11d CAR LAUNCH

SPL Syllabus Exercise 11d: Car Launch			
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(ii)	**Use of the launch equipment**	**(vi)**	**Safe and adequate profile of car launch and limitations**
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INTRODUCTION

Car launching was very much more popular in the past than it is today. But in the UK, at the time of writing, only one club still routinely car launches. Car launching shares most of its characteristics with winch launching and therefore much of the process is identical to Chapter 11a Winch Launch. However, there are some important differences which this chapter will highlight. **Therefore, please read chapter 11a first and then note the additional points provided in this chapter.**

Car launching can be conducted in two different ways. The simplest involves a powerful vehicle pulling a length of cable attached to the glider. The launch is usually conducted on a runway to provide the vehicle with a suitably smooth and lengthy surface. If the glider is to get more than 1,000 ft on its launch, without a significant headwind, well over a kilometre of runway is required.

The second method involves feeding the launching cable around a large stationary pulley situated at the upwind end of the runway. The car sets out from near the pulley heading towards the glider to conduct the launch. This makes much better use of the available runway length at the expense of some added complexity. It can also provide a very quick turn-around as the car delivers its end of the cable to the launch point for the next glider to launch and then returns to the pulley, attaches the other cable end there and is ready for the next launch.

As with winch launching 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 risk mitigation, however the trainee, must be taught the risks, to enable their own TEM before solo launches.

The BGA have worked extensively to understand the risks associated with winch launching, inform its members and this has greatly reduced accident rates. All of that guidance also applies to Car launching. New trainees must be shown how to access the 'Safe Winching' information and review it **with an instructor** during training and most definitely before solo.

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

Traditionally, as Car launches are normally conducted off runways, the launching cable usually consists of hard spring steel wire, commonly referred to as 'Piano Wire,' to resist the inevitable abrasion. However, as with Winch launching, clubs are moving away from steel cables to polymer-based materials. These 'Synthetic' cables have significant advantages over steel. Notably, much improved reliability. Piano Wire, unfortunately, suffers with work hardening in use and is prone to breakage. Also, if it forms a loop when it falls to earth after a launch, then as the loop tightens on the next launch it will form a kink and promptly fail.

Car 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.'

The elements of; cable, parachute, strop, weak link and release rings are common to winching. But trainees should be trained in the local procedures.

Launching cables must always be regarded as 'Live,' they may move at any moment without warning. Expect the cable to disappear without warning. Any vehicle or aircraft crossing a cable can pick it up and move it suddenly. Always educate trainees to handle cable so that it will pull out of their fingers, do not get between the parachute and launch vehicle and do not loiter in front of gliders after hooking on.

THEORY BRIEFING

Signals or communication before and during launch

The verbal commands are the same as winch launching but especially if the launch is a direct tow rather than a reverse pully, it can be very difficult for the driver to watch visual signals as they drive the vehicle. Therefore, a robust radio system is preferable, so that any emergency signals can be clearly heard.

Use of the Launch Equipment The instructor in charge at the commencement of flying should, consider with the car driver the positioning of both the launch run 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.

A full launch is simple to anticipate as the car will normally use power to pull the cable supported by the parachute downwards. However, in the case of a cable break, that will not be possible. Consideration needs to be given to where it may land, also where 'strops' may fall following a weak link break. If another glider, or aircraft has landed downwind of the launch run cable may fall on them.

In a cross-wind at sites with limited space or directional options 'laying off' is often required.

Pre-Take-Off Checks

These are as per winch launching but note the following.

Use the same a walk around, A-B-C-D-E for car launches, as any other launch.

C-B-S-I-F-T-B-E-C has some car specific considerations. Set the **T**rim for the required approach speed, usually somewhat forward of neutral (nose down) in anticipation of a launch failure. If the glider has flaps, they may need to be set differently to that required for aerotowing.

As always, the **E**ventualities check is particularly important. Ensure that there are no obstacles in the launch area or anywhere the glider might end up if a wing drops, and the glider departs left or right. Check the circuit is clear of traffic. Also make a final check of wind speed and direction and consider the launch failure options appropriate to the glider type, site and weather thoroughly.

Into & Cross Wind Take-Off

If the pilot/trainee is used to a normal winch launch, care needs to be taken. Whilst the two launch methods are very similar the differences through take off and rotation into the climb are substantial and require great care in their handling. A winch pilot 'programmed' for significantly more initial acceleration may well attempt to pull the glider off the ground early. They may also rotate into the climb at their usual (winch launch) rate, rather than as appropriate for the more subtle acceleration.

The mechanics of the car launch are straight forward and can be considered about each axis of the glider in order to anticipate the likely consequences once the cable is taught and glider accelerating.

Lateral axis (pitch) - With the glider on the ground the pull on the hook will tend to rotate the glider around the gliders CoG which will be above the line of the cable. This effect is usually less marked than on a typical winch launch but can still be significant.

Longitudinal axis (Roll) – **the slower acceleration on a car launch may make a wing drop more likely.** Pilots vary considerably in their ability to recognise when the wings are not level, or indeed 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, as per normal winch launch procedures.

Car launch profile and limitations.

if your trainee is Winch Launch trained or current, do stress that the ground run and transition to full climb may be MUCH slower than with a modern winch. The tow car engine is having to accelerate the tow car as well as the glider, so is working much harder than a winch engine. Careful airspeed monitoring is vital.

It is only practical to employ a vehicle with an automatic gearbox. Despite that it is common to get a power reduction as the gear changes in the early part of the launch. This may well be during rotation, just when you don't want it.

It is important to start the launch directly in line with the launch cable with little or no bow in it.

As with a winch launch, the glider should not be allowed to rotate up into the transition to full climb until the pilot is able to recover without stalling the glider or hitting the ground. It is important that the ASI is monitored as that speed is increasing as the glider is pitched up into the full climb.

This is normally 1.5 times the 'normal stall speed.' More speed may be required in windy or turbulent conditions so an alternative 'rule of thumb' is the minimum approach speed for the day.

As the acceleration is slower this may take longer to achieve than on a normal winch launch.

The glider will not autorotate into the climb as in a winch launch so the transition into the full climb must be flown by the pilot.

If the aircraft fails to reach "recovery speed" then the nose needs to be carefully raised into the climb as long as the ASI indicates that the airspeed is increasing until you reach "recovery/approach" speed when the climb may be continued into the full climb attitude.

This is because, once the car reaches full speed, which may be below "recovery/approach" speed, it cannot provide any more acceleration, so you need to use the sling shot effect to provide the increase in airspeed required. **Note – this is completely the opposite to a winch launch.**

This requirement will be more pronounced in light wind conditions.

The normal climb attitude is slightly less than for a winch launch at 40 degrees.

Stick action for too fast or too slow:

Too fast – reduce the angle of climb to slow down. Radio the tow car if still too fast.

Too slow – carefully increase the angle of climb to increase speed. If you have reached your minimum speed you **must release immediately and not wait until you reach a safe height. it may be too late !!.**

Release procedures

At the top of the launch as the car runs out off runway space it will slow down, and the nose of the glider will go down. Relax the back pressure and select an attitude to place the nose on or just below the horizon. The cable will probably back release as you do. Don't forget to double pull the release to make sure.

As per a normal winch launch, back release is the preferred option, but an emergency or inadequate launch profile may require the release to be pulled as per a winch launch.

Launch failures

Launch failure procedures need to be clearly understood as per winch launching. The options from the glider pilot's perspective are likely to be very similar to those from a winch launch failure. In the event of a launch failure the driver will immediately exit the runway via a predefined route.

AIR EXERCISE BRIEFINGS

Car launch take-offs usually happen slower than typical winch launches but still too quickly for any instructor to patter everything of significance and even if they could, no trainee could ever retain that information. Many demonstrations will be required, particularly if conditions, a change in crosswind, different take-off directions etc. These will result in variations in the briefings.

Remind the trainee of the most significant points of the take-off and transition.

TEM

Threats:	**Mitigation:**
Errors, omissions or distractions to the checks resulting in taking off with an inadequately prepared glider	Carefully monitor the conduct of the checks
Helpers & spectators may interrupt the checks.	Discourage interruptions. If they do, be 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.	Take sufficient breaks to maintain your concentration.
Failing to allow for changing conditions.	Stay alert for changes, even on 'benign' days.
The trainee may make sudden and inappropriate inputs.	Monitor closely and take over, do not prompt.
Allowing the trainee too much scope for making errors.	Monitor closely and take over well before you get to your limits.
The trainee may release under tension causing cable issues at the car.	Brief and demonstrate the correct procedure carefully.

The Flying

MANOEUVRE DEMONSTRATION

Conduct the launch as accurately as you can concentrating the limited time to talk on the items you are teaching on that particular flight.

As it is impossible to alter the pace of the launch and much happens quickly, multiple demonstrations are needed to cover all the features and give the trainee time to absorb the volume of information. Given that no two launches are quite the same and conditions vary, patter what you are doing and what you are monitoring on each demonstration, explaining any unusual features later.

MANOEUVRE LESSON

It is not appropriate to start teaching the launch procedure until the trainee's handling skills are good enough that they are attempting the landings. After a thorough briefing, explain that you will hand them control towards the top of the launch i.e. once fully established in the climb, and gradually hand over lower down as they are managing the upper part. Once they are manging the full climb competently, allow them to do the initial take-off, including the critical rotation into the climb.

Before the trainee attempts a take-off, they should be taught to recognise the 'wings level' position from the forward picture and when it is approaching acceptable limits. Confirm their ability to comply with the requirement: 'If I cannot keep the wings level, I will release before the wing tip touches the ground.'

Emphasise that the cable must be released before this point is reached if aileron input is not arresting the wing drop.

Pre-solo, the trainee should demonstrate that they recognise whilst looking ahead when the wings are not

level, and releases the cable with the wing tip still safely clear of the ground. Ensure they understand the significant risk involved and that it does not diminish with experience.

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, but once the glider is airborne, move your hand to behind the airbrake lever to prevent the brakes being inadvertently or deliberately opened at the wrong moment. Be ready to prevent any or excessive forward stick movement if there is a low-level failure. Also, be prepared to release immediately during the ground run if a wing threatens to or actually touches the ground.

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 touch it), then taking control will come naturally and quickly.

As the glider leaves the ground, the pilot should maintain the normal take off attitude. A forward stick movement may be required to stop the nose from rising. Monitor the ASI and its trend. Only once the minimum recovery speed has been reached and is rotate the glider smoothly and steadily into the full climb attitude. When ***winch launching*** this usually takes more than five seconds from lift off to a 45° climb. When **car launching**, because acceleration is usually comparatively modest, longer period will commonly be appropriate. This later point is particularly important if you or your trainee are winch launch current.

Once in the full climb, minimum speed is more important than the maximum launch speed (V_W). If the maximum launch speed is about to be or is exceeded, do not allow this to be rapidly reduced i.e. do not pull back sharply. At this point of the launch being 'overspeed' carries no risk.

Monitor both the climb and bank angles by looking at the wing tips, look forward to see the position of the horizon relative to the edges of the canopy. Unless lay off is being applied, if it is not symmetrical use coordinated control to roll so a straight flight path is maintained. Glance at the ASI and again note both the speed and its trend. Note the progress along the airfield as height is gained or more importantly, not!

Crosswind launches As for winch launches the maximum acceptable crosswind component depends on the glider type. Gliders which sit tail-down and have tail-skids are generally more susceptible to crosswinds, particularly on hard surfaces. 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.

DE-BRIEFING

Following your demonstrations debriefing will still be required, in particular to cover any unusual things that occurred. Given the brevity of a normal take-off it can be challenging for an instructor to spot every point worthy of mention, but fortunately a significant number of launches are usually required for a trainee to get to solo standard and normally they will be able to take off satisfactorily well before all the other pre-solo exercises have been completed. 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. They must understand safe speeds for transition and the importance of monitoring the ASI

LAUNCH FAILURES

Simulated and real cable breaks tend to be sharp and obvious. Car failures often die away gradually. It is important that trainees experience this type of power failure.

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. They must also be completely conversant with the following:

- unless close to the ground, lower the nose to the recovery attitude (below the approach attitude.)
- be patient, do not turn, open the airbrakes or make decisions until the approach speed is attained
- check the airspeed
- 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.)

COMMON DIFFICULTIES

Too abrupt or gentle a transition into the climb. This may be due to a failure to monitor the ASI. 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, he is putting both of you at risk!

Not monitoring the ASI in the early climb leading to over rotation into the climb at below a safe airspeed.

Poor directional control, wing dropping on ground run. The most likely reason is that the trainee has not yet learned how large the control movements at low speeds need to be. The problem is aggravated by the fact that on the ground the rudder is steering the glider as well as counteracting aileron drag. Release immediately if a wing goes down on the ground run.

Does not use sufficient aileron to keep the wings level on the ground run. Stress the importance of keeping the wings level and the need for full aileron promptly applied.

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. Converting Winch Launch pilots are prone to this. 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 tail-skid/wheel. Lack of headwind lengthens the ground run and can also induce this problem.

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***W**inch converts:*

Getting the increase and reduce speed corrections with the elevator the wrong way around.

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 in excessive negative G and either does not take the time to let the speed recover or starts to turn prematurely. More practice at the Upper Air exercise (Chapter 11a) to settle them down and convince them that they can handle launch failures is required

