Chapter 5
Basic slope flying

SINCE A GLIDER of any kind—radio controlled or free-flight, model or full-size—is, by definition, an aircraft without any form of on-board motive power, it is only able to descend through the air around it, trading off the potential energy bestowed by its initial height above the ground into the kenetic energy of its speed through the air. The efficiency with which it makes this transition can never be 100 percent of course, and is measured by a number of factors, principal among them being the glide angle, or the distance it can cover from a given height.

In order to prolong and sustain flight, and for the aircraft to actually gain height in relation to the ground, the air mass in which it is flying must be rising at a speed greater than the sinking speed of the aircraft—the glider must be 'in lift'.

There are, in general, two sources of such rising air; thermal lift which is considered later, and which may be found anywhere, and slope lift, which is associated with a hill or slope facing into a wind. The way in which slope lift is generated is illustrated by the sketch in Fig. 5.1. As the air is forced to rise over the slope an upward lift component is created, and it is this which the slope soaring radio controlled model uses to remain airborne. Naturally, the strength and extent of the lift generated varies in direct relation to a number of factors; the height and angle of the slope, the strength of the wind, whether or not it is blowing exactly at 90 degrees to the slope, the type of ground cover on the

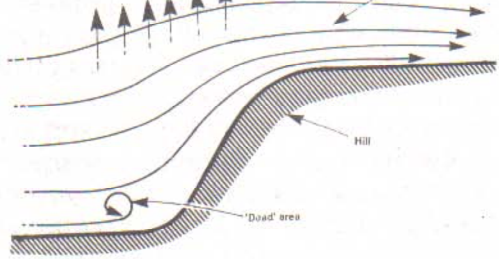

Fig. 5.1 Slope lift generation.

hill face (i.e. scrub, trees), and the topography in the area upwind of the slope.

The ideal slope would have a face angle of between 45 and 60 degrees, a smoothly rounded lip with a generous flat area behind, be covered in short grass and face out onto a flat area of land with no significant obstructions for ten miles or so, or onto the sea. While such 'ideal' slopes do exist (the best one I know is in the Isle of Man) and can produce truly amazing lift conditions, the vast majority of hills used by the modeller will have some shortcoming or other—shallower than the ideal, or steeper with a sharp 'lip' which causes turbulence, covered in trees, scrub or bushes, possessing a small, difficult (or in some cases) non-existent landing area, or suffering from other hills upwind which affect the lift. Far from upsetting the dedicated slope soarer, such problems are often regarded as challenges which make the hill more 'interesting' to fly!

From the beginners' point of view, a hill with a reasonably easy landing area, a sensible slope angle (30 to 60 degrees) and a fairly clear upwind area to reduce turbulence is to be desired. The time to explore the more difficult and interesting sites which you will hear about is when complete mastery of flying technique has been obtained. In identifying a suitable hill and recognising appropriate conditions of wind strength and direction for the model to be flown, the help of experienced local slope glider fliers is invaluable. Quite apart from the purely technical problems of choosing the correct slope, the matters of land ownership, access, permission to fly and any special local conditions (for example, some slopes are 'off limits' during lambing season) must be considered; usually local groups will have been through all the appropriate channels on these matters already.

Although it is not possible to describe all the variations of slope which the new glider guider may encounter, the following descriptions will give some idea of the principal possible variations, and their good and bad points.

'Ideal' site.—Fig. 5.2.

A ridge of reasonable length, with a slope angle of around 45 degrees and a smooth lip running out into a flat landing area behind.

'Normal' ridge—Fig. 5.3

Here the ridge falls away behind the crest, thus creating a lee slope which has considerable turbulence and downdraught over it.

Cliff—Fig. 5.4.

Steep or near-vertical slope with an abrupt edge and flat area behind. The lift area will be similar to the normal ridge in position, but generally narrower and more powerful. Severe turbulence will be encountered for some distance behind the edge.

Bowl—Fig. 5.5

This is a useful site in that it is capable of accepting rather more in the way of variation of wind direction than a

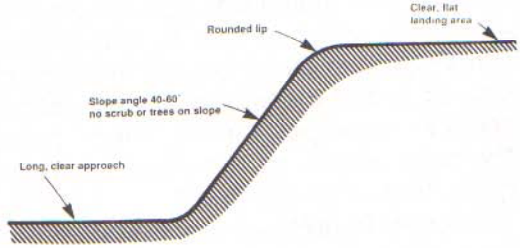

Fig. 5.2 'Ideal' slope site.

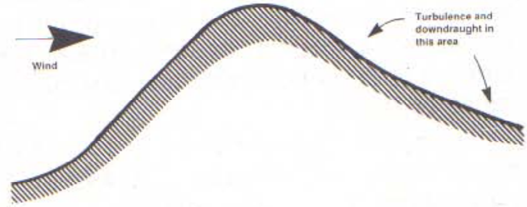

Fig. 5.3 'Normal' ridge.

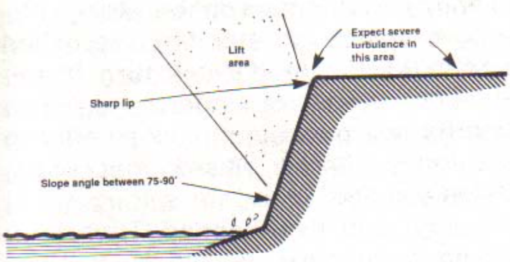

Fig. 5.4 Cliff.

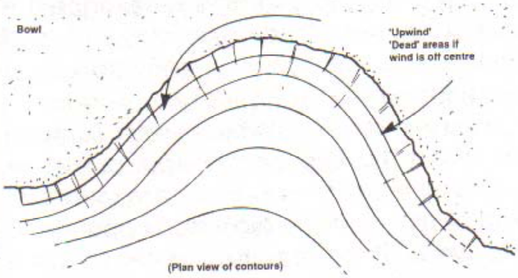

Fig. 5.5 Bowl.

straight ridge. However, if the wind is off centre, care is required to avoid the 'dead' area in the lee of the upwind arm of the bowl.

Naturally, many slopes are a combination of these basic types and, as stated above, ideal shapes and angles are rarely found. From the beginners' point of view, perhaps the most important consideration is the presence of a relatively flat and turbulence free landing area of reasonable size.

A glorious slope soaring site with wonderful life—but only for the experienced; beginners should stick to safer hills.

Preparation

Preparing a slope model for flight is no different from preparing any other radio controlled model. If possible get an experienced clubmate to cast an eye over the finished glider, this can head off a lot of problems. The balance point (often referred to as the centre of gravity or 'CG') should be in the position shown on the plan (often some ballast will be required in the nose to achieve this). For first flights, it may be an advantage to adjust the model so that it balances just a small distance in front of the CG position shown on the drawing. This will tend to make it a little more stable in the pitch or longitudinal sense, which can be an advantage in the early stages. However, this trick should not be overdone, otherwise it will want to fly in a permanent dive.

The wing (and tail, if it is removable) should be fixed firmly to the fuselage—if fastened by rubber bands, select ones which will be virtually at full stretch when fitted. In this way, the bands will exert sufficient pull to hold the wings properly in place (which is not the case if they are only partially stretched), and in the event of a crash they will snap, allowing the wings to break free with the minimum of damage.

All the control surfaces should be checked through their full range of movement to ensure that there is no tendency to bind or stick. Controls which are stiff or 'sticky' on the ground will often bind up completely in flight with the inevitable disastrous results. The linkages to the control surfaces should be adjusted to give the amount of movement specified by the plan or instructions. Here it is best to err on the side of a little more rudder movement than specified, but a little less elevator.

With the radio equipment switched on, the rudder and elevator should line up accurately with the fin and tailplane respectively, when the transmitter trim controls are in the central or neutral position. If they do not, adjust the screw-in clevises which connect the control rods to the surfaces until they do line up properly.

At this point, it will be worthwhile to try a test-glide with the model from a hand-launch on a suitable flat field. Have the radio switched on when doing this, but do not touch the controls unless you must to avoid a crash. Launch the model with the nose down at about 5 degrees, running forward and giving it a firm push rather than a hefty throw. The correct 'trim' to aim for with a slope soarer is a straight and steady descent, covering a distance of twenty or thirty yards from a six foot high launch.

If the model turns one way or the other, and there is no offset on the rudder, then either the wing or tail surfaces will probably be warped. In other words, the leading and trailing edge of the surface, as viewed from the front, will not be parallel. If, for example, the trailing edge of the right wingtip is warped down, relative to the leading edge (known as 'wash in'—trailing edge

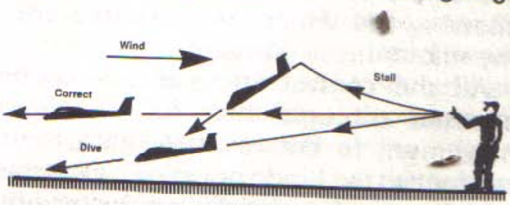

Fig. 5.6 Test gliding.

up warps, sometimes deliberately built-in both tips to aid stability, are called 'washout'), the model will turn to the left. This is easy to understand if you view the warp as acting like an aileron i.e. down aileron raises that wing. Warps are bad news, since their effect will vary with flying speed. Therefore, although the turn caused by a warp could be trimmed out with rudder offset during the hand gliding phase, once the model is launched from the hill and flown at a higher airspeed, its effect would reappear.

Every effort should be made to remove the warp by the gentle application of heat (an electric fire) or steam (a kettle) and twisting in the direction opposite to the warp. If, as may be the case with a very rigid foam wing, it is not possible to remove the warp, then it should be corrected by fixing an aluminium sheet tab to the trailing edge of the affected wing and bending this to counteract the effect of the warp (i.e. bent up to counteract wash in and down to offset washout).

Assuming that the glide from a hand-launch is now straight, the other factor to examine is the glide angle. If this is steeper than would be ideal, i.e. the model is tending to dive, then a little ballast should be removed from the nose until it improves. On the other hand, any tendency of the model to 'float' nose-up from a hand-launch is definitely to be avoided in a slope soarer, ballast should be added to the nose to correct this.

Once a satisfactory glide has been obtained, the controls can be tried *gently* during further hand glides, but a word of caution is in order here. It is very easy to stall the model, or turn it too tightly; at low altitude there will be no time to recover and a damaging crash will result. If a very gentle slope can be found, dropping away at an angle of four or five degrees only, then extended test glides can be made down this to explore the effects of gentle control movements. If the beginner is absolutely forced, due to geographical isolation, to attempt to teach himself to fly, this is the best way to start, since throwing the model off a 'real' hill without prior experience or some form of assistance is almost certain to lead to it crashing.

Progressing to the actual moment of flying, the following comments are made in the expectation that some form of experienced help will be available. It is worth re-stressing that the chances of an absolute novice successfully flying and landing a slope soarer entirely unaided are very slim.

A factor which must be considered is the natural flying speed of the model. All models, properly trimmed, will have a natural flying speed—say 15 miles per hour, which is probably typical for a trainer-type slope soaring model. If the wind speed on the day chosen for flying is greater than fifteen miles per hour, then the only way for the model to make progress into wind—away from the ridge—is by increasing its flying speed to a greater figure. This can be achieved in two ways—the most obvious is to give down elevator which will cause the model to dive and hence fly at a greater airspeed. This solution is often acceptable in slope soaring, since the constant hill lift is strong enough to still permit the model to climb relative to the ground although it is being dived through the rising air in order to 'penetrate' upwind.

A more sophisticated solution is to raise the model's wing loading by adding ballast in such a way that the balance point of the model remains unchanged, i.e. adding it around the CG position. As the wing loading is raised, so the model's natural flying speed will gradually increase. This is a useful trick, since although the glide angle of the model is steeper at the higher wing loading, it will still tend to fly more efficiently than a light model using a lot of down elevator, and will hence need less lift to sustain it.

On the whole, the beginner should avoid flying in conditions which are too windy for the natural penetration speed of his model, just as he should avoid flying in conditions of poor lift.

The main thing to remember is that one cannot simply pull in up elevator and climb as would be the case with a power driven model—you must have rising air. A common saying among glider fliers is that, if the model is descending, down elevator makes it descend faster while on the other hand up elevator also makes it descend faster, albeit in a nose-up attitude! In other words, the model will lose flying speed, stall (i.e. the wing will stop lifting) and fall out of the sky if too much up elevator is pulled in.

To take an early flight from start to finish:

Always launch the model nose down and give it a good firm throw. Remember that you will be (hopefully) launching into a stream of rising air, so unless the nose is held down the model will tend to balloon upwards and stall straight from the launch. Until proficient it is far better to have someone launch the model for you, so that you can be already in full control of the sticks from the moment of launch. The airflow on the edge of a slope can do strange things to a model (I have had one rolled inverted as it left the launcher's hand before you could say 'wreckage'—good for the adrenalin but bad for the bank balance!), so the aim is to punch straight out away from the hill as quickly as possible.

The cardinal rules for the beginner are:

Keep away from the ridge
Do not make 360 degree turns, keep 'essing' the model left and then right.
Never, never, turn directly downwind towards the ridge until you are able to fly properly

For rudder/elevator models the turn should be initiated by a fairly big 'kick' of rudder, which is rapidly eased off and the model 'caught' with opposite rudder before it has turned more than 45 degrees. Forget about co-ordinating rudder and elevator in the earliest stages of learning to fly, this will come later. At first, use them separately; a gentle application of 'down' to increase speed slightly, followed by the big rudder kick to start the turn, a little 'up' to help it along, then opposite rudder to stop the turn and a little 'down' to stop the model from zooming as it exits the turn. Gradually, with experience, these movements will merge into a series of smooth and largely simultaneous control inputs, but this will take time. At first it is far easier to make a series of jerky stick movements, returning to neutral between each.

Should the model start to sink lower, guard against the dreaded 'up elevator' syndrome—keep the model flying at a reasonable speed and try to move it a little closer to the ridge until the lift improves again. Until you can really recognise lift, and make a fair assessment as to whether a patch of sinking air is likely to be of long or short duration, if in doubt it is always best to land—it can save you a long climb down the hill and back

As experience is gained, you will find that the easiest way to fly is to tack across the slope, with the model facing at an angle to the wind, holding in a little

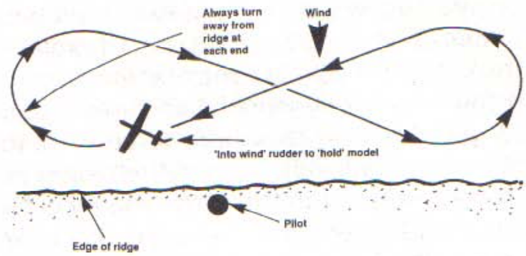

Fig. 5.7 'Tacking' along ridge.

'into wind' rudder and allowing the glider to proceed in a crab-like fashion.

Once you have mastery of the model, it is possible to fly for as long as the wind blows, or as long as the batteries last . . . but sooner or later comes the manoeuvre which has to be performed once each flight—the landing. I would assess the chances of a beginner launching and flying his first slope soarer successfully unaided as about 200 to 1 against; on the same scale, the chances of him landing it unaided without damage might be 5000 to 1! In other words, it is not easy!

Consider the problems for a moment; even on slopes with a 'good' landing area, there is likely to be some turbulence present, which you will not see until the model hits it, which, allowing for the relatively slow reactions of the beginner, will be far too late. The ground will probably be rough, with concealed rocks and pot holes, the wind gradient (i.e. the rate at which the wind speed increases with height above the ground) will be unpredictable and variable compared with flat ground and there will probably be more wind blowing than would be the case when undertaking first thermal soaring flights. Add to these factors the fact that a mighty sink will be waiting over the back of the hill, and it is easy to appreciate that, even for experienced slope soaring pilots, landings can sometimes be rather a lottery.

When learning to land your slope

soarer, do not attempt to fly a conventional 'circuit' approach as you would with a power model or thermal glider. If you do, one of two things will probably happen; the model will fly into the hill on the downwind leg, or, after turning into wind for the final approach, it will disappear smartly backwards (and downwards!) over the back of the hill. Instead try 'essing' back and forth, alternately to left and right, letting the model gradually drift back until it is over the landing area, and then applying down to fly it positively in to land. In this way, if the model is too high, it can simply be allowed to fly out into the lift again for another try, if too low it will undershoot, but hopefully not too seriously. The final thing to remember is that, on a windy hill, a classic 'power model' flare out, a foot above the ground, will lead to the model shooting up in the air and stalling in from six or seven feet, which can be very damaging. Resist the temptation to apply up elevator at the last moment, the model should be landed firmly, or 'flown on'.

Once the early flights (or as they were referred to more appropriately by a clubmate of mine, 'early frights!') are over, the beginner should fairly soon be able to cope with the model when it is away from the ridge and soaring in the lift area. However, he will still need help in the occasional 'difficult situation' which will arise, and also, for some time, with landings. Once extended periods of flying can be undertaken without constant rescue by the instructor, the novice should concentrate on extending his abilities by attempting to fly a pre-planned pattern—for example ten legs up and down the slope with 180 degree turns at each end, or a series of 270 degree turns whilst well out in the lift etc. The aim is to build up experience and confidence so that reactions to the model's attitude become automatic responses rather than each requiring a separate conscious decision. For this reason, more benefit can be obtained by carrying out pre-planned manoeuvres than by flying around aimlessly; in the latter situation the model often finishes up by going where *it* wishes to go rather than where the pilot wants it to be.

The next stage of development should see the pilot deliberately practising landings (horrifying as the thought of actually indulging in this awful task more often than strictly necessary may seem), since until he has mastered the difficult art of the 'slope side' landing, the number of sites on which he can fly will be severely limited to only those with a relatively flat landing area.

In essence, the slope side, or slope edge, landing is simplicity itself—it is all a matter of timing and using the airflow over the hill to advantage. The first time the novice sees an expert perform such a landing, he will be horrified; it looks awfully difficult. However, the problem can be approached in stages, which makes learning the technique fairly easy.

The aim is to place the model just above the ground as it slides out of an into-wind turn, in the area of maximum airflow just over the edge of the slope. In this way, the high wind speed reduces the ground speed of the model to zero, and it can then be gently 'plonked' down through the last couple of feet with down elevator, arriving with practically no forward speed. To be fair, this technique is actually easier with an aileron-equipped aerobatic model, but once learnt with a rudder elevator model, it will never be forgotten.

The technique is as follows:

Position the model out to left or right, about fifty yards away, above the edge of the ridge and about fifty feet up. Ease in down elevator and allow speed to build up as the model is dived down the slope. When the model is well out and below slope level, turn and fly across the slope for seventy or eighty yards, then turn directly towards the slope. The model, with excess speed, should now climb up the lift, climbing at the same angle as the slope (adjust the angle with the elevator). As the model approaches the slope, its speed decaying with the climb, start to skid it round in a turn; the aim is to complete the turn as the model arrives at the slope edge, so that it is facing into wind. At this point, faced by the maximum airflow just above the slope, the model's ground speed will be at its lowest and it can be neatly 'sat down' with little or no forward speed.

Needless to say, if this manoeuvre is carried out too low, the glider will hit the slope with a mighty crash while still travelling downwind. Too high, and it will simply slide forward and out into the lift again. The aim, then, is to work up to the finished article gradually, starting deliberately too high and making each subsequent attempt just a little lower until one is just right. The necessary judgement, which needs varying to suit the hill, model and wind conditions, will be acquired surprisingly quickly and, like most flying, the whole procedure will soon become automatic. Trust me!

Once the new slope pilot can competently control his model from launch to landing, it is simply a matter of building up some air time to sharpen and refine his flying skills with the rudder/elevator trainer before progressing to an aileron model which will be capable of more advanced manoeuvres, as described later. After this, it is likely that the modeller will either build more, and hopefully better, aerobatic slope models, or will progress into pylon racing, cross-country or scale. Many slope soarers happily fly the same model for season after season, going out and enjoying themselves on their local hills in all conditions, without any thoughts of contest flying or building super scale models. This is indeed one of the attractions of radio glider flying in general and slope soaring in particular—it can be anything from a pleasant way to pass a few hours at the weekend in the open air and congenial company all the way to an all-consuming passion which excludes (almost!) all other spare time activities.

Chapter 8
Basic thermal soaring

POSSIBLY MORE than any other branch of radio controlled glider flying, learning to recognise and use thermal lift to prolong flights is something which can only be really learned by practical 'hands on' experience.

As with slope aerobatics, the starting point is for the newcomer to have progressed to the stage of being able to confidently fly his model, putting it where he wants in the sky and landing it safely and close to the intended spot. Having reached this point, the next stage is to discover the magic of climbing the model away to great height in a thermal 'bubble' and returning it safely to the pilot's feet after a flight of 30, 40 or more minutes.

About thermals

First of all, the novice thermal pilot should stick to reasonable weather conditions. Lift can be found even on the most unpromising days, but it is easier when the winds are light and the sun is shining.

Secondly, it is necessary to appreciate something of the nature of the lift we are seeking to exploit. Unlike slope lift, the generation of which is easily understood, thermal lift is a more complex and less easily definable phenomenon. It is common knowledge that warm air rises, and this is the basis for all thermal lift. If a mass of air becomes warmer than the general air surrounding it, it will rise, cooling by expansion as it does so. However, since the average air temperature will decrease with altitude above the ground, some differential between the temperature of the mass of air in our 'thermal' and the surrounding air will be maintained and it will continue to rise until the two temperatures eventually coincide.

Since air can only be warmed by contact, thermal generation during the day is usually associated with areas of ground surface which are more efficient at reflecting heat—concrete and tarmac areas, large building roofs and short grass fields. Later in the evening, lift is generated from areas which are efficient 'heat stores'—woods, long grass areas etc. Naturally, once the warmed mass of air breaks free from the ground it will drift with the wind as it rises (see Fig. 8.1). It is this effect which makes thermal flying more difficult on windy days, since the length of time for which a model, piloted from a fixed ground location, can be kept in the rapidly drifting rising air is strictly limited by the operator's eyesight.

The topography of the surrounding area will have a considerable effect on thermal generation. Relatively small

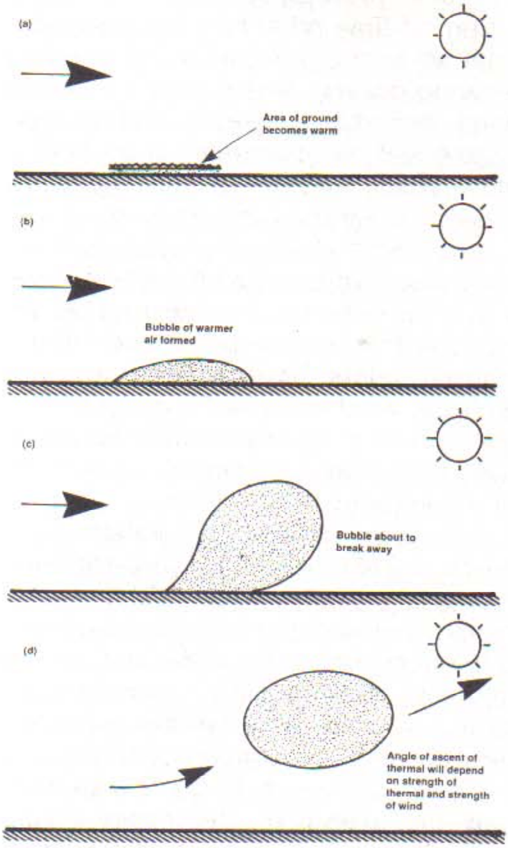

Fig. 8.1 Formation of thermal.

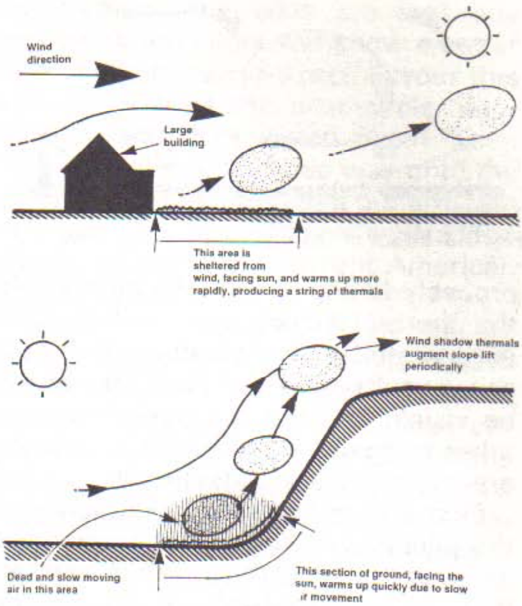

Fig. 8.2 (a) Wind shadow thermals. (b) Wind shadow thermal generation on a slope.

ground features, such as walls, lines of bushes etc. seem to 'trigger' lift patches into rising as the wind blows across them. Much more important, and widespread, though, is the 'wind shadow' effect. This simply means that if an area of ground upon which the sun is shining is protected by some feature from the wind—it is in the lee of a large building, row of trees or small ridge—it will heat up more rapidly and release a continuous stream of thermals (see Fig. 8.2). Incidentally, this factor is also important to slope soarers, since the area at the upwind base of a slope is an area of stagnant or slow moving air. Often, then, thermals are triggered in this area which then rise up to join the slope lift at the crest of the hill (see Fig. 8.3).

How to find lift

This is all well and good, but after spending a good few days seeking, and

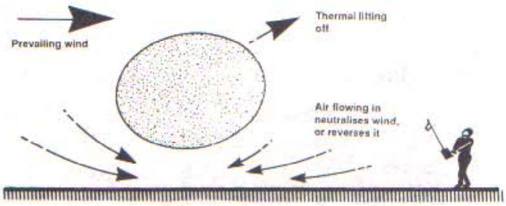

Fig. 8.3 Effect of thermal on prevailing wind.

probably failing to find, the elusive lift, the thermal novice may well become exasperated. As you cannot *see* lift, how can you tell where it is? Well, lift may not be visible, but the reaction of various other things to lift is visible, and there are many ways of detecting it.

First and foremost is the reaction of the pilot's own model. Did it tow more easily to the top of the line than normal? If so it was probably in lift. Is the normally stable model being bounced around by turbulence, despite the light wind? Lift always has turbulence associated with it around the edges, so here is a positive indicator. If one wing kicks up and the model enters a turn without any bidding from the transmitter, then try reversing the turn and 'flying into the rising wing'—something has caused the wing to kick up, probably lift.

Obviously, if other gliders are being flown at the same time, these should also be watched for similar symptoms. At the heights to which we launch (400 to 500 feet), lift patches are often very localised, so that one model can be climbing rapidly in lift whilst another as little as fifty or sixty yards away may be struggling around in sink.

Certain birds can be very useful lift markers. Gulls are an obvious indicator, it is very easy to tell by their stiff winged circling when they have contacted lift. Other birds such as rooks and crows also use lift on occasions, and closer to the ground, insect feeding birds such as swifts, swallows and martins provide useful indications. These birds do not soar themselves, but they do feed on insects which are often sucked up by patches of rising air, and many times lift can be picked up almost from ground level by observing their behaviour.

Perhaps the best lift indicator of all, though, is the wind. In wind strengths up to light breezes, the behaviour of the wind, if observed carefully, can give an unerring pointer to the elusive thermal. When a thermal lifts off, the rising warm air is replaced by other air which flows in under it as shown in Fig. 8.3. If the prevailing wind blowing at the time is only light, this air movement will have a marked and easily perceptible effect upon it. For example, if the modeller suddenly feels the wind fall away, or in very light breezes, even reverse its direction, then there will be a thermal lifting off upwind of him (i.e. upwind in relation to the 'normal' wind direction blowing on that day). Conversely, if the wind strength increases, the thermal centre will be downwind. If it veers to blow from further to the right, the thermal is on the left and so on.

This 'wind shift' effect is amazingly consistent, and works time after time as a thermal detector. For this reason, you will see that most experienced thermal soaring pilots have a light streamer (knitting wool or something similar), on the end of their transmitter aerial, so that they can constantly monitor the wind direction whilst flying.

Free-flight contest modellers make much use of ultra-light Mylar streamers mounted on poles some 200 metres or more upwind of the launch area. These streamers normally blow out in the lightest breeze, but if a thermal passes over the area, they behave quite differently, often rising vertically in the air for their full length. Such aids as these can be useful to the radio control soaring pilot when sport flying. However, they are not much used in contests, since all the owner's opponents can also see and take advantage of them.

It is apparent then , that by observation of a range of factors, some relating to the model itself, others to the surrounding environment, the chances of contacting lift can be improved. It does take time for these observations, and the analysis of the data which they are providing, to become automatic. Until this degree of automatic response is attained, thermal soaring can be, mentally, quite hard work. There is absolutely no substitute for lots of practice flying, nor for having a model which is properly adjusted to fly straight and smoothly at its lowest sinking speed, without interference from the pilot. Many experienced thermal soaring pilots talk about the 'feel' of the model. Of course, there can be no direct feedback 'feel' on the transmitter, but, sooner or later, the newcomer will experience a flight which will make clear the use of the word 'feel' in this context. Sometimes the model just sits right in the air and 'feels' right—there is no other way to describe it. On these occasions one can be absolutely sure that it is in lift.

How to use it

Once some lift is detected, the priority must be to keep the model in it, and maximise the height gained from the lift while it is within flying range of the launch point. The normal way in which this is done is to circle the model and let it drift at windspeed. However, care is required since, in doing this, it is often possible to work the model out of the lift! The golden rule when circling in lift is to constantly observe the behaviour of the model. Unless you have been lucky enough (or skilful enough!) to find the central, strongest area of the lift patch immediately, the odds are that one portion of the circle will show a better rate of climb than the rest. Favour this side by making the next circle 'egg-shaped' and then watch again. Keep moving the model in this way until the whole of the circle shows a uniform rate of climb, and you will have centred the lift (or, to quote the current American jargon 'cored out'!).

Sometimes, patches of lift will be contacted which do not seem to behave like a normal thermal in that they do not seem to drift downwind. In these circumstances, the pilot usually starts circling, only to find out after a few turns that the model has stopped climbing—it has 'fallen out' of the downwind edge of the lift patch. Under these circumstances, the correct action is to move back upwind to contact the lift and then, instead of circling, 'ess' the model back and forth, rather as you would when slope soaring. It is likely that lift patches such as this are really low-level wave lift, generated by ground features some distance (even miles) upwind of the flying site.

. . . then how to lose it!

Having found our lift, it is very easy for the novice to be literally carried away by it all, and find that the model has dwindled to a dot at great height and distance. Caution is required, since it is very difficult to accurately fly a model in these circumstances, and, if over course control movements are used, it is very easy to accidentally over-stress the airframe and pull off some vital component, like a wing for instance!

In the early stages always quit the thermal by flying away in a straight line while you still have comfortable visual contact with the model, i.e. while it is still recognisable *as* a model rather than appearing as a dot. If you *do* get too high, you will appreciate the importance of having a model which will fly itself. The main thing to remember is to heed the advice of *The Hitchhiker's Guide to the Galaxy* and *'don't panic'!* Ease in about half down trim, and then concentrate in keeping the model in a straight line coming towards you. Do not circle, and do not indulge in large movements of the elevator control. If the model has airbrakes, deploy them, and readjust the elevator trim into the position which has been previously established as the right one for flight with airbrakes out.

The best way to escape is to fly the model in long straight legs; in this way you will lose the lift and the model should fly itself with minimum interference. If there are other modellers present on the field, ask them to help keep track of the model until you get it down to a comfortable height again. If the sky is a mixture of cloud and blue, try to keep the model against a cloud background, it will be much easier to see.

To someone who has yet to experience their first really big thermal, the above advice may seem superfluous, but believe me, it is not; there have been many times in the past fifteen years when, notwithstanding excellent eyesight, I have very nearly lost visual contact with the model.

Golden rules

To revert from the art of losing lift to that of finding it here is a summary of some golden rules for finding and using thermals:

1 Be familiar with your flying site and the likely sources of thermals—car parks, buildings, wind shadow areas etc—around it.

2 Monitor the wind when flying and be alive to any changes in direction and strength which may point to lift.

3 Watch for soaring birds and also for insect feeders close to the ground.

4 Watch any other models flying in different parts of the sky from your own.

5 During lift searches, it is much easier to detect movements of the model if it is some distance away horizontally, rather than directly overhead.

6 Note the behaviour of the model during the tow-launch; if the rate of climb is faster than normal it is probably being towed through lift.

7 Watch for anything which disturbs the normal flight path of the model and always turn towards such disturbances. In particular, if a model trimmed to fly straight suddenly starts turning one way, turn it back and fly in the opposite direction.

8 Watch the 'sit' of the model during flight. If it speeds up and starts to 'bounce', lift is almost certainly there. On the other hand, if it suddenly requires more up elevator, and then starts to sink in a nose up attitude, rapid action is required to move away from the area since sink is indicated.

It is a fact that the newcomer to thermal soaring, even if experienced in other branches of radio flying, is likely to have a most frustrating time at first. He will fly through many usable patches of lift, simply not recognising them for what they are. There are few things more annoying than watching experienced thermal soarers on the same field winding their models away in lift time after time while you are simply going to the top of the tow-line and back to earth in five or six minutes. The best plan in these circumstances is to pick out the most consistently successful pilot, and when he has landed his model, ask him to 'spot' for you. Explain that, although you can fly the model you are having trouble in finding lift. Having asked for his help, do exactly what he says, and if he is a good thermal soaring pilot, the odds are he will put you in lift within the first few launches. After the flight, don't just thank him, but ask 'Why?' Why did he give you a particular instruction, what did he see that gave away the lift to him? Now relate the answers to the flight you have just had and try to do the same without his help.

It will take time, but the rewards in satisfaction gained from extending a dead air flying time of six minutes up to and beyond the hour mark with no more aid than the invisible air are very great, and worth the effort.