sugarbushsoaring.com

Sugarbush Soaring – *The Flight Line*

2355 Airport Road, Warren, VT 05674 (802) 496-2290
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OPENING DAY ANNOUNCEMENT

Our opening day is Saturday, May 18th. There will be a safety meeting at 9:00 am, followed by any remaining glider assembly and general field preparations for the season. Please make every effort to attend, and please also join us for dinner at 5:30 at Mad River Glen's General Stark Pub.

WELCOME
Welcome back to the 42nd season of Sugarbush Soaring. All of the snow on the field is gone, we've been busy prepping several gliders, and there have already been several days of classic spring soaring weather. There's much to be excited about this year:

Programming
Once again we will run three youth camps this summer (July 7-13, July 21-27, and August 4-10), each hosting nine campers. These camps continue to be quite successful and are oversubscribed. If you have the opportunity, please stop by during one of the camps and witness for yourself the enthusiasm and positive energy that they bring to the airport.

The FEFY (Flight Experience for Youth) Airport Day was a complete success last year, so FEFY will sponsor another day this year on June 22nd, with a rain date of June 23rd.

After the positive response to last year's "Wings and Wheels" event, Rick Hanson will host an expanded version of the event this year on August 25th. Don't miss it!

Facilities
Ginny Hanson has generously agreed to run the airport restaurant this season and plans to be open Friday-Sunday, serving breakfast and lunch. We continue to look for additional help in order to expand the restaurant hours. Please let us know if you have any referrals.

You may notice continued improvements in the terminal building. A new membrane roof was added last year, there's a very comfortable couch on the first floor, and a brand-new weather station adds the Warren-Sugarbush airport to the Weather Underground and Ambient Weather networks. You can always pull up the current weather conditions at the airport by clicking on this link, which is also available on the weather page of sugarbushsoaring.com.

Membership
Since the beginning of last season we've had a several new members join Sugarbush Soaring or upgrade their membership:

- Full Members: Kevin Sweeney, Kirk Jordan, Guy Cosby, Susan Levaque and Dana Davidsen
- Members upgrading to active Status: Bob Benz, Charles Norman, Frank Konesky
- Youth Members: Alek Velleau, Daniel Burns, Ethan Prins, Mike Vinton, Zachary Fuss and Bryson Whitaker
- Alek Jadkowski joined this spring as a young professional. He used to tow at Stowe Soaring.

Welcome to all! Please join me in introducing yourself and making them feel welcome.

Thanks very much to Alex Scaperotta, Rick Hanson, Jen Stamp, Fabio Schulthess and Steve Platt for your generous contributions to the newsletter this year.

Our club works best when there's plenty of active participation, so please fly often this year, volunteer to help when you're able, and make every effort to attend our safety meetings. I look forward to seeing you all on opening day and for a season of great flights and social events!

Carl Johnson
President

Friday Night Seminar Series

Thanks to the great work and hard efforts of Steve Platt, Tom Anderson and Rick Hanson, Sugarbush Soaring will offer a series of Friday evening seminars this season at the airport terminal building. The topics should be fascinating, and they're a great opportunity to learn, socialize and have a great meal. Please join us whenever you can. All seminars will begin with dinner (format TBA) from 6-7pm, followed by the lecture from 7-8pm.

Preliminary schedule, other topics to come:

Date	Lecture	Description	Speaker(s)
5/31	Flight Preparation	Recommendations on how to prepare for flights (Regulations, Weather, Glider perf., weight and balance)	Tom Anderson Rick Hanson
6/7	Recommended Resources	Glider Flying Handbook, FAR/AIM, Airport Facility Directory, TFR's, NOTAMs, NTSB accident and incident reports	Tom Anderson
6/14	Aerodynamics	Basic Aerodynamics 101 – Weight and Balance	Steve Platt
6/21	FAA Regulations	FAA Regulations including currency, medicals and maintenance	Rick Hanson
6/28	Airspace	Sectionals, symbology	Tom Anderson
7/5	Science of Soaring Part 1	Flight polars, optimizing time, distance and energy acquisition (thermalling) and weight	Steve Platt
7/12	No seminar (Youth Camp #1)		
7/19	Science of Soaring Part 2	Glider performance in winds, crosswinds, MacCready flight, dolphin flight, ridge lift, mountain wave	Steve Platt
7/26	No seminar (Youth Camp #2)		
8/2	Weather	Weather information, weather planning	TBD

Soaring Southern Skies
By Alex Scaperotta

This past December, while I was studying abroad in New Zealand, I got the chance to fly in the country's beautiful Southern Alps, from Omarama Airfield. Omarama [oh-**MARE**-a-mah] is world famous for its amazing soaring conditions and stunning scenery, all of which I got to experience during my ten days there.

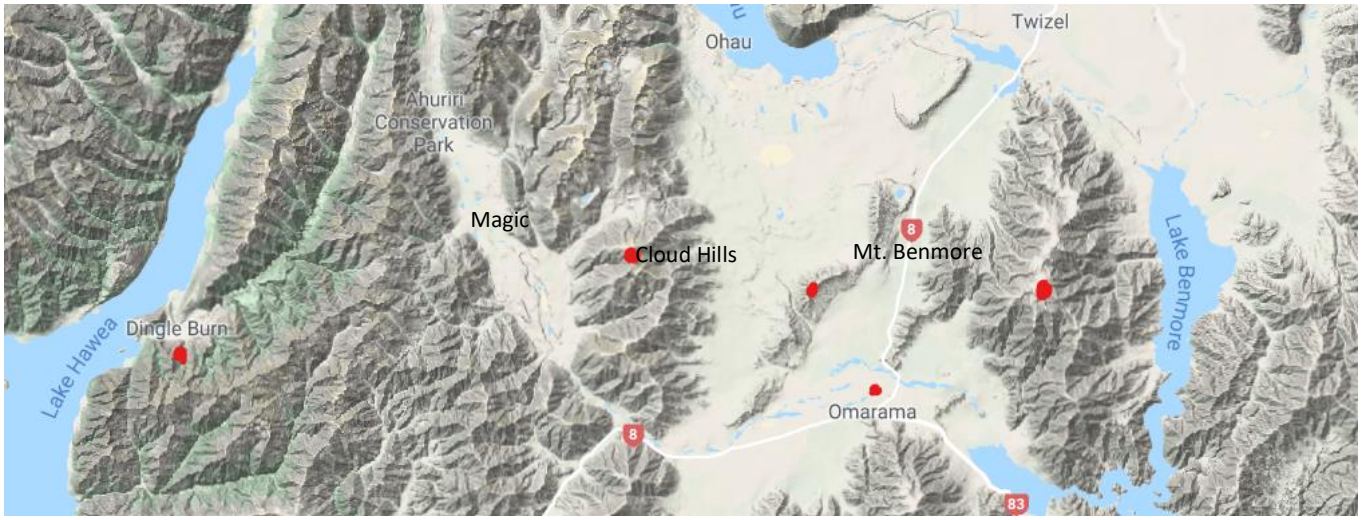
Every morning, all the pilots would gather in the tower and have an extensive weather briefing, going over thermal soundings, winds aloft, satellite and radar imagery, and more to get the most accurate prediction for the soaring conditions of the day. Early on I learned that we were stuck in the middle of a record stretch of poor soaring weather, something many of the pilots bemoaned at dinner on several occasions. So I concentrated my flying on familiarizing myself with the area and getting checkouts in all the aircraft available, waiting for the weather to change.

On my second to last day, the weather finally shifted. I went up in an LS4 with an LXNAV Nano flight recorder with the goal of silver altitude gain. I found some three knot thermals topping out at 6,000 ft (it was weird seeing imperial units on the altimeter after spending six months immersed in the metric system). I went from thermal to thermal up and down the Mt. Benmore ridgeline but couldn't manage to climb any higher before spotting a storm cell coming in from the west, resulting in my decision to come down. The flight lasted an hour and forty minutes, and I missed the height gain goal by 100 meters.

The next day, the soaring conditions got even better. While the locals claimed this would still usually be considered a bad weather day at Omarama, back at Sugarbush we would call it a boomer! Fraser McDougall, my instructor, a professional skier, and an all-around great guy, pulled me aside and laid out his plan for our flight that day. We were going to attempt a 50-kilometer cross country through the Southern Alps to a place called Dingle Burn, 'the Dingle' as he called it. We got into the club's Duo Discus and took a tow up to Mt. Benmore where we thermalled for a bit trying to gain enough altitude to make the first sprint to Cloud Hills. After a bit of work and making the eight-mile bee line to Cloud Hills, we caught up with another glider, circled back up to altitude and followed them west, towards the mountains.

We reached a peak called ‘Magic’ where the fun really began. Before the flight, Fraser had told me that getting into the mountains would be difficult, but once among them the soaring becomes remarkably easier. Magic was the gateway to the Southern Alps from the east side and passing through was a trial by fire. I managed to hook into a weak thermal on the ridgeline but was only able to maintain altitude and not climb high enough to pass over the peak. Fraser offered to take the controls, flew us out of the thermal and along the ridgeline. Flying closer to the ridge than I ever had (I could make out the eye of a rabbit running next to us), Fraser showed me how much I had left to learn. After only a handful of turns on the ridge, we traded some of the altitude we’d gained for even more airspeed and flew a line of lift across the top of the ridge to cross onto the other side. We were in the Southern Alps now.

The fight had paid off. Cloud base in the mountains was 9,000 ft and rising. We easily flew thermal to thermal the rest of the way to Dingle Burn, enjoying spectacular views the entire way. We reached ‘The Dingle’ and spotted that other glider again. We thermalled together for a bit before they continued west and we headed off east, back to Omarama. We were able to make the entire trip back in one final glide and landed so someone else could have a turn. “Sorry we weren’t able to take you up on a good day,” Fraser said nonchalantly, acting as if this hadn’t been one of the best flights of my life.



Pilot Accomplishments
By Jen Stamp

There were a number of accomplishments by SSA members over the past year that we'd like to acknowledge. These include FAA pilot certificates and first solos. Notably (but not all inclusive) we'd like to acknowledge the following:

New FAA pilot certificates: Lucas Allraum (Private) and Ian Clarke (CFI).

Lucas Allraum earned his Private Pilot Glider certificate.

Ian Clarke earned his CFI Glider certificate. Ian is a former SSA Line Crew member who is currently attending University of Vermont.

First solos

Will Drody, a second-year youth camper, soloed both the SGS 2-33 and SGS 1-26.

Danny Burns, a SSA Line Crew member, soloed both the SGS 2-33 and SGS 1-26 and is planning to take his Private Pilot glider checkride this season.

Zach Fuss (left) and Alex Chudzik (right, with instructor Tom Anderson) both soloed the SGS 2-33.

Other noteworthy solos

First glider solo: Kevin Sweeney (retired airline pilot), pictured with instructor Steve Platt

Solo after a 5-year hiatus: Riley Kissenberth (also a champion RC plane pilot!)

This winter Mike Lutynski passed his FAA private pilot written exam (he also reshingled the Rwy 22 gazebo last year…thank you again Mike!).

“ARE WE THERE YET?”
Philosophy from the Back Seat
By Rick Hanson

Every parent or grandparent has heard the question a thousand times on any trip longer than ten minutes from home. Whether it’s a trip to get an ice cream at the stand three miles away or a three day drive to visit “Silly Grandma and Silly Grandpa” (don’t ask), from the time of first conscious thought on, we are programmed to want answers to “who?”, “what?”, “when?”, “where?”, and “why?” After all, what is the point of starting on something and not getting “There”, or “Done”?

There are some journeys – I want to say “real” journeys - that are not designed to end. The destination is either a moving target or only an excuse for the trip. Some of life’s most memorable events are voyages to unknown places for indeterminate periods of time.

What does this have to do with flying? Everything.

Yes, we fly to get to distant places in powered aircraft and on the airlines. Yes, we fly gliders to get to maximum altitude in the wave or silver distance, or to place in a competition, or to stay up for longer than anyone else that day in thermals. Those are the “goals,” the answer to the question: “Are we there yet?” The real question might be: “How’s the trip?”

Both figuratively and literally, don’t miss the fulfillment and fun of learning to fly - to soar. The “journey” never ends – there is always something new to learn, people to fly with, places to fly to, conditions to fly in. If you keep your attention on the voyage, you can give up the search for the elusive destination. You are already “there”.

Sugarbush
By Fabio Schulthess

"Fabio, there is one glider over the east ridge and another one on downwind 22" the warming radio call from John flying his towplane catches me, as I am announcing myself in my Piper Pacer taildragger over Lincoln Gap at 3,000 ft to land at Sugarbush. Communications are pertinent to safety around airports to watch for traffic, I know this as an airline captain. The welcoming sight of my home airport has been my joy since I started flying my Pacer in 2002. "What are your dinner plans tonight?". Father Bill calls over the frequency, approaching Sugarbush on a quiet evening. I have my handheld radio plugged in in the kitchen of my house across threshold 04. We do make arrangements to meet at a local restaurant later on the evening.

It is the entire Sugarbush aviation community which I love so much, that I am spending my entire vacation in Vermont flying.

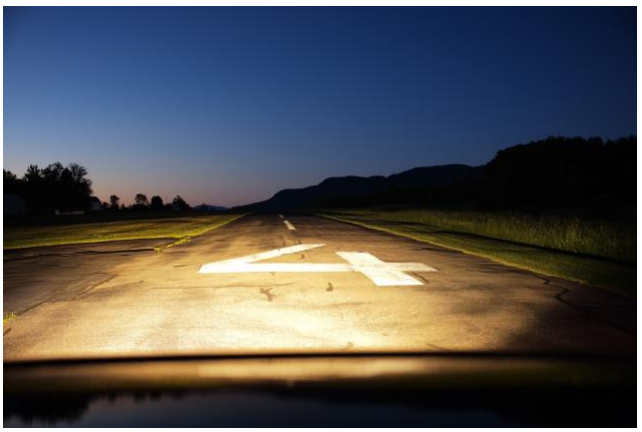
Very often I overfly 0B7 at 37,000 ft at the controls of an Airbus 340 or 350, arriving from Munich, Germany, destined for Newark, Washington D.C. or Charlotte. Weather permitting, I can actually see Sugarbush airport, Jim Parker's hangar and even my house! I always take a picture of the view. I do call 123.0 to see who is there, and once in a while I get an answer. The view makes me terribly homesick for Vermont, as I am landing less than an hour later in Newark and spend the evening at the layover hotel in Jersey City.

Often I used to talk to Allen from Boston Center on 135.7, either from my Pacer or the airliner. He works now Burlington Tower. What a joy!

Being based at Sugarbush, having a house very close to the airport and my airplane in a hangar is the ultimate dream for me to come true.

And the friendships among all people at the airport make me feel being at home. I highly appreciate being a member of the flying family and very thankful for it.

Safe flying to all, Fabio Schulthess



Glider Aerodynamics Puzzler #12 (Thermaling)
By Steve Platt

[Note: this puzzler will appear in the July issue of Soaring magazine. *Ed.*]

The Glider aerodynamics puzzler is intended to stimulate your thinking about soaring and refresh your understanding of glider aerodynamics and soaring optimization. The correct answers with detailed explanations follow the questions. Have fun.

Glider pilots spend a significant amount of time thermaling, particularly when Mountain wave or Ridge lift conditions are not available. On a recreational flight as much as 25-50% of flight time may be spent thermaling. Indeed, knowing how to thermal efficiently is one of the challenges and joys of our sport. While every thermal is different in strength, shape, profile, etc……a standard thermal has been used for decades to analyze and model net climb rates for gliders as function of bank angle and airspeed. Originally proposed by H. C. N. Goodhart, the "Standard British Thermal" is defined as a Thermal with a circular cross-section with airmass lift of 4.2 knots at the core decreasing parabolically to zero at a radius of 1000 feet. (Reference: "The Complete Soaring Pilot's Handbook", by Ann & Lorne Welch and Frank Irving, 1977, Page 242 ISBN: 0-679-50718-3), While you or I may not have ever seen or been in a "Standard British Thermal", it has proven useful to study the effects of angle of bank and airspeed on net climb performance.

QUESTION 1: You are student pilot taking up a low performance Schweizer 233 (Best L/D = 23) with your instructor for a training flight. After a 2500 foot tow you approach what appears to be a "Standard British Thermal". As you enter and center the thermal what angle of bank and airspeed will maximize your Net climb rate in the thermal? (Key performance parameters for the Schweizer 233 are: Min sink speed = 42 MPH, Best L/D speed = 52 MPH, Best L/D = 23 to 1).

A. Airspeed = 42 MPH with Bank angle = 20 degrees
B. Airspeed = 43 MPH with Bank angle = 25 degrees
C. Airspeed = 45 MPH with Bank angle = 30 degrees
D. Airspeed = 48 MPH with Bank angle = 40 degrees
E. Airspeed = 50 MPH with Bank angle = 45 degrees

QUESTION 2: Similar to Question 1, you are flying your Club's medium performance PW6 glider (Best L/D= 34). After a 2500 foot tow you approach what appears to be a "Standard British Thermal". As you enter and center the thermal what angle of bank and airspeed will maximize your Net climb rate in the thermal? (Key performance parameters for the PW6 are: Min sink speed = 50 knots, Best L/D speed = 56 knots, Best L/D = 34 to 1).

A. Airspeed = 52 Knots with Bank angle = 25 degrees
B. Airspeed = 54 Knots with Bank angle = 30 degrees
C. Airspeed = 55 Knots with Bank angle = 33 degrees
D. Airspeed = 57 Knots with Bank angle = 40 degrees
E. Airspeed = 59 Knots with Bank angle = 45 degrees

QUESTION 3: Similar to Question 1, you are an experienced cross country pilot flying a very high performance Ventus (Best L/D = 50). After a 2500 foot tow you approach what appears to be a "Standard British Thermal". As you enter and center the thermal what angle of bank and airspeed will maximize your Net climb rate in the thermal? (Key performance parameters for the Ventus: Min sink speed = 47 knots, Best L/D speed = 56 knots, Best L/D = 50 to 1).

A. Airspeed = 49 Knots with Bank angle = 25 degrees
B. Airspeed = 50 Knots with Bank angle = 30 degrees
C. Airspeed = 52 Knots with Bank angle = 35 degrees
D. Airspeed = 57 Knots with Bank angle = 40 degrees
E. Airspeed = 59 Knots with Bank angle = 45 degrees

EXPLANATION QUESTIONS 1-3: The net climb rate in a thermal is a complex function of at least five variables:
1. Thermal Strength: The peak airmass lift (vertical velocity) at the core of the thermal
2. Thermal Profile: The shape of the thermal….ie…the decrease in vertical lift extending out from the core of the thermal to the extremity……ie..parabolic, linear, etc.
3. Thermal Size: The thermal width, diameter, or radius.
4. Glider Performance: The flight polar of the glider and, in particular, the wings level minimum sink speed and minimum sink rate.
5. Flightpath: How centered the glider is in the thermal

It goes without saying that weight also effects climb performance as weight shifts the polar for ALL gliders. Increasing weight decreases net climb performance and decreasing weight improves net climb performance……Adding ballast may help cruise performance but it definitely hurts climb performance.

Puzzler continued…

FIGURE 1

Shown in Figure 1 is the Profile of a Standard British thermal as a function of radius from the core overlaid with the magnitude of sink rate for a Schweizer 233 as a function of radius of turn….ie.. as a function of bank angle and airspeed if flown at the optimum minimum sink speed for each angle of bank. Subtracting the 233 sink rate from the airmass lift yields the Net Climb rate as a function of radius of turn…..ie….as a function of bank angle and airspeed. Notice that for the Schweizer 233 perfectly centered in a standard British Thermal the peak net climb rate occurs at a bank angle of 25 degrees and an airspeed of 43 MPH yielding a radius of turn of 280 feet. The answer to Question 1 is B 43 MPH and 25 degrees.

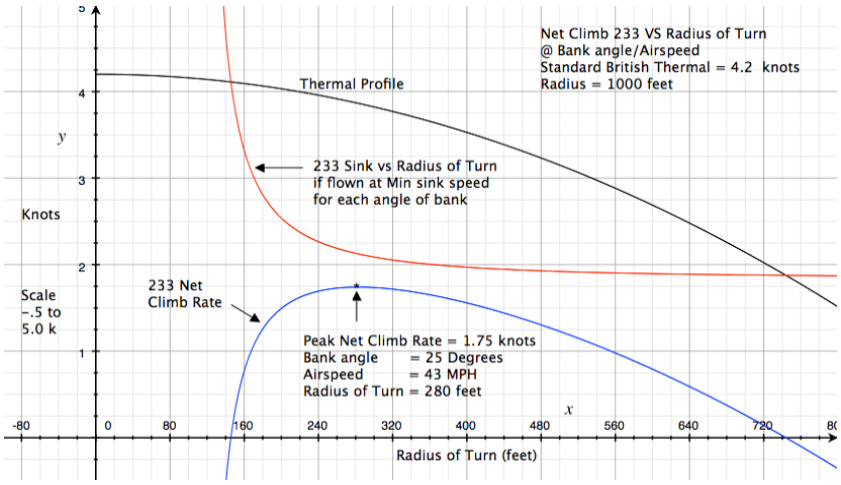


FIGURE 2

Shown in Figure 2 is Profile of a Standard British thermal as a function of radius from the core overlaid with the magnitude of sink rate for a PW6 as a function of radius of turn….ie.. as a function of bank angle and airspeed if flown at the optimum minimum sink speed for each angle of bank. Subtracting the PW6 sink rate from the airmass lift yields the Net Climb rate as a function of radius of turn…..ie….as a function of bank angle and airspeed. Notice that for the PW6 perfectly centered in a standard British Thermal the peak net climb rate occurs at a bank angle of 33 degrees and an airspeed of 54.5 knots yielding a radius of turn of 410 feet. The answer to Question 2 is C. 55 knots and 33 degrees.

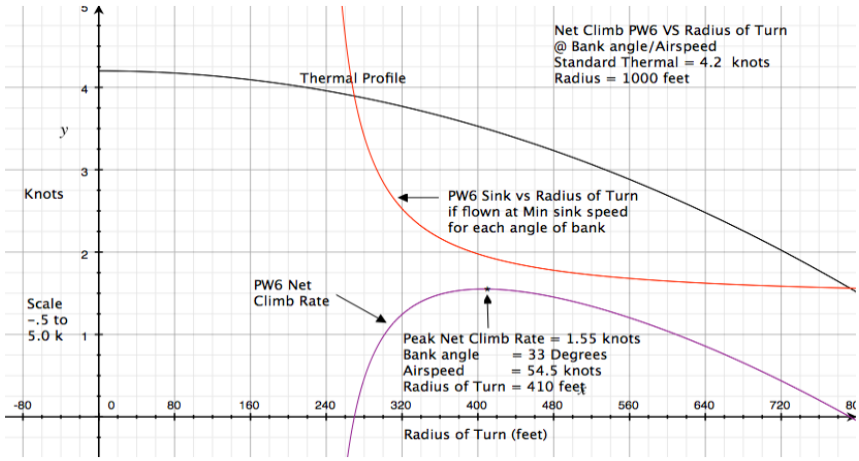
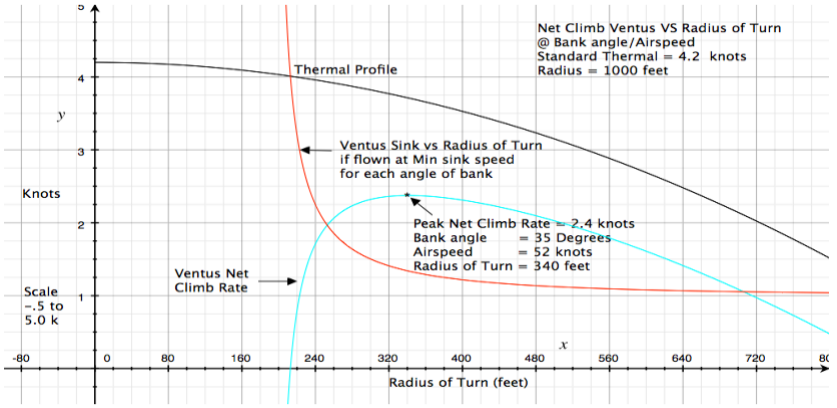


FIGURE 3

Shown in Figure 3 is Profile of a Standard British thermal as a function of radius from the core overlaid with the magnitude of sink rate for a Ventus as a function of radius of turn….ie.. as a function of bank angle and airspeed if flown at the optimum minimum sink speed for each angle of bank. Subtracting the Ventus sink rate from the airmass lift yields the Net Climb rate as a function of radius of turn…..ie….as a function of bank angle and airspeed. Notice that for the Ventus perfectly centered in a standard British Thermal the peak net climb rate occurs at a bank angle of 35 degrees and an airspeed of 52 knots yielding a radius of turn of 340 feet. The answer to Question 3 is C 52 knots and 35 degrees.

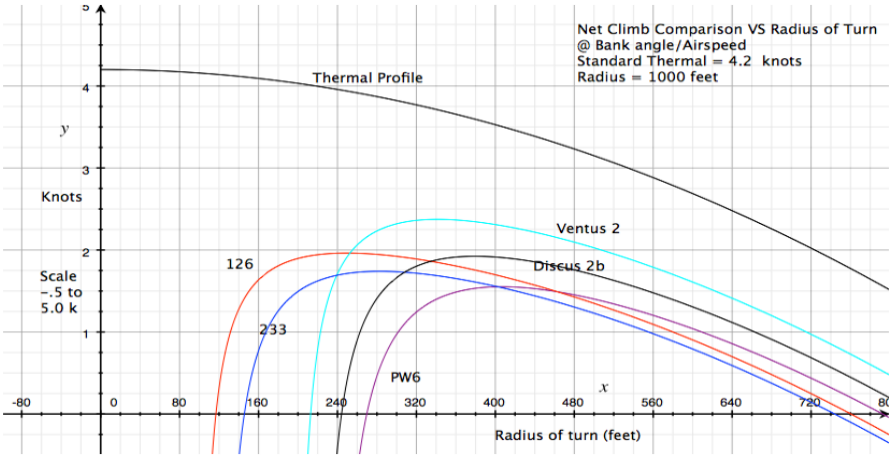


Puzzler continued…

LESSONS LEARNED: Optimizing Net climb rates in thermals is complex. There are no simple answers. What is certain is: for a given thermal the optimum angle of bank and airspeed varies significantly for gliders of different performance parameters. Lower performance/ slower gliders achieve optimum net climb rates with shallower angles of bank than high performance/higher speed ships. For all gliders, too shallow an angle of bank the radius of turn is large and the glider may circle in the weakest portion of the thermal, or worst case, circle the thermal entirely. Too steep an angle of bank the radius of turn may be small but the the sink rate of the glider increases dramatically with the higher load factor more than offsetting the benefit of flying closer to the core of the thermal. For each glider, and for each thermal, there is an optimum angle of bank and airspeed required to maximize net climb performance…..ie…..radius of turn matters. As a general rule, narrow (less than 750 foot radius) strong thermals require steeper angles of bank to maximize net climb rates while wide (greater than 1500 foot radius) weak thermals require shallower angles of bank to maximize net climb rates. Knowing the minimum sink speed for key angles of bank is also important.

FIGURE 4

Shown in Figure 4 is a comparison of the Net Climb rates for a 126, 233, Ventus, Discus, and a PW6 versus Radius of Turn in a Standard British thermal. Notice that if all ships are centered perfectly and flown at their optimum minimum sink speeds for each angle of bank, the lowly Schweizer 126, with a peak net climb rate at only 250 foot radius of turn, is capable of out climbing all but the Ventus! Minimum sink speed matters. Radius of turn matters. Optimizing thermaling flight is fascinating. Have fun. Fly safe.



Puzzler continued…

APPENDIX: Note, all of the computer generated Net Climb rates are theoretical. While the results are useful for understanding the relative performance and effects of angle of bank and airspeed on Net Climb performance, the models assume perfect flight…….ie…..gliders are perfectly centered, and flown in perfectly cylindrical thermals, at the perfect minimum sink speed for each angle of bank. Highly unlikely. For those readers interested in the technicalities or plotting Net Climb rates for different Make / Models the following equations will prove helpful:

For ALL gliders the Sink rate as a function of Radius of Turn (and therefore bank angle and airspeed) if flown at the optimum minimum sink speed for each angle of bank is generated from the following equation:

EQUATION 1: VSink(R) = VSink (0) * [1 / { 1 - (Vo^2 / g * R)^2 }^0.5]^1.5 where:

VSink(R) = the sink rate at a Radius of Turn for a particular angle of bank /airspeed

VSink(0) = the level flight minimum sink rate for any glider at the operating weight Vo = the level flight minimum sink speed at the operating weight R = the Radius of turn at a particular bank angle flown at the min sink speed for the angle of bank

The Minimum sink speed at angle of bank (x) is given by:

EQUATION 2: Vangle = Vo * (1 / Cos (x))^0.5 where:

Vangle = the minimum sink speed for coordinated turning flight at bank angle x Vo = the level flight minimum sink speed at the operating weight

EQUATION 3: R = (Vo)^2 / (g * Sin (x)) where:

R = the Radius of turn at a particular bank angle flown at the min sink speed for the angle of bank

Model representing a Standard British Thermal…….ie…. a cylindrical column of rising air with a maximum air mass rate of climb of 4.2 knots at the center decreasing parabolically to zero at a radius of 1000 feet:

EQUATION 4: Thermal Lift (R) = 4.2 * { 1 - (R / 1000) ^2} where:

Thermal Lift (R) = the thermal strength at Radius R from the center of the thermal

About the author: Steve Platt

Steve is a commercial pilot in single engine airplanes, single engine seaplanes, and gliders. He holds an instrument rating and is a Certificated Flight Instructor for airplanes, instruments, and gliders. He has logged over 4000 flight hours including over 2000 hours as a flight instructor. He is a retired IBM Engineering Manager and a Flight Instructor at Sugarbush Soaring, Warren, Vermont.