Trigger points and feeders

Justin Needham's experience of hang-gliding has led him to devote some serious thought to trigger points and their all-important feeders

A TRIGGER point is usually a ground feature, but can be anything that will provoke warmed air to leave the ground and rise as a thermal.

Imagine a big puddle of air that has been heated by contact with the warm ground. It has expanded and is less dense than the cooler air adjacent and above, and it wants to go up. It can't all rise at once like a flying carpet or it would leave a vacuum underneath, so it has to find a sneaky way to escape in a way which allows it to be replaced by air at the sides. This sneaky escape is of course a thermal.

Usually, you should concentrate on individual thermal sources below about halfway to cloudbase. Above that height, their identity becomes obscured by the conglomeration of many different columns of rising air in a good area. High up, we fly the 'population' of likely thermal sources below, or (better still) are guided by clouds, if there are any. But even when high, and particularly on blue days, we must be able to recognise triggers – and feeders, the reservoirs that supply the energised air. One analogy invites you to imagine an Artexed ceiling and the bath in the room above it overflowing. Where will the water drip off? From the pointy bits, of course, and that's what happens with air rising from the ground.

This is all very well, but it overlooks vital issues such as the effects of wind and the relative heating of different areas. And it doesn't emphasise the need for feeders.

The all-essential feeder

A thermal is only as good as its feeder. It's no good at all having the most humungous trigger point if it's hemmed in on all sides by cold air, or by terrain which prevents the inflow of warm air to feed the thermal. The feeder is absolutely vital, so when you're low and have nowhere to go, think hard about how much warm air is likely to have built up in which areas of the terrain, and whether the warm air can actually reach the trigger point you have selected.

A classic feeder is a wide, flat valley floor. Favoured areas heat up rapidly: fields of dry, standing corn or the big town, as opposed to square miles of adjacent grassland. But don't be put off by cool-looking valleys if this is all you have. The energy concentration may be lower in the green parts of a valley, but with feeders we must consider volume as well as temperature. Thermals are really big things and they need lots of air to make them. Therefore the feeder is often not an area you would mark out as being particularly hot, but a very large volume of fairly ordinary warm air which just happens to have a really good trigger. Avoid damp, green fields and cool woodland, of course, but the important point is that many less-than-perfect areas will work if you choose the right trigger to exploit them. What an area lacks in temperature it can often make up for in volume. Think big feeders.

Understanding the behaviour of air close to the ground can make or break your soaring flight

I frequently hear tales of woe such as: "But I went for the quarry and got nothing at all!" If you fly low over a quarry you are merely chancing your luck that when you get there it will happen to be triggering for all the masses of heat which have built up in the surrounding landscape – because you can't create a decent-sized thermal just from the contents of a quarry. The quarry is only a hot trigger, and it needs feeding like anything else. If you do go for the quarry, don't take one surrounded by damp grassland; nearby there could be square miles of baking cornfield with a nice line of trees to trigger it all off.

So a feeder needs to be big, and open. There are classic examples of triggers that don't work because they have no feeder. Say you have flown north up Pandy to head for a patch of sunshine deep up in the gully at the gap. Chances are that you won't find a good climb here because the enclosed valley below has no feed from the flatlands to provide a source for really big thermals. An even better example is Stanage Edge in the Peak District, where a superb cliff-edge trigger is masked from the heat of the valley floor by a big raised plateau in front. The thermals actually trigger on the edge of the plateau, feeding from the valley floor a kilometre in front of the ridge. Because there's no decent feeder (the plateau is small and damp) for the local thermals triggering on the edge itself, all you find there is small, punchy stuff with no volume to keep it going. So go for the open sections of a ridge with wide flatlands in front, then pick out the best trigger points along these sections of ridge.

To imagine the feeder in action, you must build up a mental picture of the wind at ground level. Which way is it blowing? Is it being funnelled by ground features to better favour certain trigger points, or perhaps being forced to rise over small ridges, cutting off certain triggers from a source of warm air? On a windy day, heated air cannot easily collect and wind shadow areas can be good feeders. Lee-side thermals occur when hot air, built up undisturbed behind a hill with sun on the lee slope, is triggered on the downwind lip of the hill. They can be extremely good once they unstick.

Considering all these features of thermal feeders throughout your flight will allow you to build up a picture of where the biggest volumes of air can go most easily... and where the best sources of warm air may escape. Feeders are vitally important, and the basic principles are:

- Size – bigger is better.
- Flow – how easily can air empty from an area? Obstructions and hillocks can impede the flow at low level.
- Ground type and crop cover – dark and dry is better than pale, green or damp.
- Time – remember stored heat sources such as trees late in the day.
- Temperature – consider how hot you would feel down there.
- Sunshine – ensure your feeder hasn't just come out of cloud shadow. If there's no sun, consider the thickness of cloud cover in different areas.
- Timing – once a feeder has been triggered it may take some time to warm up again (though some, particularly in mountains, will be almost continuous).
- Orientation – south-facing slopes collect more sun.
- Ground wind flow – consider whether the wind favours one feeder and trigger combination over another?

Finding trigger points

A trigger is something which disturbs the airflow and gives the warm air an excuse to escape. The biggest trigger points nearly always win (provided they have a feeder!), and little triggers close to big ones simply never get a look in. A 500ft pointy hill in front of a mountain range would probably be useless there, but the same hill in the Lincolnshire flatlands would produce the most humungous thermals in England. You must go for the biggest triggers in an area because they will steal nearly all of the hot air, although in flatland areas devoid of big

features small ones will be what counts. So consider any feature as a potential trigger, but keep the basic principles in mind:

- Scale – the biggest triggers always win (provided they have a feeder).
- Contrast – boundaries where ground features meet: different types of crops, edges of woodland, water sides, etc.
- Bumps – but even better edges and sharp things (remember that Artexed ceiling!); cliffs and spines in mountains, hillocks in flatlands (trees on top of hillocks are even better).
- Hot/cool – a trigger point is frequently a spot where hot air meets cool, not the other way around. Think of the downwind side of hot things (towns, hot fields, airstrips) and the upwind side of cool things (lakes, the sea, forests, green fields).
- Size – you'll rarely get a big thermal off a little trigger, but a big trigger and a big feeder will immediately produce a great thermal.
- Wind direction – is the prevailing wind at the feeder pushing the warm air towards your selected trigger point? Do valleys or undulations in the ground favour certain trigger/feeder combinations?
- Time – Late in the day go for the centre of forests; they store heat during the day and let it out slowly. During the day the cooler forest often just triggers the surrounding flatlands.
- Atmospheric triggers (more on this later) – sea breezes, storm fronts or the edges of cloud shadows, and the possible triggering effect of an advancing shadow.
- Anything! When really desperate, consider anything which could disturb the airflow even a bit: houses, hedges, fences, individual trees, tractors, you name it!

You must consider all these points and combine as many of them as possible.

The hot/cool one is frequently overlooked. If you are dribbling along low a couple of miles upwind of a town, don't break out on a death glide for the houses unless you can be sure of reaching the downwind edge of the town. The thermal you crave off the town will rarely be found on the upwind side (cool/hot) but at the downwind side where the warm air is given a kick when it meets the cool fields. Similarly, the upwind side of plantations and forests can be good.

Many hang-glider pilots who have flown to the coast will testify that in an offshore breeze the coastline itself can be the mother of all triggers.

Exploiting triggers

Once you've located your trigger you need to exploit it. In flatland areas with few features you can find that the base of a thermal, once triggered, will drift with the wind, hoovering up hot air from the fields as you pass over like the tube on a vacuum cleaner. In this way you may drift for many miles at only a few hundred feet, gaining little height, until the column happens to pass over an exceptionally good, hot area and you climb out well. This is therefore a moving trigger; once the thermal has had its initial starting kick it acts as its own trigger to feed itself from below. This type of thermal will be fairly vertical once it has detached from its original fixed trigger.

On the other hand a stationary trigger would be a ridge or a district ground feature, significant in the local area so that it 'wins' all the hot air. Once the thermal has drifted you away from this there may be no more hot air below and you will have to fly back upwind to the trigger so as to climb in a stepwise fashion. A good climb from a stationary trigger (eg, a hill) may take several such steps; you may also have to re-centre upwind in the lower levels of wind shear to prevent yourself falling out of the back of the tilted thermal.

If drifting downwind, desperately low in zero, and all your gliding options are closed, it is often best to select a linear

'Sometimes parking up over the only good trigger in an area will reward you with a decent climb'

feature (hedgerow, road, dyke) which lies diagonally along the direction of drift and use it to cover as much of the triggerable feeder as you can with the height available. If all your chances really are closed, it may be worth parking up over a stationary trigger. This can be frustrating, and in severe sink may not be sensible, but sometimes the pain of losing a few hundred feet parked over the only good trigger in an area will reward you with a decent climb.

Over-hyped triggers and feeders

Some legendary sources of lift are not as useful as you might expect. Quarries, as noted above, may be nice trigger points, but unless they are huge they are an unimpressive source of heat on their own. Power stations, under many circumstances, fall into the same category. A power station can be a good trigger point for the surrounding landscape and is likely to work well (think big trigger points), but should not be seen as a source of much heat in its own right, especially during the summer when the sun on the surrounding landscape will be a much greater source of energy. In some circumstances the waste heat from the station can be worthwhile, but think of it merely as a good trigger point, not a ready-made thermal. And if you fly into the centre of the stack take a deep breath, hang on tight and expect mostly turbulence and not much lift.

Bonfires fall very much into the desperate trigger point category. Smoke from a few leaves on its own won't keep you up; if you benefit from a bonfire it'll be because it has acted as a trigger for the surrounding landscape.

Don't let someone's garden bonfire faze you into ignoring the massive housing estate alongside, and don't forget feeders.

Alternative triggers and feeders

There are a few situations where lift can come from unexpected places, but they are not run-of-the-mill cross-country experiences. During the winter months, when the sea is warmer than the land, the coastline can reliably trigger off thermals from the feeder of warm air out to sea. The waste heat from power stations can be significant in the winter. And I have it on good authority that thermals can form off boggy areas or ponds in winter. Water vapour and moist air, being less dense than air, will in theory rise when nothing else is stirring... I think we are talking desperation here; I have never experienced a "bog" thermal!

Atmospheric triggers

These triggers arise from prevailing weather conditions, and are a massive subject in their own right. Broadly, consider them as any atmospheric effect that causes one airmass to carve up another. On the largest scale we are talking about the advance of a cold front, causing large-scale uplift and thermals creating rain showers or storms. On a smaller scale, the advance of an individual rain shower or rain front will frequently trigger lift on its advancing edge. The cold air dragged down by the descending rain creates a moving wedge which displaces the warm air in its path at ground level, and you can sometimes fly a long way by keeping just in the edge of the rain ahead of a large storm cloud – but bear in mind the associated severe-weather risks.

On a smaller scale, the advance of a cold wedge of air from beneath a decaying cumulus will trigger thermals in its path and, smaller still, simply think of the edge of a cloud shadow in terms of the contrast effect mentioned earlier. Think hot/cool with respect to cooler air beneath the shadow at ground level being forced by the wind into hot feeder areas rich in trigger points. Consider also the triggering effect of katabatic windflow down cooling hillsides in the evening (responsible for 'magic' evening lift in the centre of the valley). Finally, let's not forget the sea-breeze front in its various guises, which again acts as a mini cold front, triggering and wedging up any warm air in its path.

With all these atmospheric triggers it is important to remain on the right side of them to benefit from the triggering of warm air in its path. Once behind the sea breeze front, or beneath the rain on the storm front, for instance, conditions will immediately become very poor.

So ends my brief introduction to trigger points and feeders. Staying on the lookout for these mechanisms as you fly will allow you to make more informed choices in searching for lift, and you'll stay up longer and fly further.

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