C. Wave Soaring

This section is not meant to be a treatise on wave soaring but a few general hints which may assist people who do not have much experience of this type of lift.

1. Flying in wave

Working wave lift is much the same technique as working hill lift as the lift (and sink) is found in an elongated area lying across the wind and which stays fixed in one location – some of the time! It can be present at low, medium and high levels or all three at the same time. Cloud may or may not be present.

The lift itself is generally silky smooth, varying from zero sink to 15–20 knots (up and down!) and it may be that no control movements are necessary for minutes at a time. Before the lift is contacted however very turbulent air can be encountered in passing through areas of rotor. The lift is usually found up wind of this rough air and the technique thereafter is to use the band of lift in a very similar way to working hill lift

Wave flying is often done in wind speeds >30knots and at operating heights around 5 – 10,000 feet or greater. This makes it almost impossible to judge your exact location by eye and furthermore the ground track of the glider can be rather surprising so here are a few hints:

- Always, always have a moving map with the latest airspace and wave boxes on it. Make sure you know how to use it and that it has an adequate power supply for a long, cold flight. Also make sure you have a current aeronautical chart on board.
- Do not assume that the wave areas/boxes are open – check before take-off.
- Remember that in the relatively high wind speeds you will need to fly the glider at higher speeds than you may normally be used to, only slowing up if you really need to take a climb. It is essential to make sure that you are not drifted downwind into any airspace or cloud there may be, remembering that, although the wind may be in excess of 40 knots, the associated cloud is stationary relative to the ground. Jumping upwind to a wave bar may require flying through strong sink at 100+kts, however….
- Be aware of the change in the V_{NE} of your glider with altitude. This change in V_{NE}, with reference to the ASI (i.e. indicated airspeed), should be tabulated in the aircraft manual and may be displayed on a cockpit placard.
- Have a working oxygen system, know how to use it and remember to switch it on(!) and test it before you take off – more on oxygen below.
- An obvious one – dress warmly regardless of how warm it feels on the airfield. Getting really cold will take the edge off your enjoyment of the flight and may start to impair your mental skills and judgement.
- Be very careful if entering cloud. Icing is a very real risk particularly with a very cold airframe contacting supercooled water droplets in even a wisp of cloud. Know where the freezing level is. Do not enter cloud unless you have suitable instruments and know how to use them.
- While at height watch out for the onset of night. The evening is frequently a time of good wave conditions when it is easy to gain considerable height in a short space of time. It can however take a long time to get down from FL190 and it could be dark on the ground by the time you get down. We try to keep a last landing time chart current on the notice board and you should check this before you fly. Sunset time for your location is readily available on the internet. Your

glide computer (i.e. XCSoar) should also show the sunset time for your location.
- Be ready for the possibility of encountering severe turbulence in the circuit and a marked wind gradient on approach when you return to land after a wave flight.

2. Use of oxygen

The oxygen system is your life support system. It must not only function correctly throughout the flight, but you as the pilot must know its operation and its limitations. You should have your oxygen system set up and ready to use prior to launching.

The use of supplemental oxygen is recommended above 10,000 feet and mandatory above 13,000 feet. Bear in mind that there are considerable variations in tolerance to lack of oxygen so if you have any doubts, go on oxygen sooner. Due to the rapid rate at which you may climb in wave have your oxygen mask/cannula within easy reach so that it can be donned quickly. Consider using oxygen while descending to low levels or even landing especially if you are cold and tired after a long flight. The effects of a lack of oxygen are pernicious; be constantly alert to your own well-being.

3. Actions on being caught above total cloud cover

Watch for signs of the wave gaps filling in and creating a solid layer of cloud beneath you through which you may have to make a long descent on instruments. This itself causes no real problems provided you know what height cloud base is and what your position is and you are competent at cloud flying (cloud flying rating!), though be alert to airframe icing. We have some fairly high mountains just to the North of us and they can easily become cloud covered! If the wave system collapses the general environmental change could lead to a significant lowering of the cloudbase. If you have a radio, call other gliders or Portmoak Base and ask what the cloudbase is.

Navigation above cloud has been greatly simplified with the introduction of GPS moving maps and all pilots wishing to make wave flights must use one. Remember though, your GPS moving map should never be fully relied on to get you home; battery power in cold conditions being a particular concern. You should back it up with basic navigation skills at all times using your aeronautical chart.

If you have lost contact with the ground and are forced to descend through cloud you have two options:

1. Fly directly into wind at an airspeed such that you stay stationary over the ground or make forward progress; use the forward track on your moving map to hold heading to an upwind point on the moving map that is clear of high ground.
2. Adopt the Benign Spiral Mode of descent. This is considered the safest method of escape when caught above cloud provided the wind is not so strong that there is a danger of being blown downwind into terrain. In that case use the technique of holding heading into wind, as just described.

3.1 The Benign Spiral

The Benign Spiral Mode is a technique where, once properly trimmed, the glider is allowed to enter a gentle spiral of its own volition and left there without the pilot touching the controls until clear of cloud. Obviously the glider will drift downwind, possibly at quite a rate, so be aware of entering airspace laterally.

To enter a Benign Spiral, do the following while still in VMC if possible:

- Establish a heading into the last known wind (your moving map may show this).
- If the glider is equipped with flaps, lower them to the normal position for thermalling.
- Lower the undercarriage.
- In level flight, trim the glider to as close to 1.5 times the stall speed as possible (roughly 55kts in club gliders).
- Open the airbrakes to the full position. If necessary, hold them there.
- Take your hands and feet off the controls and allow the glider to enter a spiral on its own. Once established in the spiral the airspeed and attitude will become constant, or the nose will nod gently up and down.
- Once you have cleared clouds, return to a normal flight attitude and configuration.

It is recommended that this method of descent is practised a few times in clear air before needing to use it in cloud!

> Entering cloud can be very dangerous unless you are competent at cloud flying. Avoidance is the best strategy so open the airbrakes and descend as soon as there are any indications of the cloud gaps closing below you.

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