11a WINCH LAUNCH

SPL Syllabus: Exercise 11a Winch Launch			
(i)	**Signals or communication before and during launch**	**(v)**	**Crosswind take-off**
(ii)	**Use of the launch equipment**	**(vi)**	**Safe and adequate profile of winch launch and limitations**
(iii)	**Pre-take-off checks**	**(vii)**	**Release procedures**
(iv)	**Into wind take-off**	**(viii)**	**Launch failure procedures, simulated during the winch launch**

INTRODUCTION

Winch launching is the most popular glider launch method in the UK with about 150,000 conducted annually. It is a safe means of launching gliders providing the inherent risks are thoroughly understood and mitigated. During early training, the instructor will carry out all the risk mitigation, however the trainee must be taught the risks, to enable their own TEM before solo launches.

The BGA has worked extensively to understand the risks associated with winch launching and educate the members; and this has greatly reduced accident rates. Even so, wing tips still touch the ground during the ground run. The success in getting pilots to have the hand on the release is not always matched by the willingness to actually pull the release when unable to keep the wings level. It is essential the release is pulled as soon as the pilot cannot maintain the correct picture ahead. That is usually before the wing has dropped markedly, well before it touches the ground.

See the on-line video below for the potential consequences.

https://members.gliding.co.uk/wp-content/uploads/sites/3/2015/04/cartwheel_6.mp4

Do not assume that trainees will obtain all the required information by 'osmosis.' Make sure they are aware of the reasons for the BGA rules and operational guidance. That guidance is regularly updated and should be referred to as part of the training process. The new trainee must read the 'Safe Winching' information, and review **with an instructor** during training and most definitely before solo.

https://members.gliding.co.uk/bga-safety-management/safe-winching/

Many clubs operate professionally constructed winches. These modern winches are capable of promptly providing power - considerably more than that needed. It is essential winch drivers deliver power at an appropriate rate. Excessive acceleration makes it difficult for trainees, (and instructors) to keep up with the process. Excessive acceleration may initiate undesirable pitch and yaw moments to the glider.

Clubs are also moving away from steel cables to polymer-based materials. These 'Synthetic' cables have significant advantages over steel. Whichever cable their club uses, both instructors and trainees need to be aware of the significant characteristics of their system.

Winch launching requires a team of people who are competent in the various roles required. Competency requires training and monitoring to ensure the whole process is conducted safely. It is not appropriate for anyone to perform any of the operation(s) in the launch process without close supervision unless they have been trained and 'signed off '.

Winch cables must always be regarded as 'live.' They may move at any moment without warning. Expect the cable to disappear towards the winch without warning. A grass cutter or any vehicle or aircraft crossing a cable can pick it up and move it just as quickly as the winch. Always educate trainees to handle cable so that it will pull out of their fingers if it is moved unexpectedly, rather than wrap around them. Do not get between the parachute and winch and do not loiter in front of gliders after hooking on.

ADVICE TO INSTRUCTORS

Takeover

Things happen quickly when winch launching. **Take over early** if at any stage the launch profile is incorrect, recovery of a failure is inappropriate, or the trainee turns the wrong way. Take over and complete the launch or recovery and landing. Debrief after getting out of the glider.

Do not be tempted to begin winch launch training until the trainee can at least achieve a reasonably straight glide and coordinated turns. It is usually preferable to wait until they have begun to master how to land the glider.

WINCH LAUNCHING - THEORY BRIEFING

Winch launching overview

Whilst we teach winch launching from the 'top down' i.e. initially allowing the trainee to take control on the upper part of the launch first, it is important to fully brief the whole winch operation. The primary consideration for any launch is that it is conducted safely. Achieving the maximum height is a secondary consideration, but excessively steep rates of climb do not contribute to achieving a greater launch height.

The trainee must understand that whatever the glider characteristics a smoothly controlled rate of rotation consistent with the speed increase is essential for safety. The ability to comfortably recover safely in the event of a launch failure is also a key consideration.

The mechanics of the winch launch are straightforward and can be considered about each axis of the glider in order to anticipate the likely consequences, once the cable is taut and glider accelerating.

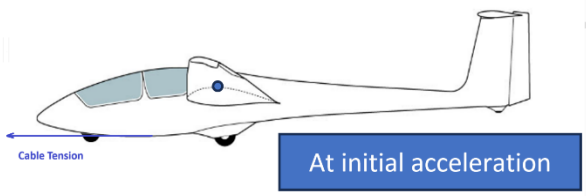
Lateral axis (Pitch)

The glider stalls when the angle of attack reaches a critical angle, and the lift available at that angle of attack depends upon the speed. The path followed by the glider depends upon the balance of that lift and the glider's weight and cable tension. If the lift is enough to exceed them (as a vector sum), then the surplus will cause upward acceleration and a reduction in the angle of attack relative to the air. If it isn't, there will be a downward acceleration and an increase in angle of attack which reinforces any stall. Put very simply: if we rotate more rapidly, we pull more G, increasing the stall speed. For example, A glider with a 1g stalling speed of 34 knots will stall at about 50 knots during rotation on a winch launch if the rotation rate is 20° per second. The stall speed will be about 45 knots if the rotation rate is 15° per second.

A low airspeed and a high rotation rate can arise from a too rapid rotation at low airspeed, or from a rotation with an airspeed that was initially adequate, but which reduces during the latter part of the rotation. Therefore, there must be sufficient airspeed to allow the glider to climb and, additionally, the rate of rotation must be smooth and gradual, so that the increase in angle of attack is small. See Figure 4

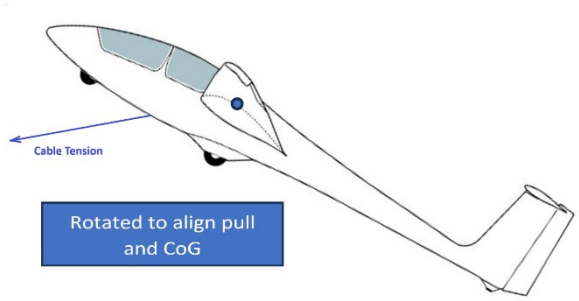
With the glider on the ground, the glider's CoG will be above the line of the cable. Therefore, the pull on the hook will tend to rotate the glider around the CoG i.e. the nose will want to rise.

Figure 1.



Once the wings produce sufficient lift, the glider lifts off the ground and it becomes free to rotate in pitch. As the speed increases the glider, having lifted off, will start to climb. I**f the pilot does not prevent** the nose from rising, the force from the cable will continue to rotate the glider, rapidly increasing the angle of attack i.e. effectively auto-rotating and increasing the risk of a stall.

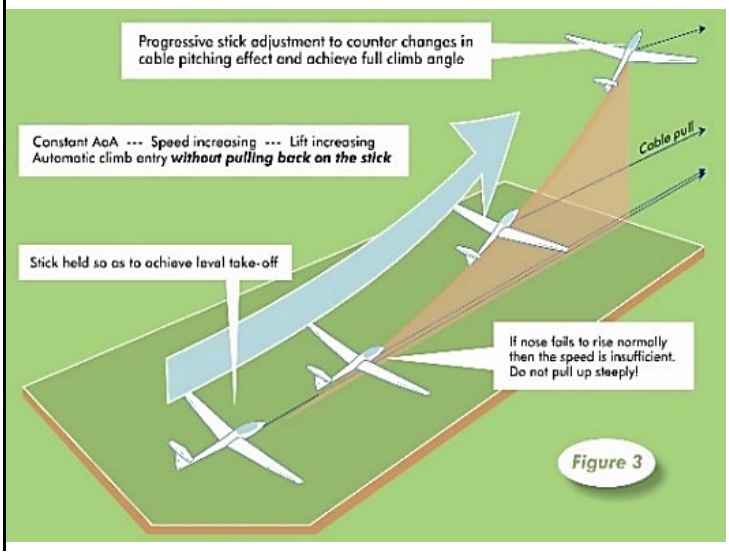
Figure 2



The correct procedure is to start with the elevator slightly forward of neutral. As the 'all out 'is given, and the glider accelerates, use the elevator to balance the glider on the mainwheel and then maintain the glider at or close to the take-off attitude for the initial part of the launch. Provided there is continued acceleration and sufficient airspeed (not less than 50kts or 1.5.x stall speed of the glider, and increasing), the pilot can allow the glider to transition smoothly and progressively into the climb, if anything, the pilot must be ready to move the stick forwards to control a smooth rotation, if the nose tends to rise rapidly.

There must be no abrupt changes of attitude as these entail corresponding changes of angle of attack. If correctly trimmed, no back pressure is needed to achieve the rotation.

The importance of speed monitoring throughout the launch must be stressed. Slow speeds at low level are unsafe. Feeling the acceleration of the glider is equally important. the ASI lags (because of the glider's inertia) and if no acceleration is felt as the glider is lifting off, the launch should be abandoned, whatever the ASI says.



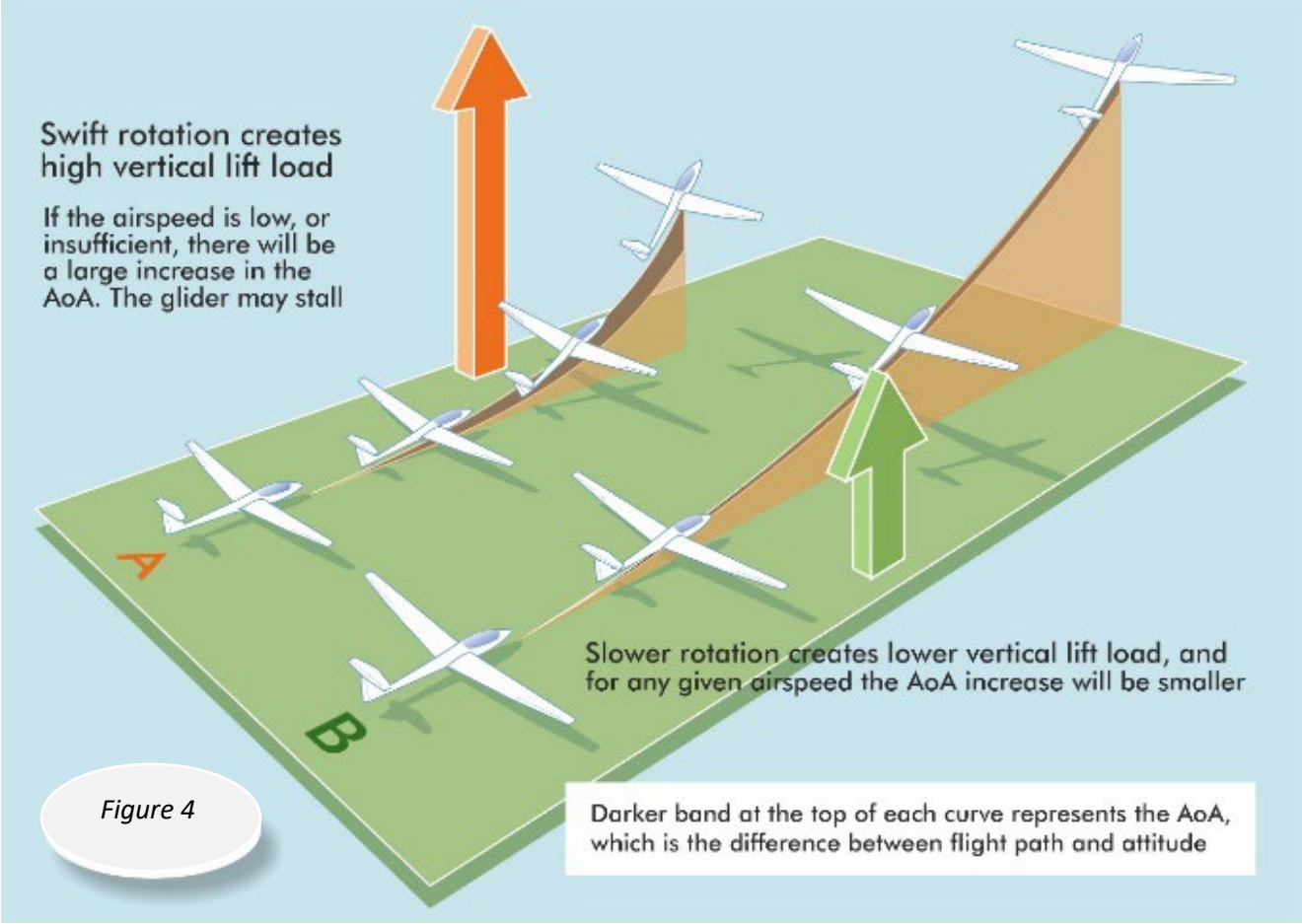


Figure 4

It is important to allow the nose of the glider to climb gradually see fig 3.

Pilots are often concerned about exceeding max winch speeds at the lower part of the launch. However, because the cable is pulling longitudinally to the direction of travel, the stress on the airframe will not be excessive.

The max winch speeds only become relevant in the upper parts of the launch. There is no record of an accident resulting from too high an airspeed on a winch launch.

Longitudinal axis (Roll)

Wing drop recognition: pilots vary considerably in their ability to recognise when the wings are not level, or even when a wing tip is dragging on the ground. Failure to recognise and react promptly to a significant wing drop can be fatal. Therefore, wing drop recognition must be taught from the outset.

The correct position of the horizon to maintain the wings clear of the ground can be described in a variety of ways. It is straightforward on a flat airfield with a distant horizon, but many are not like that, so illustrate to the trainee what the view ahead should look like at the start of the winch run, by sitting the trainee in the glider and getting a wing tip holder to vary the position. Contrast this view with what it looks like if a helper holds the wing tip slightly above the ground.

To maintain wings level at low speed on the ground, full deflection may be required. However, the trainee will often only apply the amount of aileron deflection that would be appropriate to correct similar small errors in bank angle when in flight. Brief them before their first attempts and monitor closely. Emphasise that if the wings cannot be held level the pilot must release before the wingtip touches the ground.

Vertical axis (Yaw)

The glider should always be lined up with the launching cable. However, even when it is, it may yaw as it accelerates. Several factors (see figure 5) cause this:

- An offset release hook.
- The lie of the cable on the ground.
- The wing-tip holder holding back.
- Crosswind.

Many gliders have their winch hooks offset from their centreline. So, when the cable applies its pull, there is a force trying to rotate the glider away from the hook offset. (i.e. Hook offset to left – glider swings to right.)

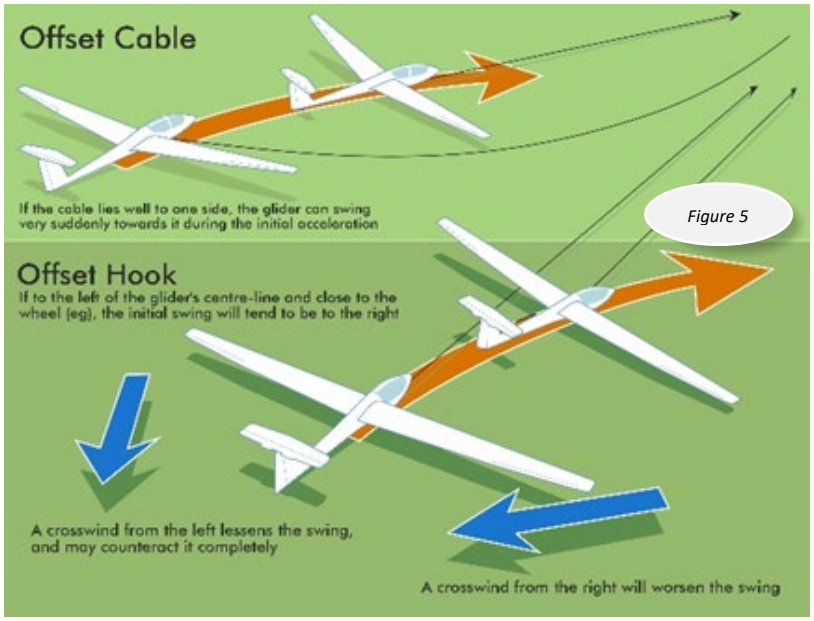


Figure 5

Field layout

The instructor in charge, together with the winch driver, will consider the positioning of both the winch and launch point. Whilst achieving the best height is important, safety is more important.

Consideration must be given to the fall of cable from all stages of the launch, including in the event of a cable break. The pilots must also be aware of where the cable will fall. At sites with limited space or directional options 'laying off' is often required.

Wind conditions may change throughout the day. This can have a significant effect on the safety of the set up.

Landing or taking off into a low sun is hazardous but may be avoided by a small change in the operating direction. There can be significant 'inertia' when it comes to changing the launch set up, particularly if it is late in the flying day. However, safety is important so do not continue when you should not; make the change.

Immediately before getting into the glider at the launch point, assess the wind direction and strength, cable pull-out route and the direction in which the glider is pointing. Do not try to launch with any tail wind component.

If a wing goes down and the pilot releases, there may be a significant heading change as the glider rolls to a stop. Therefore, the launch area must be clear of obstructions in a 45-degree angle either side of the nose for a reasonable distance.

Although the elements of cable, parachute, shock rope, weak link and release rings are common to all clubs, there are innumerable local variations. Trainees and visitors must be made aware of these differences. For example, some clubs will use a coloured hose over the strop cable to identify the weak link, others do not. Trainees should be trained to look at the actual weak link to see its colour.

Cables are often drawn out towards a point alongside the glider rather than directly at it. To minimise the likelihood of the glider swinging as it accelerates, the cable should be pulled in line with the glider. A simple technique to teach ground crew is to pull the cable right across to level with the further wingtip and then drop the end back in front of the glider's nose.

Signalling

Inadequately trained ground crew present a significant safety hazard. Brief the trainee on these ground signals, 'Take Up Slack,' 'All Out' and 'Stop.' They need to understand when they are to be given, who gives them, how they are given and any local methods or variations.

The 'STOP' signal can be given by anybody, including the wing-tip holder if the glider is significantly out of balance. The wing-tip holder must be properly trained to keep the wings level as long as possible and to avoid pulling the wing back as they run the wing. Discuss when and how to signal 'Too Fast' whilst launching. It should only be required in the upper half of the launch. Encourage your trainees to observe the launches taking place prior to theirs. It may provide useful information for planning the launch, such as any yaw and possible reasons, cloud base above launch height, lay off required etc.

Preflight checks

Use the same pre-flight checks; a walk around, A-B-C-D-E & C-B-S-I-F-T-B-E-C for winch launches, as any other launch. Complete the external pre-flight checks. Do not launch if the wings are contaminated with rain, snow. Any increase in stalling speed as a result is unacceptable.

Before getting into the glider, check seat backs are in, if necessary, and locked in position. Avoid using packing between the pilot and seat back, but if it is unavoidable DO NOT use any compressible material. This is important due to the high acceleration involved during take-off. Check for any ballast fitted.

C-B-S-I-F-T-B-E-C has some winch specific considerations. The **T**rim is set for the required approach speed, usually somewhat forward of neutral (nose down) in anticipation of a launch failure. The factors involved in estimating how to set it include the glider type, the cockpit load and desired recovery speed. The position will also depend on the wind speed and combined weight of the pilots. If the glider has

flaps, they may need to be set differently to that required for aerotowing; always check the Flight Manual.

Ensure the straps are secure and tight, and that all the controls, including the cable release can still be comfortably reached, without risk of it slipping from the grasp in the event of having to pull it.

The Eventualities check is particularly important. Ensure that there are no obstacles in the launch area or anywhere we might end up if we drop a wing and release. Check V_W, the maximum permitted launch speed.

Make a final check of wind speed and direction and consider the launch failure options thoroughly.

Consider:

- how much landing area is ahead
- the headwind component
- any crosswind component
- potential alternative landing directions

Nominate a minimum manoeuvring speed to be adopted in the event of a launch failure. Finally, before closing the canopy and accepting the cable, check for traffic in the circuit. Ask for the cable to be attached, **checking the correct weak link and hook are used**. Once the release is closed keep your hand on the release. If there is a delay between attaching the cable and take up slack, or you hear a 'Stop' signal, pull the release.

Flying the launch profile

During 'take up slack' monitor the rate at which the parachute moves away from the glider, if the speed is excessive pull the release before the rope goes tight to avoid a snatch.

As 'all out' is signalled, look ahead and use aileron as required (possibly full aileron) to keep the wings level, rudder to point the glider along the cable and elevator to balance on the main wheel if possible.

As the glider accelerates it should leave the ground in a level attitude. Maintain the glider at or close to the take-off attitude. Do not attempt to raise the nose. Monitor the ASI and its trend, as you see the airspeed increasing through the safe minimum (around 50kts on most gliders) and feel continuing acceleration. allow the glider to transition smoothly and steadily towards the full climb attitude. This phase should typically take about 5 seconds.

At this point minimum speed is more important than maximum winch launch speed. It is common for the maximum launch speed to be exceeded; do not allow this to be rapidly reduced. i.e. do not pull back. At this point of the launch 'overspeeding' carries no risk because the cable is pulling longitudinally to the direction of travel. In contrast, changing the angle of attack sharply is dangerous.

Once the full climb is reached, monitor both the climb and bank angles by looking at the wingtips. Look forward to see the position of the horizon relative to the edges of the canopy. If it is not symmetrical use coordinated control to roll so a straight flight path is maintained. This will need to be modified if lay-off is required.

Glance at the ASI and again note both the speed and its trend. As the glider gains height, the cable pull direction relative to the glider will increasingly try to pull the nose down. The wings are now not only supporting the weight of the glider but opposing the considerable cable tension. Considerably more back pressure than the trainee is used to applying in normal flight, is needed on most types to maintain the climb attitude.

The back pressure needed increases steadily as the glider climbs towards to the top of the launch. The load on the airframe, the wings and tail in particular increase considerably above normal at the top of the launch. The speed should be maintained at the target ideal speed, i.e. between maximum winch speed and the minimum for the glider and conditions.

If speed is reducing, reduce back pressure, if this does not yield an increase in speed abandon the launch.

Provided there is sufficient airspeed the glider can be held in a climb of up to 45° (check by glancing at the wingtip). **Do not exceed this climb angle because a safe recovery from a launch failure may not be possible at steeper angles, particularly if there is a wind gradient.**

If the full climb angle has already been reached and the speed is increasing towards maximum, signal 'too fast.' This should be done by relaxing the back pressure and yawing the aircraft positively left and right whilst keeping the wings level. – so the winch driver observes a clear signal.

If the speed does not reduce, pull the release.

Inevitably, despite considerable back pressure on the stick, the nose will be pulled down – the horizon moves up the edge of the canopy and may become visible over the nose. At this point release is imminent.

Release Procedures.

At the top of the launch one of the following will happen:

- a feeling of deceleration when the driver cuts the power which may be accompanied by a reduction in airspeed and in the noise transmitted up the cable from the winch. When this occurs, the nose should be lowered to the normal attitude and the released pulled. If the pilot times the lowering of the nose well when the driver cuts the power, then the aerodynamic drag and weight of the cable often causes a gentle back release, minimising the stress on the hook.
- If the winch driver fails to cut the power, lower the nose to reduce tension in the cable and pull the release.
- If the pilot does not release in time, and power remains on, the glider will overfly the winch resulting in a back release accompanied by a bang! This is best avoided.
- If the launch is too slow, too fast or if cloud is encountered, it may be necessary to release the cable early. In these cases, it is safer to release the cable under tension before lowering the nose to reduce the probability of the glider encountering the parachute or cable.

Crosswind launching

Any crosswind will tend to swing the glider into wind during the ground run. It is good practice to consider these factors before accepting the cable. Apart from the glider no longer going in the right direction swing encourages wing drop.

It is usual for the downwind wing of most gliders to be held at the start of the ground run, to reduce the probability of weathercocking.

Some thought about the launch point set up may also reduce the cable lie problem. If the cable lies to the left of a glider with the hook offset to the left the swing will probably be minimal. It the cable is laid on the right it will be much more significant, particularly if the glider has a nosewheel and the strop pulls around that. For nosewheel gliders, if the cable is laid on the opposite side to the hook offset it should be fed under the glider behind the nosewheel before being attached.

At the start of the ground run the pilot should be ready to apply into wind aileron and opposite rudder to prevent the weathercock effect of the wind on the fin. When launching in a crosswind, it is normal to 'lay off' in order to limit how far downwind the cable will be dropped if it breaks. This is accomplished with the into wind wing low, the yaw string centred. i.e. balanced flight in the upwind direction. Point out that even with the yaw string centred the glider will not feel as though it is in coordinated flight due to the external force from the cable. The lay off should not be introduced until in the full climb. The maximum acceptable crosswind component depends on the glider type. Gliders which sit tail-down and have tailskids are generally more susceptible to crosswinds, particularly on hard surfaces.

WINCH LAUNCHING - EXERCISES

(i) SIGNALS OR COMMUNICATION BEFORE AND DURING LAUNCH

AIR EXERCISE BRIEFING

Only the 'Too Fast' signal is employed in the air and in practice that is likely to be practised on an opportunity basis, so repeated briefings may be required until such an opportunity occurs.

When the opportunity arises demonstrate and patter giving the signal. Point out that the nose should be lowered slightly to reduce the stresses on the airframe and that the aircraft should then be yawed each way whilst keeping the wings level and finally the nose raised slightly to continue the climb.

TEM	
Threats:	**Mitigation:**
A trainee may fail to signal when required.	Monitor closely & take over early rather than late.
Errors:	
A poorly conducted signal may result in the glider being re-directed left or right.	Monitor closely with particular regard to maintaining the correct bank angle.
A poorly conducted signal may fail to get the message across.	Monitor conduct of the signal and if inadequate take over and demonstrate.

MANOEUVRE LESSON

When the opportunity arises allow the trainee to practice the signal. It may be necessary to prompt them to give the signal. Ensure the signal is given clearly and that the trainee resumes the climb appropriately afterwards. They must abandon the launch if it remains too fast.

DE-BRIEFING

Reinforce the correct indication for the signal. Explain how to correct any error/improve.

(ii) USE OF THE LAUNCH EQUIPMENT

Ground briefing to include**:**

- Field layout, cable and parachute and cable runs
- strops and weak links
- release rings
- key safety aspects

(iii) PRE-TAKE-OFF CHECKS

EXERCISE BRIEFINGS and DEMONSTRATION

Demonstrate and ensure the trainee understands how to perform the following checks:

Walk-around check – Airframe
Ballast
Controls
Dollies
Environment

Cockpit checks - CBSIFTBEC

Explain there may be variations due to the glider or conditions.

Consider and agree: -

- Maximum winch launch speeds – placard, weak link colour.
- Minimum safe speed to begin the rotation phase.
- Minimum recovery speed following a launch failure for the current conditions, before deciding if landing ahead is possible or manoeuvring / air brake operation.
- Who will fly the launch failure.

Note: Eventualities **must** include the reminders **that if wings level cannot be maintained, we must release immediately.** Also, the speed following launch failure recovery. Finally, to Land ahead if safe and sensible and if not the appropriate direction of turn. Make certain there are no obstructions ahead, and that the wing is clear of the other cables / parachutes.

TEM	
Threats:	**Mitigation:**
Errors or omissions in the checks may result in taking off with an inadequately prepared glider	Carefully monitor the conduct of the checks
Helpers & spectators may interrupt the checks.	Encourage third parties not to interrupt. When they do, be very careful the check has been correctly completed. If necessary, start again.
Errors:	
As instructor after hearing the trainees checks many times it can be hard to remain attentive to their conduct.	Take sufficient breaks to maintain your concentration.
Failing to allow for changing conditions.	Stay alert for changes, even on 'benign' days.

LESSON & DEBRIEF

Allow the trainee to undertake the checks from an early stage, so they understand their own responsibility for them on subsequent flights. Try to ensure that the trainee running through the Eventualities involves thinking them through, not simply reciting the usual words or assuming they are the same as the previous flight. As these practice checks will precede real flights it is not appropriate to leave the de-brief until later. Question, discuss and correct issues as they arise.

(iv), (v) & (vi) INTO & CROSS WIND TAKE-OFF AND SAFE AND ADEQUATE PROFILE OF WINCH LAUNCH AND LIMITATIONS

Before learning to launch, the trainee needs to be able to control the glider in harmonised flight. They will usually be flying the circuit approach and landings. Before allowing them to progress to flying the take-off, take them through the safe winch program materials on the BGA Website, explaining why the profile is flown the way it is. Knowledge of the consequences of getting it wrong early in the launch will hopefully make our trainees suitably cautious.

EXERCISE BRIEFINGS and DEMONSTRATION

Winch launch take-offs happen too quickly for the instructor to patter everything of significance and even if they could, no trainee could ever retain that information. Many demonstrations will be required, particularly in different conditions: maybe a change in crosswind, different take-off directions etc. These will result in variations in the briefings.

Winch launches should be taught from the top down. Once the trainee is handling the upper stages of the launch, they can attempt the take-off and the critical rotation into the climb.

Remind the trainee of the most significant points of the take-off, in particular those you want them to learn on that flight.

TEM	
Threats:	**Mitigation:**
Cable falling onto things or people, on or off the airfield.	Consider the set up carefully to minimise risk.
Errors:	
Underestimating the risk.	Take care and try to arrange a margin in your airfield set-up.
Failing to allow for changing conditions.	Stay alert for changes, even on 'benign' days.

MANOEUVRE DEMONSTRATION

Focus initially on how to achieve the correct and safe launch profile. Demonstrate a full launch, with the trainee following through on the controls, while you patter, to cover the points above. On subsequent launches allow the trainee to take control late in the climb, to maintain it and finally release. Once they can maintain direction attitude / speed & any lay off, progressively give them control earlier in the launch.

Flying the launch profile

Ensure the following key points are re-enforced.

- Ensure the hand remains on the yellow knob to release immediately if necessary.
- When 'all out' is signalled, look ahead and use aileron as required (possibly full aileron) to keep the wings level, and rudder to steer. Balance on the main wheel if possible.
- Monitor the ASI frequently.
- As the glider accelerates it will leave the ground in a level attitude, the last part to leave the ground should be the main wheel.
- Do not attempt to raise the nose and use the elevator to maintain the glider at or close to the take-off attitude. Monitor the ASI and its trend.
- Only once the minimum ***speed for rotation*** has been reached and is increasing, allow the glider to transition smoothly and steadily to the full climb attitude.
- Monitor both the climb and bank angles by looking at the wing tips.
- If the full climb angle has already been reached and the speed is still increasing towards maximum signal 'too fast.'

TRAINEE ATTEMPTS

After the initial demonstration, the trainee should only be allowed to take control once the glider is established in the full climb, and at a steady speed. If the trainee is ready, has been briefed correctly and has seen a number of effective demonstrations they should handle the top third or so of the launch without too much difficulty. Only the load on the stick at this stage of the launch will be new to them.

Once the top third is being flown OK the whole launch from the top of the rotation should also follow with few difficulties. In subsequent flights the trainee can take-over at a progressively earlier stage

The take-off and rotation however need to be handled carefully. Much is happening quickly and if anything is not as it should be do not hesitate to take over. Wasting time prompting here may result in an accident!

Be extra alert during the take-off, initial climb, and following any launch failure. Hover your right hand behind the stick ready to take over if the trainee tries to climb too steeply. Have your left hand on the release, and if possible, also lying over the airbrake lever to prevent the brakes being inadvertently or deliberately opened at the wrong moment. Be prepared to release immediately during the ground run if a wing threatens to or actually touches the ground. Be ready to prevent any or excessive forward stick movement if there is a low-level failure.

On or close to the ground, the effect of a prompt on the trainee's conduct of the launch is unpredictable. **If a potentially hazardous situation develops do not prompt, take control.**

In the event of an unacceptably rapid pitch-up after take-off, taking over immediately and doing something about it safeguards the situation and reinforces to the trainee the severity of the situation. Debrief it later! If your hand is hovering just behind the stick (not actually touching it), then taking control will come naturally and quickly.

The ASI must be monitored frequently. Sometimes a questioning de-brief will indicate that whilst the launch may well have been flown correctly, the trainee had little, or no idea of the speeds involved. The ability to monitor the airspeed effectively during these busy seconds will only come with practice. Initially you, as the instructor, must do it for the trainee and, as ever, be ready to take control.

Crosswind launches

Trainees often struggle to maintain an appropriate or steady lay off. Demonstration of appropriate response to various crosswinds will address the former. Often insufficient reference to the wingtips once in the climb aggravates the problem.

Remind the trainee that the layoff should not be introduced until in the full climb.

DE-BRIEFING

Given the brevity of a normal take-off, it can be challenging for an instructor to spot every point worthy of mention, and to do so would overload the trainee. Pick one or two key points to emphasis.

(vii) RELEASE PROCEDURES

AIR EXERCISE BRIEFING

The trainee will have seen several demonstrations of the release procedure before they do it themselves. This exercise is normally combined with the trainee flying the upper part of the full climb.

TEM

Threats:	**Mitigation:**
Collision	Maintain thorough Lookout
Errors:	
The trainee may release under tension causing cable issues at the winch.	Brief and demonstrate the correct procedure carefully.

The Flying

MANOEUVRE DEMONSTRATION

It is not necessary to devote a complete launch just to a demonstration of the release. It should be incorporated in the teaching of the upper part of the launch. Point out to the trainee that the end of the launch is imminent and release as required.

Once the cut in power by the winch driver is felt, the pilot lowers the nose to the normal attitude and, if the cable does not immediately back release, they should pull the release.

If no cut in power is felt, the pilot must decide when they are at the appropriate position to release, then lower the nose definitely and immediately (before the cable comes tight again) pull the release. The sequence is always 'lower the nose, then pull [the release].'

TRAINEE ATTEMPT

Assuming the trainee is appropriately handling the upper part of the launch then they are ready to release, initially when instructed and as they gain experience, when they see fit.

DE-BRIEFING

Only the timing of the release presents any difficulty and if that is not correct then advise as required.

WINCH LAUNCH FAILURES

INTRODUCTION

Any instructor teaching winch launch failures must obviously be current at the exercise themselves. If the site is difficult or restricted the TEM pre-planning must be thorough and the instructor must be ready to take over if the trainee deviates from what has been determined as the safe plan.

Advice to inexperienced, recently qualified instructors is to make the launch failures you teach initially very straightforward: obviously land ahead or obviously no room ahead. Remember that an important part of the training is to convince the trainee that they can easily handle these situations themselves. This object is defeated if the instructor has to take back control because the manoeuvring required is so difficult. The situation should at all times be comfortably within the instructor's control, not pushing *their* limits.

At large sites cable break options are usually plentiful and easy, but we should be teaching trainees to deal with launch failures at any site. A concentrated session of training is advisable just before solo and regular refresher training later. The trainee may have managed comparable tasks, e.g. stall recovery, circuit planning etc., but the workload during a launch failure/cable break may be too high for them. If you are not demonstrating, then be prepared to take over. Taking over and turning the exercise into a demonstration is safer than prompting.

Airfield set up

The winch run should always have overlapping options in the event of a launch failure. i.e. there should be sufficient height to safely turn before there is too much height to land ahead.

The land ahead option should not require anything other than full airbrake to accomplish, once approach speed has been reached. Whilst it may be possible to get in using full brake / side slip / energy dump combinations, if the winch run has been set up correctly in those situations, turning is likely to be simpler and have a better outcome.

Be aware of light / zero wind conditions, the rate of climb is markedly lower, and landing distance is longer. The glider will fly a very considerable distance in ground effect as during the ultralow failure demonstration.

Be cautious of wind changes during the day. While you are focusing on instructing it may have changed and eroded the margins for safe cable break options.

When judging the point at which to initiate a simulated cable break (by pulling the release) in launch failure training, consider using distance along the winch run rather than the altimeter. Pulling the release in the first ⅓ of the run should give a comfortable land ahead option, and anything over ½ way an abbreviated circuit. Between those two there may or may not be room to land ahead, depending on the airfield and the strength of the wind.

Given the rather poor view of the airfield ahead from the back of a typical two-seater climbing steeply, inevitably, we will pull the release at the wrong time on occasions. It is particularly important to fly the launch failure we have, not the one we wanted.

Ongoing Launch Failure Training

Launch failure training does not stop once the exercises have been signed off. Pre- and post-solo trainees need to be checked frequently with a range of launch failures. Also, experienced pilots should prove they can handle launch failures safely, preferably at least once a year.

When to teach

This is a particularly important part of Winch Launch training, and a thorough classroom briefing is required. Trainees not only need to know what to do, but why they should do it. Once the trainee can fly the launch profile consistently in different wind strengths and directions and perform the approach and landing well, they are ready to handle the additional pressure of launch failures.

i.e. the trainee should be able to

- Judge the circuit, to put the final turn in about the right place.
- Achieve a stable approach (Speed, centre line & descent rate.)
- Do a fully held off landing.

Teach trainees to expect a launch failure and be surprised when they reach the top of the launch. For example, during Eventualities, using words such as '*<u>When</u> the launch fails I will ….*'. Rather than; '*<u>If</u> the launch fails I will…*'.

A number of launch failure causes need to be considered. Depending on the type of failure there will be different noises and or sensations. It is important for the trainee to recognise the reduction in (power) airspeed, rather than reacting to a loud bang, which will not always occur. Simulated and real cable breaks tend to be sharp and obvious. Winch failures often die away gradually. It is important that trainees experience both varieties.

Start by demonstrating and practising launch failures as an upper air exercise.

Then, demonstrate launch failures at different heights before they are practised by the trainee. Begin with the low launch failure and a land ahead first. Then the high launch failure with a mini-circuit, followed by the **Ultra-low-level failure which should be done as a demonstration only**.

Trainees need to be taught to consider the minimum safe speed/height combination for launch and launch failure options and nominate the approach/recovery speed before taking off for every flight.

Typical demonstrations of launch failure, with the instructor pulling the release, provide inputs which will not be present in actual launch failures. It is possible for the trainee to feel the instructor start to pull the release before the cable comes off the hook. Failures initiated by the winch driver are often preferable. Some of these should consist of a slow reduction in power. The weak link failing or a cable break very close to the glider can feel similar to pulling the release, but most failures are rather more subtle.

Simulated failures at early stages of the launch, where there is a risk of flying into the cable parachute, should always be initiated by the winch. Higher up, there is the drawback that the winch driver may not be able to judge the height accurately, giving a simulated failure not at the height the instructor wanted. This drawback must be balanced against the advantages just described

The introduction of Polymer based cables for glider launching has much improved reliability, but they still fail occasionally. When they do fail it is usually with little or no noise. A winch running out of fuel during launch, would give progressive deceleration.

LAUNCH FAILURE PROCEDURES, SIMULATED DURING THE WINCH LAUNCH - THEORY BRIEFING

After any launch failure the objective is to avoid stalling, maintain as much energy as possible and land safely. To that end it is important that our trainees respond to any failure however it presents. Treating a poor or 'unusual' launch as a failed launch is the safe option.

Following any launch failure:

- Lower the nose to an appropriate recovery attitude, while checking the ASI.
- Wait until the approach speed has been achieved.
- Plan a safe approach and landing.
- Monitor airspeed.
- Fly the approach and landing accurately (keeping the string in the middle).

Recovery

Except for the very lowest of failures, this will require the nose to be promptly lowered to the appropriate attitude for the phase of flight, which reduces the angle of attack.

The degree of stick movement will depend on the attitude of the glider at the time. Immediately after take-off, before the nose has been allowed to come up at all, little or no forward movement will be appropriate. From the full climb a positive movement forward is needed and will need to be held until the glider has accelerated to the appropriate speed. A reduction in G will accompany the significant pitch attitude changes from 'nose up' to the recovery attitude, which will be below the normal approach attitude for the day.

A push-over at zero G is ideal; the glider will not stall at this loading and it provides a 'window' in which to achieve the nose-down recovery attitude, from which the glider will easily accelerate to an appropriate flying speed even if the airspeed is very low when the normal 1G force returns.

It is important to consider the wind gradient: on windy days, the launch may have been given a boost in energy as the glider climbed into faster moving air. Unfortunately, that will be lost again when descending. Whatever the phase of flight, lowering the nose to the appropriate recovery attitude should not be delayed. Typically, we set a minimum approach speed and a target +5kts higher.

The recovery attitude enables safe airspeed to be recovered as quickly as possible. Once this is done, the aim is to maintain an appropriate airspeed for the phase of flight. It will take time for the glider to accelerate, and the pilot **must wait for the speed** to reach the correct value. Once the target airspeed has been reached in the recovery attitude, speed will increase beyond the target, **so make a correction to the attitude to steady the speed**, this will change the picture ahead. Once the glider is maintaining approach speed the correct picture over the nose can be seen and the possibility of landing ahead judged. **See figure 6 below**

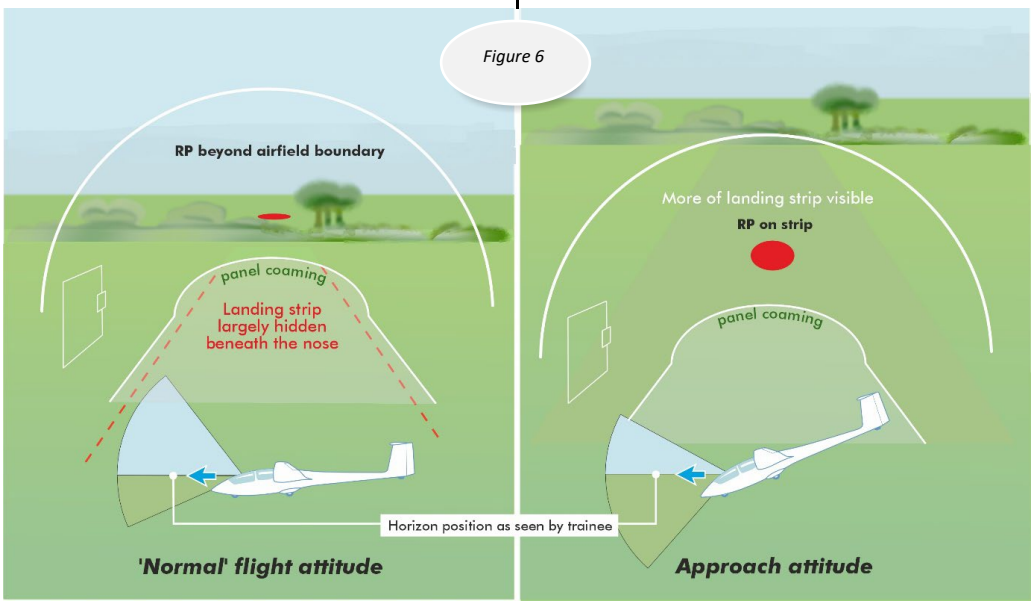
Planning and judgement

Deal systematically with planning decisions. The only objective is a safe landing. Do not allow the often illusory 'convenience' of a shorter retrieve to influence the decision.

The first question is 'Can I land ahead'? If the nose is not lowered sufficiently after a launch failure at anything more than a few hundred feet, the airfield perspective will look wrong, and there won't appear to be sufficient room to land ahead (figure 6). The trainee will conclude 'No' to the question and almost certainly turn. Given the initial attitude and speed, giving a high angle of attack, a spin is highly likely.

The correct answer to the question is only apparent once the nose has been lowered to the approach attitude. If the answer to 'Can I land ahead?' is then 'Yes', do so!

Figure 6



At small or restricted sites, 'Is there enough space to land ahead?', can be a tricky question, as the answer 'No' may occur at modest height. If this is the case then assuming that height is modest for turning, then the next question would be 'Do I have to land directly ahead?' Would a small change of direction make more space available, by, say, taking advantage of any crosswind or a corner of the airfield.

If it is impossible to land ahead, then, whilst maintaining the target speed, commence the turn in the direction decided before take-off, i.e. based on any crosswind component, the airfield layout, and terrain. In most cases an upwind turn is not the best decision (figure 7.) The glider has to turn through more than 360° to get back into wind. If the cross wind is strong and the break is at an awkward height, it may be impossible to return to the site.

A downwind turn first is best (figure 8), unless it takes the glider over the lee slope at a hill site, say, or is inadvisable for other reasons which are peculiar to the site. Those reasons apart, turning downwind offers more options, and the angle through which the glider has to turn is smaller.

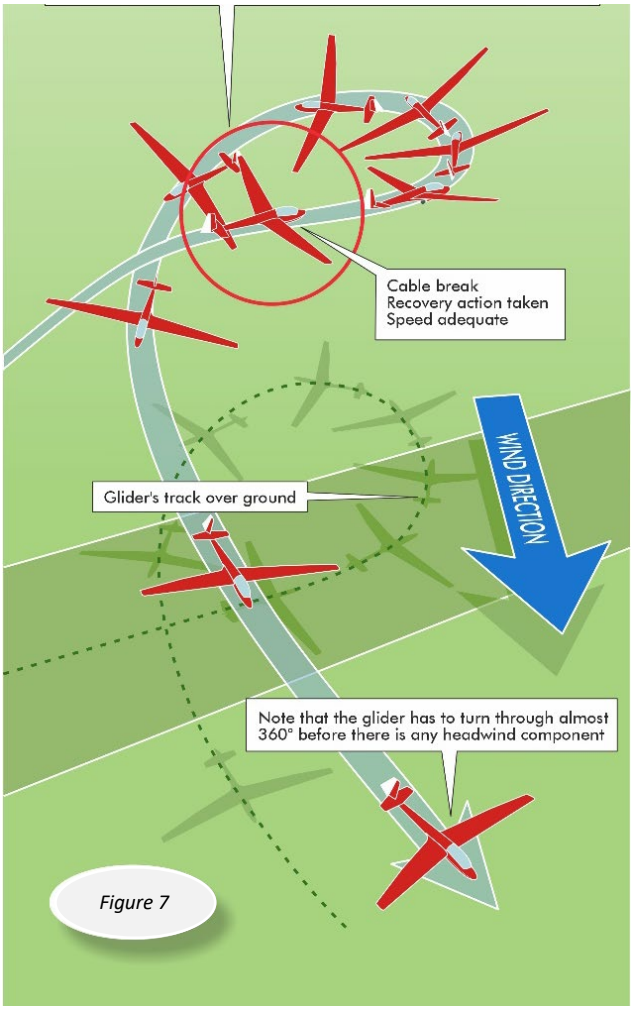
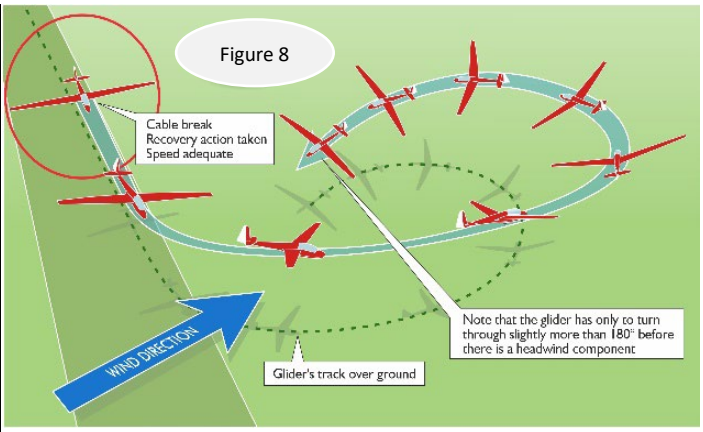


Figure 7



- if you decide to turn, be aware that your airspeed may be less than the apparent ground speed when travelling downwind. The illusion is strong when relatively close to the ground and may tempt you to slow down. Monitor the airspeed closely.
- If, after turning 270°, you are below your normal final turn height, level the wings and land as soon as it is safe to do so. Do not continue an already low turn simply for the convenience of landing into wind.
- Depending on the circumstances, the circle can be extended into a more or less truncated circuit. The decision to turn in is then the same as the one to be made when running out of height in the circuit. The final turn should normally be completed at the same height as any other final turn. At restricted sites, a lower-than-normal final turn may be unavoidable.
- Off-field landing: Do not exclude this possibility at restricted sites, or elsewhere, especially when other choices might involve a very low final turn. An off-field landing might be a good option at some hill sites.
- The 'S' turn involves a fair amount of manoeuvring, often at low altitude and even on narrow strips is seldom appropriate. It can lose you more height than a straightforward circle but if poorly executed, the glider can arrive higher and nearer the upwind end of the airfield than it would with a straight-ahead approach using airbrakes.

Cable release

After a launch failure has occurred, the drogue chute and a length of cable very occasionally remain attached to the glider. If significant it normally pulls itself out of the back-release, if not it does not matter. **The priority is to fly the glider.**

For straight ahead launch failures, the strop/cable is extremely unlikely to cause a problem even if it does not back release. So:

- Fly the glider
- Action the plan i.e. focus on landing safely.
- If a turn is required - pull the release.

The club's standard operating procedures should have considered and mitigated the risks of where cables and strops are likely to fall in the event of emergency procedures such as launch failures.

WINCH LAUNCH FAILURE EXERCISES

WINCH LAUNCH FAILURES

AIR EXERCISE BRIEFING

Remind the trainee of the theory involved and explain what you will demonstrate, and which points you particularly want them to observe. Brief one exercise at a time: Upper Air Exercise, Straight Ahead failure, Failure requiring a short circuit and finally a demonstration of an ultra-low-level failure. Things happen quickly in these exercises, and a thorough briefing is essential if the trainee is to get the most from them.

In summary the correct sequence is:

- unless close to the ground, lower the nose to the recovery attitude (below the approach attitude)
- wait until the approach speed is attained
- is it possible to land straight ahead?
- check the airspeed again
- if it is not possible to land ahead, select alternatives
- release the cable (only if time permits).
- continue to monitor the airspeed
- do not turn or open the airbrakes until approach speed is attained.

TEM

Threats:	**Mitigation:**
Collision	Maintain thorough Lookout
Errors:	
Not lowering the nose promptly to recovery attitude	Monitor adequate response/takeover
Running out of height for appropriate circuit	Monitor height & position

WINCH LAUNCH FAILURES
Upper air exercise

MANOEUVRE DEMONSTRATION

The intention is to simulate a launch failure in the full climb.

After the HASSELL check,

- Increase speed to about 70kt and then pull up smoothly into a 45° nose up attitude.
- immediately state that the launch has failed (do not say 'Bang' or pull the release).
- lower the nose to the recovery attitude (below the approach attitude)
- wait for the airspeed to increase to the nominated approach speed.
- Ask the question: 'Can I land ahead?'

TRAINEE ATTEMPTS

Allow the trainee to fly the exercise until they can push over at the appropriate rate, to the appropriate extent and then wait while the nominated speed is attained. They should ask the question: 'Can I Land Ahead?' Get them to repeat the exercise until they can do the whole thing smoothly.

DE-BRIEFING

The exercise is not difficult and after a few attempts trainees usually get it right. Take the opportunity to reinforce their understanding of launch failures generally and the important pre-decision on landing options.

WINCH LAUNCH FAILURES
Straight ahead launch failure

MANOEUVRE DEMONSTRATION

Fly the manoeuvre from a height where a straight-ahead landing is clearly the only option. Be careful to concentrate on the key and safety critical points. Stress that, whilst time must not be wasted, there is plenty of time to conduct the change of attitude, and take the time to assess whether there is room to land straight ahead safely.

TRAINEE ATTEMPT

Try to repeat the conditions of the demonstration accurately so that the trainee sees the same picture post failure. Monitor them carefully to ensure that they respond appropriately. Ensure they do not start to turn before they have waited for the nominated speed and allowed time to ask the question; Can I land Ahead?' Monitor speed and accuracy of flight carefully. If either of these is noticeably in error, take over and fly the rest of the exercise. Do not hand the glider back to them. Re-brief for another attempt when back on the ground.

DE-BRIEFING

If the exercise was not flown well then point out the errors in the order they occurred. This can form the briefing for a further immediate attempt if that is possible.

If the exercise has been well conducted, say so. However, point out that even then they will have to repeat it several times under a range of weather conditions and on all the available launch directions.

WINCH LAUNCH FAILURES

Launch failure requiring a modified circuit

MANOEUVRE DEMONSTRATION

Fly the manoeuvre, being careful to concentrate on the key and safety critical points. Stress maintenance of safe speed all the way down, once it has been regained after the failure.

Sometimes on a practice 'go round' launch failure, the cable will have been released too early. Thus, having adopted the recovery attitude and achieved the required speed, on asking the question; 'Can I land ahead?' the answer will actually be 'Yes.'

If this is the case then that is what you must do, even if you are at a safe height to do a short circuit. Turning when you do not need to is teaching the trainee to do something potentially dangerous. Instead apologise the exercise did not go to plan and repeat it with appropriate modification.

TRAINEE ATTEMPTS

In the early stages of cable break exercises, tell them exactly what you are planning and what you expect them to see and do. If the upper air exercise has been conducted thoroughly, they should only require a few attempts to handle this exercise.

DE-BRIEFING

Whilst there is plenty of time to conduct this manoeuvre, trainees often do not find that to be the case. Rushing the procedure is common and should be discouraged. Strict adherence to the correct procedure including waiting while the speed recovers and only after that making the decision.

WINCH LAUNCH FAILURES

Ultra-low level launch failure

This exercise is a demonstration only, as there is insufficient time to recover any mistakes made by the trainee. However, trainees will benefit from practice on a simulator, if available. There is a simulation video on the BGA website under Instructor Resources.

A thorough briefing is essential so that the trainee understands the issues. It will need to be demonstrated more than once to reinforce the key points.

Response time is limited, so if you lower the nose dramatically too close to the ground, a potentially serious heavy landing will ensue.

Conversely, if you have enough speed to start the transition and the launch fails, you have a lot of energy - if you just hold the take-off attitude you will be climbing. You need to adopt an appropriate attitude i.e. you may have to lower the nose slightly to stop the glider climbing any further - think ballooned landings! The technique is essentially the same.

DEMONSTRATION

The exercise must not be simulated by pulling the release. Talk to the winch driver and ensure that they understand what is to be done and that they have been trained in this exercise. Be aware of light / zero wind conditions. The glider will fly a very considerably distance in ground effect during the ultra-low failure demonstration. Be aware that although you have asked for an ultra-low launch failure, it may not be at the planned height – deal with the one you get – not the one you asked for.

If the power has been cut just after the glider has left the ground, it will not yet have transitioned into the climb and may well be doing less than the minimum speed for transition i.e. 1.5 x the unaccelerated stalling speed for the glider. Carefully lower the nose (if necessary) to the appropriate attitude. DO NOT open the airbrakes; wait for the glider to land. If it has already gone through the minimum speed for the transition, still adopt the same attitude, but it may be possible to very carefully open a small amount of airbrake.

The cable must not be moved after the glider has stopped, until it has been confirmed from the glider or launch point that the glider is safely clear. At the conclusion of this exercise the glider is likely to be close to the cable, possibly over it.

Fly the manoeuvre, being careful to concentrate on the key and safety critical points. In particular, stress the lack of urgency to open the brakes.

DE-BRIEFING

Debrief the exercise with reference to what went well and what did not. Point out **what you did not do**: in particular not 'pushing the stick forward.' Probably, any forward movement was small or possibly non-existent. Discuss if and when you opened the airbrakes, and the caution with which they were opened.

COMMON DIFFICULTIES

Too abrupt a transition into the climb. This may mean that the trainee has never had a decent demonstration of what it should look like in the prevailing conditions. Do not be afraid to re-demonstrate if prompts or descriptions do not work. This part of the launch is over too quickly to give you an opportunity of correcting the fault in flight, and if the trainee climbs too abruptly, both of you are at risk!

Fish-tailing up the launch is usually caused by a failure to apply sufficient (or any) rudder to counteract the adverse yaw which results from small aileron inputs. The trainee may also be nervously bracing himself against the rudder pedals and finding the rudder 'very heavy.'

Incorrect rudder coordination in crosswind drift correction. Explain that drift correction is achieved by applying some bank with coordinated controls.

Bucking or hunting at the top of the launch. Some gliders are particularly prone to this, often older ones. The symptoms indicate that the glider is near to the stall or even stalling. The remedy is to lower the nose slightly, enough to stop the oscillation and then gently raise the nose back into the climb attitude.

Releasing under tension at the top of the launch, can cause time-wasting breaks and tangles, particularly if it is a winch using piano wire. Releasing under tension does not offer any significant height gain and increases wear on the hook.

Does not use sufficient aileron to keep the wings level whilst still on the ground. Stress the importance of keeping the wings level and the need for full aileron promptly applied. Stress the need to release before the wing touches the ground.

Tries to take-off too soon. This should be strongly discouraged as it can lead to very swift rotation into the climb at the worst possible moment. Watch out for this if the ground run is longer or faster than usual, and/or the ground is very rough. Get the trainee to run the glider on the mainwheel, not the mainwheel and the tailskid/wheel. Lack of headwind lengthens the ground run and can induce this problem.

Veers off to one side during the climb. The trainee needs a reference point to help keep the line of the launch.

The trainee rushes the launch failure recovery resulting either in excessive negative G or does not take the time to let the speed recover or starts to turn prematurely. More practice at the Upper Air exercise to give them confidence is required.

