**RAF GSA**

**WINCH MANUAL**



**February 2022**

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**INTRODUCTION**

# The RAFGSA operates Skylaunch winches for providing glider launches. It is a two drum winch, powered by a V8 LPG-fuelled engine driving a single drum at a time, via an automatic gearbox and drum selector.

This manual has been approved by the RAFGSA Ops Member as the training and reference manual for RAFGSA winch drivers.

Winch launching is an important part of the RAFGSA operation. It typically accounts for 80% of the total launches achieved and provides a cost-effective launch method. However; launch height, and consequently value for money, varies due to a variety of factors. Likewise, the launch rate depends on numerous factors. Some are uncontrollable (e.g. wind velocity); others rely on the skill of the winch driver and glider pilot, or effective launch point management.

This manual aims to optimise the skill of the winch driver so that the launches provided meet the satisfaction of the RAFGSA management, Club CFI’s, Winch Members, and of course, the glider pilot who is paying for the launch.

This manual is written to comply with BGA guidance on winch launching and the Skylaunch Winch Operators Manual, a copy of should be available in the winch cab.

Many thanks to the Cranwell Gliding Club for their work on this manual.

For revisions, please contact the Ops Member.

**SAFETY**

The winch is a powerful machine, and a driven cable potentially lethal. **A driven cable can easily saw a tractor in half very quickly, so be warned.** Treat the winch cable with the utmost respect, always. The area around an operating winch is a most dangerous place to be. Your safety, and that of all personnel on the airfield, is of paramount importance. The procedures contained in this manual must therefore be taken seriously and complied with.

* If in doubt about anything, STOP and contact the Duty Instructor or Winch Member.

**As Winch Driver you must ensure that:**

**General Safety**

* Whilst towing the winch, no person is permitted to stand on the side platforms adjacent to the cab. However, a person may ride in the winch cab with the doors closed.
* No personnel apart from the winch driver (including those under training) and retrieve drivers are to be at the winch during winching operations.
* Beware of moving parts. Ensure no loose clothing.
* Danger of scalding. Engine coolant may be hot. Do not remove cap while engine is hot.
* Engine coolant is poisonous - wash hands after contact.
* Ensure you maintain 3 points of contact when entering or exiting the winch cab. Do NOT jump from the cab.
* High Voltage - the ignition system uses extremely high voltages. Do not touch any ignition components while the engine is running.
* LPG gas is highly flammable - there is to be NO SMOKING anywhere near the winch.
* Keep hands clear of guillotine blades.
* Only trained and current operators are to drive the winch.

**Safety at the Winch**

* When launching is in progress, no vehicle or person is to be in front of the winch. Vehicles and people must stand in a position of safety.***Winch drivers must check the area around the winch before commencing every launch.***
* The winch driver is to be in the winch during cable retrieving.
* Whilst working on the drums or cables the winch engine is to be switched off and the STOP light is to be ON.
* No loose objects are to be left on the ground at the winch area. Tools and other items are to be secured in their respective stowage’s.
* All covers, and guards must be in place whilst the drums are turning.

**Safety at the Launch Point**

* Cables which have been towed out to the launch point must NOT be wound in without clearance from the launch point.

**WINCH DRIVER DUTIES AND RESPONSIBILITIES**

* Safety (see above).
* Daily inspection of winch and tractor.
* Positioning and preparing the winch for launching.
* Providing satisfactory and safe launches.
* Radio communications with launch point and retrieve vehicles.
* Expedient cable repairs.
* End-of-day duties.

## WINCH DRIVER TRAINING

Winch drivers are to be trained and authorised by an authorised Winch Trainer. Winch Trainers are nominated by the club Winch Master and must be approved by the club CFI / DCFI. Only qualified winch drivers and winch trainers may operate the winch. The Winch Master is to maintain a register of current winch drivers and trainers.

**Prerequisites**

* You must be a member of a RAFGSA Club.
* You must be at least a solo glider pilot.

**You are qualified as a Winch Driver when**

* You have signed that you have read and understood this manual.
* You have undertaken all training specified on the Winch Driver Training card, including winch preparation and maintenance, launching and emergency procedures.
* You have satisfied a Winch Trainer that you are competent in all aspects of winching, and he has endorsed your Winch Driver Training card and Ground Training and Qualification Record.

**You are qualified as a Winch Trainer when**

* You have satisfied the club CFI / DCFI/ Winch Member that you are sufficiently experienced and competent to provide training, and they have endorsed your Ground Training and Qualification Record accordingly.

**MAIN SKYLAUCH CONTROLS**

The main driving controls which the winch driver needs to know about are set out in the following table. The same terminology is used throughout this manual for clarity:

|  |  |  |  |
| --- | --- | --- | --- |
| **Control** | **Colour** | **Type** | **Function** |
| DRUM SELECTOR | Black | 3-way | Selects left, neutral (none) or right cable drum |
| GUILLOTINE | Red | OFF / ON | To chop cables in an emergency |
| DRIVE | Blue | Drive / Neutral | Engages engine to drive selected drum |
| THROTTLE | Blue | Variable | Controls engine power |
| DRUM BRAKE (left and right drum) | Blue | Variable | Applies brake to appropriate cable drum |

A key to the cab controls is at Appendix E. Note that cable tow-out brakes are applied automatically via the DRUM SELECTOR; with the lever in neutral, the tow-out brakes are applied to both drums. Once a drum is selected the tow out brake on that drum is disengaged.

All the control levers move away or towards you, the operator, except the DRUM SELECTOR which moves from side to side.

The controls are consistent in the sense that they all need to be pushed forward to “go” and pulled towards you to “stop.” The GUILLOTINE lever is pulled towards the operator to activate the guillotines.

**Settings**

Before launching a glider, the headwind and glider type are set to control the THROTTLE GATE. This is a ‘soft stop’ position to limit the THROTTLE for the wind and glider type. It is designed to be correct for the main climb phase of the launch only. The THROTTLE may be pushed through the GATE to provide more power if required.

The headwind setting should be estimated from observations, and experience from earlier launches. Note: this setting is the wind component in the direction of the launch, so with 15 knots at 90° to the launch direction, the correct setting would be ZERO.

The glider type setting is taken from the table displayed in the winch cab. If you are unsure of the type of glider to be launched, use the radio to check with the launch point.



## DAILY INSPECTIONS

**Look after the kit, and the kit will look after you when it is your turn to fly**

**Engage GUILLOTINE Safety Lock before the Daily Inspection**

* Before towing the winch to the launch point carry out the daily inspection (DI) in accordance with the DI check list at appendix 1 in the Winch Log Book, held in the winch cab, including signing for the completed DI.
* Record any replenishments in the log book.
* Any damage noticed during the DI should be recorded in the log book and the Winch Member informed.

**Repairs to the Winch**

As a Winch Driver you are not necessarily authorised to perform repairs to the winch. If in doubt consult the Winch Member or another member of the engineering staff for advice.

### Positioning the Winch

* Seek advice from the Duty Instructor regarding the positioning of the winch.
* Before moving the winch, check that the cables are tight on the drums and not dragging on the ground.
  + Position the winch pointing towards the Launch Point and set up in accordance with Winch Set up at appendix 2 in the Winch Logbook.

**END OF DAY PROCEDURES**

* + On completion of the days flying carry out the “end of day servicing” as per appendix 3 in the Winch Logbook.
  + Request the number of launches for the day from the launch point and complete the last three columns of the DI signature sheet.

# Cable Inspection

The cables are inspected periodically at the discretion of the Winch Member or his deputy. To inspect the cables, they are towed out from the winch to the launch point (or beyond if safe to do so). The inspection then takes place at the winch as the cables are slowly wound in. The cable is stopped if a defect is seen and repaired in situ. All inspections are recorded in the Winch Log Book.

Note that this is the only time a person is close to the cables at the winch while cables are being wound in. That person must keep clear and not step over the cables unless the winch engine is stopped.

# Controlling the Cable on Retrieve Tow Out

Depending on the model of winch, the cable tow out brakes are applied automatically by the DRUM SELECTOR or by the paying out brake lever: With the DRUM SELECTOR in neutral the tow out brakes are applied to both drums. Once a drum is selected the tow out brake on that drum is released.

Before a cable is towed out the winch driver is to ensure that the drum is NOT selected.

Any problems with the tow out (cable spills etc) are to be reported in the Winch Log Book.

**Communications**

Good communications between the Winch, Retrieve Vehicle, and Launch Point are essential to safe to winching operations. It is recommended that hand-held radios are used for this purpose.

The primary method of passing launch instructions from the Launch Point to the winch is to be by use of lights installed at the launch point. The system may use 2 lights, one for either side of the winch. The light signals may be supplemented by radio calls and / or use of a bat if required (see Laws & Rules for Glider Pilots for methods of signalling)**.**

The Winch Driver may use the take up slack, all out and stop commands over the radio to the Retrieve Vehicle when the cable is being towed back to the Launch Point.

In addition, all parties should use radios to communicate with each other when resolving problems such as cable breaks or weak link failures or passing supplementary information such as glider type prior to a launch.

Before transmitting a message, listen to ensure no one else is transmitting, then press the button. Say who you are calling, followed by who you are. For example, if you want to call Retrieve, and you are the Winch, you would say *“Retrieve, Winch”* followed by your message. Release the button after transmitting otherwise you will not hear the reply.

The winch has a light on the cab top, which is be used signal STOP in combination with radio calls. For example, if you are working on a cable drum at the winch the light should be used to signal STOP. The reason for the STOP light can be confirmed by radio to the Launch Point and Retrieve Drivers. A continuous WHITE light is an official STOP signal. Cables must not be moved if a stop light is showing.

# Launch Procedures

**Introduction**

The object is to accelerate the glider smoothly and rapidly to its optimum launch airspeed whilst avoiding snatching, which over-stresses the cable, or tail-banging which over-stresses the glider.

**Method**

***Prepare* Phase. When a launch is imminent (glider wings level):**

* Ensure engine is warmed up. Check the temperature gauge.
* Check the wind speed setting on the throttle gate.

***Take Up Slack* Phase. Wait for “Take Up Slack” signal from Launch Point, then:**

* ***Ensure that the surrounding area is clear of obstructions and pedestrians***.
* Unlatch the guillotine safety lock.
* Set the glider type on throttle gate.
* Select the appropriate drum with the DRUM SELECTOR.
* Engage DRIVE to take up slack.
* Use small amounts of throttle to ensure cable drums continue to rotate as the cable becomes taut, and the slack is pulled in smoothly.

***All Out* Phase. Wait for “All Out” signal from the Launch Point, then:**

* Push THROTTLE open smoothly and progressively, taking 2 - 3 seconds to push up to and, if necessary, through the THROTTLE GATE until the glider has rotated into the full climb. At this stage, throttle back smoothly to the gate.
* Maintain appropriate power for the conditions throughout the main climb phase of the launch.
* Adjust the throttle setting in response to any speed signals received from the glider.

**Top of Launch.**

* Reduce throttle as the glider approaches the top of the launch, then close the throttle fully well before the cable reaches a vertical position.
* **Immediately the glider is seen to release**, smoothly increase the THROTTLE enough to deploy the parachute and maintain a slight tension in the cable, enough to prevent the cable from touching the ground. This ensures a clean wrap onto the drum with no loose loops of cable.
* **Adjust the THROTTLE to “fly” the parachute back to the winch**, clear of the ground. Once on the ground, the parachute may be drawn closer to the winch but VERY SLOWLY, with reduced throttle.
* **Be careful to stop the parachute assembly in suitable time** to avoid it jamming in the winch rollers.

Note: It is your job as Winch Driver to ensure that the cable lands safely away from obstructions, and certainly not on top of, or behind the winch.

**When stopped.**

* DRIVE to neutral.
* DRUM ENGAGEMENT LEVER to neutral.
* Re-engage the GUILLOTINE safety lock.
* Check there is no loose cable and that it is seated correctly on the drum.

**As Appropriate.**

* Check the parachute etc. are clear of the other cable if ready for the next launch.
* Prepare for the next launch.
* Co-ordinate cable retrieve with the Retrieve Drivers. **Do not commence next launch until retrieve vehicle and driver are safely clear of the remaining cable.**

**Emergency Procedures**

**A stationary or falling cable does little damage; a driven cable is potentially lethal**

**Failure of Glider to Release the Cable**

Provided that the THROTTLE is closed to terminate the launch at the appropriate point, the cable should back-release before it is carried into the vertical position by the glider. Once the cable has reached or passed vertical, it may be assumed that the glider is unable to release the cable. If this happens:

1. THROTTLE to idle.
2. Operate the GUILLOTINE immediately.
3. DRIVE to neutral.
4. DRUM SELECTOR to neutral.
5. Switch engine off.
6. **STAY INSIDE CAB UNTIL EMERGENCY IS OVER.**
7. Inform the Launch Point.

**“STOP”**

If you ever see or hear “STOP” in any form:

1. THROTTLE to idle.
2. DRIVE to neutral.
3. DRUM BRAKE to stop cable.
4. DRUM SELECTOR to neutral.
5. Await further instructions from the Launch Point; contact by radio if unsure it is safe to proceed with launch.

**Hazard Observed**

**Do not launch if you notice any conflict or hazard,** regardless of any signal you may receive. It may have gone unnoticed by the Launch Point. Inform the Launch Point and do not proceed until the hazard has been removed to your satisfaction.

**Cable Breaks & Launch Failures**

**Following any Cable Break or Launch Failure:**

#### Close THROTTLE immediately to bring the cable to rest and avoid any conflict between the glider and the cable/parachute assembly. Select DRIVE to neutral and DRUM SELECTOR to neutral.

* On no account should the cable be winched in until it is safe to do so.
* If the glider lands ahead, DO NOT move the cable until you are CERTAIN that the cable is clear of the glider and crew.

#### If the glider is high enough it will turn away from the launch line and you may wind the cable in, keeping an eye on the glider. The glider may still do a truncated circuit and land in front of the winch, or across the launch line. If you have any doubt, then STOP.

**Cable Recovery**

* If the cable is broken and the area is clear, use or instruct the Retrieve Vehicleto recover the broken end.
* When the Retrieve Vehicle brings the cable back to the Winch, it may have to drive past the winch to provide enough slack cable to facilitate the repair.

**Cable Repair**

Club Winch Masters are to locally publish their club cable repair schemes.

**DAILY INSPECTION**

ENSURE GUILLOTINE SAFETY LOCK ENGAGED BEFORE STARTING CHECKS

**Inside winch cab**

* + - 1. Check servicing record for faults and that the guillotine check is current (valid for 28 flying days since last check).
      2. Check all circuit breakers are closed.
      3. Turn on Battery Isolator (Below Instrument panel).
      4. Turn on Ignition Switch (do not attempt to start engine).
      5. Test all warning lights, lamps, and horns.
      6. Turn off Ignition Switch.
      7. Check there are enough ferrules in the tool box.
      8. Check there is a radio in the cab. If not, obtain one from the charging point in the workshop, or from the front of the bus.
      9. Exit cab through right-hand door.

**Outside winch (right-hand side)**

* + - 1. Check tyre pressures (engine end: 40psi / 2.7bar; tow end: 48psi / 3.4 bar).
      2. Ensure chock is secure.
      3. Open right-hand engine and cable covers and check:
* Brake fluid level; OX8 or DOT 4 Brake fluid.
* Transmission cooler clear of debris;
* Auto-box for leaks (level can only be checked with engine at idle); Transmission fluid. ATF
* Engine oil level; OMD90, 90x or 10w/40 SAE semi synthetic
* Alternator drive belt (condition and tension);
* Guillotine linkage for security and damage and guillotines are free of damage or debris;
* Cable runs and drum. If there is any loose cable, wind back onto drum by hand and re-apply tow out brake;
* Parachute, strop, and weak links.
* Clean window;
* Close engine cover.
  + - 1. Right-hand roller box: Check cable rollers (6 in each roller box) are free of damage or debris, running freely and there is no excessive bearing or surface wear.

**Outside winch (left-hand side)**

* + - 1. Left-hand roller box: Check cable rollers (6 in each roller box) are free of damage or debris, running freely and there is no excessive bearing or surface wear.
      2. Engine Coolant Level (T-shaped dipstick in winch cab).
      3. Open left-hand engine and cable cover and check:
* Coolant pump and fan drive belt condition;
* Guillotine linkage for security and damage and guillotines are free of damage or debris;
* Check battery connections for corrosion/tightness
* Cable runs and drum. If there is any loose cable, wind back onto drum by hand and re-apply tow out brake;
* Parachute, strop, and weak links.
* Clean window;
* Close engine cover.
  + - 1. Ensure chock is secure.
      2. Check tyre pressures (engine end: 40psi / 2.7bar; tow end: 48psi / 3.4 bar).

**WARNING: USE HANDLE TO OPEN AND CLOSE REAR COVER**

* + - 1. Open rear cover check:
* Both gas tanks are full;
* Earth spike stowed correctly;
* Oil is visible in sight glass on bevel gearbox;
* Close cover.
  + - 1. Check earth lead is secure.
      2. Check general condition of winch (record any damage noted in Log Book).
      3. SIGN THE PAPERWORK!

**SETTING UP THE WINCH**

1. Confirm with DI where to set up the winch.
2. Line up winch with the bus, allowing for cable drift in crosswinds.
3. Leave connected to tractor.
4. Apply wheel brake.
5. Lower tow hitch jack (remember to place the board, stored in the winch cab, under the jack before lowering).
6. Position earth spike and attach earth cable to T-bar at top of spike.
7. Lower chocks.
8. Remove parachutes from cable guides and connect short strop.
9. Start engine. If the speed cam is used to increase idle speed during warm-up, REMEMBER TO TURN IT BACK DOWN ONCE THE ENGINE IS WARM.
10. Once engine has been at idle for a couple of minutes, check transmission fluid level (engine warm: oil level should be between the top and bottom marks; engine still cold: oil should be level with the bottom mark).
11. Check operation of brake system on cable drums, including tow out brake, before cables are taken to launch point.

**END OF DAY SERVICING**

The engine is cooled by an engine-driven fan. Ensure the engine temperature has returned to normal after final launch before proceeding.

* + - 1. Note the number of winch launches from the launch point and enter in Log Book.
      2. Allow engine temperature to return to normal, then switch off engine.
      3. Switch off battery master switch.
      4. Wind both cables in by rotating the cable drums by hand. Whilst doing so, check for any damage to the drums.
      5. Disconnect the “short” strops and store them in the winch cab.
      6. Stow parachutes, long strops, and weak links in cable guides.
      7. Disconnect earth lead and stow lead and spike.
      8. Raise chocks.
      9. (Check the winch is still connected to the tractor!) Raise tow hitch jack and stow the board in winch cab.
      10. Release wheel brake.
      11. Check the area around the winch is cleared, cleating press/ Dyneema repair kit, cutters stowed, and rubbish put in the bin.
      12. Tow winch off airfield and refill LPG tanks ready for the next day’s flying.
      13. Park winch.
      14. Ensure cab is clean and tidy and rubbish thrown away.
      15. Ensure radio switched off. Return to charging point in the workshop.

**TYPICAL CABLE COMPONENTS**



**KEY TO CAB CONTROLS**



Note: the Skylaunch winch at Cranwell has independent braking systems for each cable drum.

