



free flight

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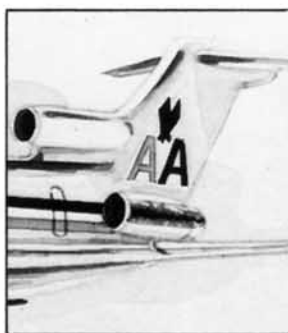
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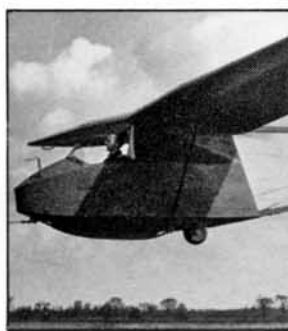
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Cover photo by Maurice J. Aubut shows National Open Class
Winner Dave Webb on final in DBW-2.

Outside the window of the 727 a new day dawned. The early morning gloom was gradually replaced by the brilliance of the

Flight 281 on Final

by Bert Small

sun, streaking yellow rays through the flimsy layers of wispy clouds. So far, the flight was routine. Just like all the other business trips I had made to New York over the past fifteen years. There was no reason to think that it would be any different.

After an enjoyable breakfast, I relaxed as the busy flight attendants cleared the dishes in preparation for our landing at LaGuardia Airport. Now unexpectedly the normal pattern of sounds were broken by the blaring inter-com, "Ladies and Gentlemen, the Captain has asked me to make the following announcement - if there are any licensed pilots aboard, please make yourself known to a flight attendant or come forward to the flight deck. There is no need for alarm - everything is under control."

Since I was seated near the back of the plane I had a good view of the whole passenger area and as I wondered what the announcement could mean, I noticed that no one had moved toward the flight deck. Thoughts were now racing through my mind as to the possible reason for the announcement and just then the inter-com came to life

again - "Ladies and Gentlemen, I wish to repeat that request for a licensed pilot. We have a minor emergency and the Captain requires the assistance of a qualified pilot. Do not delay - come forward to the flight deck immediately."

The passengers were now mumbling to each other and as I looked down the length of the plane, I couldn't believe that no one went forward and within seconds I found myself heading towards the front, to be met partway down the aisle by the steward.

His attempt at calmness was betrayed by his shifting eyes, as he asked, "Are you a licensed pilot Sir?"

"Yes I am," I replied.

A fleeting glance of relief and, "How many hours to you have?"

"About 150 hours total."

"O.K. please follow me."

We walked forward and as he clicked open the door to the flight deck I immediately saw the reason for the emergency. The whole flight crew were slumped in their seats, unconscious, like three rag dolls, not moving. The aircraft was flying on auto-pilot. The



steward then told me that unknown to the crew noxious fumes had entered the cabin and they had all passed out before they realized what was happening. Fortunately they had been flying on auto-pilot and the Captain managed to signal for the steward just in time. The crew were now being removed outside the flight deck and oxygen was administered from emergency bottles to try to bring them around. Vents were opened to clear the fumes.

I asked the flight steward, "Can't we just fly on auto-pilot until the Captain comes to?"

"No we can't, just before the second officer passed out he advised us that a miscalculation had been made on the fuel reserve and we had to be on the ground by 8:10 A.M. at the latest. It's now 7:46 A.M., so we can't wait, we must land now. Can you do it?"

Can I do it? I looked at the hundreds of switches, dials and gauges on the instrument panels and my scalp tightened. The empty crew seats looked very lonely as my thoughts went to the passengers now depending on me to get them down safely, and then I replied, "I'll do the best I can."

Now, stepping nervously into the Captain's seat, I fastened the seat belts, adjusted the mike and said, "LaGuardia Tower, this is American Airlines Flight No. 281, we are at 4,500 feet over Stamford Connecticut and we have an emergency. The flight crew is unconscious, I am a passenger trying to fly this aircraft and at the moment we are on auto-

pilot. It is also necessary that we land before 8:10 A.M. or we will be out of fuel. Do you understand?" (over)

"We have you on radar 281 and we understand your situation. First - stay on auto-pilot until you answer a few questions."

"Are you a licensed pilot?"

"Yes I am."

"How many hours?"

"About 150."

"What types have you flown?"

"2-22, 2-33, 1-26, 1-34 and M-100 S."

"Sorry 281, I'm not familiar with those numbers. Are they single engine or twin?"

"Sorry LaGuardia, they're gliders!"

—now a long silence from the tower, and then - "aah-aah—you did say gliders 281, what types of power have you flown?"

"None - only gliders! I have never flown power."

"Well it looks like we do have a problem doesn't it? Are you sure there isn't a power pilot aboard?"

"After two announcements, no one came forward so I decided to see what was happening, and if I could do anything to help."

"281, we have to make a course correction here. There is a disconnect switch for the auto-pilot on the control column, when I tell you, I want you to press that switch, bank to your right to a new heading of 227° on the directional compass. This new heading will put you on course to fly directly over LaGuardia Airport. Now listen carefully 281, I have a 727 Captain here advising us and he wants to caution you, after you release the auto-pilot - do not over control! Make small, smooth movements of the control column. O.K. let's make that bank to your new heading - remember, it's 227°" (over)

Now I was really going to fly this airplane - I pressed the disconnect switch and immediately felt the surging power that I had in my hands. Easy moves now - small movements and we swing slowly and evenly to the right. The numbers of the directional compass rotate smoothly through 180° - 190° - 200° and we level out to meet that now important number 227°. "O.K. LaGuardia, we are just south of Westchester Airport and at a heading of 227°. Airspeed is 155 kts. It might help if you know that I have flown this route as a passenger many times and I know where LaGuardia is by visual references." (over)

"That's good 281, it's very helpful if you know where the field is without us having to guide you in all the way. Now I want you to make one more announcement for a power pilot and if no one comes forward, we'll have to talk you in for a landing." (over)

I flipped the intercom switch and as coolly as possible under the circumstances said, "Ladies and Gentlemen, this is the Captain speaking, if there is a power pilot on board please come forward immediately - we need your assistance."

After two long minutes went by the cabin door clicked open. It was the steward shaking his head slowly from side to side, meaning very clearly, there were no takers. Well, now it was up to me and LaGuardia. "LaGuardia Tower, this is 281, still no takers on the pilot announcement. I'm afraid it's just between you and me!"

"Understand 281, we will have to give you all the power settings and control directions as well as the spoiler operation and reverse thrust for your landing. Are you ready?"

"Hold it! LaGuardia - I think I have a better idea. It is my understanding that a 727 has an

L/D or glide ratio of better than 18 to 1. Without power training I couldn't land this thing in fifty tries and we don't have enough fuel for three. My idea is that I land it like a glider. All power off - half flaps - a regular downwind, base and final glider circuit, only in this case with very big numbers - spoiler if I need them. This way we have a chance of bringing it in first time. My training has always been - you get one chance at a landing - no more! Under the circumstances it's the only practical way. Do you agree?" (over)

"281 - are you serious? A power off landing when you have all the power that you need? Just follow our directions and we'll get you down!" (over)

"LaGuardia - I didn't want it this way, but I am now the Captain of this ship. I have 125 people aboard depending on me to get them down safely. I have no confidence in myself to land with power, but if you can give me approximate numbers for gliding in, then I think we have a chance. LaGuardia there is no argument - I am going to land power off - it's the only way I know. I am going to need your help with the following:

With all power off - gear down - half flaps. First a minimum airspeed to maintain flight. Next an altitude to cross over the end of runway 31 to enter the circuit. We will then make a left turn onto a downwind leg until we are over Shea Stadium - this will be our point to turn onto base leg and we need an altitude check there. When we are lined up with runway 13 we will make a left turn onto final and will need another altitude check at that point. This final leg of the circuit takes us across the water and a touchdown on runway 13. I realize that all the heights you give me will be approximate and I will expect sink over the water, but if you keep all the numbers slightly on the high side, I will be able to adjust with spoilers as I see fit." (over)

"281 - you win - we will work on the numbers as requested and will relay them to you as soon as possible. Stand by."

Now I had time to reflect on how I got into this situation. If I hadn't taken that intro flight in Arizona three years ago, I would still be sitting in my passenger seat wondering what all the fuss was about. After my "Intro" I was so hooked on gliding that I joined a club in Ontario and became a very active member. Over 350 flights in less than three seasons qualified me as being active. Now it seemed I was the only pilot aboard this flight, and I found myself sitting in the Captains seat of a 727 (with absolutely no business to be there) and coming up ahead through the haze of the New York area. I could just make out LaGuardia Airport where I'm supposed to land this monster glider. Throughout the next ten minutes I must keep the right mental attitude. My task is to land a glider and I mustn't let the big picture of the whole situation warp my thinking. If the numbers the tower gives me are close to being correct, and if I can keep this airplane flying, then we have a chance. Ahead of us is either a safe landing or disaster, but I have to attempt it the way I think is best. The only way for me to protect the interests of the other passengers, is to glide it in. My thoughts are interrupted by....

"281 - we have your numbers as follows - are you ready?"

"281 - ready."

"First, you must maintain a minimum airspeed of 120 knots. Continue on your present course and cross over the end of runway 31 at an altitude of 3,500 feet. When you are past the airport boundary and over the

houses of Queens, turn left and line up with She Stadium, this is your downwind leg. When you reach the stadium turn left onto your base leg at 1800 feet. When you are lined up with runway 13, and at 1000 feet turn left for final. These calculations should put you in close to a perfect landing, however it's an untried procedure and we can't be absolutely sure, so if we are putting you in too high you will have to use spoilers when required. Finally, if your visual reference tells you something is wrong, abandon the numbers and react according to your instincts and training." (over)

"Thanks for the numbers LaGuardia - I will follow them as long as they appear visually correct. Wish us luck - we'll need it!"

"Good luck 281."

Now we're crossing over the end of runway 31 at an altitude of 3700 feet - the landing gear goes down clunking and banging - the whirr of tiny motors as the flaps are set - that sure slows us down in a hurry - we're over the houses and we bank left onto the downwind leg of the circuit - time to shut off the power and start the glide. Ease the throttles back slowly and it's like putting on the brakes in your car. All power off now - nose down slightly to maintain minimum airspeed - test the spoilers briefly - wow - they sure bring you down fast. Everything is relatively quiet now, just like the M-100 S on final - we're dropping fast, but still flying and it's starting to feel almost like a glider. She Stadium seems a long way off and I'm beginning to question that we can make it around and back to the airport, but as we approach the round form of the Stadium the altimeter shows 2000 feet - 200 feet high according to the numbers, but that's money in the bank - I'd rather stay high until I'm certain we can make it over the water - we turn onto base leg at 1950 feet instead of 1800, but it still feels and looks O.K.

The runway is a long way back over my left shoulder and coming up on the final turn the altimeter reads 1250 instead of 1000 - still slightly high, but I'll take it this way - the water that we have to cross is straight ahead and looking grey and ominous - now we're gliding over those waterfront shacks and out over the bay and this is where we should expect sink - but it doesn't come! Now I know we're high - 800 feet and not too far to go - we could overshoot! Spoilers out and we sink fast and slow down dangerously close to stall - quickly - nose down for more speed, but we're still too high! Will a 727 sideslip? Well it's an airplane, why not? Left wing down - right rudder and we drop like a stone, but we're still flying - height looks good now - straighten out from the slip - nose down attitude to keep the speed up and we cross over the threshold with the red and white stripes - a flare with my seat 25 feet off the ground seems unreal, but we parallel the runway and glide - glide - and finally settle for a bumpy but safe landing and a rollout that seems to go on forever - by touching the brakes at the top of the rudder pedals a controlled stop is accomplished - we made it!! The only way possible for me was to glide it in and it worked!

Now we came to a complete stop, I leaned back in my seat in relief and heard the click of the cabin door behind me. I expected it to be the steward with congratulations, but instead it was a flight attendant this time. She had just clicked open the over-head locker and looking down at me in my passenger seat, she smiled and said, "We have arrived at LaGuardia Airport. Sorry I had to wake you. Is this your coat Sir?"

President's Notes

Karl Doetsch

The SAC's thanks are due to the York Soaring Association which hosted well the 1979 National Soaring Championships at its fine glider port near Arthur. Thirty seven gliders were entered in three classes. Regrettably, the weather did not cooperate so that it was doubtful until the last day whether the four contest days required for an official contest would materialize. Despite this lack of flying, good competition, unmarred by accidents, occurred.

The most serious activity of the Board of Directors since my last report in Free Flight has unquestionably centred on dealings with the Fitness and Amateur Sport Branch of the Federal Government. As a non-resident sport association in the National Sport and Recreation Centre, the SAC has since 1969 been provided with various levels of funding for, amongst other things, Instructors' schools, Directors' meetings, Annual General Meetings as well as for competitions ranging from regional to international levels. Also, many services, such as the printing and mailing of Free Flight have been generously subsidized. The Government has now served notice to remove all Federal Government support from the SAC after this year because the Association does not satisfy a new, and in our view, abruptly applied and somewhat irrational funding criterion. The stumbling block for the SAC is the need to obtain funding from six provincial governments for provincial associations which are members of the SAC before any further Federal Government support, either in grants or services, will be considered. It does not appear that the SAC can meet this criterion before 1981 because of the time required to constitute the necessary additional two provincial associations and for them to receive provincial government support. Our appeals for an exemption period have so far been rejected. Each club, at the time of publication, will have received a letter asking for your assistance in changing the Government's mind, and we can but hope that our collective efforts of persuasion and protest will bear fruit. The Board of Directors is actively considering the operation of the SAC without Government support and, if necessary, will present its plan of action in the next issue of Free Flight and, of course, at the Annual General Meeting. Without question, new funding would be necessary to replace that received to date from the Federal Government.

The Board of Directors is pleased to announce the appointment of Dave Tustin to the Chairmanship of the Airspace Committee, and he looks forward to any inputs or questions which you may have on Airspace matters. Dave succeeds Bruce Hea who has served the Committee well for several years.

Finally the SAC is issuing its own calendar this year. We hope that you will support this venture by purchasing copies from your club officers or from Terry Tucker, and, for next year, by providing slides for the 1981 calendar. Bert Small kindly undertook to manage the calendar project.

May I wish you a safe winter and season's greetings.

ARMCHAIR COMMENT

by E. Feather



The other day a fellow aviator and I got to talking about autopilots, not the guys who drive four-wheelers but those gadgets in aircraft that take the drudgery out of flying. We didn't feel we needed an autopilot to remove drudgery from soaring - whoever thought it boring - but we felt removal of some of the load might allow us more time to look out and enjoy the peaceful view of fellow pilots circling around with us. Maybe too the extra time would allow us to more fully utilize our new super-climb-rate-cruise-speed calculator, slide rule and map reader.

We argued that when the glider banks all we need is a balancing force on the stick. What better device than a Swiss cowbell hung suitably from the canopy right on top of the stick. When the glider tips to the left the bell will stay upright due to the fact that the glider will conveniently slip in - so that the bell will exert a force on the stick to the right! Now due to aileron drag - we didn't want to

complicate our device to include the rudder - the glider will yaw to the left (I think). The bell goes right some more tending to accentuate the righting force on the stick. As the glider resumes level flight the bell returns to the centre and, we have not touched the controls once!

Well, I thought the idea had merit, but forgot about it - problem being we are far from Switzerland. However on a recent weekend at the club I awoke early to the sound of a bell. Maybe if I sneak up on the cow, if indeed it was a cow bell making the sound, I might yet be able to try the system I thought. But then my wife might decide to adopt the cow too, she is rather partial to animals I find, so I dropped the idea for the present. However don't despair all of you who eagerly await news of this latest device, if you hear a cow bell at your club it might well be me dropping in for a visit!

Have a Merrie Christmas!

Club News

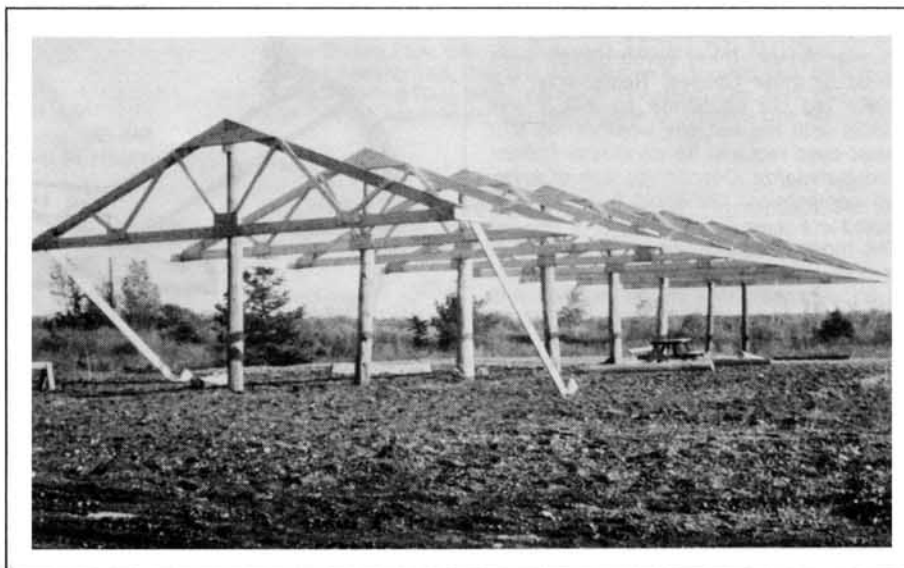
BLUENOSE SOARING CLUB

BSC started this season's operations on April 28, 1979. The weather through April and May kept the pace slow until the Victoria Day weekend when Mike Leblanc, our Winch Tech officer, was sent solo by duty instructor Debbie Burleson. Since then it's hard to keep Mike out of any glider left unguarded. Already he's been up over an hour a number of times.

In early June two additional gliders joined the Ka-7 at the cable hook-up. CF-XGU, an Open Cirrus, owned by a syndicate of four; and CF-PHH, an SH-1, owned by a syndicate of three. These gliders soon extended the radius of action out of Stanley. On his third flight in the Austria, Chris Purcell went for a 100 km flight down the Annapolis Valley before returning to Avonport where he was obliged to put down in a pasture at 3 o'clock in the afternoon. He was then treated to the spectacle of a re-cycling sky that had tall cumuli appearing in every quadrant.

The Cirrus went on similar wanderings and so far has always returned. Ralph Olive took XGU for a 6 hour flight out of Havelock, the field of our kind soaring neighbours, The New Brunswick Soaring Association. he spent most of his time between 6,000 and 9,000 feet above ground. Tom "Sea Breeze" Foote has been displaying his nautical knowledge by running the Cirrus along Stanley's local SB front. The sea-coast is only 10 miles from the end of runway 02.

In July a Schweizer 2-22E joined the club inventory and right away went about making friends within the club membership. Not having the benefit of a good vario, let alone a reasonably fast TE one, C-FACE's flights have been under 20 minutes, but just wait till we get a Cambridge in the panel! After having



experienced the Ka-7's divebrakes it's spoilers have awakened the need for everyone to review their sideslipping skills.

With Doug Girard acting as "The Force", we finished our 84 x 30 foot hanger in July. It is a canopy design that accommodates four gliders and the winch, and keeps them out of the sun and the rain; it is also located much closer to the launch point than the previous tiedowns. As always, everyone worked hard, yet we owe Doug a special thanks for his energy, effort, and expertise. You flying wing fans might be interested to hear that Doug expects to have fans powering his Pioneer off

the ground come September.

Our flights so far total 478, and we should pass last years mark of 640. We have six active students, but three of these are solo, so our instructors have an easier time of it.

Our winch is operating reliably for us and a kind soaring friend located 6000 ft of tow target cable for us. President Dan Morrison, in addition to putting together the wings for his Eaglet, has a 12 inch dia. Tost type pulley fair-lead in the works. This we hope will treat the cable better than the 5" dia rollers, as well as allow us to use a greater variety of cable types.

DIAMOND FEVER

by Kate Estebany

The 1979 season at the Montreal Soaring Council has seen some excellent cross-country flights, despite the overall weather. This season has had more rainy weekends than anyone cares to remember with the best soaring days tending to occur on weekdays. April, May, and June were exceptionally poor while July saw such an improvement that it was the best July since 1975. In spite of our sad weather cycles, M.S.C. pilots have taken what opportunity they could to fly Diamond tasks, many of them successful.

It all started with John Bisscheroux's Diamond goal 500 k. flight from Hawkesbury to Madawaska and return on June 25th. Flying his HP-14, he was the club's first pilot to complete 500 k. flying from the Hawkesbury field. His time was 9:08. Many believe that Mother Nature was tricked into giving us good weather that day; Quebec pilots were able to spend a beautiful day soaring due to the

Jean-Baptiste holiday while neighbouring residents went to work. Were it not for it being a working day in Ontario, John may not have had the weather to fly. As it turned out, however, John's was the precedent-setting flight that seems to have infected the M.S.C. with Diamond Fever.

On Tuesday, July 17th, Hans-Peter (Hampa) Roth flew a 300 k. Gold-distance-Diamond goal task in 6:36 in his KA-6. Flying a triangle, Merrickville-Cedars-Hawkesbury, Hampa's flight was evidence of a definite trend.

The following day, July 18th, Gunter Geyer-Doersch set out and completed his Diamond distance to Madawaska and return in 7:40. Flying his DG-200, Gunter was the only one of three who set out that day to complete the task. Symptoms of Diamond Fever continued to be in evidence that day as Jonathan Trent flew a 300 k. Gold Distance-Diamond goal task to Balderson and return. Flying a Stan-

dard Cirrus, Jonathan (who's 18) completed his task in 4:37.

Monday, August 6th (another weekday boomer!) saw three pilots go out on task - that Fever again - and only one pilot, Geoff Alcock, complete the task. Geoff flew a Gold distance-Diamond goal task to Portage-du-Fort and return in 7:10 in the club's Astir CS.

Diamond Fever still runs rampant at the M.S.C. as other pilots have attempted Diamond goal flights several times - and with persistence they'll succeed as well. Our younger pilots appear to have been stricken with a similar Fever as several Silver C 50 k flights have been completed at the time of writing. yes, it seems that all it took was one successful flight to spark ambition in the hearts of many. Of course, this doesn't mean that it'll end here; now its on to bigger and better things. 750 k, 1000k ?? Who knows, its only a question of time...

REGINA GLIDING AND SOARING CLUB

The Regina Gliding and Soaring Club marked its 25th full year of operation in 1979. Mr. Harold Eley, one of the founding members, and the second person to earn diamonds in a 1-26, wrote the following history which appeared in the club's August "Cloud Street": The Regina Gliding and Soaring Club began in the fall of 1953, thanks to the efforts of three enthusiasts; Julien Audette, Max McConnell and Walt Fryers. Their success in this venture was due in part to a Western Canada Soaring Meet held in Swift Current that same summer, which showed a lot of people just what the sport was all about. One of the participants in that meet was Dick Noonan of Winnipeg, and he treated Max McConnell to a ride in his Cinema II Glider. This encouragement was enough to prompt the trio, Audette, McConnell and Fryers, to set up an organizational meeting in Regina on September 30 and within a few days, enough money was raised to buy the Noonan glider.

On October 7, 1953, Noonan brought the Cinema to Regina and in the next four days he checked out Julien to instructor standard. Altogether that fall, a total of 64 flights was made for a little over 10 hours air time!

This was the beginning of the club which still flourishes today; Max McConnell was the President and Julien was C.F.I. The club was incorporated under a national charter and these formalities were completed by early 1954.

A big step forward occurred in 1954 when the club purchased a tiger moth tow plane from Rusty Chapin, and leased a Grunau Baby sailplane from Bob Cheston for a nominal charge. (Bob had bought the glider from Ralph Wiseman of Rosetown). The Club also bought a Kirby Cadet glider as a rebuilding project and a year later bought Bob's Grunau. The investment to this point was about \$2,500, a far cry from the purchase price of such equipment today.

For you fledglings, a brief description of that fleet is in order. The Cinema II was a war surplus trainer designated by the military as a TGI (for trainer glider). It was a high wing, 46' span, 20'1" glide, wood, fabric and metal glider. The Grunau was a high wing, 44' single seater, wood and fabric machine having a low speed and low sink rate and therefore easy to thermal but it has only 17:1 glide ratio. The Kirby was a low performance wood and fabric trainer. The Moth was an ex-

airforce, bi-plane trainer with a 130 hp Gypsy Major - inverted in-line 4 cylinder engine. This plant made a reasonable tow plane but compared with the cub it was quite inferior.

From that point on, a succession of gliders and airplanes passed through the club. We repaired the Kirby Cadet which is a story in itself - and promptly sold it in 1957 to the Red Deer Club. In 1953, Bob Cheston bought an AV 36 FAUVEL flying wing and although somewhat unorthodox in appearance performed equivalent to a 1-26. In the winter of 1957-58, Jones, Townsend and Audette built a 1-26 (CF-ZDF) from a kit and sold it to the club in 1960. In 1958 we bought a surplus Auster - less engine - with the idea of replacing the moth. However, we had considerable trouble getting our surplus Gypsy Major engine modified to fit this particular airplane and because of this delay, bought a Super club instead in the States. This super-club, L.J.L., was used for many years before it was lost in an accident. We eventually got the Auster into flying condition thanks to some airforce engineers and after a few test flights we sold it to the Calgary club. In the spring of 1959, our venerable moth CLW made its last tow and was flown off to its new owner in Edmonton.

In 1959, three more gliders came in, the Eley brothers 1-26, Bob Shirley's LK 10A and Harold Townsend's BG 12 (kit form). So you can see by this time we had a fairly impressive array of gliders in the Regina Club and in fact we filled one whole wall of the Regina Flying Club's hangar.

In the winter of 1959 we discovered a structural problem in the Cinema wing and decided to sell it to a Brandon group for rebuilding. Julien located a Schweizer TG-2 in Montreal and we brought it out in time for the 1960 season. This mid-wing glider had a 1-26 type performance and was easy to fly, except this particular one was "wing-heavy" on tow which required considerable stick pressure. It had another fault, the instructor in the back couldn't see much to the side, so circuits were a little more "hairly" for him. To correct this problem we had "basement" windows under the wing, so at least you could see straight down to give some idea of where you were. We lost the TG-2 in 1964 when due to a moment of carelessness, we let it blow over in a high wind. Even worse, it landed upside down on the Moose Jaw 2-22 which was

visiting here.

We tried to repair the TG-2 but the further we got, the more damage we discovered, until finally we gave up and sold it to a group in Souris. However, turning adversity to advantage seemed to be the forte of our club and we promptly repaired Moose Jaw's 2-22 and leased it from them. Later we made a deal with them and bought the 2-22, CF-ZDW from them.

In the meantime other gliders changed hands in the club; in the winter of 1960-61 Julien bought a new 1-23 from Schweizers and Harold Townsend completed his BG-12. He sold the glider, after a few flights, to Wiseman and Art Penz and bought Wiseman's BG-12 kit. Harold made all the modifications on the second glider that he had thought of when he built the first one. He finished this glider, the next winter and flew it for a couple of years before selling it to a member of the Moose Jaw Club in 1963. That same year Bob Shirley was killed in an accident with his LK. Julien sold his 1-23 in 1966 and in 1969 bought George Redzich's HP 11, but sold it again in 1972. The club bought our 2-33 in 1968 and sold the 2-22 to a Winnipeg club. That brings us up to the modern era of Bergfalke's, Cherokee's and 1-23, of our present members.

This account has only touched on the formation of the club and the equipment owned by the members since that time. There are many, many other facets which I have had to leave out; like the glider meets we've held and/or have participated in; the Canadian record flights that have been made here; the expeditions made to Pincher Creek including our members part in developing wave flying in that area; the long journeys made to transport our new gliders here; the badges earned by our members; the beginnings of air cadet training including the licensing of about 20 air cadet seniors; the time one of our members made a perfect landing on the telegraph wires; the rebuilding programs we've had, the airshows we've put on and others we've helped in; the assistance we've given the Moose Jaw, Saskatoon and Melville groups in starting clubs; and many more events within our group. These stories will have to wait for another time but it would be a worthy project to have a complete history recorded for our club someday. We've come a long way!

GLIDING CLUB COMES TO INDIAN HEAD

by Harold Eley

You may have noticed some strangely acting aircraft flying over your area this summer. Some of these machines are soaring along without motors, while, at other times, you might see one joined to another airplane with a long, thin rope. Well, in case you haven't guessed, these aircraft are gliders, flying free or else being towed aloft by an airplane. The Regina Gliding and Soaring Club has come to

the Indian Head district to make its home.

By way of introduction, the Club has been around since 1954 and has operated at the Regina airport until now. With the growing activity at that airport, and with the runway construction going on this year, our members decided we would like to try our sport in a more open atmosphere. We were fortunate indeed to find a place like Indian Head air-

port, and to be accepted by Everett Potter, the owner-manager of Dun-Rite Aviation. This location appears to be an ideal one for our purposes, and we have already enjoyed many pleasant days of flying.

This arrangement has worked out very well for us, not only because we have a very good

Continued on page 9

Hangar Flying

DH SPARROW

In the May/June FREE FLIGHT there was an item in "Hangar Flying" about a "new" Canadian glider that had just flown. It turns out, according to Peter Masak, the DeHavilland Sparrow glider was new, but 39 years ago. FREE FLIGHT picked up the story from one of SAC's member club's newsletters - the dateline in ESC's Towline must have been dropped, or the editor wanted to have us on a bit. Anyway, Peter has provided some information about the Sparrow, which follows. (Now all I have to do is explain to the eager individual who wrote in enquiring about this "new" design.)

"There was a mistake in the Hangar Flying Column of FREE FLIGHT. It indicated that two new aircraft had recently been flown in the Toronto area, an event which in fact happened about 39 years ago!

Dick Robinson of Toronto sent me some information about the Sparrow, which has been taken from part of a slide show he has on the history of Canadian Gliding:

In the early war years, a group of Polish aeronautical engineers escaped from Poland, made their way to Canada and joined DeHavilland Aircraft.

They formed a sports gliding club of DeHavilland employees and one of them, Mr. W. Czerwinski, an aeronautical designer, designed the 'Sparrow' glider to be built and flown by the club.

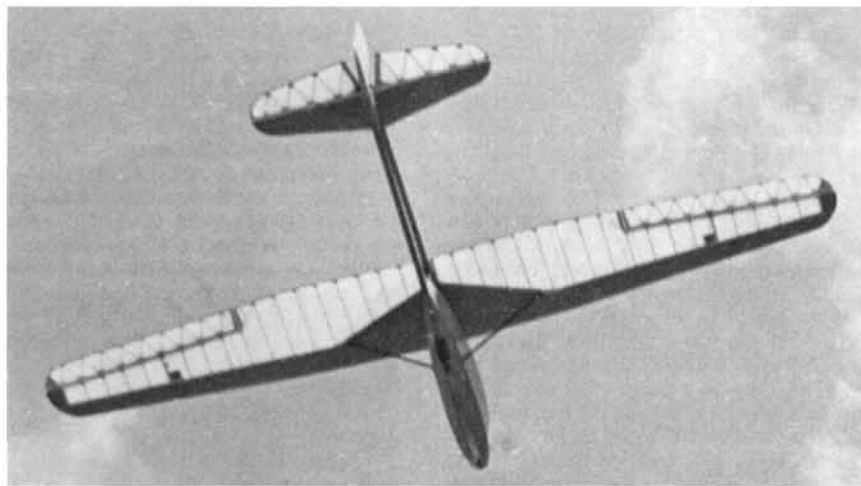
The DeHavilland Co. support both the club and the building of the Sparrow in many ways. They contributed \$11,000 to the construction in the form of a full time employee project. Other club members devoted substantial free time to Sparrow construction.

Construction was begun in the fall of 1941 and finished in June 1942. The glider was actively used during the next few seasons to train DeHavilland employees to glide and soar. The Sparrow was an advanced secondary glider of 234 lbs. empty weight and a span of 38 ft. It was initially launched by auto tow using a 1931 Auburn auto that was purchased for \$45. Launches up to 900 ft. altitude were achieved with a 1000' rope.

Subsequently, a Tiger Moth was used for towing, and many long flights were made; in fact one March day a four-hour flight was made over the DeHavilland plant.

The loss of hangar space at Downsview forced the owners to move their gliding operations to the Toronto Gliding Club, who operated where Toronto International Airport now stands.

Airport expansion forced them to move to Oshawa where the Sparrow was damaged, possibly for the fourth time. The remains were kept until 1955 or 1956 and finally burned as junk in London, Ontario."



Thanks to Peter, and especially to Dick Robinson for providing these rare

photographs, and his research. Sorry homebuilders!

SOARING QUOTE OF THE MONTH

Penelope Peabody, gossip columnist for *Vancouver Soaring Scene*, provided a "soaring quote of the month" that ranks with some of the goodies that come out of the Instructor's Seminars:

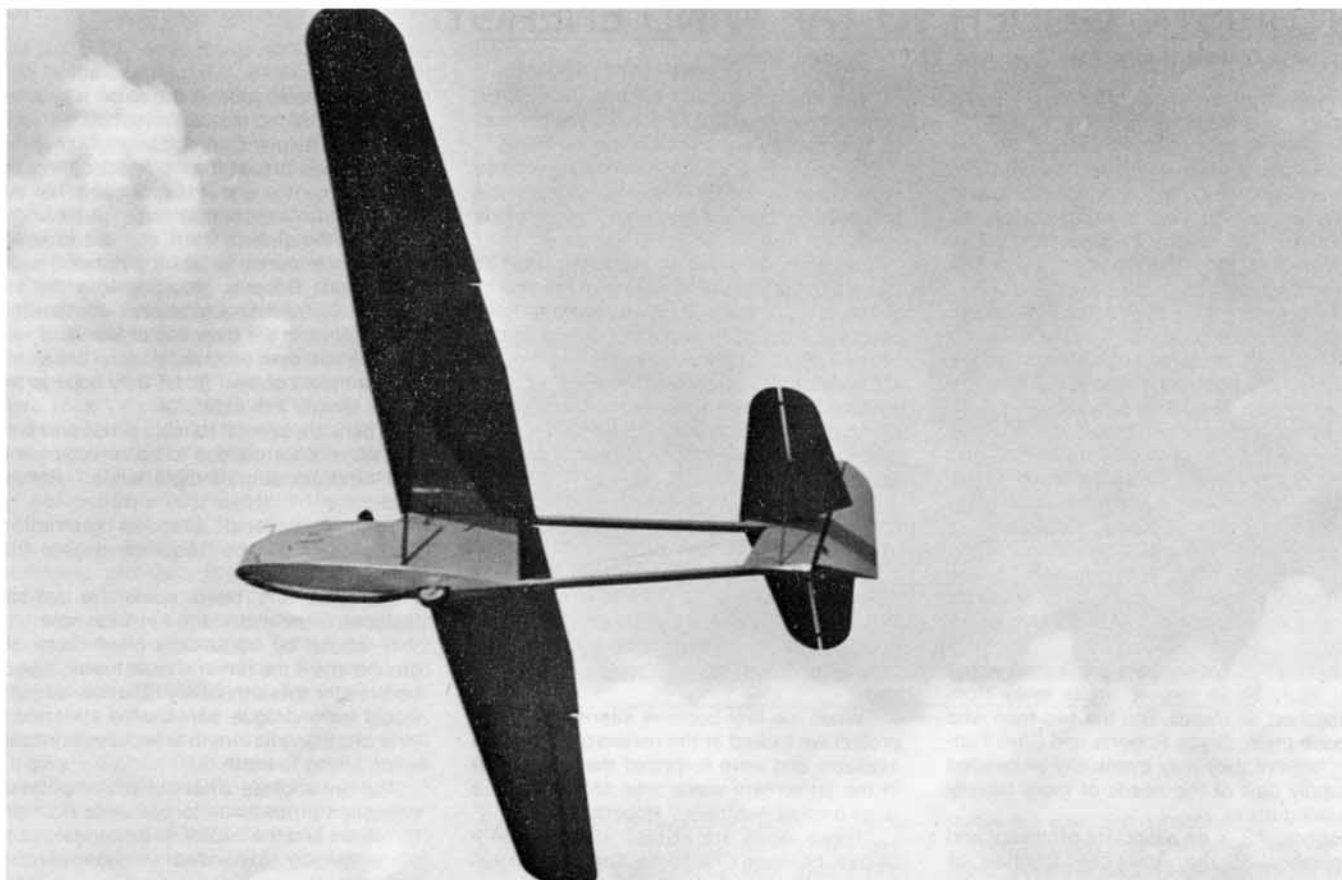
Instructor overheard debriefing student: "Generally, we simply tell the tow pilot where we want to go, rather than trying to lead him there."

SOLAR RISER

By now, most FREE FLIGHT readers will have seen a story or pictures of the "Solar Riser", the first successful solar-powered electric airplane (e.g. September SOARING). The implications for soaring are obvious and exciting.

Self-launching is seen by some to be the answer to the negative side of conventional launching; waiting, costs. It's also used as a training method with good results, and of course, the worst aspects of outlandings are eliminated. The solar electric self-launching

sailplane, if and when developed, offers the same potential but without the expense, ever-rising, of gasoline, and best of all no teeth-clenching rasp of the ever-irritating Two-cycle engine. As a non-fossil fuel consuming source of launching energy, it has the HPA (Human-powered aircraft) beat, at least at the level of development achieved by McCready, so far, anyway. One never knows. It almost looks too good to be true. Best of success to Larry Mauro, of Cupertino California, the developer of the "Solar Riser".



Club News

Continued from page 7

airport to work from, but because Everett is also available for our maintenance needs. Last winter, for instance, Mr. Potter completely overhauled and recovered our super cub tow plane. Our Club has also purchased a modest building for a club house, and has located it at the airport. When furnished, it will add a bit more comfort for our members.

The soaring conditions in this area are excellent, and we have already made over 300 flights this year. Several of these are noteworthy: one flight was over five hours in duration; another glider gained over 10,000 feet of altitude to a height of 13,000 feet above sea level; one glider starting from Indian Head flew to Killarney, Manitoba, for a free distance of over 225 miles, and another went over 200 miles to Plumath, Manitoba, while still another went about 125 miles.

The aim of the Club is to promote soaring both locally and nationally. One of our goals is to provide equipment and training to as many interested people as we can. To do this, we have a modern two seater training glider for dual instruction as well as for casual

passenger rides. We also have a single place sailplane which students can use once they have gone solo. In addition, private partnerships within the Club own another three gliders which helps to free-up the Club gliders for the newer members. Since the Club also has its own towplane, we are able to operate at our own convenience.

The Club is run on a volunteer basis, with instructors and tow pilots providing their services free. Other members assist the operation by walking wing tips, pushing gliders to position, connecting the tow ropes, phoning students, and all the many other details necessary to keep the gliders flying. Because the Club operates on this basis, the gliding sport is relatively cheap.

One other aspect of our Club is our involvement with the glider training of air cadets. As a matter of interest, our Club was instrumental in introducing the sport to the air cadet movement in Saskatchewan many years ago. Today, the air cadet leagues across Canada own many gliders and do most of their own training on a large scale. However, our Club still teaches the art of soaring to two or three

cadets every year, as we have for nearly 20 years. This year is no exception, and we, again, have two cadets on course from No. 41 Squadron in Regina.

Our Club has approximately 30 active members at the present time. These people come from a variety of backgrounds from students to farmers to business and professional people. Most of our people are from Regina, but we have members from Melville, Colonsay and Sintaluta. These people have one thing in common: they have all been "bitten by the flying bug" and all want to achieve that ultimate in flying by soaring a glider.

Membership in our Club is open to everyone, and visitors are also welcome. At the present time we have room for two or three more students. For contacts in Regina, our president is Bryce Stout, call 585-0042, and our chief flying instructor is Dennis Miller, phone 949-3853. We usually fly every Saturday and Sunday, so if you are interested in learning to glide or just want to come out and find something about the sport, or just want to watch, you'd be most welcome at the gliding club base at the Indian Head Airport.

Hangar Flying

FUTURISTIC GLIDER TO TAP WIND ENERGY

From: New Zealand Gliding Kiwi June-June 1979.

John Arbouh

A large unmanned glider is tethered to the ground from a height of 11,000m.

It contains four turbines which, in the powerful jet stream winds of the altitude, generate electricity and send it back along the tether to a ground terminal station for distribution. The electricity-generating glider is located in industrial regions along the eastern seaboard of Australia.

This scenario may sound like a futuristic fantasy from the pages of a science fiction novel but if two research engineers at Sydney University are right, their idea for generating electricity from the jet stream will work.

They hope their research will lead to a 1.7 MW prototype flying power generator and testing of it in a remote area. Research so far indicates that while it would have a maximum output of 1.7 MW in idea conditions, its average over a year would be about 1 MW.

If it is successful, they envisage larger glides with a maximum capacity of about 85 MW and an average of about 50 MW which would feed into the State grid.

Initial use for these flying generators would most likely be in remote areas away from established air routes. But the two men who propose them, Bryan Roberts and Clive Fletcher, believe they may eventually be needed to supply part of the needs of more heavily populated areas.

Roberts, 42, is an associate professor and a member of the American Institute of Aeronautics and Astronautics (AIAA) who teaches mechanics in the department of mechanical engineering.

Fletcher, 34, is a member of the Royal Aeronautical Society and the AIAA and lectures in fluid dynamics and computational methods in the same department.

They hope to receive an energy research grant to initiate a wind tunnel program to maximise the efficiency of the airframe and the aerogenerator system of a 10 kW model which would also be used in altitude tests.

The proposed prototype system would have a power output of 1.7 MW at a wind speed of 110 knots according to Roberts.

"The glider will have a wing span of about 40m and contain four diffuser-augmented axial flow turbines while will drive electrical generators," he said.

"Diffuser-augmented turbines with a high power-to-weight ratio have demonstrated a threefold performance over conventional turbines."

These aerogenerators would be cooled by ambient air at a temperature of -55° C.

"The glider will be held in position by a Kevlar cable which acts as the load-carrying member and carries aluminium electrical conductors to a ground terminal station," Roberts said.

"Kevlar with its high strength-to-weight ratio makes it ideal for their function and it has recently become available at a reasonable cost.

"The total weight of a 1.7 MW glider is expected to be about 3400kg, while the conductor and cable weight will be about 1400kg."

The two research engineers believe they have come up with the world's first feasible proposal to tap energy from high altitude winds.

These winds were first discovered 35 years ago but the useful nature of the energy available from them does not seem to have been appreciated previously, Roberts said.

The high altitude winds are the result of the subtropical jet stream. The wind at high altitudes has an average annual power density of more than 20kW/m² which he said is 3000 times greater than that near the earth's surface.

He considers it inconceivable that a potential form of energy such as this should not be utilised.

At altitudes of 11,000m or more, the mean wind speeds can range from 30 to more than 200 knots, he said. Australia is generously endowed with these high altitude winds and they extend over about a third of the continent.

"When we first became interested in this project we looked at the meteorological data available and were surprised that the energy in the jet stream winds was so high over a large area of Australia," Roberts said.

"These winds are at their strongest on a latitude between Charleville, Queensland and Forrest, Western Australia."

The two engineers with the help of undergraduate student Graham Wylie, have been working for about a year to find a means of tapping this form of energy.

Roberts first became interested with these winds while testing high altitude meteorological balloons.

He met Fletcher, who has considerable experience with gliders and a strong interest in diffuser-augmented wind turbines, and they decided to pool their respective knowledge to tackle the problem of harnessing energy from high altitude winds.

Fletcher has been flying gliders on and off since about 1968.

"On a few occasions, in strong winds, I have remained tethered to the ground at heights up to 700m for quite lengthy periods," he said.

"That experience convinces me that the stability of a tethered glider is probably greater than a glider flying freely."

The estimated air speed necessary to lift the glider from the ground is 15 knots. It could be winched or towed initially to get it airborne.

Roberts said that during the winter, the high altitude wind exceeds 40 knots except for about an average of a half day a month.

If the wind drops below 40 knots the system will be designed to settle back to the ground or alternatively, to maintain altitude, thrust could be provided from motors or the turbines themselves, driven from the ground.

The glider would tack, in the same way a sailing boat does, so that sufficient lift would be created to help keep it airborne.

The winds are at their lightest during two summer months and it is proposed that during this time annual maintenance be undertaken on the glider.

Design features to be incorporated in the glider, said Roberts, would ensure the vertical fin surfaces would always weathercock the turbines in the direction of the wind.

If the two men receive financial backing to build a model of their glider they hope to test it in a remote site in N.S.W.

"There are several suitable sites in northern N.S.W. which are close to transmission lines and far from aircraft flight lanes," Roberts said.

Temporary local airspace restrictions would probably be required during high altitude testing.

Provision has been made for fail-safe features in the glider, the two men said.

It could be radio-controlled from the ground and if the tether should break, it could be brought to earth safely. The Kevlar cable would have drogue parachutes attached at intervals along its length to reduce its velocity when falling to earth.

The two engineers have used computer optimisation procedures to calculate both performance and the capital and operating costs of a greatly expanded version of their scheme.

For a 500 MW station - consisting of 10 units each averaging 50 MW - the capital cost would be about \$83 per kW, they said. Operating costs would range from 1.20c per kWh to as low as 0.23c per kWh depending on the power station size.

They feel these figures compare more than favorably with typical costs of the N.S.W. coal-fired electrical network.

"A possible early use of the glider could be to provide power augmentation for the electrolytic production of aluminium because these processing sites are usually located in remote places," Roberts said.

"However, the ultimate goal might be to locate high altitude generators in the industrial regions along the eastern seaboard and perhaps satisfy 30-40 percent of the peak demand."

He anticipates complaints about the hazard this would present to air traffic but considers that if this technique becomes economically viable and if the advantages are sufficiently great, it would be appropriate to reconsider airline routes.

According to Roberts, this system is not proposed as a replacement for base load power stations but to satisfy a considerable part of the peak demand.

"The proposal has definite advantages of offering no thermal, gaseous or visual pollution and uses only a renewable energy resource," he said.

The 1979 Western Canada Instructors Course

Jim Cumming, W.G.C.

The 1979 Western Instructors Course was held in the beautiful B.C. interior, at Vernon, from July 8-14. The hosting North Okanagan Soaring Club arranged for the facilities of the Vernon Flying Club and Municipal Airport from which the Course was run under the expertise of Ian Oldaker.

A total of ten pilots wended their way towards the site from as far away as Winnipeg. Of these, three were absolutely new to the instructing game, and the other seven figured that it was time to finally "get it right". Five different Clubs were represented in this group, with the largest contingent being from Winnipeg. The North Okanagan members were Dick Van Nostrand and Woody Woodford who spent most of the week upside down in the front seat of the 2-33. No, they don't fly like that out there. They were on "battery duty" (the battery mount was up in the nose and a little tough to get at). The "flatlanders" from Winnipeg were Ray Amyot, John Bandorf, Jim Cumming, and Gary Proskiw. They were on the bus over fifty hours coming and going, and were somewhat apprehensive about the mountain flying ahead. The Saskatoon Soaring Club was represented by "Diamond" Jim Koehler and Keith Williams. Jim's hat was a marvel to behold and Keith added much, much needed stability to the group. From Calgary's Cu-nim Club came Paul Pentek, a one-of-a-kind "free spirit" and from way up in Grand Prairie, Lee Johnson, whose presence in the back seat of the 2-33 would pretty well guarantee a nice spin (C of G location and all that).

Under our hardened task-master, the motley assemblage fell into the routine of things. Sixteen-hour days were taken in stride, with early morning ground lectures giving way to intense flying and penetrating analysis of our instructional tape recordings. Our gliding moved mountains ("...move the stick forward. Do you see the mountain rise?"). It introduced innovative flying procedures. ("...I want you to follow through with me. Do you have your *hands and feet* on the stick?"). In other words, we learned how it feels to be ridiculed and laughed at by one's peers.

Conditions were not conducive to long flights, which was perhaps just as well since it would have been difficult for everyone to get his flights in. Insurance *against* long flights was somewhat guaranteed by threats that that "selfish" twosome would have to buy the beer for those less fortunate earth-bound souls. Also, copious quantities of freshly picked cherries, (provided by Eric Craig and Dick Van Nostrand), brought to the flight line on a daily basis did their work well (need I say more?).

There were many cherished memories; the wonderful meals served up by Yvonne Oldaker under somewhat trying conditions, the twelve minute tows to 2000 feet above ground, the long walks down the runway at mid-night talking over the events of the day,



such as where we would put down in case of a rope break - the campground or the lake, the "Cherry Pit Spitting Contest" (won by Ian - legitimately. Think about what qualities it takes to be good at it), the daily ritual of group bathing in Lake Okanagan and the resulting 200 foot diameter ring of soap suds, the billiard table at the clubhouse that shook the laws of physics, the auto retrieves (courtesy of Woody) down the runway at 30 km/hr, the local "tangled ball" technique of putting

away the tow rope. I could go on.

The hospitality of our hosts was outstanding. Many thanks to Linda and Woody Woodford, Dick Van Nostrand, and Eric Craig, for the trouble they went to to ensure that things ran smoothly, to Yvonne Oldaker, for the coffeebreaks and meals, and to Ian Oldaker for a well-run course that was very meaningful. All kidding aside it was an experience that I personally won't soon forget and I'm sure this feeling prevailed among the rest of the group.

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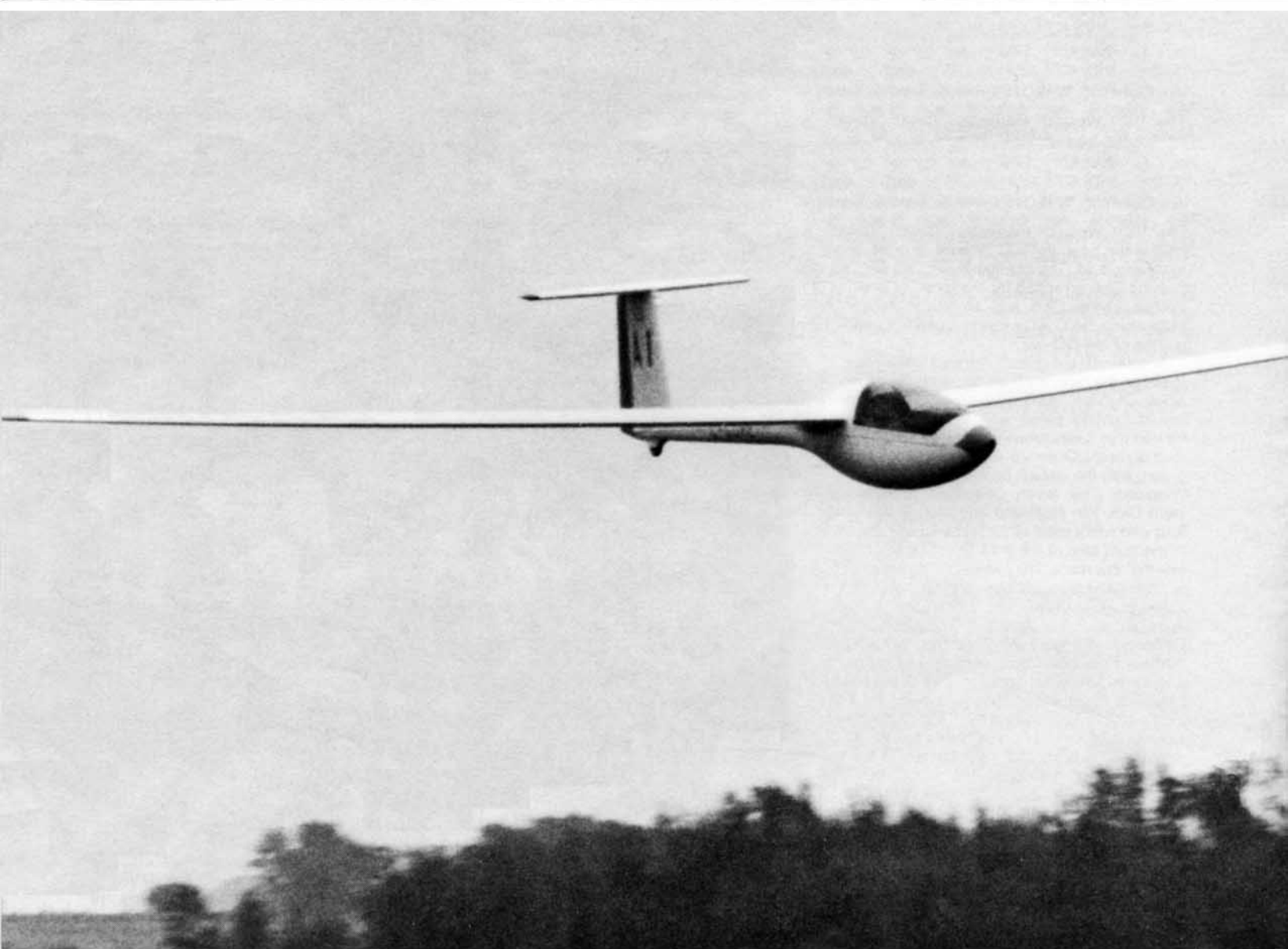
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H. Polzl on Final in PIK-20B

THE CANADIAN '79 NATIONALS

by Maurice J. Aubut
Photos, unless noted, M.J. Aubut

CONTEST ORGANISERS:

Contest Director:

Al. Sunley

Contest Manager:

Walter Chmela

Field Manager:

John Kollar

Chief Towpilot:

Don Band

Start Gate Controllers:

Art Schubert

Chuck Keith

Meteorology Reports:

Larry McDonald

Blaine Grills

General Information Desk:

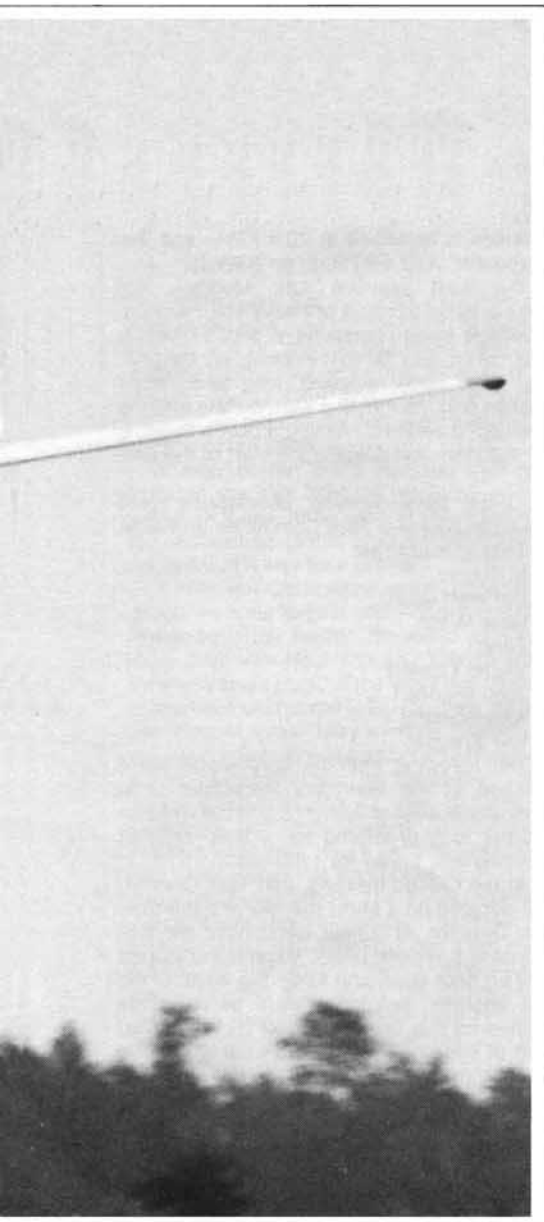
Steve and Jane Williams

Catering:

Anne-Marie von Maurick

Lena Holm

Breakfast was offered on the airfield for \$1.50 and supper for \$2.50 by the dedicated girls.



P. Sears, 1st Place Standard Class PHOTO: P. MASAK



D. Webb, 1st Place Open Class PHOTO: P. MASAK



Start Gate Crew PHOTO: P. MASAK



J. Carpenter, 2nd Place Standard Class PHOTO: P. MASAK

The 28th Canadian National Soaring Championships (July 24 - August 3, 1979) were hosted by the York Soaring Association geographically located seventy miles north-west of Toronto. The village of Arthur is the nearest community, four miles west of the club. The gliderport blends into the South Western Ontario rural scene with farm buildings and metal arched hangars dispersed on a two hundred-acre farm. The main runway measures 3500 x 500 feet with two diagonal runways of 2400 x 225.

The present airfield was acquired in various parcels. The first block being purchased in the winter of 1969-70 with flying operations beginning the following spring. That year the club owned 2 - Doppel-Raab's, 1 - LK, 1 - K-7, and an MU-13. Although the first flying season was spent constructing a metal hangar, the club managed to register 269 flights. Nine years later, instructors flew an impressive 6,200 flights in the back seat of trainers.

A new corrugated metal hangar was constructed last fall along with the foundations and a concrete block shell for the adjoining clubhouse. The project was completed with washroom facilities shortly before the start of

the Nationals. Today the space inside the large hangar houses an enviable fleet of gliders: 7 - 2-33's, 2 - 2-32's, 2 - 1-26's, 1 - 1-23, 1 - 1-35, two Blaniks and four towplanes.

Unfortunately poor soaring conditions hampered the competition, and at one point threatened to nullify the contest as two days remained with only three tasks completed out of the required four to validate the meet as a national championship. It was only on the last day that it was possible to call a task as the fog and clouds lifted, making way to sunshine.

The weather that caused poor flying resulted from two extensive warm fronts sweeping across South Western Ontario in succession. The four-day contest was flown between and after the frontal passage.

Thirty-eight sailplanes entered the soaring meet, and they represented the latest European fiberglass racers, metal homebuilts and earlier ships of plywood-fabric construction that did exceptionally well when the final standings were tabulated. Sailplanes were classified into three categories: The Open Class, Unrestricted 15-Meter and the Restricted 15-Meter (Standard).

Contestants arrived on the weekend before the contest after travelling as far away as Calgary and Winnipeg in the west, Montreal and Ottawa in the east. But the majority of competitors came from the Toronto area while two Americans drove from Los Altos, California and Brookfield, Connecticut.

A speed-limiting gate was utilized for the first time in a Canadian national soaring competition. The maximum speed permitted through the gate (making allowances for wind velocity) is 100 kts or 185 KPH. A timing officer is positioned 1200 feet upstream of the start gate and the distance between the two gates is clocked, ending the countdown on the start gate officer's command, "Mark." Several pilots tested the gate only to be turned down as a bad start.

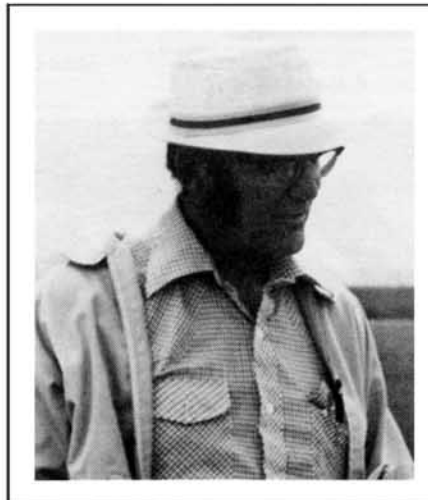
To facilitate daily scoring and standings, the organisers rented a Radio Shack TRS-80 computer with video display. The program is known in the trade as Level II Basic. It has been on the market for business and technical aids. Scoring and standings for one class are run-off by the computer within fifteen minutes after all coordinates have been verified.



C. Filson, Start Window PHOTO: P. MASAK



Karl Doetsch, President of SAC and a Contestant



Contest Director, Al Sunley

Pre-trial Day 1 July 22 (Sunday)
Task: YSA - Stratford - Rockton.
187.87 km. triangle.

Thirteen pilots participated in the pre-trial task with visibility down to minimum VFR conditions, making for poor navigation. Harry Polzl in a PIK-20B completed the task by registering the fastest speed around the course at 76.5 KPH., followed by Karl Doetsch in an HP-14 at 73.8 KPH., and Jim Carpenter at 67.9 KPH. in an ASW-19.

The next practice run, Monday, got cancelled on account of heavy soup and unfavorable flying conditions. A pilot's meeting was called for 7:00 that evening. As the contest rules were reviewed, long discussions ensued and the meeting went on late into the evening. It ended by calling a pilot's meeting for 9:30 the next day and the start of the contest.

At the same meeting, contestants were asked to vote in a Task Committee and Jury.

Task Committee:

Al Sunley
Hal Werneburg
Dave Webb

Jury:

Walter Chmela
John Brennan
Karl Doetsch
Wilf Kreuger

The following morning contestants were advised of the restricted Parachute Drop Zone north-west of Arthur. Since the weather did not look promising for a task, another meeting was called for 1100 hrs.

At the second meeting, that Task Committee decided on a short triangle and the Contest Director, Al Sunley, announced the turn points to surprised pilots. Marshalling started half an hour later, and since the weather did not improve, sailplanes were serenely immobile on the launching grid for the better part of the day. Pilots milled from one group to another, sitting in the shade under wings.

At 1300 hrs., a sniffer reported cloud base at 2000 AGL with visibility down to 1 1/2 miles. To the relief of pilots and crews, the day was cancelled for safety reasons. There were no storm warnings in the morning forecast and sailplanes were tied down outside. The futile exercise seemed to set the pace for the warm days that followed.

While the temperature loomed to a sultry 31°C, pilots and crews found relief in the waters of the Quarry, Elora Gorge and Belwood Lake.

At 1500 hrs., while the gliderport looked deserted, met officers phoned to advise of severe thunderstorm activity. Just before 1700 hrs., a thunder clapper swept across the airfield with gale force winds and a heavy downpour. Several tents suffered, but as luck would have it, sailplanes were not damaged - thanks to several people who braved the storm by laying across wings and secured tie downs, getting drenched in the process. A few sailplanes were airborne when the isolated CB cell advanced in the area, and as they landed there was a mad scramble to secure them in the trailers.

Rain followed and it was not until the following Friday that it was possible to declare a task.

"Did you damage your ship?"

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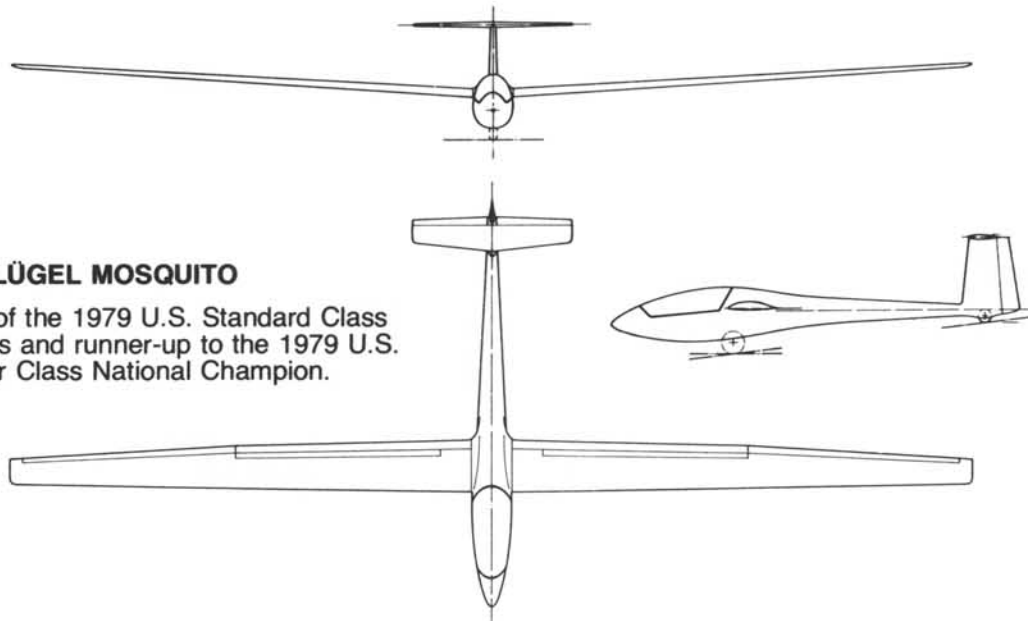
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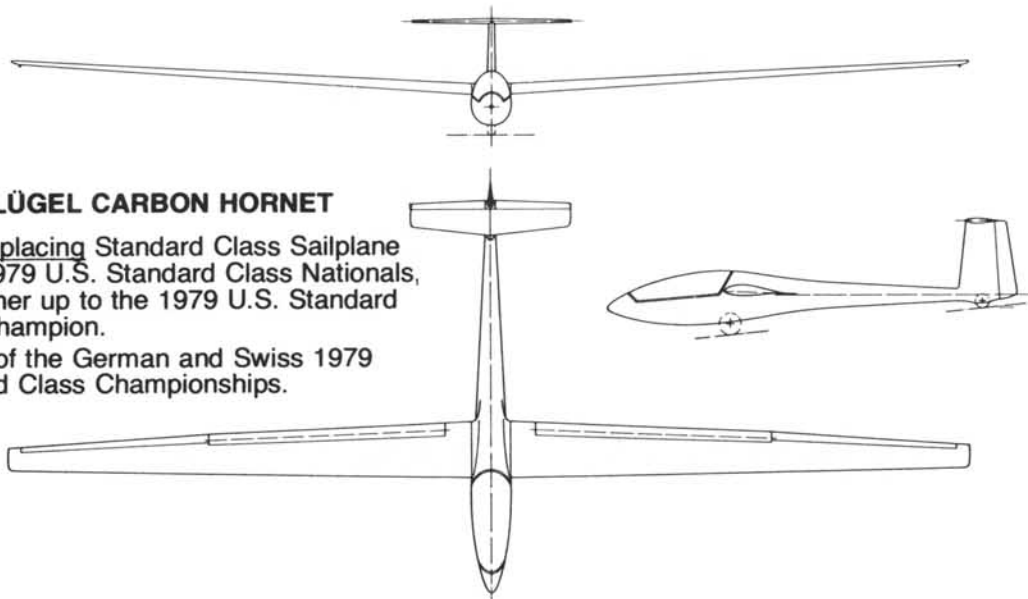
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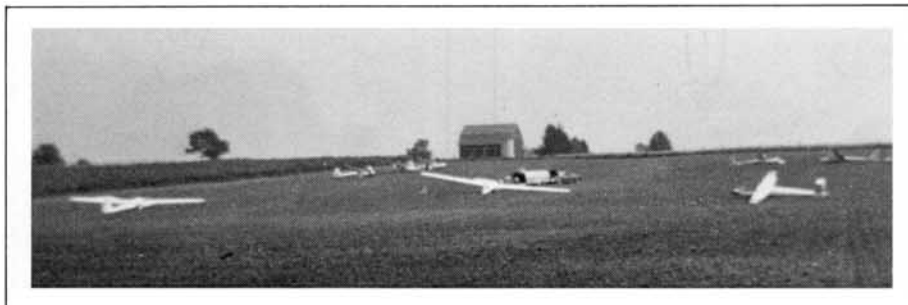
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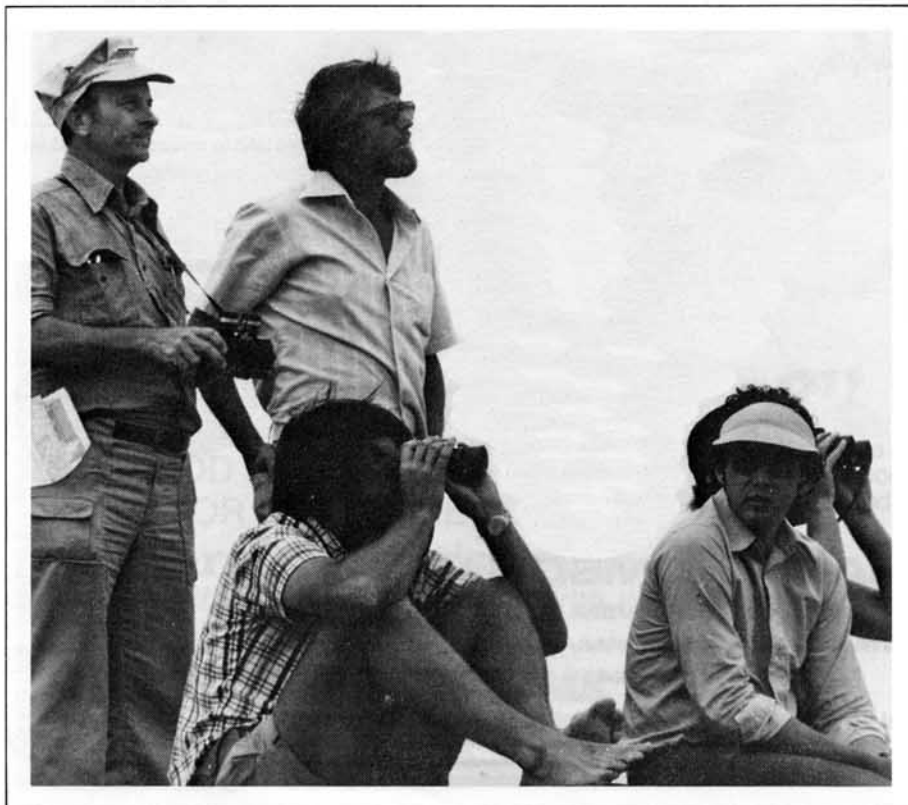


The start of a long day...



"The International Gliderport of South Western Ontario" PHOTO: KARL DOETSCH

Spotters at finish gate PHOTO: P. MASAK



Contest Day 1 July 27 (Friday)
Task: YSA - Listowel - Guelph.
151.5 km. triangle.

Out of thirty-eight sailplanes to cross the start gate, only seventeen finished. Jim Carpenter registered the fastest time for the day. He was reported dolphin flying and pressing on with thermals peaking at 2500 AGL around the course. Most pilots though, flew the task conservatively with the last wave of sailplanes crossing the finish line after seven o'clock. Others missed the last thermal of the day and landed out mid-way on the last leg, while some pilots were forced down a few miles short of the gliderport.

It was reported difficult making speed with only 1500 feet as a margin to find lift, missing one thermal meant an immediate outlanding and the loss of valuable speed points.

Pilots did not have the opportunity to test the speed-limiting gate as they crossed the start gate at 2000 AGL well below the minimum restricted speed. It seemed that pilots found themselves at 1000 feet on the other side of the gates and repeated the procedure for a more advantageous start, but to no avail.

Dave Webb and Hal Werneburg finished the task with the same speed to take top placings in their respective classes.

Contest Day 2 July 29 (Sunday)
Task: YSA - Listowel - Tillsonburg.
241.1 km. triangle.

As contestants arrived for the daily pilot's meeting under a clear blue sky, and the weather forecast looked promising for the next few days, morale was high in all camps.

Larry McDonald briefed the gathering on the weather: "...maximum temperature of 29°C reached at 1500 hrs...4 to 5 kt thermals developing at 1200 hrs...cloud base up to 4000 and 5600...10 kt winds from the north-west..."

Conditions were strong enough for several pilots to test the speed-limiting gate as the weather behaved as predicted.

Dave Webb marked the fastest time of the day with an average speed of 90.0 PH. In the Unrestricted 15-Meter, Hal Werneburg climbed in a "boomer" on the third leg and started a final glide well out on course, holding on to his lead. But an interesting dual developed between the Werneburg brothers, Hal and Ulli, with only a 139 point spread. H. Polzl was also threatening the lead in third place.

Paul Sears took the lead from Jim Carpenter and a major competitive battle was developing between three contenders for top placing in the Restricted 15 Meter. Wilf Kreuger in third place was waiting for Paul or Jim to make a mistake with only 127 points separating him from the lead.

By far the best day of the contest as 28 sailplanes crossed the finish line. Positions below the top three leaders in each class changed slightly to effect the standings of the leaders after the second contest day.

Contest Day 3 July 30 (Monday)
Task: YSA — Hanover A/P - Ingersol A/P
288.6 km. triangle.

If Sunday was considered a good day, Monday was predicted as being super with strong thermals and a higher cloud base. It was the type of classic soaring pilots and the organisers had prayed for all week.

Another warm front was expected to cross South Western Ontario, but the system was not going to arrive until late evening. Therefore, the Task Committee set the longest course of the contest. Contestants with sailplanes performing substantially better under strong conditions were hopeful of upsetting the standings at all levels.

Sailplanes were bunching up at the IP (initial point of entering the gate - a mile out) for a starting position, making it difficult for Art Schubert, the start gate officer, and spotters to identify the ships with precision as faster ships were overtaking slower ones through the gates. These problems were straightened out by the last contest day as the start gate officer permitted only two ships to "orbit" (holding pattern) at the IP and spaced them at ten-second intervals. Al Sunley threatened to close the start gate and to keep it closed until the sky over the gates cleared.

On the first leg, strong predictable thermals were encountered under dark cu's and pilots sped in to take turn point pictures of Hanover Airport only to find weak lift a few miles away. As the warm front moved in faster than expected, it cut off the heating with altostratus and patches of fratostratus clouds. By mid-afternoon, thirty-seven sailplanes were on the ground between the first and second turn points. Lena Holm at the reception desk was inundated with calls and did an excellent job of getting pilots and crews together.

Shortly after dusk, tired pilots and crews began to return, checking in turn point films and landing cards. There were many a tall story told in the clubhouse about outlandings and the rarity of fields without high crops. But the most fascinating stories evolved around a plowed field where eight sailplanes put down, thereafter named, "The International Gliderport of South Western Ontario."

Paul Thompson dropped in on the friendly farmer and his family, and all was well. Since the farmer was leaving on an errand, he left Paul in charge. Three hours later, when Paul was leaving with crew and sailplane safely tucked inside the box, he met the farmer at the gate. "How's everythin' young fella?" the farmer asked amicably. Slightly perturbed, Paul replied, "Have you seen your field?"

After Paul marked the field, more sailplanes appeared over "International." A pilot already on the ground advised, "... land long - there's plenty of field... wheel down and locked in position..." One pilot still airborne, a few hundred feet above the others, asked "Any rocks down there?" Somebody answered, "Just follow the wheel marks." The pilot was reported saying, "Roj," and seen joining the left hand circuit.

Other pilots, seeing crowded "International" pressed on toward Listowel Airport several kilometers south. They found themselves low and circling in weak lift with no apparent landable fields between the two points and drifted back over International. One pilot summarized the general attitude at that frustrating moment. "Might as well join the party. The lift's not going to improve and the farmer might have eight beautiful



Towplanes are ready to launch, but...



R. Zimm, 2nd Place Open Class PHOTO: P. MASAK



W. Werneburg, 2nd Place 15 Meter Class PHOTO: P. MASAK

daughters."

It appeared that Paul Sears was going to run away with the lead as he got an early start and planned his flight for the weather out on course. He upset the point spread by flying a distance of 178.5 kms. for a 1000 points while Jim Carpenter, having the second longest flight of 97.5 kms., only chalked up 370 points. After the scores were posted the next morning, it was rumored at the pilot's

meeting that the formula for scoring a distance task day should be reviewed for future national competitions. According to international contest rules, the day would not have counted.

Dave Webb continued to add a 1000 points to his total and widened the point gap in his class. Hal Werneburg won the day in his class and caused a wider spread in the points to remain comfortably in the lead.



Wilf Kreuger, taping it up...



Oscar Boesch looking over "Wings of Man"



Unrestricted 15 Meter Winner, Hal Werneburg



W. Chmela, Contest Manager
PHOTO: P. MASAK

Contest Day 4 August 3 (Friday)
Task: YSA — Mildmay - Guelph.
185.5 km. triangle.

At the pilot's meeting two days earlier, while it was pouring rain outside, contestants voted to prolong the contest by one day if Friday got cancelled. The Restricted Class declined while the Open and Unrestricted classes voted for the extra day.

The soup cleared on the last day and a short task declared. The weather forecast was far from encouraging for an upset in the standings, and the day turned out like the first contest day with marginal lift. Thermals were reported topping at 3000 AGL pass the first turn point and only fourteen ships had crossed the finish line at the end of the day.

A wide band of cirrostratus moved in while most of the pilots were racing toward Mildmay. Early starters arrived at Guelph when the high cloud seemed to intersect the middle of the triangular course. After taking turn point pictures, they were able to climb high enough to cross the lift destroyer's path and pick up weak thermals on the other side, permitting them to make it home.

Late starters were caught behind the high cloud and forced down before reaching Guelph while others reached the second turn point under the wide shadow and found weak lingering thermals. They were forced down several miles short of completing the task.

Wilf Kreuger crossed the start gate early and zapped around the course. When he called in, "Tango Two - one mile," the next gag-

gle of sailplanes were crossing the first turn point at Mildmay. It was speculated by crews that Wilf's flight would upset the standings in the Restricted Class. After Wilf verified the first turn point from a power aircraft, he had inadvertently taken a picture of Clifford another small village on track fourteen kilometers south. There were other pilots reported lost and taking wrong turn point pictures for the lack of height and good visible landmarks to navigate.

On the last day of a contest, it seems that more spectators turn out to watch the competitors cross the finish line. When it seemed that every pilot who finished had derigged and stored his sailplane inside the box, the crowd silently began to break up. But lo and behold, another pair of wings appeared on the horizon, low n' slow. "He's not a contestant," it was whispered around circles of onlookers, "it's a ship from another club making an unscheduled landing." But how the pilot was going to make the runway was of high interest and everybody continued to observe the sailplane while it seemed to hover in the distance rather than the speedy beat-ups they had been treated to earlier.

Walter Herten, very much a contestant, manoeuvred his Ka-6E at minimum flying speeds and seemed to conquer every begrudging foot of ground toward the finish line - at least to the end of the runway. As the sailplane's imperceptible progress continued, and as it crossed over-the-fence not higher than seven feet, everybody kept holding on to their breaths. Walter was out to finish, come hell or high water, and he per-

formed a spectacular slow motion beat-up inches above the runway. When Walter crossed the finish line, he must have felt a ton of bricks lift from his shoulders as he plopped the ship on the ground for a short roll out. Applause and cheers followed as Walter removed the canopy and stepped down from the cockpit, wearing a winsome Colgate smile, seemingly unmoved.

As expected, Dave Webb added another 1000 points to his standings and finished at the top of the Open Class. Rainer Zimm, formerly from YSA and now flying out of Cum-Nim in Calgary, placed second. From the reports of good soaring conditions out west, pilots are looking forward to the '80 Nationals.

The Werneburg brothers continued to battle it out down to the finish line. Hal taking top placing in the Unrestricted and Ulli second. The race for the top position is expected to continue next year.

In the Restricted, an upset by Paul Sears over Jim Carpenter, but nothing can be taken away from Jim's flying skills as a competition pilot. The dual is expected to be fearsome out West.

Peter Schwirtlich and Doug Winger took the team awards. They flew a club Hornet out of SOSA (Rockton).

Walter Chmela presided over the Awards Banquet that evening at Ferguson's Restaurant in Fergus. Karl Doetsch, President of SAC, was asked to address the gathering of eighty-nine adults and seven children. The winners were presented attractive souvenirs plaques for their efforts and the ladies sparkled the decor with fashionable fineries that had pilots, who missed out on the top honors, saying, "I knew there was more to life than soaring."

Congratulations to Walter Chmela and York organisers for hosting the Nationals. And the hard-working Contest Director, Al Sunley, who took on a demanding job. Al flies out of SOSA.

Newcomers were welcomed and made to feel at home with the conviviality of the York gang. Breakfast and supper was offered at the old clubhouse by two dedicated girls: Lena and Anne-Marie. The sanctum of the chicken coop was invaded often - not for eggs - the bunkhouse is where the beer cooler is kept. One night, visitors joined in song and dance around a tall campfire as it started to rain, but that did not stop anybody. It was said, "York members take their flying seriously, but they have fun too." Another night after an open air bar-b-que, Bill Sikma of YSA entertained the large gathering with a triple-screen slide show. Everybody appreciated and applauded the four season panoramic scenes of South Western Ontario as a piece of art work.

A passing thought:

Although competitive soaring means exposing one's skills to open criticism, it's the epitome of flying. The struggle to win is fought against oneself, kilometer after kilometer, over terrain that looks like a piece of Earth that God gave Cain and under the worst possible soaring conditions, day after day, until a pilot's nerves are as tender as an open wound. When it's all over, we've learned a little more about flying; and ourselves.

But the spirit of soaring is found in the hearts of friends, old and new, with whom one spends a hard earned two-week vacation cursing the elements and the sad feeling to watch them take to highways when it's all done...

Results of Contest Day 1

Open Class:

Name	Kph	Pts	Stndg
D. Webb	52.8	1000	1
R. Zimm	46.5	911	2
F. Markut	45.8	874	3

Unrestricted 15 Meter:

H. Werneburg	52.8	1000	1
H. Polzl	52.0	988	2
U. Werneburg	48.8	939	3

Restricted 15 Meter:

J. Carpenter	59.5	1000	1
W. Kreuger	51.6	925	3

Results of Contest Day 2

Open Class:

Name	Kph	Pts	Stndg
D. Webb	90.0	1000	1
F. Markut	85.9	954	2
R. Zimm	63.8	709	3

Unrestricted 15 Meter:

H. Werneburg	89.6	1000	1
U. Werneburg	84.2	922	2
H. Polzl	78.3	836	3

Restricted 15 Meter:

P. Sears	81.1	1000	1
J. Carpenter	76.9	942	2
W. Kreuger	75.2	918	3

Results of Contest Day 3

Open Class:

Name	Km.	Pts	Stndg
D. Webb	152.5	1000	1
R. Zimm	99.5	483	2
K. Doetsch	87.0	361	3

Unrestricted 15 Meter:

H. Werneburg	123.5	1000	1
W. Sikma	108.5	796	2
D. Harper	99.0	667	3

Restricted 15 Meter:

P. Sears	178.5	1000	1
J. Carpenter	97.5	370	2
J. Oke	96.0	358	3

Results of Contest Day 4

Open Class:

Name	Kph	Pts	Stndg
D. Webb	66.2	1000	1
F. Markut	65.8	995	2
R. Zimm	56.5	868	3

Unrestricted 15 Meter:

H. Werneburg	63.6	1000	1
U. Werneburg	62.1	987	2
H. Polzl	57.0	944	3

Restricted 15 Meter:

R. Cook	60.0	1000	1
J. Carpenter	56.7	967	2
Schwirtlich/Winger	50.8	908	3

F.A.I. BADGES

by Tony Burton

The following FAI Badges and Badge legs were issued Jun - Aug 79.

DIAMOND BADGE

Anteo Talevi, No. 31 (World 2576)
John Bisscheroux, No. 32 (World 2580)
Gunter Geyer-Doersch, No. 33 (World 2598)
Richard Matthews, No. 34 (World 2599)

GOLD BADGE

153 Andrew Heinemann
154 Verne Ennis, Independent
155 Candace Matté, Independent
156 D.A. Collard, Regina
157 Chester Zwarych, Edmonton
158 Willem Sikma, York
159 W. James Oke, Winnipeg
160 D.M. Williams, Vancouver

SILVER BADGE

518 Peter Davey, SOSA
519 Bryce Stout, Regina
520 Chick Silliphant, Rideau Valley
521 Hans Brendl, SOSA
522 Keith Williams, Saskatoon
523 Kevin Conlin, MSC
524 R.J.F. Smith, Saskatoon
525 Ursula Wiese, Rideau Valley
526 Wolfgang Weichert, Gatineau
527 Colin Tootill, SOSA
528 Aydin Salivar, MSC
529 David Baker, Vancouver
530 Malcolm Ovenden, Vancouver
531 John Jeddry, Quebec
532 Kent Beckham, London
533 Boris Karpoff, Erin
534 James Small, COSA
535 Geri Moore, MSC
536 Lynne Gough, SOSA
537 Barbara Puky, COSA
538 Robert Graham, Bonnechere

DIAMOND LEGS

Goal

Andrew Heinemann
Verne Ennis, Independent

Frits Stevens, Winnipeg
Candace Maté, Independent
Peter Flanagan, London
Rick Matthews, Calgary
Jim Oke, Winnipeg
Hanspeter Roth, MSC
Chris Eaves, London
Distance
John Bisscheroux, MSC
Gunter Geyer-Doersch, MSC
Anteo Talevi, (earned in Australia)

GOLD LEGS

Distance
David Stephenson, Saskatoon
David Baker, Vancouver
David Collard, Regina
Chester Zwarych, Edmonton
Chris Eaves, London
Altitude
D.M. Williams, Vancouver
Dennis Miller, Regina
Malcolm Ovenden, Vancouver

SILVER LEGS

Duration
Chick Silliphant, Rideau Valley
Wolfgang Weichert, Gatineau
Felix Zurbuchen, Vancouver
Blake Cowan, Vancouver
David Baker, Vancouver
Keith Williams, Saskatoon
Paul Didrikson, COSA
Malcolm Ovenden, Vancouver
Ursula Wiese, Rideau Valley
Aydin Salivar, MSC
Colin Tootill, SOSA
Bryce Stout, Regina
R.J.F. Smith, Saskatoon
Boris Karpoff, Erin
Geri Moore, MSC
Georg Matthias, Vancouver
Alfred Embury, SOSA
Lynne Gough, SOSA

Barbara Puky, SOSA
Dave Clair, Vancouver
Hans Stauffert, Borden
Dean Stauffert, Borden
John Weber, Cu-Nim
Altitude
Blake Cowan, Vancouver
Geoff Hemsley, Winnipeg
Denis Pepin, Quebec
Peter Davey, SOSA
Chick Silliphant, Rideau Valley
Wolfgang Weichert, Gatineau
Aydin Salivar, MSC
Colin Tootill, SOSA
Kevin Conlin, MSC
Boris Karpoff, Erin
Geri Moore, MSC
Alfred Embury, SOSA
Norman Beug, Regina
Eric Meikle, Toronto SC
Kenneth Ferguson, Toronto SC
Lynne Gough, SOSA
Dave Clair, Vancouver
James Lewin, Air Sailing
Distance
Geoff Hemsley, Winnipeg
Garry Burt, Edmonton
Denis Pepin, Quebec
C. Silliphant, Rideau Valley
Ursula Wiese, Rideau Valley
W. Weichert, GGC
Aydin Salivar, MSC
Colin Tootill, SOSA
Hans Brendl, SOSA
Keith Williams, Saskatoon
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Boris Karpoff, Erin
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 N.B. E1B 2H3
 Newfoundland Soaring Society, c/o Mr. J. Williams, 57 Boyle St.,
 St. John's, Nfld. A1E 2H5

Quebec Zone

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 Ariadne Soaring Inc., 735 Riviere aux Pins, Boucherville, P.Q. J4B 3A8
 Association de Vol a Voile Champlain, 192 Highfield, Mont St. Hilaire,
 P.Q. J3H 3W5
 Buckingham Gliding Club, c/o No. 8 - 365 St. Joseph Blvd., Hull,
 P.Q. H8Y 3Z6
 Club de Vol a Voile Asbestos, 379 Castonguay, Asbestos, P.Q. J1T 2X3
 Missisquoi Soaring Association, Box 189, Mansonville, P.Q. J0E 1X0
 Montreal Soaring Council, Box 1082, Montreal, P.Q. H4L 4W6
 Quebec Soaring Club, Box 9276, Ste. Foy, P.Q. G1V 4B1
 St-Jean Glider Club Inc., 611 - 860 Blackthorne Ave., Ottawa,
 Ont. K1K 3Y7

Ontario Zone

Air Cadet League (Ont.), c/o Mr. G. Fraser, 1105 - 2175 Marine Dr.,
 Oakville, Ont. L6L 5L5
 Air Sailing Club, Box 2, Etobicoke, Ont. M9C 4V2
 Base Borden Soaring Group, c/o Mr. Popodynec, CFB Borden,
 Ont. L0M 1C0
 Bonnechere Soaring Inc., Box 1081, Deep River, Ont. K0J 1P0
 Central Ontario Soaring Association, Box 762, Peterborough, Ont.
 K9J 6Z8
 Chatham Air Cadet Gliding Club, 561 Lacroix St., Chatham,
 Ont. N7M 2X1
 Erin Soaring Society, Box 523, Erin, Ont. N0B 1T0
 Gatineau Gliding Club, Box 883, Station B, Ottawa, Ont. K1P 5P6
 Huronia Soaring Association, c/o Mr. G. Ehmcke, 714 King Street
 Midland, Ontario L4R 4K3

Kawartha Soaring Club Inc., P.O. Box 168, Omemee, Ont. K0L 2W0
 London Soaring Society, Box 773, Station B, London, Ont. N6A 4Y8
 Rideau Gliding Club, c/o Mr. H. Janzen, 172 College St., Kingston,
 Ont. K7L 4L8
 Rideau Valley Soaring School, Box 93, R.R. 1, Kars, Ont. K0A 2E0
 SOSA Gliding Club, Box 654, Station Q, Toronto, Ont. M4T 2N5
 Toronto Soaring Club, P.O. Box 856, Station F, Toronto, Ont. M4Y 2N7
 Windsor Gliding Club, 62 Lancefield Pl., Chatham, Ont. M4V 2N5
 York Soaring Association, Box 660, Station Q, Toronto, Ont. M4V 2N5

Prairie Zone

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 Regina Gliding & Soaring Club, f9 Ritchie Cres., Regina, Sask. S4R 5A5
 Saskatoon Soaring Club, Box 379, SPO 6, Saskatoon, Sask. S7N 0W0
 Winnipeg Gliding Club, Box 1255, Winnipeg, Man. R3C 2Y4

Alberta Zone

Cold Lake Soaring Club, Box 1714, Medley, Alta. T0A 2M0
 Cu-Nim Gliding Club, Box 2275, Station M, Calgary, Alta. T2P 2M6
 Edmonton Soaring Club, Box 472, Edmonton, Alta. T5J 2T6
 Grande Prairie Soaring Club, Box 550, Grande Prairie, Alta. T8V 3A7
 Namao Soaring Club, c/o Capt. K. Peters, CFB Edmonton, Lancaster
 Park, Alta. T0A 2H0
 Southern Alberta Gliding Assoc., c/o D. Clark, 514 Sunderland Ave. S.W.,
 Calgary, Alta. T3C 2K4

Pacific Zone

Advanced Soaring Training & Research Association, c/o Mr. L.M.
 Bungey, General Delivery, Port Mellon, B.C. V0N 2S0
 Alberni Valley Soaring Association, Box 201, Port Alberni, B.C. V9Y 7M7
 Bulkley Valley Soaring Club, Box 474, Smithers, B.C. V0J 2N0
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Andy usually puts in five hours or more during each flight. Renters, envious on the ground, wait in line for their 60 minute chance. Indeed, life is too short and financial costs of too little consequence for those keen for the sky. **OWNING YOUR OWN IS THE ONLY WAY TO GO.**

Two major questions arise, (one of them is not money - there is always credit). The first question, family duty, has been answered by a line in a popular newsletter: "if your wife does not take to soaring - make a choice." Don't worry about the choice, Penelope* knows that a number of alternative female, would be co-owners are always waiting in the wings. The second question is more important - which sailplane?

Dave has a wonderful time in the present with a craft long out of the past. Lloyd could only be really content with something out of the future. Super performance this is not the only goody for your bag. Easy, safe flying, rugged construction and ease of maintenance will always have their place. That is why Schweizer thrives, and the pilots of Schweizer ships.

I recall the incident of a wife in a Schweizer 1-26 crashing after her husband accidentally knocked off the left wing when passing her in a thermal. She walked away from the total wreck with a scraped knee. That story has real appeal.

A 1-34 I had been flying only minutes before was spin into a hillside by a light-weight who removed the lead ballast I had added to help my own not inconsiderable bulk bring forward an aft-inclined centre of gravity. He survived with a few broken bones. The ship flew again in a few months.

**The notorious Penelope Peabody.*

Owning your own

by John Southworth
from Vancouver Soaring Scene Aug. 1979.

Similar stories with glass are not so happy. Glass is great for the top of the line as most, but not all, contests prove. But if top of the line is not your bag, perhaps safety, fun and durability are. Many good ships, such as the 1-34, offer a lot of performance without demanding super piloting skill and constant off-field landing luck.

For example, with the help of the much derided nose skid, surprisingly kept by Schweizer on the high-performance 1-35, I once got into a 100-foot farmer's front yard with only \$25.00 paid damage. The nose brushed the fence. I don't advise such close tolerances as general practise, but it is very nice to know that your ship is capable of such feats when urgently called upon.

Fiddling with variometer instrumentations can be much of the fun of self-ownership. Several different variometers have been in the 1-35. At one time it flew without any, just to see how well one could do with only an altimeter (very difficult on a so-so day!) Will Schuemann made a Total Energy Box for this machine and is soon sending one of his new mechanical averaging variometers to work from it. Getting such equipment to work properly gave me a degree of pleasure that I found missing in the exhausting hassel of always trying to go faster than a bunch of hard driven competitors, although this has its appeal too, I am told.

My only true dissatisfaction with being an owner has come to be the availability of time. Unlike our hero Jack B. who is near the field most of the time nad has few spare-time commitments other than generously giving of his skill and right goodwill to the club, I am pulled away from the field constantly by my job. I could only get in four days for four hours flying last year, despite desperate attempts to get out of having to travel abroad during summer months. This year is even more disastrous, with chores in the Middle East, where there is no such thing as soaring, claiming at least three to four more journeys in the near future and most of my weekends.

The 1-35 now sits there, neglected, and all its luxurious group support equipment does likewise. My flying rust gets rustier, as it never should be allowed to do. The thought of becoming a non-owner remains somewhat painful. Perhaps, though, it would be fairer if other owners took my place and the 1-35 became busy again.

Anybody got any good suggestions?



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"No Motor, One Wheel and A Tow"

Bert Small

There's a strange group of people I know,
To Chemong every weekend they go,
They all look quite sane,
Till they fly a little plane,
No motor, one wheel and a tow.

They're hooked up on the end of a rope,
And climb to two thousand with hope,
No thermals, no lift,
They land, very swift,
And suddenly feel like a dope.

The plan is to try it again,
In the same little no-power plane,
If you make it this time,
The feelins' sublime,
But try not to land in the grain.

The neighbors look up in the sky,
And see the silent gliders go by,
While tending the corn,
They don't show their scorn,
But secretly ask themselves - why?

We all know the answer to why?
The solution is up in the sky,
You've felt it like me,
You try it, you'll see,
It can't be explained till you fly.

There's a strange group of people I know,
To Chemong every weekend they go,
They all look quite sane,
Till they fly a little plane,
No motor, one wheel and a tow.

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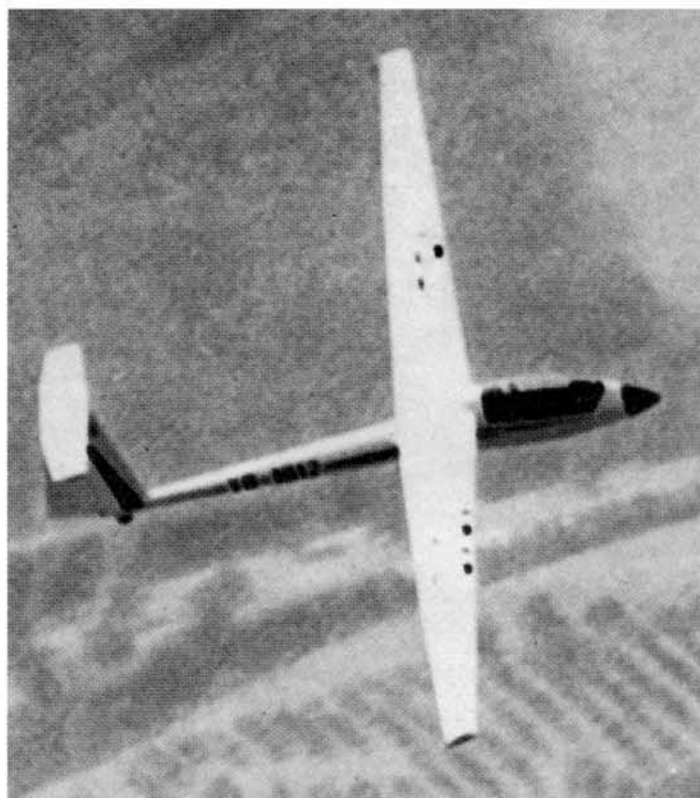


For further information please contact:

George Couser
735 Riviere aux Pins, Boucherville, Quebec J4B 3A8
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Technical Data	PIK-20D	PIK-20E
Span	15.0 m	15.0 m
Aspect ratio	22.5	22.5
Empty weight	220.0 kg	290.0 kg
Max. weight	450.0 kg	470.0 kg
Water ballast	140.0 kg	120.0 kg
Wing loading	29.45 kg/m ²	36.47 kg/m ²
Best L/D (max. wt.)	42 @ 117 km/h	41 @ 117 km/h
Min. sink (min. wt.)	.56 m/s @ 73 km/h	.61 m/s @ 77 km/h
Stall speed (min. wt.)	60.0 km/h	66.0 km/h
Rate of climb		4.0 m/s
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Fuel consumption		16.51 /h

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