Strategic Decisions to Improve Your X/C Speed

Joerg Stieber Graphics from Helmut Reichmann's Streckensegelflug



Why Speed?

- < Speed is a factor for any distance greater than 400 km
- < Every contest is a race

< Speed is the measure how effectively we are utilizing the available energy in the atmosphere



What Speed to Expect?

- <Depends on lift and glider performance
- <Important for task planning
- <Based on MacReady – try to beat it





Decisions Affecting Your Speed

- < Route
 < Ring Setting
 < Ballast
- < Final Glide



What is the Best Route?

< Fly the lift – maximize straight climbs

- , Follow terrain features
 - High Ground (high = dry)
 - Ridges
- , Cloud Streets
- , Lake Fronts
- < Take the upwind thermal
- < If you have to stop find the strongest lift – the race is in the climb not the run





Deviations – which Side?





What Ring Setting?

- < The classic speed to fly model (MacReady)
 - , Ring setting according to the expected lift in the next thermal

< Limitations

- , Assumes unlimited height the next thermal with the expected lift will be reached
- < Real life is different!







The Luck Factor

Managing the Statistical Odds

< Your chances to find strong lift improve with range

- Assuming your chance to hit a 4kt thermal within 1 km is 5%
- 10 km -> 52%
- 20 km -> 77%

<Sometimes it makes sense to trade speed for range

- <Be conservative when low low range
 - John Cochrane: MacReady Theory with Uncertain Lift and Limited Altitude

<Higher performance gliders allow higher ring settings



Wrong Setting – What is the Loss?

		The 2-3-4 Rule						Loss of Range (ASW 19)
ed Ring Setting (kts	5		22%	7%	1%		2%	35%
	4			4%	0%	1.5%	4%	26%
	3		7%	2%	0.5%	3%	8%	20%
	2		3%	0%	2.5%	8%		11%
	0			10%	20%	30%		
Spe		0	1	2	4	6	8	

ACTUAL



Summary

- < Know the limitations of the model you apply
- < The precise setting of the speed ring is not important
- < Conservative ring settings increase your chances of finding better lift (or lift at all)
- < Reduce the ring setting as you get lower
- < Do not set the ring to zero (losses too high!)
- < Do not thermal in lift below your current ring setting
- < There are no "hard and fast rules" everything depends on the circumstances



Water or no Water?

Effects of Ballast

<Increased speed in the glide <Better L/D at high speeds

<Increased minimum sink – reduced climb rate

<Increased turn radius – more difficult to core



Effects of Ballast





When does Water Make Sense?

< In strong conditions

- , Thermal average more than 4 kts
- , Smooth lift wide cores

< Linear lift – no need to circle

- , Ridge
- , Wave [caution: freezing!]
- , Streets
- , Lake fronts



Common Mistakes

<Water kept too long

- , The speed advantage is obvious, the climb penalty is not
- , Dropping is irreversible
- , Lot of work to load
- , Drop as soon as you have difficulties climbing

<Water only used in contests

- , Water changes the handling characteristics of your glider
- , If you want to use water in a contest you have to practice with it



Final Glide

< Classic Model is the MacCready inverted , You fly the ring setting of your last thermal

< Inputs are:

- , Distance
- , Head wind component
- , Ring Setting
- , Rule of Thumb: 1000 ft per 10k (L/D: 30)



A Simple Final Glide Calculator





Reality is Different Two Scenarios – what is the Difference?

- <At 4:30 p.m. on a day with lift ranging from 3 to 6 kts you are 60km out, 6000 ft AGL, climbing in 5 kts – your final glide computer says you need another 1000 ft to be on final glide with a ring setting of 5 kts. Do you stay or go?
- <On a weak day you are 7 km out, scratching at 600 ft AGL in 1 kt, you are high enough to make it home with best L/D (zero ring setting); for a ring setting of 2 kts you would need another 100 ft. How high do you climb?



The Difference is in the Chance to find Lift

<Scenario 1: 60 k out, 6000 ft AGL

- , Over a distance of 60 km there is a good chance of
 - making up the missing 1000 ft by pulling up in thermals along the way
 - finding a 6 knotter
- If it hasn't happened at the 3000 ft AGL level there is still plenty of opportunity to slow down.



The Difference is in the Chance to find Lift

< Scenario 2: 7 k out, 600 ft AGL

- , Within 7 km and below 600 ft there is very little (no!) chance to find usable lift
- Once you start the final glide you are committed.
 That's why it's called the COFFIN CORNER!
 There are no more options if it doesn't work out.
 You will likely break something.



Summary

- < Be aggressive far out be conservative when close and low
- < If you are high, you can afford to be picky pick only the best lift
- < Try to get to final glide altitude by pulling up in lift
- < Re-evaluate at the 3000 ft AGL level
- < High ring setting = high safety margin
- < Use an arrival height you are comfortable with (min 500 ft)
- < At 8 km (5 NM) out you are committed if you are not absolutely sure to make the field, plan on landing out. Don't get caught in the Coffin Corner!



Fly Fast!

