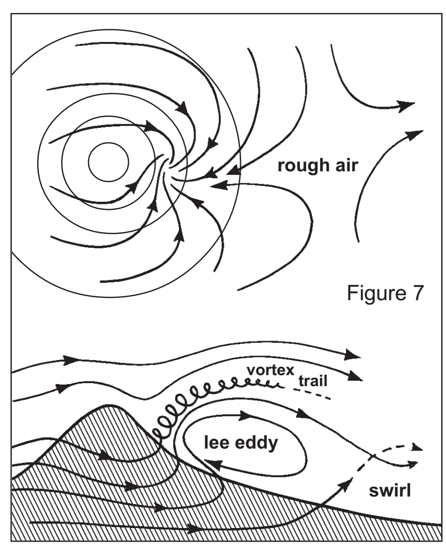


Figure 7

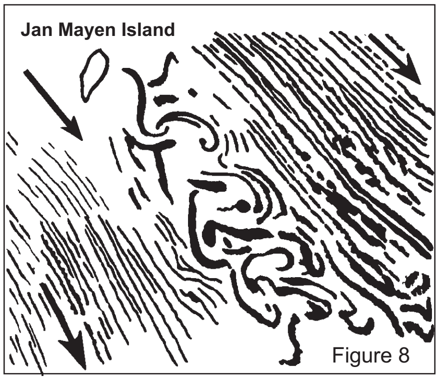


Figure 8

tion. Aircraft flights have found that in real life the turbulent region trailed far downwind of the island.

Vortex shedding

Much larger vortices are shed by islands several miles wide. A pattern of contra–rotating eddies have been seen when there was an inversion near the peaks of isolated islands. Figure 8 shows a sketch of this vortex shedding pattern to the lee of the arctic island of Jan Mayen. On either side are regular cloud streets aligned parallel to the wind but to the lee of the island the streets are broken into swirls which twist first one way and then the other. Similar swirls often occur to the lee of the Canary Islands. This phenomenon occurs on all scales down to the size of chimneys. Some thin metal smoke stacks are fitted with a spiral strip winding from top to bottom.

This spiral breaks up the vortices so that they can't build up a dangerous resonance and shake the chimney to bits. I have been told that vortex shedding was held responsible for the collapse of a big cooling tower at Ferrybridge. Each time a vortex breaks away there is a pressure jump which switches from one side to the other. This can set up a resonant oscillation which grows large enough to destroy the downstream tower.

Vortex stretching

The air flow may develop horizontal vortex rolls in the strong shear near the ground. If there is an undulating ridge which has promontaries extending out into the wind these vortices may be tilted from the horizontal, lifted off the ground and stretched out. A thermal breaking away may help this process. Stretching a vortex makes it spin faster. The result has sometimes been made visible on a snowy sope. Here the vortex can lift up a swirl of snow like a dust devil. The danger for pilots arises when there is no visible sign of the vortex. It may only give a jolt to a large fast moving aircraft but slow flying ultralight craft, like hang gliders, which often fly close to the ground, could suffer a fatal upset.

Feedback between waves and hill flow

The way air flows over a hill depends very much on the tendency for waves to develop aloft. In part 1 the feedback between low level cumulus and waves aloft was described. This section describes the interaction between waves and hill flow.

Figure 9A shows a smooth ridge with the wind blowing from left to right. The shaded zone between 4000 and 5000 feet is a weak inversion. As the flow takes the air across the ridge the inversion dips down on the lee side and then recovers. The streamlines come closer together over the crest showing stronger winds over the hill top and part way down the lee slope. A weak wave pattern grows above the inversion. Notice how the wave front tilts upwind so that the streamline starting out at 9000 feet starts to rise ahead of the streamline from 6000 feet. With only a feeble inversion well above the hill top the wave is relatively weak.

Figure 9B shows what happens when the inversion is both deeper and stronger and the base is lower down. This makes the wave much stronger. In this example the base of the inversion starts out at 3000 feet upwind (on the left). It dips down to half this height on the lee slope and in doing so brings the streamlines much closer together, implying a greatly increased wind down the lee slope. The first wave lifts off from the foot of the long slope. The streamline associated with the top of the inversion becomes quite steep two miles downwind of the hill crest.

Once again the wave front slopes into wind with height. The streamline starting out at 12,000 feet begins its ascent nearly a mile ahead of the crest line while at low levels the lift lies some two miles downwind of the crest.

Figure 9C shows an extreme case when the upwind side of the ridge is filled with cold stable air so that the low level flow is blocked and never ascends the ridge. Now the upper flow plunges down the lee slope producing very strong winds and then surging up sharply like a hydraulic jump over the downwind valley. This is almost certain to produce a severe rotor and very rough conditions.

In the USA wind speeds have been found to double between the crest of the ridge and the valley floor downwind. The flow is not very stable; the first blast of wind can arrive with a roar bringing speeds of some 100 knots. Lulls and further surges may follow. Such exciting events are less common in the UK but many years ago Sheffield, on the lee side of the Pennines, suffered damage to a number of buildings by just such a wind. Further north there were many trees blown down in forests on the lee side of Scotland.

Blocking on the windward side is not essential but seems to encourage this kind of wind storm; blocks may also form on the lee side. Lee side blocks occur when cold and very stable air is trapped to the lee of the main mountain ridge. When this happens the upper air does not penetrate the very stable lower air. Instead it continues more or less horizontally at high level. The effect is to cancel out the mountain almost completely so that lee waves do not develop.

Figure 10 shows five situations which summarize the different flows:

(A) is the subcritical flow when the air makes a dip down over the hill and recovers beyond it. The wind is strongest near the hill crest and the flow often separates downstream leaving eddies on the lee side. Subcritical flow seems more likely when the inversion is more than twice the ridge height. At the surface the wind speed is strongest over the ridge top.

(B) is a (just) supercritical flow with the shaded inversion layer rising and falling as it crosses the ridge, ending up rather lower on the lee side. The weak and shallow inversion reduces any wave effects.

(C) shows the difference made by a strong and deep inversion. The air plunges down the lee side and the strongest surface winds may develop down in the valley beyond, accompanied by a powerful wave. This plunge down the lee slope becomes more likely as the inversion becomes deeper and stronger.

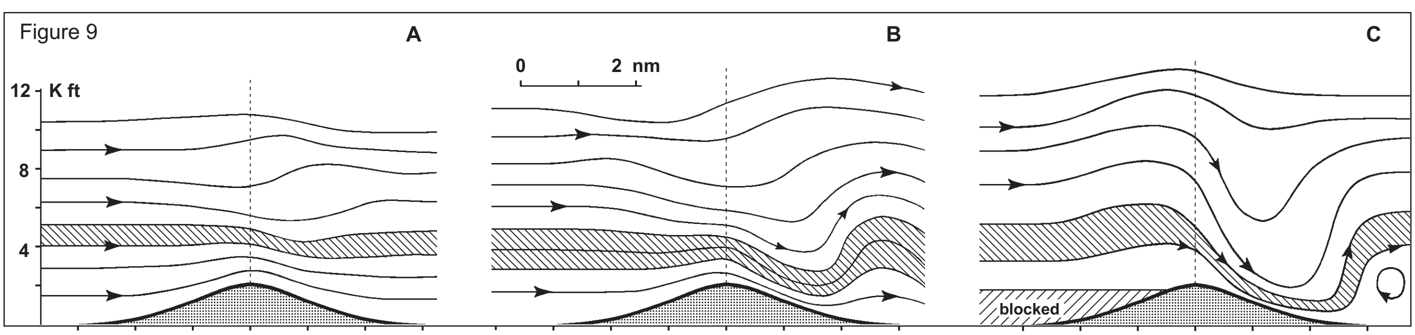
(D) occurs when there is cold stable air upwind and the low level flow is blocked. Air from much higher up comes plunging down the lee slope producing a windstorm near the ground and a very steep wave, even a hydraulic jump, over the valley.

(E) shows how everything becomes much quieter when the inversion is weakened and lifted high above the hill. There is only a very weak wave and the strong winds have died out on the lee side.

The one–bounce wave

All the best waves seem to occur when the wind speed increases with height (positive wind shear) and there is good inversion just above the ridge top. However, if air blows down off a plateau it gains a good deal of kinetic energy during its descent and sometimes rebounds as a single lee wave. This may happen even when the wind shear is in the wrong direction (speed decreasing with height).

Figure 9



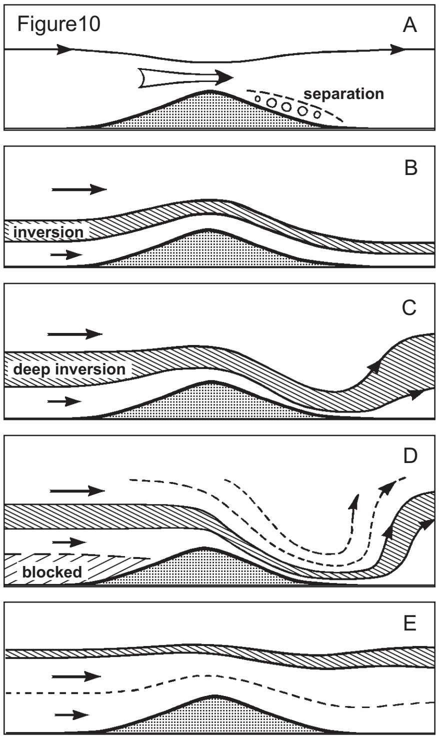


Figure10

Figure 11 shows a one–bounce wave; it might be termed a hydraulic jump. The lines running across this diagram represent potential temperature. Provided the air is not saturated the potential temperature lines follow the up and down movements of the air. This makes it possible to plot the wave flow by making lots of temperature measurements from aircraft. The profile of the wind velocity is shown extending from the dashed line just right of centre. Actual speeds are marked near the end of the arrows. The profile shows the maximum horizontal winds occurred just below 2000 feet where the speed rose to 43 knots.

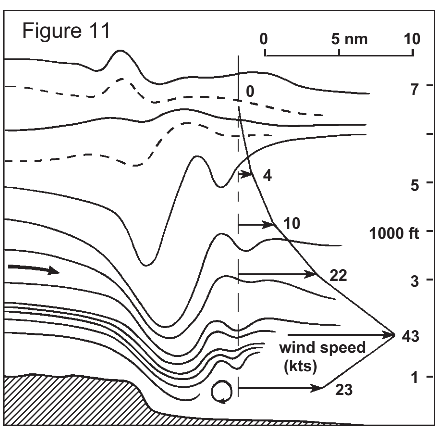


Figure 11

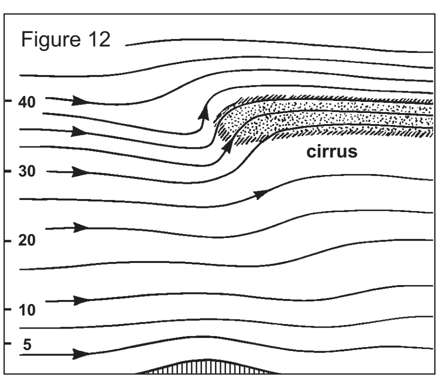


Figure 12

Above this the wind speed decreased to zero near the 7000 feet level. There was just one very steep wave close to the lee slope and it vanished at the zero wind level. This example was observed in Western Australia but the effect has also been seen here in the UK where the air is much moister. Such waves are nearly always marked by cloud which shows how steep the wave front becomes.

Wave steepening

Lee waves are sometimes drawn as a smooth series of undulations rather like a set of sine waves. Such waves do exist, especially a long distance downwind of the mountains, but many waves are far from symmetrical. Observations, such as those illustrated in Figure 13C and reported by Tony Crowdon at Talgarth show that the streamlines can become vertical. *(The story and drawing illustrating Crowdon's flight in such a wave appeared in free flight 6/87, page 7. This wave gave him genuine 18 knot lift but stopped at 7000 feet.)* Indeed there are cases when the wave actually topples over and breaks. Once a wave does break like this it sets an upper limit to the wave flow.

Whatever the wind velocity was upwind of the mountain, the wave steepening will reduce the horizontal speed and may bring it down to zero just before the wave breaks. This makes it hard for anyone measuring the wind speed on the lee side to know whether the change is due to a general decrease of wind speed with height or just a local steepening of the streamlines.

Once–bounce waves at cirrus level

On days when the wind speed increases with height up to 30,000 feet or more one may find a single wave jump occurring at high levels. Figure 12 illustrates this. The low level waves have not been added to this diagram as they are sometimes unsteady and rather mobile. However, at around 30,000 feet and often extending into the base of the stratosphere, the wave flow steepens abruptly. It may jump several thousand feet and having surged up like this stays high for a long distance downstream. The frequency of this type of flow was not recognized before the era of satellite pictures. Now that Meteosat provides half–hourly infra–red pictures one may often see this kind of wave develop on time lapse loops.

Most of the wide areas of cirrus are due to frontal systems or the blow off from a Cb anvil, but the wave cirrus is different. It suddenly appears as a narrow strip of high cloud over the crest of a mountain range and grows downwind for several hours. The upwind edge of the cirrus remains anchored over the hill crest and usually has a straight leading edge. The tail grows several hundred miles downwind. When the upper wave collapses the cirrus detaches from the mountains and blows away downwind. I have seen Pennine wave cirrus extend to northern Germany before becoming detached and a Scottish cirrus trail reaching the Channel south of Devon. More spectacular wave cirrus extends from the lee side of Greenland when a west to north–west jet crosses the high ice cap.

Hill size

Figure 13 shows how bigger hills can dramatically increase the size and character of a lee wave. In each of the three sections there

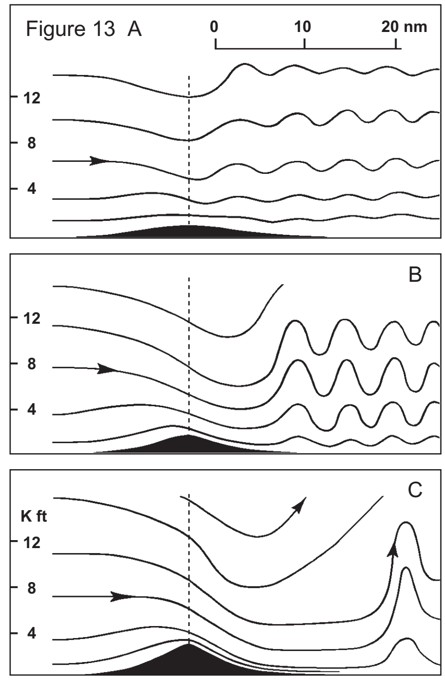


Figure 13

is a very strong inversion with its top at 11,000 feet. The width of the hill is constant but its height is increased from 1000 feet in (A) to 1600 feet in (B) and finally to 2600 feet (C). In the first case the wave amplitude (half the displacement) is about the same as the hill height. In (B) the amplitude increases to more than 2000 feet, in the third case (C) there is a shooting flow down the lee slope and a severe wave resembling a hydraulic jump some 25 miles beyond the crest of the ridge. Notice how the highest hill produces a very strong flow down the lee slope extending out into the plains beyond. These patterns were generated by computer but similar results have been observed in nature; in particular the severe downslope windstorms have been observed to form a ferocious rotor cloud much further from the mountains than normal. These super–rotor clouds seem to be straighter than the average rotor cloud. They do not conform to bends in the ridge line upstream as most wave clouds do.

Summary

Wind shear, the shape and size of hills, the stability of the air and the type of wave flow aloft are all connected. Feedback between the various factors can iron out a promising wave or stimulate it to monstrous proportions. Almost anything seems possible, and given time the atmosphere can change the pattern from smooth waves to jagged breakers, even if the upstream conditions remain the same. A gradual lifting of the inversion can alter the tuning of the atmosphere to produce a particular resonance that stimulates a large amplitude wave; then further lifting may detune it and allow the waves to decline.

As the wave alters, so it changes the wind near the surface. One usually expects to find the strongest wind over the hill top with lighter winds near the base of the hill or even a reverse flow on the lee side. Occasionally this may alter, producing a decrease of wind over the ridge. On rare occasions when a very large amplitude wave develops the strongest winds occur down the lee slope or even over the plains beyond. •

INSIGHTS

Personal asides on a World contest

Tom Knauff
from *Soaring Pilot*

Many years ago, A.J. Smith explained how a competition pilot progresses. At the local soaring site, the pilot finds that he or she is always at the top of the thermal, always the last one down, the first to obtain FAI badges and generally respected as one of the best pilots. Entering a regional contest full of expectations, our pilot finishes last. Experienced regional pilots are very good pilots with skills surpassing the neophyte. Entering more regional contests our pilot improves until a victory is scored. Thinking how great a pilot he must be, a national soaring contest is entered. The pilot finishes last. National soaring pilots are at another level of skill. If our pilot perseveres, his skills will improve until the first world soaring championships are entered where the process is once more begun.

The Worlds in Uvalde was a wonderful, exciting experience. It was fun, and the other pilots were always friendly, both on the ground and in the air.

One incident might explain: The French team was very serious and developed a reputation for not speaking to others. Jean–Claude Lopitaux is a past world champion and his grid position was just behind our sailplane. His crew did everything and you never saw the pilot until moments before takeoff. I never saw him speak with others.

During the contest flights, I would often fly with this pilot and his Nimbus 4. I told Doris that I would make him speak to me. One morning, I boldly walked up to the great pilot and introduced myself with the few words of French I know. He spoke in perfect English, but with that famous French accent that girls love, “Of course I know who you are.”

We spoke for just a few moments before taking flight. Hours later, and hundreds of miles into the flight, I caught up with Jean–Claude in a thermal. I was below him and left the thermal before he did. Cruising to the next thermal I was passed by Jean–Claude and he gave me a mighty wave as he went by. Each country has its own radio frequency, and I announced to the other USA team members that I had received a friendly wave from one of the French pilots. Bruce Dyson said, “Are you sure it was a wave?” This brought lots of laughs. I announced that he seemed to be using all his fingers!

Radio Codes

Flying in the world championships is different than flying in our own contests. The scoring system is different requiring different thinking and different tactics. The major difference, however, is that you fly as a team. Sharing information on the radio between pilots and even ground crews is allowed. To prevent the other teams from stealing information from our team, we used codes. Speaking on the radio during a competition flight is very distracting for a pilot who usually turns the radio off during competition flights. Using codes with the necessary code sheet and the need to refer to the map more frequently also distracts from the matters at hand.

> *“ I always liked POST until the Worlds when the task was used without intelligence. ”*

I never bothered to listen to other teams’ frequencies, but other teams seemed to enjoy breaking our codes. One of the daily meteorological events was the seabreeze front that affected the contest area each day. The location and strength of the seabreeze front was important information to all pilots. Our code for the seabreeze front was “Front Bumper”. One day the “Front Bumper” was especially large, and Jim Payne, our team manager announced it was a “Dolly Parton”. This certainly fooled no one. On another day, Justin Wills (England) came to me and explained how his team had broken all of our codes except one, and wanted to know what was special about a “’54 Cadillac”? We older pilots remember the ’54 Cadillac as having a very large front bumper.

The fact that other teams were listening to our frequency was dramatically demonstrated one day when Doug Jacobs asked Karl Striedieck to rock his wings so he could identify Karl from all the other sailplanes in a thermal. Five sailplanes rocked their wings!

Team Flying

The USA team consisted of seven Individuals, five having flown several world contests before. The team flying technique was principally sharing information that might be useful for the other pilots. Some team members tried to start together, but often separated during the task. The French have developed team flying to another level. Their sailplanes were often seen flying just a few yards apart. They did not win any class, but their overall placings were impressive with a 2nd, 3rd, two 4ths, 5th, and a 6th. I was told that their team has an annual budget of $400,000 and each team member must make a 2 1/2 year commitment. The French arrived in Uvalde in June!

The 15 metre Class

Conversations with designers and pilots seem to indicate that an 18 metre class will soon replace the 15 metre class. The Standard class sailplanes are now flying as well as the 15 metre class sailplanes at a greatly reduced price, so why own a 15 metre sailplane? The 15 metre will survive as a class for many years before the new class is developed.

The Schleicher ASW–27 will soon be flying. This is a very small wing area, 15 metre class racer based on the ASW–24 fuselage with a very high wing loading. “I heard one designer call it the Karl Striedieck class sailplane”. The Europeans see no use for such a sailplane in their weaker conditions.

SZD–56 This is a new Polish 15 m design. When you first see the sailplane, you are overwhelmed with its smallness and light construction. The sailplane was flown by a good pilot, but not one of the world class pilots, to 21st place. The placing is not as important as the overall score, just 938 points behind the winner. Another 500 points would have placed the sailplane in the top ten. The Polish factory has not yet decided to begin production of this sailplane, but I am sure we will hear of other designers working on this idea.

Open Class

No one flew the best Open class sailplane for the Uvalde conditions. In strong conditions, the Ventus 17.6 has a much higher wing loading than the Nimbus 3 or 4 and so the performance at high speeds is significantly better. The risk of flying a smaller sailplane is the chance of a weak soaring day when the big ships excel. The Open class is not a truly unlimited class because of the 750 kg weight restriction. At the Open Class Nationals in Marfa, Texas, Gary Ittner would have won by several hundred points flying a Ventus if he would have not had the bad luck of landing out on the first day and earning only 150 points for the day.

The Nimbus 4 As it turned out, the Nimbus 4’s performance was just as Klaus Holighaus said it would be: better in climb and about the same in glide compared to the 3. The Nimbus 3 and the ASW–22B flew equal to the Nimbus 4 in the strong Uvalde weather. The final placings for the Nimbus 4 of third, fourth and fifth were due to the French team’s flying techniques and a lucky thermal on a day when seventy–five sailplanes landed out. This one weak thermal allowed the few pilots who found it to fly much further than others even though they landed out too. The international scoring system gave these lucky pilots the full benefits of a 1000 point day.

nearby field to the empty sailplane. The towpilot and sailplane pilot returned to the factory with a new request for a sailplane.

Retrieves

Power planes were used to locate pilots who had only a vague notion as to where they were. At night, the plane would fly overhead and, guided by the sailplane pilot, would obtain a position fix using GPS or LORAN. Crews could get to within radio range of their pilots, but could not find the necessary dirt road leading to the pilot. Many pilots spent the night in their sailplanes. Stig Oye slept in a small hunter's cabin. The sailplane flew the next contest day.

Mosquitoes

The foreign pilots were warned about insects and were told that the repellent "Off" was probably best. A trip to the local *K–Mart* found some stuff that was probably better than Off ... "EASY OFF"! I have never tried this oven cleaner as an insect repellent, but come to think of it, I have never seen a mosquito in our oven either!

Best Story

Lots of stories were told during sessions by the pool. One of the best was about a pilot who contacted the Centrair factory to buy a new Pegasus sailplane. When told of the long delivery time, he offered substantially more money and a sailplane suddenly became available. He went to the Centrair factory in France to pick up his new Pegasus. He was to be aerotowed from the factory to his soaring site and arrived in the towplane. After attending to business matters he climbed into the sailplane and began the long aerotow.

Messing with maps, or some other detail, he lost control of the sailplane and began a series of PIOs. During one severe push–over he was thrust through the canopy as in his haste he had forgotten to fasten the seatbelts. He floated safely to the ground using the parachute while the towpilot did his best to stay in front of the pilotless sailplane.

The towpilot did not witness the pilot's ejection from the sailplane and assumed he was incapacitated in some way. Finally, the sailplane became so far out of position the towpilot had no recourse but to release. The sailplane crashed and the towpilot raced to a nearby field to the empty sailplane. The towpilot and sailplane pilot returned to the factory with a new request for a sailplane.

Fatality

Anssi Passila from Finland was involved in a midair collision in a large gaggle of sailplanes on the first leg of a long task. Some estimated twenty–five or more sailplanes were in this gaggle. The wreckage of the two sailplanes could have struck other sailplanes causing an even greater disaster. The other pilot bailed out successfully. Anssi was only 26 years old, and a promising competition pilot. The towns people of Uvalde took charge of the candlelight ceremony held that evening. It was impressive.

Gaggles

The task committee made the error of forcing pilots to start together, fly together and finish together, increasing the risks of midair collisions. The tasks were so long there were few options for selection of start times. All pilots left soon after the startgate opened.

We used a photo start and so each class was separated at the start. However, the finishes were particularly dangerous with all classes (114 sailplanes) finishing in a very small time period. To the credit of the pilots and crews, I am only aware of one collision on the ground after a landing. It was not unusual to see four and five sailplanes on base and final at the same time for the same runway.

The European style of flying is strongly oriented towards gaggle flying. We call it leeching here. Some pilots would simply get on top of a thermal and stay there until others led the way. On one day I flew with one of the top finishing pilots the whole day. He led once. I related this story to Ray Gimmey who passed it off. This pilot attached himself to Ray the next day. We called him "Super Leech". By never leading, these pilots would position themselves so they could take advantage of minor errors as the other leading pilots would travel to the next thermal. When the next cloud would be reached, the leech notes where the leading pilot finds the best lift and begins to thermal. This saves considerable search time. Towards the end of the flight the leech should be in a position to be above the good pilots and then be able to finish before the pilots who lead the whole flight.

There was considerable discussion about the problem. Maximum task setting was seen as a major problem as it was not possible to play startgate roulette to get rid of these people.

POST tasks

The Europeans hated this task. As one of the past world champions stated, "We won't find out who the world champion is until the next world contest." I always liked POST until the Worlds when the task was used without intelligence. The task setter simply declared that every third day would be a POST day. On one day, all classes had POST. Our seven member team was so divided on the assessment of the day's weather that we all went different directions. If good pilots cannot figure out what is the best direction for the weather information available, then luck plays a too important role. The POST task must only be used on a specific set of conditions.

Team USSR

These folks came with no money! Many Uvalde residents helped them. The team brought some hand–painted pottery from a company in Russia that is considered to be one of the best in the world. An auction was held to sell these beautiful pieces and a large amount of cash was raised. Some of the team members visited Doris and myself in our motel room and we became good friends.

Near miss

Bruce Dyson of the USA team was struggling at a low altitude and had just begun to make a steady climb when a T–38 fighter went by at such a close distance that he thought he might have been hit. A precautionary landing was made at a nearby ranch strip.

Measuring 15 metres

The current interpretation of a 15 metre sailplane allows the sailplane's wings to be bent up to fit through a 15 metre space. Bruno Gantenbrink from Germany had the only sailplane (Ventus) with winglets to fit through the required space with no bending. In one case, six people were required to bend a sailplane's wings sufficiently. Ten sailplanes flew with winglets. •

An offer I couldn't refuse

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sure that the upper ridge was the right choice. "Ah," he explained, "we needed a good last climb before the second turn, and I knew we would not find it on the top ridge, but there is a rock outcrop at the end of the low ridge that I was certain would provide what we needed." And so it proved to be. The HUDIS started to sing as the lift increased to 14 knots, taking us to 13,000 feet before rolling out and heading over Mount Segal for the turnpoint.

We took the turnpoint pictures at Farias Wheel Airport from 11,300 feet. I activated the fixed cameras and J–R took the handheld insurance shot. Then we turned for home, skimming across the spine of Mount Segal, before dropping down the slope into the Carson Valley. We came in from the Pine Nuts at 110 knots, speeding up to 130 during the last few miles. J–R got on the radio to owner Lee Hallerberg, "I am not planning to maneuvre," he promised, recalling an earlier, even faster and bumpier, final glide, when Lee had cautioned J–R, "Do you know that the maneuvering speed of this glider is 100 knots?" After the landing, a quick cockpit calculation showed that one hundred and eight kilometres in less than forty one minutes gave J–R the new French record at 160 km/h.

It was a pleasure to fly with J–R in Lee's beautiful glider. J–R has several thousand hours in gliders, and several hundred in the ASH–25. Two Five Hotel is a wonderful sailplane with state–of–the–art instrumentation and I am very grateful to Lee Hallerberg for letting me have two memorable flights in his ship. I learned a lot during these two flights and had a great deal of fun too. As I said to Jean–Renaud, maybe we should make flying together in Lee's ASH–25 a habit — every time we do it, we break a record!

And so, after almost three weeks of interesting flying, we said goodbye to Minden. Michael made his Gold altitude but did not get a good enough day to complete Diamond distance. The weather was something of a disappointment and we did not manage the 500s, 750s, and 1000s that we had dreamt of. Nonetheless, we had some spectacular soaring in two superb gliders over a landscape that is rugged and intimidating but always beautiful and awe inspiring. This is one of the best places in the world to fly sailplanes, with good ground support in the shape of Soar Minden and High Country Soaring, and I recommend it wholeheartedly. •

BUILDING "57"

HOW TO MODERNIZE AN OLD GLIDER KIT

Ed Hollestelle
SOSA Gliding Club

Back in the winter of 1988 I wrote a little blurb in *free flight* about building an HP–18 from an untouched kit that my son Eddy and I picked up in El Paso, Texas in the fall of 1987. It also mentioned some of the proposed changes we intended to make from the original design.

The idea was that if we simply built the airplane as designed, we would end up with "just" an HP–18, of which many have been constructed all over the world and have proven to be a nice performer, but it uses yesteryear's aerodynamic concepts.

I flew the Peter Masak built HP–18 many years ago which by then was (and still is) owned by Kurt Hertwig and Simon Davies of the London club. The flying position reminded me of my Diamant 16.6 that I once owned but with even less headroom. I found the side mounted control stick very awkward, and aileron control was marginal to say the least. In 1976 I had completed an RS–15 and enjoyed about 500 hours of cross–country flying with distinctively more comfort and much better handling.

Let me explain that the two wings and the control surfaces are identical but the RS–15 ailerons hinge on the top (more up deflection) and the "18" ailerons hinge on the bottom and have considerably less up deflection. I guess the fact that the HP–18 has less aileron response demands more rudder control and that's hard to get out of a V–tail. There's no doubt however, that the "18" fuselage is perhaps the sleekest design to date. And, after building the RS–15 some 16 years ago, I was quite sure the airfoil could be changed to a faster, more modern one.

So we decided to make the following changes:
- a centre stick
- a faster newer airfoil
- increased aileron control
- increased water ballast
- a better seating position
- a one piece canopy
- added optional wingspan
- a "T" tail

I talked these ideas over with Dick Schreder who was all in favour. He told me he went with the Wortmann 67–150 because it was the latest proven airfoil section available at the time. The aileron control can be increased per Schreder's latest mod by adding the last flap section to the aileron (a 30% increase in control area). The wings are constructed out of a metal box spar with machined top and bottom caps, and foam ribs spaced every four inches. The rear spar is a tapered metal U–channel which is epoxied to the end of all the ribs with the open end facing backwards to provide the flap and aileron attachment. Spacers are glued in between every rib at a four inch spacing so the whole wing interior is a four inch square honeycomb. This already strong structure is then covered with .025" aluminum skins (with a pre–bent leading edge radius) out of two sections which are epoxied to the ribs and main spar and riveted to the rear spar.

My experience with the RS–15 was that if proper care is taken in sanding the ribs, a very true airfoil can be achieved. The problem however, was the choice of a new airfoil. The airfoils used on the newest generation sailplanes are designed for the use of boundary layer control or turbulators. They are more critical than the older type laminar airfoils and are usually pretty thin. The Wortmann 67–150 is only 15% thick (that is what the "150" stands for).

Months were spent trying to find an airfoil that would give better high speed performance, retain the docile handling, and have good climbing qualities. It also had to be similar enough to use the existing main spar, ribs and rear spar, and it had to be 15% thick. Blow holes are pretty complicated so we were restricted to turbulator tape.

You guessed it, it did not exist! At least I couldn't find it. I also found out in the process that all the current designers all had their own idea of what a perfect airfoil should look like. So the best way to make it work would be to design my own. So I did. Care was taken in making the airfoil true from root to tip by making many templates of the top and bottom surfaces).

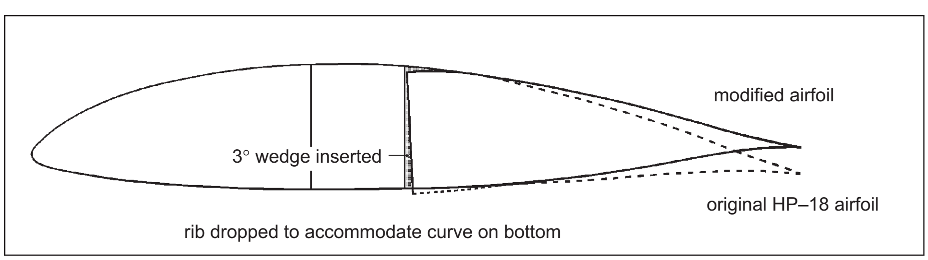
The wing interior structure was constructed with the airfoil as per the original design with the addition of two aluminum pipes 3 inches in diameter bonded into the ribs in front of and behind the spar for additional water ballast. They run from the root to about half the wing span — they're just visible in the photo. Then I cut the wings in two lengthwise 3/8 of an inch behind the main spar! Every single rib (90 of them) was carefully cut with a hacksaw blade to leave as straight a cut as possible. The metal root and tip ribs were also cut at that location. So now each wing was in two fairly stiff and manageable pieces.

I made a metal jig to make 90 or so foam wedges of exactly 3 degrees from big (root) to small (tip) in pairs. The wing structure was then bonded back together on the building table by setting the back half (a straight structure by itself) onto the wedges which had epoxy on both sides. An offset to the ribs was necessary to match the new curve on the bottom rear of the airfoil (see drawing below). Care was taken that the offset was tapered to the tip. The fact that this procedure was done on the building jig on which the original structure was constructed, and the fact that both halves were straight to begin with made it possible to align them perfectly straight again.

The metal root and tip ribs were then spliced back together by riveting a metal plate over the cut. Then came the tedious job of cutting 90 or so pieces of foam to fit the gap created at the top joint of every rib. The ribs were then sanded to the new contour (using the many templates I had made with the help of a reducing photocopier) and, voilà!, we did it.

Before the wing skins were fitted and installed, I made a spar extension so we can add a wingtip at a later date without having to cut into the tip. I also vented the water ballast tubes as I had done with the RS–15.

In the meantime John Murray of Eastern Sailplane found me a complete stick assembly from a crashed LS–4, and it fitted nicely into the HP–18 cockpit floor. After we removed the original "hump" in the floor we fibreglassed the whole assembly into the right spot and rebuilt the new hump and glassed in the push/pull tubes for aileron and elevator on the right hand side. A new bellcrank assembly was designed for the aileron drive incorporating



more differential made possible by the use of new Mylar seals on the top gap of the aileron instead of the “up” restricting metal ones, and the elevator rod connection with the original mixer had to be redesigned.

The landing gear handle is located on the right where the side mounted stick was to be on the original design. The flap drive was modified to incorporate a six inch disk with holes PIK–20B style (see picture of cockpit) to allow flaps to be set and locked at any position freeing up the left hand when needed.

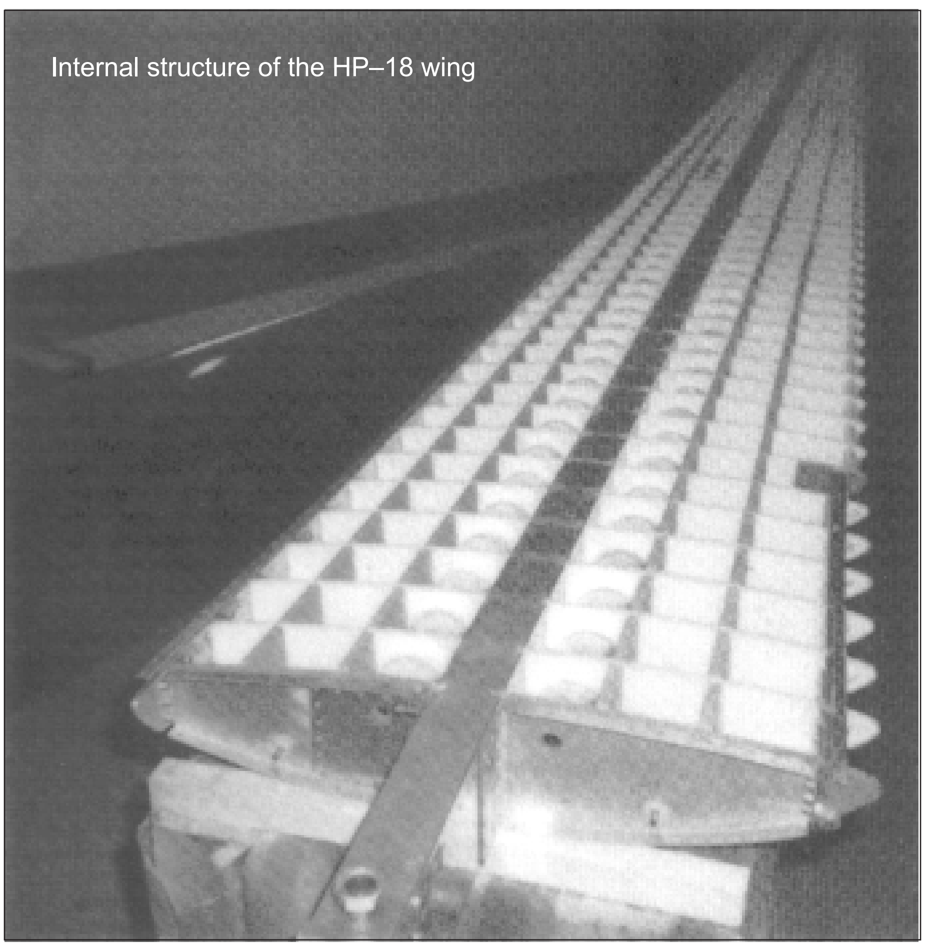
Looking back now, I think that up to the point of redesigning the airfoil I was enjoying the building and Eddy was learning many skills in the process. Once the wings were completed and the skins bonded and the fuselage and aileron modifications completed, I felt a strong urge and desire to find out the performance and handling of our new creation.

The big push was on and a lot more “overtime” was spent to get all the time–consuming little details completed. Finally, in May 1991, we got our final inspection and the paperwork was sent in to the RAA who in turn submitted the total package to DoT.

New wing fairing shaped from foam and glassed into fuselage behind turtledeck

photo unavailable

In the interim we “fine–tuned” the wings. We used a high–solids polyester primer on the wings (DuPont 1020R, a European product) to smooth out any uneven spots. A total of six coats (two in one spray session) were applied, with hours and hours of sanding in between. The sanding was initially done wet, using a three foot straight aluminum U–channel two inches wide with 240 wet sandpaper glued to it. We soon found out that the suction of the bar on the .025" aluminum skin was enough to pull the skin up to actually sand the space between the ribs and the spacers instead of the ever–so–slightly protruding ribs. When we switched to dry sanding we started getting a much better result, but it made for a very messy and unhealthy job. The high solids primer is very easy to sand but the fine brownish/yellow dust soon turned the shop into a “desert storm” scene. My overhead forced air gas heater would blow it into every little nick and corner. The best results were accomplished by letting the bar slide 45 degrees to the leading edge by its own weight altering direction frequently. This turned out to be very time consuming but after six coats we were satisfied and ready for the final paint.


Internal structure of the HP–18 wing

The final coating is a product from California called “Polylux” which is used by most fibreglass refinishers and repair shops in the US. It is a product similar to the famous “Prestec” but not as expensive and easier to sand. It is a polyester paint that looks and smells like gelcoat but is much more viscose. After adding the MEK hardener, it sprays on quite nicely. With about 15 minutes flashtime in between, two heavy coats can be applied in one spray session. The coating sets in a few hours and dries hard to sand in about 12 hours without any “shrinkage”. This makes it ideal to sand and polish.

We sanded the wings, fuselage and tail with 600, then 1000, 1500, and finally 2000 wet. The finish looks as good as if not better than polished fibreglass. Eddy used a gray and white spatter paint inside the entire cockpit area to give it a “factory” look. The instrument panel face was baked in the oven at home (Mom must really love us guys) with a wrinkle finish.

The initial flight permit came while I was flying the Worlds in Uvalde in August, and when I returned to Ontario on August 14th Eddy was just about ready with the trailer fixtures and dollies etc. to take the plane for its maiden flight. We still had to install the Mylar seals on the top and bottom of the ailerons and stick the zig–zag turbulator tape on the bottom wing surface exactly 67% behind the leading edge. I also covered the bottom flap gap with Mylar by using very wide Mylar taped far enough forward of the gap to allow the 90 degree down deflection without ripping the bond. My winglets were not quite ready so instead of rushing them we quickly made a set of temporary wingskids/fairings. On the Labour Day weekend we trailered the plane to Brantford airport for the initial test flight, and on Sunday night September 1st it made its first flight. It flew “right off the drawing board” with no adjustments needed.

With the extra 30% area and 5 more degrees up, the aileron control was an amazing improvement. The plane immediately “grooved” behind the towplane as we took it up to 5000 feet. After release, I took it through its paces and I was more than pleased with the way it handled. The stall occurred at 36 knots and was preceded by a warning shudder. It mushes nose down with no tendency to drop a wing. With the stick still all the way back, it repeats the same procedure by itself with a steeper nose up attitude.

The improved roll rate and the centre stick made a big improvement on the original design. All controls seem to be adequate and very pleasant. After the test flight, it was Eddy’s turn, and after one flight at Brantford to get used to the flaps–only landing, he flew it back “home” to SOSA.

We haven’t been able to do any accurate flight performance testing, so we have no numbers, but during the many long comparison flights that Eddy made, the performance over the entire speed range seems to be there.

Several weeks after the test flight I finished the winglets which are designed using Peter Masak’s criteria for height and angles but using my own airfoil and tip design and they incorporate a wing skid as well. Eddy made the first flight with the winglets and was very impressed with the improved handling.

Paul Thompson in his LS–4, “T2”, did one of the first comparison flights. It lasted many hours, and several real long runs at different speeds were made with absolutely no performance difference right up to 105 knots. This was the highest speed they tried that day. Afterwards we discovered that “57” was flying at a 120 pound weight disadvantage. So there should be even better performance once we fly with water ballast. That same day I put my Ventus together and went up to look at “57” from the air. Conditions had weakened considerably but we managed to stay up for a few more hours. The HP–18 climbed better than my Turbo Ventus and the LS–4 had no big loss on the run.

There are a few refinements that I should mention. The counterweights on the ruddervator tips were completely rounded–off and faired. Also the fairing at the flap area of the wing/root junction is a new one. When I changed the airfoil I also had to change this fairing. So we ripped out the old and designed a new one to fit the new airfoil. Instead of the original zero degree position, we set the fairing at the –3 degree flap setting to minimize drag with the use of negative flaps (the same is done with modern ships like the LS–6). The idea is that you hardly ever fly at a flap setting of zero degrees. On the run you fly with negative flaps (now faired–in properly) and the other flying mode is “thermalling”, using a positive flap setting.

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Cockpit with flap disk and LS–4 stick assembly

This winter the plumbing for the water ballast will be completed so we can test the performance at the higher wing loadings. We will have two dump valves, one for the main spar tanks (20 gallons) and one for the secondary system (14 gallons). That gives us the option of dumping either one in flight and know exactly how much is left.

I am working with the people at “Cowley Canopies” in California to design a new one–piece canopy that will be about 3.5 inches higher at the back to give a more comfortable seating position. This will require redesigning the turtledeck and a new canopy frame with a side or front hinge system.

A disk brake would be a nice safety feature, and sometime in the near future we will add the additional wingspan in the form of removable wingtips. At this time it does not look like we will change the V–tail as the handling is quite acceptable. •

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The moment of truth. Ed about to takeoff on 57’s maiden flight.

RAY'S CLUB CRAWL

Ray Richards
Regina Gliding & Soaring Club

IN MARCH 1991 I was in England and had the use of a car so that I could visit some of the gliding clubs. It was not the best time of year for soaring but it was certainly better weather than my fellow Regina club members were enjoying at the time. First, my wife and I drove to Talgarth in the Black Mountains of Wales. This club is well known for ridge and wave flying. It was not easy to find the field but we arrived after driving along some hedge and rock bordered roads that were muddy and slippery due to the rain. This is a very beautiful location but not a site that we in North America would pick for a gliding field. It was not level and was not any longer than was needed — in fact it seemed to me that a good stiff wind was a requirement to a safe takeoff. There were some pilots from a Yorkshire club waiting out the weather in hopes of getting wave conditions later on. I had a chat with them in the somewhat restricted confines of the office/lounge. I learned that their tugs were equipped with four bladed propellers and mufflers to meet noise abatement requirements. The weather was not good enough to stay longer (nor was there room) so we did tourist things in Wales in hopes that it would improve the next day. It was still raining a couple of days later so we left Wales and went almost to London. We spent the night in Maidenhead and the next day went back west a little way to the Booker Gliding Club. Now this was an experience.

Booker is a huge club that operates from an airfield that is busy all the time. I met the club manager, was invited to look around and I would find the double decker green bus out on the field somewhere which marked their operations site, introduce yourself and wait your turn for a flight. The British Airways Flying Club, with facilities all done up in BAC colours, operates here. There is an aerobatics club, and two helicopter flight training schools with at least six helicopters buzzing around the field perimeter about six feet above ground, and several large helicopters operating for newspapers or TV stations were coming and going. My head was on a swivel.

It was clearing a bit so I wandered out along the great lines of parked glider trailers. I met the club's assistant CFI and helped him rig a new Polish SZD–55, a Standard class sailplane. It looked nicely finished. It is very light weight. This chap said they felt that it would outclimb a Discus, that it might not be as fast but it was about 60% of the price of a Discus.

I then saw a Mercedes drive by and park next to a trailer with the markings of an ASH–25 on it. A trailer hitch does look a bit odd on this car. My offer to help him rig it was accepted and I was just elated to get my hands on such a marvellous, beautiful plane. It was the motorized version. It took only a few minutes to rig. The Mercedes was used to tow it to the takeoff point. The wing wheel and tailbar were put into the "boot" and a few minutes later it was gone. It is really something to see the wingtips flex upwards by what looks like several feet when it starts its takeoff. Beautiful to watch, almost 60 to 1, at a cost of £80,000.

There were only three tugs operating that morning, but finally my turn came for an ASK–13. The instructor was very trusting and let me fly it. We were taking off at an angle towards the paved runway used by the power planes so the pre–flight instruction was to do a 90 degree right turn in order not to cross the line of the runway. I don't think we were at 200 feet when the turn was made. This took us over a village at perhaps 800 feet, but that's the way it goes. By the way, the towrope was 5/8 inch, and we had to release at 2000 feet because they are not allowed to fly above that. Booker is on the western edge of the Heathrow control zone. One must fly a few miles north or west to go up to 3500, and a little further to go to 4000 feet; the rest I don't know about. From 2000 feet, Booker pilots regularly depart on 150 km triangles.

"Fly over towards that parking lot, it usually generates a bit of lift," and we found about half a knot which we worked but only back to 2000 feet. The landing approach was over a valley, a busy roadway and a bunch of trees and seemed to be about 100 yards east of the route used by the TV helicopters.

Rates were £5 for the day membership, glider rental to the highest five minutes cost me £8 and £15.60 for the tow, £28.60 total. Booker is an interesting place.

My next visit was to Lasham, where I had flown in 1990. This is a busy glider field when the weather is flyable. As the sun was shining the day I arrived around noon my name was so far down the list for a glider that by 4:30 there were still enough names ahead that I didn't stay longer.

The Lasham field is huge. They use Rally tugs with four–bladed props on a runway built for 747s and a four cable winch operates right beside the runway. A launch in excess of 2000 feet is possible off the winch. The launch point is about a third of the way down the runway which makes for great efficiency as the tugs land behind the launch points on the grass to the right of the runway and the gliders land on the grass to the left of the runway and behind the launch point. The tugs just roll up to the launch point, turn on to the runway, are hooked up and take off as soon as the cable position permits it. Dan Air have a large maintenance facility at Lasham, so when a DC–10 needs the runway the gliding shuts down and moves aside for 20 minutes or so.

My next visit was to the London Gliding Club located at Dunstable, which is approximately a half hour north of the London ring road — at European speeds of 85 mph on the motorway. This is another huge club with around 600 members of whom 300 are said to be quite active. It is a nice friendly place and good meals are served. Here I ran into the pilot of the ASH–25 again. And I helped a couple of older chaps (my age) de–rig a new LAK 25 metre Latvian–made sailplane. The trailer for this sailplane was made in Russia and it was built like a rail car. The rear door swung down on hinges as a ramp. Two of us stood on it and it did not flex an inch. It was a brand new two–seater LAK that had just arrived in the UK the day before and had only flown twice. The cockpits were finished in a basic style. The exterior finish of the fibreglass looked very nice. After seeing the ASH–25, the LAK looked heavier and not as race–horsey. Apparently the LAK is priced much below the German sailplanes, and at that time delivery was said to be prompt.

I managed to get my first three winch launches there in an ASK–21. Because of the low cloud they had shortened the amount of cable used. This time the instructor asked to see my logbook. His instructions were to adopt a normal takeoff attitude and the glider would takeoff itself, keep the wings level, the airspeed at 60 knots. It was up to the winch driver how high we went, and when we stopped going up, I then was to level out and release. It took 12–14 seconds from all–out to release, and as we were getting to 1000 feet the climb rate was 5000 ft/min. Quite a ride up! The winch driver is the key, he was a full time employee of the club as were several other instructors.

There is no runway on the Dunstable field — it is just a large grassed area with prominent rolls in the terrain deep enough that a tug and glider go out of sight in them. Winch operations were in one part of the field, tugs were operating in another area and gliders were landing where it was appropriate to get close to the winching point or the towing point. The winch operator and tug pilots would not power up with a glider on final. The landing glider had to pick a safe spot. People towing gliders back to launch points were responsible not to cross the paths of incoming or outgoing gliders until safe to do so.

Costs here were £5 for a daily membership, £4 for a winch launch, and £0.37 per minute for glider rental. There are some altitude restrictions one direction from the field. They have a winch with eight cables. It was made in Holland and has a diesel engine which I was told was 350 horsepower. A farm tractor is used to pull the cables back to the launch point. They have a variety of tugs, one of which was a Chipmunk.

Three long rows of trailers contained every sort of glider that you cold imagine according to the markings on the trailers. For safety they had installed cement pilings with a trailer ball on top to which the trailers were connected plus there was a tie–down at the rear of each trailer. This was mandatory so that no trailer could be blown over to damage others. I am going to do this for my trailer as I have been using screw–in anchors with a rope.

In October I was in England again and I had time to go to Duxford, primarily because I wanted to see all the airplanes they have in the museum there. Duxford is near Cambridge

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SELECTION OF WORLD TEAM PILOTS

– a proposal to eliminate ranking by vote –

SOARING TO WIN is a goal of many pilots — a natural one that comes after living the excitement of learning to fly; finding and using the elusive upward thrusting air currents; striving for FAI badges; enjoying the freedom to roam skies with friends; challenging oneself to get the most out of each day; controlling a sailplane with ever increasing fluidity and skill; going further and faster elegantly; expanding the adventure with wave, ridge, deserts and mountains; building judgement, discipline, stamina and quick decision making capabilities. The temptation to measure oneself by direct competition comes along and, presto! you are soaring to win. The beauty of soaring is that each of us can stop or remain at any level with continuing pleasure. Not all are seduced by the competitive urge. However an increasing number of our pilots have been striving over the years to enter the sport's ultimate competition, the World Soaring Championships.

Forty years ago, 1952, the first Canadian pilots went overseas to compete on a world stage. Shorty Boudreault flew a Weihe while Barrie Jeffery and Frank Woodward flew a Kranich II at Cuatros Vientas, Spain. They set distance to goal records of 124 km in both single and multiplace open categories! In 1956, Frank Brame and Jack Ames flew at St Yan, France and Frank raised the distance to goal record to 335 km. The siren's call was and continues to be heard!

Levels of equipment sophistication and pilot prowess have risen steadily since then. Look at the statistics generated at Uvalde last summer. Who would have dreamed that a Canadian would fly 145.3 km/h over a 616.8 km course and stand 25th out of 44? (The winner that day accomplished 156.6 km/h!) The challenge endures.

How have Canadian teams been selected?

In the beginning, the most accomplished pilots were apparent. They sorted out team assignments, partly on the basis of who had the time and money to go — a kind of rudimentary peer selection process.

As the 50's progressed, pilot interest grew swiftly and so seeding list and preferential voting procedures were formalized. (Memory says it was modeled on the United Kingdom system). With refinements, the process has produced teams ever since.

Are new procedures needed?

It must be admitted there have been growing signs of querulousness and strained relationships as more and more pilots have sought to make THE TEAM. Rumblings have implied that the current process favours the most experienced pilots as long as they stay reasonably active. Newer pilots feel that direct competition should be the basis for winning places on THE TEAM, so that they might make it before they are old and grey.

Seeking a harmonious resolution of the issues involved, the SAC Board instructed the Sporting Committee to review and recommend. Therefore your Sporting Committee held meetings attended by all pilots at the Nationals in Pendleton and by the Canadian pilots at Uvalde. These pilots unanimously agreed that a competition points system should be the basis for Team selection, eliminating any need for voting.

How do other countries select teams?

While in Uvalde, George Dunbar, as a member of the Sporting Committee, talked with team managers from the UK, the US, OZ and New Zealand. (To keep the explanations clear, time is expressed in terms of: a World Soaring Contest (WSC) year is "Y"; the year of team selection is "Y–1"; previous years are "Y–2", "Y–3", etc, going back in time.)

In the UK, a team squad (a seeding list) is formed in Y–1. It includes pilots of the previous WSC team plus the top five pilots from each class of the National competition held in Y–1. Typically a squad of twenty or so pilots results. Then all vote preferentially to establish the team selection list.

In the US, straight competition determines a WSC team. Pilots are scored by class using the formula 52% of Y–1 National results plus 48% of Y–2 or Y–3 results, whichever is greater. For a given Nationals, a pilot's raw score is calculated using his total contest points divided by his class winner's total points. One wrinkle, pilots who attain a position from first to third in any class in the previous WSC can factor in that performance in place of a Y–2 or Y–3 Nationals score.

In OZ, straight competition determines a WSC team. The three class winners in the Y–1 Nationals are automatically on the team. The remaining team members are chosen by using 60% of Y–1 plus 40% of Y–2 National results.

In NZ, straight competition determines a WSC team. Pilots are scored by class using the formula 60% of Y–1 plus 40% of Y–2 Nationals results. Apparently, because their competitions are six months out of phase with the WSC, they assume no interference between a WSC and a Nationals in the same year.

What to do in Canada?

Generally, it is felt that the WSC team selection process should attain the following goals:

- find the best CURRENT pilots,
- encourage Canadian pilots to compete in Canadian Nationals.

A formula approach would:

- make participation in Canadian Nationals a necessity, improving its stature and the value of the learning experiences gained by newer pilots,
- give fast rising pilots an equal chance to make a WSC team.

It is proposed that:

1 The current selection process be replaced immediately with a formula method so that the 1993 WSC Team can be determined right after our 1992 Nationals.

2 Results of the Y–1 plus the Y–2 or Y–3 Nationals be factored to produce graded lists of pilots *by class*. (In this transition year, pilots who participated at Uvalde could be allowed to use their WSC competition results in place of Y–2 or Y–3).

3 WSC team pilots be chosen from the top of the graded class lists.

4 Consideration be given to automatically putting the top placing pilot at the last WSC (determined by comparing each pilot's total contest points expressed as a percentage of the class winner's points) on the next WSC team.

5 Grades be calculated for each pilot as follows: for each Nationals

$$N = 100\,(P_{pts}/P_{max})$$

N = pilot's rating
P_{pts} = pilot's final score for the contest
P_{max} = class winner's final score for the contest

then let $G = [f1 \cdot N_{Y-1}] + [f2 \cdot (N_{Y-2} \text{ or } N_{Y-3})]$

G = grade
$f1 + f2$ = 100%
N_{Y-1} = pilot's rating for Nationals in year of WSC team selection
N_{Y-2} = rating for immediate past Nationals
N_{Y-3} = rating for next previous Nationals

note The values of f1 and f2 will be chosen at the SAC annual general meeting in February, 1992. It is suggested that consideration be given to values 70/30, 60/40 and 52/48.

6 The SAC Procedures Manual be revised accordingly. This would involve Sections 3.21.1 and 3.21.2 entitled "Competition Seeding List Procedure" and "Canadian National Team Selection".

Helpful inputs for this submission came from present and past Sporting Committee members plus many competition pilots. As well, all relevant SAC files that could be found were appraised.

C. M. Yeates
Chairman, Sporting Committee
November 12, 1991

NATIONAL SOARING CHAMPIONSHIPS

Proposed rule changes

IN THE PAST the rules for Canadian championships have been based generally on FAI rules, plus those used at world championships, with some changes where it was felt Canadian conditions required them. In 1991 the Sporting Committee polled most of the Canadian competition pilots concerning what changes should be made to the Canadian rules. The following, based on the results from this survey, describes the changes being proposed. Comparisons will be made with rules used in previous Canadian national soaring championships and in the most recent world soaring championship. These two references will be abbreviated to CNSC and WSC.

1 Several changes in terminology should be made to ensure that the rules are not ambiguous, yet easily understood:

- When turnpoints are referred to, two specified points are now involved. These should be referred to as the "target", (or "phototarget"), which is the point which must appear in the photograph, and the "turnpoint", which is the point over which the sailplane must be when the photograph is taken. As a memory aid, one may remember that the sailplane turns at the turnpoint. All distances are to be calculated with respect to the turnpoint, not the target.

- All tasks shall be speed tasks over either "an assigned course", or "a pilot selected course". The latter has always been referred to as a "pilot option speed task" (POST) or a "pilot option task". Use of these latter terms should be avoided. An assigned course task will include a start point, one or more turnpoints, and a finish point. A task with a pilot selected course will generally have a maximum flight duration.

- When a time limit is specified for a task with a pilot selected course, a penalty shall be applied if an outlanding is made beyond the specified final time.

2 With reference to tasks with pilot selected courses, a number of rules have been proposed about the repeated use of a turnpoint. The purpose of this is to limit the number of out and return flights that may be made between two points. To make this rule more easily understood, the wording used in the 1991 WSC is proposed, as follows: "A turnpoint may not be used again until after using at least two other turnpoints."

3 In calculating points in recent Canadian nationals, and in the WSC, two special factors are used. The first reduces the potential maximum points available for that day. Thus an adjustment is made on days when conditions turn out to have been better than expected, and the task is completed in a relatively short time, indicating that the task was not difficult enough to be a good test of pilot skill. The second factor is a day factor, which reduces the points awarded to all pilots when the majority of the pilots have not been able to do as well as expected.

In the WSC, the maximum daily points are reduced in an assigned course task if the winner's time is less than three hours, and in a task with a pilot selected course if the maximum marking distance is less than 350 km. The day factor is reduced when 75% or fewer of the competitors achieve a marking distance of at least 100 km.

It is proposed to use the WSC system, with the following changes for the differences in the Canadian scene:

- The daily maximum points available for an assigned course task will be reduced if the time for the fastest finisher is less than two and one–half hours.

- The maximum for a pilot selected course task will be reduced if the maximum marking distance is less than 250 km.

- The day factor will be reduced if less than two–thirds of the competitors achieve a marking distance of 50 km.

- The day factor will never be less than 0.2.

4 The penalty for overtime finishes in a pilot selected course task has been applied in CNSC in a non–linear manner, with greater rates of penalty for larger amounts of overtime. This becomes difficult to estimate and understand. The system used in the WSC is proposed, which sets the penalty (applied to the distance achieved) at 1.75 times the distance the pilot could have flown in the overtime period.

5 The calculation of points in assigned course tasks in the CNSC uses generally the same form as in the WSC. The following are proposed for future CNSC, to make the rules closer to the WSC:

- Distance points will be calculated based on the ratio of a pilot's distance to the maximum distance for that day, rather than the distances minus 20 km.

- Basic weighting between distance and speed points will be one–third for distance and two–thirds for speed, rather than one–quarter and three–quarters.

- For CNSC, this weighting will be adjusted each day according to the number of pilots achieving at least one–half the winner's speed, rather than two–thirds of the winner's speed, as in the WSC.

6 Points calculated for a pilot selected course task are the same in CNSC and WSC, although the formulas and definitions are different. The WSC wording is proposed, as it seems easier to follow. This awards a maximum of 500 points for distance and for speed. Each pilot receives points in proportion to the relation of his distance and speed to the maximum values for these variables.

7 Present CNSC rules apply a severe penalty to a pilot who takes a turnpoint photo which does not show the target. It is proposed to permit a lesser penalty, provided that the photo shows the general area of the target, and that is shows that the photograph was taken when the sailplane was within two kilometres of the actual turnpoint. The amount of the penalty will be at the discretion of the Contest Director, with a suggested maximum of 20 percent of the maximum score achieved that day.

To obtain full credit for a turnpoint, the photo must show the target, and the sailplane position must be within one kilometre of the target. A penalty will be applied if the position is between one and two kilometres from the exact turnpoint. The turnpoint will not be allowed if the distance is greater than two kilometres. Note that the WSC rules use distances of one–half and one and a half kilometres; greater values are proposed for CNSC because of the difficulty of exactly determining the sailplane position.

A session will be held at the 1992 SAC AGM, at which discussion on the above proposals will be welcome. At this time, copies of the proposed rules will be available. Comments may also be forwarded to the members of the Sporting Committee prior to the AGM. If you disagree with some of these proposals, please let us know.

George Dunbar
member, Sporting Committee

UPDATE ON 1992 NATS

For a while, it didn't look like anyone was prepared to hold the '92 Nationals in the east. The contest was seen to be getting too expensive and too big of an organizational effort for one club to manage.

What has emerged over Christmas is a plan by a group of gliding clubs in Quebec and eastern Ontario to run a lean, no–frills "Chevy" style contest, using the facilities of the Montreal Soaring Council at Hawkesbury. An organizing committee has now been set up headed by the Quebec Zone Director, Pièrre Pépin. The proposed dates are 23 June to 2 July to take advantage of the time of best average soaring conditions for the area.

Organizational costs will be minimized, and no extras will be provided on site like "free" social occasions. Also, pilots and crews will be expected to actively participate in the running of the contest. (This may be the way it will be done more often in the future).

Approval of the MSC Board is still forthcoming at the time this is being written. More details regarding registration, et cetera will appear in the next issue of *free flight* which comes out in late March or early April.

When – and when not – to motor a glider

Walter Vergani
from *Volo a Vela*

AFTER THE POWERED SAILPLANES of the pioneer times, the powered gliders which had the widest diffusion were those fitted with a fixed engine, generally installed in front of the pilot, and a non–retractable, external propeller. These ships had sailplane wings, but usually a fuselage similar to that of the small general aviation planes, even if the landing gear was often of the single wheel type.

The advent of carbon fibre, and the consequent weight savings that could be achieved, bred a new generation of powered sailplanes, those fitted with folding, fully retractable propeller and engine. As we all know, such sailplanes can be either self–launching or self–sustaining, the difference between the two being that the former can takeoff independently, whilst the latter still needs the tug to become airborne, but can avoid landing out when lift does no longer work.

Two different categories of powered sailplanes have thus developed: those that have sometimes been defined “travelling” sailplanes (Falke, Fournier, ASK–16, Taifun, Stemme 10, Dimona, etc.) and which, as such, are a sort of hybrid, that is aircraft used for tourism and soaring, emphasis being placed on the former, and on improved safety. These are able to soar with the engine shut–down and fly some gliding circuits, although their prevailing use remains cross–country and local flying with the engine running.

The pilots of these ships are usually both glider and power pilots who enjoy flying, experimenting and studying soaring, in most cases without getting involved in competitions. The second category includes the sailplanes with self–launch or self–sustaining capabilities. These are generally recent, high performance, “leading edge” models. Their only handicap with respect to pure sailplanes is the slightly higher wing loading that cannot be decreased and which is not ideal when conditions are weak and if an outlanding must be made for whatever reason. Both these conditions can however be satisfactorily coped with by exercising due care.

Given the greater interest in the latter category, let us focus on it and on what the pilots of these ships want from them. The dream of all soaring pilots is to be able to do without the tug. This means to be able to takeoff when the gliding club is closed, or early in the morning, when too many gliders are lined up. This also means taking off from airfields where no towplane is available, or from lonely strips.

Another dream is to forget about outlanding and even more about long, wearing retrieves with car and trailer, or to be able to fly over uninhabited land with no risk of getting lost. These are basically the reasons for which self–launching and self–sustaining sailplanes were designed and are meeting with success.

It is also worth mentioning that the self–sustaining types have a lighter, simpler and cheaper powerplant and lower fuel consumption. Besides, the engine is more easily and readily removable, thus the sailplane becomes, promptly and if wished, a pure one for competitions and records.

However, the state of the art does not offer a cheap, light and small engine capable of providing an immediate power output, such as that of an electrical motor. This would be essential if the aim is to avoid an outlanding. A glider pilot is in the very end a person who loves betting: betting with the pull of gravity, the changing weather, fatigue and distance. A nice flight is not as such if it is not long, a competition is not fascinating if tasks are not demanding, if they do not reach beyond the area where the meteo can be positively forecast. A competition is beautiful if it is difficult, and the yardstick of difficulty is the ratio between those who make it home and those who do not.

We all saw very low gliders toiling to regain some height and leave a critical situation. We lived those moments when you try to avoid an inglorious “*aux vaches*”: minimum movements, window closed, breath held, one hand clenched on the stick, the other moving fast from one knob to a switch ... In such situations neither the engine, or even the engine bay doors, should move.

During the first motorglider world championships, pilots flew at altitudes at which either they found workable lift, or they would not have had enough time and hands not only to start, but even to try to start the engine.

The dedicated glider pilot gives up only when he or she pulls the airbrakes open on short final, and even then there might be the chance of pushing them in and go across the finish line, luck assisting. To compel a pilot to decide to give up early at 1000 or 1300 feet above the terrain is slicing away the proudest part of soaring, is renouncing living adventures that will never be forgotten.

To extract the engine at a safe altitude, or refrain from trying to reach a far away sunny spot, or crossing a large area of rain to attempt climbing over a distant ridge just for the sake of prudence is not easy. *Thus the self–sustaining engine, instead of enhancing safety, may turn into a source of additional trouble,* and all pilots should be aware of this.

Safety for a glider pilot is the availability of a good, landable field within gliding distance. On this the glider must land at minimum weight and minimum speed.

The current solutions, even if the engines are reliable, neglect an important fact: *starting is almost always attempted in conditions close to an emergency by pilots who are not specifically trained.* Human error is possible, and the starting operations divert the pilot’s attention from others that must be done to prepare the outlanding, as they overlap temporarily. Also, it is one thing to start the engine on the ground at the airfield, another to relight an engine which is possibly cold from previous flight at high altitude, and request maximum power from it immediately. An emergency system that needs an input of power and consumes altitude before providing you with the needed power and altitude is certainly not the best emergency system one could wish for. Its use requires prudence. At Rieti, a German pilot told me, “The engine ... I use it to take off, then I forget it.”

What is the solution then? Perhaps a solution should be designed which allowed the engine to be started inside the fuselage every time a low point is expected. This would postpone propeller deployment to the last instant. Also a sort of clutch should be fitted to transfer power to the propeller without delay. Easy to say, not so easy to do! •

New 406 MHz satellite distress beacon

Fred Wilson, Safety Director
Hang Gliding Association of Canada

IN RECENT YEARS there have been repeated rumours that the International Civil Aviation Organization (ICAO) will standardize controlled airspace around the world. The logic of this would be to avoid the confusion aviators exhibit with variations of the law as is applied around the globe. The hazards to us are that they may pick the lowest common denominator. It is really only in the USA that there remains what we would call freedom in the skies. Elsewhere, the focus has been to regulate as much airspace as necessary to safeguard commercial aviation.

Class B airspace is our greatest limitation. The primary barrier to accessing it is the requirement for a transponder on the aircraft. A transponder can communicate the exact three dimensional position of an aircraft, with its individual identification code to both Air Traffic Control and other air traffic via repeater stations or satellites. Transponders will likely become a fact of life for all aircraft flying in controlled airspace, including Class D.

However, one item aviation uses has become a lot more possible for our sport. I quote from *SAR NEWS 1991*:

"Mariners and aviators have been using distress beacons for over twenty years to pin–point the location of sunken vessels and downed aircraft. These beacons operate at 121.5 and 243 MHz which are the frequencies used for civilian and military distress transmissions, and were designed to be detected by passing aircraft or ships using standard radio equipment. In 1984, an international satellite Search and Rescue system called COSPAS–SARSAT became operational. The system picks up the old 121.5 beacon transmission, but a new frequency allocation of 406 MHz allowed technological improvements. … The 406 MHz beacons have location accuracies of 3 km as opposed to 20 km for the 121.5 MHz beacons. This translates to a reduction in search area by a factor of 45 …"

The following are definitions of two of the three types of satellite distress beacons (ed. note – the third being for maritime vessels):

ELT: (Emergency Locator Transmitter) This is an aviation distress beacon which is either activated automatically when the aircraft crashes or is activated manually.

PLB: (Personal Locator Beacon) This is a terrestrial distress beacon that is activated manually in the case of land based emergencies by people travelling in isolated territory.

The primary users of these beacons will be:

- adventurers, hunters, trappers and prospectors travelling into isolated and hostile environments such as the Canadian Arctic.

- isolated workers who fall under the jurisdiction of the Workman's Compensation Board and Labour Canada.

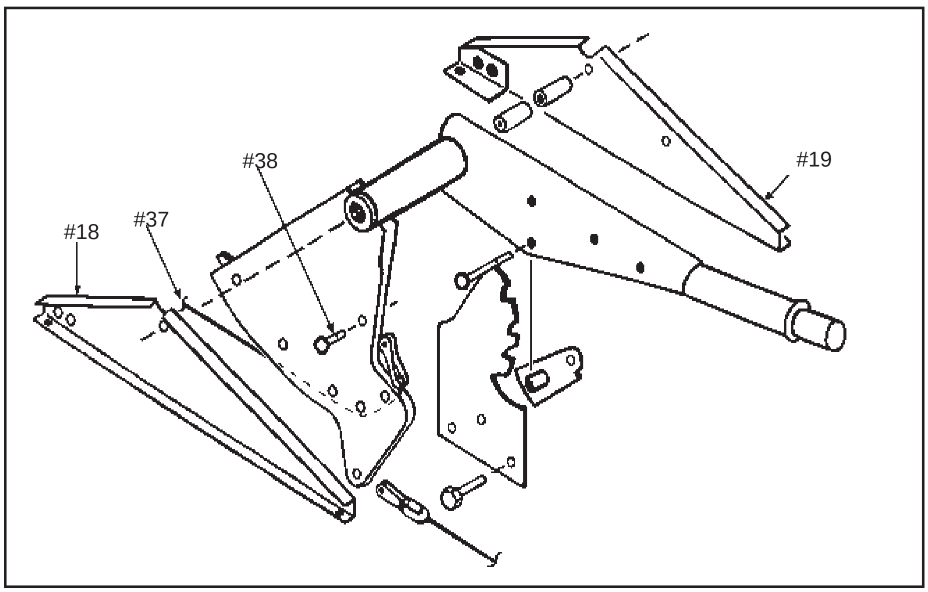
- aviators who are fortunate enough to survive a crash in isolated territory.

Location accuracy of these beacons is dependent upon all the elements in the system – local interference and the transmission angle to a satellite are particularly relevant. CMCC reports that 50% of 406 MHz beacon locations are accurate to within one kilometre. MPR Teltech Ltd. has achieved locations within 500 metres in tests conducted at its facility on top of Burnaby Mountain, BC.

Summary I hope that this article was successful in promoting the COSPAS–SARSAT system and 406 MHz beacon technology in general. In tests, the performance of the beacon and the system itself met expectations … greater accuracies are possible but good average results were demonstrated. The 406 MHz PLB is a new device which will assist SAR agencies in carrying out their responsibilities in an effective manner and will provide a new level of safety for those who must travel through or work in remote areas and hostile environments.

Authors note "SATFIND–406TM" is a registered trademark of MPR Teltech which is the research and development arm of BC Telephone. Current products include the SATFIND–406 EPIRB (for marine vessels) which is manufactured and marketed by Alden Electronics, Inc. of Westborough, Mass. The SATFIND–406 PLB is currently represented exclusively by MPR Teltech. Design work is currently underway on a size reduced model (shirt pocket sized) which will be marketed as the SATFIND–406 Pocket PLB. Other design efforts are currently being directed towards the 406 MHz ELT's and a 406 MHz directional finder.

Contact for further information:
Al Coppin, Marketing Manager
Emergency 444 Communications Products
MPR Teltech Ltd., 8999 Nelson Way
Burnaby, BC V5A 4B5
tel (604) 293–5774, fax (604) 293–5787 •



Technical advisory on the L–19 flap drive

The flap mechanism of the L–19 towplane is subjected to high loads, especially when operating at the fully–extended 60° position. Owners and operators of L–19s are urged to carry out the following inspection of their flap drive *as soon as possible* in order to ascertain the integrity of the mechanism. (This relates to the manual flap system, I cannot comment on the electrical flap drive system.)

The inspection relates to the FLAP–DIRECT mechanism which lowers the flaps. First, brackets 18 and 19 (which support the flap handle) should be inspected for cracks, especially around the bolt holes used to fix them to the cabin floor. Secondly, cable #37, which lowers the flaps, originates at bolt #38, wraps around an elbow immediately after the bolt, and then runs rearwards. This cable undergoes bending when wrapping and unwrapping around this elbow. Inspect the cable for damaged braids or strands at this point. (See drawing above which is a portion of Figure 70 on page 147 of the US Army Technical Manual TO 1L–19A–4.)

Inspection of the brackets is relatively easy. Inspection of the cable will require removal of panels on the cabin floor and *great care* to view the area in the vicinity of the elbow. If more details are required, I will be happy to try and supply them to you.

Michael Krieger
Quebec Soaring Club
(514) 646-2908 home, 647-3314 office

club news

A DECENT FALL CAMP

The Cowley Fall Camp was a good one this time around, unlike last year when it was snowed out but for one day with two early season October snowstorms. The Thanksgiving weekend started out with 25°C weather. It was odd watching mukluk and snowmobile suited pilots being strapped into the Blanik by bare–chested helpers.

The camp was held over eight days beginning with the Thanksgiving weekend and flying took place on six. Everyone got some wave flight experience, even if "classic" conditions were not present. The upper winds stayed out of the northwest most of the time, which gives a rather thin angle to the Livingstone Range, but were strong enough to produce wave regardless. Only two days midweek were unflyable when an arctic front came down and dumped the snow on most of the province. The hours prior to the front gave winds gusting over 100 km/h, but we had warning and everything was either derigged or very well tied down (memories of a Scout being blown over two years ago still fresh).

Forty pilots registered for the camp and eighteen gliders were present at one time or another. Not everyone could stay over the whole period, but Cold Lake was well represented for a small club.

The camp produced three Diamond climbs: Deirdre Duffy to 29,200 feet in the Edmonton Soaring Club ASW–15, Rod Crutcher of Cu Nim to 25,200 in his ASW–20, and Neville Robinson of Winnipeg to 25,600 feet in his BG–12. Don Matheson, over from Campbell River BC, flew his RHJ–8 to 23,700 feet but lost a Diamond due to a paper jam in his barograph. (Don is to be commended for helping out with the area checkflights since we were short of two place gliders.) Other good flights of note was a non–Diamond attempt flight to 31,000 by Bruce Anderson of Cu Nim, and Susan Bucher of Cu Nim soloed in the Blanik. Dave Wallace had a six hour flight in the wave with ESC's 1–23 to earn a Silver duration the hard way — he had to stay low most of the time to conserve oxygen and it took him twenty minutes to unthaw his heels after landing!

Pilots new to Cowley wave conditions had the flights of their lives, and two Cold Lake newcomers landed out their club 1–26 two days in a row after getting stuck in the serious sink behind Centre Peak near the primary. This 1–26 not being the easiest to rig, the prospect of retrieving the second time around didn't earn that unfortunate pilot many friends. However it was down only four miles away, and remembering last year's vision of the Edmonton Blanik being walked down the roads back to Cowley after a sans–trailer landout, the same was done again. A pleasant two hour stroll with your 1–26 through the Alberta foothills on a sunny afternoon was quicker and more enjoyable than a derig/rig cycle.

Tony Burton, Cu Nim

COLD LAKE UPDATE

The Cold Lake Soaring Club is just winding down from its 20th year of operation. Three major events took place this year — we overhauled our Scout towplane's engine, we sold our K7 to Peter Myers of the Bluenose Soaring Club and bought Jerry Vesely's freshly overhauled Lark as a replacement for the K7. Most club members have been checked out on the Lark and the pole–hogs are enjoying the increased performance. Six club members participated at the Cowley Fall Camp and all managed to experience a good wave flight except for Marek Wakulczyk, who would have experienced the wave a little longer and higher if he had a night rating. Bingo Larue attended the summer camp and flew his Silver distance but didn't escape his negatives being cut. He also put in a cameo appearance at the wave camp.

The club now has three active students after one left to continue university. Chris Yager managed to go solo after the instructors got tired of flying with him. While Chris was up on his first solo, on a calm summer's evening, the CFI was busy coordinating the positioning of the airfield foam trucks to provide the required water for the ceremonial dunking. Chris put up a valiant retreat, but was soon overtaken by the rushing jet of water. Too bad a little foam got mixed in with the water. We were assured by the fire fighters that foam is not toxic, which was good news for Chris as he was coughing up bubbles for a week. This winter, the club plans to cover our Lark trailer and get it roadworthy. Also, we plan on putting the finishing touches on our auto–tow equipment and start overhauling our winch. Club members will be looking forward to new and cheaper launch modes for 1992.

George Szukala, CFI

THE APPALACHIAN SEASON

Appalachien had a good year with two pilots soloing, plenty of cross–country flying, a new instructor, and a homebuilt BG–12/16 nearly finished by Doug Clement and David Lord.

Our members visited the Champlain club several times, including a Labour Day weekend competition when three were introduced to the excitement of longish XC flying with other pilots. My partner Michel Prenevost and I got a first in the "Classe Amicale", and Yvan Chassé did well in the Pioneer, GUMY (a flying wing). Yvan is the forth winner of the "Migrating Eagle" trophy, invented by Bob Hyam years ago to encourage interclub flying visits. After one unsuccessful try, Yvan completed the 100 km flight west to St Dominique. The hotshots from Champlain will be dropping in to reclaim it in the spring I expect.

Although the number of flights is down we ended the year on a high note — next spring we'll begin with three new licensed pilots, Natalie Hivert, Geneviève Ogez, and Martin Arsenault. AND... with assistance from Champlain and Claude Gosselin, we will be hosting the 1992 Quebec Provincials at Sherbrooke airport on 16–18 May. Our committee is now working to make this a success with the backing of the airport management and the city of Sherbrooke. Given good weather, the competitors and crews should have a ball.

Kemp Ward, CVVA

MSC NEWS

The '91 season at the Montreal Soaring Council was one of the better ones in recent years according to both the membership–at–large and the time sheets. A lot of people were not prepared for the fantastic conditions and didn't bother to declare goals on cross countries — thus losing out claims on 350 and 500 km flights. We had quite a few first solos, "B" and "C" badge claims, but not much else.

Despite harder economic times, and contrary to the trends at other clubs in the area, our membership grew to over 125, with an increase of younger students, Air Cadets, airline pilots, and people fresh off an introductory flight. Over 3200 flights were flown for a total of 1470 hours. Weekday flying made up one third of our operation thanks to the boundless enthusiasm of the "mid week crew", not to mention kind and understanding bosses.

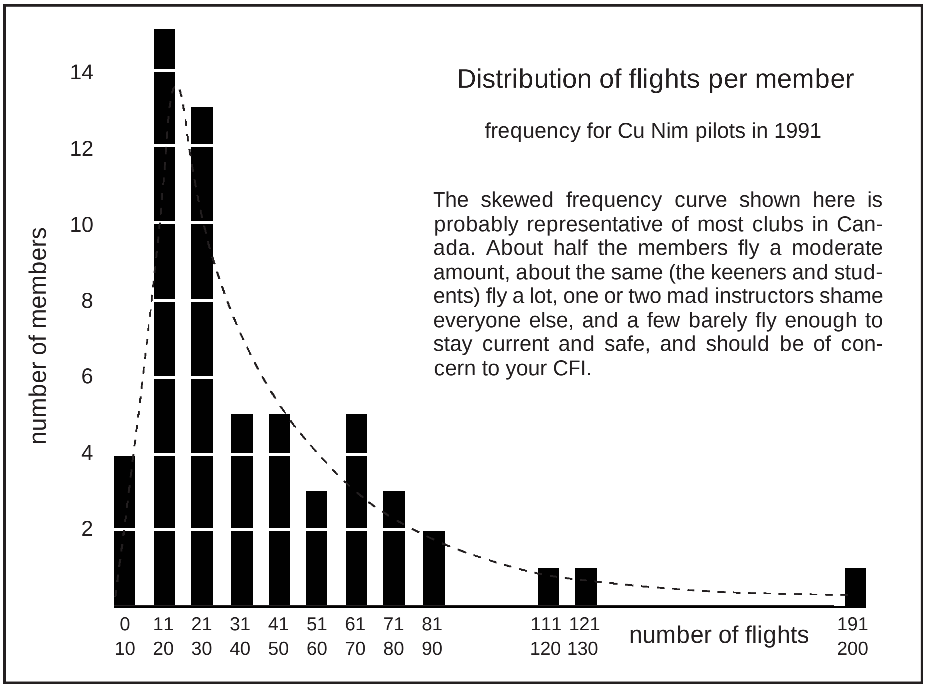
Besides some record personal bests on cross–countries, notable events included a very rare occurrence of wave activity over the airfield. On 31 August, Chief Towpilot Tony Brett found smooth lift on the first tow of the day, and soared silky smooth from tow release at 3000 feet up to 5000 in an idling L–19, before he aborted the climb. The second flight of the day, with Tony in a Blanik, went from a 2000 feet release to 7000 feet in rock steady lift running perpendicular to a long east–west cloudstreet just west of low hills on the eastside of the Ottawa River. Ironically, MSC's annual wave camp to nearby Lake Placid, New York was cancelled due to lack of commitment on moving equipment.

One of MSC's two Blaniks was sold and replaced with a lower time one. Our eagerly awaited new DG–300 Club arrived mid season. Despite arriving late, it logged 120 flights and 94 hours. We took delivery of the retractable wheel model, and the club is buying the water ballast system for it in 1992. With the addition of the DG–300, MSC has eleven sailplanes — one Twin Astir, two single Astirs, an LS–1, two Blaniks, two 1–26's, and two 2–33's. The club's three L–19 towplanes continued to serve dutifully thanks to the hard working towpilots. The new maintenance facility was completed, permitting indoor work without emptying the hangar. One workshop has been insulated, so a hardy crew will be sanding wings and sipping mulled wine mid– winter.

The end of the season sadly saw the passing of one of MSC's most senior, tireless, dedicated instructors. Walter Schulz had been active in soaring for almost fifty years and was a big part of the club. He consistently won awards for "Instructor of the Year" and "Most Instructional Flights", and was central to the mid–week flying effort. Walter flew until the day he died, something a lot of pilots would envy, although of small condolence to his wife, Kate. A lot of us learned to soar with Walter and we'll miss him.

Finally, thanks to a lot of perseverance on the part of instructors, and careful flying by members, we enjoyed an accident free season.

Peter Kom, Montreal Soaring Council



† WALTER SCHULZ

Walter Schultz, a Montreal Soaring Council member since the early 1950's, died suddenly on 11 November. Walter took early retirement after a year or so of commuting weekly to company headquarters in Toronto when his employer's plant was closed near Montreal. Living in Hawkesbury, MSC's base, he was on call any day of good weather during the week. For a number of years he had the most instructional flights a year in the club, and has won the SAC Walter Piercy trophy for best instructor of the year. Perceptive of student's difficulties, he helped many overcome these and go on to be good pilots. A naturalist, he looked after birds with broken wings and other ailments, setting them free after convalescence. A warm personality, he will be sorely missed. Walter's wife Kate provided a loving and happy background for Walter to carry out his services to others. We offer her our sympathy.

Bob Gairnes

Coming Events

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.

Mar 28, **Cross-country skills improvement workshop and AGM**, Ontario Soaring Assn, Delta Meadowvale Inn, Mississauga. Some travel expenses will be reimbursed for those attending the workshop. Call: Sue Eaves (519) 268-8973.

May 19-24, **ASC beginners XC Clinic**, Chipman, AB. Contact Tony Burton (403) 625-4563.

June 23 - July 2, **Canadian National Soaring Contest**, Hawkesbury, ON. Contact: Pièrre Pépin (514) 671-6594. Some possibility of a change, info confirmed in next issue.

date TBA, **Beginners and Advanced XC Clinics**, Ontario Soaring Assn. Clinics will run 5 days mid-week. Limited entry – interested pilots are asked to contact Ed Hollestelle asap so instructors can be lined up. Call Ed at (519) 455-3316.

Jul 25 - Aug 3, **Cowley Summer Camp**, Canada's premier soaring festivity. Contact: Tony Burton, (403) 625-4563.

Oct 3-12, **Cowley Wave Camp**, Contact: Tony Burton, (403) 625-4563.

RAY'S CLUB CRAWL

from page 17

and is where the Cambridge Gliding Club used to operate. The Cambridge club flies at another field about 12 miles away because there is too much weekend power activity at Duxford. Cambridge uses Citabrias with four–bladed props and huge mufflers which makes them very quiet. (It is very difficult in England to get planning permission for an airfield, and for a glider operation that uses tugs, noise abatement is a necessity.)

It is fascinating for me to visit other clubs and to see how they operate. It is equally fascinating to visit the museum. The "tube" will take you to the Science Museum in London and to the RAF Museum at Hendon. Train and bus will get you to Duxford but a car is best. The Science Museum has very early flying machines and all types of other airplanes including the first jets. It is an absolutely great place to visit. At Hendon there are originals of planes from WWI through to the modern jets, flying boats and so on. An afternoon at Hendon is a delight. Duxford has five hangars full of planes plus outside displays. The second Concorde built as a test plane is there to walk through.

While at Duxford I saw a YAK flying aerobatics, as were two Harvards, a Spitfire and Hurricane and others that I could not recognize. On weekend afternoons private owners of WWII fighter planes put on a two hour airshow. Technicians are restoring old airplanes while you watch. If you're interested in planes then you must visit these museums if you are fortunate enough to get to London. •

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 October to 31 December 1991.

GOLD BADGE

258	David Maven	York
259	Michael Kappl Jr	London
260	Michael Steckner	London
261	Rodney Crutcher	Cu Nim

SILVER BADGE

827	Carole King	Champlain
828	Barrie Murdock	York
829	Deirdre Duffy	Edmonton
830	Philip Backman	Bluenose

DIAMOND GOAL

Richard Willems	Montreal	314.8 km	LS–1	Hawkesbury, ON
Harry Peters	Vancouver	321.6 km	ASW–19B	Ephrata, WA
Rodney Crutcher	Cu Nim	308.3 km	ASW–20	Black Diamond, AB

DIAMOND ALTITUDE

Doug Girard	Bluenose	5020 m	ASW–15	Warren, VT
Deirdre Duffy	Edmonton	6275 m	ASW–15B	Cowley, AB
Gordon Beach	Vancouver	5520 m	LS–4	Minden, NV

GOLD DISTANCE

Michael Kappl Jr	London	301.0 km	Mini–Nimbus	Embro, ON
Richard Willems	Montreal	314.8 km	LS–1	Hawkesbury, ON
Harry Peters	Vancouver	321.6 km	ASW–19B	Ephrata, WA
Rodney Crutcher	Cu Nim	308.3 km	ASW–20	Black Diamond, AB

GOLD ALTITUDE

David Maven	York	3470 m	LS–4	Minden, NV
Michael Steckner	London	3535 m	LS–4	Minden, NV
Deirdre Duffy	Edmonton	6275 m	ASW–15B	Cowley, AB
Gordon Beach	Vancouver	5520 m	LS–4	Minden, NV
Peter DeBay	Vancouver	3420 m	Mini–Nimbus	Minden, NV

SILVER ALTITUDE

Terry Hooper	Regina	1290 m	Jantar Std	Cowley, AB
Carole King	Champlain	1250 m	Libelle 201B	St–Dominique, PQ
Barrie Murdock	York	1660 m	1–23	Athur, ON
Deirdre Duffy	Edmonton	1340 m	ASW–15B	Cowley, AB
Philip Backman	Bluenose	1400 m	Ka6	Stanley, NS
Gordon Beach	Vancouver	5520 m	LS–4	Minden, NV
Leo Reypert	?	1387 m	Lark IS29D	Grand Valley, ON
Bob Leger	COSA	1500 m	Astir	Chemong, ON
Richard Stehlik	York	1158 m	1–23	Arthur, ON
David Reyenga	COSA	1830 m	Astir G103	Chemong, ON

SILVER DISTANCE

Carole King	Champlain	54.0 km	Libelle 201B	St–Dominique, PQ
Barrie Murdock	York	61.5 km	1–23	Arthur, ON
Deirdre Duffy	Edmonton	70.0 km	ASW–15B	Chipman, AB
James Adamczyk	SOSA	61.0 km	1–26	Rockton, ON
Philip Backman	Bluenose	64.5 km	Ka6	Stanley, NS
William Park	Gatineau	88.0 km	Skylark 4B	Pendleton, ON

SILVER DURATION

Robert Leger	COSA	5:24 h	Blanik L13	Chemong, ON
Joseph Laposnyik	SOSA	5:45 h	1–26	Rockton, ON
Barrie Murdock	York	5:28 h	1–23	Arthur, ON
David Wallace	Edmonton	5:57 h	1–23	Cowley, AB
Philip Backman	Bluenose	5:13 h	Ka6	Stanley, NS
Andrew Gibson	SOSA	5:26 h	Blanik L13	Rockton, AB
George Nelson	COSA	5:12 h	Cirrus 75	Chemong, ON
Ronald McCullough	Rideau	5:09 h	Pilatus B4	Gananoque, ON
Mark Newcombe	SOSA	5:28 h	Blanik L13	Rockton, ON
Tyson Dahlem	Saskatoon	5:31 h	Blanik L13	Cudworth, SK
Brian Keron	London	5:50 h	1–34	Embro, ON
Daniel MacIsaac	SOSA	7:10 h	1–26	Rockton, ON
Yvon Langlois	Quebec	5:49 h	Astir G102	St–Raymond, PQ

C BADGE

2262	David Wallace	Edmonton	5:57 h	1–23	Cowley, AB
2307	David Knickle	COSA	1:18 h	Blanik L13	Chemong, ON
2308	Benjamin Lochridge	SOSA	2:05 h	LK–10A	Rockton, ON
2309	Joseph Laposnyik	SOSA	5:45 h	1–26	Rockton, ON
2310	Bruce Cook	York	1:03 h	2–33	Arthur, ON
2311	Barrie Murdock	York	5:28 h	1–23	Arthur, ON
2312	Terry Healy	Toronto	2:03 h	Bergfalke	Conn, ON
2313	Alex Upchurch	York	1:15 h	1–26	Arthur, ON
2314	Don Embree	Base Bordon	1:11 h	2–33	Borden, ON
2315	Philip Backman	Bluenose	5:13 h	Ka6	Stanley, NS
2317	George Nelson	COSA	5:28 h	Cirrus 75	Chemong, ON
2318	Svein Hubinette	Montreal	1:05 h	1–26	Hawkesbury, ON
2319	Mark Newcombe	SOSA	5:28 h	Blanik L13	Rockton, ON
2320	Tyson Dahlem	Saskatoon	5:31 h	Blanik L13	Cudworth, SK
2321	Brian Keron	London	5:50 h	1–34	Embro, ON
2322	Scott Prior	Edmonton	1:15 h	Blanik L13	Chipman, AB
2323	Daniel MacIsaac	SOSA	7:10 h	1–26	Rockton, ON
2324	Garth Lepine	Windsor	1:06 h	2–33	Dresden, ON
2325	David Kelly	Rideau	1:00 h	2–33	Gananoque, ON
2326	Fiona Doetsch	?	2:11 h	K8	Bottenhorn, Germany
2327	Vincent Laliberté	Quebec	1:25 h	Astir G102	St–Raymond, PQ
2328	Luc L'Heureux	Quebec	1:17 h	2–33	St–Raymond, PQ
2329	Lloyd Blondin Jr	Windsor	1:32 h	Lark IS28B2	Dresden, ON
2330	Bruce Walzer	Winnipeg	4:13 h	L–Spatz II	Starbuck, MB

FAI FILLER Look at some of the vintage gliders being used to start pilots off on their badges; L–Spatz, LK–10, Bergfalke, and a Skylark. Oldies but goodies all. Also it's good to see that soaring genes are being passed down to the children — congratulations to Karl Doetsch's daughter on flying her C badge in Germany. Lastly, a comment in "Significant Flights" in 5/91 that 123.3 km/h is the fastest speed flown in any task in Canada is not correct — at least two faster ones have been flown, unfortunately without barographs! **Tony**

FAI records

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

The following flights have been confirmed as records:

200 km speed to goal – open (not FAI), 109.6 km/h, 27 July 91, Walter Weir, ASW–20B, C–GGWW. Flown from Chemong a/p to Smiths Falls a/p, ON. Exceeds previous record of 93.6 km/h set by Tony Burton in 1989.

300 km speed triangle – open multiplace, citizen, 128.5 km/h, 30 July 1991, Ian Spence (passenger J–R Faliu), ASH–25, N725H. Flown from Minden, NV with turnpoints at road intersections in Willow Springs and Buckley Flat, NV. Exceeds previous citizen's record of 79.4 km/h set by Charles Yeates in 1989.

500 km speed triangle – open, territorial, 105.7 km/h, 24 June 91, Walter Weir, ASW–20, C–GGWW. Flown from Pendleton a/p, ON with turnpoints at Gananoque a/p and Round Lake Centre, ON. Exceeds previous territorial record of 101.8 km/h set by Dick Mamini in 1973.

More ways to get Speed to Goal records

The data–back camera method of timing Speed to Goal flights for national records (see SAC's *"FAI Badge and Record Procedures"* booklet, Section 18.7) has been used successfully on a number of occasions, generally in conjunction with a completed goal and return flight. The possibility of extending the use of this timing method for Speed to Goal flights flown as the first leg of a triangle was raised recently by one of our regular contest and record pilots.

Since the Speed to Goal category is not recognized by the FAI, there appears to be no reason why this should not be done. Effective immediately, Speed to Goal records may be claimed for the outward (first) leg of either a Triangle or a Goal and Return flight, provided the timing is done in accordance with the above mentioned reference. Note that this does not change in any way the rules for completion of the flight and for claiming of other speed and distance records which may be broken on the same task. No change is required to the declaration of a planned triangle or goal and return flight. In fact the addition of "extra" turnpoints is *not* permitted. The only extra planning required is to set up the calibration of the data–back camera for determining the "Time to Goal".

I look forward to a flood of Speed to Goal claims from pilots with closed circuit speed flights that missed the mark!

CURRENT WORLD GLIDING RECORDS

RECORD TYPE	OPEN			FEMININE			MULTI –OPEN			MULTI–FEM		
DISTANCE (km)												
4.3.2.1 **Straight distance**	Hans W Grosse (Ger)	1460.80	72	Karla Karel (UK)	949.70	80	H Grosse/K Grosse (Ger)	1091.86	90	Pavlova/Mechkina (USSR)	864.85	67
4.3.2.2 **Distance to goal**	Drake, Speight, & Georgeson (NZ)	1254.26	78	Joanne Shaw(USA)	951.43	90	Walker/Delore (Ger)	1020.	90	Gorokhova/Koslova (USSR)	864.86	67
4.3.2.3 **Goal & Return dis.**	Tom Knauff (USA)	1646.68	83	Doris Grove (USA)	1126.68	81	Walker/Delore (Ger)	1020.	90	Sviridova/Toporova (USSR)	649.63	86
4.3.2.4 **Triangle distance**	Seymour, McMaster, Striedieck, Knauff, & Robertson (USA)	1362.68	86	Joanne Shaw(USA)	847.27	84	Grosse/Kohlmeyer (Ger)	1379.35	87	not established		
SPEED, Δ (km/h)												
4.3.2.5a **100 km**	Ingo Renner (Aust)	195.30	82	Susan Martin (Aust)	139.45	79	Sommer/Anderson (Ger)	177.26	84	A Dankowska/Grzelak (Pol)	126.28	78
4.3.2.5b **300 km**	J-P Castel (France)	169.49	85	Inge Muller (Ger)	138.71	84	H Grosse/K Grosse (Ger)	170.90	88	Inge Muller/C Muller (Ger)	123.33	86
4.3.2.5c **500 km**	Beat Bünzli (Switz)	170.06	88	Susan Martin (Aust)	133.14	79	H Grosse/K Grosse (Ger)	163.03	88	Dankowska/Toporova (USSR)	95.72	86
4.3.2.5d **750 km**	H W Grosse (Ger)	158.40	85	Pam Hawkins (UK)	111.53	84	H Grosse/K Grosse (Ger)	161.33	88	not established		
4.3.2.5e **1000 km**	H W Grosse (Ger)	145.32	79	not established			H Grosse/K Grosse (Ger)	157.25	88	not established		
4.3.2.5f **1250 km**	H W Grosse (Ger)	133.24	80	not established			Grosse/Kohlmeyer (Ger)	143.46	87	not established		
ALTITUDE (m)												
4.3.2.6 **Gain of Height**	Paul Bickle (USA)	12,894	61	Yvonne Loader (NZ)	10,212	88	Jozefczak/Tarczon (Pol)	11,680	66	A Dankowska/Matelska (Pol)	8,430	67
4.3.2.7 **Absolute Altitude**	Robert Harris (USA)	14,938	86	S Jackintell (USA)	12,637	79	Edgar/Klieforth (USA)	13,489	52	Babs Nutt/Duncan (USA)	10,809	75

Annual General Meeting

Palliser Hotel, Calgary
28 February – 1 March

Friday: all day *provincial ass'ns, FT&S committee, SAC Board*

evening *registration, and reception beginning 7:00 pm*

Saturday: morning and afternoon *seminars*

topics may include cross country and badge flying, mountain soaring, flight training & safety, competition topics, insurance

noon *ACC awards lunch* evening *SAC awards banquet*

Sunday morning *annual general meeting (ending about noon)*

for Palliser room reservations, call: 1–800-361-1400 (from Toronto)
1–800-268-9420 (from ON and PQ)
1–800-268-9411 (elsewhere)

AGM rate $85 (+GST) single or double (refer to Aero Club of Canada block)

Canadian Airlines is the official airline for this convention. To book your flight, phone the "Canadian Convention Line": 798-2288 (from Toronto)
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CLUB ____________________ Number in party ____

Please register me. I will be attending the following activities:

Reception Friday evening, February 28		☐
Seminars on Saturday, February 29	REGISTRATION – $15	☐
Aero Club of Canada Awards luncheon, Feb 29	CHARGE – $10	☐
SAC Awards banquet, February 29	CHARGE – $40	☐

(Note: luncheon and banquet charges include service and GST)

Annual general meeting, March 1 ☐

I enclose a cheque for $ ______

I have made room reservations at the Palliser Hotel ☐
elsewhere ☐

I am interested in getting an information package on area ski resorts ☐

Please copy this form, check appropriate boxes, enclose correct amount, and return to: **Cu Nim Gliding Club, Box 2275, Station M, Calgary, AB T2P 2M6**

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1-23G C-FZDO $12,000 firm. Basic instrumentation, electric vario. Contact Kurt Hertwig (519) 686-0332 or Andy Gill (519) 660-0523

1-26B, #372, all-metal wings, fuselage recovered, very good condition. $6000. Kemp Ward (514) 297-3268, or fax to Gilles Bellanger (819) 563-1101.

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

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

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JANTAR STD 2, C–GGFG, 130 hrs, excellent condition, 360 radio, Cambridge and PZL varios, barograph, trailer. CofA to Aug 1992. John Kollar (416) 625-7095.

MISCELLANEOUS

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

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

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

PIK-20 canopy wanted. Call (403) 625-3155 (B).

Parachutes, 26 foot in sport type container. Current inspection and repack, $300 each. Cu Nim, contact Dave Fowlow (403) 289-9477 (H), 296-6889 (B).

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

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MAGAZINES

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

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

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

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

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

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- Personal sailplane and sailplane equipment ads are free for SAC members, $10 per insertion for non–members.
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NOTICE TO PILOTS

Please do not send Trading Post items by fax unless specifically requested. I have to pay for receiving them. Thank you. Tony

Consumer Alert

Each time a "Soaring Stuff" flyer appears in free flight, there has been some change in supplies or pricing. Please, only use the information on the most recent flyer when ordering to avoid delays due to ordering errors. Ontario pilots note that sales tax is payable on everything but instructional books. The 1992 German Bildkalender is selling well so get one before they are gone. We are well stocked with the SSA calendar. Joan at the office thanks you in advance for your consideration.

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Ste Foy, PQ G1V 4B1

MONTREAL SOARING COUNCIL
Box 1082
St. Laurent, PQ H4L 4W6

CLUB DE VOL A VOILE MONT VALIN
3434 Ch. Ste Famille
Chicoutimi, PQ G7H 5B1

ONTARIO ZONE

AIR SAILING CLUB
c/o 100 - 1446 Don Mills Road
Don Mills, ON M3B 3N6

ARTHUR GLIDING CLUB
10 Courtwood Place
North York, ON M2K 1Z9

BASE BORDEN SOARING
c/o OC Rec. Platoon, CFSPER
CFB Borden, ON L0M 1C0

BEAVER VALLEY SOARING CLUB
Box 394
Thornbury, ON N0H 2P0

BONNECHERE SOARING
Box 1081
Deep River, ON K0J 1P0

CENTRAL ONTARIO SOARING ASSOCIATION
Box 762
Peterborough, ON K9J 7A2

ERIN SOARING SOCIETY
Box 2284
Bramalea, ON L6T 3S4

GATINEAU GLIDING CLUB
Box 883,
Station B
Ottawa, ON K1P 5P9

GUELPH GLIDING & SOARING ASSOCIATION
183 Norfolk Street
Guelph, ON N1H 4K1

KAWARTHA SOARING CLUB
Box 168
Omemee, ON K0L 2W0

LONDON SOARING CLUB
Box 773, Station B
London, ON N6A 4Y8

RIDEAU GLIDING CLUB
Box 307
Kingston, ON K7L 4W2

RIDEAU VALLEY SOARING SCHOOL
Box 1164
Manotick, ON K0A 2N0

SOSA GLIDING CLUB
Box 654, Station Q
Toronto, ON M4T 2N5

TORONTO SOARING CLUB
c/o S. Foster
10 Blythe St
Richmond Hill, ON L4E 2X7

WINDSOR GLIDING CLUB
Box 2172
Walkerville, ON N8Y 4R8

YORK SOARING ASSOC.
10 Courtwood Place
North York, ON M2K 1Z9

PRAIRIE ZONE

PRINCE ALBERT GLIDING & SOARING CLUB
219 Scissons Court
Saskatoon, SK S7S 1B7

REGINA GLIDING & SOARING CLUB
Box 4093
Regina, SK S4P 3W5

SASKATOON SOARING CLUB
Box 7943
Saskatoon, SK S7K 4R6

SWAN VALLEY SOARING ASSOCIATION
Box 850
Swan River, MB R0L 1Z0

WINNIPEG GLIDING CLUB
Box 1255
Winnipeg, MB R3C 2Y4

ALBERTA ZONE

BLUE THERMAL SOARING ASSOCIATION
73 Cypress Way SE
Medicine Hat, AB T1B 1H1

COLD LAKE SOARING CLUB
Box 2108
Medley, AB T0A 2M0

CENTRAL ALBERTA GLIDING CLUB
4309 Grandview Blvd
Red Deer, AB T4N 3E7

CU NIM GLIDING CLUB
Box 2275, Station M
Calgary, AB T2P 2M6

EDMONTON SOARING CLUB
Box 472
Edmonton, AB T5J 2K1

GRANDE PRAIRIE SOARING SOCIETY
Box 446
Grande Prairie, AB T8V 3A7

PACIFIC ZONE

ALBERNI VALLEY SOARING ASSOCIATION
Box 201
Port Alberni, BC V9Y 7M7

ASTRA
c/o Christine Timm
9280 - 168 Street, RR 10
Surrey, BC V3S 5X7

BULKLEY VALLEY SOARING CLUB
Box 474
Smithers, BC V0J 2N0

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

VANCOUVER SOARING ASSOCIATION
Box 3251
Vancouver, BC V6B 3X9

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

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

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

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