

SGC Tug Pilots Manual



Portmoak Airfield
Scotlandwell
KINROSS
KY13 9JJ

JANUARY 2022

FOREWORD

The following document has been prepared in order to standardise tug operations and to safeguard the long-term viability of the Eurofox glider tugs whilst ensuring that operations are at all times conducted safely. It is to be used in conjunction with the Eurofox Pilot Operating Handbook (including glider towing supplement) and the Portmoak Airfield Manual, Chapter 6, Operation of Powered Aircraft; in particular, attention is drawn to the following sections:

3.2 'By joining the SGC, members agree that they will operate within the privileges of their license whilst complying with the Air Navigation Order and any local rules in force at the time. They also agree that they will comply with necessary medical and currency requirements. A copy of this medical must be passed to the SGU office before flight'.

3.3 'Pilots should familiarise themselves with the requirements of EASA Flight Crew Licensing (PART FCL), Laws & Rules for glider Pilots and the aircraft Flight Manual for the type of aircraft in use. The club requires all pilots to check weather and NOTAMs prior to flying. Facilities are provided at the club to enable pilots to familiarise themselves with local club rules and protocols before flying'.

These procedures cannot cater for every eventuality and it is the responsibility of all tug pilots to ensure that they comply except where it is judged that doing so may compromise flight safety.

Tug flying can be very demanding and requires high levels of concentration, anticipation and good airmanship. The aircraft is subjected to exceptional operational workloads, so careful handling and a thorough Daily Inspection are essential for your own safety and in the interests of prolonging the economic life of the aircraft. Please read the following pages thoroughly. Pilots who operate the tug aircraft in contravention of these guidelines will be asked to undertake further coaching and may have their tug flying privileges removed.

Jamie Dickson

TUG MASTER

Scottish Gliding Centre

ACKNOWLEDGEMENTS

Recognition and thanks are due to both the Eurofox build teams and to all who were involved in getting the projects off the ground, without whom these notes would not have been necessary! In addition, a big thanks to Tony Brown and Colin Hamilton whose assistance with this manual has been invaluable.

NOTE

Any Tug Pilot who might wish to suggest improvements to the methods of operation contained in this document, should forward any comments, in the first instance, to the Tugmaster. Subject to due consideration and discussion with the proposer they may be incorporated into future amendments of this manual.

INDEX

	Page Number
Title Page.....	1
Foreword /Acknowledgements.....	2
Index.....	4
Amendment Record	5
1 Authorisation of pilots and pilot privileges.....	6
2 Training and coaching..... (inc. currency requirements)	7
3 Noise Abatement.....	8
4 Airfield/Aerotow Operations..... (inc. runways, tug/winch joint ops, parking, hill lobs and limitations)	9
5 General Procedures..... (inc. fuelling, DI, oil, strong wind ops, launching, climb, descent, landing, field retrieves and returning to the hangar)	13
6 Aircraft General – Aeropro Eurofox..... (inc. limitations, speeds, quantities, tyre pressures and RPM,s)	20
7 Engine Temperature Management.....	21
8 Emergency procedures.....	23
Annex 1 G-OSGC Differences	26
Annex 2 Training Syllabus.....	32

AMENDMENT RECORD

Issue No	Pages affected	Subject	Date Incorporated	Incorporated By
01	All	Initial issue	17/06/2014	A.H Brown
02	All	Full revision	01/10/2019	Jamie Dickson
03	All	Full revision/name change	10/08/2020	Jamie Dickson
04	All	Addition of G-GC 914 mod	24/01/2022	Jamie Dickson

1. AUTHORISATION TO FLY SGC TUG AIRCRAFT

All Pilots wishing to fly any Tug must have prior authorisation from the Tug Master.

A suitable number of tug pilots will be approved at any time, and where there are sufficient a waitlist established. This ensures enough towing to go around and keep all pilots in currency.

No pilot shall fly the tug aircraft without initially undertaking, as a minimum, a check flight with the Tug Master or persons specifically authorised to do so by him/her.

Pilots must hold applicable licences and ratings, i.e. a PPL, NPPL or a LAPL(A) with an SEP or SSEA rating. A Sailplane Towing rating is not required for the Eurofox, however training will be given to the same standard as per the EASA syllabus. See training form in Annex 2

To satisfy insurance requirements, all tug pilots shall be members of the Scottish Gliding Centre (SGC).

As a minimum, at least one of the following requirements shall be satisfied prior to a pilot being considered for aerotowing operations:

- 1.) - Be currently approved on the Eurofox type for towing operations;
or
- 2.) - Have a minimum of 100 hours solo flight time and experience in tail wheel aircraft and have satisfied the Tug Master that they have the necessary knowledge to operate safely. A bronze C” is also desirable to ensure that the pilot is fully conversant with gliding operations.

Minimum solo requirements in 2) above may be waived at the discretion of the Tug Master if an individual can demonstrate the required skill level for tug operation and it can be shown that provision of the necessary coaching would be in the best interests of the club in maintaining tug pilot quotas.

Pilots will be grouped according to their experience and supervision requirements.

Group C Pilots

Those who are new to glider towing and require guidance and supervision. These pilots are not permitted to fly the tug unless a supervising pilot is present on the airfield and has given authorisation to fly. May fly normal tows and trial lessons only. No first solo aerotows, retrieves or type conversion flights permitted. Crosswind limit of 10kts and no turbocharged (G-OSGC) aircraft operations.

Group B Pilots

Those who have acquired the necessary level of expertise and who do not require further supervision. These pilots are self-authorising and do not require supervision.

Group A Pilots

Those who have acquired the necessary level of expertise and who in addition have the necessary skills required to provide supervision to pilots in group C).

Note: Supervised familiarisation flying (group C) will involve an unspecified number of monitored tows (normally around 50 across a range of weather conditions from benign to more challenging) before the pilot is cleared for unsupervised operations by the Tug Master. All group allocation and group changes will be at the discretion of the Tug Master.

2. TRAINING AND COACHING

Utilisation of Tugs for training purposes shall be with the sole aim of developing competent future tug pilots who will operate from Portmoak. However subject to Board approval other training may be conducted at the discretion of the Tug Master.

The Tugs are to be operated primarily as the SGU tug aircraft and this function shall take priority over all other operations with these aircraft.

The Tugs shall not be taken from the airfield local area other than for extended aerotows without the express permission of the Tug Master or his nominated representative. In the Tug Master's absence, the duty instructor may authorise aerotow retrieves.

Pilots who satisfy the minimum requirements may undertake conversion training or aerotow coaching subject to club requirements for tug pilots.

Conversion training or aerotow coaching is to be delivered only by the Tug Master or persons specifically authorised to do so by him/her.

Where pilots require consolidation of experience and it is deemed that this may be best achieved by further solo flight then, at the discretion of the Tug Master, this may be authorised.

Ongoing coaching may be required before an individual is deemed competent to operate the tug. Where possible, this coaching will be incorporated into normal aerotowing operations; however, where this is not practical, coaching will be at the expense of the trainee pilot.

The sum of all aerotows completed by the tug pilot and glider pilot combined must never be less than 6 or any updated published minimum.

Practice circuits with the tow rope attached are prohibited.

See Annex 2 for the training syllabus for the Sailplane Towing Rating. Tailwheel and turbocharger differences if required is covered separately by a qualified instructor.

2.1 Currency Requirements and Check Flights

The Tug Master may request a check flight with any tug pilot at any time.

As a minimum, a check flight is required by all tug pilots within each 12 month period of operation at the discretion of the Tug Master.

After 60 days since last flight on SGC tow aircraft , pilots must contact the Tug Master before flying any SGC tow aircraft in any capacity. Based on weather and pilot experience the requirement for a check flight will be discussed.

A pilot may complete up to 3 circuits without authorisation before their duty if they feel the need to get back into practise or have been authorised to do so past 60 days by the Tug Master. The circuits must be paid for by the tug pilot at the training rate.

3. NOISE ABATEMENT

As with any airfield, we must be considerate to our neighbours and actively work on reducing our noise impact.

Pilots should avoid overflying the villages of Scotlandwell and Kinnesswood, as well as the equestrian buildings and Loch End Cafe at the eastern boundary of the airfield unless for safety critical reasons.

During towing operations, it is recommended that pilots vary flight paths throughout the day to minimise the impact of noise on one particular area where practicable. This is most relevant to operations in Easterly wind directions from RWY 10 L/R. Consideration to changing from a left/right turnout should be given every hour or so.

The diagram below illustrates noise sensitive areas.



4. AIRFIELD/AEROTOW OPERATIONS

The surface of our airfield is very rough in places. If slower turnaround times are achieved as a result of the need to land in smoother areas of the airfield, then this is to be encouraged where the alternative would be to land on rougher ground. Under all circumstances, it is important that we consider the neighbouring population and exercise reasonable noise abatement measures.

The airfield can be very busy at times, and glider pilots will not always vacate the strip so expect to go around and land at another section of the airfield if this happens. A good lookout and radio calls/monitoring is key to maintain situational awareness.

Pilots must be particularly careful in wind directions with a significant Northerly or Southerly component due to turbulence from the hill or trees and use an appropriate runway for takeoff and landing. If in doubt, ask someone more experienced or don't fly. In strong winds the turbulence can be severe.

4.1 Runway 28 L/R

Departures from 28L/R should be flown to give maximum EFATO or failed launch options and avoid going out of gliding range of the loch shore. This is best achieved with a right hand turn out after departure flying along the shore of the loch. 28L allows a more level and longer takeoff run and may be preferred in light wind conditions.

Landing on 28R preferred to be across the field in a "20" direction dragging the rope across the marsh area to the north of the 28R threshold. If this is not possible due wind/pilot preference then a landing deep into the field, crossing the boundary not less than 300ft should be performed.

Landing on 28 L is similar, requiring a deep landing crossing the boundary high to keep the rope clear of the clubhouse, or by flying down the south field with a turn to align with the runway in the later stages.

4.2 Runway 10L

Departures carry no restrictions; however, attention is drawn to operating limitations for R/W 28 when approaching on a reciprocal heading during light wind conditions. Be aware of the fence and the need to clear this with the rope. If clear, the approach can be made up the hill from the southwest to land on the hill or just after. Be aware of wind shear off the trees.

4.3 Runway 10R

Departures should make a slight right turn and remain to the southwest side of the south field centre line to avoid overflying the loch end cafe buildings or club house and give best options in the event of an engine failure.

When landing do not drag the rope through the field adjacent to the west boundary, as it damages the farmers crops.

4.4 Runway 30

When towing the wind should be suffice that the tug and glider can become airborne before crossing the path. This will only be suitable on strong North Westerly days with a strong headwind component.

When landing into the south field, the boundary fence must be crossed at 200FT to prevent the rope dragging on the road and hitting vehicles. A side slip may be needed in light winds and avoid crossing the path at high speed. Care should be taken if winch launching is taking place.

4.5 Aerotow Operations

Before Aerotow operations commence, the tug pilot shall discuss with the duty instructor as to the field setup and where he/she intends to operate from. The preferred option is the North strip, however in certain wind conditions the centre or south strip can be used. The final decision on where to tow from rests with the tug pilot.

If no winch launching is taking place, then for convenience the centre strip may be used.

Before aerotow operations commence, the fire truck is to be positioned at the launch point and glider log sheets are to be made available.

In addition to the glider log, a log must be kept by the tug pilot, who will record details of the tow.

Fly all sorties within safe range of the airfield (particularly whilst at low level) in case of engine failure.

Avoid unnecessary engine running time on the ground, but do not take off with a cold engine. The image below suggests the runway layout (yellow lines, 20 and 12 for landing only) and parking areas (red circles) on the airfield.



4.6 Concurrent Tug and winch operations in the centre strip.

It is permissible to operate both aerotow and winch from the centre strip. Pilots must establish clear communication between the launch points and ensure that no conflict occurs. On the takeoff pilots shall avoid overflying the winch unless a safety reason overrides i.e. insufficient clearance from trees. Reciprocal landings should only be carried out when the tug pilot is certain no glider is about to launch.

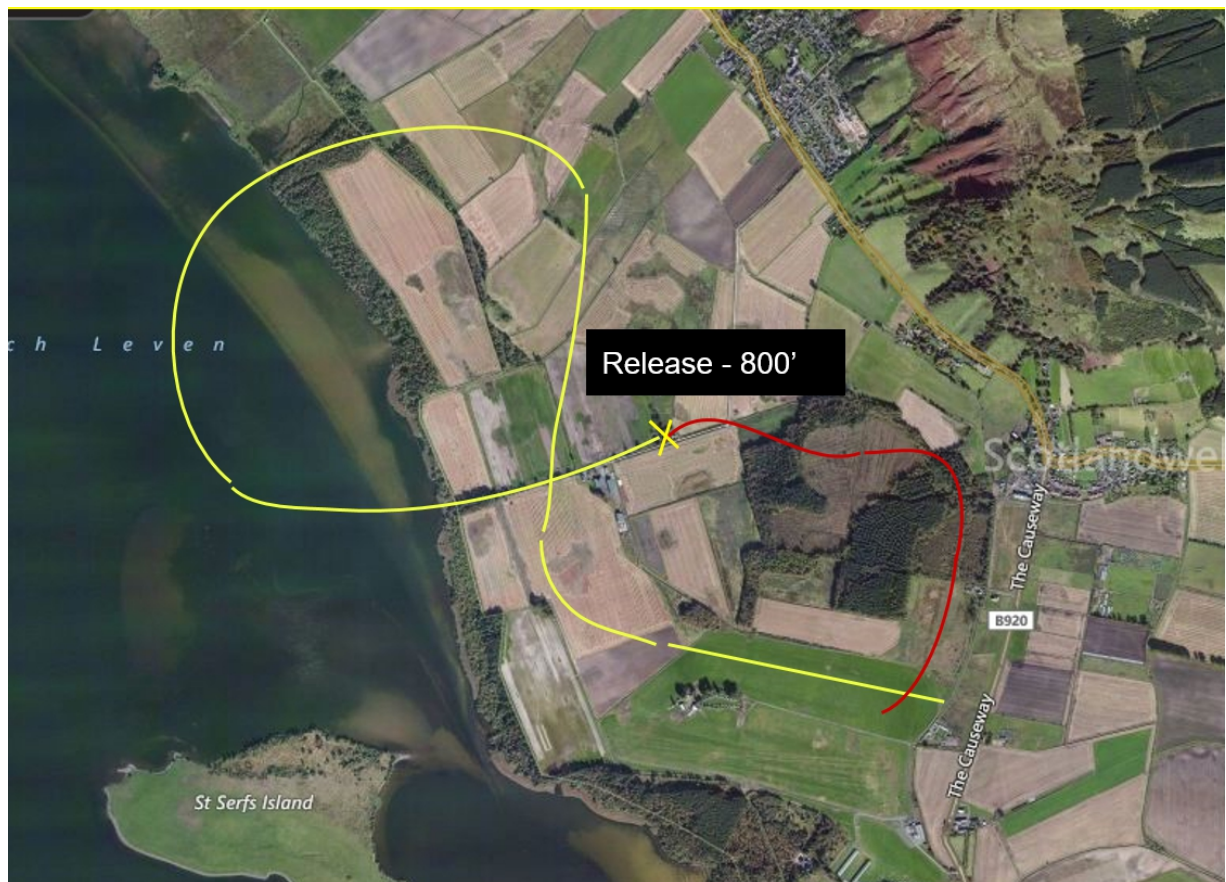
4.7 Aircraft Parking

Please be aware of where the tug is parked when not in use. Do not park the aircraft close to the threshold of runway 28R, but on the eastern boundary south of the aerotow run to allow space for other powered aircraft and gliders to approach. Ensure launch caravan and fire truck are well clear also. For 10L, near the northern boundary is best and 10 R near the track by the eastern boundary leaves space for landing gliders. **See image on page 10 for suggested parking areas (red circles)**

4.8 Hill Lob Procedure

Various procedures have been trialled, however the official and recommended procedure has reverted to the original pattern shown below. A hill lob is not the same as a 1000ft tow. Pilots wishing this on non hill days should expect to be dropped 1000ft at a point suitable for the circuit.

The procedure is detailed below, and may need to be tightened for lighter gliders or indeed the more powerful tug. Note that 800 is a suggested minimum release height, it may be between 800' and 1000' depending on conditions and the glider.



4.9 Aerotow limitations

The LAA have approved the Eurofox tug to be used with 3 people in the glider/tug combination which is to be specifically for tug pilot training or familiarization.

Maximum Take Off weight of glider..... 750 kg

Maximum of 3 people in glider and Eurofox combination with either 2 POB in the Eurofox and 1 in the glider or, 1 in the Eurofox and 2 POB in the glider).

MAUW of the Eurofox limited to 560 kg when 3 people total in combination and 2 POB in the Eurofox (for tug pilot training).

MAUW of the glider in tow not to exceed 500kg with 3 people combination configured as above.

Every effort should be made to ensure that the strip being utilised for aerotowing operations has short grass and is clear from obstructions which have the potential to create turbulence and further compromising climb-out performance.

The table below details guide minimum **head wind component** in knots required and below which towing operations with the Eurofox should not be attempted. The figures assume that runways 100/280 are in use and that the maximum runway length is being utilised. The figures are to be used as a guide only and are not intended to be applied blindly. **Tug pilots should use their own knowledge and experience to determine whether or not it is safe for a glider tow to proceed. For the EF 914 these figures may be relaxed at pilots discretion.**

Glider type	Wood	Glass single seater	Glass two seater	Heavy glass (water ballast or TOW > 600kg)
Short grass dry	0	0	5	10
Longer grass dry	0-5	5-10	10	Do not attempt
Short grass wet	0-5	5-10	10	Do not attempt
Longer grass wet	10	10	Do not attempt	Do not attempt

5. GENERAL PROCEDURES

5.1 Fuelling

Fuelling should be terminated at around 35 litres per tank to prevent overflow and spillage. To prevent damage to paintwork, spillages of fuel onto aircraft surfaces are to be rinsed down with soapy water without delay.

As a rough guide, fuel consumption for aerotowing will be 2-3 litres per 2000' tow (previous operations have indicated a reliable average to be 2.6 litres per 2000')

The following fuel grades are acceptable: EN228 min RON 90 unleaded Mogas, UL91 or Avgas 100LL. 100LL is a last resort and for minimum time only.

To reduce the impact of fire, fuelling is only to be performed outside of the tug hangar.

Ensure the earthing lead is connected and, if the fuelling hose is run over the road, lower the refuelling barrier.

Use the steps provided to ensure a stable platform from which to refuel. This will ensure a reduced likelihood of fuel spillage and of aircraft damage.

Consideration should be given to fuelling the starboard tank to 35 litres and the port tank to around 10 litres. Utilising the starboard tank only between refuelling stops will reduce overall weight whilst allowing breaks for refuelling at realistic intervals selecting the starboard tank for use in this configuration will compensate for cockpit weight distribution in single pilot operations.

Ensure that the aircraft is sufficiently close to the fuelling point such that there is no tension in the hose during fuelling operations. **SUPPORT THE HOSE AT ALL TIMES. Under no circumstances is the fuelling nozzle to be wedged into the fuel tank filler neck as this will place unacceptable loading on the structure and WILL lead to damage.**

5.2 Daily Inspection

Before the days flying, the pilot must complete a thorough pre flight or daily inspection of the aircraft. This should be done according to the aircraft POH, however some additional items to note are:

Unplug the trickle charger from the aircraft and store the cable at the rear of the hangar to prevent damage.

Check the sheets at the rear on the log sheets to ensure the aircraft is serviceable and has enough hours remaining to fly the anticipated amount of tows.

If any defects found, contact the Tug Master and the office at the earliest opportunity.

Once finished, sign the DI book noting fuel and oil state and any oil added.

5.3 Checking the Oil

Remove oil tank cap and dip stick and place in a clean area away from dirt and grit.

Ensure engine Master and Magneto switches are to the 'OFF' position.

Hand crank the engine in direction of rotation until a gurgle is heard from the oil returning to the tank

Clean and replace dipstick to check tank oil level.

Replenish with oil as necessary to bring oil level to upper limit.

Take care not to overfill

Note that from the bottom to the top of flat on dipstick is only **450 ml**. Please use the small measuring jug to determine accurately how much is being added.

REPLACE THE OIL TANK CAP.

Record the amount added in the DI book as “ + xxx ml ”

Note: G-OSGU and G-OSGC use different oil types.

G-OSGU

Aerolube 10W40



G-OSGC

Aeroshell Sport Plus 4



5.4 Tow Ropes

Daily Inspection of the aircraft should include the selection of a serviceable tow rope, inspection of the weak link and a full operational check of the rope release equipment. This will involve enlisting the help of a third party for a release check. Tug pilots should ensure that the rope is of sufficient length, free from damage and free from knots. The minimum allowable rope length is 50M; the maximum length is 65M (new ropes are made up to 60M in length).

The weak links in use should be coloured GREEN (300Kg) and positioned at the TUG end of the rope. There will be no weak link at the glider end, as this is susceptible to damage in our operation and may cause more failures.

Positioning the weak link at the tug end of the rope will safeguard the tug from a fence snagging incident on landing and is extremely important.

Any defective ropes should be left at the rear of the hangar and the tugmaster informed.

5.5 Operating in Strong Wind Conditions

When operating tail-wheel aircraft, there can be a marked loss of directional control when taxiing in strong crosswind conditions and the potential for pitching over onto the nose when taxiing downwind.

If wind strength is such that that safe taxiing cannot be accomplished, return the aircraft to its hangar. If already at the launch point, wait for a reduction in wind strength before attempting to move the aircraft, or enlist the help of persons familiar with the procedure of towing the aircraft back to the hangar.

Pilots should be familiar with the correct positioning of elevator and ailerons when operating in crosswinds, which are:

Taxiing into wind, elevator up and ailerons into the wind.

Taxiing downwind, elevator down and ailerons away from the wind.

Problems are most likely to be encountered when attempting to turn downwind or when taxiing crosswind.

To manoeuvre the Tug downwind, the recommended technique is as follows:

Before turning from into-wind to downwind, apply forward trim, hold the stick fully back and apply power, using rudder and gentle brake, if necessary. As the nose is about to swing onto the chosen taxi path, reduce power to 2000RPM and ease the stick forward. If the flaps are being moved by the wind, (this indicates wind strengths above operational limits) then select full flap to stabilise their movement. Use gentle application and small amounts of power, brakes and rudder.

To turn into wind, apply rudder and brake in the direction of the turn, easing the stick

back and applying power as the aircraft turns into wind.

If wind conditions are such that taxiing becomes unsafe, then suspend towing operations and park the aircraft into wind. The POH for the LAA 560kg version does not set headwind or tailwind limits, however the SGC limits are 22kts headwind, and 4 kts tailwind. Fly Conservatively at all times.

5.6 Launching

Before the first flight of the day and prior to lining up in preparation for receiving the tow rope, pilots are to ensure that all necessary pre-flight checks have been completed.

Monitor Airfield Frequency 129.980 and set squawk to 0034.

Line-up at 45 degrees to the glider, to allow best view of other airfield operations.

Complete the tug log.

The rope handler should be encouraged to lay the rope out in straight or curved lines and not to simply coil it in front of the glider – the latter will result in tangles and lead to knotting of the rope (ensure that launching personnel are familiar with the correct method of checking the weak link for breaks, and with removing knots from the rope before launching). Watch the rope handler as he handles the rope and check that he appears to be looking for knots

Complete final pre-take-off checks.

Confirm radio contact with glider to be towed and obtain membership number of paying pilot

On take-up slack check:

Windsack

Clear ahead and above

Glider brakes closed and tail dolly removed, and is lined up with takeoff run.

Line-up in front of glider and take-up slack gradually and with care, especially when nearing the full length of the rope. **Take care to line up properly with the glider before all out to minimise possibility of a failed launch.**

For G-OSGU, at all-out signal, apply full throttle smoothly and progressively, taking at least 3 seconds to reach full power. Check RPM normal. Check mirror frequently to monitor glider position. For G-OSGC the required throttle movement is dependant on glider weight – see G-OSGC differences section

At the pilot's discretion, the use half flap for take-off will allow a shorter ground run in damp or long grass conditions, As soon as airborne, the flaps should be retracted;

unlike a conventional flapped aircraft, this doesn't result in major handling problems.

5.7 Climb-out

As soon as a safe, constant climb and obstacle clearance altitude is reached, power should be reduced to 5400 (G-GU) or 100% - 34.9 inHg MAP (G-GC). As a guide for most tows at Portmoak this is between 200 and 300ft. Full power can be selected again should a situation dictate it.

In addition, the following points are to be observed:

Continue to monitor glider position especially at levels below 800' where an upset may not be recoverable.

Maintain a good look-out at all times and monitor engine instruments regularly.

Choose a flight-path consistent with best landing options for tug and glider at all times.

Do not tow out over Loch Leven at low-level.

Do not climb in a straight line for more than 30 seconds.

Avoid climbing into the sun.

Turn bank angles should be limited to 30 degrees maximum.

Do not tow to the base of cloud where VMC conditions may be compromised.

Do not compromise glider safety where straight ahead descent cannot be made safely following an unplanned release.

5.8 Release and Descent

Visually check the glider has released, noting (mentally) the release height.

Check that the area below is clear and commence the descent directly from release, continuing to monitor FLARM and radio transmissions closely.

Engine management varies per aircraft, with more careful handling required for the Rotax 914 engine in G-OSGC. See the aircraft specific annexes for type specific procedures.

(Refer to Airfield Operation details above for acceptable circuit protocols).

5.9 Landing

A fully- flared landing may stress the tail wheel if it contacts the ground first and this will eventually lead to failure. Pilots should not fly the aircraft onto the ground on the main wheels but should aim to achieve a 3-point landing in the fully held off condition.

Following touchdown, clear the landing area if necessary and taxi back to the launch point whilst continuing to monitor radio and monitor visually in the circuit pattern for conflicting traffic. Park into wind.

Complete normal engine shutdown in accordance with the Pilot Operating Manual if there are no subsequent tows. The 914 Turbo in G-GC must have a 2 min cooling period before shutdown to allow the turbocharger to cool.

Complete the Tug log.

Tidy the tow rope away from the runway and check for damage/knots/weak link.

5.10 Field retrieves.

It is unlikely that all of the safety factors required for a successful field retrieve will be satisfied. Retrieves, therefore, are only permitted from known airfields and with the prior authorisation of the Tug Master or his nominated representative.

5.11 Returning to the hangar/cleaning

On completion of towing operations for the day, the Tugs are to be refuelled and washed in preparation for subsequent operations. (See fuelling 5.1 for guidance)

Release the tow rope and stow in the hangar having checked for damage/knots/weak link. Remove from service if necessary.

Due to the lightweight structure of the Eurofox aircraft, it is imperative that strict procedures are followed when cleaning. This will ensure minimal potential for damage and the prolonged life for our aircraft. **Tug pilots returning the aircraft to the hangar at the end of the flying day are personally and directly responsible for ensuring that the following points are observed.**

1. Use only sponges and clean water (fresh that day, with detergent if necessary).
2. Ensure sponges are frequently rinsed to remove grit/dirt which will damage paintwork.
3. Brushed/extended brushes/brooms are not to be used under any circumstances.
4. Start from the top and work down so that water being used to wash the airframe remains relatively clean. Use step ladders provided to access wings.
5. If water being used becomes excessively dirty/gritty then renew it rather than risk scratching paintwork.

6. Finish the job with clean damp chamois leather – rinsing frequently in clean water.
7. Stay well clear of Perspex panels when washing aircraft. Under no circumstances are sponges or chamois leathers to be used on Perspex panels.
8. Use lint free cloths and Perspex cleaner only on Perspex panels having first ensured that there is no dirt/grit present.
9. Clean inside as well as outside of the aircraft; it is important that the cockpit remains free of mud, grit and debris. A vacuum cleaner is provided for this purpose.
10. Clean the propeller, both front and rear surfaces. **This is a high performance aerofoil!**

Moving the Tug single-handed is not recommended; seek assistance, if available, to avoid damaging the aircraft.

Taxiing over the entrance road to the hangar runs the risk of damaging the propeller with stones and of collision with the hangar building.

Park in the Hangar with brakes **OFF** and chocks in.

Ensure that the Master switch is **OFF**. Fuel taps **OFF**, Throttle to **IDLE** with friction set tight.

Ensure the battery charger is plugged in and switched on.

Ensure Pitot cover on.

Update the aircraft log with number of launches and hours flown.

Ensure the rope and the fire trolley are in the hangar

Switch off fuel pump Master Switch

Switch off hangar lights.

Lock the second door with the slip bolt and lock the main door with the padlock

Return the tug log sheet to the office.

6. Aircraft General - Aeropro Eurofox

6.1 Limitations

VMC by day only. No aerobatics. No smoking in or around the aircraft. No dual tows. Maximum operating altitude 10,000 feet amsl, 9640 feet above Portmoak (this limit is consistent with requirements for supplementary oxygen supply which is not available in this aircraft).

Refrain from carrying loose articles in the cockpit which could jam controls if dropped. All equipment should be securely stowed in the baggage area behind the seats.

No flight with doors open.

The following data is taken from the Pilot Operating Handbook for easy reference and is the same for both tugs. It is for guidance only, and pilots MUST read the POH.

6.2 Speeds (IAS)

Max rough air:	95 knts.
Flap limiting:	80 knts.
Never exceed:	124 knts
Max X-Wind:	12 knts
Max Head Wind (SGC Limit):	22 knts
Max Tail Wind (SGC Limit):	4 knts
Stall (flaps extended):	36 knts. (V _{so})
Stall (flaps retracted):	43 knts. (V _s)
Approach (flaps extended):	55knts.
Approach (flaps retracted):	65 knts.
Towing wood:	60 knts.
15m Glass:	70 knts.
High performance Glass:	75 knts.
Best Glide:	60 knts. (1:9 or -551fpm)

6.3 Fuel Quantity

Fuel tank capacity (wing tanks)	2 X 40 litres
Fuel tank capacity (central connecting tank)	6 litres
Max fuel quantity	86 litres
Usable fuel quantity	85 litres

Approx 2.6 litres per 2000ft tow fuel burn.

6.4 Oil Quantity

Oil tank capacity	3.2 litres
Minimum oil quantity	2.1 litres.

6.5 Tyre Pressures

Main wheels - 10 psi
Tail wheel - solid

6.6 Engine RPM's (Same for 912ULS and 914UL)

Maximum continuous RPM take off:	5800 RPM (5 minutes maximum).
Maximum continuous RPM in the climb:	5400 RPM
Maximum continuous RPM in cruise:	5500 RPM
Maximum RPM on the ground:	5200 RPM
Closed throttle Idle speed:	1600 RPM (approx).
Engine Idle (to reduce gearbox wear)	2200 RPM

914UL Specific

Max MAP 115% (5 min max)	39 inHg (39.9 for 2 sec overshoot)
Max MAP 100% (max cont)	34.9 inHg (35.4 for 2 sec overshoot)

7. Engine Temperature Management

7.1 912ULS (100HP) – G-OSGU

Use cowl flap diligently to ensure optimum cooling of engine.

In cold weather, the cowl flap should be closed for take-off and during the initial stages of the tow, monitoring engine temperature continually. When engine temperature rises to the bottom of the normal operating range, then open the flap a little and continue to monitor.

On hot summer days, start the tow with the cooling flap fully open and leave it there throughout the tow.

Once the glider has released, initially leave the cooling flap in its set position and then as the oil temperature starts to drop, gradually close the flap over the remainder of the descent, keeping some warmth in the oil. Although the cooling flap should not be closed immediately on glider release, it is not drastic if the oil temperature is pushed into the upper yellow arc occasionally and in fact is to be encouraged as it will boil off any water that may have condensed out in the oil, thereby helping to prevent internal corrosion.

During long approaches and when descending from a considerable height, it is not advisable to reduce the throttle control to idle as the engine may become overcooled resulting in a loss of power. When descending use an increased idle setting and ensure the cowl flap is closed such that the engine temperature remains just inside the normal operating range.

7.2 914UL (115 HP) – G-OSGC

As for the 100 HP, engine temperature management is achieved by use of the oil flap as above. In addition, it is of paramount importance that the following is adhered to in the descent to prevent serious and catastrophic engine and turbocharger damage.

115% power should only be used if necessary for a safe takeoff and in an emergency. Most club gliders on a day with some headwind do not require 115%. In any case, this can only be used for a maximum of 5 mins, and should be cancelled well before this, when the combination is climbing safely and above obstacles (2-300ft at Portmoak). This helps preserve the life of the engine and turbocharger.

To reduce the risk of this, when the glider releases, reduce power to not less than 4000 rpm and at the same time increase speed to 90-100kts. Maintain this for 30-60 seconds before further rpm reduction.

Please read the annex on G-OSGC before flying along with the POH.

8. EMERGENCY PROCEDURES

ENGINE FAILURE

In Flight G-GU

Jettison rope immediately if safe to do so.
Select landing area
Assume best glide or approach speed and set trim.
Make a mayday call.
Position aircraft for landing.
If height permits, carry out engine checks
Check both Mag switches **ON**
Carburettor Heat **HOT**
Main Fuel Valve **OPEN**
Both Wing Fuel Selectors **OPEN**
Boost Pump **ON**
Throttle set 1/3
Turn Key to Attempt restart
If engine restart unsuccessful secure engine and fuel systems as detailed below.

In Flight G-GC

Jettison rope immediately if safe to do so.
Select landing area
Assume best glide or approach speed and set trim.
Make a mayday call.
Position aircraft for landing.
If height permits, carry out engine checks
Check both Ignition switches **ON**
Check **TCU** on
Main Fuel Valve **OPEN**
Both Wing Fuel Selectors **OPEN**
Both fuel pumps on
Throttle set 1/3
Press “**start**” button to Attempt restart
If engine restart unsuccessful secure engine and fuel systems as detailed below.

On Take-Off

Jettison rope immediately
Select landing area
Assume best glide or approach speed and set trim
Position aircraft for landing.
Throttle to idle
Mag switches **OFF**
Master **OFF**
Fuel **OFF**

Landing Checks

Rope/glider released
Throttle closed
Main Fuel Valve **CLOSED**
Wing Fuel Selector **CLOSED**
Mag switches **OFF**
Master **OFF**
Harness tight
Flaps as required

ENGINE FIRE AIRBORNE

Throttle Fully OPEN
Main Fuel Valve CLOSED
Wing Fuel Selectors CLOSED
Heater OFF
Mag switches OFF (when engine has stopped – to burn all fuel in carburettor/manifold)
Master OFF
Increase air speed if appropriate to extinguish flames.
Expedite landing.

NOSE OVER TAXIING

Mags off before propeller hits ground
Master off
Fuel off

LOW RATE OF CLIMB

If the combination is not climbing, briefly check engine is operating at correct RPM. If RPM is well below normal wave off glider immediately. Release the rope if the glider pilot doesn't release quickly. If RPM is normal, check glider for open airbrakes. If this is the problem, waggle the tug rudder so that this will be visible to the glider pilot. If there is no response and it is safe to do so, tow the glider above the Airfield, trying to establish contact by radio on 129.980 or 130.105 and then wave it off by rocking wings.

Note that if the glider airbrakes open during the tow and the tug and/or combination is endangered due to a negative rate of climb then the towrope must be jettisoned before the situation becomes unrecoverable.

GLIDER UNABLE TO RELEASE

The Glider Pilot should indicate the inability to release by flying as far out to one side (usually the left) of the tug as possible and rocking the gliders wings. The tug pilot should then return to the airfield and release the tow rope from the tug, allowing the glider to descend and land with the rope attached. No attempt should be made to break the weak link by applying excessive loads from the tug or glider end. Should the glider be fitted with a radio, the glider pilot should first attempt to contact the tug pilot by radio and only if this fails to signal as above.

Tug pilots should note that a radio call may thus be made by the glider pilot to indicate his/her inability to release hence it is important the tug radio be switched on at all times and the pilot be listening out for transmissions.

N.B. Use radio with caution, as the human auditory function is the first to fail in times of stress, even in high-hours pilots.

Annex 1 – G-OSGC Differences

OVERVIEW OF DIFFERENCES

These are the main differences to note:-

Engine

Turbocharged – differences training and logbook sign off required.

TCU switch – **requires careful handling in certain scenarios**

Push button start rather than key turn

Two electric fuel pumps. **Don't switch them both off at the same time!**

Cooling - Oil, Coolant & Air cooling Different layout

Panel Layout – extra dials and switches (manifold pressure)

Airframe

Same basic design - easy to fly

Ailerons slightly stiffer

Trim much more nose heavy in approach configuration

Flaps slightly stiffer – Flap handle has bend making it easier to reach.

Parking brake – different type – same action

Pilots will only be considered for conversion to G-OSGC after at least 20 hours PIC time on the Eurofox and at least 100 takeoffs and landings as PIC on type.

AIRCRAFT DATA AND TECHNICAL INFORMATION.

Pilots shall be fully conversant with the AEROPRO Eurofox 914 Pilot Operating Handbook Mar 2020 edition and any subsequent revision and G-OSGC Differences Quick Ref as provided by the Tugmaster via email. Copies can be downloaded from the pilots' area of the club web site. Pilots who are not fully conversant with key operating parameters will not be permitted to undertake solo flight.

Note that this document is the separate supplement for differences training for G-OSGC in addition to the G-OSGC Differences Quick Reference.

The following data is taken from the Pilot Operating Handbook for easy reference:

G-OSGC - Rotax 914(S) UL

Date of Manufacture: March 2019

Serial number: LAA 376-15576

Max authorised weight: 560 kg. empty weight 305 kg

Airframe Speeds – All the same as G-OSGU

Engine Rotax 914UL 115 hp at 5800 RPM.

Maximum continuous RPM take off:	5800 rpm (5 minutes maximum).
Maximum continuous RPM in the climb:	5400rpm.
Maximum continuous RPM in cruise:	5500rpm
Maximum RPM on the ground:	5350rpm.
Closed throttle Idle speed:	1400 rpm (approx).
Engine Idle (to reduce gearbox wear)	2200 rpm
Operating ceiling limit:	10000ft amsl

Fluids, Temperatures & Pressures - different from G-OSGU

Max Oil pressure:	7 bar.
Min Oil pressure:	0.8 bar
Max Oil temperature:	130 °C
Max CHT: (Not Measured in GGC)	135 °C
Max Cooling liquid temperature:	135 °C
Note blanking tape over coolant radiator in ambient temperatures below 10 °C reducing radiator area by approx. 30%	
Max Exhaust Gas Temperature	950 °C
Normal Exhaust Gas Temperature	900 °C -> throttle back
Max fuel pressure:	5 bar
Min fuel pressure:	0.15 bar

Oil Quantity – same as G-OSGU

Oil tank capacity	3.2 litres
Maximum oil quantity	2.6 litres
Minimum oil quantity	2.1 litres.

PROCEDURES (DIFFERENCES ONLY)

START UP

Fuel	ON
Master Key Switch	ENGINE
Ignition	BOTH ON
Fuel Pump	ONE ON, CHECK PRESSURE *
TCU Switch	CHECK ON

IF COLD	CHOKE ON, THROTTLE IDLE
Start Button	PUSH TILL ENGINE FIRES, MAX 3-4 SECS
After Start	CHOKE ON FOR APPROX 30 SECS, THEN OFF SLOWLY

IF HOT	CHOKE OFF, THROTTLE APPROX 2 CM OPEN
Start Button	PUSH TILL ENGINE FIRES, MAX 3-4 SECS
After Start	AS PER G-OSGU

* Only one pump needed for start, 2 only increases load on battery.

***If no start, check ignition, fuel pump, fuel taps, throttle position etc before trying a second time. **IF NO START ON SECOND CRANK OF 3 to 4 SECONDS, WAIT 2 MINS FOR STARTER TO COOL BEFORE ANOTHER ATTEMPT.**

RUN UP

Brakes	HOLD ON PEDALS
Fuel Pumps	BOTH ON
Throttle	SET 3800 RPM
Ignition	CHECK BOTH, MAX 500 DROP, 200 DIFFERENCE
Fuel Pumps	CYCLE BOTH, ONE AT A TIME, CHECK PRESSURE
Throttle	Throttle closed to check rpm then SET 2200 RPM

TAKEOFF

Oil Flap	OPEN
Fuel Pumps	BOTH ON
TCU Switch	CHECK ON
Throttle	SLOWLY TO 100%, THEN QUICKLY TO 115%
2-300FT	THROTTLE BACK TO MCT OR LESS
At 500FT	ONE FUEL PUMP OFF

NOTE -115% SHOULD ONLY BE USED WHEN NEEDED UNTIL SAFE OBSTACLE CLEARANCE IS ACHIEVED! AS A GUIDE, CONSIDER 115% FOR 2 SEAT GLIDERS AND BALLASTED SINGLE SEAT GLIDERS AND 100% FOR SINGLE SEAT GLIDERS.

SHUTDOWN

Engine	ALLOW TO COOL FOR 2 MINS MINIMUM @2200RPM
Avionics	ALL OFF
Ignition	OFF ONE BY ONE, WHILST RETARDING THROTTLE

INSTRUMENT PANEL LAYOUT

The instrument panel has several differences compared with GGU. The pictures below illustrate the overview and some details.

Picture 1

General layout of panel – note the manifold pressure gauge new after the re-fit to 914 spec.



Picture 2

In this view, note the TCU switch and TCU warning and caution lights.

DO NOT CONFUSE THE TCU SWITCH WITH THE BACKUP FUEL PUMP ON G-GU



The charge control light and “fuel remaining” warning light and test button at the top of the panel

Picture 3

Note the Ignition switches above the fuel pump switches on the left hand side. Be careful not to confuse ignition switches with fuel pump switches when turning off a pump after takeoff. The key has two positions, avionics and engine, and the push to start button is below it.



Picture 4

Further to the right of the panel we have switches and fuses for the landing lights ; strobe lights; radio and transponder as per GGU.

The switch under the guard is the Emergency Power switch



The Emergency Power switch is under the red guard. If the key switch fails the fuel pumps will stop, the TCU loses power and the starter motor will not operate. In that situation it's worth trying the emergency power switch.

ENGINE TEMPERATURE MANAGEMENT

OIL COOLING is via the oil radiator on the stbd side of the engine and is controlled by a cowl flap operated by a push pull control in the cockpit, similar to GGU. Use cowl flap diligently to ensure optimum cooling of engine keeping the needle in the green zone on the gauge.

CAUTION – THE PUSH PULL knob for the oil cowl flap and the cabin heater control are juxtaposed compared with GGU. BE CAREFULL to operate the correct control!

In cold weather, the cowl flap should be closed for take-off and during the initial stages of the tow, monitoring engine temperature continually. When engine temperature rises to the bottom of the normal operating range, then open the flap fully and continue to monitor. Subsequently make adjustments to keep the oil temperature in the green.

On hot summer days, start the tow with the cooling flap fully open and to leave it there throughout the tow.

WATER COOLING is done by the single radiator in the centre of the lower cowling. It is very efficient and in winter, when ambient temperatures are below 10°C, it needs to be blanked off by approx. 30% so that in flight coolant temp is $\geq 65^{\circ}\text{C}$. In the summer it is likely that the radiator blanking will not be required.

Once the glider has released, initially leave the cooling flap in its set position and then as the oil temperature starts to drop, gradually close the flap over the remainder of the descent, keeping some warmth in the oil. Although the cooling flap should not be closed immediately on glider release, it is not drastic if the oil temperature is pushed into the upper yellow arc occasionally and in fact is to be encouraged as it will boil off any water that may have condensed out in the oil, thereby helping to prevent internal corrosion.

On advice from ROTAX and Eurofox, a similar regime in descent to conventional air cooled engines should be followed to prevent engine damage. After release the engine should not be reduced to idle,

Caution

If cowl flap is closed during prolonged descent, damage may result if it is not reopened for a subsequent tow and the engine is allowed to overheat. This is critical on the 914 as temperatures will climb very quickly at 115% power.

POWER FLARM

The Flarm is a Powerflarm. The display gives a distance to a target and will give warnings and estimated distance of transponder equipped traffic (and Flarm like traffic warnings for Mode-S stuff with a GPS feed). The LED pattern for non-directional transponder traffic might confuse you the first time you see it. The distance is a bit unreliable as it is signal strength only but if the number is decreasing, conflicting traffic may be getting closer.

Annex 2 – Aerotow Training Syllabus

Tug Pilot Training Knowledge & Skill Requirements

INTRODUCTION

Learning to aerotow sailplanes needs to follow the detail given in EASA Part FCL.805. Much of the syllabus theoretical knowledge and practical application can be studied from these documents:-

- SGC Tug Pilots Manual and AEROPRO EUROFOX POH, available at: https://drive.google.com/drive/folders/1_c2HfTVUUrSHFiaS1efsZnRKz72PH_RX?usp=sharing
- BGA Aerotowing Guidance Notes at https://members.gliding.co.uk/wp-content/uploads/sites/3/2015/04/1430311946_aerotownotes.pdf
- BGA Safe Aerotowing at <https://members.gliding.co.uk/bga-safety-management/safe-aerotowing/>

This document is intended to outline the subject area and serve as a training record for both the knowledge and skills required.

Extract from EASA Part FCL (page 853 onward)

<https://www.easa.europa.eu/sites/default/files/dfu/Part-FCL.pdf>

FCL.805 Sailplane towing and banner towing ratings

(a) Holders of a pilot licence with privileges to fly aeroplanes or TMGs shall only tow sailplanes or banners when they hold the appropriate sailplane towing or banner towing rating.

(b) Applicants for sailplane towing rating shall have completed:-

- (1) at least 30 hours of flight time as PIC and 60 take-offs and landings in aeroplanes, if the activity is to be carried out in aeroplanes, or in TMGs, if the activity is to be carried out in TMGs, completed after the issue of the licence;
- (2) a training course at an ATO including:-
 - (i) theoretical knowledge instruction on towing operations and procedures;
 - (ii) at least 10 instruction flights towing a sailplane, including at least 5 dual instruction flights; and
 - (iii) except for holders of an LAPL(S) or an SPL, 5 familiarisation flights in a sailplane which is launched by an aircraft.

(c) [removed – specific to banner towing]

(d) The privileges of the sailplane and banner towing ratings shall be limited to aeroplanes or TMG, depending on which aircraft the flight instruction was completed. The privileges will be extended if the pilot holds a licence for aeroplanes or TMG and has successfully completed at least 3 dual training flights covering the full towing training syllabus in either aircraft, as relevant.

(e) In order to exercise the privileges of the sailplane or banner towing ratings, the holder of the rating shall have completed a minimum of 5 tows during the last 24 months.

(f) When the pilot does not comply with the requirement in (e), before resuming the exercise of his/her privileges, the pilot shall complete the missing tows with or under the supervision of an instructor.

AMC1 FCL805 Sailplane towing and banner towing rating

THEORETICAL KNOWLEDGE AND FLYING TRAINING

- a) The aim of the towing instruction is to qualify licence holders to tow banners or sailplanes.
- b) The ATO should issue a certificate of satisfactory completion of the instruction that can be used for licence endorsement
- c) Theoretical knowledge: towing of sailplanes
- d) The theoretical knowledge syllabus for towing of sailplanes should cover the revision or explanation of:
 - (1) regulations about towing flights
 - (2) equipment for the towing activity;
 - (3) sailplane towing techniques, including:
 - i. signals and communication procedures;
 - ii. take-off (normal and crosswind);
 - iii. in-flight launch procedures;
 - iv. descending on tow;
 - v. sailplane release procedure;
 - vi. tow rope release procedure;
 - vii. landing with tow rope connected (if applicable);
 - viii. emergency procedures during tow, including equipment malfunctions;
 - ix. safety procedures;
 - x. flight performance of the applicable aircraft type when towing sailplanes;
 - xi. look-out and collision avoidance;
 - xii. performance data sailplanes, including:
 - (A) suitable speeds;
 - (B) stall characteristics in turns.

Flying training: towing of sailplanes

The exercises of the towing training syllabus for towing sailplanes should be repeated as necessary until the student achieves a safe and competent standard and should comprise at least the following practical training items:

1. take-off procedures (normal and crosswind take-offs);
2. 360° circles on tow with a bank of 30° and more;
3. descending on tow;
4. release procedure of the sailplane;
5. landing with the tow rope connected (if applicable);
6. tow rope release procedure in-flight;
7. emergency procedures (simulation);
8. signals and communication during tow.

End of FCL.805 extract

The above references give much detail of the good practice aspects of the tug operation. These have been distilled into a tug training record card:-

Candidate Name	Date passed	Instructor Signature
Theoretical Knowledge FCL.805		
(1) regulations about towing flights		
(2) equipment for the towing activity;		
(3) sailplane towing techniques, including:		
a) signals and communication procedures;		
b) take-off (normal and crosswind);		
c) in-flight launch procedures;		
d) descending on tow;		
e) sailplane release procedure;		
f) tow rope release procedure;		
g) landing with tow rope connected		
h) emergency procedures during tow, including equipment malfunctions;		
i) safety procedures;		
j) flight performance of the applicable aircraft type when towing sailplanes;		
k) look-out and collision avoidance;		
l) performance data sailplanes, including: (A) suitable speeds; (B) stall characteristics in turns.		
Flying Training Towing of Sailplanes FCL.805		
m) take-off procedures (normal and crosswind take-offs);		
n) 360o circles on tow with a bank of 30o and more;		
o) descending on tow;		
p) release procedure of the sailplane;		
q) landing with the tow rope connected (if applicable);		
r) tow rope release procedure in-flight;		
s) emergency procedures (simulation);		
t) signals and communication during tow.		
u) take-off procedures (normal and crosswind take-offs);		
v) 360o circles on tow with a bank of 30o and more;		
w) descending on tow;		
x) release procedure of the sailplane;		
Aircraft & site-specific issues at Portmoak		
1. Daily Inspection and getting ready		
a. Insurance & Permit to fly in date		
b. Oil level & recording use		
c. Coolant levels; expansion bottle and header tank		
d. Fuel levels; test for contamination		
e. Known weaknesses		
1.e.i. Exhaust brackets & springs		
1.e.ii. Radiator bolts		
1.e.iii. Trim cable		
1.e.iv. Brake pads & Brake disc bolts		
1.e.v. Throttle springs		
1.e.vi. Tailwheel grease		
1.e.vii. Undercarriage bolts & rubbers		

	Date Passed	Instructor Signature
f. Tow rope;		
1.f.i. Weak link 300kg @ tug end; Rings; Knots, abrasion, cuts and Condition of splices		
g. Logsheet how to record and totalise		
h. Fire dolly & aerotow log to launch point		
i. Pilot comfort; water & food; headset; mobile phone; jacket; shoes;		
2. Flying		
a. Engine management – checks and oil cooling control in flight		
b. Tow out patterns		
2.b.i. Obstructions off site – within 2 miles		
2.b.ii. Engine failures - options		
2.b.iii. Noise abatement - mitigation measures		
c. Descent patterns		
2.c.i. Runway designators		
2.c.ii. Approach routes		
2.c.iii. Potential Traffic conflict points		
d. Concurrent ops on centre strip		
e. East & West wind ops in each of centre and north field		
f. Ops through south field		
3. Refueling		
a. Earthing; keys, fuel book; switches; steps, traffic barrier		
b. Pump unlock & record readings; Hoses; Nozzle placement in filler		
c. Logging fuel drawn		
4. Cleaning and hangarage		
a. Clean it thoroughly!! Leave it the way you would like to find it;		
b. Details as per the Operating procedure document Clean water, Clean sponge & cloths; No abrasives or strong detergents;		
c. Special attention to Propeller especially end “spoons”;		
d. Only clean water and ungloved hand without rings to clean windscreen;		
e. Windscreen polish vertical only not horizontal or circular		
f. Chamois down water on painted surfaces;		
g. Wheel into hangar – avoid doors with wing tips and avoid getting too close to other tug. Get help. Slow is best. Chock wheels.		
h. Follow check list on door prior to locking up		
5. Reporting issues		
a. Any issues found with the aircraft must be marked in the DI book and reported to the Tug Master the Office staff. This should be done verbally if possible with a follow up message on “tuginstant” to inform all pilots.		
6. Sign off	Flying completed at stage	
a. The Candidate has passed stage 1 - cleared solo on Eurofox under supervision	Dual hrs Solo hrs	Landings Landings
b. The Candidate has passed stage 2 - cleared solo aerotowing under supervision	Dual hrs Solo hrs	Landings Landings
c. The Candidate has passed stage 3 – self authorising aerotowing	Dual hrs Solo hrs	Landings Landings