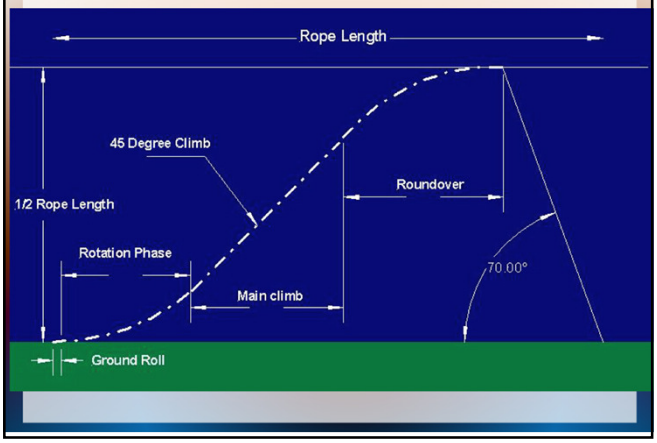
Winching

What to Know
What to Understand
What to avoid

What to know

- Winching is potentially dangerous, but it need not be, through training and alertness, dangers can be mitigated.
- It all happens very quickly. Therefore you need to be ahead of the action.
- You need to know what actions to take, when to take them and react instantly.

Normal winch launch



Launch Preparation

Pilot

- Seating Position-firm cushions so you won't sink back
- Rudder Controls closer
- Mentally Prepared
- Tense neck muscles
- Have target airspeed and limits in mind
- Hand on release handle, not grasping it.
- Have a critical height in mind for that site

Glider

- Pretakeoff checks
- Correct trim setting
- Correct weaklink
- Lined up exactly
- Belly Hook used
- Glider won't foul other ropes
- Ensure grass is short for ground run

How Quickly does it Happen?

After one second, the glider will have traveled 16 feet and have reached a velocity of 19 knots. At this speed the pilot will have control authority.

After 2 seconds, the glider will be at 38 knots and ready to leave the runway surface.

At 3.5 seconds, the glider is airborne and smoothly rotating to capture the "Target Airspeed".

A launch to 2000' AGL will take about

40 seconds.

Ground Roll

Controling the Ground Roll

The first 3 seconds of a winch launch require a high level of alertness.

If at any time the pilot feels things are not **precisely** normal, an **immediate** release is called for!

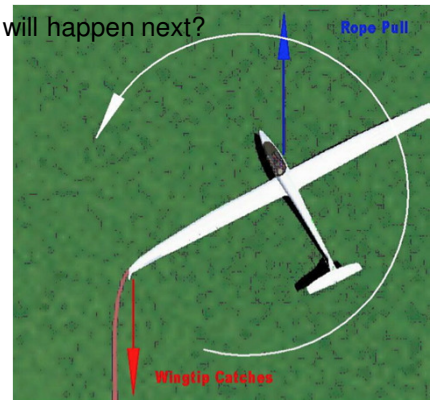
Never try to "save" a launch or pick up a dragging wing tip - RELEASE!

Fly (control) the Glider

- The glider ***must track straight with wings level***.
- Release before a wing touches the ground.
- You will have roll and yaw control in less than a second, so if you start straight and level, there should be no problem if controls are centred before you start.
- Only exception is in the case of an offset belly hook.

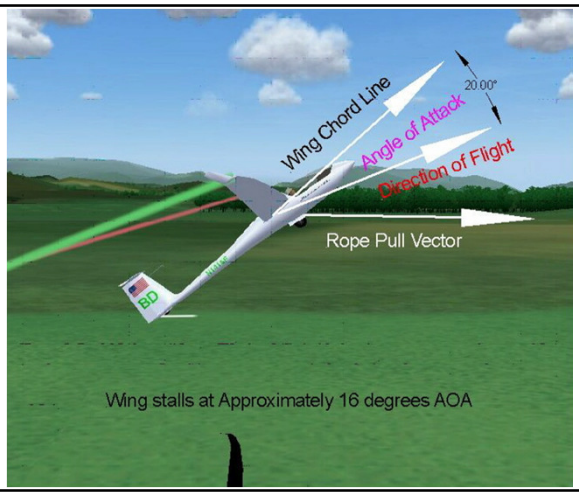
Ground Loop

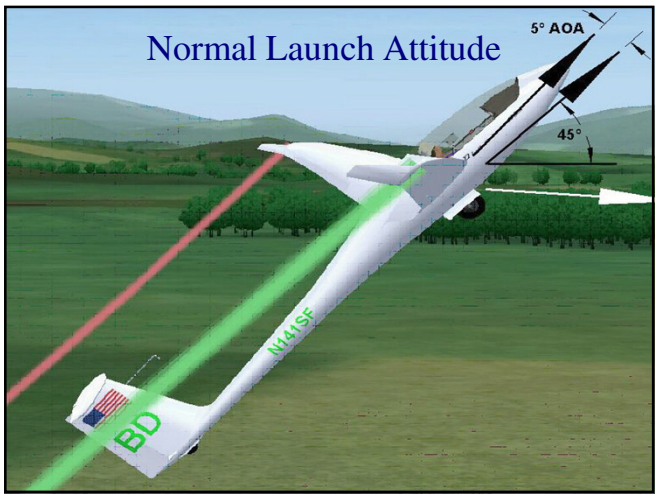
What will happen next?



Most Important

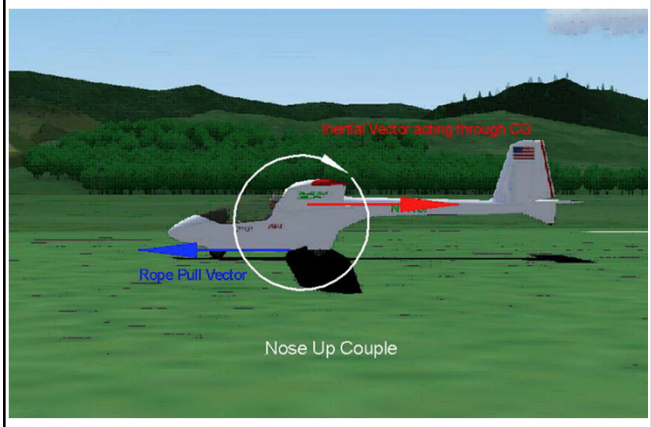
At no time during the rotation phase will the combination of Airspeed, Attitude and Altitude (AAA envelope) be such the pilot could not pitch over and land straight ahead with generous safety margins should a launch failure occur.





Control the Tendency to Pitch Up

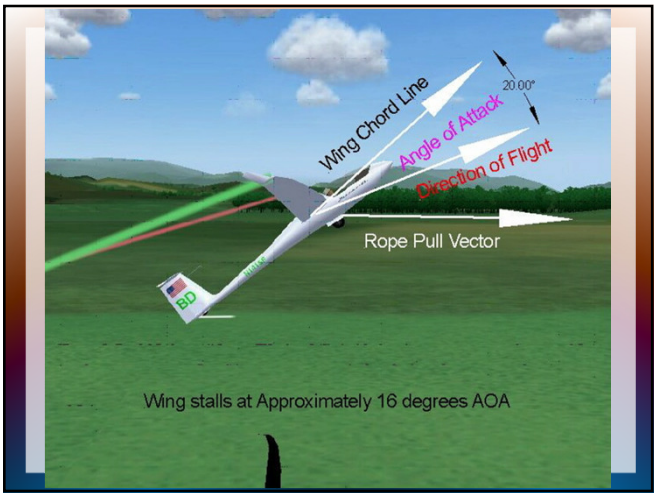
Most gliders will exhibit some tendency to pitch up due to the low CG release location. Any such tendency **must be opposed with down elevator** during the ground roll and early rotation to prevent too early and too rapid rotation.



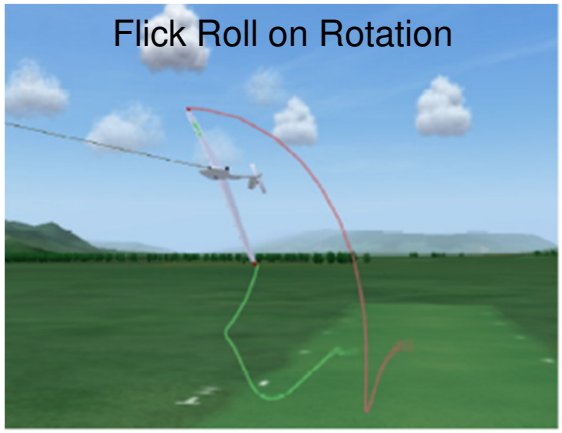
Control the Rate of Rotation to the Climb

The stall margin is reduced during the rotation phase as the wing is loaded by the need to accelerate the glider to a vertical speed of over 45 Knots even as it is beginning to take on the load of the rope pull. As a result the “loaded stall speed” increases significantly during the rotation phase.

If a highly loaded wing stalls while there is left-right asymmetric control inputs, a violent snap roll may ensue with probable fatal results.



Flick Roll on Rotation



Hazard Avoidance

- Carefully monitor airspeed through to full climb
- **Resist rotating too early. Wait for airspeed**

Airspeed may be permitted to exceed the target during the rotation phase for extra stall margin.

Cross Wind Takeoffs

- Don't exceed glider manuals cross wind limit
- Beware weather cock tendency on belly hook
- Centralise rudder before rotation if rudder input has been made to counter weather cocking
- Keep wings level
- Drifting a few feet on the ground roll is OK

Cross Winds in the Climb

- Lower the upwind wing so the glider will track into a crosswind.
- "Crabbing" into a crosswind is completely ineffective.
- Tracking up wind makes life easier and safer for the winch driver to recover the rope.

Takeoff Roll and Rotation Summary

1. The glider must roll straight with wings level - otherwise ***RELEASE IMMEADIATELY***.
2. The pilot's left hand should be on the release but not gripping it.
3. Pilots should expect gliders with a high CG and low hook to pitch up (Inertia Coupling)
4. Use down elevator to oppose inertia coupling and to prevent rotation until at least 50 Kts.
5. Rotate smoothly so airspeed continues to increase until it stabilizes at the "target airspeed" .
6. A stall during rotation is ***EXTREMELY DANGEROUS***.

Airspeed Excursions. Causes

- Pilot error
- Winch bahaviour
- Winch operator error
- Turbulence
- Wind layers

It helps the winch driver if you regularly radio airspeeds.

Airspeed Excursions. Actions

Airspeed errors, in themselves, represent less of a threat than ill considered, precipitative actions by the pilot. Managing an airspeed excursion while still on the rope is preferable to an early release.

Airspeed can exceed Vw (Max winch airspeed) during the first half of the launch with no danger.

The BGA states categorically ,

"No airworthy glider, using the correct weak link, has ever been damaged by excessive airspeed while on a winch launch."

Too Slow

- Lower the nose. The reduced load should speed the winch. (the winch driver should observe this and increase power)

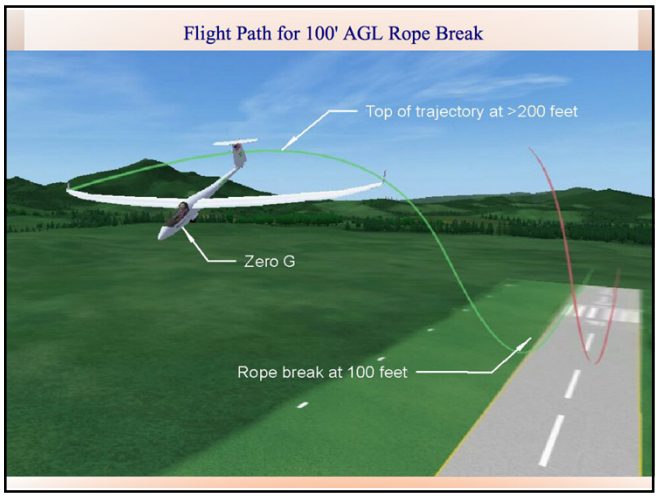
Discussion!

Too Fast

- Raise the nose. The increased load will slow the winch. If excessive, yaw side to side to signal winch

Managing a Launch Failure What is a Failure?

- Loss of Power
- Weaklink Break
- Rope Break



Response

Unload the Wing and Fly the Glider

If the nose is up 45 degrees at the failure, the glider will be losing airspeed at about 12 knots per second so the pilot must react swiftly.

Unloading the Wing

- Vigorously push over in a zero or negative G ballistic trajectory.
- Continue with the push over until the angle below the horizon is the same as it was above at the break.
- You ***must wait*** for a safe airspeed (1.5Vs) before taking further action. (See 60kts on the ASI)

It is critical no turn be initiated or spoilers opened until a safe airspeed is achieved.

Discussion

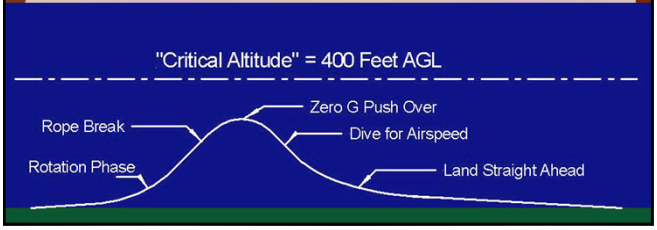
At zero G, "stall speed" has no meaning - airspeed can be, and often is, well below VS without stalling.

At zero G the wing is producing no lift thus has no induced drag.

What then?

Land Ahead

- Land ahead is preferable to a circuit to land back
- Know your critical heights before take off
- Get airspeed before anything else
- Pick an aiming point

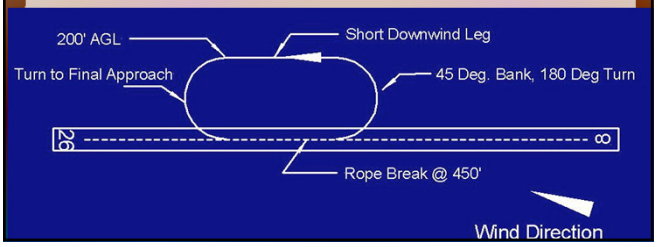


Circle to Land Back

A circle to land from a "high" launch failure is done in phases. The first, as with a low failure, is a zero G pushover and safe airspeed recovery - only then enter a 45 degree bank, 180 degree turn to the downwind side of the runway if a crosswind component is present. The downwind turn direction is chosen so the bank angle will be decreasing as the glider performs the final 180 degree turn to align with the runway.

Circuit to land back

- Minimum 400' AGL
- Once you have 1.5Vs turn down wind – 45 deg bank 180 deg turn
- 45 deg bank 180 deg turn on to final no lower than 200'AGL



Summary

1Expect every launch to fail – be prepared and fly the glider

2 Know the “Critical Altitude” for the site and conditions before you launch. Plan landings accordingly before you launch.

3 Always stay inside the safe AAA envelope.

4 React instantly to launch failure by pushing over at zero or neg G. Airspeed below unaccellerated Vs at the top of tradjectory is no problem at zero G.

5 Height lost or gained is primarily determined by speed at the top of the ballistic trajectory.

6 **Wait for 1.5Vs (60kts) and return to level flight before you open the brakes or start to turn.**

7 Execute preplaned landing straight ahead or circle to land if above critical altitude.

8 Play extremely close attention to coordination and airspeed if circling to land

9 Pick an aiming point when on final and fly accordingly

10 Don't worry about pulling the release until 1 – 6 are satisfied

11 Concentrate on landing anywhere on the airfield – **never try for a conveinient landing**

	HAZARD	AVOIDANCE	PRACTICALITIES
GROUND RUN	Wing touches the ground, glider cartwheels or ground loops violently.	• Start the launch with your hand on the release. • If you cannot keep the wings level, release immediately.	• Strap in tightly. • Be aware of the second cable. Release if the glider swings too close to it during the ground run. • Anticipate yaw. • Hold correct wing. • Run with tip. • Monitor wings level. • If wing drops, release before the wing touches the ground. • First flight on type in benign conditions.
ROTATION	Stall/spin during rotation.	• Avoid taking-off with a significant amount of yaw present. • Maintain a shallow climb until adequate speed is seen with continuing acceleration. • Ensure the transition from level flight at take off to the full climb (typically 35°) is controlled, progressive, and lasts at least 5 seconds.	• Do not pull back to reduce ground run over rough ground or with tail wind. • Be prepared to use whatever forward stick may be necessary to maintain a shallow climb until speed is adequate. • Monitor the airspeed; reduce rate of rotation if appropriate.
	Stall or heavy landing after launch failure below 100ft.	• If the launch fails, immediately lower the nose to the appropriate recovery attitude. **Minimising the reaction time is crucial.** • Do not use the airbrakes until the glider has attained an appropriate attitude combined with a safe speed. • **Instructors: simulated power loss with less than 50ft and 55kt by instructor demonstration only.**	• No cross wind correction below 300ft. • If speed is excessive do not release; maintain shallow climb to a few hundred feet and then release or signal. • Beware harshout opening of airbrake; use airbrakes with care or not at all after launch failure. • Do not release the cable; allow it to back release.
CLIMB	Stall or spin, after launch failure.	• Adopt the recovery attitude; do not turn or use the brakes until the approach speed is attained. • Land ahead if it is safe to do so.	• If airspeed reduces, unload the wing; consider releasing if airspeed approaches 1.5 times stalling speed. • It typically takes 5 seconds in the recovery dive to accelerate to the approach speed.
	Controled flight achieved after launch failure but subsequent stall, undershoot, overshoot, heavy landing, or collision.	• Plan provisional circuit options before taking off.	• If instructing, and P2 makes a mistake, take over early.