Cross-country techniques

or

How to fly 500 km in 5 hours or less.

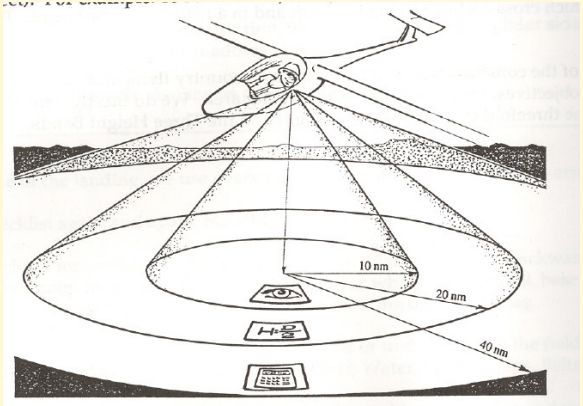
Three Problems

The three most common factors counterproductive to good cross-country technique are

- Circling in all available lift.
- Failure to circle tightly/bank steeply enough.
- Flying too slowly between thermals.

Cross-Country Modes

- Local Overhead
- Enlarged Local Area
- Measured Distance



Local Overhead

Flight conducted exclusively around and within sight of an airport or landable field. It is defined by an area even untrained eyes can judge. This corresponds to about a maximum glide of 10:1. We don't want to have to compute anything. As long as we are within this distance, it is easy to return to the field or known place where there was lift.

Enlarged Local Area

This corresponds to an area defined by a maximum glide of 20:1, or about 4 mi. per 1000 ft. This is near the limit an experienced eye can judge accurately. Now we use simple calculations — remember to add a safety margin.

Measured Distance

This is an area defined by the sailplane's normal glide ratio. Many parameters affect it: wind, MacCready, wing loading, safety margin, etc. It requires a flight computer, whizz-wheel, or chop stick.

Our progression is:
Starting with 10:1, which any beginner can judge, to 20:1, which can be easily computed, to some higher glide ratio whose value is determined by many parameters.

Height Bands

- Performance Band

  In Flat Country The upper third of the convective layer.

  In the Mountains Well above the peaks/ridge tops.

- Climb Band

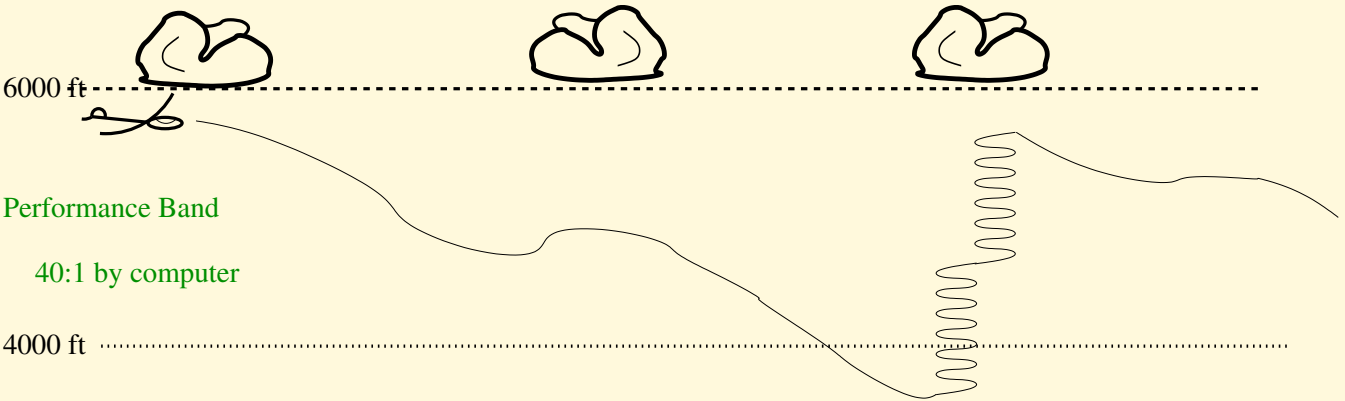
  In Flat Country The middle third of the convective layer.

  In the Mountains Just above the peaks/ridge tops.

- Survival Band

  In Flat Country The lower third of the convective layer.

  In the Mountains Below the peaks.


6000 ft
Performance Band
40:1 by computer
4000 ft
Climb Band
20:1 by rule of thumb
2000 ft
Survival Band
10:1 by eye
0 ft

Performance Band

In Flat Country The upper third of the convective layer.
For cloudbase of 6000 ft., it goes from 4000 ft. to 6000 ft.

In the Mountains Well above the peaks/ridge tops.

Strategy In the upper height band, try to optimize your cruise by dolphin flying. Take only the best lift. Set your MacCready based upon the average lift encountered. In Measured Distance mode — use the flight computer to evaluate landing options ahead of you.

Climb Band

In Flat Country The middle third of the convective layer.
For cloudbase of 6000 ft., it goes from 2000 ft. to 4000 ft.

In the Mountains Just above the peaks/ridge tops.

Strategy In the middle height band, we worry less about the task and focus on conserving altitude while advancing cautiously. Reduce the MacCready somewhat. Look for lift that will take us back to cloudbase (into the Performance Band). In Enlarged Local Area mode — increase our safety margin by flying within 20:1 (4 mi. per 1000 ft.) of landable terrain.

Survival Band

In Flat Country The lower third of the convective layer.
For cloudbase of 6000 ft., below 2000 ft.

In the Mountains Below the peaks/ridge tops.

Strategy In the lower height band, forget about the task and focus on staying airborne. Fly a MacCready of zero. Dump water ballast and look for any lift that will keep you in the air. In Local Overhead model — stay within (obvious) gliding range of landing fields.

Planning & Thinking Ahead

- Methodically envision what may happen ahead.
- Always have
  - two aerological plans: two cumulus, or cumulus + ridge.
  - an escape to a landing: airport or landable fields.

Where to Go

- Establish the relationship of lift to clouds — upwind edge v. downwind edge.
- Meander to stay in the best lift.
- Upwind and high is better than downwind and low.
- Fly under/to short cycling cloud wisps, even if they disappear before arrival.
- Follow lift/cloud streets even if up to 30 off course line.
- Keep an eye on terrain.
- *Plan ahead*: two sources of lift and a landing.

Good

- baked bare ground
- industrial sites
- concrete/asphalt jungle
- high ground

Bad

- downwind of lakes
- downwind of ridges
- sandy areas
- wet/irrigated/low ground

Wind

Keep track of wind direction, especially in the mountains.

- drift
- smoke
- large flags
- ripples and wind shadow on water
- cloud shadows

Thermal Streets

- Wind and terrain organize thermals.
- Climb straight ahead.
- Stay below cloudbase to see what's happening and be able to dolphin.

How Fast?

- MacCready Speed-to-fly Theory
- Speed ring or flight computer — trust them.
- Base the MacCready setting on the average rate of climb in the last thermal. This is less than how high the needle bounces or even the perceived rate of climb.
- Start by setting the MacCready to $1/2$ to $2/3$ of the achieved rate of climb. You will have more range and will tend to not get as low.
- If you get low, set the MacCready lower.
- Change gears with the weather.

Another way to think about it:

The MacCready setting is a confidence in the day factor. Set the MacCready for your confidence in the day (and yourself). If you think you will be low and have to work weak lift, set it low. If you think you can find strong lift, because you are high and won't have to stop, set it higher.

- Things look good ahead, more confidence — higher MacCready, longer glides, better climbs.

- Things look bad ahead, less confidence — lower MacCready, stop for weaker lift, stay high.

When to Thermal

- If you circle, you're spending half your time going backwards.
- Goal: long glides and long climbs
- What you will accept changes with altitude, just like the MacCready setting.
  - Don't thermal in the performance band unless its is *very* good. S-turns work well.
  - Stop for what you expect in the climb band.
  - Take anything in the survival band.

- Workable lift $\sim 5\times$ as far apart as they are high: 5000–6000 ft. day, $\sim$5 mi. apart.
- Use other gliders when you are gliding just like when you are climbing. If they seem to go down, move away. If they are going up, move over to them.
- Leave the thermal when the climb rate drops to two-thirds of the average.
- Envision a line of lift through the clouds.
- *Plan ahead*: two sources of lift and a landing.

Importance of the Glide

- 200 min. flight (3:20 hr.)
- At 60 mph that's ∼200 mi.: Gold Distance
- Assume a 3 kt average climb.
- If you find 23 fpm better lift through the entire flight that's 4000 ft. you don't have to climb at the end — that's 15 minutes you save!

Final Glide

- MacCready theory: wizz-wheel, chopstick, or flight computer.
- Optimum is height depends upon the average rate in your last climb.
- Rules of thumb:

4 mi.	per	1000 ft.	$\Rightarrow$	20:1
5 mi.	per	1000 ft.	$\Rightarrow$	25:1
6 mi.	per	1000 ft.	$\Rightarrow$	30:1
7 mi.	per	1000 ft.	$\Rightarrow$	35:1

- Add in generous safety margin.