Bicester Gliding Centre
Towing Operations Manual
1 General

1.1 Introduction

As a Tug Pilot you carry a degree of responsibility to the Windrushers Gliding Club. Aerotowing is an expensive and noisy operation. Both factors have a bearing on the very existence of the gliding club and it is essential, therefore, that aerotowing be carried out efficiently and thoughtfully, particularly with regard to our neighbours.

Aerotowing should be carried out in accordance with the following procedures and in conjunction with the Windrushers Gliding Club Flying Orders. As the pilot in command of an aircraft you are ultimately responsible for the safe conduct and actions that you choose to take. Within these constraints the glider pilot’s requirements should be accommodated as far as possible.

1.2 Purpose

The tugging operation exists to provide launches to gliders. Thus waiting time must be minimised and the launch needs of the glider pilot met. Solo soaring pilots may require you to drop them in the nearest lift source, whilst students need to remain near the field with gentle manoeuvres.

Another important point is to minimise cost to the club, by conserving the engine by careful handling, and fuel by accurate aircraft handling and by minimising ground running.

In short the Three Main Points that a tug pilot based at WGC should always aim to achieve are:

SAFETY – Safe flying and good airmanship is expected at all times and is everyone’s responsibility.

ACCURACY – Delivering the best service to the glider pilot.

EFFICIENCY – Handling the engine with precision and fuel economisation.

1.3 Chief Tug Pilot (CTP)

The Chief Tug Pilot is responsible for the towing operation. This includes checking and training of tug pilots; maintenance and airworthiness of tug aircraft. The CTP has a Deputy Chief Tug Pilot (DCTP) for assistance.

1.4 Approval to Fly Tug Aircraft

All Windrushers Gliding Club tug pilots must complete a minimum of 10 hours gliding per year and if possible hold a current gliding Instructor rating. The CTP may revoke or suspend any tug pilot’s approval for any reason. It is the pilots own responsibility to maintain a current license and medical, a list of the validity of these licenses and medicals will be held by the CTP and CFI and will also be checked at least annually by the CFI or CTP.

A pilot with previous towing experience must have satisfactorily completed a check flight with the CTP or DCTP before flying tug aircraft at Windrushers Gliding Club.

1.4.1 Licences and Membership

Each tug pilot must be a full flying member of the Windrushers Gliding Club. Each tug pilot must hold a valid pilot’s licence. This must include the following:

A valid medical certificate.
A valid FCL 150 (Certificate of Experience) or a PPL issued within the last 12 months. The FCL 150 is valid for 24 months from the date of signing or from the old expiry date if within 90 days of that date.

The FCL 150 contained in the licence must be signed and be current for “SE Piston (land)” aircraft. Any JAA Type/ Class Rating Examiner or R Rating Examiner may sign the FCL 150, once he is satisfied those 12 hours P1 have been completed on any SE piston aircraft during the preceding 12 months and must have completed at least 1 hour’s flying with a BGA authorised Class Rating Instructor (CRI) or equivalent must have been undertaken in the preceding 12 months. The flight is essentially a general handling and aero-tow refresher. Revalidations are lodged with the CAA for general licence usage.

1.5 Recency and Checks

Any pilot who has not flown any powered aircraft, excluding SLMG’s or TMG’s, in the last 28 days, or who has not flown that type in the last 90 days, must fly two circuits in that aircraft before towing, with the CTP/DCTP or nominated deputy.

Every tug pilot must have an annual instructional flight with the CTP/DCTP or nominated deputy to include normal tows, general handling and emergency drills. The flight should be viewed as an opportunity to brush up on flying skills, and practice unusual situations - it is not a test.

1.6 Noise Abatement Procedures

All tug pilots must be aware of the possibility of noise complaints at ALL times, and avoid Bicester town all villages and farms by the widest margins.

Continual towing or descent over the same area may cause considerable nuisance and irritation to our neighbours. Tugs have already been modified to minimise the actual noise produces, however we can also spread the load by thoughtful and varied tow-out patterns. It is variation; therefore, that should form the basis for our noise abatement procedures.

When towing the following general points should be considered:

1. Make full use of all airspace available to you.
2. It is not always necessary to drop upwind; a tow made for the most part downwind of the site and then terminating overhead or slightly upwind of the site can also be used.
3. Remember that when turning, the focal point of your turn (the lower wing will be pointing at it) will be subjected to a concentration of tug noise
4. A soaring pilot may be happy to be towed directly away from the site; this should be done when the opportunity arises.

Remember that the noise of a descending tug with a relatively high power setting can be equally annoying, apply the same techniques in descent as well. Also, try and make your descent route different from the tow out route. It is a good idea therefore to not descend below 500 feet until entering the circuit area to assist in reducing noise to our nearest neighbours.
1.6.1 Areas to Avoid

RUNWAY 24

Aim to pass left of the main hangar then turn right on to heading 300, keeping Bicester town to your left. Landing right hand circuit.

RUNWAY 31

Turn 45 degrees right or left after take-off to avoid Caversfield House and the stables. Low powered aircraft are advised to climb straight ahead and then turn right on to heading 360. Landing left hand circuit.

Note: Engine failure options are severely limited in these directions.

RUNWAY 18

Turn to heading 130 after takeoff to avoid Launton village or turn to heading 200 to pass between Launton and Bicester (following the ring road). Landing left hand circuit.

RUNWAYS 36 and 06

Avoid the village of Stratton Audley and Bicester town. Landing 36 right hand circuit. Landing 06 left hand circuit.
2 Operational Requirements

2.1 Authorisation and Responsibilities

Most of Windrushers tug pilots are self-authorising for aerotowing but it is a legal requirement that all powered aircraft movements are recorded. A movement log is located in the office, all aero-tow retrieves, positioning flights or hire flights should be entered along with the pilot’s signature.

2.1.1 It is the tug pilot’s responsibility after full consultation with the instructor in charge, to terminate aero-tow operations when darkness approaches. Do not launch a glider after sunset. Resist all forms of persuasion to launch in these circumstances. Advise the instructor in charge of this time a little in advance.

2.1.2 It is the tug pilot’s responsibility to terminate aero-tow operations if conditions are deteriorating or operation is becoming hazardous for any reason. Remember you are P1 for the whole combination until release however senior the pilot of the glider.

2.1.3 Before every take-off it is essential to check that a winch launch is not taking place or about to take place. A radio call is required on 129.975 to confirm this with the duty instructor. Delay the launch until the cable is back on the ground. Do not take off across or close to the winch cables.

2.1.4 Before take-off note on the Tug Log Card the glider, name of pilot to be charged and the take-off time. Subsequently record the exact aero-tow release height (to the nearest 100’). These cards are essential for rendering launch charges to Club members and must be legible and accurate. For example a release at 2100 feet should be recorded as such and not as 2000 feet.

2.1.5 Ensure adequate clearance of the towrope from the ground when approaching to land, in general do not over fly people, aircraft or vehicles prior to landing. Leave a minimum of 100’ approaching over crop or any boundary.

2.1.6 Passenger carrying is NOT allowed whilst aerotowing. Exceptions to this rule must have specific authorisation from the CFI, CTP or DCTP.

2.1.7 ALL flights that involve landing away or flights for navigational practice etc from Windrushers Gliding Club require booking out after first checking that the aircraft will not be needed for the expected duration of the exercise.

2.1.8 Anti-collision lights and landing lights where fitted, should be on whenever the aircraft is in flight.

2.1.9 No tug aircraft shall take off unless the pilot in command is certain there is sufficient fuel in the tanks for safe operation. If in doubt, refuel! Fuel starvation is still the most common cause of engine failures in piston singles. It is imperative that you do not allow yourself to be pressured into carrying out ‘just one more tow’ when you think you should be refuelling.

2.1.10 During towing operations the fuel pump should be on when the engine is running.

2.2 Allocation of Tugs

Check status board for allocation of tug aircraft. Should a second tug be required at peak times, the second tug pilot is then responsible for putting it away when the demand has again dropped sufficient for one tug only.
2.3 Daily Inspection and Defects

The Duty Tug Pilot or nominated Tug Pilot should DI both tugs, if it likely that both tugs are to be required, before flying commences.

Any defects must be recorded on the defect board and brought to the attention of the CTP immediately so that they can be rectified at the earliest opportunity.

The tug pilot should also DI two ropes, checking them for chaffing, knots and the condition of the rings and weak links. Unserviceable ropes must not be returned to the rack, but left in the tug store with a note as to the defect. Please do not attempt to repair a broken rope or change broken weak links – take a new rope from the store.

2.4 Standard Aerotow

2.4.1 Run up

Turn the tug before starting the engine so as to avoid streaming your prop wash into the open hangar, or at nearby parked gliders. Warm the engine at 1000 to 1200 rpm. Do not go above 1500 rpm until CHT is approaching 100°C. After the power check, if there is any doubt that the engine is not developing full power, do not attempt to tow until the problem is rectified. A slight reduction in rpm equals a substantial reduction in power available. (An engine rated at 180hp will only producing 160hp if you try to take off at 2400 rpm!)

2.4.2 Takeoff

Move into position by passing across the nose of the glider in order to bring the rope closer to the ground crew when convenient, and park at 90° to the glider. This gives you a good view of the glider whilst sending the slipstream clear. Now is the time for pre-takeoff checks. Always maintain a 15metre clearance radius from people, gliders and vehicles when taxing.

Once the ground crew are clear, move into line and take up slack by moving gently forward using minimum power and without brakes. If you are not happy that the takeoff run is clear, DO NOT LAUNCH. At the ‘all out’ take four seconds to move the throttle to full power, as you reach full power it is vital to check rpm. This is the only opportunity to check full power and the tow should be rejected if the rpm is not within the range indicated by the aircraft notes. Meanwhile it is vital to keep straight as the glider has less steering ability than the tug on the ground.

Before you unstick, check the in the mirror that the glider’s position is normal and it’s airbrakes are in. Once airborne, smoothly transition to the climb allowing the tug to accelerate. Any pitch or speed changes should be very smooth and gradual and made by primary reference to the attitude. Remember that tugs have quicker manoeuvre rates than gliders.

2.4.3 Climb

All tows should avoid the noise sensitive areas. In addition the route should be planned to fly under areas of lift whilst avoiding the smooth blue gaps. Turns should be shallow but this should not prevent you circling in areas of lift to improve tug climb rates.

The first turn should be into wind to keep the glider within easy gliding range of the field at all times. Also when low, stay over areas where the tug could successfully land after an engine failure. If the tug is safe, the glider must be also. Avoid turning through or flying directly into the glare of the sun.

During the climb try to vary the headings to reduce the risk of collision – and always maintain a good lookout!
Be aware that a club two-seater will usually be training, so remain close to the field and avoid excessive manoeuvring. For spinning exercises, the glider will need to be fairly close to the overhead. A cross-country pilot, in contrast, will want a fast direct tow to the nearest source of lift and is happy to be released much further from the field. Do not tow gliders to the downwind side of the site. Always bear in mind that the glider may release at any time and must still have had a beneficial launch. (A student will not be happy paying for a 2000’ launch from which he has to spend all the flight time flying directly back to the airfield.)

2.4.4 Glider in Low Tow Position

If the tug requires sustained forward stick pressure, the glider has gone to the low tow position. The glider will not be visible in the mirror, but the rate of climb and forward stick pressure prove that it has not released. Use normal towing speeds, and be aware that a slightly less nose up attitude will be required. The glider should return to the normal tow before release, else it would not be obvious when it has gone. If a glider does release in low tow, note the log and brief the glider pilot not to do this again and why. Normally the glider cannot get too low on tow, but if the tug’s stick reaches the forward stop and the airspeed begins to decay, release the glider, but do not reduce the throttle initially to avoid the glider below.

2.4.5 Glider out of Position

Glider pilots often practice ‘boxing the slipstream’. As for the low tow, continue to fly the tug’s attitude using whatever control inputs are required. Heavy rudder inputs will be needed if the glider is out to one side, but caution should be exercised with large rudder inputs (See Emergency Procedures 4.1.3). Often this exercise leads to a bow in the rope and a sharp deceleration as it snatches tight. Do not initiate a turn, as often the glider pilot will rush this exercise causing a bow to form in the rope. This will then cause a snatch as it goes taut, but should not cause the tug a loss of control, just a little discomfort. Similarly, do not initiate a turn towards the glider if it is out to one side, as the resulting bow will snatch hard enough to break the rope. If the glider pilot does cause control problems, or demonstrates erratic flying that may put the tug at risk, wave it off and brief the pilot on the ground.

2.4.6 Release

Glders normally perform a climbing turn to the left after release.

As a tug pilot, first lookout to guarantee that it is clear ahead, then check the mirror to see that the glider has really gone and confirm the direction of release and ensure adequate separation. If the glider has made it difficult for you to tell it has gone, again annotate the log and brief the pilot or an instructor.

2.4.7 Engine Handling during Descent

At this stage the engine is extremely hot and precise engine handling is required to prevent shock cooling damage. The cylinder walls and the valve seats cool at different rates, so too low a power setting for the descent will cool the cylinders whilst the valve seat remains hot and expanded, causing a stress crack in the cylinder walls.

Take sufficient time to accelerate to the correct descent speed whilst retarding the throttle to maintain the climb rpm and paying particular attention to the red line. There should be no notable change in engine note at this stage. Once stabilised, trim and take a further 15 seconds to gently reduce to the descent rpm (2000RPM and 90 Knots recommended) and maintain the correct descent speed.

Continue to avoid noise sensitive areas during the descent, and try to fly in the sink between thermals. Turning will improve you rate of descent without cooling the engine too rapidly. A good lookout is imperative as the tug is now travelling much faster than most gliders near the circuit. Try to avoid the vicinity of the winch run, as it may not be obvious from the ground if you are clear of the launch path or not.
2.4.8 Circuit

It is essential that tug aircraft do not descend onto the circuit pattern, which increases potential collision risks. You should plan the descent to join the circuit level at or not below 500ft, approximately midway downwind or on baseleg. Holding level at 500ft will allow the aircraft to decelerate into the white arc without touching the throttle. Select flap as necessary and position for a steep approach reducing the throttle steadily to idle before touchdown. This is to ensure maximum clearance of the rope in the later stages of the approach and provision for smooth engine handling in the transition from decent power to touchdown.

Once stopped, consider which way to vacate the runway, bearing in mind that approaching aircraft maybe expecting you to turn left. Try always to turn away from the winch run. Taxi back, and if the next glider pilot is not completely ready to launch, shut down. Plan where you park to minimise obstruction and ground running time repositioning the tug for the next launch.

2.4.9 Go-Arounds

This is potentially very hazardous, due to the possibility of a winch launch in progress, or a glider on an abnormal approach. If the landing area is blocked, make an early decision, as some ropes are 200’ long and trail far below the tug. Apply enough power to climb at around 500 fpm, and this reduced throttle setting will give you a better view over the nose of possible gliders. Turn sufficiently to move away from the winch run without cutting across the circuit, and when sure the circuit is clear, rejoin for a landing.

Avoid S-turns or orbits on final approach, as it is too easy to miss a glider final gliding or another aircraft.

2.4.10 Shutdown

Do not stop engine while still moving and if you have just landed idle the engine for approximately one minute at 1000 RPM to allow engine temperatures to stabilise.

Switch ALL non-essential electrics OFF, including Fuel Pump and Radio.

Shutdown by closing the throttle and pulling the Mixture control to cut-off.

After the engine stops, switch Magnetos OFF, remove key and set the master switch to OFF.

2.5 Fuel and Oil

No tug shall fly with the low fuel light illuminated. Generally counting one gallon per 1000’ of tow height errs on the safe side. Annotate the ‘in-tug’ log sheet when refuelling, and always check the oil level before returning to the field.

Try to anticipate tow demand, and refuel when demand is slack, and ready the tug with full fuel before peak demand occurs, i.e. before it gets soarable or after launching the grid on a busy day.

Tugs must be refuelled at the end of the day unless a request has been made by the CTP for engineering purposes etc.

Oil is kept in the fuel store – ensure that the correct oil is being used (tug status board) before topping up the engine level – do not overfill!

2.6 Cleaning

Tugs must always be washed after flying to remove mud and dirt, and importantly, to remove corrosive exhaust emissions. After removal of large quantities of mud, consider re-lubricating the hinges.
Windscreens must be kept clean throughout the day, using a clean cloth and water, or non-silicon based spray polish and a soft cloth. Harsh tissues scratch Perspex so avoid their use.

2.7 Hangaring

Generally the tugs are the last aircraft to go in the hanger and are located in the front. Ensure that the parking brakes are off. At this point it is worth checking that the aircraft master and magnetos switches are both set to off.
3 Abnormal and Non-Standard Towing Operations

3.1 Glider Badge and Record Flights

FAI rules for all badge and record claims allow a maximum start of 1000m without incurring a penalty. If the pilot is starting off tow, it is important to arrange the flight so that the release is with the maximum possible energy, in the correct sector for the start, and running on the first track. Ask for the first turn-point, and aim to be approaching 3000’ on the reciprocal track from the club. Turn to run in on track towards the club, and on reaching 3200’ accelerate to maintain level flight. The glider will release just before reaching the clubhouse overhead. Be sure to log the exact position as well as time of release. Your signature will be required on the claim form after a successful claim.

Even if the glider releases from a more normal tow before a claim, the tug pilot is still required to certify the exact time and position of release on the paperwork, so be sure to record it.

Silver ‘C’ distance attempts may require a similar tow but to a lower altitude. The 1% rule states that the angle between release height and landing point must be less than 1 in 100; i.e. if a pilot flies exactly 50km and lands at the same altitude as Windrushers the tow must be no higher than 1640’ (500m).

3.2 Slow Gliders

The tugs may launch wooden gliders, but certain vintage gliders have very slow max aerotow speeds. The minimum towing speed is around 55 kts, and should not be any lower as the engine will overheat and control difficulties will be encountered if the engine fails. Use ½ flap for the tow, but remember to retract it after release before accelerating, you could over speed the flaps. Monitor the CHT carefully, and weave frequently as the high nose attitude will obscure your view.

3.3 Dual Tows

Dual tows are not permitted using Windrushers Gliding Club tug aircraft unless there is authorisation from the CTP.


4 Emergency Procedures

4.1 Aborting Tow on Ground

If the glider pilot releases or overruns the rope in the first few meters, then stop ahead but do so with caution. At any point beyond this, be very aware of the possibility of the glider rolling into the tug as tug brakes are usually much more effective than the glider’s. The danger point is while the tug is still firmly on the ground and the glider lifts into ground effect therefore losing the ability to stop quickly. If the glider aborts the tow it is usually far safer to climb away, leaving the runway clear for the glider, and continue into the circuit with the same procedure as for a go around.

If the tug pilot initiates the abort by releasing the glider, climb away as before. If it is not possible for the tug to continue, for example if the engine failed, then roll to a stop without braking and watch the mirror, moving to one side if it is appropriate.

4.2 Glider Airbrakes Open

Glider airbrakes may open in turbulence, or by the pilot’s failure to lock them properly. If the tug is climbing at a poor rate, first check the throttle is fully forward and the engine gauges are normal, then check the mirror. If the glider brakes are open, DO NOT SIGNAL IMMEDIATELY. If the signal is not well done, the glider pilot can mistake the roll resulting from the secondary effect of yaw for a wave off. This could lead to an accident if the brakes remain open. If the tug is maintaining height, gently return towards the airfield and consider delaying the signal until within gliding range or over landable fields reachable even with full airbrake. The tugs should climb even with the glider brakes open, but if the tug is at risk, wave the glider off or even release it.

4.3 Glider out of Position

Gliders practicing boxing the slipstream has already been discussed. Although uncomfortable to the tug pilot, this exercise should not cause control difficulties.

4.4 Tug Upsets

One danger to the tug lies in the glider getting too high and lifting the tug’s tail uncontrollably. This tends not to happen from a pilot flying consistently high on tow, but rather from a pilot in difficulties a little low, perhaps in the slipstream, who suddenly ‘winches’ up behind the tug. This creates so much lift, and hence drag on the glider that the tug is not only tipped, but loses its forward momentum as well.

From time to time over the years, tug upsets have occurred at low level from which the tug has been unable to recover, usually with fatal results. A glider pilots’ aero-tow training emphasises that correct position behind the tug is essential and that he must release if he is losing control. However, tug pilots must be vigilant during the early stages of the launch for any tendency of the tug to be pitched nosed down. At all times monitor the tugs’ attitude and if a significant backpressure is required to prevent any nose down pitch - release immediately. Be aware that tug upsets can happen rapidly with little warning.

There are a number of factors that increase the possibility of a tug upset:

- A glider that is to be towed from a belly hook.
- Gliders with high set wings relative to the towing hook.
- Gliders with a low wing loading, usually older or vintage types.
- The presence of turbulent conditions, especially if associated with a strong wind gradient.
- Glider pilots with low hours and/or aero-tow experience.
• Lightweight pilots
• The use of short towropes will exacerbate the problem.

A typical sequence is shown in Figure 1, with a simplified rope load / angle plot in Figure 2. In reality the situation is worse than shown because the glider zoom climbs behind the tug, its total energy increases (simultaneous increase in height and speed). This energy can only come from the momentum of the tug and therefore its speed will rapidly decay. This means that just when a high down load is required to be generated by the tailplane/elevator to retain control and break the weak link on the rope, its capability to do so is vastly reduced by the decay in airspeed. This may result in the tailplane, and possibly the wing, stalling. Typically, 600 feet or more may be required to recover from an upset.

Figure 1
Also it is important to avoid a hasty transition from level acceleration to climb, as this will result in the glider becoming low relative to the tug. This can tempt the glider pilot to make a rapid recovery, with obvious potential for over correction.

The solid line corresponds to the vertical component of the tow rope load which will upset the tug, and the dashed lines represent the loads applied by the glider calculated as if tow rope were extremely long. For typical ropes, the loads are greater than shown - much greater for steep flight paths. The tug will therefore be upset at small rope angles by rather gentler manoeuvres than this diagram suggests. The rope weak links will protect the tug at the right side of the diagram while rope release is the only solution at the left side.

Figure 2

Another cause of tug upsets occurs when glider pilots performing a climbing turn on release before confirming that the rope has gone. In addition, there are other destabilising influences for both tug and
glider pilot, such as re-trimming, flap and undercarriage retraction, instrument scan, etc. For the tug pilot, retracting flaps should be left to a safe height, at least 300 feet.

The upset occurs so rapidly that the tug pilot has no chance to react and release the glider before the upset. If any glider pilot gives cause for concern, do not hesitate to release the glider before he/she jeopardises the tug, being sure to advise the duty instructor that further training will be required.

### 4.5 Lateral Tug Upsets

Another danger to the tug is the situation leading to a lateral upset (Figure 3). This is a result of the glider going out to one side and progressively diverging until the tug reaches its control limits. If the tug pilot continues to apply full rudder it is possible to stall the tugs fin. The sudden loss of directional control at this point is spectacular and very close to a flick manoeuvre. The violent yaw is caused by the rudder no longer apposing the rope tension, therefore allowing the glider to pull the tail round. As a result of the rate of yaw the secondary effect in roll is also very significant and can go beyond vertical. Although the wing may not always have stalled, the effect is similar to a flick roll. The need to release immediately is obvious as if the glider remains attached, the vertical upset scenario will develop.

The lateral upset can be avoided by caution when applying large rudder deflections. If more than half rudder is insufficient to prevent further yaw then be very careful and allow the tug to yaw slightly. If there is a significant increase in rudder load or the glider continues to diverge then release. If the rope is released or the weak link breaks while full rudder is applied, the sudden yaw can also be alarming but not as violent as a fin stall. The difference in this case is that the tug will yaw towards the glider presenting a collision risk. The highest risk of a lateral upset is during the glider cannot release signal demonstration. As this involves a heavy two-seat glider going a long way out of position it should only be demonstrated at a sufficient height.

---

**Figure 3**

[Diagram showing lateral upset scenarios and control effects]
4.6 Glider Unable to Release

The glider pilot will fly out to the left and rock its wings. Take care not to confuse this with a wobbly student practising out of position exercises. Radio communication between the tug and glider may also confirm the problem. No immediate action is required. Firstly tow the glider back towards the airfield and to a suitable position. Manoeuvre tug so that the glider is higher than the tug and the rope slack to reduce the risk of the rope smashing the glider canopy.

If the rope is taut, reduce power a little and check in the mirror that the glider is high before releasing.

4.7 Serious Tug Emergencies

In the event of a major problem, do not hesitate to release the glider. The time taken to give the wave off may compromise the tug’s safety.

Also remember that if you believe that the emergency would benefit the utilisation of an alternate airfield for whatever reason then use the options open to you.

4.7.1 Tug Overheating

If the CHT is approaching the red line, accelerate by 5 to 10 kts. If this fails, wave the glider off in a safe position and land. After landing, allow 5 minutes for the oil to drain to the sump and check the oil. Then check the oil cooler baffles are not clogged with debris or insects. Check for loose or missing engine baffles. Check the silencer for distortion or loose baffles, which will impede exhaust and cause power loss and overheating. Check the carb heat intake is shutting off properly. Finally piston ring wear can cause overheating; often diagnosed if an engine is using more than a quart of oil per 20 tows.

4.7.2 Total Power Loss

Release the glider immediately and trim for the aircrafts best glide, carry out a standard force landing procedure.

4.7.3 Serious Engine Vibration

Rough running is often a symptom of Carb icing. Failing this, check the mixture and magnetos, and try changing tanks. Shed propeller tips can cause serious vibration. To prevent the engine shaking from its mountings, shut the engine down, slow down to stop the propeller and carry out a forced landing.

4.7.4 ASI Failure

Check that the ASI is increasing during the ground roll and abort the tow before getting airborne if possible. If you do get airborne fly by attitude and keep climbing to the top of the tow. If you are very unhappy, wave the glider off near the airfield and conduct a half flap powered approach.
5 Weather Difficulties

5.1 Poor Visibility or Low Cloud

If you are ever unhappy with the weather conditions, do not let a glider pilot pressure you into giving a launch. The average PPL holder will lose control in a matter of seconds once visual reference has been lost even with a full instrument flying panel. The tugs are not equipped for instrument flight. Remain clear of cloud, even if a lowering cloud base means a field landing is required. If caught by a local deterioration, e.g. a large shower, consider holding off upwind until it has cleared. Alternatively consider landing at one of the neighbouring airfields. If landing in heavy rain, the windscreens will be obscured, so look out sideways to judge your height and land well into the airfield to avoid obstacles.

5.2 Strong winds

Beware of turbulence and curl over from nearby trees or structures. Exercise caution in the initial climb as a strong wind gradient increases the tug-upset risk. Check the position of the glider regularly to ensure you don’t leave them behind in the ground effect. It is very easy (in the Pawnee especially) to end up climbing through 100’ with 75 knots indicated while the glider is at 50’ and at 55 knots has insufficient energy to catch up (Figure 4). It is vital to hold the attitude and not chase the ASI, accepting a higher than normal airspeed through the gradient until the glider is stable behind the tug. (Being towed too fast is not as bad as falling into the slipstream nearly stalled at 75’ with the tug climbing away from you!)

Land as into wind as possible using plenty of power on the approach. Do not hesitate to go around if badly rolled by gusts. Once landed, avoid taxiing or attempting to turn downwind, particularly in Cub/Pawnee. If necessary, shut down or get someone to hold the tail and wings as you taxi.

Figure 4.
6 Retrieves

6.1 General

Tug pilots in current navigational and radiotelephony practice and listed by the CTP may conduct retrieves from airfields with the approval of the CTP or CFI or DCTP. Suitable proficiency at the Annual Check is required before any pilot performs aerodrome retrieves.

A small number of aero-tow retrieves are carried out each year. Generally, requests for “Airfield” retrieves will be accommodated if at all possible. “Field” or non-airfield retrieves will generally be discouraged because of the high level of associated risk and can only be undertaken with specific approval from the CFI, CTP or DCTP.

Before embarking on a retrieve it is important that the following points are addressed:

1. Permission must be obtained from the airfield operator or landowner.
2. Tugs should normally be refuelled before departure.
4. A spare rope must be carried.
5. A suitable map must be carried.
6. Consider which aircraft to use. The Pawnee is probably most suitable because of its take off and climb performance.
7. If radio procedures are required, and most airfields do, then the Pilot must also hold an R/T rating.
8. Be aware of the logging procedure; the pricing is based on the total tacho time.

6.2 Techniques

On arrival overhead or in the circuit take some time to assess the landing area for approaches, size, surface - if you are not 100% sure then return to Windrushers Gliding Club.

If at an active airfield ask which run will be most suitable for departure, considering surface, length, wind, climbout and other traffic requirements. Many airfields will not appreciate a glider blocking their main runway for long. It is unlikely that you will get the standard aerotow signals from ground helpers. Consider hooking on the glider yourself before starting engines, then the glider pilot closing the airbrakes when they are fully ready to launch. Obey any Air Traffic instructions.

Before take-off ensure that you do the following:

- Work out your contingency plan to cover actions in the event of an aborted take-off or in the event of rope break (release) soon after take-off. Brief the Glider Pilot accordingly.
- Decide on a tow speed to suit glider and pilot.
- Decide how the signalling is to be arranged and any other relevant details.

It is essential to have radio communication between Tug and Glider whenever possible.

After take-off, do a normal climb out and then accelerate to your agreed tow speed. Once a safe height has been reached or a chosen altitude, reduce power to achieve a slight climb or level flight. If possible it is often preferable to reach the top of the climb just as the glider is achieving a glide back to base.
Try to avoid the need to descend on tow, as it can be quite destabilising. If a descent is needed for cloud or airspace, then reduce power slightly to achieve a smooth 100-200 fpm descent, anything more will require the glider to use his airbrakes.

Surging is when the towrope slackens and tightens continually. It can be caused by turbulence, lack of concentration on the part the Glider Pilot or by descending too quickly or inadvertently. Surging can occur during level flight, but is most likely to occur during descending flight. The best solution is to apply power and accelerate or climb slightly until the surging ceases, then slowly return to the desired stable state.

Remember that until the glider releases, you are in charge of both aircraft and responsible for navigation and any RT calls.
7 Fuelling Regulations and Procedures

7.1 Fuel Sampling

Windrushers Gliding Club is licensed to store Avgas 100LL in a bowser.

Before the first refuel of the day, the following regulations MUST be followed. It will be worth doing this before flying starts if it looks to be a busy day, to save glider-waiting time when you go to refuel with a long queue.

It is a legal requirement to take a fuel sample from the bowser before delivery to the aircraft to check the absence of any water, sediment or cloudiness. These samples must be kept for a minimum of seven days, after which they may be returned to the tank to save wastage. Also the storage tank must be dipped and checked for water contamination. To this end, a fuel-testing log is provided in the bowser, as well as 8 sample jars, numbered ‘one’ to ‘eight’. These should always be full of fuel for inspection by the CAA in case of an accident to any aircraft that has uplifted fuel from our pump.

7.1.1 Daily Sampling Procedure

1. Look at the fuel sample log sheet to determine which sample jar is the next in sequence.
2. If uncontaminated, empty old sample back into aircraft tank if there is sufficient capacity, if not empty into main underground tank.
3. Fill sample jar.
4. Record the sampling results on sheet and return jar to shelf.

7.1.2 Weekly Sampling Procedure

1. Frequency – once every week in winter, twice in summer months.
2. Collect the bowser keys, the dipstick, the water testing paste, and some tissue.
3. Open the bowser cover and tank lid (using a club key). Dip the fuel noting the contents.
4. Smear a small amount of green paste on end of dipstick. Re-dip the tank. Paste will turn purple if water contaminated. Wipe paste off dipstick.
5. Close the bowser lid and cover; return dipstick, paste and keys.

Signed:

Derren Francis
Chief Tug Pilot
### Appendix 1

Some Useful Checks and Mnemonics for Windrushers Tug Pilots

**Pre Engine start**
- Controls
- Ballast(fuel etc)
- Straps
- Instruments
- Flaps
- Trim
- Canopy
- Brakes
- Propeller(fine/course)
- Petrol
- Throttle
- Mixture
- Ignition

**After start**
- Starter Warning light
- Gen Warning light
- Oil pressure
- Avionics
- \textit{T+Ps}
- Avionics
- Flight instruments
- \textit{T+Ps}
- Mag cx
- Check Idle

**Power check**
- Clear behind
- Check T+Ps
- Set required rpm
- Check T+Ps
- Carb Heat cx
- Mag cx
- Check Idle

**Pre take off**
- “CAMFIGHT”
- Controls
- Carb Heat
- Avionics
- Airbrakes
- Mixture
- Mags
- Fuel
- Flaps
- Instruments
- Icing
- Gauges
- Gyros
- Hatches
- Harness
- Throttle
- Trim

**After take off**
- Brakes
- Engine
- Flaps
- Fuel
- Directional Indicator
- Altimeters
- Harness

**Cruise/Descent**
- Fuel
- Radio
- Engine
- \textit{CAMFIGHT}
- \textit{T+Ps}
- Altimeters
- Harness

**Pre landing**
- Brakes
- Undercarriage
- Mixture
- Propeller
- Fuel
- Instruments (Altimeter)
- Carb heat
- Harness

**After Landing**
- Flaps
- Carb Heat
- Strobes
- Transponder
- \textit{Shutdown}

- Brakes
- Mag cx
- Avionics off
- Mixture cut off
- Mags off key removed