

INTRODUCTION TO HILLSOARING

Preamble

Soaring all year around in the UK is possible, but how to we make slogging up and down a ridge more appealing.

These notes are designed for instructors and students alike; they highlight training issues and illustrate how good hill-soaring skills will help a pilot improve his competence both handling his sailplane and thermalling.

Introduction

Relatively few pilots have had the opportunity to develop their hill soaring skills. Little training material is available and even less guidance for instructors.

Sailplanes and piloting skills have developed in parallel. As soon as the early pilots managed to break their bonds with the local hills, they looked to thermals and wave as the major area for training and development.

Some pilots are even critical of the apparent low skill level required to soar a hill, this in turn tended to discourage pilots from exploring this fascinating area.

The recent growth of interest in mountain flying has been fuelled by cheap transport and the opening up of Europe. Pilgrimages to the Alps for instance are now commonplace. Perhaps we should now be paying more attention to training, and ensure pilots maximise their enjoyment safely.

What is hill-soaring?

Before we attempt to develop our skills we should first understand the beast. We often hear about pundits roaring along a ridge low level at some breakneck speed---it may be good fun, but is certainly not ridge soaring. "Soaring" is to use the air efficiently and safely in order to support the sailplane; the purpose may be to buy time or to assist the sailplane across country.

Lift over hills comes in several forms, traditional hill lift, anabatic flows and streaming thermals being the more common sources of energy.

Wind generated ridge lift is the most commonly encountered form of lift. The size shape and orientation and strength of the wind all have a direct effect on the strength and position of the best lift. (see figure 1)



Illustration FAV IS32 soaring Y Grib in South Wales

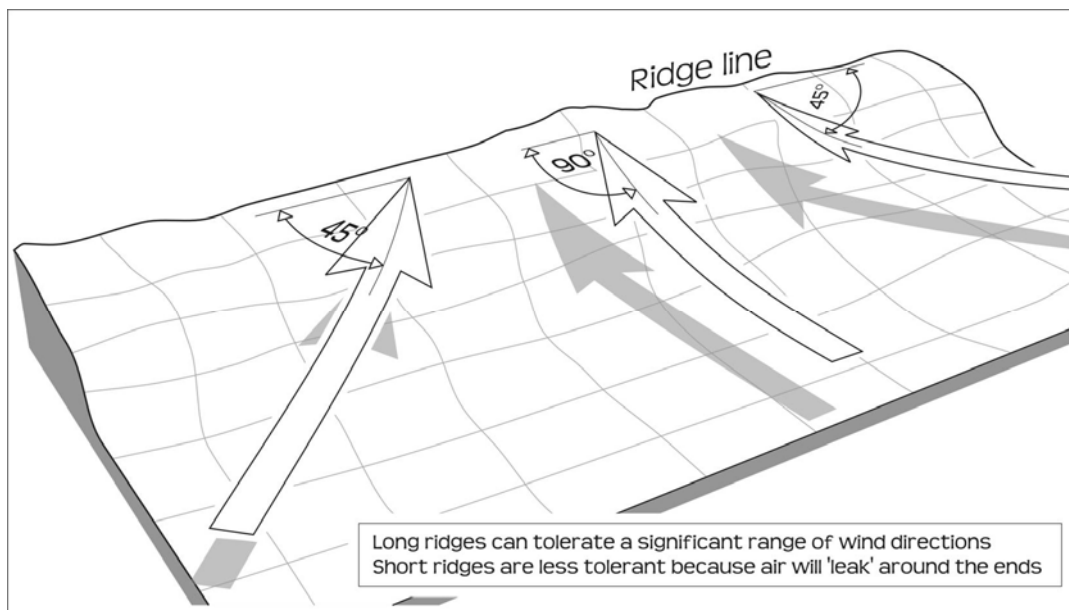


Fig 1

Learning the subtle skills required to soar ridges below the crest of the hill

The techniques described in this section should not be attempted without proper tuition from an experienced hill soaring instructor.

Airflow below hill tops can be difficult to predict. The length, height and shape as well as wind direction and strength have a significant influence on its value as a good lift generator. (See figure 2)

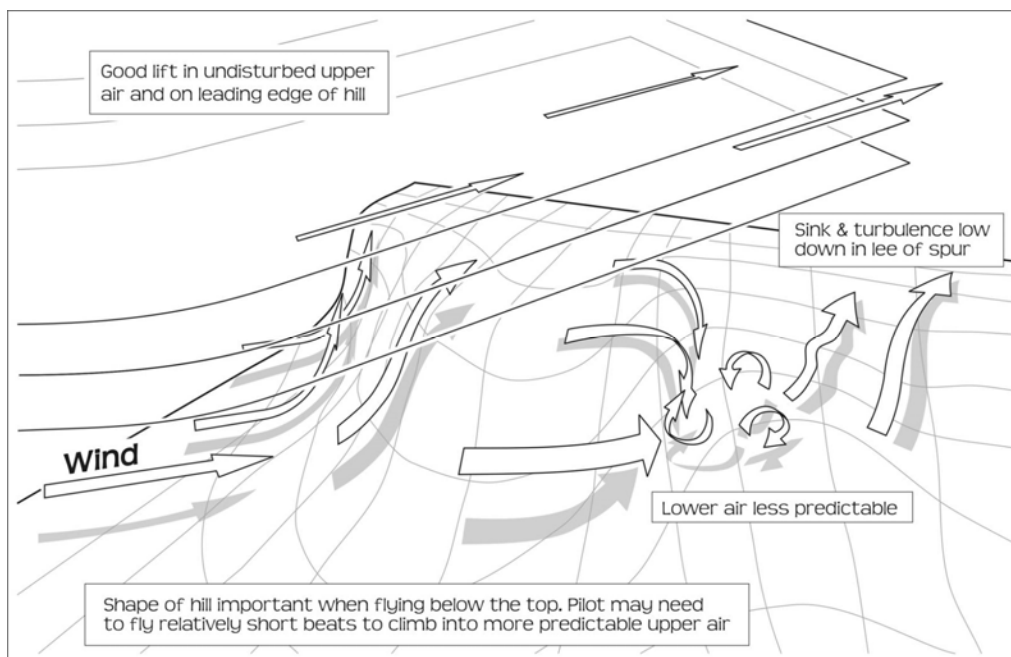


Fig 2

Habits formed in earlier flying training, can cause significant problems and generally some **unlearning** is required:-

- Most cross country pilots have an almost uncontrollable urge to reduce speed as the lift improves. This is a particularly dangerous practice when hill soaring below the tops.
- Airspeed must never be allowed to get too low, a gust can cause the glider to stall at the most awkward of times. The natural horizon is not visible and the pilot must learn to use noise levels and control responsiveness as his guide; he must most definitely not chase the airspeed indicator.
- Lookout procedures must change, pilots can easily become fixated on the wingtip (often fairly close to the hill), and can easily fail to look ahead to avoid the next rocky outcrop or oncoming glider.
- Differences between heading and track can be quite disconcerting when close to a hill. With the glider pointing away from the hill, to correct for drift, the yaw string should be central.(see figure 3)
- Optical illusions can lead an inexperienced pilot into difficulty. A variometer indicating lift and the ground outside appearing to move upwards can cause the pilot to sub consciously pull back on the stick to correct the visual anomaly.
- High closing speeds when approaching a hill are common with the relatively high groundspeeds. Gliders typically approach a hill with a tailwind. The effect is not obvious until the glider is very close to the hill. Great care must be taken to avoid an inadvertent collision with an immovable object.
- Selecting an appropriate airspeed is critical for both safety and soaring efficiency. Too slow is unacceptably dangerous, and too fast may mean you are due for a field landing. If you are in any doubt, it is always sensible to seek the advice of an expert. A carefully judged balance is required between optimising speed for soaring, and leaving a safe margin for gust related stalls or lack of concentration on the part of the pilot.
- Sufficient manoeuvring room must be allowed for the glider to move away instantly should he need to. The glider must always have a safe escape route.

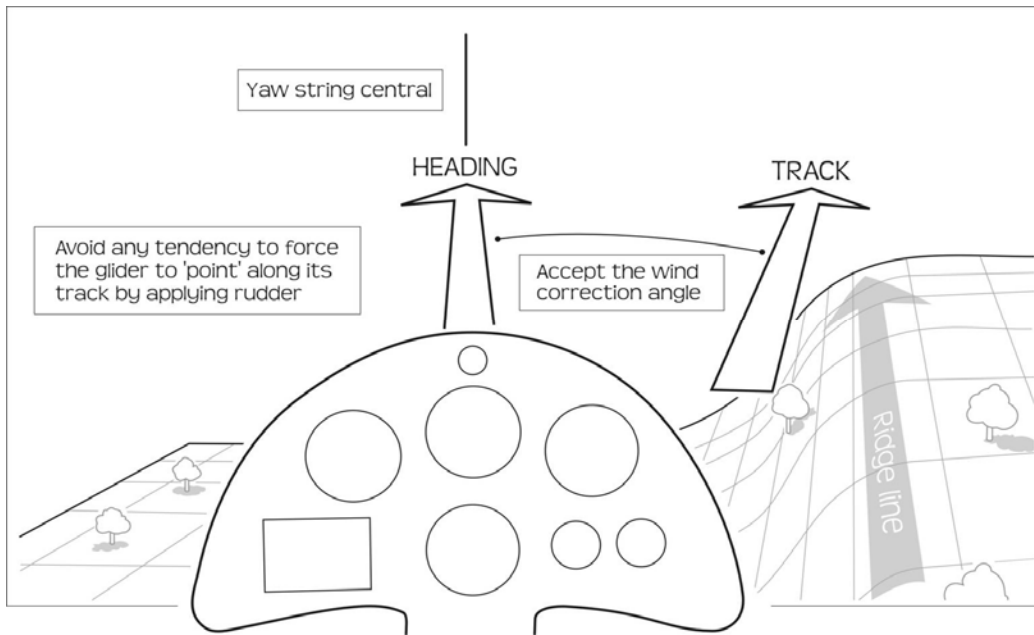


Figure 3

Joining a hill below the top (Fig 8)

There are few things more satisfying than gliding towards your next hill and hearing the sound of the variometer as it confirms you have lift.

1. Keeping well clear of areas of potential sink, you should approach the hill by the most expeditious route, normally 90° to the ridge line. Keep a good lookout for other aircraft, assess the best route to avoid conflicting with them and continue to fly at best L/D.
2. Lookout for potential landing sites, in case you arrive too low or the hill is simply not working.
3. Don't visually fixate on the hill; just like thermals another pilot may have exactly the same intentions as you. Continue to keep a good lookout.
4. At a reasonable distance (can only really be shown by practical demonstration), increase speed and introduce a 45° turn, this allows you to judge your next turn more easily.
5. As the variometer indicates an improving situation, and before you get too close, progressively turn through a further 45° plus a wind correction angle, level the wings and follow the hill contour.

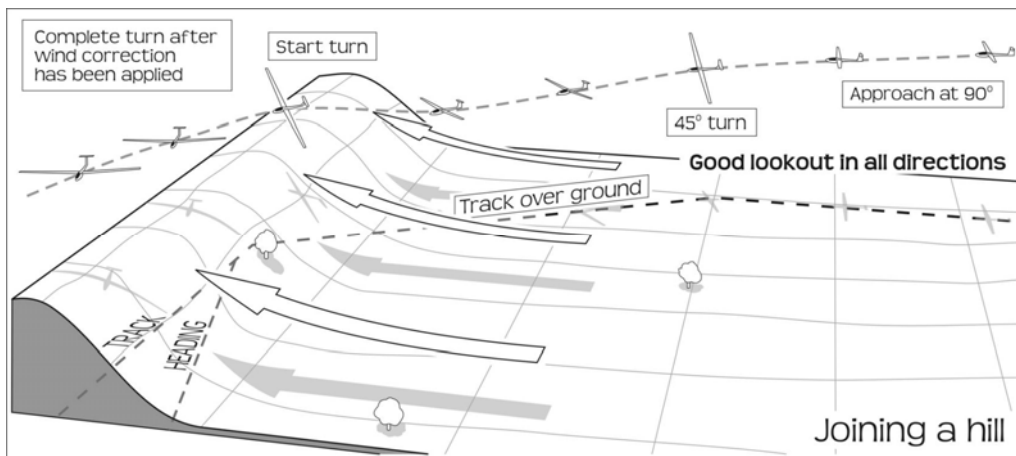


Fig 8

Speeds to fly should be higher than normal to start, this will give you the opportunity to identify any potentially turbulent areas safely. Gullies, areas of marked change in hill direction, windshears or wave rotors can have surprising effects on your own airspeed.

Climbing up (Below the top)

1. Below the top, the best lift is normally, although not always, fairly close to the hill.
2. As you get nearer the crest, the lift should improve. Conversely, the lower you are, the weaker the lift will be, and at some point there will be insufficient to sustain you.
3. If you are in weak lift, at a high point along the ridge, try flying to a lower section. Air often leaks over these sections and provides stronger lift as a result. (Fig 4)
4. As you climb, you will need to progressively reposition yourself in relation to the hill surface. Shallower slopes are a particular problem because gains in height quickly move you away from the hill.

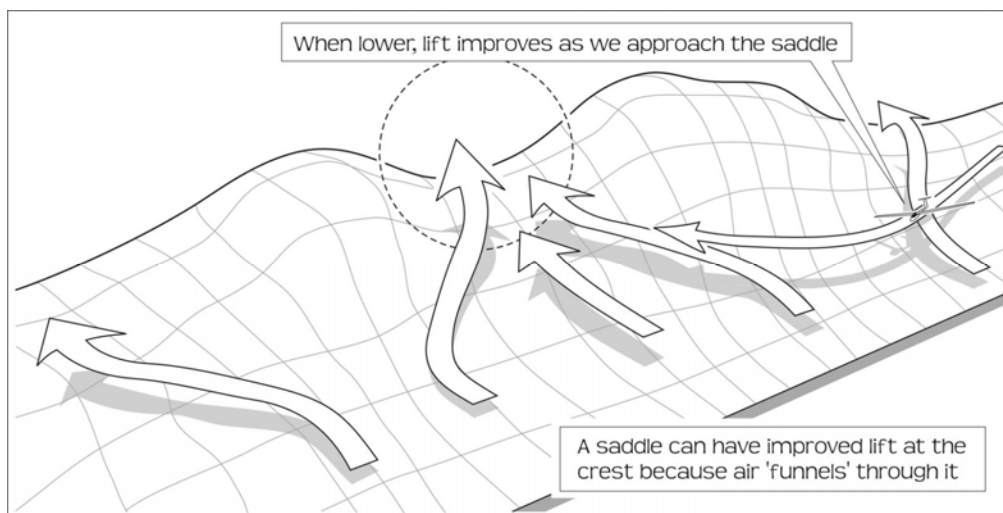
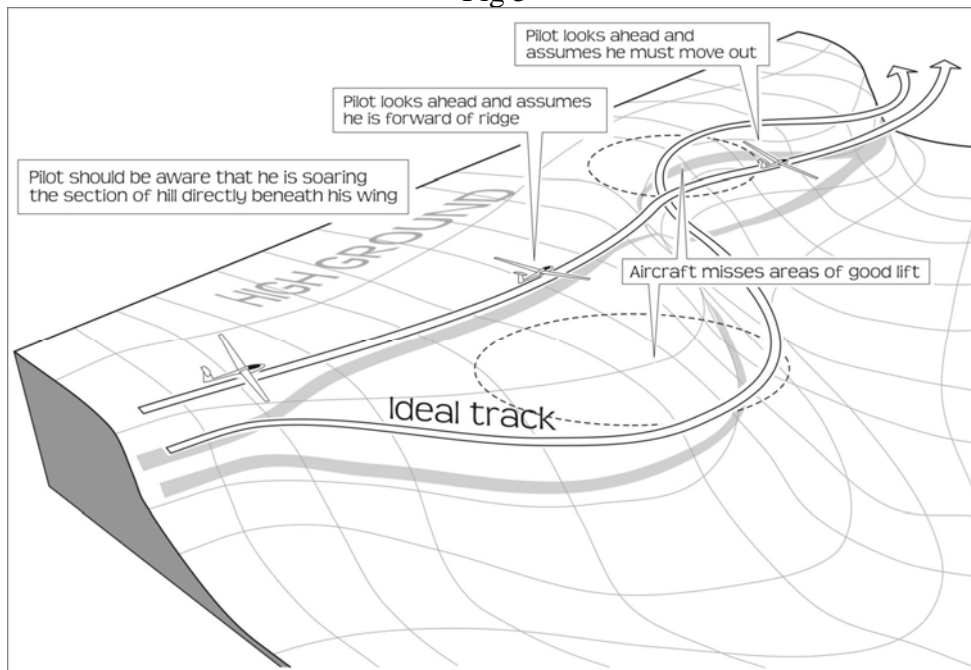


Fig 4

5. You should allow for a drift angle, and accept the fact that your heading and track will be different. Try to keep the yaw string straight.(Fig 3)
6. Maintain a very good lookout, and pay particular attention to blind corners. It is normally safer to move further away from the hill and improve the forward visibility. Don't forget that it is not only gliders soaring ridges, meeting a slow moving para-glider can be quite disconcerting.
7. Below the top it is quite common to find sink areas in the wind shadow sections. Pay particular attention to this, if the wind is not square onto the hill.
8. Do not attempt to slow down if you hit an area of stronger lift.
9. Judge gullies carefully, many can be too small to negotiate safely.
10. Never attempt thermalling below the top, drift will quickly get you dangerously close to the hill. 'S' turns are a better method of using a thermal and are quite reasonable providing there are no other aircraft in your vicinity.

Climbing up (above the top)

Fig 5



1. Above the top, the best lift is normally forward of the ridge, and at a steady angle from the crest. The higher you are, the further into wind you should be. The slope angle of the ridge has a marked influence on your ideal positioning.

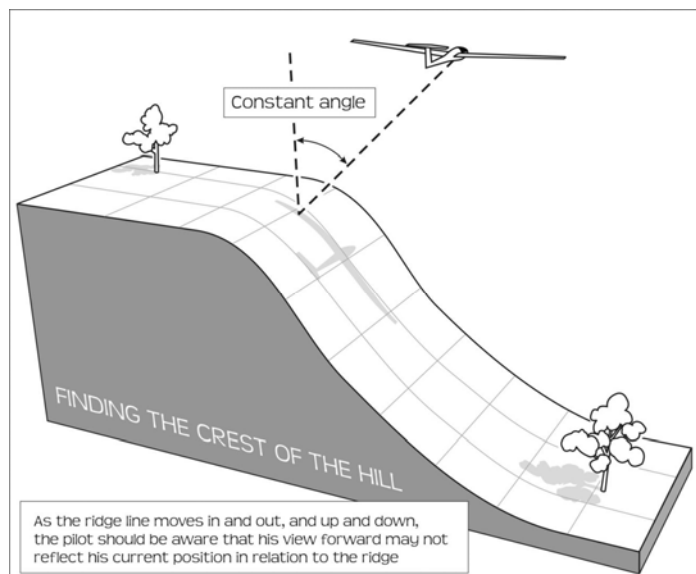


Fig 6

2. As you climb, the lift will get weaker. As your physical separation from the ridge increases, the safer it is for you to reduce airspeed. Reducing airspeed will allow you to take advantage of the weaker upper air.
3. The best lift is likely to be over the highest parts of the hill.
4. The airflow above the tops is normally much more reliable, and does not normally suffer from the wind shadow effects experienced below the top.
5. As the ridge moves in and out and up and down the pilot should realise that his view ahead may not reflect his true position in relation to the ridge. (Fig 5)

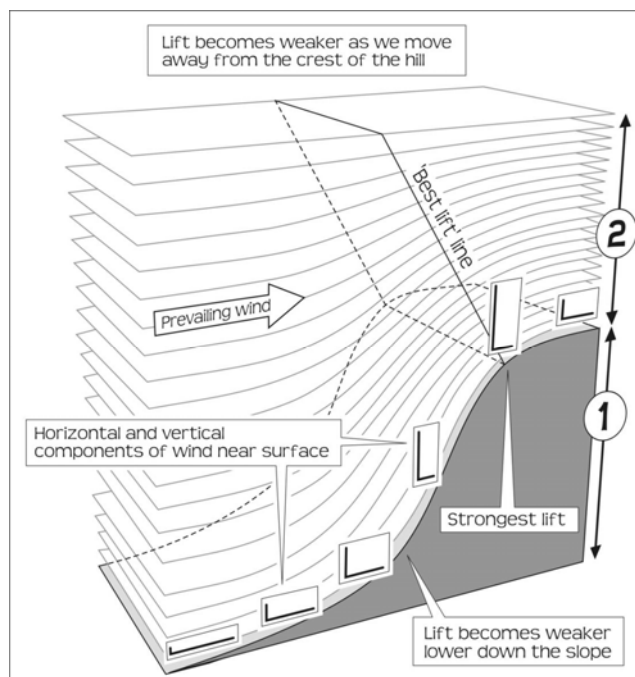


Fig 7

Turning

Particularly in weak conditions, accurate turning makes a big difference. Near the hill gliders must fly faster for safety reasons, unfortunately this can mean very large radius turns. Large radius turns often take you away from the useful lift.

1. Always lookout before turning, look well ahead and be certain there is sufficient time to turn before any distant glider passes you (closing speeds of 150 knots are not unknown), then check behind and ensure there is no conflict with following traffic. Below the top, following gliders may not be able to pass you on the hillside, there is simply not enough room, and a glider catching you up may be very poorly positioned in relation to your intended flight path.
2. As you turn, use a good bank angle and slow down. Removing your excess speed will reduce the radius of your turn. Your speed will reach a minimum value when parallel to the hill and travelling in the opposite direction. You should still be in lift and reasonably close to the hill.
3. Increase speed again and roll the wings level by the time your flight path is 45° to the hill. Remember the glider will not roll quickly and you must allow sufficient time to get the wings level. If you got stage 2 correct, you will be reasonably close to the hill already.
4. As the glider approaches the correct position in relation to the hill, turn away from the hill and level the wings after the drift angle has been applied. The glider should now be pointing away from the hill and in the ridge lift.
5. Turning below the top requires accuracy and good co-ordination. The lack of natural horizon can make turning particularly challenging.

Hill soaring instruction

Hill soaring instruction should always start above the top. Developing the flying skills is normally necessary, most pilots will need to “unlearn” some earlier training. This is much safer if well away from the hill to start with.

Any tendencies to

1. Fly by ASI
2. Lead with the rudder in a turn.
3. Look down the wing in a turn.
4. Chase the yaw string
5. Pull up in the lift
6. allow the nose to go down in the turn
7. Mechanically pull back on the stick in the turn without reference to attitude and speed.
8. Fail to lookout
9. Slow down when approaching higher ground.

should all be resolved BEFORE the “below the top” training begins.

Summary

Hillsoaring is technically demanding and an excellent platform for pilot development.

It is a useful way for pilots to not only remain current during the winter season, but it is probably the most technically demanding form of soaring today.

The biggest single challenge to hill soaring instructors is the improvement of his pupil’s basic handling skills. After a few hours on the hill, most pilots recognise a new and higher set of standards they need to attain.



Scenes from a 2 seat trainer in the Black Mountains