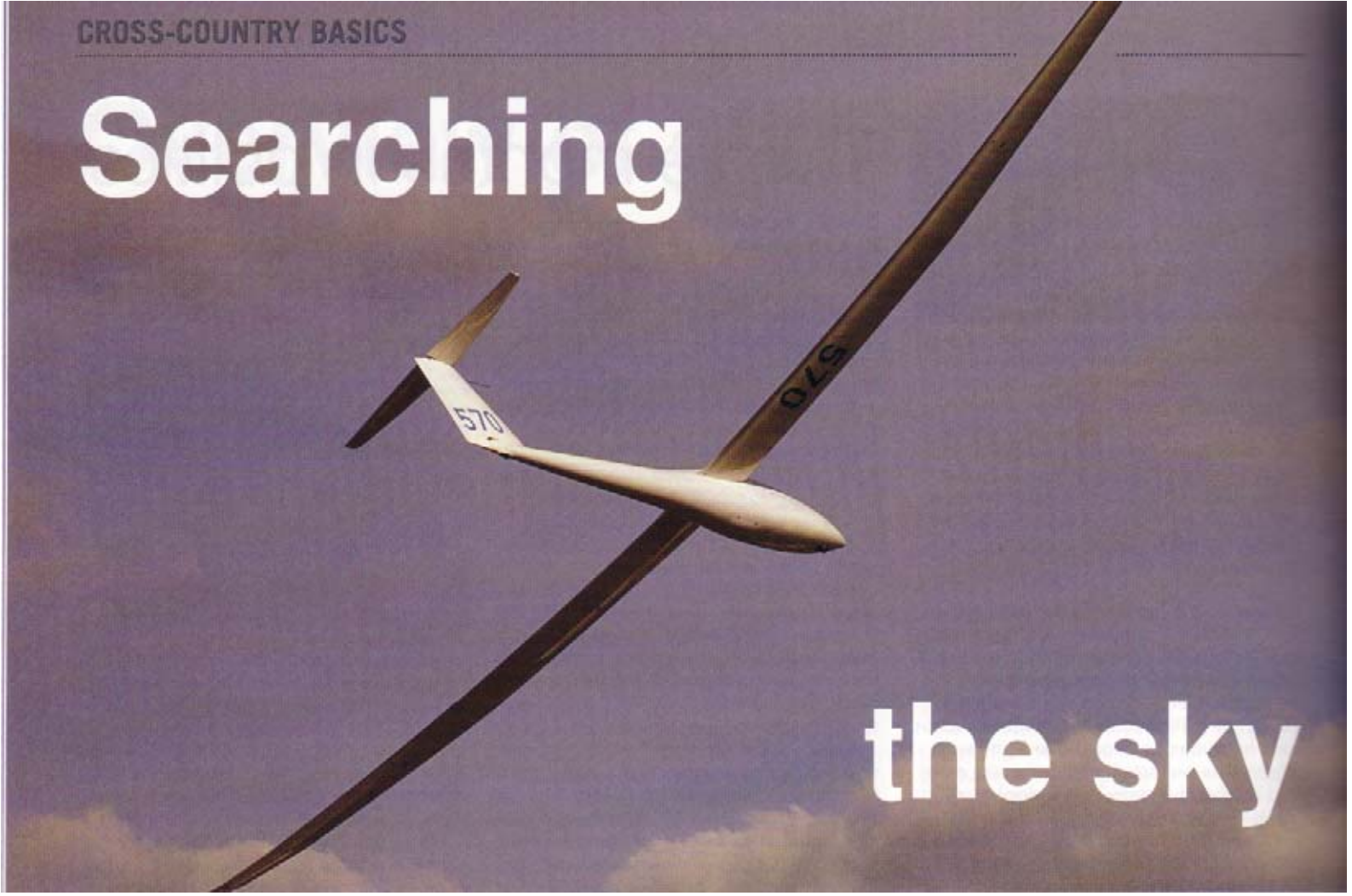
# Searching the sky




the *white planes* picture co

**The third of Jay Rebbeck's four cross-country articles explains how to pick the racing line**

TO FIND the best lift, we need to somehow judge what the invisible currents of air around us actually look like. We have to analyse the clues available in the sky and on the ground, integrate all these scraps of knowledge into one holistic picture in our mind, then decide where to point the glider.

The first part of this three-stage process -absorbing information - demands a real thirst for knowledge. Flying with Andy Davis for the first time, it rapidly became apparent that he devoted far more of his energies looking outside than I had ever thought necessary.

This attentiveness meant he was always the first to notice birds circling or tendrils being sucked into cloudbase.

An acute awareness of the wind direction is equally important. Try to assess the local wind direction using whatever indicators are available (see *Reading the sky ahead,* December 2000-January 2001, p26). Based on this, imagine the wind flowing like a fluid over the terrain below you. Then you can visualise what it is doing and create a mental picture of it squeezing through narrow valleys or spilling around ridges over which you may be flying.

Another thing to look for is the angle of the sun to the ground. What might the effects be of the sun passing from east to west through the day and of its height at different times of year or in different latitudes? For example, have you ever experienced an inexplicable lull in thermals in the early afternoon, just as you get into the rhythm of a good flight? Justin Wills suggested at the Junior Nationals last year that when the sun is at its highest, the cooling shadow cast on the ground by your cloud falls directly upon the very area of hot buoyant air that is feeding the thermal. Later in the day, the angled sun is better able to provide energy directly under the cumulus to reinforce your thermal.

*Jay, of London GC, has recently flown 400hrs as a cross-country instructor in Spain and South Africa. The Junior National Champion, he has almost 2,000hrs and will represent Britain at the next Junior Worlds, in August 2001*

## Putting the picture together

Once you've gathered your information about the effects of the sun's heating and monitored the wind, you then have to process this information to build a mental picture of what's going on. In my December-January article, I discussed the interaction of sun and wind with ridges and wave, but what about their effects on convergence and thunderstorms?

I remember reading in textbooks that convergence is the lift created when two opposing airmasses met. So a sea breeze convergence would be set up when sea air flowing inland met a different airmass. However, what I had always assumed was that these would have to meet each other in diametrically opposite directions. Experience in Spain, though, has taught me that surprisingly good convergence lines can form even when two airmasses meet at quite shallow angles. So, noticing a change of wind direction of as little as 20° could be enough for you to exploit a developing convergence line.

When soaring the kind of electric storms you get out in South Africa, you need to think carefully about how the air is moving on a big scale. With wind speeds on the ground fluctuating by up to 50kts at a time, you need to cultivate the big picture of how storms work. These storms throw out violent orange dust fronts at ground level as the rich soil is kicked up off the ground. Dropping into such dust fronts yields only turbulence, but they often force the air in front up into the leading edge of the storm. This forms thick, dark, tendril-ridden lines of lift that you can ride for hundreds of kilometres. The best place to run is under the dark shelf, normally between one and five kilometres out. There are, however, risk-reward trade-offs to be made: how close would you fly to a wall of lightning to

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get a line of 14kt lift? *(Lightning strikes can hit gliders well clear of cloud - the report into the K-21 accident in 1999 near Dunstable calculated that strikes could occur up to 10km away from the charge centre - Ed.)*

Isolated storms that track with the wind work quite differently from storms that are expanding but stationary. As the storm moves over the ground, the lift tends to be found on the upwind side, continuously supplied by the sun's heating. Meanwhile, a shadow is cast over the downwind edge, suppressing thermals. Stationary storms tha expand in all directions tend to produce lift on three sides: the cirrus blow-off (created as the upper winds sweep the developing anvil downwind) dictate which side is blanketed from the sun.

So, once we've pieced our jigsaw together where do we actually point the glider?

## The comfort zone

Where we search for lift depends on our height. When we're cruising along in contact with cloudbase - what Brian Spreckley calls the comfort zone - our outlook is quite different to when we drop to lower levels.

But height is relative, so how do we define the height below which we are uncomfortable, and why is this important?

A really useful distinction is to imagine splitting in two the operating layer - the height band in which you plan to fly your glider - with the divide at half the height of cloudbase. This allows for the fact that how comfortable you are about your height depends on how close you are to cloudbase. While you can frequently push down to 2,000ft in the UK and be relatively confident of climbing away, attempting the same tactic on a storming South African day with an 18,000ft cloudbase will almost certainly end in tears. The thermal which is feeding that booming cloud might have left the ground as long as half an hour ago, and there's no guarantee it's still sucking down low...

Put simply, when we are cruising along in the top half of convection, we are nearer the clouds than the ground, and so should pay more attention to features we note at cloudbase. However, as we descend into the bottom half of convection, ground features become more relevant to our decision-making. So we search the sky differently at different heights.

## Searching at cloudbase

Use your time climbing to pick your route ahead. At cloudbase, the deterioration in horizontal visibility makes it difficult to choose the best direction. If, however, you are forced to make a decision at cloudbase, rely on the shadows cast on the ground ahead. This will show in which direction the clouds line up best.

When deciding which clouds will yield the best lift, it is more important to concentrate on what the bases look like


*When you're below half the height of cloudbase, you're more likely to get clues about lift from the ground than the clouds. Look for hotspots, such as small towns*

than the tops. Search for the darkest flattest bases from the side, but when you arrive under cumulus look for the discontinuities in the base.

When picking your route, try and work out if the lift is located consistently relative to the cu on a given day. This will be more predictable on some days than others.

Even when you can reliably find lift, the effect of the sun moving from east to west may cause the thermals to shift.

Remember, too, that the picture looks completely different when you change directions. To avoid disorientation after rounding a turning point, spend time looking down the next leg before you turn.

When you've decided where you think the best lift is, what's the best way to search under the cloud? To maximise the number of thermals you sample, fly to the side of the cloud you think looks best, and then turn towards the middle. I often S-turn three or four times under a cloud before I decide either to press on or stop to climb.

## Getting low

Below half the height of convection, I start feeling low! I find I don't have the capacity for so much long-term planning, and am more occupied with the short-term problem of climbing again. It often pays to take larger deviations to get a climb out of trouble. When you get low, your options are more limited and a weak climb (with associated swearing) frequently ensues.

As you are now nearer the ground than cloudbase, it pays to study it more closely for thermal sources. The key factor to search for is differences in surface heating. Thermals are formed by bubbles of air, warmer than their surroundings, escaping from the ground, so anywhere that encourages good temperature differentials will facilitate thermal formation. Good examples include:

- Hot spots such as small towns in the UK on blue days, working power stations, motorway service stations, and so on.
- Edges between cloud shadows and sunlight, especially on the upwind side, as the sun starts heating an area that was previously in shade.
- Borders between ground features of different heating capacity. For example, mountainous snow lines provide good trigger points for warm bubbles to break away from the mountainside.
- Ridges facing the wind obviously boost thermals, but lee ("wind shadow") thermals can also form on the downwind side of ridges in relatively light winds. Here the ridge itself provides shelter for warm bubbles to heat up, before they break away in the turbulent air behind the ridge.

As well as paying close attention to ground features, another key to getting out of low scrapes quickly is good preparation. Firstly, choose your landing options as early as safely possible, so that when you get really low you can concentrate fully on soaring. Secondly, prepare yourself, mentally and emotionally. When low, you often have to take a weaker thermal to climb out of survival mode. Whatever mistakes got you into this mess are history now. As you glide to a low point, combat the frustration by mentally rehearsing patiently climbing. Avoid the temptation to leave a weak climb sooner than is sensible because your rhythm has been broken.

## Work the energy

In order to get the most out of the sky when flying cross-country, you need to practise. The best way to do this is by racing against friends in similar gliders. I personally have learned how to choose routes through the sky by flying my own flight, but watching others around me. At competition level you will see relatively small differences in climb performance. However, in the glide, the good guys can pull out surprisingly big leads by working the energy efficiently. My advice to any pilot hoping to make the most of the weather is to race, compare, and learn.

**Searching the sky for the best lift is endlessly challenging. Decision-making is essentially a three-stage procedure. Firstly, continually analyse all relevant factors - the wind, sun, ground surface, and the shape and texture of the clouds - throughout the flight. Secondly, use all your experience - of ridges, convergence, wave, thunderstorms - to process this information. Then try to build a mental picture that helps you plot the movements of the ocean of currents ahead. Thirdly, where to search for lift depends ultimately on your height. When cruising in your comfort zone, pay more attention to activity at cloudbase. When descending into the bottom half of convection, focus on monitoring ground features.**