A very short introduction to gliding for power pilots.

Seen from the viewpoint of a power pilot used to clear (ish) directions from the ground and to flying routes and circuits at (fairly) constant heights and headings, gliding can look somewhat anarchic. It is not. It obeys its own consistent logic and it will help you to understand this before arriving close to an active gliding club.

The essential and blindingly obvious thing to remember about a glider is that it has no engine; it moves forward by going gently downhill. The glide angle varies from about 1 in 20 for antiques to as much as 1 in 60 for a very modern glider. However, even when climbing, it is still flying downhill relative to the air round it, all the while quietly but efficiently converting potential energy into distance travelled (or kinetic energy if the pilot chooses to speed up) and losing a minuscule amount in overcoming drag. This basic energy conversion affects every aspect of its operation and the techniques which the pilot will employ to go from place to place.

The illustration shows the very simple front panel of one of our club two seat trainers in action, climbing quite fast in a thermal somewhere over Oxfordshire. I have included it mostly to show that once you have taken away the engine and its instruments what you have left is pure flying. The essential information is all there, though; even the radio (just below the bottom of the picture. We value a bit of quiet; I have to say that the view is better from a glider as well).

As you can see, a bank angle of 40 to 50 deg is not unusual. The panel may look sparse, but all the basic information is there; ASI and alti. to the left, here showing a typical circling speed of 50kt and approaching 3000ft. On the right are two variometers. They are showing a climb rate of 500fpm with an average climb rate in this thermal of 5.1kt so far…not bad for an unpowered aircraft!

Glider pilots operate under VFR, on the 'see and be seen' principle, and are used to coming comparatively close to other gliders when thermalling to gain height. Of course they cannot

choose to climb at will, and thus cannot either maintain an even height or abort a landing to go round if balked in circuit. Glider pilots in circuit have only the one chance to make a tidy landing each time and will be very unhappy if you hinder them by driving across their circuit. They are however used to sharing airspace and can usually anticipate the likely path of another glider so that they can plan their own circuit to land in a clear area. They may not necessarily be able to anticipate the path of a powered aircraft which has the means to change or maintain height at will or to abort a landing and go round.

Gliding sites launch gliders by aerotowing, winch launching, or both. A combination of tug and glider cannot manoeuvre easily, will climb quite slowly, and must of course be avoided. Winch launching is shown on the ICAO charts for sites employing it and must be taken very seriously indeed by the visiting pilot. The stranded steel cable is only 5 or 6mm diameter, is pulled by a 400hp winch and can be carried up (at Aston Down, for instance) legally to as high as 3000' above the site. It is completely INVISIBLE save for the glider at the end of it. It is also being reeled in at up to 60kt and has been proven (unfortunately) to cut through metal as thick as a car's bodywork with ease. A light aircraft would obviously present no obstacle whatsoever.

Overhead joins are not a desperately good idea at a winch site...

This time lapse image shows a typical glider winch launch to about 1500'-2000' AAL. The entire process takes about a minute from the ground run to the cable arriving completely back at the winch. Notice that during the climb the pilot has no view ahead horizontally due to the steep angle of attack.

See also the small drogue 'chute descending as it is pulled back to the winch after the cable has been released from the glider; in a cross wind this can be carried out to one side as it descends.

Never *ever* fly across the operational runway of a winch launch gliding site below the full clearance height, which is the field elevation of the airfield plus cable launch height specified on the chart plus extra height for safety. At Aston Down this adds up to a considerable 4100' AMSL minimum.

The typical glider circuits in the diagrams for runways at Aston Down are shown in the 'arrivals' section of the full briefing as quite large circuit shaped 'funnels' leading towards the landing areas (rather than as defined routes). This pattern is generic to all gliding airfields. The reason for this is that the glider pilot makes a circuit with a limited and diminishing amount of energy in hand. At any point in the circuit the height of the glider dictates the distance it can fly before it has descended to a suitable height to make a final turn to approach. By moving away from or towards the intended landing area the pilot changes the distance the glider has yet to travel so as to lose more or less height. The pilot may also run into rising or sinking air on circuit, and have to adjust the shape and length of his circuit according to whether he gains or loses height. In still air he will typically fly a gradually descending path, making slight lateral adjustments to his flight path as he goes. Of course we have airbrakes, but height thrown away is difficult to regain.

In effect gliding is all about 'energy management'. Effective cross country flying depends upon a good understanding of this; speed, distance, altitude, time and air mass movement are linked in a series of interlocking relationships that are not linear and nowadays in modern gliders are usually calculated for the pilot by sophisticated software running in flight computers receiving constant input from static and pitot heads, GPS, accelerometers and pressure transducers. The cutting edge aerodynamic design of modern gliders enables them to conserve their energy very well. A pilot can effect a change back from kinetic to potential energy by pulling up from a fast glide and gain several hundred feet in a few seconds. 140kt of airspeed near the ground can translate into 50kt some 500' higher up in as little as 5 seconds so be very careful not to get above gliders that are travelling back to an airfield at what seems to be a low altitude but at high speed. When a competition is under way (usually NOTAMed well in advance) this sort of high speed 'arrival and pull up' is very likely, the competition pilot wishing to cross the finish line at maximum speed before using the excess energy to gain enough height for a short circuit.

It is therefore important that the visiting power pilot takes great care in the circuit. It is a fluid environment in which the movement of individual gliders both horizontally and vertically may be somewhat unpredictable if you are not used to it and in which the gliders have the right of way. Moreover at times of day when thermal lift becomes unreliable or later in the day after soaring across country there may be many gliders all returning to the field at about the same time, so the situation can change into a high workload environment quite suddenly.

Of course the aim of the sport is to get away from the home club and to fly somewhere more interesting. The distance record in the UK is well over 1200km in a single flight, and some jaded pilots even go on 'novelty flights', a circumnavigation of the London airspace for instance. Listen in on 130.1 or 130.125 on a good day and you may be surprised by the number of gliders

in the air and their wide distribution (and by the inane chat of some of the pilots). Flights of 500km and more are not at all uncommon and in good conditions you can encounter gliders almost anywhere in class G airspace. Gliders circling in thermal lift may be climbing at up to or even over 1000fpm, anywhere from 500' agl. up to cloudbase (though climbs a great deal higher are made under some conditions). Be very careful passing near such a glider; its presence and the success of its climb rate may be attracting other nearby gliders that can arrive unannounced from any direction at considerable speed (on the whole, glider pilots are simple souls…if they can see a glider climbing well, they aren't going to waste time looking somewhere else for lift). A circling glider may also have several other gliders above and below it in the same patch of lift which you may not yet have spotted, so pass to one side rather than through the line of their climb.

When circling in lift, each turn takes about 15 to 20 seconds, and the glider is typically banked at 40-50deg. Thus for half of this time in every turn you will be in the pilot's blind spot and particularly if you are near to a collision course (and therefore not moving much against the background) you may well not be seen until quite late in your convergence.

We tend to fly rather closer together than you may be used to; these two seat trainers from Aston Down are thermalling together up to about 5000'alt over Bicester, Oxfordshire.

A glider pilot in a well populated thermal is a busy person; he won't be overjoyed to see you in there with him, however fleetingly!

The glider making progress across country will not maintain an even height or heading either; if you want to go somewhere, it is quicker to avoid circling if you can! Although the glider isn't turning in the lift the pilot will be altering course continuously to seek out and exploit the energy

of the air mass, so give him room and try to stay in his field of view. Flying near to a glider in the six o'clock position or just below it is inviting trouble; the glider pilot simply can't see you in these positions, and he will want to pull up sharply and slow down if he finds lift. He can't maintain an even height anyway, and you can be certain he will be turning without warning sooner or later, even if it's only to find out where the noise is coming from; there are few more worrying sounds for a glider pilot than that of a nearby aircraft engine with no apparent aircraft!

I hope that these notes have given you some insight into the absorbing passion we share. You may even feel inspired to join us at Aston Down to find out more; we offer practice at engine-off landings every time…guaranteed, 100%... (and we don't need to wear headsets).

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