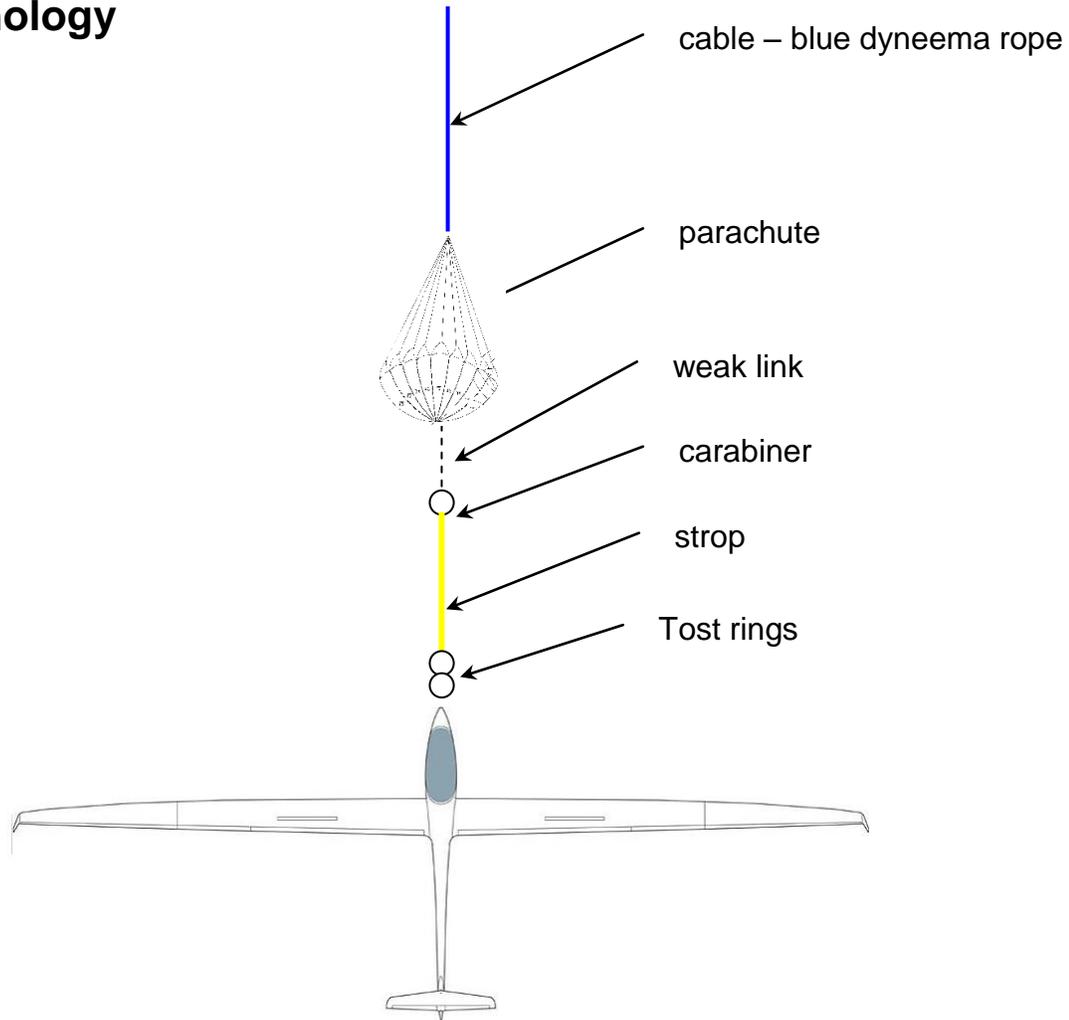


Winch Procedures

SOSA is a not for profit corporation whose primary goal is to provide safe enjoyable flying for its members by providing a high quality soaring operation at a modest cost. These procedures are designed to achieve that goal.

Terminology



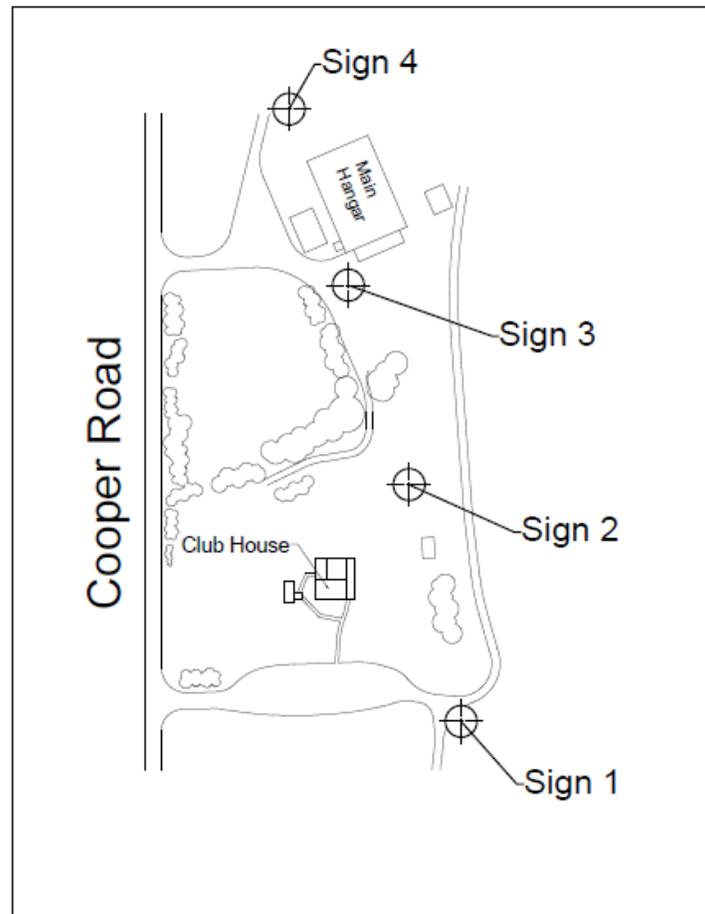
- The **cable** used by the winch is a synthetic rope known as dyneema or spectra
- The **weak links** are designed to break before damage is caused to the glider
- The **carabiner** is used to quickly change the weak link for each glider type
- The **strop** is a stiff rubber hose around the cable to prevent the soft rope from wrapping around the glider axle in the event the glider overruns the cable on the ground take-off roll

Ground Operations

Signage

When conducting winch operations at SOSA it is important that visitors and members do not wander onto the runways. To help prevent this occurrence, winch operations signs will, as a minimum, be posted at the following locations:

1. runway entrance from the clubhouse parking lot
2. clubhouse lawn
3. apron area in front of the hangar
4. road from workshop parking lot towards the small hangar.



These signs shall be in place before the first launch of the day. It is the responsibility of the duty instructor to ensure the signs are in place.

Flight line

Winch operations are substantially different from aerotow operations, primarily due to the fact that the launch is silent. There is no warning noise as we are accustomed to with the aerotow. This means that everyone at the flight line must maintain a heightened situational awareness at all times. For this reason, the use of cell phones while at the flight line is strongly discouraged.

Cars are NOT allowed at the flight line during winch operations unless towing a glider to the launch point. There should be no vehicular movement during a launch.

When the cable is laid out on the runway it should be considered live at all times and vehicles and aircraft should not roll across the cable.

Launch Control

Due to the hazards indicated above, tighter launch control is necessary during a winch operation. To control the launch, a Launch Boss will be designated for winch operations. The Launch Boss is responsible for the safe and efficient launch of all gliders

Launch Signals

Radio and visual signals will be used for launch control during dual winch and aerotow operations. The Launch Boss will control each launch and will conduct all radio communications from the launch point to the winch. The specifics of the radio communication between the Launch Boss and winch are detailed in the *Hook-up and Launch* section below.

Winch Light Signals

The winch is equipped with various lights that will be used for signals.

- Flashing Amber Beacon – the winch is running and the cable is live
- Solid white light – STOP – do not touch or move the cable, maintenance is in progress
- Flashing white light – emergency – send immediate assistance to the winch

Cable Retrieve

The timely retrieve of the cable is the key to a smooth and efficient winch operation. The John Deere Gator is required exclusively for cable retrieve operations. The Golf carts are not fast enough to ensure an efficient operation and they should be used solely for retrieving gliders after landing.

It is important to ensure that the Gator is fully fueled before starting operations and the fuel level should be checked regularly to avoid running out of fuel as this will bring the operation to a complete stand-still.

The retrieve driver must be focused completely on the task of cable retrieve. Before the glider has launched, he should already be moving down the taxiway (on the hangar side of the runway) towards the winch and stop about $\frac{3}{4}$ of the distance to the winch to observe the launch, cable release and where the parachute falls. As the parachute falls, continue to move along the taxiway while observing the cable to determine where it will land. Once the parachute is on the ground, check for aircraft traffic and if clear, move onto the runway to the parachute.

Before connecting the cable to the Gator, visually confirm that the winch's solid white STOP light has not been illuminated and establish visual contact with the winch operator to ensure it is safe to proceed. The cable can then be secured to the retrieve vehicle by attaching the TOST ring at the very end (glider end) of the assembly over one of the two delay toggles behind the Gator driver's seat. The parachute assembly is then laid in the corresponding carpeted 'bed'. The retrieve weak-link is permanently attached at the base of the parachute and is required in case the cable snags on the winch during the high-speed retrieve. The weak link is attached to one of the two tow hook mechanisms at the rear of the Gator. Care should be taken to stand to one side of the Gator when making this final connection as the Gator could be moved by cable action initiated inadvertently by the winch.

Once the cable is attached to the Gator, check for aircraft traffic and then accelerate smoothly and angle towards the east side of the runway. The Gator should be placed immediately to the runway side of the pool noodle runway markers so as to minimize intrusion into the landing lane. There is no need to drive directly to the side except for aircraft traffic, but driving down the middle of the runway should be avoided to leave landing options open for those who are airborne.

During the retrieve, it is important to maintain a consistent speed and when you need to slow down and stop, do so slowly and smoothly so the winch drum does not "spool up" and cause loose loops on the drum that can jump the guards and wrap around the axle. (In the event this happens, you will be glad to have used the retrieve weak link!)

As you approach the flight line, you will be directed to the next glider that is ready to launch. Slow down as you approach the glider. Pull the release knob to position the ring for hook-up, see that the cable has released from the vehicle, and steer the Gator past the wing of the glider. Clear the glider launch area and move back up the west-side taxiway for the next retrieve.

Hook-up and Launching Procedures for Ground Personnel

The cable, once it has been retrieved, should be laid out by the glider and the rope splices visually inspected. At this point the glider weak-link should be verified for the specific glider to be launched. For the K-21's the black weak link is used. For the Puchacz and Junior, the red weak link and for the LS4 and other single seat gliders the light blue weak link is used. The weak-links are permanently attached to the top of the parachute and the correct rope must be attached to the strop via the carabiner about 25 ft forward from the glider.

Glider	Weak link Colour	Weak link Strength
ASK-21	Black	1000 kg
DG-505	Black	1000 kg
Puchacz	Red	750 kg
Junior	Red	750 kg
LS4	Blue	600 kg
Other Singles*	Blue	600 kg

*Note: It is the owner/pilot's responsibility to determine the correct weak link for private gliders.

Once the glider is at the take-off point, pilot(s) strapped in and ready for hook-up, the area in front of the glider must be 'sanitized'. There should be only one person in front of the glider as there is now a hazard zone in front of the wings. Once connected to the cable the glider can move with no audible warning. Check the area in front and 30° to either side of the glider to ensure there is nothing within this cone for about 500 ft. If it is clear, it is safe to hook up. The Launch Boss will radio to the winch– **“Winch, [glider type]/[glider registration] n people on-board”**.

When the pilot is ready for hook-up and the canopy is closed and locked the cable may be connected to the glider on the pilot's command. By accepting the cable, the pilot has indicated that he is ready for launch. The cable should be connected and as soon as this is done, move immediately to the wing tip and level the wings. Do not stand by the cockpit. There is no need for a thumbs-up from the pilot before leveling the wings. The Launch Boss will check the area in front and 30° to either side of the glider to ensure there is nothing within this cone for about 500 ft. If there is, he will instruct the pilot to release the cable and then re-connect when the area is clear.

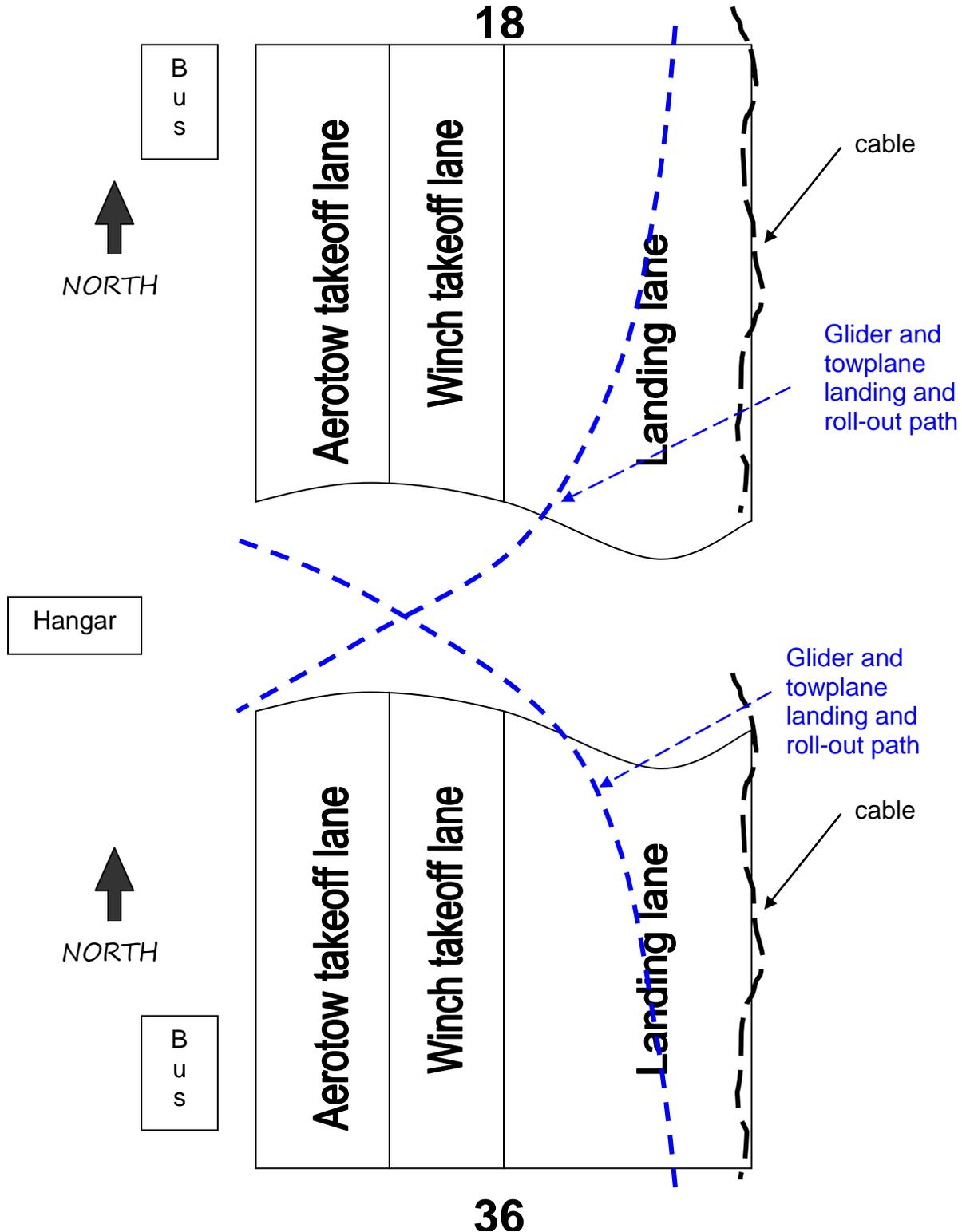
The Launch Boss will then check the circuit for landing aircraft and also check overhead the runway along the path of the launch to ensure the sky above is also clear of traffic. If clear, the Launch Boss will signal the winch operator with the – **“Take up Slack”** - and then – **“All Out”** – commands. When the glider starts to move, the wing runner must run the wing being careful not to steer the glider or let the wing drop.

Note: The K-21's and Puchacz have their centre of gravity hooks on opposite sides of the gliders. Once connected, never step across the cable, run the wing on the same side as the tow hook. This is different from aerotow operations where the same wing is always used.

Take-off and Landing Runways

During winch operations, it is not possible to follow the same procedures that have been developed for aerotow operations at SOSA. The launch point must be arranged so that the runway is divided into 3 lanes (runway 03 may be an exception, configuration to be arranged by the Launch Boss and Duty Instructor). The eastern half of the runway will be the landing lane (partially occupied by the Gator and cable) and the western half of the runway will be further divided in half with aerotow and winch take-off lanes. The

aerotow take-off lane will always occupy the lane closest to the hangar (west side) and the winch take-off lane will be located between the landing lane and aerotow lane. This means there should be two lines of gliders on the runway, awaiting take-off for either winch or aerotow, respectively.



The active runway will have a live cable laid along the east side, preventing gliders from turning off the runway away from the hangar (towards the east). It may also have the Gator in the midst of cable retrieve on the east side of the runway. For these reasons, all gliders and towplanes will always roll off the runway towards the hangar (west side) after landing. This requires an increased level of situational awareness from all people on the ground when walking, driving or towing gliders to the launch point as landing gliders will now be turning towards this side of the runway. Pilots of the landing gliders must also assess the ground traffic while selecting their reference, touchdown and roll-off points while flying the downwind leg of the circuit. As is always the case, any runway may be used at any time, in any direction, for emergencies or simulated emergencies, for this reason people on the ground must always maintain a vigilant look-out when crossing runways enroute to the launch point.

The primary factor for selecting the take-off runway must be the wind direction. For each 10 kts of headwind there is about 40 HP of reduced power requirement from the winch and the runway is effectively lengthened by about 675 ft. Downwind take-offs should be avoided at all times as the winch engine will easily exceed redline.

Winch Daily Items

DI

The winch DI consists of the following items before leaving the hangar:

- confirm the winch kit is in the cab (kit includes splicing tools, winch log and keys)
- check the correct functioning of the amber beacon, solid and flashing white light
- check the fuel and oil levels
- check the radiator over-flow bottle has coolant
- visually inspect tire pressures
- visually inspect engine compartment for loose wires/ hoses/ mouse nest
- inspect the splice and all hardware at the end of the rope
- inspect the parachute, weak links and all hardware on the strop
- move the winch outside and start the engine to let it warm up (leave it running while it is towed to position)
- ensure the amber beacon is on

Set-up

The winch has a tongue weight around 325 lb, so it takes a large vehicle and trailer hitch to move. If a vehicle is not available, then the small 135 tractor should be used to tow the winch into position.

- once at the end of the runway, sight down the winch line to confirm that it is aligned with the runway
- lower the legs at the front of the winch first
- use the jack at the tongue of the winch to firmly push the front legs on the ground

- lower the rear legs
- lower the jack so the rear legs are also firmly on the ground
- do all of this so that the winch remains attached to the ball of the tow vehicle
- chock the wheels
- remove the safety chain from the guillotine
- the engine should still be running from the previous start-up at the hangar
- put the transmission in Neutral so the gator may pull the rope and parachute to the launch point
- move the gas cans to a safe point about 10 ft behind the winch
- place the fire extinguisher about 10 feet outside the cab door
- connect the radio and establish communication with the launch point
- arm the guillotine by rotating the handle to the vertical position
- check the engine temperature and pressure gauges to ensure they are in the “green”
- do a run up of the engine to the red line RPM to make sure it is running smoothly (this can be done in neutral while the cable is being towed, or in park if the retrieve is complete)

Operations

Operating the winch relies on the operator’s visual judgment of the glider’s speed. This judgment is learned through the operator training and in the early stages of training is aided by the engine tachometer. The engine noise is another cue that can be used.

At all times when the winch engine is running, the flashing amber light must be illuminated. This gives everyone on the airport the knowledge that the cable is “live”.

After the cable has been retrieved, the winch should be shut down if the next glider is not immediately ready to launch. The Launch Boss will advise the winch operator by radio when the next glider is getting ready and give about a 1 minute warning. Use this notification as a guide to start the engine. Note: the engine will only start when in park, it will not start in neutral.

Once the **Take-up Slack** command is received, while holding the brake lever, place the transmission in drive (D) or second (2) depending on the wind. For winds less than about 10 kts use drive.

Slowly release the brake lever and wait for the **All Out** call. At this point gently accelerate the cable from zero to launch speed using a 3-4 second count. The transmission will normally shift out of first gear while the glider is still in the ground roll. If the **All Out** call is not heard within a reasonable amount of time from sensing the tension in the cable, apply the brake and shift the transmission back to neutral. There may be a bad radio connection or a problem at the launch point. Never launch without the **All Out** radio call from the Launch Boss.

On the climb, watch the glider attitude. Once it has rotated into the steep climb attitude, you should see a constant platform view of the glider. If the nose comes down, it is too slow and you need to apply more power. If the nose goes up it is too fast and you need to reduce power. The pilot may also be giving feedback via radio as to the actual speed. In general, the gliders should be launched in the 50-55 kt range. When making power adjustments, do so gently and take into account that there will be a lag from the time you change power until the glider pilot senses the change.

When the glider gets to the top of the arc, reduce the power further. If you do not see the parachute fall clear of the glider call "**Cable NOT Released**".

Once the parachute is clear, add power to reel in the cable and remove all the accumulated slack in the cable. Once under tension, use power as required to keep the parachute from drifting off the runway due to cross-winds. If it appears to be drifting towards trees or trailers as it falls, add more power to keep the cable and parachute over the runway. The cable should be reeled in close enough to the winch so the Gator driver can establish visual contact with the winch operator before retrieving the cable. Once the parachute is on the ground, put the transmission in neutral for the retrieve.

Mark the launch on the tally sheet in the cab. After every 10 launches on the tally sheet refuel the winch. This will typically take about 7-10 litres of fuel.

Once the retrieve vehicle is back at the launch point, leave the transmission in neutral and shut down the engine if the next glider is not immediately ready to launch.

Note: The first launch of the day should not be a passenger flight or introductory flight.

The Ideal Launch Profile

At the start of the launch, the winch operator will increase the power such that the tension in the rope is equal to the glider's weight to produce a 1g acceleration of the glider.

As the glider's airspeed approaches 50 kts and it starts into the shallow climb followed by the steep climb phase the rope tension is maintained at the glider's weight through a constant throttle position.

Once established in the steep climb, the tension in the rope is reduced gradually using a gentle power reduction.

By the time the rope angle reaches 70°, the gentle power reduction should reach idle. At this point the glider should be approaching level flight at the top of the climb.

This is an ideal profile and will be affected by wind shears, thermal gusts and pilot input. Winch operators must learn to recognize these variations and react to them to maintain

as close to the ideal profile as possible so the glider has a constant launch regardless of who is the winch operator.

End of Operations

After the last launch of the day, the cable must be reeled all the way back onto the winch. It is best to do this under no tension on the cable to prevent damage to the drum over time. To help prevent wear and tear on the parachute, after the last launch, the parachute should be removed from the cable and the old white parachute attached to the cable. The gator should pull the cable back to the launch point and then the cable wound back onto the drum at idle. The old white parachute on the cable serves as a visual aid so that you can see the end of the cable approaching. Do not reel the parachute and metal hardware through the rollers!

Shut down the winch and pack up the equipment. Refuel the winch so the tank is always full at the beginning of the next day. Log the total hours from the Hobbs meter, the engine time and number of launches that day.

Winch Training

Introduction

It is important for those pilots familiar with aerotow only, that they understand that whilst being aerotowed is mainly a subordinate activity for the glider pilot, winching requires much more proactive thinking, and proactive actions.

The direction of the cable will be for most of the flight invisible to the pilot and thus directional forces have to be perceived and recognized from other clues.

The winch launch progresses far more rapidly than aerotow and the glider pilot's response rates have to keep up with this. Falling behind the sequence of the winch launch is the most common difficulty in transitioning from aerotow to winch launches.

As for the aerotow, the instruction for the winch launch has two components:

- Ground Instruction
- Flight Instruction

Ground Instruction Approach

For Winch Take-Off a thorough Ground Instruction is of maximum importance since during the launch there is not much time available to provide explanations and to communicate in general. This also increases the importance of the flight briefing and especially of the debriefing, as the way to explain to the Student in a more detailed way what will happen and what happened in the short span of the Winch Take-Off.

The ground instruction should cover as a minimum the following main subjects:

- The glider
- The launching equipment
- The ground equipment supporting the operations
- The communication with the winch
- The Winch Take-Off
 - Normal Procedures
 - Emergency Procedures
- The briefing
- The debriefing

The instructor should encourage the student to take notes during ground instruction. The notes should help the student to review and assimilate more thoroughly the required knowledge. At the end of the ground instruction, the instructor should check the student's comprehension. If the instructor determines that the student has achieved the required level of knowledge to proceed to flight instruction, the instructor should sign the Ground Instruction - Winch Take-Off in the student's card. For post-solo pilots (Solo, Licensed, Instructors in training), an entry to the same effect should be signed in the pilot's log book.

Once the Ground Instruction - Winch Take-Off has been signed, the flight instruction portion of the instruction may start. However, even during the flight instruction, the Instructor should continue to verify the Student's (or post-solo pilot) level of knowledge related to Winch Take-Off ground instruction.

Note: Only the highlighted part of the ground instruction content is covered in this document. Additional to this, requirements for pilot transition to Winch Take-Off are provided.

Flight Instruction Approach

Building on ground instruction, the flight instruction consists of instruction on Normal Procedures and Emergency Procedures.

Winch Take-Off Segments

The Winch Take-Off consists of the following segments:

- Ground Roll
- Moderate Climb Path
- Steep Climb Path
- The Recovery to Normal Gliding Speed and Attitude

Prior to Ground Roll

After boarding the glider and prior to Ground Roll start:

- 1.1 If the Winch has been inactive (the glider is boarded with no other glider in front of it on the line), the Launch Boss establishes radio contact with the winch:

“Winch [glider type]/[glider registration] n people on-board (or n UP)”

Note: Establishing radio contact signals the winch operator to prepare for take-off.

- 1.2 The pilot completes the Pre-take-off check-list.

Note: Don't skip the **Options**. To properly consider the *Options*, check the wind direction and correlate with the available landing alternatives.

- 1.3 Check whether a reference point can be found in the sky (such as a cloud) that would help to keep the glider aligned with the runway heading while climbing. Monitor the take-off of the previous glider (if applicable) and notice the amount of drift, or yaw to counter the drift. Launch Boss visually checks the glider and the airspace and reports:

“Clear above and behind”

- 1.4 Cable is hooked-up.

Note:

1. By accepting the hook-up of the cable, you have indicated that you are ready to launch and the wing-runner will immediately move to the wing tip and level the wings.
2. From the moment the cable is hooked-up, place your left hand near the release control and keep your hand there until release.
3. Initiate the release at any moment when:
 - (specifically) there is a departure from the expected sequence of the winch take-off, or,
 - (in general) there is a sense that safety is impacted, or
 - the release height is attained.

- 1.5 Once the wings are level, the Launch Boss initiates the following sequence of radio calls:

Launch Boss: **“Take-up Slack”**

Winch Operator: **“Taking-up Slack”**

Once the slack is removed, the Launch Boss calls: **“All Out”**

Subsequent to this, the ground roll will commence.

Ground Roll

The winch driver applies power and the glider starts moving. If the glider was not oriented prior to take-off with the nose aimed toward the winch, the pilot should align the glider on the winch direction and maintain this direction as long as the winch is in sight. Once the glider starts moving it is paramount to keep the wings level, in case of a wing drop, or any problem in controlling the glider is anticipated, release should be immediate.

The pilot should keep a positive forward pressure on the stick (for a tailwheel configuration) to bring the glider to an attitude corresponding to the normal take-off attitude; practically the glider should be rolling balanced on the main wheel. In this situation the glider should become airborne by itself, while the speed is increasing. Proceeding in this manner will cause the glider to lift off with some excess speed. The glider should not be lifted off by stick input, as this has the same result as getting airborne at a slower speed (as from a lift-off from two points). The additional speed ensures that the glider will have a clear lift-off with no subsequent ground contact which may create a hazardous situation.

Moderate Climb Path

After lift-off, the glider speed will continue to increase and therefore the glider will have a normal tendency to climb. The glider attitude should be maintained constant; to achieve this sometimes some forward pressure may be required to be applied on the stick. If the glider has any tendency to raise the nose, such tendency should be countered by the pilot.

With the stick still in the middle (middle - in a generic sense), the pilot should maintain the Moderate Climb Path. The glider attitude should not be changed until a speed corresponding to the bottom of the green arc is achieved. If the take-off profile up to this point and the winch power application schedule were correct, the glider should be at around 150 -200ft AGL when the speed is passing through the bottom of the green arc. Achieving each of the two conditions is equally important. Transitioning the glider too early in terms of height and speed represents a condition that can be briefly described as “low and slow”, and such a condition constitutes a hazardous situation. “Low and fast” is not an acceptable situation either; in case this situation starts to develop (when winch power output is too high) the pilot should terminate the launch by releasing the cable.

Steep Climb Path

When the speed and height conditions are met, the pilot can increase the angle of attack by gradually moving the stick back, coordinating the amount of force applied with the speed increase. The target speed should consider the maximum winch tow speed, and other manufacturer recommendations. The optimum speed depends among other factors on the winch power application schedule, the glider type (weight and performance) and wind condition.

The pilot should not be surprised that the speed will increase while applying back pressure on the stick during the transition from the Moderate Climb Path into the Steep Climb Path.

Once the target speed is achieved the stick should be kept in that position. It should be understood that the glider response to control inputs is quite different than what happens in free flight or aerotow. Large and repeated control inputs should be avoided. While rounding up the path, if the speed stops increasing, the pilot should stop the stick movement and wait. If the speed is still not increasing then the stick should be moved slightly forward to reduce the angle of attack. Once the target speed is achieved, the only inputs are those required to counter perturbations; here, it is required to apply the correction and then wait for the glider response.

When the winch is out of sight, the pilot follows the sky reference point selected pre-take-off. In case no sky reference point is available, the pilot should maintain runway heading based on peripheral vision, the application of an estimated yaw angle, and Winch Operator directions provided by radio.

Once stabilized on the steep climb path, the pilot should apply upwind rudder. The wind correction through rudder pedal pressure should be maintained throughout the whole Steep Climb Path and the wings should be level. The rudder pressure should not be excessive, if too much rudder seems to be required, the pilot may slightly lower the upwind wing.

Once the glider starts to level out at the top of the climb (approaches an attitude parallel to the ground) the pilot should be able to recognize the moment when the glider acceleration starts to decrease. This is the moment when the pilot should lower the nose gradually, anticipating the moment of the release. At the release, the glider should be in the normal gliding attitude.

The Recovery to Normal Gliding Speed and Attitude

As a rule of thumb, after covering approximately 2/3 of the initial launch point - winch distance, the glider is at the achievable maximum height. This can be confirmed by the reduction in the acceleration induced by the winch.

The pilot should gently bring the glider to the normal gliding attitude and then release. Depending on the geometry and the dynamics of the launch, the glider tow hook may auto release. Regardless of which way the release is achieved, the pilot should continue the maneuver to bring the glider to the normal gliding attitude and activate the release mechanism 2-3 times (in this order).

The pilot should develop the feel to recognize when the acceleration is decreasing, and initiate the return to the normal gliding attitude by this feel.

After releasing the cable, the pilot should fly on the same heading until the normal gliding speed is achieved; this is also a good time to set the trim. If the cable remains attached, the winch operator should call **“Cable NOT Released”**.

Normal Procedures - Abbreviated

- Adjust seat and pedals.
- Launch Boss makes radio contact with the winch:
- **“Winch, [glider type]/[glider registration] n people on-board”**
- Complete pre-take-off check-list; don't skip Options
- Connect the cable
- Place the left hand near the cable release control; ready to release at any moment if needed.
- The Wing Runner will automatically level the wings after hook-up
- Launch Boss calls: **“Take-up Slack”**, the Winch Operator confirms **“Taking-up Slack”**.
- Watch the cable, and when the slack is removed be prepared to launch as the Launch Boss calls: **“All Out”**
- Once the glider starts rolling, maintain wings level and balance the glider on the main wheel.
- Keep the glider's nose aimed at the winch.
- In the balanced attitude on the main wheel, let the glider become airborne by itself and maintain the same attitude once airborne.
- When the speed exceeds the bottom of the green arc and at a height of at least 150-200ft AGL apply gradual back pressure on the stick to rotate the glider into the steep climb path.
- Achieve the target speed by stick input; once the target speed is attained, stop the stick movement.
- Counter the crosswind with rudder input. Follow Winch Operator cues if provided. Maintain the pressure on the upwind pedal until the end of the winch take-off.
- When the acceleration starts to decrease, gradually lower the nose to achieve the normal gliding attitude.
- Once the glider is in a normal gliding attitude, pull the release control 2-3 times to release the cable (do the same even if auto release has occurred).
- Do not turn before normal gliding speed is achieved.

Emergency Procedures

Note:

To avoid any confusion, prior to each take-off the Instructor should clearly state who is in control for every segment of the launch, both for normal procedures and emergency procedures. The Instructor takes control immediately (if not already in control) in any case where an emergency procedure is required in an unplanned (real) situation, while the Student will maintain control only for planned situations where an emergency procedure is applicable.

Field in Front of the Glider Not Clear

Do not accept cable hook-up if people other than the Wing Runner, or other gliders or vehicles are in front of the glider. If this happens after the cable has been connected, immediately RELEASE.

Cable Overrun

If due to an improper taking-up of slack in the cable, the glider overruns the cable, immediately and simultaneously transmit "**STOP, STOP, STOP**" and RELEASE.

Wing Drop

Do not try to recover a wing drop, immediately RELEASE.

Loss of Directional Control

Whenever loss of directional control is anticipated (preferably), or experienced, immediately RELEASE.

Broken Cable/ Thrust Loss During Ground Roll

1. RELEASE and look for the cable
2. Spoiler/ Wheel Brake as required
3. Avoid the cable
4. Clear the runway

Broken Cable/ Thrust Loss During the Moderate Climb Path

1. Lower the nose to achieve normal gliding speed.
2. RELEASE
3. After normal gliding speed is achieved, use spoilers as required
4. Avoid the cable, if possible
5. Land straight ahead

Broken Cable / Thrust Loss Between Rotation and 350-400ft AGL

1. Lower the nose to achieve normal gliding speed.
2. RELEASE
3. After normal gliding speed is achieved proceed with landing as per Options.
4. Avoid the cable, if possible

Options: When releasing below 350-400ft AGL, in general, there is not enough height for an abbreviated circuit; possible options are: land straight ahead, a 180 degrees (teardrop) procedure to land on the same runway downwind, or land on another runway. The main factors in selecting where to land are the crosswind, obstacles, and the arrangement of additional runways (if any). Think about landing options during the OPTIONS portion of the CISTRIC-O

Broken Cable / Thrust Loss Above 350-400ft AGL

1. Lower the nose to achieve normal gliding speed.
2. RELEASE
3. After normal gliding speed is achieved, proceed as per Options.
4. Avoid the cable, if possible.

Not Possible To Release Cable

In the event of a release failure, several fail-safe mechanisms come into play.

1. The automatic back release mechanism
2. The weak link
3. The guillotine

If the glider is still attached after the pilot has pulled the release multiple times, fly straight ahead to allow the back release mechanism or weak link to do their job. If this fails, the winch operator should use the guillotine to cut the cable. If this fails, the pilot can in theory fly in circles around the winch until a landing of sorts can be made. If the cable is cut, the pilot must fly a high pattern, or consider landing downwind so the dangling cable does not snag. The pilot should land well clear of objects or people.

Notes for Instructors

Following the ground instruction, the flight instruction starts with a minimum of 1-2 Demo Flights (or as many as required by the Student for comfort).

Demo Flight

The instructor is the pilot-in-charge for the whole duration of the launch. The instructor will brief the Student prior to the take-off, with a focus on the abbreviated normal procedure and emergency procedure. During the launch, to the extent possible, the Instructor will comment on actions to control the glider. At the discretion of the Instructor, the Student may keep a light touch on the controls or have hands and feet off the controls.

If there is a second Demo Flight, the Student may be asked to follow on the controls and release the cable at the Instructor's request.

Since this is a Demo Flight, the student involvement is null or minimal. However, the instructor should monitor Student's reactions during the launch.

Note:

Special attention should be paid to the proper adjustment of rudder pedals and seat. The Instructor should assist and make sure there is no possibility that the student's

body will shift due to higher acceleration and attitude change specific to the winch take-off. The Instructor should recommend that the Student memorize the cockpit set-up and reproduce it prior to every flight.

Winch Take-Off Instruction Approach

After the Demo Flight(s) the Student is given gradually more control starting with the higher part of the launch and progressing to the launch start. For the purpose of instruction, the four main segments of the winch launch are considered:

- The Ground Roll
- The Moderate Climb Path
- The Steep Climb Path
- The Recovery to Normal Gliding Speed and Attitude

Steep Climb Path Training

Following the Demo Flight(s), the Instructor will pass the control to the student once the glider is established on the Steep Climb Path at the predefined target speed. The Student will be required to:

- Maintain target speed
- Counter wind drift
- Sense glider acceleration reduction
- Lower the nose to attain normal gliding speed and attitude
- Release
- Trim
- Once on normal gliding speed and attitude, turn and commence the free flight

The Instructor should monitor the way the Student maintains the target speed and direction on the required path to avoid drifting due to the cross wind. It may be necessary to remind the Student that rudder pressure, once applied should be maintained until the winch take-off ends. If needed the Instructor should prompt the Student to help recognize when the glider acceleration starts to decrease and subsequently monitor the gradual lowering of glider's nose to attain the normal gliding speed and attitude. The Instructor should address the Student's tendency to rush with the release and the initiation of the turn.

It may be beneficial practice to ask the Student to call loudly:

- ***“Chute is clear”*** after the release,
- ***“Gliding Speed”*** when achieved
- ***“Trimmed”*** when achieved
- and only after these calls to turn.

Once the Student has achieved an appropriate level of competency in flying the top part of the winch take-off (Steep Climb Path and Recovery), the instruction of the Moderate Climb Path may commence.

Moderate Climb Path Training

The Instructor will pass the control to the student once the glider is established on the Moderate Climb Path. The Student will be required to:

- Maintain the glider's attitude (constant AOA)
- Rotate into the Steep Climb Path when both speed and altitude conditions are met (minimum bottom of the green arc; minimum 150-200ft AGL)
- Establish the glider on the Steep Climb Path at the predefined target speed

The Instructor should remind the Student to maintain the glider's attitude unchanged until Rotation. If needed, the Instructor should assist the Student in recognizing the moment to initiate the Rotation.

The Instructor should make sure the Student is gradually moving the stick back, coordinating the amount of force applied with the speed increase and prevent any tendency for a sudden, rushed rearward stick movement (pull) that may stall the glider.

Ground Roll Training

Once the Student gets proficient in transitioning from the Moderate Climb Path to the Steep Glide Path, the training continues with the Student taking control from the ground. The Student will be required to:

- Co-ordinate with Wing Runner and Launch Boss prior to hook-up
- Maintain glider's direction of movement towards the Winch
- Maintain wings level
- Maintain AOA with the glider balanced on the main wheel
- Allow the glider to become airborne due to speed increase (as opposed to initiating the lift-off with stick input)
- Maintain AOA once airborne; prevent premature rotation

The Instructor should monitor (and intervene when needed to correct) the way the Student achieves and maintains the glider's correct attitude for the Ground Roll. Attention should be paid and correction should be made to any tendency of the Student to force the lift-off.

Emergency Procedure Training – Spoiler Control

As part of ground instruction the Instructor should clearly highlight and remind whenever the emergency procedure is reviewed that the Spoiler deployment should normally be initiated only after safe gliding speed is achieved.

Once the Instructor has released the cable or the Winch Operator has reduced power, as part of a planned emergency procedure training, the Instructor's left hand should go on the spoiler's control handle. This is to prevent a premature spoiler deployment by the Student.

Transition to Winch

Categories of Pilots

It is assumed that all categories of pilots mentioned below have received Ground Instruction and the pilots are competent to the level required for their category (listed below):

- Instructor (I)
- Licensed Pilot (LP)
- Solo Pilot (SP)
- Student (pre-Solo) (St)
- Ab initio (Ab)

Requirements

The number of flights for each category is a suggested minimum number to provide a reference; the Instructor should allow the transition from one segment of the winch take-off to another based only on the Student's proficiency.

Demo Flights: Min 1-2; Max as required by the Student to feel comfortable to proceed to the next step of instruction.

Steep Climb Path (and Recovery to Normal Gliding Speed and Attitude) I 2, LP 3-4, SP 5, St 6, Ab 6

Moderate Climb Path (and Rotation to Steep Climb Path): I 2, LP 3-4, SP 5, St 6, Ab 6

Ground Roll (and transition to Moderate Glide Path): I 2, LP 3-4, SP 5, St 6, Ab 6

Sequence

Once the Instructor considers the Student proficient with the normal procedure of the winch take-off, the training continues with the emergency procedures. As part of emergency procedure training, all categories of pilots will be checked-out in a number of situations of simulated/ planned Broken Cable/ Thrust Loss.

The Thrust Loss will be simulated by Winch Operator reducing the power output of the winch; a minimum of 2 such check-outs will be performed (2TL).

The Broken Cable will be simulated by cable release initiated by the Instructor (3BC); a minimum of 3 such check-outs will be performed (3BC).

The 2 Thrust Loss and 3 Broken Cable situations will be distributed as below:

1. Moderate Climb Path (1TL+1BC)
2. In the lower half of Steep Climb Path (1BC)
3. In the higher half of the Steep Climb Path (1TL+1BC)

The two Thrust Loss will be carried out while the Student is still in training on the NP; the TL will be simulated at a higher segment than the one currently under training (i.e. while the Student is trained for the Moderate Climb Path, the check-out for TL will be performed in the Steep Climb Path; while the Student is trained for the Ground Run, the check-out for TL will be performed in the Moderate Glide Path).

The three Broken Cable situations will be created only after the Student has achieved and demonstrated an acceptable level of proficiency in Emergency Procedures and two Thrust Loss situations.

An example of the EP sequence check-outs is provided for the Instructor's transition in Table 2.

The Requirements and Sequence above apply to each category to qualify to fly solo on the twin-seater glider used for instruction.

To qualify to fly single-seaters on tow, each pilot regardless of category should qualify to fly the club's single-seater glider the Junior – it is assumed that all pilots are single-seater qualified using the aerotow. To transition to the single-seater glider, the following requirements apply:

I: 3x K21 SOLO, 2xJunior

LP: 5-6x K21 SOLO, 3xJunior

SP: 8+ K21 SOLO, 4xJunior

For a summary of required transition flights see Table 1

All SOLO flights shown above, should be performed under instructor monitoring from the ground. At the end of the transition, an entry should be made in Pilot's log book reflecting the level achieved by the Student.

The Student Flight Card should reflect the training steps described above.

Tables

Table 1 Required Flights

		I	LP	SP	St
All Pilots	SCP	2	3-4	5	6
	MCP	2	3-4	5	6
	GR	2	3-4	5	6
	CB	3	3	3	3
	Solo K21	3	4-5	8+	
	Junior	2	2	4	

Note: The range for minimum number of flights for LP reflects the range of LP experience.

Table 2 Example of EP check-outs for Instructor transition

	GR	MCP	SCP
NP+TL	I	I	S
	I	I	S
	I	S	S
	I	S	S; TL
	S	S	S
	S	S; TL	
CB	S	S	S; CB(H)
	S	S	S; CB(L)
	S	S;CB	

Note: For the Instructor transition the CB flights should be flown with the Student in the back seat. If the LP and SP are back-seat qualified, CB flights should also be flown with the Student in the back seat.

Winch Operator Training

Introduction

These Notes have been prepared for the guidance of winch driver training at the SOSA Gliding Club. They provide a framework for training and authorizing winch drivers, and act as an aide-memoir on basic safety and operating matters. They are based closely on the Windrushers Gliding Club edited version of the BGA Winch Operators Manual (Revised Edition dated Oct 2002), as well as information from the Canadian air cadets.

The methods employed in training new winch operators will closely resemble our flight training. Briefing, demonstration and observation by a qualified operator (winch instructor), followed by the student performing the tasks while being coached by the winch instructor. The winch operator student will receive a briefing on all procedures from normal operations to emergency procedures.

The briefing on setup, close down and storage will usually be conducted as part of normal operations by the winch operator student while being briefed, coached and observed by the winch operator instructor.

The student will observe several launches from outside the winch, then by sitting beside the winch instructor in the winch cab to gain an understanding of the methods used by an experienced winch operator as well as getting a sense of what the launch looks like from the “driver’s seat”. The winch instructor will use the idle time between launches to continue the briefing of the student on winch instruments, switches and controls.

When both student and instructor are ready to exchange seats, the student will perform all of the duties of launching the glider under close observation of the instructor. The instructor will give cues during the launch to ensure a safe, well executed launch of the glider.

Once again the idle time between launches will be used to debrief/discuss with the student and additional coaching to improve the launch quality and consistency. The training should be conducted over several days to ensure the student trains in varying wind conditions and is given the opportunity to launch different glider types.

Safety

There are serious safety considerations at all times and with all aspects of winch driving. A powerful engine combined with fast moving cables poses significant potential threats to safety. These risks apply to any activity in the vicinity of the winch and its cables; they extend from the winch itself to the launch point and glider, and include cable towing and retrieve operations. **Winches are dangerous** so cautious, deliberate action is essential at all times.

Winch Operations

The winch requires a thorough daily inspection and servicing (Daily Inspection) of the winch, cables and its attachments. Details of the checks to be carried out are contained in a checklist stored in the case with the winch log book stored behind the seat of the winch.

Positioning and Setting Up the Winch

The Duty Instructor will decide the runway to be used and the positioning of the winch for the day's operations.

The winch has a tongue weight of around 325 lb, so it takes a large vehicle and trailer hitch to move it. If a truck or SUV is not available, then the small 135 tractor should be used to tow the winch into position.

Once in position, apply the brakes to tow vehicle / tractor and engage first gear. (the tractor is normally left attached to the winch as an additional anchor).

- once at the end of the runway, sight down the winch line to confirm that it is aligned with the runway
- lower the legs at the front of the winch first
- use the jack at the tongue of the winch to firmly push the front legs on the ground
- lower the rear legs
- lower the jack so the rear legs are also firmly on the ground
- do all of this so that the winch remains attached to the ball of the tow vehicle
- chock the wheels
- remove the safety chain from the guillotine
- the winch engine should still be running from the previous start-up at the hangar
- put the transmission in **Neutral** so the cable retrieve vehicle may pull the rope and parachute to the launch point
- move the gas cans to a safe point about 10 ft behind the winch
- place the fire extinguisher about 10 feet outside the cab door away from the gas cans.
- arm the guillotine by rotating the handle to the vertical position
- check the engine temperature and pressure gauges to ensure they are in the "green"
- do a run up of the engine to redline RPM to make sure it is running smoothly (this can be done in neutral while the cable is being towed, or in park if the retrieve is complete)

Switch on any communications, radio, lights, and test function. Before starting operations, the winch driver should carry out checks to confirm that all lights are clearly visible and that there is good radio contact with the launch point.

Communications

The standard SOSA system of communicating between the winch and launch point is radio using SOSA frequency at the launch point and winch, supported by visual signals.

The standard radio calls from the Launch Boss are

“Aircraft type and number of people on board”

“Take-up slack”

“All out”

Each of these transmissions will be acknowledged/ read back to the launch boss **before** the appropriate action is initiated.

The pilot may also be giving feedback via radio as to the actual speed. In general, the gliders should be launched in the 50-55 kt. range.

When the glider approaches the top of the arc, the throttle should be close to idle as a result of gentle power reductions throughout the latter part of the launch.

Light Signals

The standard SOSA light signals are:

Flashing Amber Beacon means - the winch is running and the cable is live.

A steady ‘ON’ white light means - **STOP**. All winch launching or retrieve activity is to cease until the problem has been identified and cleared. Resumption of activity is normally confirmed by radio, and then cancellation of the stop signal (all clear).

A RAPID FLASHING White light means Emergency- send **immediate** assistance to the winch

Glider Launch Procedures

Introduction.

The object of the launch is to accelerate the glider smoothly and rapidly to its optimum launch airspeed while avoiding any lurching, and then gradually to adjust the power to maintain an optimum speed throughout the climb

Method.

The following actions are required:

Ensure that the engine is warmed up to its normal operating temperature.

Await advice from the Launch Boss re: type of glider to be launched.

Check visually that there are no loops or slack at the winch, and that the cable has a clear feed to the drum.

On receipt of the signal **“TAKE-UP SLACK”**, While holding the brake lever place the transmission in **Drive**, release the brake lever and allow the winch, at idle, to slowly take-up slack in the cable.

On receipt of the “**ALL OUT**” signal, open the throttle smoothly and progressively over a count of 3 to 4 seconds to the power setting appropriate to the glider type and wind strength. It is very important to accelerate the glider rapidly to assure full control of the glider at the earliest point in the launch. Smooth steady application of power is essential to ensure the glider does not lurch forward creating slack in the cable, which may cause a number of undesirable outcomes i.e. the glider over running the cable, a sudden jerk on the cable as it become taught again has the potential to cause damage to the glider, the cable assembly or the winch. If there is any jerk or hesitation in power at the commencement of the launch, the winch driver must terminate the launch and await a fresh set of instructions from the launch point. If the All Out call is not heard and/or the visual All Out signal has not been seen in a reasonable amount of time after the slack has been removed from the cable, apply the brake and shift the transmission into neutral. **Never launch without hearing the “All Out” call clearly or seeing the All Out signal.**

Maintain this power setting until the glider is established in its climb and then adjust power to achieve a steady climb. Indications can be obtained from a general impression of speed, rate of climb, and the degree of bow in the cable. Watch the glider attitude. Once it has transitioned into the steep climb attitude, you should see a constant plan form view of the glider. If the nose comes down, it is too slow and indicates a need to smoothly apply more power. If the nose goes up, it is too fast and less power is required. The pilot may also be giving feedback via radio as to the actual speed or through the standard winch signals, (yawing for too fast, lowering nose or wing rocking for too slow). In general, the gliders should be launched in the 50-55 kt range.

As the climb continues, progressively reduce power to avoid over-speeding / overloading the glider. If the pilot finds the launch is too fast, he will radio and/or signal the winch to slow down by yawing the glider repeatedly from side to side by using the rudder. On seeing this signal, reduce power until the signal ceases.

As the glider approaches the top of the launch, the throttle should already be close to idle as a result of a progressive power reduction throughout the latter part of the launch. If not, move the throttle to idle in time to ensure that the launch is terminated before the cable reaches vertical. (This is especially important in light, or no-wind, conditions when there is a danger of the cable dropping on the winch, or beyond the airfield boundary, if the glider delays releasing).

Immediately after the cable is released, smoothly increase power until the parachute deploys and then maintain a light tension in the cable until the parachute touches the ground. This helps to avoid loops and achieve a clean wrap on the drum. This can often be accomplished by allowing the engine to idle as it slowly reels in the cable. Under light wind conditions, more throttle will be required to keep the parachute inflated.

If wind conditions allow mid-field retrieves, allow the parachute to land as far down the runway as possible to minimize the retrieve distance. When cross-wind conditions exist,

mid-field retrieves may not be possible and the parachute should be brought close to the winch under power to ensure that it does not land off the runway. To recover the cable to the winch, adjust power to 'fly' the parachute clear of the ground & back to the winch. Power must be cut to idle and the brake applied when the parachute is still at a safe distance from the winch (approx. 100 metres) and in most cases simply flying the chute onto the runway, clear of trees, is all that is required. If there is reason to bring the chute all of the way back to the winch, the final stage of recovery must be made **slowly and carefully**. Be ready to disengage drive and apply the drum brake. If cable attachments are pulled through the rollers, considerable damage and delay will be caused.

When the cable is at rest, put the gear selector in neutral.

Mark the launch on the tally sheet in the cab.

If gliders are soaring or the launch rate is slow, the winch engine shall be switched off to save fuel. Be certain the cable has been delivered to the launch point before switching off. Once the cable has been delivered to the launch point, switch off the engine, if the next glider is not immediately ready for hook-up. An engine shut down of only 10 seconds is fuel efficient. Prior to switching off the engine turn off the radio to avoid current spikes through the radio from shut-down. Then turn the radio on and maintain a listening watch. Prior to starting the engine for the next launch, again shut off the radio and master switch before engaging the starter.

On completion of the retrieve, check cable visually at the winch to ensure that no loops or over-runs exist. If slack cable is found, switch off the engine and pull out slack / loops forward of rollers.

Fuel Level.

After a period of continuous winching - about 10 launches -check the fuel gauge. Inform the launch point if refueling appears necessary. When ready to restart the winch engine, **Please remember the winch will only start with the gear selector in the park position.**

Emergency Procedures

In certain circumstances, immediate action by the winch driver may be essential to ensure the safety of a glider and its crew, or of other people on the airfield. Emergencies can be considered under the four categories, described below, with advice on the actions required by the winch driver:

- Launch failures, including simulated / practice launch failures.
- Failure of the glider to release on completion of the launch.
- Obstruction of the launch.
- Winch power failure.

Launch Failures.

Provided the cable Daily Inspection is completed correctly, the majority of launch failures will normally result from a weak link breaking. However, other possibilities are that the cable itself has broken, a splice has failed, a practice cable break exercise is taking place, or a pilot has chosen to abandon the launch. The winch driver may not be immediately certain as to the actual cause. It is good practice for the launch point to warn the winch driver by radio if a simulated cable break is planned.

The first action is to gently reduce the power (rapid reduction of the power will almost certainly result in an over-run and loops on the winch drum) to bring the cable to rest and avoid conflict between the glider and a moving cable or parachute assembly. As soon as power has been cut, apply the brake to prevent drum momentum continuing to wind in the cable, shift gear selector to neutral.

It is crucial to safety that no attempt to wind in, or retrieve, the cable should be made until the cause of the launch failure has been positively identified and it is safe to move the cable. Subsequent actions will depend on the cause of the launch failure and the location of any break in the cable.

If either a real, or a practice, cable break has taken place, the glider may land close to, or on the cable after completing its recovery maneuver. No movement of the cable should take place until the glider is seen to be well clear. If the cable has broken, the retrieve vehicle should be briefed to find the broken end (normally by tracking back from the parachute along the cable towards the winch) and tow it back to the winch for repair. Meanwhile, the winch driver should cautiously wind in the broken but 'live end' of the cable.

If a weak link has failed, the retrieve vehicle should be briefed to recover the separated stop and retrieve the cable to the launch point for repair. Spare weak links are stored on the Retrieve vehicle, additional spares will be stored on the bus.

Failure of Glider to Release the Cable.

Provided the throttle has been closed to terminate the launch at the appropriate point, and if the pilot does not release, the cable should normally back-release before it is carried to the vertical position. If the glider does not back release, place the gear selector in neutral to take tension off of the cable, this may allow the release to be operated manually in the glider.

If the glider flies beyond the winch with the cable still attached, the winch driver must always be alert to the possibility (thankfully very rare) that the pilot is unable to release.

In this situation it is not possible to define exactly the point at which the cable should be guillotined, but if the glider passes significantly behind the winch, or starts to turn with

the cable still attached, or if the cable angle at the pay-on rollers exceeds the vertical, the winch driver is to:

- Operate the guillotine.
- Apply drum brake.
- Stop engine.
- Use radio to inform launch point that cable has been severed.

Obstructed Launch

If there is any reason to believe that a launch is, or may be, obstructed by people, aircraft, vehicles, or animals, the launch should immediately be stopped. No further cable movements made until confirmation is obtained from the launch point that it is clear to proceed.

Winch Power Failure

If any loss of power is experienced during a launch, the Duty Instructor and Launch Boss are to be informed and the cause investigated before a further launch is attempted.

Safety Reminders.

The winch driver must be alert to any activity near to, or behind the winch. There is a special danger of cable brakes causing a 'whiplash' effect. If a cable breaks under load, tension is released and it contracts instantly, causing it to move faster towards the winch than the speed at which it was being wound in. This effect develops very rapidly particularly if the break occurs close to the winch and can cause the cable to 'whip' at high speed behind the winch for at least 20 – 30 metres.

The winch driver should ensure that no persons or vehicles are within 30 m (100 ft) of the drum side of the winch during launch. All vehicles and persons should be on the door side of the winch and are safest if they are close to the winch

Safety Note.

A stationary or free-falling cable does little damage: a cable moving under power is potentially lethal.

Closedown Procedures

On completion of flying, carry out the following actions:

- After the last launch of the day, the cable must be reeled all the way back onto the winch. It is best to do this under no tension on the cable to prevent damage to the drum, over time. To help prevent wear and tear on the parachute, after the last launch, the parachute should be removed from the cable and the old white parachute attached to the cable. The retrieve vehicle should pull the cable back

to the launch point and then the cable should be wound back onto the drum at idle. The old white parachute on the cable serves as a visual aid so the approach of the cable can be seen. **Do not reel the parachute and metal hardware through the rollers!**

- Put gear selector in Park.
- Switch off engine.
- Enter Hobbs meter engine time in the Log Book as well as the number of launches performed that day.
- Switch off radio / accessories.
- Wind in all remaining slack by turning the drums by hand. Stow parachute.
- Secure free end of cables.
- Stow chocks / stabilizing legs fuel cans and fire extinguisher.
- Put the tongue jack in the traveling position.
- Retract the orange beacon.
- Refuel winch before parking it in the workshop.

DAILY INSPECTIONS

Before the first launch of the day, all winches and prime movers are to be given daily maintenance in accordance with the following schedule:

<u>Item</u>	<u>Action</u>
Fuels	Check contents are sufficient for the day's operation. Replenish as necessary.
Coolant	Check coolant level. No obvious leaks.
Oils	Check levels in engine and transmission. Check for oil leaks from engine), transmission, drums, pay-on gear and brakes. Before checking the automatic transmission fluid level, warm up engine to normal operating temperature. Note that engine and transmission have separate dipsticks.
Brakes	Check operation and brake fluid level
Fan Belts	Check for tension and any excessive wear or fraying.
Tires	Visual Check
Warning Lights, beacons and radio	Check lights and gauges for correct indication and function. Check winch radio.
Prime mover and winch cab	Check that these are clear of broken cable and debris. All controls accessible and free.
Pay-on gear, all rollers and pulleys	Check serviceability and freedom of movement.
Guillotine	Check that the mechanism is clear of debris which could impede operation. Visual check only – seek specialist help if unsure. Do not touch mechanism or operating levers.
Strop and parachute assembly	Check correct configuration and serviceability of linked rings, launch strops (plastic hose covered winch cable), quick-release couplings, weak links (black, red and blue), shackles, ropes, towing links

(single strand of winch cable), parachutes and shrouds.

Cable repair equipment

Check that the repair kit is complete and stored behind the seat of the winch.

Safety Check

Check presence and serviceability of:

Guards

Fire extinguisher(s)

First Aid kit

Earth Stake

Wheel chocks

Communication equipment (eg. light, radio).

Log Book

Complete and record any defects (a glider DI book is adequate for this purpose).