Dublin Gliding Club

Briefing Notes for Power Pilots

1. Introduction

Aimed at power pilots with little or no gliding experience, this briefing note hopes to familiarise you with some of the main differences between flying a glider and flying the powered aircraft that you're accustomed to.

2. The Flight

Launch will be by aero-tow, using our 180 HP Super Cub. The glider is connected to the tug by the 150' long tow-rope. For take-off, the combination hook up, the tug slowly taxis forward to take slack out of the rope and then takes off as normal, with the glider maintaining station behind the tug. For a standard training flight (i.e. one not involving spinning) the combination climb to 2,000' whereupon the glider releases it's end of the tow-rope. The tow-rope can be released at any time by either the tug-pilot or the glider pilot.

3. Controls

A glider is controlled in very much the same fashion as a powered aircraft. The primary controls (control column and rudder pedals) are identical, the mechanical trim lever (colour coded green) is mounted on right hand side of the cockpit. Unfamiliar to you will be the tow-rope release knob (colour coded yellow) which is pulled to release the tow-rope and the

airbrakes (lever colour coded blue) – these are used on approach to degrade the glide angle so as to enable accurate approach control.

4. Instruments

Basic instruments will be familiar – ASI (knots), altimeter (feet), compass. The variometer(s) fitted to all gliders are effectively sensitive VSI's and often have an audio attachment or feature, such that the volume and/or the pitch of an audio tone increases as the rate of climb increases, and vica versa. Varios read in either knots (one knot is approx. 100'/minute) or m/s (one m/s is approx. 2 knots). Radios are fitted but, subject to local airfield practise, are not normally used.

5. Pre Take-Off Checks CBSIFTCBE

C	Controls	Check for full and free movement of control column and rudder pedals, in the correct sense.
B	Ballast	Front seat pilot weight (including parachute or ballast if appropriate) must be above the minimum specified cockpit load, total pilot weight must be below the max. specified cockpit load.
S	Straps	Check that your own harness, and that of your passenger/instructor, are secure.
I	Instruments	Check that all instruments are reading normally, switched on as appropriate and set for take-off
F	Flaps	Set for take-off, after checking range of movement
T	Trim	Set for take-off – forward of neutral - after checking range of movement
C	Canopy	Closed and locked.
B	Brakes	Check airbrakes open fully, by the same amount on both wings, then closed and locked – check that the over-centre lock is engaged.
E	Eventualities	This point of the check considers the parameters of the flight and how they affect decision making in the event of a low level power failure or cable break. Factors to be considered are: • Wind strength: is the wind too strong to allow for a down-wind landing if necessary? • Wind direction: a strong cross-wind will indicate the preferred circuit direction • Runway condition – is the grass long or short? Wet or dry? This will affect take-off run length and consequent height over the upwind boundary. • Cockpit load – a high cockpit load will increase the ground run. • Upwind fields – note location of suitable fields for any off-site landing Note: Power pilots are trained not to turn back to the airfield when recovering from a low level engine failure shortly after take-off. Due to their glide angle (28:1 for a typical two-seat glider), gliders can realistically expect to be able to turn back to the airfield from a much lower height than powered aircraft.

6. Take-off

Subsequent to completion of pre-flight checks, pull the yellow cable-release knob and ask the launch assistant to hook the tow-cable on – release the knob when told to do so.
The launch assistant will then hold one wing tip, keeping the wings level.

Signals

When you're ready to go, ask the launch assistant "All clear above and behind?" (left hand digit finger rotating). When the launch assistant confirms an all clear, call out "Up Slack" (left hand digit finger held up). The tug will slowly move forward until the tow-rope is taut. If you're still happy to launch, call out "All Out" (left hand two fingers raised, moved to and fro).
If you want to stop the launch at any stage, call out "Stop" and release the tow-rope. For this reason, always have your left hand near the release knob during the ground run so that you can release the cable rapidly if necessary.
This also applies to any bystanders at the launch point – if you see something you're unhappy about, call out "Stop" and raise your right hand extended above your ahead – Safety is everyone's responsibility.

Ground Run

Hold the stick fully back at the beginning – this is to get the glider running on its main wheel as soon as possible. (Procedure will differ on gliders with c. of g. behind the u/c.) Steer with the rudder pedals and keep the wings level with the ailerons – you'll need to use large control inputs, especially at the start of the ground run and/or if there is little head wind. As the combination accelerates down the runway, you'll see the nose starting to rise. As it rises, move the stick forward so as to get the glider balanced on the main wheel. From here on, simply keep the glider running on the main wheel and allow it to take off itself – any attempt to prematurely unstick it will simply dump you back on the ground. Due to its lower stall speed, the glider will take off before the tug. Due to its increasing airspeed, the glider will want to climb behind the tug – you will need to keep the glider at about 6 or 8 feet above the ground at this stage – it is **ESSENTIAL** not to get high behind the tug. If you get too high, you may pull the tug into a nose down attitude from which it may not be able to recover. The tug will unstick a few seconds after the glider and climb away (typically at about 500 or 600 fpm).

7. Aerotow

Position

The ideal position on aerotow is have the glider just above the tug's slipstream. When in this position, the tow-rope will be bisected by the horizon i.e. the tug will be the same distance above the horizon as the glider is below it.

Flying the Aerotow

Aerotowing is basically formation flying and requires a high degree of concentration; as long as you keep the wings of the glider parallel with those of the tug, you will stay in-line. If you do get a little out of line, simply keep the wings of the glider parallel with those of the tug and the rope will slowly pull you back in line – this is slow but it does work. If you get more out of line than you'd like, you can fly back into position by making a very small co-ordinated turn back towards the centre, centralising before the glider swings back in line. If you leave the centralising too late, the glider will simply swing out to the other side. If this goes on for too long or goes too far, that nice chap in the back will take over for a moment or two to straighten things up. If you do need to move up or down, do so in VERY small discreet steps, about 1' at a time and no more.
Don't get discouraged if the tug seems to have a mind of its own as it waltzes around the canopy in front of you - there is a knack to aero-towing and it takes most people two or three attempts to get it sorted. The main thing to remember is to use small co-ordinated inputs (stick and rudder together) to keep the wings of the glider parallel to those of the tug at all times. Catch any deviation immediately before it becomes divergent. Do **NOT** get high behind the tug – if you lose sight of it (i.e. if it disappears below the nose) release immediately. Flying too low is no particular problem, it's just uncomfortable if you're in the propwash, and flying very low just means that the tug-pilot has to do a lot of re-trimming.

Release

As you approach release height (typically 2,000'), look out to the left to make sure it's clear, pull the release knob, confirm visually that the cable has released and then make a climbing turn to the left as the tug dives away to the right. Slow the glider down to 40 knots and re-trim. You may then sit back, relax and enjoy the silence.

8. Flying

Speeds to Fly

Typical cruise speed for local flying for a K13 or K7 two-seater is about 40 knots – this is close to the airspeed which yields the rate of minimum sink (about 200'/minute (2 knots) for this type of glider). This is reasonably close to stall speed (about 34 knots) and is quite manageable.
Best glide (28:1) airspeed is 48 knots.
Vne for the K13 is 108knots and 92 knots for the K7.
Stall speed is about 33/34 knots and is quite a docile event. These gliders will spin and will recover normally using the standard spin recovery technique. All stall/spin exercises must always be preceded by a HASAL (Height, Airframe, Straps, Area, Lookout) check.

Handling

The main difference you'll find in general handling is that adverse yaw is quite pronounced and that a lot of rudder (compared to your Cessna) is required to produce a balanced turn. You may also find the roll rate a little sluggish but ok.
You'll find that after a while, you'll be pretty well ignoring the instruments. Visibility is excellent and the light wing loading means that you'll very readily be able to feel what the air is doing. All this means that a good and constant look-out is all the easier, with relatively little time spent instrument gazing.

Thermals

Gliders prolong their flying time and travel cross-country by climbing in thermals (bubbles of rising air). If you do find a thermal, have a good look-out to make sure it's clear to turn, then turn into the lifting wing (the chances of flying straight into the centre of a thermal, while it does happen, are small). Start with an angle of bank of about 45° and try to assess the position of the centre of the thermal (i.e. maximum lift) as you go around – the pitch and volume of the vario (VSI) will increase as the rate of climb increases. Move the circle towards the area of max. lift – this is best done by temporarily straightening up as you feel a surge of lift, then bank back into the turn. The core of the thermal will move about as you climb so you will have to constantly monitor the climb rate and adjust your position to stay within it. It's best to leave the thermal a few hundred feet below cloudbase – visibility deteriorates rapidly as you approach cloudbase, which is exactly where gliders tend to gather.
The first glider to find a particular thermal sets the direction of turn for that thermal – any gliders joining a glider already established in a thermal must circle in the same direction as the first glider. If you're circling with another glider, do not fly into his blind spot; always fly so that you can see him and he can see you.

9. Circuit Planning

Circuits are best worked out "backwards".
The glider should be positioned such that, at 300', the final turn has been completed and that the glider is, wings level, placed so that an approach with half airbrakes applied will bring the glider down to land at the chosen landing spot. For a power pilot, the chosen landing spot is normally on the active runway. Glider pilots select their landing spot in the active area.
A final turn at 300' dictates a turn onto base leg at about 450'

This dictates a low-key point (i.e. a point on the downwind leg opposite your chosen landing spot) of about 550'.
This in turn dictates a high-key point (i.e. a point on the downwind leg about 500m upwind of the low-key point) of about 700/750'.
Which means that the downwind leg should be started at about 800', about 700m upwind of the low-key point.
All of these heights are approximate; glider performance is sufficient to allow for minor deviations.

Landing Checks

L	Lookout	In addition to the normal look-out being maintained, check for other aircraft on circuit. Check the windsock and select a landing area. Remember that gliders do not necessarily have to land on the active runway. Monitor the airfield as you fly around the circuit and be prepared to select a new landing area should conditions change (dogs, sheep, tractors, aircraft, visitors, etc encroaching on your selected landing area). Maintain a good look-out all around the circuit, in particular check for powered aircraft approaching on long finals.
U	Undercarriage	Check down and locked
S	Speed	Decide on the appropriate airspeed for landing, given the conditions of the day.
T	Trim	Trim the glider for the chosen landing airspeed

Speeds to Fly

For "normal" conditions (i.e. light to moderate wind strength, with a reasonable cross-wind element), fly the down-wind leg at 40 knots. As you pass the low-key point increase to 45 knots and re-trim for this speed. Abut half-way down the base, or crosswind, leg, increase speed to 50 knots and re-trim for this speed. Maintain this airspeed until round-out.
On a windy day, increase all these speeds by 5 knots
On a very windy day, increase all these speeds by 10 knots.

Circuit Direction

Circuit direction is often set by local airfield rules.
In the absence of any such rules, circuit direction is usually dictated by any cross-wind that may be present, in that the base leg should preferably be flown into the cross-wind. The advantage of flying such a circuit is that the base leg is flown with a lower ground speed than otherwise, allowing greater time to assess angle to the runway and make any modifications that may be desirable. It also means that if it becomes necessary to turn in early to land due to being lower than you would like, the resulting approach will at least have some element of an into-wind component.

Flying the Circuit

Start the circuit as follows:

Position:	About 700m upwind of the low key point
Height	About 800' agl
Angle	The runway should be about 30° down from horizontal
Airspeed	40 knots.

Go through landing checks as or before you start the downwind leg. Check that you pass opposite the high key point at about 700/750' and the low key point at about 550'. If you pass through some lift on the way, widen the circuit slightly. If you pass through some sinking air, increase your airspeed (to get through the sink as quickly as possible) and move the circuit in towards the runway. If necessary, be prepared to turn in early – be aware of any other aircraft movements, either on or over the airfield, if you need to do this.

Once you pass the low key point, ignore your altimeter; fly the rest of the circuit by eye. Watch where you're going, look out for other aircraft and maintain the appropriate airspeed. Increase the airspeed to the speed already chosen for the base leg and trim for it, returning your hand to the airbrake lever. The distance of the base leg back from the downwind threshold will be determined primarily by wind strength and direction.
About half-way down base leg, rest your left hand on the airbrake lever – this is to stop you groping for it half way down finals. Increase the airspeed to the speed already chosen for finals and trim for it.

10. Approach

As you turn onto finals, try to estimate how much airbrake you will need to bring you down to your selected landing area. When the wings are level, open the airbrakes to your chosen setting. You will need to make a small forward movement on the stick to maintain airspeed as you do this. If it becomes evident that the glider is overshooting, open the airbrakes further. If the glider is undershooting, close the airbrakes a little. The airbrakes are a very powerful tool of approach control, varying the glide angle from 28:1 (closed) to about 10:1 (fully open). If necessary, gliders can be sideslipped in.
As the glider descends, constantly monitor your approach airspeed and make any necessary adjustments as required to maintain the airspeed at your chosen level.

11. Landing

Landing a glider is very similar to landing a powered aircraft – the main difference being that the flare is a lot lower than you're used to and that the elevator remains more powerful for longer during the hold-off.
Once the glider gets down to about 20', leave the airbrakes (but don't take your hand off!) at whatever position they are at – pumping the airbrakes at this stage is asking for trouble. Hold the aircraft off for as long as you can, about 1' above the ground and let her gently settle onto the ground when she wants to. As soon as the wheel touches, open full airbrakes and concentrate on keeping the wings level until the glider comes to a stop, gently letting one wing down on the ground…