

# Competition Speed Flying

(This article by Scott Lennon is taken from the Canberra Gliding Club web site)

## Audience Assumptions

To fully appreciate the context in which this is written, I have assumed that the target audience has some cross country experience (at least Silver C), a working knowledge of Macready speed to fly theory, access to a glider when required and most importantly "The Need for Speed".

## Objective

Before going out to a gliding camp or a competition, you should have set yourself a fairly clear set of goals. I like to set a few goals of varying degrees of difficulty. That way you are likely to achieve at least a few of them and go away from the event happy. Your chosen goals may be just to fly further than you have been before, a badge distance or a particular standing in a competition. Note that the last goal is hard to realize because you are competing against other people whose performance is not within your control. My goals have mainly been focused on speed and competitions. The speed around a course is greatly determined by the conditions on the day but I have been able to compare my performance to the top competitors who are very consistent in their results.

## Preparation

Before even considering X/C flying on set tasks or in competitions, you must prepare mentally, physically and have all your equipment sorted out. The equipment is the easiest to prepare. You must be comfortable with your cockpit set up. This should include comfortable seating, easy access to maps, navigation equipment, breakfast bars, sultanas, lip balm, water, sport drink, comp information, and relief system. Other items in your glider should be extra water supply, extra food, tie down kit, but can also include ELT, extra clothing, first aid kit, phone, money, phone numbers, handheld radio, torch, GPS and logger. Practise flying around with all this stuff to know where it all fits best and work out all the bugs before leaving your home field.

At the X/C event, the glider should be prepared early in the day before it gets hot. DI, wash and prepare as much as possible before briefing, but leave food and water out till the last minute. Use a canopy cover if not raining or windy or extremely dusty to keep heat out and the canopy clean. The noted conditions

can cause scratches so be careful. You should probably drink 1 litre during the DI and preparation before 10am.

## **Briefing**

At the briefing, note the weather and winds, grid time, launch time, start order, start points, turn points and other class tasks. It is always useful to know when you are crossing the path of a different class to use them as thermal spotters. Take start board photos and load any new coordinates into the GPS. Drink another ½ litre during briefing (maybe a sports drink at this stage).

You should be about 10 minutes away from being ready to fly at this time.

Go somewhere cool, eat something substantial, drink another ½ litre of water, relax and discuss weather and tactics. You should be able to wander out to the tie down, hook up the glider and tow straight out to the launch area without any extra preparation. Use a 'Cool It'. This is basically a wet sponge that you can tie around your neck to keep cool. From your cool spot in the clubhouse, keep an eye on who is towing out and try to time it so that you get a spot in the middle third of the grid. If you only have a choice of the front or the back of the grid, take the front. It is better to be in the air sampling the conditions than to launch last and have to start as soon as you reach the top of the convection. Start gates typically open 10 minutes after the last launch, which is not much time to get high if the day calls for an early start.

At the grid remove all tow out gear and park the car. Do this casually and don't rush in the heat. You should have plenty of time to sit and wait for your launch. Load all your food, water and other gear. Make sure you leave the keys in your car if it is likely to be needed for a retrieve or someone has to move it. Also make sure you keep the tank full in case your car has to come and get you on a long retrieve. Keep a cover on the canopy. Sit under a wing or an umbrella. Relax, eat lunch or some snacks and drink some more. Look at the sky and discuss the way conditions are developing. If you are team flying, this is the time to decide on a general direction for POST tasks or early/late start tactics. You should now be only prelaunch checks away from flying.

## **Use a Pre-launch Checklist**

Because the launch will not wait for you, there must be a planned but unhurried checklist before you get in the glider. Safety items are covered by ABCD and CHAOTIC, but there are lots of other considerations in a comp or distance flight. Make sure your GPS signal is locked, logger connected correctly

(and has enough memory for the flight), camera lens open, declarations completed, drink water flowing, and oxygen on. Have this written somewhere in the cockpit.

## **Launch**

Typically competition launches are a maximum of 2000' AGL. You should release in a thermal during the tow if possible, but not the first one you hit and not below 1600' AGL. Off tow, establish a solid climb, not necessarily the best. I have nearly outlanded off the field by leaving a 1 knot thermal at low level and chasing a visible 5-6 knots of another glider. Build up a solid buffer of height in the lift you have, before searching wider areas for stronger lift. Remember it is not a race until you cross the start line.

Look around at conditions and how the air feels, note any wind drifts using GPS ground speed and a constant air speed square flight pattern. Subtract any differences in GPS and indicated air speed to get the wind drift. Note any shears and their heights. If there is plenty of time before the start, venture down your proposed track 20 km to get a feel for the thermal strength and spacing. The typical spacing is 2.5x the thermal height. A 6,000' day should have a spacing of 4.6 km, a 10,000' day would be 7.6 km.

Within 15 minutes of your intended start, stay high and get the last out of the thermals. Pre-start gaggles can be very busy, especially if there are only a few thermals available near the start point area. 20 - 30 gliders can be flown very safely in one thermal, but you must respect the etiquette involved. You must keep an even spacing and fly as a group at the same speeds and diameters. A reduced rate of climb must be accepted because the gaggle cannot make quick re-centring moves. No single glider can make aggressive re-centring moves to increase his climb rate as the whole gaggle is then disrupted. Keep a careful eye out for other gliders joining in and allow a merging space if necessary. If the gaggle becomes too crowded, then it may be better to leave and find other lift or return at a later time at a lower level. When leaving a gaggle, make your departure deliberate but slow. Gently open out the turn and depart at a tangent to the circle.

## **Start**

The dream start is above cloud using shear wave, 0.5 km out from your start point, which is lined up with a cloud street in the direction of travel. That has never happened to me, but you should be searching for those things and

picking the best start point possible on a given day. If there are people at a higher level and you cannot contact the lift to get you there, then don't worry too much. There may have only been a small window that allowed that climb and you cannot waste too much time and effort searching for lift that has since disappeared. Be as high as possible at the start point, don't go at cruise speed for a long run into the start, approach slowly to conserve height and accelerate across the line. Ideally there will be some gliders in front to mark the thermals. Don't get distracted by them if they are not in the best air. Use their information but FLY YOUR OWN RACE.

## **Thermals**

Fly along at block speeds related to the thermal strength. That means you are using the nominal Macready speed to fly, but you do not chase the small variations during the cruise. I would use a Macready setting of  $\frac{1}{2}$  to  $\frac{2}{3}$ , the peak average thermal strength of the day. For a Standard Libelle, cruise speeds above 80 knots are reserved for the booming days as the reduced performance over these speeds is significant. Assuming an average 75 knot cruise, I would slow to 55 - 60 knots for a suspected thermal or bubble. At 60 knots you have a good roll rate and a good margin above stall to manoeuvre, but you are slow enough to feel the air, gain any useful lift with a reduced sink rate, and not charge straight through the thermal. If the potential thermal does not kick above the average thermal strength and hold for 3 seconds, use the lift without slowing any further, then re-establish your cruise speed. If you start a turn and the lift drops quickly, straighten and leave (veer the other way just in case). If you think the lift is worthwhile, but you turned the wrong way, continue the circle and re-centre after 270 degrees.

Look for streets near your track, or a simple line up of good clouds. Always be ready to fork off to a better track, but only if the angles and the benefits are worthwhile. Otherwise, use the best on track. When near cloudbase, use the cloud shadows on the ground to search for the best track or the next biggest Cu as you will not be able to see very far ahead or gauge the size of the next cloud easily. A 30 degree deviation requires a 50% increase in speed to be worthwhile. Identify every thermal source you can and use this information during later stages of the flight. Knowing that today the patches of forest are working better than the brown paddocks will be particularly useful when you are low and searching for a thermal trigger point.

Use a speed appropriate to your height. You should aim to stay in the top half of the convection height, pushing along at your chosen cruise speed and being

very critical about taking only the best lift. As you descend into the bottom half, you should be a bit more conservative. Slow down a few knots and be prepared to take any reasonable thermals to take you back to the upper levels. The higher you are, the faster you are travelling over the ground due to the air density. There is also a much better chance of streeting at height. Long glides and just a few good quality climbs is theoretically better than using every good thermal and having to centre each one, but the risk is that you miss the one vital thermal and need to make a low save at a reduced rate of climb. The lower you are, the less picky you can be about your thermals. If you are high and happy, you will probably fly better than repeated low saves and getting stressed out all the time. Streeting in light lift is a lot faster than having to use the occasional weak thermals to save you from a low point.

## **Turnpoints**

Make a conservative turn point photo or logger point. Going 1km past a turn point scores a whole lot better than 0.1km short. In POST tasks a valid turn point is anywhere within a 0.5km circle around the turnpoint. Use a 5 second interval on loggers and fly to within 0.2km of the turn point, look out, turn and leave. This will guarantee at least one good point within the 0.5km circle. I use a Garmin 'Distance and Arrow' display. I find it clear and uncluttered. Set a beep if you have one on your GPS at 0.5 km or glance at the distance to run between your lookout scan.

Know where you are going!! At the last thermal before a turn point look at the sky and reassess what is happening. From 10 km out you should know where you are going next and what feature or cloud to aim for.

When there is a strong wind drift, you should aim to get to upwind turn point low and downwind turn point high, but you should use good lift whenever you find it. If you come across a really good thermal a few kilometres before an upwind turn point, then you should seriously consider your height, wind strength and climb rate. The best option may be to mark the thermal, run around the turn point and then use the thermal to gain height and also gain the benefits of the wind drift.

Halfway through the task or after 2 hours of flight, concentration becomes a very real problem. It is quite common after two hours that attention to detail is lost, you tend to daydream and just cruise along during the best part of the day. Thermalling technique tends to deteriorate and lookout becomes less effective. This is the time to be particularly vigilant for other traffic and really

keep focussed on the task and your speed. If you have been at altitude for extended periods then mild hypoxia is also likely. Use oxygen if you have it. The various cannula type systems are ideal for this type of flying to aid concentration.

Write down your start times and turn point times along with the cumulative kilometres flown after you leave the turn point area. Use this to determine your progress on task. You should be able to relate your average speeds to conditions and either note your mistakes for improvement or congratulate yourself on going so fast. With POST tasks, work out how far you need to fly with one hour to go. Remember that final glides are about double your average speed so allow for the faster cruise at the end of the flight. Select a few turnpoint options that can be extended or shortened to match your finish time. For POST tasks, finish over time but only just. Remember that start height equals free distance especially on shorter tasks. Any extra time you stay out on course erodes that advantage. The only reason to fly longer is if conditions have improved dramatically and you are improving your average speed. There is a big risk of conditions failing at the end of the day and even an outlanding. Finishing 5 minutes early is usually better than going an extra 30 km and having to finish 20 minutes over time.

### **Final Glides**

Ideally you will have some form of electronic glide computer that is either integrated or can be cross-referenced with a GPS distance to run. Good rule of thumb glides can be done but a continuous automatic monitoring of the glide slope is simpler and allows more time to be spent on maximizing performance.

If conditions are deteriorating remember to hold on to the last thermal higher than normal. A Std Libelle can final glide 75 km at 55 knots from 7500 ft above the airfield with a 500ft finish. Straight in landings are an option but should not be relied on. That decision should be left until the last 15 km. A Std Libelle can achieve the following L/D:- 20:1 @ 80 knots (~6 km/1000' ); 30:1 @ 65 knots (~9km/1000' ); 35:1@ 55 knots (~11km/1000' ).

### **Recovery**

Even if you have had a good day with not too much stress and an easy relaxed race you still need to allow your body to recover if you expect to fly a whole competition at peak performance. Re-hydration is probably the most important thing to get right. Alcohol and coffee both tend to dehydrate the

body so consider some other form of fluid intake for the best results. It may be boring but water works wonders. A good night's sleep is another important factor in being able to do it all again tomorrow. Most once a year X/C pilots will usually notice fatigue affecting their flying after about four days of solid competition and may not be able to build back the reserves for several days, if at all.

## **Lead and Follow**

Lead and follow usually assumes a one on one coaching exercise that requires the two gliders to remain together and allow the demonstration of techniques and critical assessment of flying. If there are two gliders following then the exercise becomes much harder to coordinate and the group will always be limited by the slowest member. In a coaching task you must ensure that the group starts together, therefore the last 15 minutes before an agreed start time should be an orbit pattern near the start point, maintaining height. Don't experiment now about lift patterns and get caught 1000' low while the rest of the group leaves.

When flying together, maintain safe separation. Safety is the primary aim of any flight, performance is secondary. All pilots should know where the other gliders are even if they are unsighted. It is therefore the responsibility of the followers who are usually unsighted by the leader to maintain the safe separation and report any position changes. Try to fly in each other's view or make it known by radio that you are x km back on the left, x feet below. Being to the side especially at close range is much better in case the lead aircraft suddenly pulls up and slows or dives down into your path. The leader must be able to turn in either direction uninhibited so watch very carefully. When following to the side, be prepared to initially turn towards the lead aircraft and pass behind the tail rather than be on converging paths inside the turn. Ideal follow mode is to leave a thermal one turn after the leader then follow off to one side. You will be able to watch the initial centring technique of the next thermal before joining one turn later. While following at a safe distance you can use information of the lead aircraft to improve your own track. If the glider in front hits heavy sink 1 km ahead then you can turn further to the side and avoid the area. Likewise if the lead glider slows in a patch of lift, fly the same track through the lift zone before moving back out to the side. This can be done out to the limits of visibility. A lead of 5 km is on the limits of practical visibility. Beyond this distance it is very hard to find the leader visually or keep a close eye on any turns.

Beyond visual range you need to rely more on the radio but still in the lead and follow mode. The follower is then using the same general track but must be disciplined enough to keep up the pace without the visual incentive. All calls should start with call signs, distance to run to the next established turn point, left or right of track and height QNH. This gives the others in your group an idea of how you are going and where you are. Abbreviations should be used to reduce radio clutter once communications are established. Within sight calls of 'turning', 'have you visual' and 'leaving' are short and all that is required. Excessive chatter is distracting to the other pilots, but discuss important flight decisions like options for the next turn point.

A group of three gliders should not be spaced out over more than one thermal cycle. The leader can be topping out a thermal while the third aircraft is entering the bottom of the thermal. Any further apart than this will lose the coaching value of following. Cut off heights must be nominated and agreed before the flight to allow everyone to fend for themselves if things go bad.

As a follower you may not be very confident of the calls being made by the leader. If so you should make it known to the leader and state that you are intending to stay above x feet by taking weaker thermals. It can be hard to fly through 4 knot lift without slowing down because your leader has promised 8 knots just ahead. It is however worth trusting the judgement of the person ahead if you are cruising in the top third of the sky with little risk of landing. There is no quicker way to lose ground than circling in average air to cloud base, then flying into the boomer only to have to leave after one turn. This is after all what you are trying to learn, the process of lift selection. All lift is good, but depending on the day only a small percentage of it is worth circling in.

### **Competitions and Team Flying**

In a competition with near equal pilot skills you can use a team approach to flying and gain additional benefits. You must ensure that the team starts together. In this case the two gliders would be better off flying side by side to sample more air and increase the chance of finding thermals. It is accepted that at various times during a flight either pilot may be in the lead. With the additional information being fed to the rear pilot, the situation is more or less self correcting, however if a large gap develops then all benefits of team flying are lost.

In POST tasking, turn point codes can be used to disguise where you are heading if you do not want everyone else to know. If the trailing pilot is falling behind then you can usually modify the last part of a POST task to finish together at the correct time.

For differing pilot skills or different glider performance the team technique can still be used in a competition, however the slower pilot may aim to start earlier and be overtaken during the race. This will rely a lot more on radio communications than with visual cues.

### **Attitudes and Goals**

You should set goals that reflect something achievable but challenging. My targets are usually speed based but this can be determined by the conditions. Part of your mental preparation will be to organise your thoughts about what these goals will be. Any fears and doubts about abilities and out landings etc, must be dealt with before you get in the glider. The most dangerous problem with your first competition or gliding camp will be concentrating on the things that really matter. Do not forget that above all you are flying a glider and you must do that safely every time. Getting distracted by a rushed launch and making sure your GPS is on leads to rushed checks and towing with the airbrakes out. You may get away with it if you are in a Libelle behind a Pawnee but it can catch you out. Preparation and practice will alleviate most of these sorts of problems.

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