Skyline

Summer 2003 (Volume 42, No. 2)

Capital Hang Gliding & Paragliding Association

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Aerotowing at Highland Aerosports—Ridgely, MD

Pre-Flight ~ *by Ralph Sickinger*

SO, the one question that I've been asked more times than any other this summer is "Where have you been?". I admit, I've been "missing in action" for most of the season, but not by choice. Let me tell you about my Summer...

To begin with, there's been this god-awful weather we've been having. Normally, by this time of the year we're starting to ask ourselves "where has the Summer gone?" - I'm asking myself "Where has the Summer been?" April and May rained all the time, June and July were either blown-out or completely dead calm. As a result, it's been difficult even finding flyable days. Then, when there HAVE been flyable days, I've ended up missing them anyway. Why? Well let's just see...

April 22nd: Hooky Day at Woodstock! *(I get a 5 minute extended sled in L&V winds.)*

April 27th: Looks like it's going to be a good day at the Pulpit, and I'm on my way. While cruising along I-270 near Gaithersburg, my transmission decides to eat itself, taking the clutch with it in the process. On off-duty policeman stops within two minutes, and offers to call a tow truck for me. I take him up on his offer, and eventually get towed *(with the hang glider still on top of my truck)* to Gaithersburg Isuzu. It takes them until Thursday to get a new clutch and transmission *(which have to come from Ohio)*, and another day to install it. I'm finally able to pick the truck up at 6pm Friday night *(and my glider, which has spent the week sitting in the Parts Department's storage area)*, and head for home. Nearing the beltway, I hear a ticking sound coming from the engine, and every time the engine idles, the oil light comes on.

Now how much time does a vehicle spend idling between Rockville and Bowie? At 6pm... on the beltway... on a Friday night... An hour and half later, the truck is finally back in my driveway, where it is absolutely going to stay put until I can get it to my regular service people. So, no flying this weekend either.

Monday morning, I take my truck in. They tell me that it has "spun a rod bearing"; roughly translated that means "It's dead, Jim". I decide to rent a car from Enterprise, until I can get myself a new truck. Unfortunately, it seems that car makers have forgotten that "SUV" stands for **Sport**-**Utility** **Vehicle**. From where I stand, I don't see how the current crop of "soccer-mom mobiles" has *anything* to do with "sport"! After a week of fruitless searching, I decided that I really wanted to keep my baby, and found a place that would rebuild the engine for me. Three weeks later, I get my truck back, and I'm finally mobile again!

June 10th: Desperate to fly, I succumb to one of Madame President's hookie days, this one at Ridgely. Again, only sled rides. <*sigh*> Apparently, the Gods decide to smite me for taking the day off; the next day while I'm at work, a water connection under the kitchen sink comes apart, flooding the kitchen. And the garage underneath it. Where I keep my glider, and all the rest of my hang gliding gear. I came home Wednesday night and discovered that the fire department had broken the door down in order to let the police in. I spent the rest of the following weekend moving wet things out of the house, getting the front door replaced, and trying to get the living room dried

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Capital Hang Gliding and Paragliding Association

CHGPA represents hang glider and paraglider pilots from the Washington, DC mid-Atlantic region. We are committed to the safety, growth and solidarity of hang gliding and paragliding.

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Prez Sez ~ *by Lauren Tjaden*

I had no idea what to say in my column this month. I have nothing profound to share, certainly no words of wisdom. I am no Tom, who can tell a new pilot how to prepare to launch at High Rock. I am no Sunny, who has performed a zillion wing-overs and can land on the spot, whether tandem, ridden by a two hundred pound woman, or alone, cruising in the latest rocket put out by Aeros.

I slumped in front of the computer. I opened my hang gliding files and read some of the things I have written over the years, looking for inspiration. Some of my old posts made me smile.

Here is what I wrote about my first mountain flight: For over an hour, Ms. T soared, and I remembered why I love to fly. Sometimes I banked Ms. T hard, so she screamed around the turns, and then I let her whisper around others. I stalled her a few times for fun, pushing her nose high until she quit flying and dived. I watched cows eat and the other gliders float. Paul zoomed by, screaming and waving. My sweet fifty four pound kite – an amazing machine – seemed to move with no more effort than my thoughts.

Some of the old posts made me wince. My first whack: I try to always land with speed, but I don't think I've ever been quite as successful drumming up that much pace before. When I tried to transition to standing up from the prone position, I got a shock. The nose popped up when I shifted my hands, with more insistence than a hungry baby screaming. The ground looked ugly as a dog turd from twenty feet high in a full blown stall. It never happened that way at the training hill.

I tried to pull in and get my wings level, but it was too late. Ms. Target plummeted down with no more grace than a bale of hay. She threw herself between the ground and me, saving me from any harm. However, while I strolled away without a scratch, Ms. Target wasn't so lucky. I bent her downtube so bad it looked like an old clothes hanger, and it appeared a Sumo wrestler had slept on her speedbar. I whacked her so hard that she wouldn't even rest on my shoulders properly while I carried her back – head down in shame – to the group by the picnic table.

I cried when I glanced at the post I wrote about Chad after we lost him: He would wake us by buzzing our tents with the Dragonfly, a punishment for those who had overindulged by the bonfire the night before. We learned to play spoons – a juvenile game of electricity and nerve. Chad could take enough voltage to stop an elephant's heart, so I learned that I should drop out of the game early, because he was going to win anyhow. He always smelled like airplanes and motorcycles, and that became the smell of happiness to me, the smell of Ridgely.

Paul Tjaden at Slaughter Beach, Delaware Bay - photo by Lauren Tjaden

Last Wednesday I flew High Rock, where you step off a cliff. Flying there is like what I dreamed about as a kid. It's magic. You have a little kite and you jump off this huge rock, and then you fly, wings outstretched, a magic being. I soared above the mountains, the lift so generous I could inspect the entire valley at leisure. And then on the weekend I experienced my first XC, which was so short but such an adventure.

So, this is my brief history of hang gliding. This sport has brought me the greatest joys of my life – no exaggeration – and also, my greatest sorrows. I only wish this part was an exaggeration. I keep thinking that someday I will heal about Chad and Terry, but I don't know when that might be.

Nevertheless, I have felt alive. I have learned to love the sight of cumulus clouds that billow softly, and I have forged friendships that will outlast the sting of bitter, unhappy comments and misty days where no lift can be found. I am shocked, when I look in the mirror, to see how old I really am, to see how my body has aged, no matter what my heart feels, no matter how young my spirit is. As my father advised, we are all going to die anyhow, it is only a natural progression of life. I am starting to realize how limited my time is, even if I scrape through until the end. My time here is small, all of our time here is small.

This is what I mean now: you have made this time special. This sport, and you guys, have provided the greatest fun, and yes, the greatest sorrows of my life. But I wouldn't have missed it, or you, for anything. With hopes that you fly to the beach, or at least sky out, and that you inhale some pure air. Watch some damn pods of dolphins while you laugh from the sky.

~Lauren

Coming Down to Earth ~ *by Brian Vant-Hull*

Flying the Crowded Skies

A flock of gliders spangled the sky and launch at Fisher's Road as a lead-in to the night's festivities at the High Rock Fly-in. At some point a massive flush cycle set in, and gliders were stretched between the ridge and LZ like a string of carnival pennants in a mad dash to get out of the sky before the ground hit. Paul and Carlos did a beatiful side-by-side landing that looked like it had been choreographed. Awareness of the situation and a willingness to modify flight plans in response made for a safe landing.

What goes for landing goes for the ridge as well. There was not a lot of altitude to be gained that day, which presses pilots close together both vertically and horizontally as they try not to leave the lift band or stray too far from the LZ. The situation was much worse several years ago when we were blessed with the rare occurrence of the Pulpit ridge being soarable during the McConnellsburg Fly-in. The conditions, in fact, were much worse, with at least twice as many gliders and a much narrower lift band. With the Fly-in coming up again, this is a good opportunity to review close quarters flying: additional thoughts beyond the rules of the ridge.

- ***Clear your turns***

Everyone has heard this rule, crucial because we can't hear anyone around us, and we don't fly with rear-view mirrors. But even in glass-off, in a crowded sky the rule is barely adequate. For smooth winds we might write "*For God's sake, AT THE VERY LEAST clear your turns*". But for thermally air this doesn't even come close to being enough.

- ***Keep track of EVERY glider within a hundred yards of you, updating constantly***

In order to stay up in thermally air, you need to be very responsive and ready to turn as soon as you feel a bump. Efficient flying will not give you time to completely check out the area before you begin to turn. If you are continuously aware of every glider in your immediate area, you'll know if it's safe to start maneuvers *(but you still look to clear your turn!)* To do some calculations, I'll switch to metric: a hundred yards is a hundred meters, gliders fly at about 10 meters per second. If a glider a hundred meters away switches direction when you're not looking, you have a relative speed of 20 meters per second: you'll be on top of each other in 5 seconds! (*Crabbing into the wind reduces ridge speed, but not everyone is crabbing all of the time*). This is why a continous update is a must. It also explains why you still look in the direction you are turning before you turn, as gliders can pop into existence quickly.

If you are continuously aware of every glider in your immediate area, you'll know if it's safe to start maneuvers

- ***While passing, if the other pilot does not or cannot make eye contact while you are approaching, pass with a wide berth.***

When coming up behind gliders, you must go far around or far below: far enough that if they begin to initiate a turn you will have time to get out of the way. If you can't pass at a comfortable distance while staying in the lift band, reevaluate your need to pass. If you pass above a glider, you must be far enough above that if you hit sink before they do, you won't suddenly drop into sight right in front of them. And if you're coming head on and they never look up at you, stay the heck away. They may be fooling with their harness or something. You simply cannot rely on the rules of the ridge to protect you.

Remember that thermals also mean sink. Check this situation out for late night willies: two gliders heading towards each other, but one is 50 feet above the other, so the lower pilot decides it's not worth the neck strain to keep looking up. Now the lower glider hits a thermal while the upper glider hits the surrounding sink. Suddenly you've got two pilots eyeball to eyeball. It happens. Especially if one glider is busy trying to thermal so can't track the oncoming glider continuously. You both must instinctively turn to the right (rules of the ridge), even if it means one of you ends up in the trees. Better than a middair.

Finally, if you get nervous, just go ahead and land. Crowded skies usually mean plenty of vehicles going up and down. You can always run back up and prepare to be the first one in the sky for the evening glass off.

Big Spring Revisited

~ by Tom McGowan

Walking Tall - Part II

Last year, Dave Proctor and I flew in the US Open in Big Spring, Texas and Bruce Engen was there to free-fly and drive for us. The weather was terrific. We flew 7 out of 8 days and picked up lots of air time and XC miles. Dave Proctor couldn't make it this time due to his knee surgery.

However, Bruce came along to fly in the meet and John Claytor joined us for his first western flying experience. Little did we know that this would be an epic trip, exceeding all reasonable flying expectations.

We arrived Friday night. Saturday was a practice day, and the meet would run for seven days from Sunday to Saturday. On Saturday, winds were fairly strong from the south. Pilots flying there the past week reported high cloudbases and turbulent lift due to the winds blowing apart the thermals. While killing time at the airport, I met a local who ran a used car business. When I mentioned that we needed to hire a driver, he told me to call him in the morning and he would give me a list of retirees in the area that he used occasionally as drivers. The next morning, true to his word, he gave me a list of four drivers, and one of them, Carl Bacon, agreed to drive for us. He lived near Big Spring his whole life and had a job servicing oil wells all around the area. He turned out to be a great driver, and I never came close to breaking down before Carl arrived.

We hung out until around 4:30 pm when things seemed to die down. Lift was still strong and I had a nice check out flight of about an hour, getting to 9,000 msl (roughly 6,500 agl). That night, the town hosted a dinner for us at the airport. Also, there were lots of signs around welcoming hang glider pilots to Big Spring. You would have thought that thousands of pilots were coming, not just 55 entries.

Day 1: The first day of the meet, winds seemed strong, but the task committee called a challenging 60 mile triangle. Like the rest of the days of the meet, the first leg would be somewhat downwind, the second leg would be primarily cross wind and the third leg upwind. John flew to the first turnpoint in record breaking time and then landed for 22.4 miles, happy with how he handled the tough western air. Bruce and I made the first two turnpoints. Bruce had over 40 miles and I landed with 55 miles. A great day with 1000+ on the averager and gains to 10,800 msl – more than 8,000 agl. Not a bad start to the trip.

Day 2: With the strong winds aloft, the task committee called a 104 mile downwind task to the municipal airport in Levelland, Texas. Now, I am not complaining, but last year on a 150 mile task, I landed ½ mile from that airport for my personal distance record. I guess I would still be setting a personal record if I made the task.

Once again, John set out like a rocket while Bruce and I took our times. I proceeded to chase clouds farther and farther off course until 50 miles into the flight I didn't know where I really was, but knew that I had better get up if I wanted to be found in the rolling canyons that I was flying over. It took 30 minutes or so, but I finally climbed up and tried to get back on course. From then on, things went quickly. Lift was strong to the high cloud bases and lift was there when I needed it. Finally, at 6:00 pm, 6 miles out from goal and down to 1,500 agl, I found a boomer to take me way higher than necessary to make goal. Although it wasn't smart racing, I just wanted to enjoy the day and making goal on a 104 mile task! Bruce had landed about 60 miles out and had been picked up by Carl.

Arriving over the airport, I radioed Bruce to say I made goal, but had not heard from John since he was 70 miles from goal. But spiraling down, I saw his kingposted TRX in the LZ. Not only had John made goal (smashing his pr of 35 miles) but his time was faster than mine! Great flying on his part. Two great days in a row.

Day 3: A 74 mile triangle. The forecast had a higher chance of over development. Bruce and I had very similar flights. For me, I got very low trying to get around a small rain cloud and drifted far downwind of the course line for almost 10 miles before climbing up to base in a boomer. From then on, it was climb 1000 up, glide, 1000 up, glide …. Because I was so slow on the first leg, by the time I got to the second turn point, the day was dying. I tried to work a small thermal at the turnpoint, but couldn't climb out. I then saw Bruce for the first time all day landing right below me. Since I had 100 feet on him, I glided 0.25 miles farther to smoke him for the day, getting 45.5 miles. John, on the other hand, had blazed by both of us and had gotten to the second turnpoint 10 minutes ahead of us. That made a big difference as he porpoise flew 10 miles back towards goal along a line of dust devils, never turning but climbing 3,000 feet in the process. Another stellar day for John getting around 56 miles.

Day 4: A Dog Leg, but a secondary task so I don't know the miles. A larger chance of T-Storms today. Today, I wanted to keep up with John. After breaking a couple of weaklinks I was finally up. John was further out on course radioing the that clouds ahead of me were working, so I kept pushing it across blue stretches to the few small clouds along the course line. Of course, later John would say that he was 5 miles to my south under a solid cloud street while I was flying in mostly blue skies. Nevertheless, pushing on was the thing to do as I stayed high while only climbing in the good lift. 10 miles from the first turnpoint, John had landed, still to the south. I pushed on the turn point and climbed out 7,000 ft in another big thermal. Looking to goal, all you could see was a line of Cu-Nims. They could have been 10 miles past goal or 50 miles, but I didn't see the need to take the chance of a gust front or rain, so I glided in the direction of the airport (picking up some

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miles as this was 45 degrees off course) to stay under some nice clouds and away from the storms. Once again, when I was 300 agl, I saw Bruce for the first time that flight. He landed while I was able to fly 200 yards past him to win the day among the Virginia boys.

Day 5: A 57.2 Mile Out and Return. A great looking day as conditions were drying up. I raced out on course only to get low 10 miles out. Then even lower. I was unzipped, about three phone poles high when I hit a bubble. Not a good bubble, so I lost it quickly and chased it down wind maintaining at best. The two more bubbles, but they are violent enough to spin my vario off the down tube. Now to get up, I have to fly with one hand on the down tube holding the vario and one on the base tube. After 30 minutes of this, I have drifted 10 miles and had been sucked into a beauty of a thermal, climbing to base. My lowest save ever! With that confidence, I pushed on and made goal after gliding from 12 miles out and 11,000 msl (about 9k agl). John landed just short of the first turn point, and Bruce landed a few miles on the way back. With a promise of better weather to come, I doubled my dose of ibuprofen.

Day 6: A 74 mile triangle. What can I say. More of the same. Big lift with some clouds. We finally flew a task similar to the tasks flown last year. I remembered which fields worked last year and they were still working, so I pushed fast to the first turnpoint. I actually caught some gliders there. I rode the strongest thermal of the trip between the first and second turnpoints while John landed on the field below. I obviously have not gotten used to the rowdy air over the past week. Still, lift goes to 12k so I make good time and was in position to make an attempt to goal. But after 3 ½ hours, I am beat and land for 60 miles. After breaking down, the tables are turned and Bruce flies over my head for 61 miles.

Day 7: 77 mile Out and Return. The weather forecast for today is the best of the entire meet, but Gary Osoba suggests a late start. I hit the start circle at 3:00 at 11,000 msl and start gliding. The day is blue, but clouds form just when I need them. I feel like I am making good time, although I see a few gliders pass me and go directly towards the turn point. I finally get there just in time for the clouds around the turnpoint to dry up. It takes me a while to get going again, but then I try to push quickly to goal. However, the day is quickly dying. At 10,000 msl and 16 miles out, I don't have it. I try for a few late clouds but end up landing for 71 miles. Bruce lands at the turnpoint for 38 miles and John gets about 15.

For me, 27 hours for the meet with 430 miles. About the same airtime as last year, but 80 more miles. Probably a combination of better conditions and trying to fly more along the course line. Anyway, a fantastic meet. John sets PRs for distance, duration, and altitude. Bruce sets a PR for out and back mileage.

The only thing I would change is the food. Seems almost every restaurant is Mexican. Our bodies needed four days to adjust to all that refried beans! We had use of the hangar again. That meant that we could keep our gliders set up overnight or set up in the shade in the morning. If you like flying, Big Spring seems to be the place. You can find me there next year.

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Thermalling Revisited

~ by Larry Huffman

Over the years I've had a number of pilots ask me how they could improve their climb rate in thermals so I have spent quite a bit of time trying to arrive at an answer. This article is an attempt to present my conclusions. I have included here some of an earlier article of mine that appeared in the Capitol Club newsletter, and you can access the original one at:

http://www.go-get.com/skyline/9910/climb.htm

Turn Initiation

As we approach a thermal we commonly encounter an increase in turbulence, sink, and sometimes small bits of lift that feel like a thermal. These small bits of lift aren't usually workable but the better core is almost certainly near by. Usually if you are in lift for 2 - 3 seconds it is big enough to turn in and some pilots even count as they enter lift to decide when to turn. Upon entering lift that is large enough to turn in it is usually prudent to make a hard aggressive turn. Even in light lift this can help to establish yourself inside the thermal. Once inside it may be necessary to slow down and reduce your bank angle but it is important to stay in the lift. A few seconds of hard maneuvering in lift is far better than the smoothest flying outside the lift.

Bank Angle

For years we have been told that many pilots do not turn tightly enough. From observation I have seen that most pilots will occasionally turn steeper and therefore tighter if they have to but not necessarily when they should. There are still some pilots who insist that turning flat and efficiently is the best way to thermal. While this may be the case at times, most often it is flatly untrue.

To illustrate the error of this flat-turning view I will use the accompanying graph. The graph shows half of the cross sections of three different thermals[1] to illustrate the radius of each one. If we look at the three thermal profiles we can see that the lift gets stronger as we near the center of each one. This is known as the climb gradient. In addition, at the bottom of the illustration there is a black turning polar[2] for our sample glider. This polar compares the sink rate and turning radius of our sample glider at different bank angles while in still air. Then we plot the turning polars (dashed lines) in relationship to each corresponding thermal profile and we can see what the optimum bank angle is for that particular thermal. This means that for each thermal and glider/pilot combination there is a precise bank angle that will result in the best climb rate.

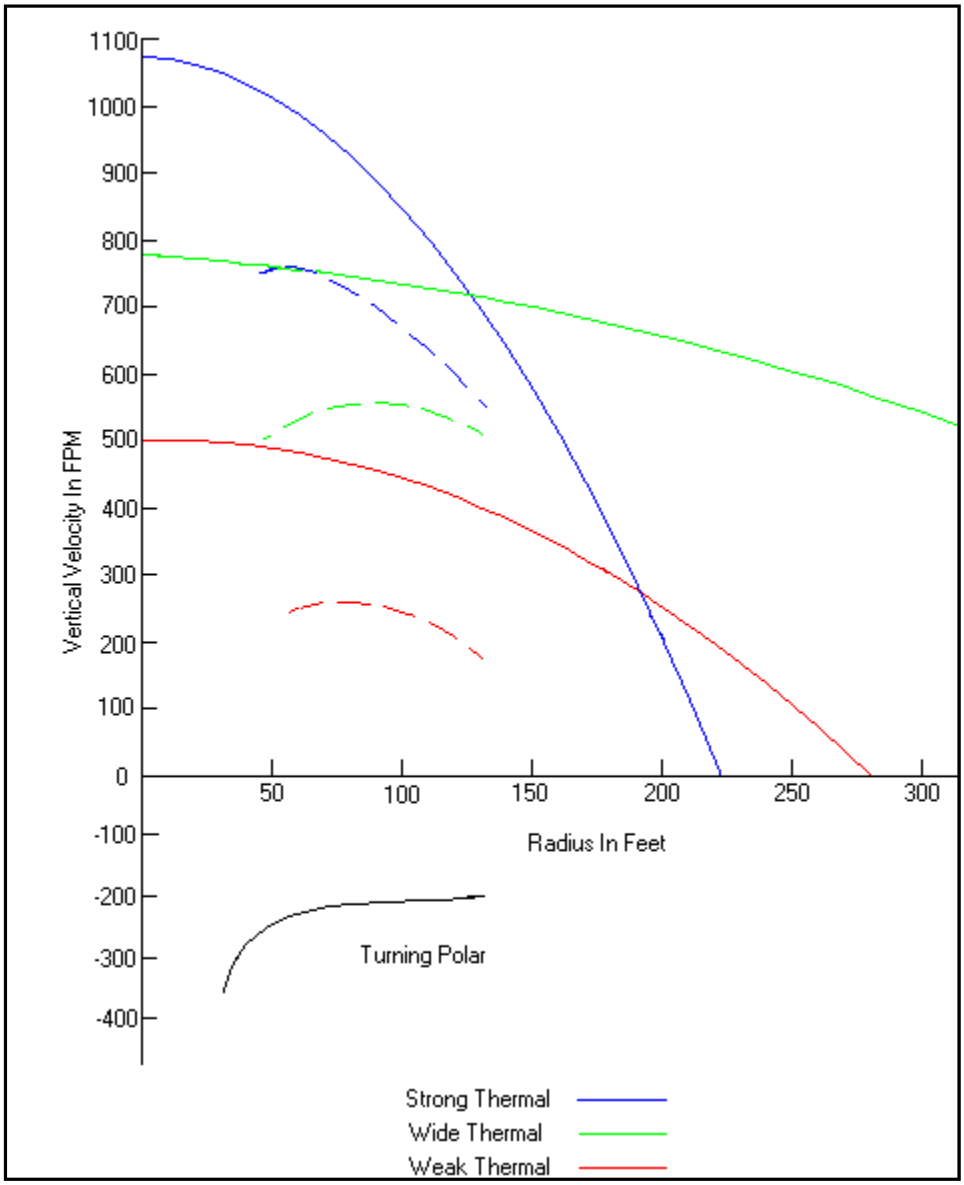

Figure 1: Turning Profiles

Too many pilots circle at the minimum bank angle that they can use to stay in the thermal. because they believe that the shallower bank and slower the speed will make their glider more efficient. The real truth is that pilots should be turning steeper more often than just when they find those "bullet thermals".

In the following chart are the raw numbers of what the climb rate will be in each of our sample thermals for a number of bank angles. The numbers in red

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show what the approximate bank angle for our thermal /glider combination should be in each case . In all three examples we could climb at a very shallow bank angle but it would not be our best climb. We can also see that being off a few degrees does not carry too much of a penalty but when it is 10 degrees or more our climb can be significantly degraded.

Bank Angle In Degrees	Weak Thermal Climb Rate	Wide Thermal Climb Rate	Strong Thermal Climb Rate
15	186 fpm	518 fpm	573 fpm
20	231 fpm	538 fpm	682 fpm
25	257 fpm	547 fpm	744 fpm
30	259 fpm	539 fpm	771 fpm
35	255 fpm	511 fpm	784 fpm
40	210 fpm	485 fpm	782 fpm

Table 1: Climb Rate vs. Bank Angle

If we compare the best climb for each thermal with the climb for 15 degrees we find that we have a 29% reduction in climb in the weak thermal, 22% in the strong thermal, and 5 1/2% for the wide thermal. Look again at the weak thermal. That means that if two pilots started together and the pilot flying at 30 degrees gained 1000 feet, the one flying at 15 degrees would be 290 feet below our pilot at 1000 feet.

Centering

There are a number of ways to center in a thermal but I will describe the one that I prefer. While in lift pay close attention to where the lift increases and decreases. As the lift increases fly a shallower bank angle to extend your flight path farther into the stronger portion of the thermal. When the lift begins to decrease turn tighter to return to the stronger portion. In my experience this is the fastest method for centering, however, it should be considered only as a fundamental method to begin with. In some cases as with broken lift we have to use our imagination. It is also important to map the thermal spatially to form a mental picture of the shape and location of the best lift.

In Figure 2 on the right, we have our pilot hitting lift at about the 7:00 o'clock position of the thermal. As the left wing comes up our pilot starts a turn to the left to enter the thermal. From the entry at point A the lift will continue to increase until its peak at point B. After passing through point B the lift will begin to decrease as our pilot flies away from the center. At this point it is prudent to sharply increase the bank angle to reduce the turn radius in order to get quickly back to the stronger lift. At C the lift will begin to increase again so it is time to reduce the bank to extend the circle into the stronger lift. At D the lift will begin to decrease slightly making it necessary to increase the bank angle again but not as much as our pilot did back at B. A constant rate turn *(the inner dashed circle)* will keep the glider centered in the best lift at least until the thermal changes, and it will change. Then it will be time to start the centering process again. With some thermals recentering is almost constant. Thermals are not always perfectly round but by following this centering technique you will stay in the best portion of the thermal even though your turns may be irregular circles. Most of the time just staying in the strongest lift possible will make a large difference in your climb rate.

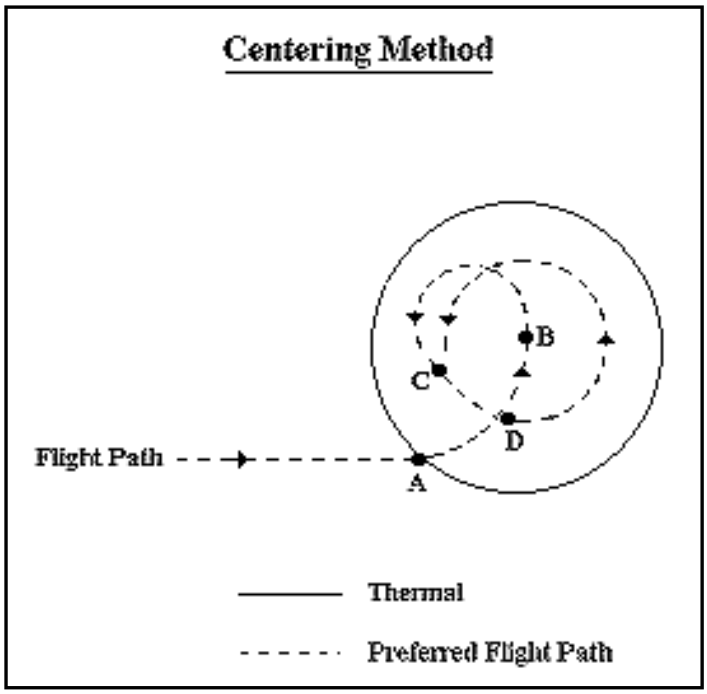

Figure 2: Centering Method.

Recentering

Listening to pilots talk of thermalling and watching them fly has convinced me that recentering is one of the most neglected skills in flying thermals. It is common to see a pilot do a few turns at the same bank angle whether steep or shallow and then flounder around trying to get back to the center of the thermal. Sometimes they even fly completely out of the thermal and lose it. How many times have we heard pilots talking about how well a certain glider does or does not hold its bank angle in a turn? These are symptoms of what I call the constant rate turn syndrome. Pilots mistakenly believe that maintaining a constant bank angle is "efficient". But thermals are constantly changing and in order to efficiently utilize them you must change with them. It is rare to be in a thermal very long without having to recenter. The methods are the same as finding the center originally and recentering may be needed after a few turns or in every turn so be ever alert to changes in lift for cues.

If we are flying with a light enough touch to be able to feel changes in the lift and the lift seems a little stronger on one side we need to recenter in that direction. High siding a little as we are coming to that area will shift our circle in that direction. If we still need to shift some more we can repeat the process on the next turn, ever improving our climb. The point is that climbing efficiently is not just a rigid technique. It is a continuous process of optimizing our

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bank angle, turn rate and airspeed to attain the best climb rate.

Energy Management

A few years ago I began studying aerodynamics. I would spend hours with a hand held calculator running formulas in the effort to understand more about the factors that effect the performance of our gliders and how I could use that to fly better. Then I would go fly and think about what I had learned. I believe that this helped me to improve. Without getting too technical I think that it is simply energy management. Lets break that down to two types of energy, kinetic and potential energy. Kinetic energy is the energy of our glider moving through the air. Because gravity powers our glider, potential energy is the surplus of altitude that we have. For example if we were flying very fast and then pushed out we would climb thereby trading kinetic energy for potential energy. Unfortunately because of inefficiencies we would not gain back as much energy as we gave up. If we were flying very slow and pulled in we would be trading potential energy for kinetic energy. Again the inefficiencies produce losses. This is particularly true of lower performing gliders. As glider performance improves the losses due to inefficiencies are less. However, because we have a better retention of energy we have to work and think more to get the best from our aircraft.

Ok, what does that mean to us in the air? When we pull in to gain speed our glider's nose is lowered and it accelerates to the speed for that angle of attack. A extreme example of that is if we fly very slowly and then stuff the bar the glider will dive until it reaches the speed for that angle of attack. We lose efficiency and altitude until we reach that speed and then we will not be losing altitude as fast. However we had to trade altitude to achieve that speed. In other words we traded potential energy for kinetic energy. Again we have the loss because of inefficiency. Speeding up in lift helps to reduce the altitude loss. For an example if when we are ready to go on course after topping out in a thermal we can fly to the side of that thermal opposite of the direction we want to fly and make a sharp turn to fly across the middle of the thermal. We then speed up in the lift rather than the sink before we go on course. The altitude we lose speeding up out of the thermal isn't all that much but if we consider working a thermal that is too small and we can't get a full turn in it the situation is different. If we speed up or lose energy in other ways every time we fly out of the thermal we accumulate losses which will reduce our climb rate possibly to a negative net gain. It is not always possible but we should try to make any increases in speed or do any maneuvering while still in the lift. There will still be losses but they will not be as costly as when they are made outside the lift. This holds true even if we have lift throughout our full circle. Try to do the maneuvering in the stronger part if there is one. The juggling of kinetic and potential energy is something that requires concentration and practice over time. It is not something that we can learn over night so it does require some patience.

Rough Or Smooth

We are taught early on in soaring that smooth coordinated flight is the most efficient for climbing. This is very true but only if we are able to so in the best lift. There are times when we must fly smoothly in part of a thermal and roughly in other parts during one 360* turn. The key is to fly as smoothly as we can without sacrificing handling or the best lift. Remember we are striving for the maximum net gain for every turn that we make.

Long Climbs

Pete Lehmann and I have discussed this at great length and both agree that it is unusual to be able to climb in the same core continuously to maximum altitude. Thermals are more often made up of a number of cores within an area of lighter lift. One core weakens but it is common that another may be working quite well nearby. Evidence of this is seen when a number of pilots are in the same gaggle. One pilot climbs well and then slows down while another in the gaggle starts climbing better. Finding and switching cores might just be the hardest part of working thermals well but there are quite often subtle hints to help us out. Remember that we are trying to fly with a light enough touch to be able to sense what the air around us is doing. Surrounding air flows into cores so we need to be alert to changes in wind direction within the thermal. Sometimes we don't feel the clues and have to explore a little. It is better to try upwind or downwind rather than cross wind but it is important to remember where our original lift was so we can return if we have to.

Concentration

Pete Lehmann suggested that I add this subject. He correctly pointed out to me that even short lapses of concentration while thermalling can result in a poor climb or losing the thermal entirely. The crucial time for a loss of focus is when recentering is needed. This is a time after you have found the thermal and are in the center climbing. It is easy to think that you are home free and lose that precious concentration. The next thing you know you are out of the lift in search mode. Events that can contribute to a loss of concentration are talking on the radio, punching gps buttons, or navigating. Those activities have a place in your flying, but that place is subordinate to the primary one of climbing well.

Thermals come in all manner of shapes, sizes, and strengths. Certainly there are some exceptions to each specific technique I have discussed but I feel that the rules outlined above are a good foundation for exploiting thermals. Good thermalling requires practice, concentration, and subtlety. There are no simplistic recipes to improve your climbing ability. But with the benefit of conscious, repeated practice you can internalize my suggested techniques. So get out there and give it a try.

---

1. Helmut Reichmann used thermal profiles in "Cross Country Soaring " to illustrate optimum bank angle for sailplanes. I modified the thermal profiles to reflect what we might encounter flying hang gliders. Thermals come in all different shapes and sizes but I chose the three in the graph for illustrative purposes.

2. The turning polar in the graph is one that I calculated from the performance curve of a glider I was flying. It wasn't a late model topless but was a high performance glider. I only plotted it with the thermal profiles to about 40° where the climb started to fall off.

The Inner Art of Airmanship

Eleven Flights to Strengthen Inner Airmanship

Start right now

Being a great pilot starts right now. For if not now, then when? No one has a perfect flight, few pilots come even close. But that is just fine. While pretenders worry about not looking good and idly dream of amazing flights, the maestros are memorizing the manuals and doing the job of a prepared pilot. They are slowly making constant corrections. They are enjoying the details.

Flying can not be taught

But it can be learned. You are a pilot, it is a state of mind as much as a seat in the cockpit. You will not master the art by reading about it or dreaming about it or talking about it. You must train. Then you must go up in the sky and practice it.

Voices in my head

We all have an inner dialogue, the voice in our head that talks to only us. And there are many times we need to think actions through using our inner dialogue. However, there are times we must quieten the voice, and trust another inner self.

No competition in the sky

It is as Gann titled a book: 'Fate is the Hunter.' You should not worry about the friend to beat, or the government minimum standard to meet; this is a long game of solitaire. You must not stop if you have beaten the other student or have passed a test. The real exam will come when you are alone.

Master of the wing, yet always a beginner

The great masters always regard themselves as beginners, with minds open to the experience, the momentary adventure of life, with new things to learn and enjoy. A B-777 examiner, and former T-37, F-4 and F-15 instructor, once told me he learns something on every flight. If he does, I must.

Up down, left right, yin yang

The airplane controls work the same inverted as in upright flight, as long as we know what up and down mean. In flying we must balance up and down, the technical and the artistic, left and right brain, Yin and Yang.

Centered within

The mind of the pilot is centered within you. There can be no reliance on props or tricks when fully flying. Of course we fly the wing, by the book, using crew resource management -- but you are pilot-in-command centered in the sky.

The pilot is nothing special

The process of learning to really fly seems magical, the results superhuman. While soaring above the clouds is living a great dream of mankind, it is what we do. Clouds and mountains are still clouds and mountains. There are no tricks to being a pilot, just fly in the present right now. Nothing special.

Trust the inner game

Are you gently grooving with gravity or do you have a death grip on the yoke? Can you flare with flare? "It is an action in which certain things are caused to happen and certain things are allowed to happen. Faults arise in trying to cause what should be allowed."

Flow on a million details

Mindfulness can make every action important, and then what were moments in the zone become an inner art. Matching skills and challenges, you are now flowing in an ocean of air, alive in the river of life.

An unending journey of self-discovery

To the winged warrior the stick becomes as a samurai sword, and the sky becomes a practice. Every flight is new, and the more we fly, the more we discover. What is not needed falls away, and your inner art of airmanship becomes masterful.

Reprinted from:

http://www.hikoudo.com/flights/index.html

Custom Comms (Revisited)

~ by Ralph Sickinger

In the last issue, I described a method for hooking up a radio on the downtubes of your glider, complete with integrated helmet wiring and a basetube-mounted PTT switch. This time, I wanted to follow-up on that project, with a few additional comments and hints for improving your glider.

Since the previous article was published, I've received a couple of phone calls from people who have run into problems wiring their helmets. The most common question that I've gotten is "How do I debug a problem if it doesn't work?" That's a good question, and while there isn't really one simple answer, I **can** give you a few tips. First, I recommend getting a modular-plug-to-spades adaptor *(from Radio Shack)* and an extra modular in-line coupler. Second, some sort of continuity tester is absolutely

Figure 1: Modular-to-Spade Line Cord.

indispensable for tracking down shorts or bad connections. I made my own tester from a few simple components available from Radio Shack. All you really need is a pair of leads, a battery and an LED. *(See "Building Your Own Circuit Tester" at the end of this article.)* To check a circuit that runs to a modular plug, I connect one of the in-line couplers, and then the spades adapter. I connect the alligator clip from my tester to the appropriate spade, and then touch the point of my test probe to the other part of the circuit that I want to test. If I have a circuit, the LED lights up. When doing this kind of test, it's also a good idea to re-run the test with the other 3 spades, just to make sure that not only do you have current where you're supposed to, but also that you *don't* have it where you're *not* supposed to!

Speaking of testing, I can't stress enough the importance of testing your circuits *as you go*. Make temporary connections to all of your components, and make sure the circuit works *before* you install the speaker and microphone into the helmet; test the connections on the plug *before* you glue the cover on; and so on. And, after completing part of the project, re-test the system to make sure that the last installation step didn't damage anything. It will take you longer to put everything together, but debugging will take MUCH less time, and the final system is more likely to work correctly the first time that you hook it up.

So, where do you look when things do go wrong? In my experience I've found three typical problem areas:

- Bad modular plugs: be careful when you strip the insulation-with the crimpers, so that you don't cut through the wires.
- Reversed modular plugs: accidentally connecting a modular plug backward is really easy to do! And when this happens, the speaker circuit will still work, but the mic circuit won't.
- Using a mic element from another headset: if you have an older headset, it's tempting to recycle the microphone from it. However, often these elements will have a resistor built in already. If you then add in the resistor from my schematic, the resistance will be way off and the circuit won't work.

Another option when things aren't working the way they're supposed to, is to try to eliminate or swap out part of the system. For instance, bypass the coiled cord, and plug the connector from the radio directly into the helmet. Or, find a buddy who is

(Continued on page 12)

Figure 2: DURATRED Overgrip.

(Continued from page 11)

using the same system, and try swapping one component at a time, to see which parts work or don't work. *(Does your helmet work with his system? Does his helmet work with yours?)* This is a good argument for sticking with the wiring standards that I listed in my article: it's harder to find someone else to help you test if you've wired your system unconventionally!

So, now that we've figured out how to get all the pieces-parts working correctly, let's take a look at the glider itself. Hugh McElrath was kind enough to loan me his glider for my previous article, and when we hooked up the wires, we added an additional touch. I got a few packages of Prince DURATRED tennis racquet overgrip to wrap the downtubes of his glider, where the control frame hits his shoulders, and where he grabs on to it with his hands. The first step in doing this was to have Hugh hold the control frame, while I marked off the locations where we would need to apply the overgrip. If you look closely at Figure 3, you can see black marks on the downtubes, where I applied strips of

Figure 3: Hugh holds up his glider.

electrical tape as a markers.

After setting all of the wires in place, I wrapped the overgrip around the downtubes. The overgrip was applied in two places on each downtube: near the top, where the control frame sits on Hugh's shoulders when he's ground-handling his glider, and down near the bottom, where his hands grab onto the control frame. The DuraTred comes in packs of three for about $5, and you need one strip for each location. If you have faired downtubes, you'll need two strips in each location. The overgrip does two things: first, it holds the radio wires in place very nicely, and second, it really improves your ability to hold the glider. The grip that is up by the shoulders will keep the control frame

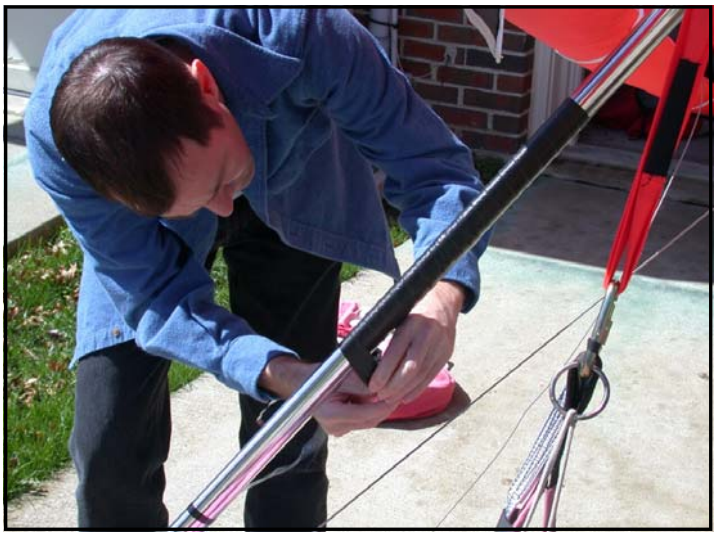

Figure 4: Wrapping overgrip around the downtube.

from slipping off your shoulders when you pick the glider up.

I've found that it works incredibly well, whether it's the Summer time and I'm wearing a tank top, or it's the Fall and I'm wearing a fleece jacket! The grip by the hands makes it easier to hold on to the control frame, especially when it's hot out and my

Figure 5: Wrapping overgrip around the basetube.

hands get sweaty.

I also added tennis racquet grip to the basetube, to cover up the wire running from the PTT switch out to the corner of the control frame. *(Figure 4.)* This extra grip makes the basetube

(Continued on page 13)

(Continued from page 12)

pretty fat, but it's certainly more comfortable than feeling the wire under your fingers when you're flying.

Figure 6: The finished product!

I hope that you've found this series of articles helpful. As always, I welcome any and all feedback. Also, I'd love to hear about anything that *you've* done to customize your glider!

Building Your Own Circuit Tester

A circuit tester is a pretty simple device; it consists of a probe with an indicator light on it, a small power supply, and an extended lead to reach to the other end of the circuit that you're testing. I made my own simple tester from a piece of wooden dowel, an 8D finishing nail, an LED, an alligator clip, and a battery holder. It was worth it to me put a little extra effort into making a nice rig, because I use mine a lot! The basic setup is pretty simple: you're basically making a simple loop from the battery to the LED and back, with a gap in the circuit between the point of the probe and the alligator clip. The circuit that you're testing closes the gap, causing the LED to light up. *(If the circuit is working!)*

To simplify my tester, I used a 2.6V LED, which matches up perfectly with the voltage put out by a pair of AAA batteries *(the nominal voltage from so called 1.5V batteries is actually closer to 1.3V)*. You can use a different LED/battery combination if you want *(for instance, to use a 9V battery instead)*, but if the voltage on the battery exceeds that required by the LED, then you'll have to add in a resistor.

To make the probe, I start with a 5" length of wooden dowel (in this case, 5/16" diameter, but you can use anything that's convenient/comfortable). I drill two holes into the dowel using a 3/32" bit; the first hole is drilled along the central axis of the dowel; the second is drilled at right angles so it intersects the first hole. *(See Figure 7.)* The nail gets glued into the dowel with a little bit of wood glue. When you do this, some glue will seep into the second hole, and you have to clean it out before it set, or

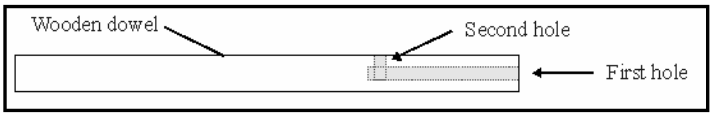

Figure 7: Drilling holes in the wooden dowel.

you won't be able to make an electrical connection with the nail.

Once the glue has dried, I solder one of the LED terminals directly to the nail. I attach a wire to the other terminal, and run it one of the leads from the battery pack. NOTE: LEDs will only function in one direction! Complete the circuit (attach the other lead from the battery pack to the nail) and test the wires before you connect them. The last step is to attach a longer wire to other lead from the battery pack, and then attach the alligator clip to the other end of that wire. The alligator clip is kind of an optional component, but I highly recommend it - It is much easier to work with the probe on the other end of the circuit if you have both hands free, which you do if you can clip the test lead to a wire.

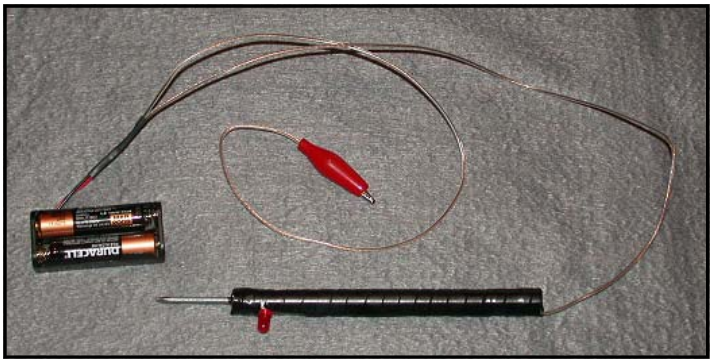

Figure 8: Completed circuit tester.

To finish the project, I ground the tip of the probe a little bit so it wouldn't be as sharp, and also to improve the electrical conductivity of the tip. I also wrapped the entire probe in electrical tape; partly for looks, but also so it feels more comfortable in my hand. You can make sure the tester is working correctly by touching the probe to the alligator clip: when you do, the LED should light up.

Happy testing!

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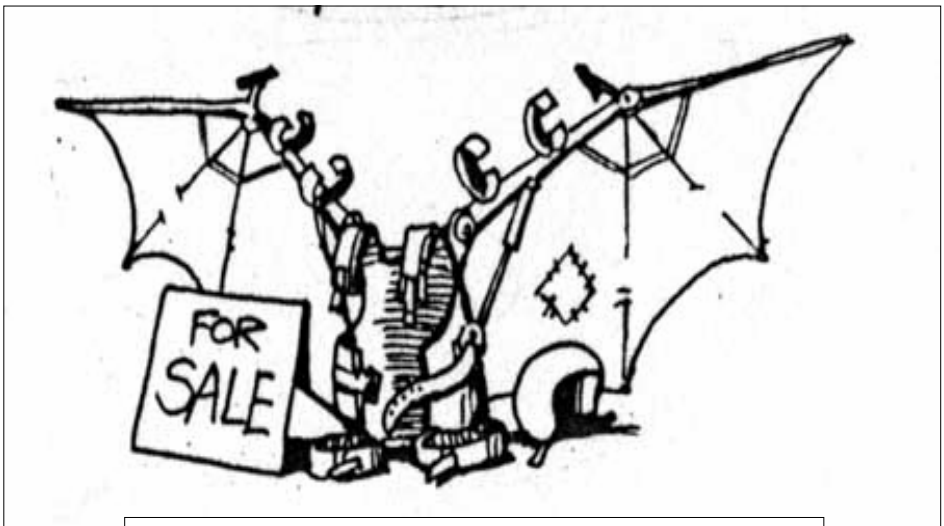

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(PRE-FLIGHT, continued from page 2)

out. Of course, a new door and door frame meant that it had to be painted; I also had to find new hardware *(locks, kickplate, etc.)*. Write off another weekend. The insurance company decided that the living room carpet *(which got a little water-logged around the edges)* needed to be replaced, so that meant spending several weekends packing up everything in the living room so that the new carpet could be installed.

July 13th: Looks like the weather could yield a nice evening flight at High Rock. Matthew Graham is going to make a decision at 3:00. Excited about finally going flying, I throw one last load of laundry into the washer. I had spent all day Saturday getting most the laundry done, and this is the last of my chores. At 2:30, it occurs to me that the water pipes don't sound quite right. I go down to the basement to check it out, and discover that the hot water supply line to the washer has burst, and is spraying water all over the basement. All over the clothes that I had *just* washed the day before! There's an inch of water on the basement floor, and a little stream running out into the garage. Where I keep my glider. And all the rest of my hang gliding gear. The only thing that keeps from crying right then and there is the realization that it *could* have been worse... the supply hose could have burst 30 minutes *after* I had left to go flying! And, the flood-recovery guys gave me a "frequent-customer" discount when they came out to mop up. I learned that there IS something worse than going into the office on Monday morning, and telling people that you spent the weekend mopping up after a flood. It's going into the office and telling people that you spent the weekend mopping up after a flood, AGAIN.

July 18th: Family vacation. I leave for Michigan, to spend a week with my parents. The vacation is nice, but it's two more weekends in a row that I'm not available to fly.

August 9th: Back from vacation, and it'd be nice to go flying again. Unfortunately, two weekends in a row of thunderstorms will keep me indoors. I guess it's ok though... I've got a newsletter to put together. Maybe next weekend!

Capital Hang Gliding and Paragliding Association

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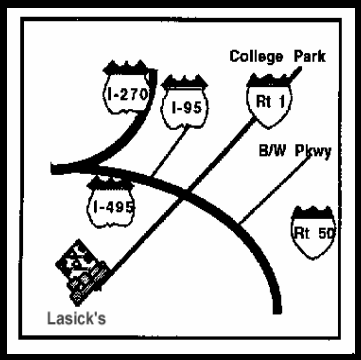
Next CHGPA meetings will be held:
***** No Meeting in August *****
September 24, 2003
October 22, 2003

Meetings are held downstairs at: Lasick's Beef House

Directions: 0.8 mile inside the beltway on Route 1 South, just past the Super 8 Motel (College Park exit off I-495). Note: If coming from points north on I-95, at the Capital Beltway stay right at the split and then take the immediate left exit to Route 1 South, College Park.



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SUMMER '03

Chris McKee takes-off from High Rock ~ Photo by Ralph Sickinger