

Ridge Running 101

or

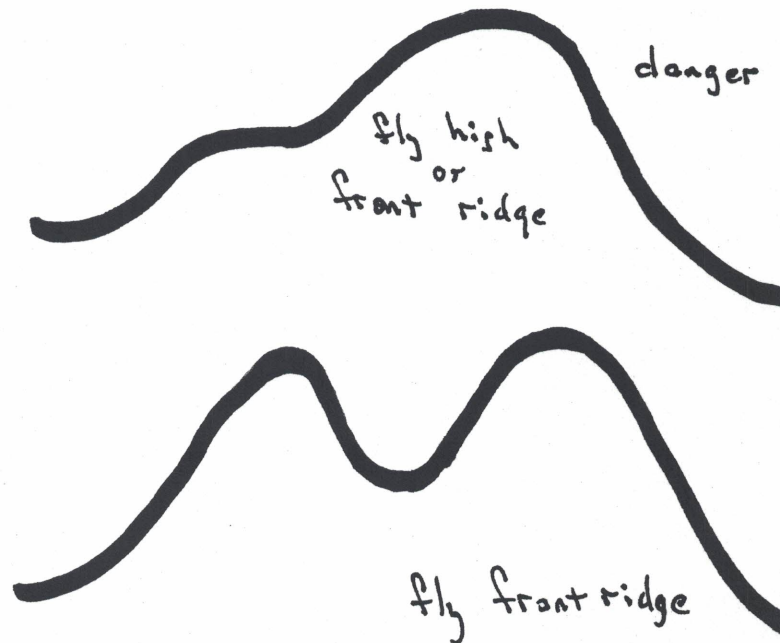
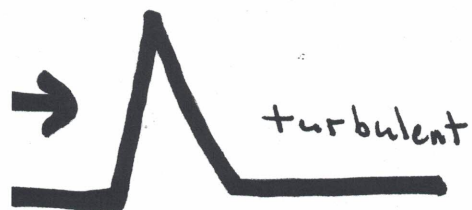
If I Can Do It So Can You

by
Cathy Williams "CL"

FAVORABLE RIDGE CONDITIONS

THE RIDGE

- The ridge should be over 200 feet high and have a fairly steep slope.
- Elongated hills and long ridges are ideal; conical mountains are unsuitable because the air can pass around, rather than over, the mountain.
- Gradual steepening of the slope from the valley floor is best. Very steep or irregular surfaces produce more turbulence and eddies. Shallow slopes mean a further distance to landable fields.
- Minimal obstacles upwind of the ridge are best. The height and direction of the slope are not as important as terrain upwind that will offer the least possible resistance to the wind. Even tall, relatively steep mountains will not generate ridge lift if another mountain to windward has already disturbed the airflow extensively.
- A windward slope facing into the sun often produces upwind thermals that reinforce ridge lift. Thermals from the lee of a slope can weaken or even cancel out the ridge lift.



Tuscarora Ridge

McConnellsburg-Thompsons town - 58sm

Burnt Cabins-Thompsons town - 47sm

Thompsons town
Bridge

Juniata
River

Susquehanna
River

Honey
Grove

2140

Carlisle

Airport

PA Turnpike

Rt 81

Burnt
Cabins

Roxbury
Dam

Shippensburg

Rt
5803

Airport

Five
Lakes

Chambersburg

Biglerville

Rt 15

Doersom

Gettysburg

McConnellsburg Rt 30
(Rt 30
+ Ridgetop)

m-ASA

Hi
Rock

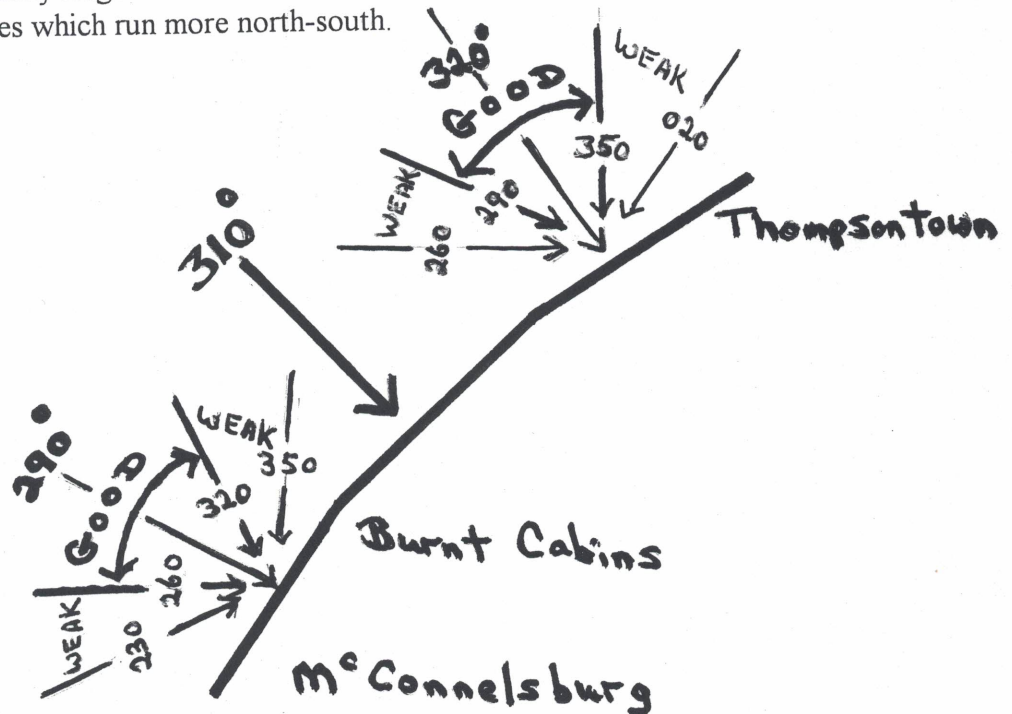
P-40

Emmitsburg

Dillsburg

THE WIND

- The wind is best if blowing at right angles to the slope and must blow at an angle of at least 30 degrees to the ridge. 60 to 90 degrees will produce good lift; 30 to 60 degrees weak lift.
- Wind speed should be at least 10 knots; 12 to 15 knots is ideal. Above 25 knots can be uncomfortably turbulent and make off field landings more difficult.
- In our area, we look for a northwest wind. 305 to 310 degrees ideally ; 300-340 degrees at the northerly ridges which run more east-west, 260-320 degrees for the more southern ridges which run more north-south.



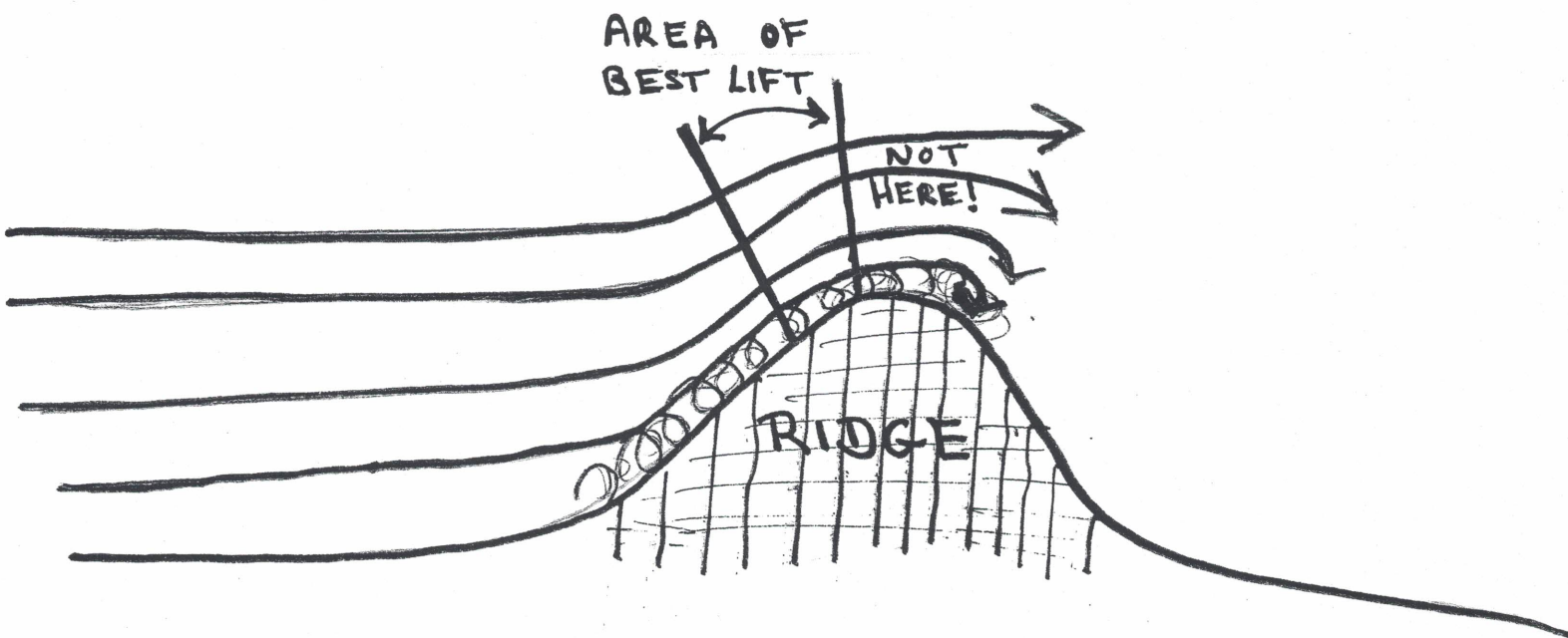
THE WEATHER

- Look for a cold front that will sweep across the ridge (NW to SE) a day or two before your flight. Ideally, a low pressure to the north and a high pressure to the south will force the winds between them, giving good wind direction for most of the ridges in our area.



WHERE ?

- The proper position is just in front of the ridge. There is no lift right above the ridge.
- The optimum lift zone moves further in front of the slope with increasing height above the ridge. If entering ridge lift from below the crest, approach with a shallow angle rather than directly toward the ridge. This will allow a safe turn away from the ridge if the lift is not as strong as anticipated. It will also prevent misjudging and being blown too close to the ridge before turning parallel. Note, it will be necessary to be quite close to the slope in order to climb up to the crest.
- Fly parallel to the upwind slope, crabbing into the wind as necessary to prevent drifting down wind. The amount you need to crab varies with wind and airspeed. The lower your speed, the more the nose will need to be into the wind. Crabbing can give the illusion of a sideslip. Check the yaw string to ensure coordinated flight and minimize drag.
- Where the slope flattens out, keep a respectful distance away, where it is very steep, you can be closer, since the escape route- underneath you- is clear. Particular care should be taken around horizontal "steps" or ledges on otherwise steep slopes, since these can cause particularly bad eddies.
- If the lift carries you up the crest of the ridge, where the wind is especially fierce, do not allow yourself to be swept back behind the hill because the strong and turbulent sink in the lee could make it impossible for you to get back.



RULES

PREPARATION

- If at all possible have a dual instructional flight. At least be thoroughly briefed on local conditions and rules. General rules are sometimes modified to fit local situations.
- Do not have anything loose in the cockpit. It will probably be very turbulent. Items will fly out of cockpit pockets and come loose from weak velco fastenings. Dust and dirt from the vents or floor will repeatedly fly into your nose, eyes, and mouth. Consider a good vacuuming before your ridge attempts.
- Be sure shoulder straps are tight. Do not have any button on the top of your hat. Consider putting some type of padding between your hat and your head.
- Know the area you plan to fly. There will be little if any time for navigation or looking inside the cockpit at instruments.
- Know the glider you plan to fly. You must be able to recognize and react to speed changes before they register on the airspeed indicator. You must be confident towing, flying, and landing in rough and probably crosswind conditions.
- Before cross-country flights on the ridges, have a land out kit with some basic first aid equipment (aspirin, bandages, first aid cream), some signal equipment (whistle, mirror, ELT), shoes you can hike in, things for warmth (matches, space blanket, tube tent, sleeping bag), water and food. If you land in the ridges it could be a long time until you are found!

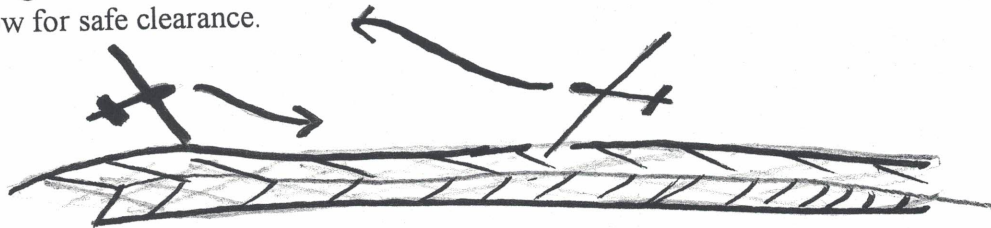
FLYING

- **LOOK OUT** Sailplanes are hard to see anytime and especially so when approaching head on at high speed. If the ridge is working, you probably have plenty of company on the ridge. Flying into the setting sun is especially bad; brimmed hat and sunglasses help.
- Make all reversing turns away from the ridge, i.e., into the wind. A downwind turn toward the ridge is liable to force the glider into the hillside. Transition from ridge to thermal by flying figure eights in the thermal in front of the ridge until you are high enough to safely circle. Make all 360 degree turns well above and in front of the ridge

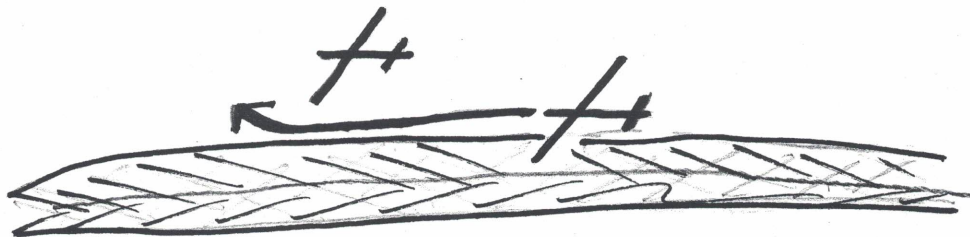


- Never fly directly above or below another glider unless there is generous clearance. The pilot above cannot see the lower glider and might nose down into it.

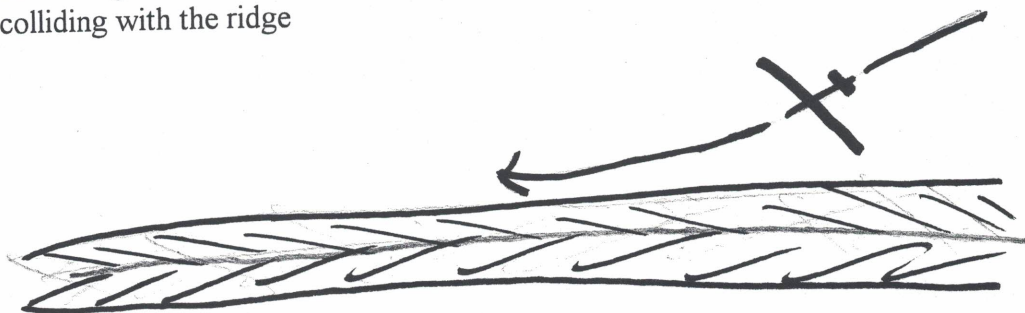
- Gliders approaching each other head-on give way to the right. The glider with its right wing to the ridge has the right of way because it may be so close that it can't move to the right. Glider with left wing to the ridge be ready to move out toward the valley to allow for safe clearance.



- An overtaking glider passes between the slope and the overtaken craft. This could mean passing on the left, a necessary deviation from the rules of general aviation to avoid having the overtaken glider turn in front of the glider. CAUTION this is not the rule taught in Reichman's book; European pilots might surprise you by overtaking on the upwind side. Look before and as you turn!



- Enter ridge lift from a shallow (45 degree or less) angle to avoid misjudging and colliding with the ridge



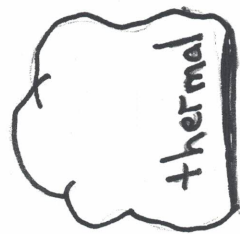
- Never fly beneath birds. They may dive and collide with you.
- Always have a field selected for landing.

HOW FAST ???

On the ridge the concept of total energy is clear. The relationship of speed and altitude is especially important. You can trade one for the other, but allowing both to be low simultaneously is a formula for disaster. As you get closer to the slope, you must speed up in order to have a reserve of energy. **LOW AND SLOW IS DEADLY**

- minimum sinking speed will make the most of the lift if you want to climb. As you get closer to the crest, fly 5 to 10 knots above best L/D and add a generous safety margin when it is turbulent. Remember it takes altitude to pick up speed, especially if you fly into sinking air which is more likely to happen when the lift is weak. If you are flying best L/D and sinking close to ridge top height **GIVE IT UP**. Look for a thermal while there is still time. Fight the temptation to slow up to minimum sink unless you are well above the crest.
- Lift is stronger closer to the ridge and therefore the highest possible average speed can be achieved close to the ridge. (If that speed is below best L/D it is a risky day to be flying the ridge and not a good day for learning) Remember you need to get closer to the ridge top in order to find adequate lift on a marginal to average ridge day.
- the speed you choose (assuming adequate lift) is determined by your desire to gain height (slow up) vs maintain height vs loose height (speed up) relative to the crest of the ridge
- strong lift allows more choices in speed and altitude and is the easiest condition for learning. When the lift is strong (ridge, wind strength and direction close to ideal) you can fly at a high speed close to the ridge or you can choose to fly slower and higher above the crest. Choose the altitude you want and fly the speed that maintains that altitude **OR** slow up some and use the increased lift to gain altitude in preparation for crossing gaps, leaving the ridge, or transitioning to another ridge
- A shallow ridge slope requires additional speed and higher altitude because you need to be able to glide further into a valley in case you have to land. A steeper slope allows for a somewhat slower or lower position because a turn away from the ridge will rapidly give you altitude above the ground
- Turbulence requires extra speed when close to the ridge. A gust could leave you stalled with no altitude for recovery. If the turbulence is too uncomfortable, slow up and cruise at higher altitude. Flight near a slope should always be carried out with enough reserve airspeed in hand to enable a pullout even in the case of a sudden downdraft. Rotor like eddies can suddenly replace a climb of 800 fpm with sink of 1500fpm.
- On a strong day it is possible to maintain altitude while flying very fast. Remember the definition of rough air redline. It is a bad idea to fly on the ridge at faster than the placarded rough air redline.
- On average to marginal days, fly a little faster through areas of sink and slow down in lift (not below minimum safe speeds)
- On strong days, to maximize speed, fly fast in lift and slow down some in sink; follow the contour of the ridge. **OR** Fly high with a steady slow speed that allows your altitude to fluctuate with the lift and sink.


minimum sink - 45
best L/D - 55
Red line - 120



lipid +

52

三十一



Lipstick

best-90
+L/A+

Minimum Sink

best L/D +
60-90

fast 80-90

faster
96-100

fast 80-90

faster-
110-120

fast-
90-100

Fast-90-100

06-08
Jamaica

faster
110-120

slow to climb 80-90

501

600- minimum sink - 45

minimum
sick 45

best List
60-90

1000
1000

Foster
90-100

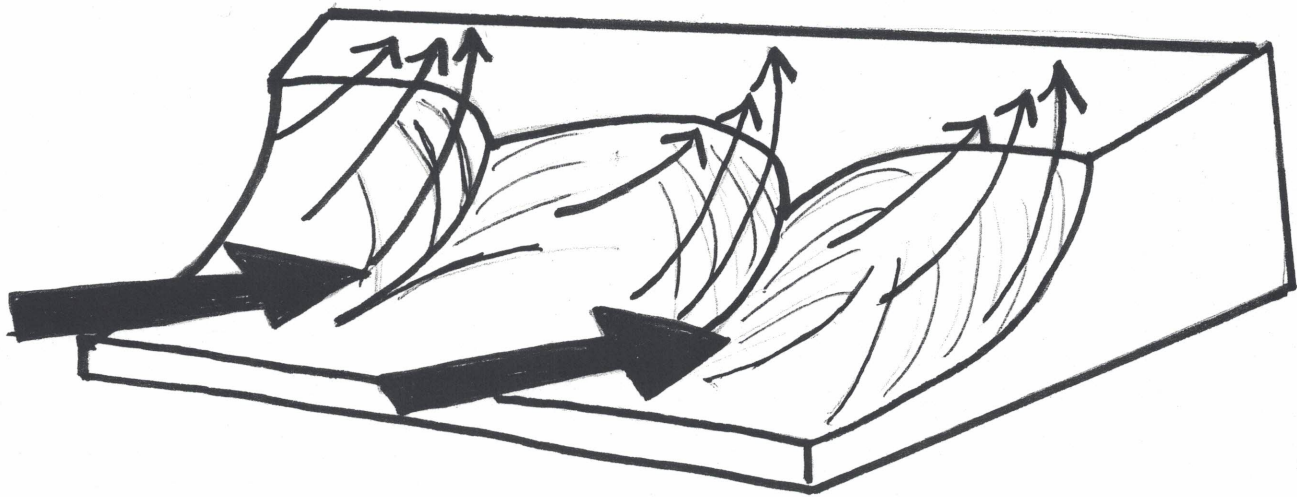
08-07
70-80
Slover

fast
80-90

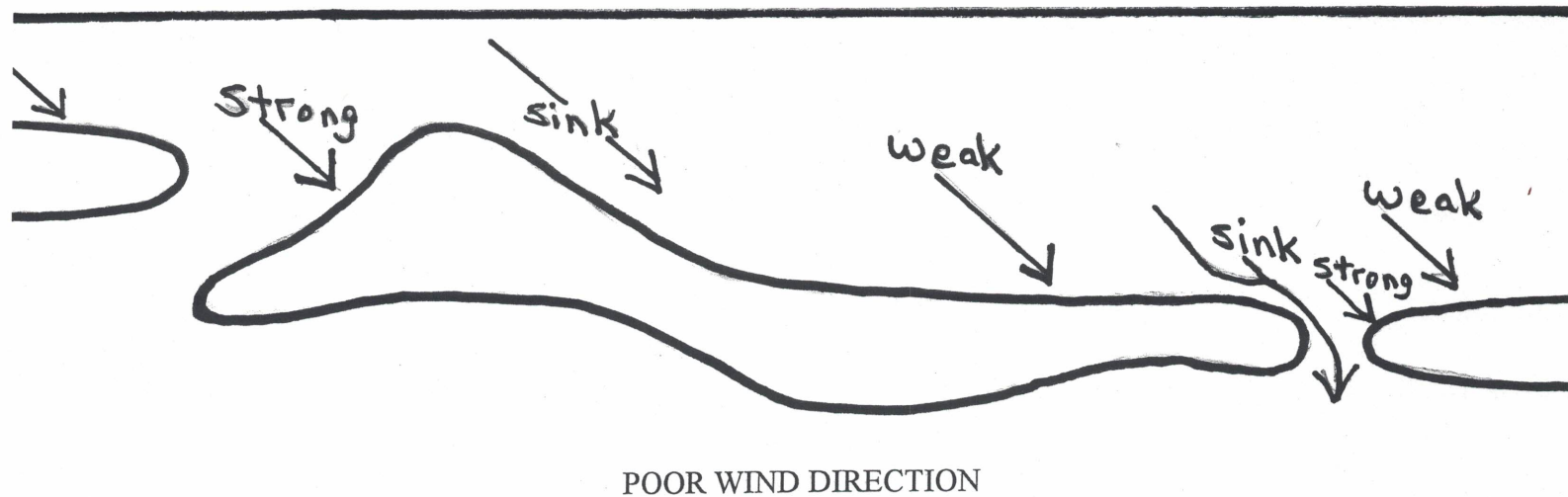
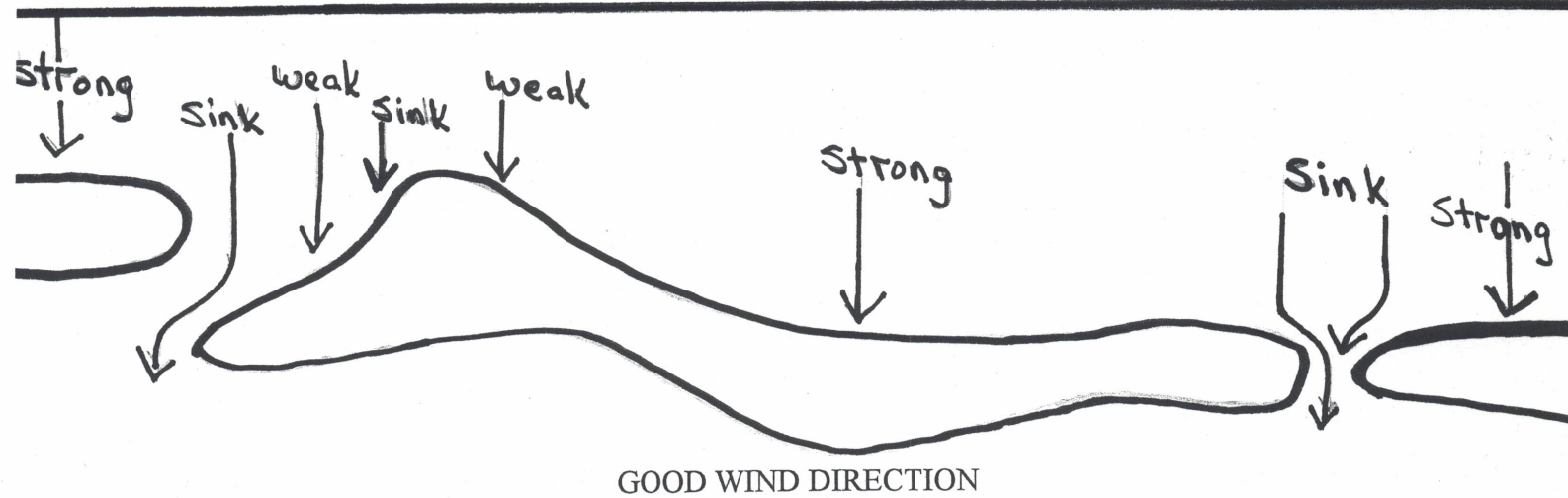
100-
200-

RIDGE

RIDGES USUALLY AREN'T STRAIGHT OR CONTINUOUS



VENTURI EFFECT AND THERMALS



SUGGESTIONS FOR CAUTIOUS BEGINNERS WHO WANT TO FLY THE RIDGE

Choose a site with an airport right there (Ridge Soaring, Mifflin County, Blairstown). Tow or arrive well above the ridge on a day when you know the ridge is working well. Stay at least 500 feet above the ridge at all times. You can fly well above and upwind of the high ground. There will be less turbulence and a lower safe speed. You will not need to worry about being squeezed into the ridge by oncoming traffic. If the lift quits you will have more time and height to find a thermal and more time to plan a landing. You will not be disturbed by being so close to the ground; (it will be higher than flying pattern altitude over the ski hill at Fairfield). You will be high enough to thermal normally (360 degree turns at your normal thermalling speed) if you so desire. Fly back and forth along a stretch of ridge. You will not need to worry about landouts or distractions with navigation. Fly minimum sink and see how high the ridge lift will take you before you hit zero sink. When you are comfortable, experiment with using speed to go up and down in relation to the crest. Experiment with different speeds and positions relative to the ridge.

SUGGESTIONS FOR MORE DARING CROSS COUNTRY PILOTS FLYING THE RIDGE FOR THE FIRST TIME

Choose a ridge with an airport right there or many good fields in the valley (Burnt Cabins to Honey Grove, Massanutten). Memorize key features of the ridges you plan to fly- especially any gaps or transitions; the GPS will not help and you will be too busy to consult a sectional. Tow or arrive well above the ridge on a day when thermals are good and you know the ridges are working well. Always have a field selected for landing and stay high enough so that you are sure that you can get and land there safely. Establish the proper position in front of the ridge, confirm that you have good lift, then pick up speed and dive down to 100 to 200 feet above the crest. Fly as fast as it takes to maintain that distance above the crest. Do not exceed redline; always fly 20 to 30 knots faster than best L/D. If it is impossible to maintain altitude with that speed, find a thermal and climb up.

SUGGESTIONS FOR BEGINNERS WILLING TO GAMBLE THEIR LIVES AND SAILPLANES (Or What's Wrong With These Actions?)

- Have your first solo ridge experience on a marginal ridge day.
- Approach the ridge from the downwind side with just enough altitude to clear the top and turn parallel when you hit the lift on the other side.
- OR From the upwind side, arrive at the ridge below ridge top height, fly at a 90 degree angle toward the slope, turn parallel to the slope when in the best lift and try to climb up.
- Fly minimum sinking speed to maximize your climb in weak lift.
- If lift is weak or you are in prolonged sink, press on, it will probably be better ahead.
- When the lift is strong, fly fast and stay close to the ridge; don't worry when passing over a low ridge section or a stretch of valley without fields since the wind will continue to blow, the ridge will continue to work, and landing fields won't be needed.
- Fly as close as you dare to the slope to stay in the best lift.

BIBLIOGRAPHY

Cross Country Soaring

by Helmut Reichman, The Soaring Society of America, Inc. (1988)

Flying Sailplanes

by Helmut Reichman, Soaring Society of America, Inc, (1980)

Glider Basics From Solo To License

by Thomas L. Knauff, (1988)

Ridge Soaring the Bald Eagle Ridge

by Thomas L. Knauff, 4th edition (1995)