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## Happy Landings - Nigel Page

Landing accidents continue to happen, even to experienced pilots. The techniques below are intended to help make landings easy and safe each time we fly. In Britain we normally fly in conditions dominated by the geostrophic or “meteo” wind and the direction is usually obvious in ridge soaring conditions. However when wind is determined more by local thermic conditions things can be more tricky.

### Persistent Problems? - Use A Winch!

If you are having difficulty sorting out your landings, or just want to do lots of practise, why not go to a winch training club or school for a few days? As well as learning to tow launch you will be able to do a large number of landings observed and coached by an instructor without having to keep repacking your glider or walking up hills.

### Priorities and Margins

If the field is big, use it! More than one experienced pilot has crashed trying to land in a particular spot near the edge of a massive field. Our list of priorities should be a bit like this:

- 1) Not to get hurt or to hurt anyone else.
- 2) Not to damage our glider or other peoples property.
- 3) To do a “nice” landing without struggling or thumping in.
- 4) To land in the landing field.
- 5) To land in particular place in the landing field. Not to millimetre accuracy (this is not about accuracy competitions!), but within a limited area as a practise for when we might really have to.

We should always try and land with some of our safety margins and options unused. If little or none are left when we have landed we need to have a good think about the decisions we made on that flight.

## Can We Reach The Landing Field Safely?

Although landing in the landing field is only number four in our list of priorities, arranging our flight to arrive at our landing field with plenty of height will almost always make things easier.

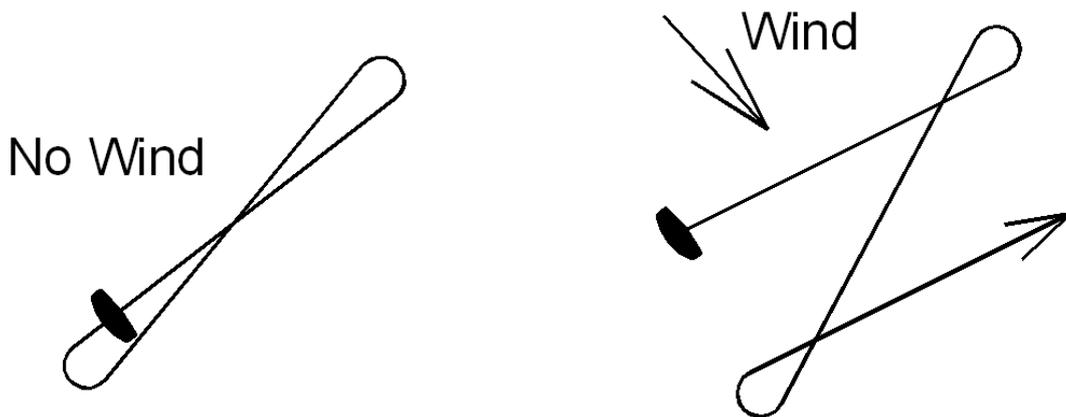
### Assessing Landing Conditions - Be Observant - Be Sceptical!

We should be positive about what we are doing when landing but being sceptical about conditions in the area we expect to land is often beneficial. From, say, 400 feet up we may think we know what the wind is doing in the landing area but it may be quite different when we get lower.

Observing the presence and behaviour of other aircraft which are trying to land will also be part of our assessment. We should keep a sharp lookout for other pilots throughout our approach and landing. Once down, we must continue to look out for other aircraft while we clear the landing area and keep out of their way whilst they land.

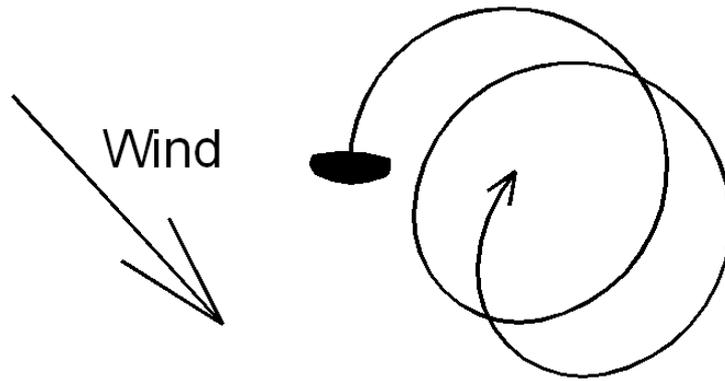
### Assessing Wind

Observation of trees, water, flags, windsocks, gliders landing etc. can tell us a lot about the wind at the surface. We can also test the wind at our height by flying particular patterns. One way is to simply fly back and forth and see if we drift.



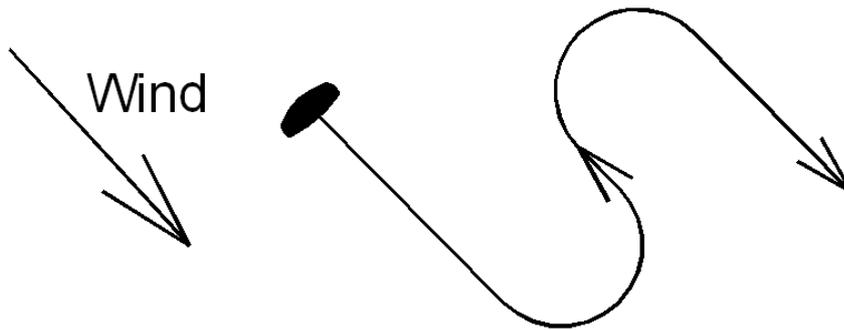
If the direction of the wind is roughly aligned with the line along which we are flying we may notice a higher ground speed on one leg than the other. GPS will give us a ground speed directly but after each change of direction we must make sure we have flown for a few seconds to allow the value to settle before taking a reading.

We can also check the wind by flying in circles.



Some GPS instruments can determine wind speed and direction when a glider is flown in circles. These can work very well but do need the circle to be flown smoothly. Near the ground it may be a better idea to rely on our eyes and brain.

When the wind is strong enough for its direction to be obvious we can check its strength by briefly turning into wind.



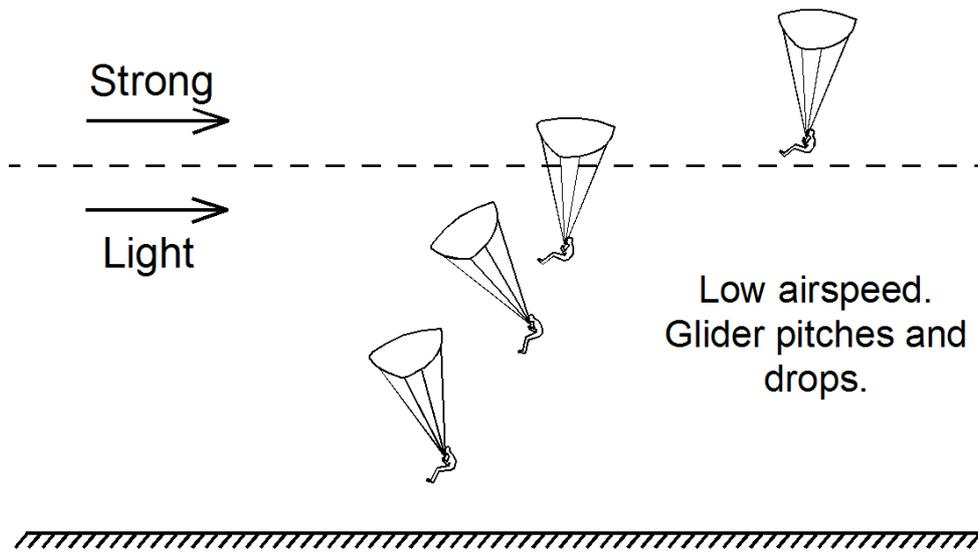
Again if we know our glider's trim speed, the GPS ground speed and a quick sum will give us a numerical value for the wind.

### Keep Doing It!

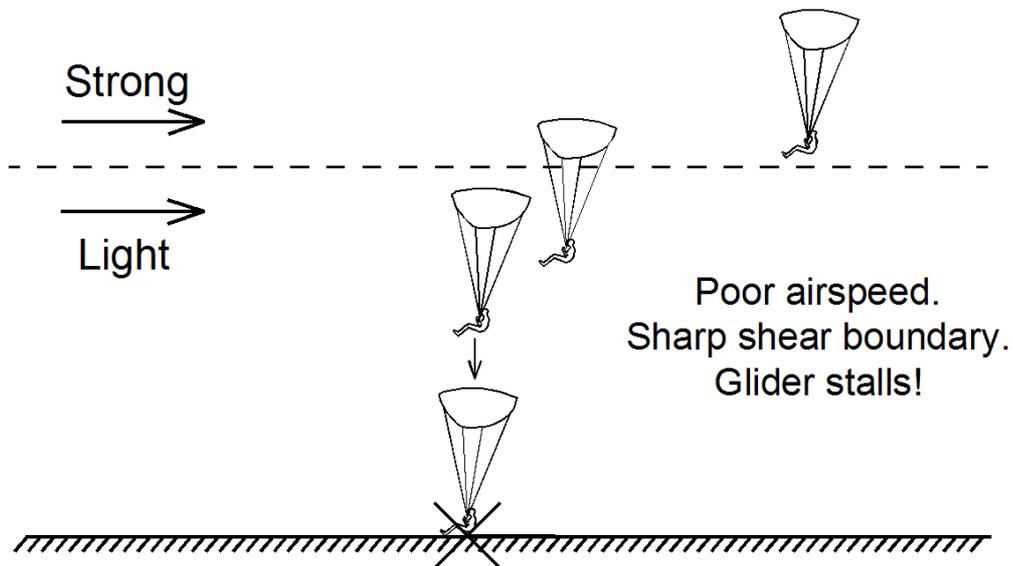
Don't just check the wind once. Keep an eye on it all the way down.

### Wind Gradient

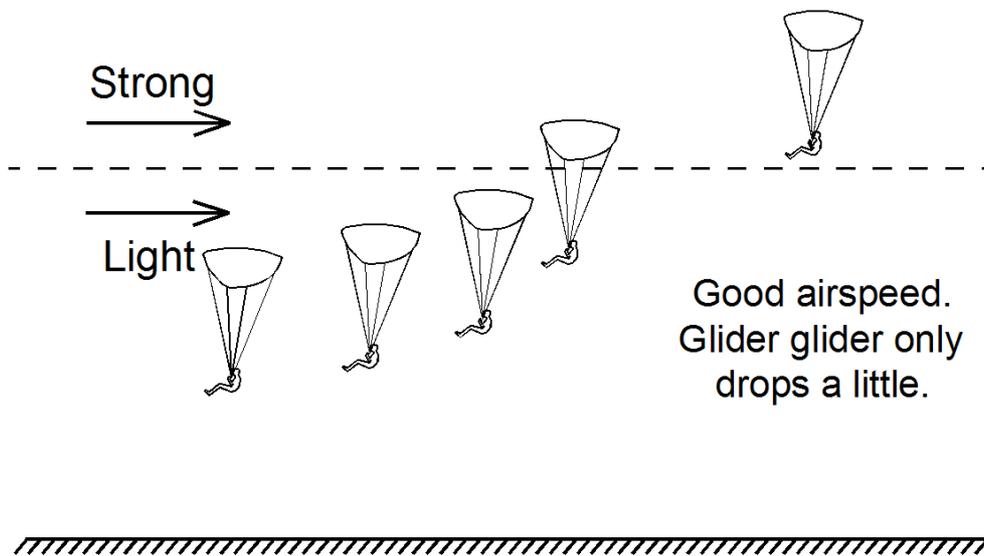
We know the wind strength can drop considerably as we get near the ground. As well as messing up our approach this decrease can be quite sudden and if our airspeed is already low our glider may surge and drop.



If the boundary between the fast and slow air is a bit sharp and air airspeed is very low we may even stall with the glider going parachutal.



As usual the best defence is to maintain a good airspeed which will reduce the effect and help us to control any surging.



In a wind of any strength we should always try and allow for an unexpected wind gradient. Unless we really have to, it is not a good idea to do our final turn too low or too steeply. As well as the above hazards, turning into wind through a wind gradient can cause a rapid loss of height.

### Last Minute Surprises - Expect The Unexpected

If our assessment of conditions in our landing field are good we should not get caught out in the late stages of our landing. However we cannot all be brilliant at judging landing field conditions from altitude and sometimes they can change quickly, especially if it is thermic. A “lifty landing field” can rapidly eat into our safety margins.

### Practising Wind Assessment

Even when landing in well known fields at regular sites we can still treat each landing as a training exercise. We may have a wind sock or be able to watch others land but we can still assess the wind by other methods for practise and comparison. Today the wind strength and direction may be obvious but would we have been able to tell that if the wind sock was not there or other pilots landing?

### Controlling Rate Of Descent And Approach Angle

Landing any aircraft is easy if we have a large enough landing field. Just get downwind, aim at the middle of the field and wait until the ground comes up to meet us. We need to do better than that. We want to be able to steepen our approach in a controlled way. Sailplanes have a special control lever to do this, usually coloured blue, which works the airbrakes. Unfortunately paragliders do not have such a device so we have to use other methods.

## Wing Control

Tucks or closures near the ground are particularly dangerous so we must be able to deal with any turbulence we find over the landing field. Wing control or “pilotage” courses are greatly recommended.

## Brakes

In many ways brakes on a paraglider do exactly what they say. They slow us down. This also has the effect of steepening our glide and we can use them to control our approach. The problem is that the more we slow our wing the less stable it becomes and the greater the risk of stalling or being stalled by a gust. Nevertheless controlling our approach angle with the brakes is fine as long as we don't overbrake and maintain a good reserve of airspeed for the conditions we are in.

## Always Maintain A Good Airspeed

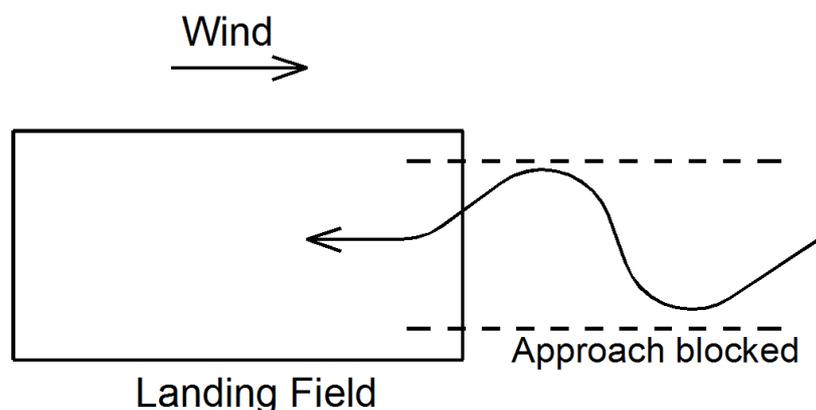
### “S” Turning

“S” turning alters our approach in several ways.

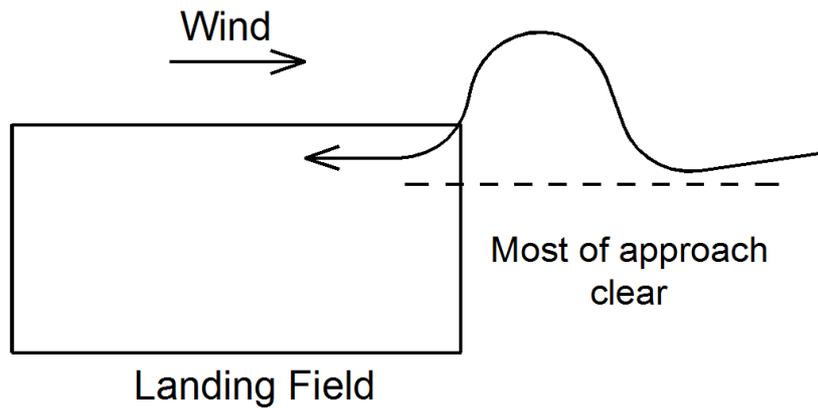
- 1) It makes our flight path longer.
- 2) It increases our rate of descent.
- 3) It increases our airspeed.

These are all useful effects, but there is are downsides.

- 4) It increases the width of our approach path making it more difficult for another aircraft to approach alongside us.



This can be alleviated by making our “S” turns to one side of the approach.



Most of the approach is now clear for another aircraft to use.

“Constant Aspect” or “Curved” Approach

This is a powerful method of approach but more difficult technically. We will come back to it later.

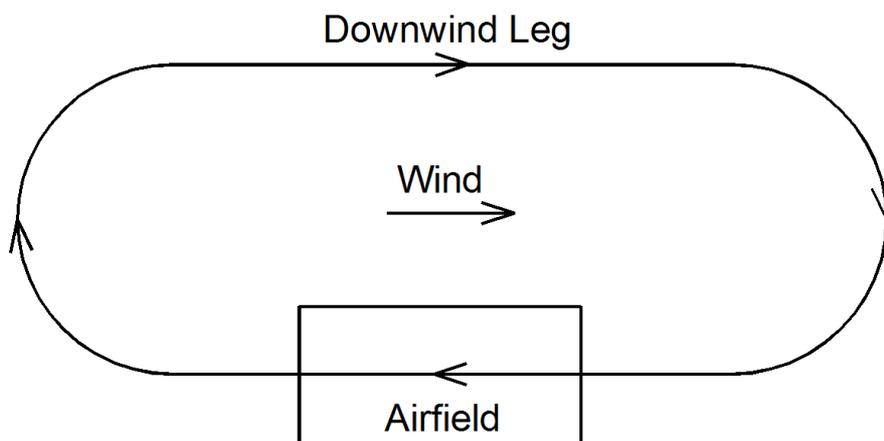
Big Ears

The use of big ears near the ground is not a good idea as a landing aid. Modern paragliders tend to be susceptible to stalling as the ears pop out.

Approach Patterns For Busy Fields

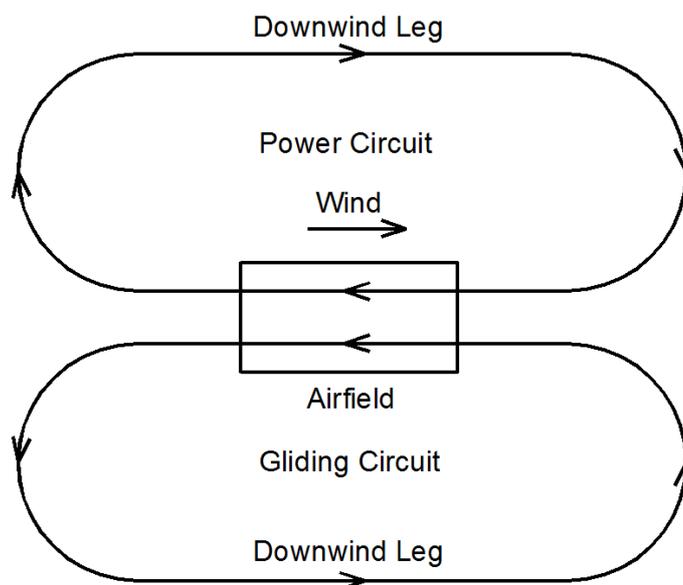
Using a standard landing pattern can make our landing easier for us and for others. This is particularly important where our field is shared with other aircraft types.

Let's have a look at some basic circuits used by power aircraft and winch launched gliders. The simplest circuit which might be in use at an airfield will look like this.



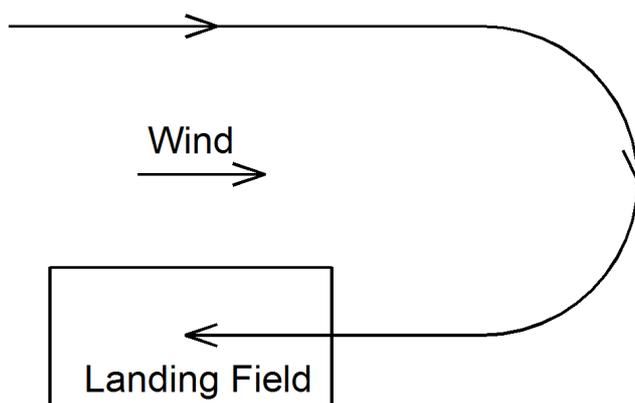
The aircraft takes off, turns downwind, turns into wind and lands. This might be modified in a number of ways, often to avoid flying over nearby buildings. Power aircraft usually incorporate crosswind legs to make a more rectangular circuit.

Where gliding and power flying is going on at the same airfield it is common to find power aircraft doing a circuit on one side and gliders on the other.

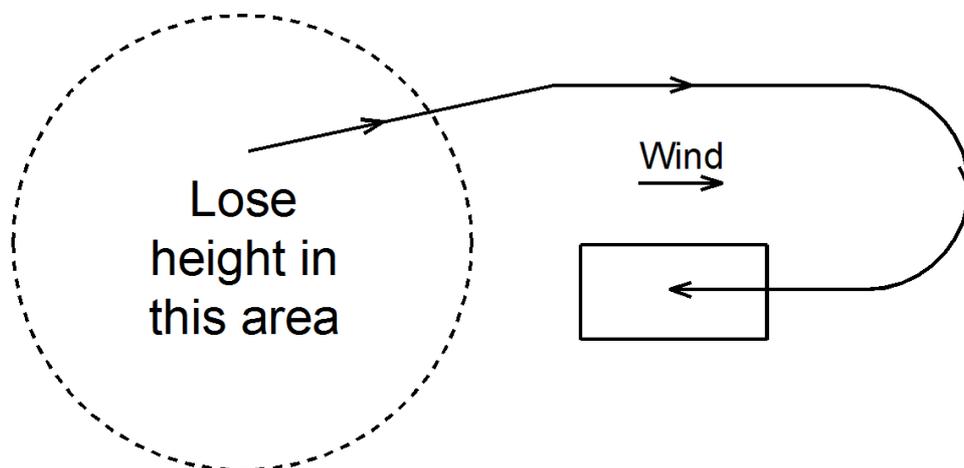


A power aircraft approaching this airfield to land will join the power circuit on the downwind leg and a glider will join the gliding circuit on its downwind leg. Joining on the downwind leg has the particular advantage of giving the pilot a good look at the landing area before turning to land.

So how does all this help a hill flying paraglider pilot? If we are near a flatland airfield on a cross country flight it might help us to understand what is going on and avoid the busiest bits of air. One day we may even wish to land at such an airfield. Let's look at a half circuit approach we could do on a paraglider.



This is just a half of the circuit type we looked at earlier. As before, it gives us a good look at the landing field and if a large number of aircraft are using the field it also gives us some order. This approach pattern, sometimes known a “J” approach is a formal requirement in some busy flying areas. The idea is that pilots wishing to land lose any excess height upwind of the landing field and then do a half circuit approach.

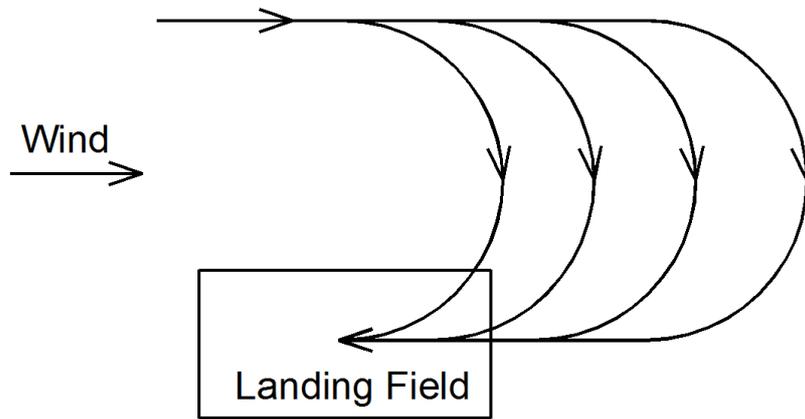


Losing excess height upwind has a number of advantages.

- 1) It keeps the number of aircraft in the final approach area of the landing field to a minimum.
- 2) Whilst losing height in the upwind area pilots can observe the landing field and other aircraft wishing to land and plan to avoid conflicts in the later phases of landing.
- 3) Particularly for paragliders, from a position upwind of the landing field the chances of ending up unable to reach the field because of the strength of the wind are minimal.

Note that if power flying or winch launching is going on on the field we must not hang around losing height in the area into which aircraft are taking off or launching.

The half circuit gives us a simple means of controlling our approach by selecting the point at which we turn in.



## Half Circuit Landings - What Could Possibly Go Wrong?

### Starting Too Low

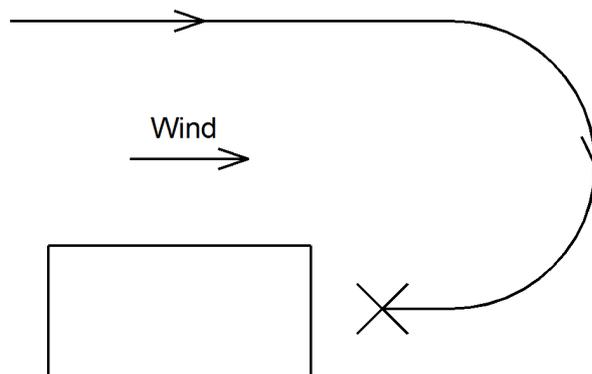
There we are happily flying about gradually losing height upwind of the landing field. All is well until we start our downwind leg. Suddenly we find we are rapidly losing height and struggle to reach the field. What has gone wrong?

The area in which we were losing height may have been inside a weak thermal which was reducing our sink rate. When we flew onto the downwind leg we flew out of the thermal, perhaps even into sink.

## Always Allow A Good Margin Of Height When Approaching A Landing Field

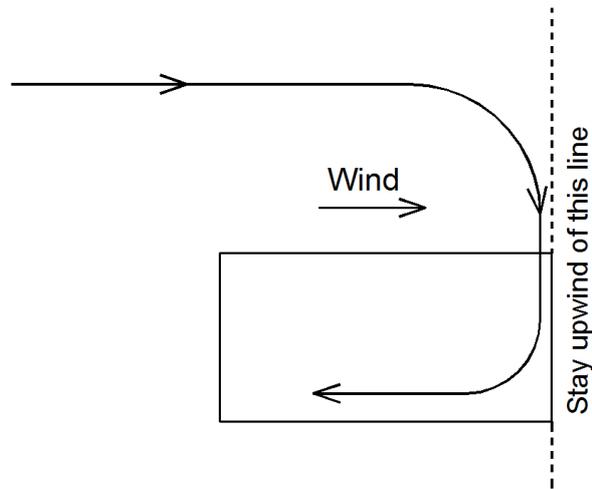
### Flying Too Far Downwind

This time we are on our downwind leg with plenty of height. We turn into wind but are unable to get to the field because the wind is too strong.



Paragliders are very slow aircraft and it is easy to be caught out in this way.

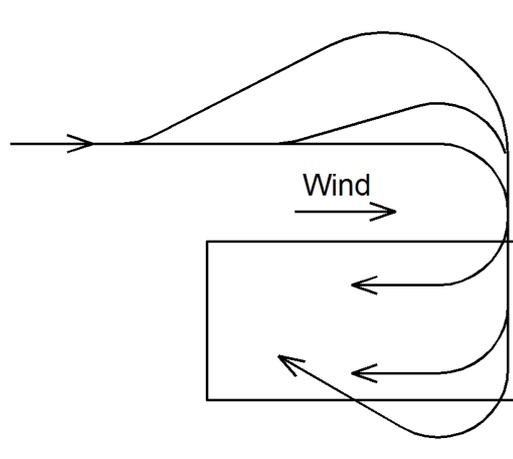
One way of avoiding this is to lose height by flying along inside the line of the downwind boundary.



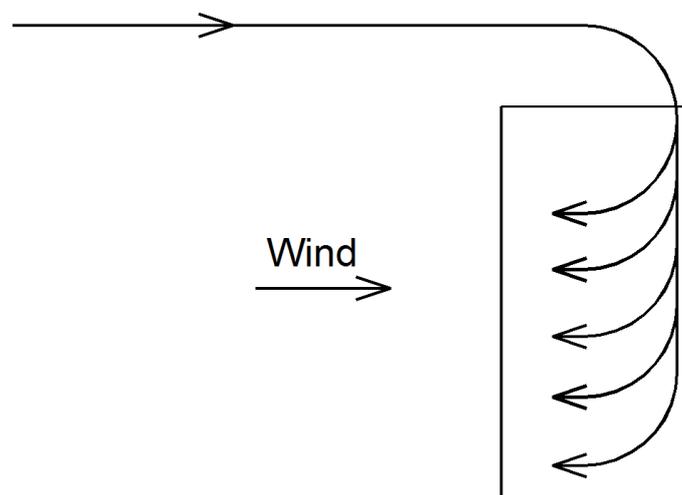
This is a compromise in that we are now using the width of the approach to control our descent so we will have to be more careful about other aircraft landing.

### If It Is Windy Keep Upwind Of The Downwind Boundary Of The Landing Field

In this case if we need to lose more height we can do so by flying further crosswind rather than downwind. We still have many options to control our approach.



This method is also useful if we have a long thin field whose short axis is in line with the wind.



We can simply fly along the downwind boundary and choose a suitable point to turn in.

### Practising Half Circuit Approaches

For some of us, (me at least!) half circuit approaches on a paraglider are not always that easy. If the wind is strong the high ground speed on the downwind leg can be a bit scary, especially if we are not used to it. An easy way to learn half circuit approaches is to simply do the half circuit high and finish with the sort of straight in approach and some “S” turns we may be more used to. If that is comfortable we can try it a little lower the next time and gradually develop our half circuit skills. As with thermalling, we must make sure we can do our half circuits turning to both the left and to the right.

### Practise Half Circuits To The Left AND To The Right

#### Alternate Fields And Embarrassment

Let's look back at the order of a couple of items from our earlier list of priorities:

- 3) To do a “nice” landing without struggling or thumping in.
- 4) To land in the landing field.

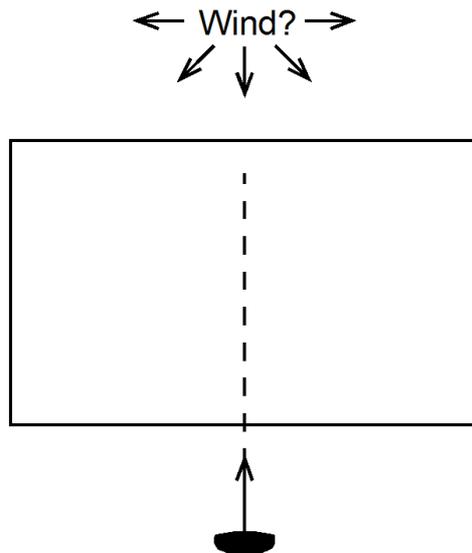
Reaching the landing field is secondary to making a nice landing. As long as adjacent or nearby fields are landable it is not the end of the world if we don't actually make our landing field. Fear of embarrassment has made many pilots crash on or near the boundary of “official” fields when good alternate fields were available. The wrong field is a much less embarrassing place to end up than a hospital bed. Good pilots respect safe decisions.

# Look For Options In Case Things Go Wrong Don't Be Afraid To Use Them

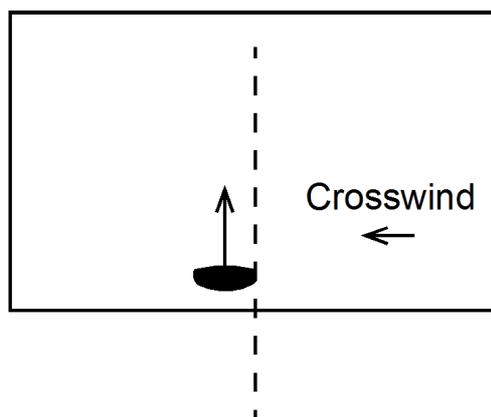
## Nil Wind Landings

The air is seldom completely still and true nil wind landings are rare. The hazard we need to address is having to land when air is wafting unpredictably back and forth such that we cannot be sure of its direction on the field. Signals from pilots in the landing field can sometimes help but are often confusing. If the wind is that light and there is no wind sock the best signal from someone in the landing field is probably to dangle a streamer, empty stuff bag or something light and let the landing pilot sort it out for himself.

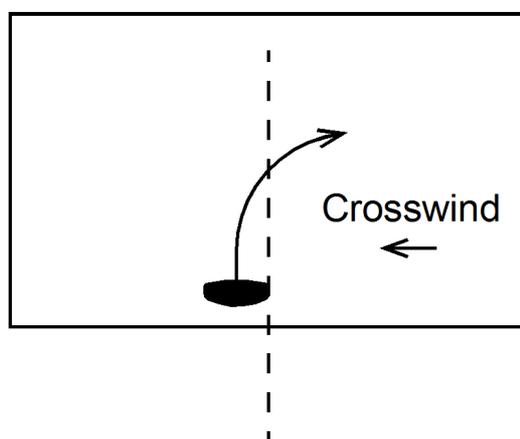
Light crosswinds are not much of a problem so rather than trying to land into wind it is more important to try and avoid landing downwind. If, say, we are unsure of the wind direction but believe it to be somewhere in a 180 degree sector we can approach in a direction which gives us the least probability of finding ourselves flying downwind.



If there is a significant crosswind we will be pushed to one side as we approach.



In a light crosswind we can probably land straight ahead with little problem but we may be able to make a gentle turn to bring ourselves more into wind in the late stages of our landing.



Sometimes, despite our best efforts, we may end up landing downwind.

- 1) Do not try and spot land. Concentrate on not crashing.
- 2) Landing fields (in Derbyshire at least!) can be rather bumpy. If we have picked an area which is relatively flat and unobstructed it will help considerably.
- 3) In this situation I usually take a wrap on the brakes. I may not use the extra brake travel but it is there if I need it.
- 4) Be ready to do a PLF.

Most modern paragliders can convert speed to height quite efficiently. As long as we approach with sufficient airspeed we should be able to round out the landing so we are flying just off the ground without stalling. At this point we have two options. We can continue to hold ourselves off the ground by gradually applying more brake until we touch down naturally. We can also brake hard enough to slow and perhaps stall the glider to a shorter stop, but we must not allow the glider to “balloon” upwards with the risk of stalling at height. It is a bit of an art and there are no firm rules. If you have a method that works for you on your glider that is fine.

### The Lifty Landing Field

Despite our best efforts at judging our landing we may come across thermal breaking from our landing field at a late stage of our approach. We are now floating down the landing field losing very little height with the end fence

looming towards us. There are no magic solutions and our only options are to brake or use “S” turns, and it can be a difficult call. Braking carries the risk of stalling and “S” turns the risk of swinging into the ground, but we must take action and the earlier the better. This is when we find out if our safety margins are sufficient.

### Landing Out

Most of the principles of landing at a “proper” landing field apply when landing out on a cross country flight. The main difference is that now we have to choose our field from the air. Our criteria are that ideally the field should be big, flat and clear of wires, crops and animals, but here are a few other points.

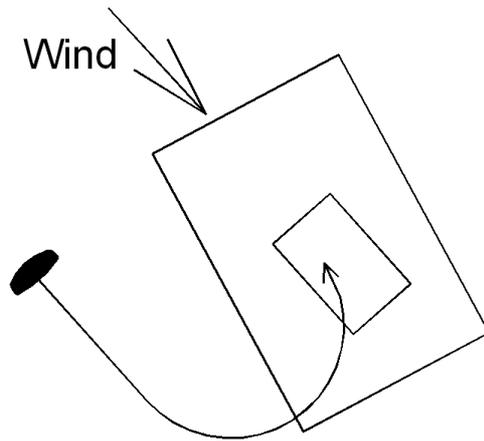
- 1) Landing away from buildings is generally a good idea. Almost all occupied buildings in rural areas have some kind of wires nearby and we don't need to test people's sensitivity unnecessarily.
- 2) If fields in the area are small, we can try and pick one which has other landable fields nearby to give us some options as we get lower.
- 3) Horse riders are very vulnerable to their mounts being scared by paragliders. Keep well away.

The vast majority of country people are nice and are often quite interested in paragliders landing in their neighbourhood, but occasionally we can come across someone who is not. Try to be sympathetic and not to aggravate anyone. You may never land in that area again but other pilots probably will.

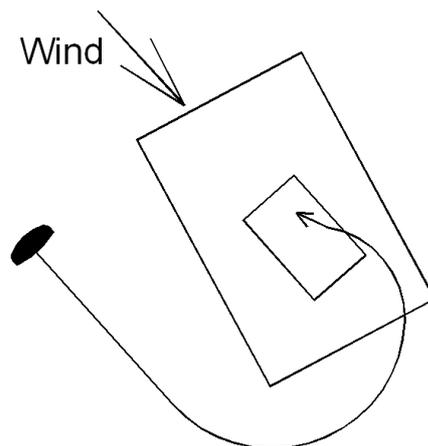
### The “Constant Aspect” or “Curved” Approach

This has been left until last because it requires a bit more skill than the methods above. It is a very powerful method for getting into a small landing area but requires some practise. It is probably a good idea to get comfortable with half circuit type landings before trying this.

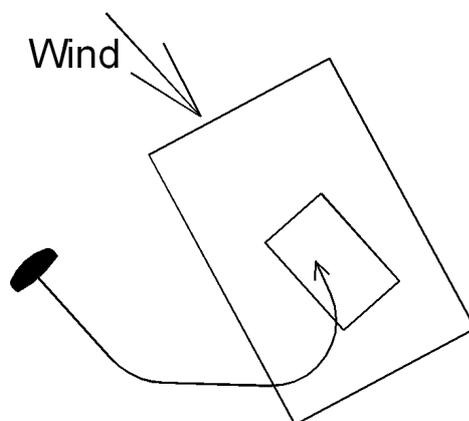
Our constant aspect landing approach looks like this.



This means starting upwind of our landing area and making a 180 degree turn towards our target. If we keep the view of our target area at a fixed angle or “aspect” relative to the ground we should arrive at it somehow. This seems a bit technical so why do it? The answer is that it gives us great flexibility in our approach. If we are too high we can easily open out the turn.



And if we are too low we can tighten the turn or even make directly for the landing area.

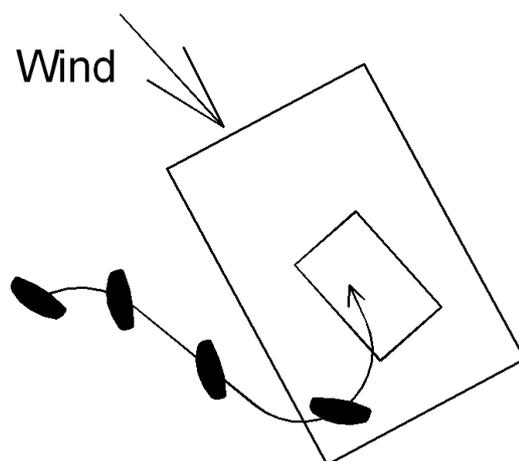


We now have a wide range of adjustment of our approach and only have to make a turn in one direction. i.e. We don't have to reverse the direction of the

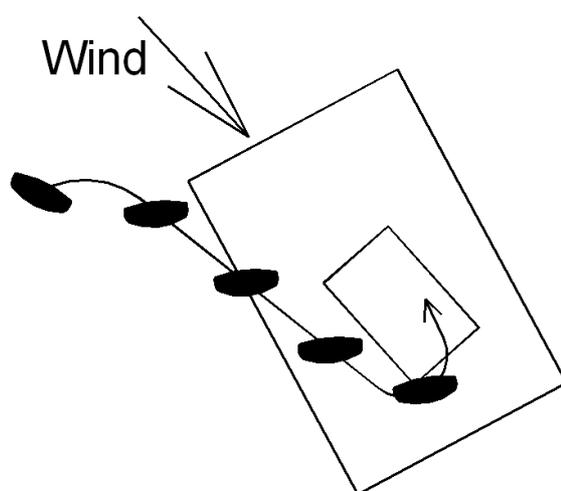
turn or turn away from the landing area. Turning also increases our sink rate from a straight in approach further helping us to get down cleanly.

The perfect system? Not quite. As with a half circuit approach, if it is a bit windy our ground speed downwind can be a bit high and make the timing and accuracy of our turn very critical.

Instead we can do a sort of hybrid approach.



Starting from a similar position upwind to one side of our landing area we make a sort of S turn in using the wind to move us crab-wise downwind. As with the curved approach this gives us flexibility to open or tighten our turns to control our approach. This method helps to keep us upwind of the downwind boundary of the field. In a very strong wind we might even do something like this.



In this sort of wind we are probably going to be quite glad to be on the ground!

Practising Curved Approaches

Again it is best to start by practising landing in a large field with extra height and finishing with a straight in or “S” turn approach. If this is OK we can go a bit lower next time and work lower as we gain experience. We do, of course, need to practise doing them both to the left and to the right.

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