CHAPTER 17

GLIDER AEROTOW PROCEDURES GUIDE FOR TUG PILOTS

Index

SECTION 1:

PILOTS

1.1. AEROTOWING - GENERAL POLICY

Aerotowing of gliders may only be carried out by trained tug pilots who are members of the Cape Gliding Club and who are correctly licensed and rated.

New tug pilots should be trained in accordance with the procedures outlined in 1.5. Tug pilot training is at the new pilot's expense and they will only be accepted for training if they are prepared to make a significant contribution to the launching needs. A minimum number of tows a year may be specified.

It is preferred that tug pilots remain in current practice as glider pilots.

Tug Pilots are expected to attend Tug Pilots Meetings.

1.2. MINIMUM REQUIREMENTS

A. Holder of a PPL (A) with tug pilots rating or higher license.
B. TAIL WHEEL TUGS - 100 Hours pilot in command power flight, with a minimum of 30 hours on tail draggers (at least 15 hours in the last 6 months) and 5 hours on type.
C. TRICYCLE GEAR TUGS - 100 Hours pilot in command power flight with at least 5 hours on type.
D. If not a glider pilot, at least 3 flights in a glider to familiarize with gliding procedures and methods must be undertaken.
E. Insurers of the tugs may impose additional requirements.

1.3. WHO CAN FLY CLUB TUG AIRCRAFT?

A list of current, authorised club tug pilots will be maintained by the Chief Tug Pilot which should be reviewed and updated at least annually.

Pilots on the list may fly tugs as authorised provided they are in current practice, as defined in 1.4.

Pilots are responsible for maintaining their license and medical. It is not the clubs responsibility to keep tug pilots current.

1.4. CURRENCY / RECENCY

If an experienced pilot has not flown a tug for 3 months he cannot be in current practice and should seek authorization before flying from the Chief Tug Pilot or other approved person.

For new tug pilots trained to the approved syllabus and established as a "Solo tug pilot", check flights with the Chief Tug Pilot will be required as follows::

i) with less than 6 months experience or 50 tows - two per month

ii) with less than 1 year's experience or 100 tows – four per month

Pilots with more experience than (ii) above should carry out at least 25 tows a year with not less than 5 tows in any 3-month period.

Depending on the pilot's total and recent flying experience he may be given a check flight or briefing.

1.5. AN OUTLINE OF THE TRAINING PROCEDURE

New tug pilots will fly dual with the Chief Tug Pilot or nominated training pilot. A minimum of 3 dual tows is required before the pilot is cleared for solo towing on the type. The experience

total between the tug pilot and the glider pilot should be a minimum of 6 solo tows.

1.6. CROSS COUNTRY RETRIEVES TO OTHER AIRFIELDS

Each flight should be authorised by either the CFI, CTP or the Senior Instructor on the airfield who may not be a power pilot but could well be in position to advise on whether the tug can be released, the expected weather conditions and the remaining daylight hours.

In all cases the safe conduct of the flight remains the responsibility of the tug pilot.

Those authorizing a flight should remain on the airfield to satisfy themselves of the flight's safe return.

Both the tug pilot and those authorizing a flight should be satisfied on the following points:

A. The Pilot satisfies the relevant conditions above, and is in current cross country practice.

B. The weather is suitable, the last landing time is known and the flight can be completed in time with an adequate margin.

C. A sensible flight plan has been drawn up taking account of Airways, Control Zones, Danger Areas, etc.

1.7. FLYING PASSENGERS IN TUGS

The Civil Aviation Regulations prohibit the carrying of passengers in aircraft which are towing.

However, trainee tug pilots may fly with the Chief Tug Pilot or approved tug pilot to familiarize with towing operations.

The following should be taken into account:

1. The weight of a passenger will slow the rate of climb of the combination making the aircraft use more fuel, increasing the turnaround time and could, in some circumstances, be critical, e.g. a low-level engine failure.
2. The glider pilot is paying for longer tows and is exposed to more risk.

1.8. THE ROLE OF THE CHIEF TUG PILOT

The Chief Tug Pilot (CTP), is responsible to the CFI for the safe and economic operation of the tug aircraft. The CTP's duties include selecting and training suitable members to become tug pilots and to monitor and record the performance of established tug pilots.

Disputes between members and the CTP which cannot be resolved by discussion between those involved, aided by the CFI or Chairman, should be presented to the Committee for arbitration.

The CTP should be as knowledgeable as possible about the economics of the tug operation and be in a position to point out to the Committee likely trends and the advantages of alternative aircraft types. The CTP can expect to be involved in any Committee decision about the tug fleet.

SECTION 2:

TECHNICAL MATTERS

2.1. AEROTOW ROPES

New tow ropes should be made up as required with spares readily available. Any ropes considered unserviceable should not be used. Cut damaged section and set aside for repairs.

The longer the rope the safer it is for the tug pilot and the SSSA recommended length is 55 m (180 ft).

Avoid if possible reducing the length of the rope significantly by repairs. It is helpful to have marks on the ground at some convenient place to check rope lengths.

Tug pilots are responsible for the serviceability of the rope they are using. At the start of the day the ropes should be examined, together with the Duty Instructor and Duty pilots, at the "Pre-Flying" Meeting.

The rope in use as well as a spare rope should be checked by the tug pilot before flying commences. The rope must be checked for fraying, cracked rings and free of knots. If another rope has to be brought into use, the tug pilot should stop the engine and get out of the tug and check the rope himself.

Pilots have to be responsible for ensuring the dangling rope does not hit any persons, vehicle or fences as they come in to land. Although the rope only hangs down about 50 ft at approach speeds the aircraft will be descending, so for the end of the rope to clear an object on ground the tug needs to pass over it at 150 ft or higher.

At the end of the day the ropes should be collected by the Duty Pilot and placed in the 'Flight Center'

2.2. ACTIONS IF AN ENGINE OVERHEATS

In warm weather the tug pilot may notice either the cylinder head temperature or the oil temperature approaching the red line. When this happens speed up the tow by a few knots (not more than 10), if this

fails to halt the temperature rise then wave off the glider and land.

After landing, check the following:

Oil: Allow time for the oil to drain into the sump then check the contents and top up if necessary. Engines run cooler with the correct amount of oil.

Oil cooler: Check it is not clogged with leaves or insects and the cowling around it is in good order.

Engine baffles: Check for loose baffles and missing edging strips. Changed airflow patterns may alter the cooling effect.

Silencer baffles: Loose baffles will increase the back pressure which in turn causes overheating and a loss of power. In the worst case there may be insufficient power to even sustain level flight.

Carburetor air intake: The air filter should be secured and functioning correctly.

Oil consumption: An engine using more than a quart of oil for 20 tows has probably worn rings allowing some hot gases to blow by, these gases will heat the oil in the engine core. Worn rings also let oil into the combustion chamber, this is turned into carbon which in turn can cause pre-ignition and further overheating.

2.3. TOWING SLOW GLIDERS

Different types of tugs have different minimum safe towing speeds. If there is a choice consider using the slowest tug for the slower gliders.

Watch the oil and cylinder head temperatures carefully.

2.4. FLIGHT MANUAL LIMITATIONS

Advice, recommended practices, and legal requirements are to be found mixed together in the various publications relevant to towing. Documents such as the CAR's, AIC s and Flight Manual all contain valuable information some of which is mandatory either to the conduct of the flight or the maintenance of the aircraft and its equipment.

Some of the information is inevitably conflicting, Rallye's have different placarded maximum towing weight to the one given in the Flight Manual for example. Whenever possible stick to the Flight Manual as the manual is part of the Certificate of Airworthiness. The aircraft must be operated within the limitations of the manual for the C of A and the insurance to be valid.

2.5. ENGINE HANDLING

In 1998 a Lycoming engine cost R 160 000 new, or R 80 000 to overhaul an existing engine. It is unusual to have an engine go past 2000 hours without needing cylinder repairs; often the cost of the repairs can be R 30 000 as a cylinder costs R 8 000 and a piston without rings R1200-00.

With sums as large as these involved it is obviously vital that pilots take utmost care of their engines from start-up to shutdown.

Warming up engines: As soon as an engine responds to the throttle and the oil pressure is satisfactory the aircraft can be taxied onto the airfield ready to run up.

It may seem surprising but it is actually bad practice to try too hard to warm up an air cooled engine. Piper's handbook for the Pawnee recommends taking off as soon as the engine responds cleanly to the throttle regardless of oil or cylinder head temperatures.

In their engine manual Lycoming stress that adequate cooling is only provided by the forward speed of the aircraft and ground running should be kept to a minimum using only 1000 to 1200 RPM. Lycoming also suggest taking off as soon as the engine responds to the throttle without faltering. The reason for this advice is to avoid local hot spots developing in cylinder walls that can easily ruin both the cylinder and its piston.

In practice this means that the aircraft that has taxied out and run up is going to be warm enough for take off. Where the aircraft has stood alongside the aerotow point run it at 1200 RPM until the oil temperature is obviously rising and the CHT nearing 100 degrees centigrade before commencing a take off.

Engine run ups: Position the aircraft on the airfield well away from any stones. Check the nose is into wind to aid cooling , the prop-wash will not affect anyone else, and the way ahead is clear just in case the brakes fail.

Check the mags as specified in the flight manual. Ensure there is both a drop and a recovery, No drop might mean a mag switch has failed, if you suspect this may be have happened throttle back to idle and turn both mags off, if the engine does not stop you were right and the aircraft must be grounded!

Accept magneto drops of up to 175 RPM provided the two magnetos are within 50

RPM of each other and there is no rough running. On older engines you may find one magneto is giving a drop of around 250 RPM accompanied with rough running and in this case it is worth trying increasing the RPM to 2200, the maximum allowable on the ground for a Super Cub, and leaning the mixture until the revs start to decrease. At this point pause then go back to frill rich, reduce RPM and try the magneto again. Large magneto drops with no rough running are a sign of an incorrect mixture and the aircraft should be grounded. A "dead cut" check at idling revs should be a routine part of engine checks both after starting and before stopping an engine.

Applying full carburetor heat at the magneto check RPM should cause a drop between a 100 and 200 RPM with a full recovery as you go back to cold air. (Only over hard clean surfaces)

The last part of the run up is to check the tick over is between 500 and 7OO RPM and that the engine does not stop with the throttle closed. Because this check is usually done before the engine has reached its normal operating temperature the tick over may well be low, this is acceptable whereas over 800 RPM would need adjustment before flight.
Do not run up or wait with the engine running on dusty surfaces.

Take off: Take 2 seconds to apply full power and during the ground run check for good oil pressure and expected RPM.

Climb: Climbs while towing are nearly always done with full power applied. The engine has a full power mixture enrichment jet that provides an over rich mixture to help cool the exhaust valves, this is brought into use by the last 10% of throttle movement and there is the danger that if you reduce power you may shut this jet off making things worse for the engine. Lycoming say there is no advantage in climbing at reduced power. Monitor the CHT which must not exceed 260 degrees centigrade or 500 degrees Fahrenheit. The oil temperature must also be watched carefully, typically it must not exceed 118 degrees centigrade or 245 degrees Fahrenheit or other manufacturers recommended figure.

Leaning the mixture: At low level airfields use of the mixture control is not normally recommended above 75% power. However when towing at high altitude or operating at airfields over 4000 ft AMSL it is acceptable to lean an engine even at full throttle just sufficiently to restore smooth running, this should not be necessary below 4000 ft. Do not attempt to lean an engine to gain extra RPM. Be aware that on a cross-country retrieve, fuel consumption may be as much as 25% up on Flight Manual figures with a consequent reduction in endurance.

After release: Careful and correct engine handling during this phase of flight is absolutely critical. If one tug pilot starts doing it wrong then he will wreck an engine on his own. It is essential no one thinks he can do it his way and it will not matter that everyone else is handling it correctly.

SECTION 3:

THE AEROTOW

3.1. THE AEROTOW

The purpose of the tow is to launch the glider on what may be a soaring, training or an introductory trial flight. Whatever the type of flight the tow should be as helpful as possible to the glider pilot and should not be regarded merely as a way of gaining height.

The aerotow should provide what the glider pilot requires. For example, a two-seater training flight this could well mean plenty of turns for training and staying near the airfield, whereas a water-filled Nimbus needs adequate speed, a minimum number of turns and releasing in lift even if it is some distance away from the airfield. It is up to the tug pilot to use his skill and experience to meet each individual need.

It is also important that the tow should be smooth and free of any moments of concern for the glider pilot. To ensure this is the case use the following guidelines for every flight:

A. Do not fly over trees or any areas low down where an engine failure would risk the tug, if the tug is safe the glider will also be safe.
B. Avoid known areas of turbulence while low, noise-sensitive areas when higher.
C. Keep all turns shallow and, if possible, make a safety turn into the wind to keep the glider and tug within gliding range of the airfield at all times.
D. Do not fly directly into the glare of the sun.
E. Do not chase the airspeed such that the tug is forever changing its attitude and do not fly too slowly.

The tow should also give the glider pilot a feel for the sky, the tug pilot must look for lift and once above 700 ft should be trying to fly under clouds and avoiding the smooth blue gaps. In tugs, as in gliders, looking for lift often finds the accompanying sink but this is all the more information for the glider pilot. Sometimes the lift may be too narrow for the tug to circle without excessive angle of bank. In this case it is best to circle in and out of the upwind side of the thermal rather than lose it altogether.

Never comment on lift conditions while on tow. It has been known for a low-time glider pilots to release in an unfavorable location as a result of such a comment. (For example at a low altitude and too far down-wind to reach the airfield if the lift turns out to be not as good as the tug pilot said it was!)

Another problem can be gliders already circling in the thermals. Never try to join them. Either circle around the outside of the thermal well away from the gliders or route away from the thermal and return when nearer the likely release height.

3.2. THE TAKE OFF

The tug should line up in front of the glider unless there is a strong crosswind when the tug should be a semi-span on the downwind side.

Remember the pilot is responsible for the care of the aircraft and he should therefore commence his tow from a position on the runway where he judges the aircraft will be airborne before the end of the tar. The glider should push back from the tug.

Next go through the checklist, there is no doubt that many pilots shorten their check list after the first couple of tows

and provided this is a conscious decision it should be alright. Pay particular attention to the fuel state, flap position, trim position and anything that may have been moved such as Carb Heat or the Canopy Latch. A reasonable check to use is FFTCC, Fuel, Flap, Trim, Carb Heat and Canopy.

Having decided on a shortened list stick to it. The most senseless accident you could have is running out of fuel so to avoid this, consider adopting a rule such as :

NO TUG WILL TAKE OFF UNLESS IT HAS AT LEAST 5 GALLONS OF FUEL ON BOARD

It is a good idea before your first take-off of the session to move your hand from the throttle to the Cable Release to help make the emergency procedure instinctive.

The tug pilot has discretion whether to operate without a forward signaler but it is recommended to insist on one who really is watching out for aircraft that could interfere with the launch when airfield is busy.

If the tug pilot is unhappy about any aspect of the launch he should not hesitate to stop flying until things are put right. Watch out for things like deteriorating weather, obviously inexperienced signaler's or runners on the wrong wing in crosswinds.

When "take up slack" is given check the glider's brakes are closed, the airfield ahead is clear of other aircraft or a wire launch is not in progress or about to start.

If there has been a cable break then there may be a cable across or close to the take-off run, especially if there is any crosswind.

The tug should move forward at walking speed, as the slack comes out of the rope the inertia of the moving tug will start the glider rolling. Try to use this inertia and keep the glider moving with a little extra power if necessary while checking for the "all out" signal from the 'Tug-signaller'. A gentle jerk helps get gliders with skids rolling on soft ground but if you overdo it there is danger of the glider over-running the rope. Be particularly careful with gliders that do not have nose hooks. If an over-run occurs the glider pilot should release immediately.

NOTE: BE ABSOLUTELY CERTAIN ABOUT THE "ALL OUT" SIGNAL.

Accidents have occurred where the tug pilot was not given the "all out" signal but commenced the take-off regardless.

Take two seconds to apply full power. During the roll, check for normal RPM and oil pressure while there is still time to stop if there is a problem.

If the rope breaks it is the tug pilot's responsibility to ensure the glider does not run into the back of the tug. He may do this either by seeing the glider slowing in the mirror while rolling forward and then abandoning the take-off or, if the break took place at higher speeds, continuing with the take off and doing a low circuit.

Once the tug leaves the ground it is either going to have to be smoothly rotated into the climbing attitude or held down to gain airspeed. Whichever is the case do not wait until the ASI is indicating the towing speed before commencing the climb, try to make the

transition from the acceleration phase to the climb as smooth as possible. If you wait too long before climbing the tug will have to be rotated quickly making it difficult for the inexperienced glider pilot to follow. If the speed is above the optimum climbing speed after the lift-off, the tug should not be zoomed into the climb, leaving the glider floundering below. The tug should be eased up gently into the correct attitude for the climbing speed, allowing the glider to follow easily, any excess speed will soon dissipate once through the wind gradient effect.

In the climb the nose-up attitude makes maintaining a good *LOOKOUT* more difficult and more essential, frequent gentle turns are the only way around this problem. Hold the correct attitude for the climbing speed, even if the speed varies slightly. Attempting to correct every small speed fluctuation will result in "chasing the airspeed" and make it difficult for the glider pilot to maintain position. A sudden lowering of the nose to regain 5 kt., (which speed variation is rarely important if an adequate margin over VS exists) can induce a "slingshot" effect, low down, this can be fatal.

Climb at full power, monitor the CHT, Oil Pressure and Temperature. Speed up if temperatures get near the red line, wave the glider off if you exceed red line temps.

Carburetor heat: The use of Carb heat should not be necessary with full power. If you feel you have less power than normal on a cold damp day it may be worth trying it, feed it on slowly and expect some misfiring and rough running. The worse the misfiring the greater the need to persevere with full carb heat, if all you get is reduced RPM and slight rough running then your problem is not carb ice.

There is a danger of "detonation", pinking in car terms, from the use of full power and Carb heat so do not try it just to see what it does.

THE TOWING PATTERN

In addition to the basic airmanship considerations given in Para. 3.1 the following will, in general, determine the towing pattern chosen:

A. If there is any crosswind the first turn after take-off will be into wind unless there are other over-riding considerations (e.g. terrain, turbulence, unfavorable forced landing area, noise considerations)

B. If possible the flight path should be optimized to give the glider pilot the best choice of fields and the earliest opportunity to get back to the airfield in the event of a rope break.

C. The distance upwind of tile airfield at which the glider should be positioned for release depends on the wind strength and visibility.

D. The tow pattern should enable the glider pilot to easily remain orientated by having the airfield in sight for as much of the time as possible.

E. If possible the flight path should be straight at the anticipated release height.

F. Since the objective is to tow the glider to lift use any lift available during the climb and avoid towing in areas of sink.

SAFETY LIMITS

Training flights also involve out-of-position exercises which pull the tug's tail around, the tug pilot should try and keep straight using full rudder and

aileron if necessary. This sort of towing can occasionally be alarming when the instructor lets the student go too far but it is not an unacceptable risk. The same cannot be said about full use of the elevator which is a much more serious matter. It is good practice for the gliding instructor to warn the tug pilot of his intention to carry out-of-position exercises and only to do so above a safe height, say 1000 ft.agl, but expect these whenever towing a two-seater.

If the tug needs full up elevator, stick back then watch out! It indicates the glider has gone high, has probably lost sight of the tug and could well pull up the tug's tail very quickly.

NOTE: IF THE STICK TOUCHES THE BACK STOP RELEASE THE GLIDER IMMEDIATELY

You are also justified in releasing the glider if you find you are moving the stick back quite quickly with little effect, this indicates the glider is "kiting" upwards and will very quickly result in the tug having its tail pulled up and the forward speed being reduced to below stalling speed. Recovery from this situation may need 1000 ft.

THE CLIMB OUT

If the tug needs nearly full down elevator, stick forward, the glider has gone low, hopefully into the Low Tow position. When this happens maintain the correct airspeed by using quite a lot of forward pressure on the stick whilst re-trimming the aircraft, this forward pressure is often the only indication the glider has gone into Low Tow since it may not be visible in the rear view mirror.

Pilots will find the tug will climb in a less nose up attitude with a glider in the Low position, normal speeds should be used. Be careful if the glider releases without coming into high tow first not to descend into it.

If during Low Towing training flights the stick briefly touches the forward stop this can be accepted, if the glider continues to descend the nose of the tug will be pulled up and the airspeed will decrease resulting in the start of a torque roll to the left. Once the roll starts release the glider, centralize the stick but do not throttle back as you must avoid the glider below you.

AS YOU COME UP TO THE RELEASE HEIGHT

If you have arranged your flight path such that you have your back to the airfield, this will allow you to make a 18O degree descending turn whichever way the glider goes.

Check it is clear to turn as the glider releases, this could be left or right.

Do not rely on the release of rope tension (sometimes felt as a jerk) to indicate that the glider has released. **Use the mirror to ensure he really has released** and the direction of turn. Lower the nose and accelerate away, only turn in the opposite direction once the glider's direction of turn is established (usually to the right). If there is any doubt at all whether the glider has released descend gently and straight ahead until the release can be confirmed.

RELEASING

Unless there is a tug emergency it should be the glider pilot's decision to release.

The emergency "wave-off" signal should not be used to indicate that release height has been reached. If the glider continues on tow above the anticipated release height then continue to plan the climb-out pattern accordingly and taking into account any possible problems for the glider pilot (e g. orientation, visibility)

When the glider releases it will execute a gradual climbing turn to the right. (unless on the ridge when the glider pilot will fly straight) The tug pilot should fly straight for a short while and then head to the “Let-down’ area. (see below)

The Tug-pilot should make a blind call to Worcester Traffic that he has released a glider and state the height and location. On no account should the glider pilot give thanks for the tow and tug pilots should ignore such remarks. Only if the blind release call is not forth coming and the tug appears not to be aware of the release may the glider pilot make a radio call to the tug. (Glider pilots should try to release when the rope is taught so that the tug pilot can feel the release).

3.3. THE DESCENT

The start of the descent is undoubtedly the most critical point in the flight, at this stage it is vital the following three things are done well on every single trip:

- LOOKOUT
- ‘LET-DOWN’ AREA
- ENGINE HANDLING

Lookout needs no explanation.

Descend in the designated ‘let-down’ area. This is abeam the opposite threshold and over the Brandvlei Dam.

Be sure you understand that if you do not handle the engine correctly you will definitely damage it.

When the glider releases it will execute a gradual climbing turn to the right. (unless on the ridge when he will fly straight) The tug pilot should fly straight for a short while and then head to the “Let-down’ area. He should then start a turn and make it steep. This turn is important as it is the only way you can keep quite a lot of power in the engine and at the same time descend, starting with your back to the airfield allows this turn to continue as long as possible (up to 180 degrees).

During the turn, control the tugs speed and start to throttle back as slowly as possible. The first minute or two are the most critical to engine cooling. The general idea is to keep as much power on as possible without the speed going to high. After one minute a small reduction in power is acceptable and after another minute further reductions in power and increase in speed will improve the descent without harm to the engine.

On no account should you side-slip to loose height.

A local ‘Restricted Area’ has been declared directly over the runways and up to 3000’amsl. (figure i - Chapter 5) This area should be avoided unless in an emergency.

3.4. EMERGENCIES

Tug pilots must know how to signal the glider to release, called the "wave-off" and how to let the glider pilot know his brakes are open. It its also important to recognize when a glider is signaling that he cannot release. These three signals should be practiced and are included in the training.

However these are by no means the only emergencies likely to be encountered and the following also offers advice on

how some other problems and emergency situations could be handled.

The "Wave-Off": The signal for this, from the tug to the glider, is the rocking the tug aircraft's wings, using about 20 degrees of bank each side but only if flying at a safe speed. On seeing this, the glider must **release immediately**.

Glider Brakes Open: A glider's air brakes can deploy if a glider hits a bump on take-off or if the pilot fails to lock them properly. When this happens the tug pilot will first notice a poor rate of climb and may wonder whether there is anything wrong with the tug, a check on the engine gauges should confirm everything is OK at the tug end. A check in the mirror will then show the gliders brakes fully open.
In this situation the tug pilot must follow the following procedure:
A. Continue trying to climb at the correct airspeed.
B. Consider whether to signal to the glider that his brakes are open by a rapid side-to-side movement of the rudder.
C. Tow the glider back to the airfield and continue trying to climb in a holding pattern around the airfield so that the glider can easily reach it, after release, even with the brakes open.
D. Repeat the signal from time to time.
E. All efforts should be made to get the glider back to the vicinity of the airfield, - however, if at any stage the safety of the tug is compromised, the tug should release the glider immediately.

Glider cannot release: When the glider is unable to release it will fly out to the left side of the tug and rock its wings.

This is not an emergency requiring instant action. Appraise the situation.

Can the glider easily reach the airfield with the tow cable dangling?

Is the glider lower than the tug? If it is there is a bigger danger of the cable going over the wing or breaking the canopy than when the tug is lower than or level with the glider.

Do not release when the cable is taut, reduce power a little first, check the glider is high in the mirror then pull the release. Check the glider is flying normally before returning to the airfield. Stop the tug or radio ground control, to let people on the ground know a glider with a problem is on its way in.
Should the tug and glider both be unable to release, it will mean the tug must land with the glider in tow. Plan a gentle low approach (100 foot per minute descent). After touchdown allow the glider to do the braking. A wheeler landing will allow a slower deceleration.

Should a serious emergency occur whilst towing, <u>immediately</u> release the glider.
Do not waste the time it takes to give a wave-off signal.

Emergencies are probably going to fall into the following three categories, Engine, Airframe and Weather.

Engine and Airframe emergencies must be handled in the usual manner once the glider is released and there is no danger of collision.

Weather emergencies will most likely be the inadvertent entry into cloud. After the glider has released, maintain full power and lower the nose slightly to accelerate away from the unseen glider. When at a safe distance reduce power and descend to visual conditions as quickly as possible. Notify "traffic" of your intentions.

SECTION 4:

TRAINING AND TYPE CONVERSIONS

4.1. TOWING TRAINING

As aerotowing is conducted at the pace dictated by the gliders and the launch point rather than the needs of the student tug pilot, it is expected that the student will be familiar with the aircraft, and the Tug Pilots Procedures, before starting towing training

Experience has shown it is best for the Instructor to fly the first few tows explaining what he is doing and why. Once the student moves into the left or front seat he is expected to do at least 3 dual tows and demonstrate his competence at the following:

A). Engine handling

B). Speed, correct selection and accurate holding

C). A tow that includes the low tow position.

D). A tow with the glider doing out-of-position exercises.

E). A tow during which the gliders' brakes come open.

F). A tow that ends in a "wave-off" from the tug.

G). A tow where the glider simulates an inability to release.

H. A tow involving level and descending flight.

(Items C-H may need a two-seater glider. The exercises can be carried out over a number of flights.)

Once the Instructor is satisfied that the pilot is safe to continue towing on his own and has done all the exercises on this schedule and has answered the questions satisfactorily he, the Instructor, may clear the pilot for solo aerotowing.

4.2. TYPES

The most usual types of tug aircraft:
150 HP SUPER CUB
180 HP SUPER CUB
RALLYE 180 T's
180 HP ROBIN DR400-180 R
CESSNA 182
CESSNA 180
HUSKY
PAWNEE
MAULE
CITABRIA

New pilots usually start on the type most suited to their previous experience and would normally gain towing experience on their first type before being converted to another.

CONVERSION TRAINING:

Dual flying concentrating on safety, airmanship and control, throughout the conversion the student will be expected to demonstrate his ability to an **above-average** standard.

Solo flying, at least 6 landings 2 of which must be observed , followed by a check towing gliders.

The conversion will include stalls from turns and in the approach configuration,

and will then concentrate on approach control. As only more experienced pilots will be involved in this conversion there will be no mandatory solo flying and those who get on well with the type will be allowed to go from the checkout directly to solo towing.

OTHER AIRCRAFT

There may be privately owned aircraft used as tugs. Because of insurance or experience qualifications they almost certainly will not be available for all pilots.

BRIEFING NOTES

The following sections offer briefing notes for each type, the data given is taken from tile Flight Manual and makers handbooks and can only be a guide. **All aircraft have to be operated within the limits laid down in the up-to-date Flight Manual.**

All revised briefing notes only cover items particular to the type, the SSSA has produced a general guide to Daily Inspections, this is included as a reminder of all the items that need to be checked, note the comments on the legal requirements for a D.I.

4.3. THE SUPER CUB, PA18-180 AND PA 18-150

The Super Cub first appeared in 1949 following a complete redesign of the PA11 Cub Special, this was the aircraft that replaced the famous J3 Cub two years previously. The Super Cub continued in production until 1969, over 10 000 were made and fitted with six different size engines between 95 and 150 hp. Apart from the basic 95 hp version which was never made with flaps or counterbalanced elevators, all the airframes were identical with flaps as an option. Super Cubs also joined various airforces as L18's (95 hp) and L21's (125 hp), some people incorrectly call these PA19's once they have been 'civilianised' but this series number was never used by Piper.

By the mid 1960's the price of second hand Super Cubs had fallen sufficiently for the growing gliding movement to operate them and the advantages of the Lycoming 150 engine, performance, economy and reliability, soon became apparent.

There are a number of possible modifications. To change the cockpit glazing to the military style with improved visibility, Cleveland disc brakes and to re-engine to 180 hp.

The increased engine size, 6OOO cc against 5250 cc, of the 180 conversion produced an economical and powerful tug. The only snag was the fuel system, which despite pipe changes, was just unable to meet the fuel flow requirements from the lower part of the left tank and all of the right. For this reason the tanks have been placarded as the left tank being the Main Tank with 7.5 gallons of its 15 gallon capacity being officially unusable, the right tank is now the Auxiliary 'Tank and has 15 gallons available for the cruise.

The aircraft have three stage flaps,10, 25 and 50 degrees. The flap limiting speed is 85 mph and there are significant trim changes with the use of flap. If the engine quits leave the, flaps up and 58 mph will give you a 1:8 glide. Boffins can prove flaps do not affect the aileron response but the Cub can prove otherwise, in rough conditions aim for flapless landings.

The usual all-up weight (AUW) is 1750 Ibs, giving cockpit load of close to 400 Ibs of which a maximum of 50 Ibs can go behind the rear seat.
In flight the aircraft has satisfactory handling with a slow docile stall, one Super Cub has been spun in from a steep turn so do not expect the aircraft to correct your mistakes! As with most high wing aircraft visibility in the turn is poor so develop the habit of lifting the inside wing first for a lookout prior to turning.

D.I. COVERING POINTS
PARTICULAR TO THESE AIRCRAFT
Include the normal checks as you go around the aircraft:

A. Start in the cockpit. Check the switches are all off and the controls for full and free movement. Inspect around the base of each stick and the area beneath it, you may find a nice strong metal pen amongst the controls!
B. The trim should have 16 full turns of travel. As you turn it, watch the tailplane move up and down, and the trim indicator following the movement. Leave it in the mid-position.
C. Unclip the seat squab *(cushion)* and check the seat locking mechanism, assure you understand how the seat locks. Check there is nothing in the seat pocket especially if the back stick is in place.

START UP CHECK LIST

1.	MASTER	ON
2.	FUEL	SELECT TANK
3.	MAGS	B0TH ON
4.	CARB HEAT	COLD
5.	MIXTURE	RICH
6.	BRAKES	ON or at least feet on the brakes
7.	START	HOLD stick back between your knees
8.	OIL PRESSURE	OK
9.	CHARGING	OK

Stick fully back for taxiing unless going downwind in a strong tailwind, always use rudder for steering assisted with brakes when necessary. When attempting a tight turn reduce the amount of up elevator as this will lessen the pressure on the tail spring and allow the pivot to remain nearer vertical, this in turn allows the rudder to effect the turn without the need for excessive power.

RUN UP
150 Engine: 1700 RPM MAX DROP 125 RPM, CARB HEAT DROP 200 RPM
180 Engine: 1800 RPM MAX DROP 125 RPM, CARB HEAT DROP 100 RPM

PRE TAKE OFF CHECKS

1.	TRIM	SET
2.	THROTTLE	SET
3.	MAGS	BOTH
4.	MIXTURE	SET
5.	CARB HEAT	COLD
6.	CONTROLS	FULL AND FREE MOVEMENT
7.	FUEL	CHECK TANKS SELECTED THEN CONTENTS 180 Cubs must use the left tank for T.O.
8.	FLAPS	UP
9.	GAUGES	GREEN
10.	HATCHES	CLOSED, LOCK ENGAGED
11.	INSTRUMENTS	NORMAL

12. HARNESS TIGHT
13. BRAKES OFF
14. TOW RELEASE READILY TO HAND

CLIMB SPEEDS

A. MINIMUM TOWING SPEED 50 MPH
B. K13's 60 MPH
C. FIBERGLASS GLIDERS 70 MPH
D. GLIDERS WITH WATER
ADD 5 MPH

DESCENT SPEEDS

A. ROUGH AIR SPEED 121 MPH
B. MAX MANEUVERING SPEED 94 MPH
C. NEVER EXCEED SPEED 153 MPH
D. FLAP LIMITING SPEED 84 MPH
E. NORMAL APPROACH SPEED 60 MPH
F. NORMAL DESCENT SPEED 80 MPH (Prevent shock cooling)
G. GLIDE SPEED (Engine Failure) 58 MPH gives a 1:8 glide

SHUT DOWN

1. RADIO OFF
2. MAGS DEAD CUT CHECK
3. MIXTURE CUT OFF
4. MAGS OFF
5. SWITCHES OFF
6. MASTER OFF

4.4 **CITABRIA 7KCAB Model. ZS-NIG**

NORMAL OPERATING PROCEDURES

INDEX

GENERAL

This section covers all recommended normal operating procedures using a checklist format whenever possible with additional information if further explanation is required.

NOTE

All recommended airspeeds in this section are INDICATED AIRSPEEDS (IAS) with the aircraft loaded to the maximum gross weight of 1650 lbs.

PREFLIGKT INSPECTION

1) Cabin - - ·

a) Cabin Door - CHECK condition, security
b) Flight Controls - CHECK freedom of movement
c) Magneto and Electrical Switches - OFF (check operation of lights if required and stall warning system with respective switches ON)
d) Fuel quantity Gauges - CHECK quantity
e) Fuel Shut-Off Valve - ON
f) Seat Belts - CHECK CONDITION - SECURE rear belt and harness if not in use
g) Emergency Locator Transmitter - ARMED

2) Right Wing

1. Wing Root Fairing - CHECK secure
2. Flaps - CHECK condition, freedom of movement, security (PGCBC)
3. Aileron - CHECK condition, freedom of movement, security
4. Wing Tip and Light - CHECK condition
5. Wing and Struts - CHECK condition, security
6. Tie-Down – REMOVE
7. Pitot-Static Tube - CHECK unobstructed (visual check only)
8. Fuel - CHECK quantity, color, cap secure

3) Right Main Gear

a) Chocks – REMOVE
b) Tires - CHECK condition, inflation
c) Brakes - CHECK condition, leakage

4) Nose Section

a) Windshield - CHECK condition, cleanliness.
b) Oil - CHECK quantity, dip-stick secure.
c) Fuel - DRAIN gascolator, CHECK leakage.
d) Engine Compartment - CHECK condition, leakage, etc.
e) Cowling and inspection Door - CHECK condition, security.
f) Propeller and Spinner - CHECK condition, security.
g) Air Filter - CHECK condition.
h) Landing Light - CHECK condition.

5) Left Main Gear

a) Same as right main gear

6) Left Wing

a) Same as right wing and in addition:
b) Fuel Vent -CHECK unobstructed.
c) Stall Warning Vane - CHECK freedom of movement (if installed)

7) Fuselage (Left Side)

1. Fabric - CHECK condition, oil, battery acid leakage, etc.
2. Windows - CHECK condition, cleanliness.
3. Fuel Belly Drain - DRAIN, CHECK leakage.
4. Radio Antenna(s) - CHECK secure

8) Empennage

a) Horizontal Stabilizer and Brace Wires - CHECK condition, Security.
b) Vertical Stabilizer and Tail Light - CHECK condition.
c) Elevator, Trim Tab and Rudder - CHECK condition, freedom of movement, security.
d) Tail Wheel - CHECK condition, inflation, security.
e) Tie-Down- REMOVE

9) Fuselage (Right Side)

a) Same as fuselage left side (no fuel drain on right side)

BEFORE STARTING

1) Seat Belts/Shoulder Harness – FASTENED.
2) Fuel Shut-Off Valve – ON.
3) Brakes – SET.
4) Electrical Switches – OFF.
5) Cabin Door - CLOSED (windows as desired)

STARTING (7KCAB ONLY)

1) Throttle - CRACKED OPEN (1/2" - 1").
2) Alternate Air - FULL COLD.
3) Mixture - IDLE CUT-OFF.
4) Magneto Switches - ON (2).
5) Master Switch – ON.
6) Fuel Boost Pump – ON.
7) Mixture Control - FULL RICH until fuel pressure noted then IDLE CUT-OFF (engine priming).
8) Starter - ENGAGE, release after engine starts.
9) Mixture Control - FULL RICH after engine fires.
10) Throttle - 1000 - 1200 RPM.

11) Oil Pressure - CHECK, must indicate pressure within 30 seconds maximum.
12) Fuel Boost Pump – OFF.
13) Radio/Light Switches - AS DESIRED

The use of the fuel primer will vary with each engine and temperature condition. If the engine is warm, little or no prime is required. During cold weather conditions, 4 - 6 priming strokes may be required. With the 7KCAB, increase the priming time with the mixture control and fuel boost pump.

CAUTION

Do not overprime or excessively pump the throttle (carburetor accelerator pump) due to the resulting fire hazard.

To clear an engine that has been flooded due to excessive priming.

1) Fuel Boost Pump - OFF (7KCAB only)
2) Mixture - IDLE CUT-OFF.
3) Throttle - FULL OPEN.
4) Magneto' Switches –OFF.
5) Starter - ENW\GE for several propeller revolutions.
6) Repeat normal starting procedures using no prime

CAUTION

Limit the use of the starter to 30 seconds duration maximum with a two minute cooling off period between each starter engagement.

During cold weather operation, (below 200F) it is recommended that the engine be pre-heated by directing warm air through the opening in the bottom or front of the engine cowl. This practice will prolong the service life of the engine and starter.

During ground operation, the mixture should be FULL RICH and the carburetor/alternate air COLD to insure good engine cooling and filtered air. Prolonged idle below 1000 RPM is not recommended due to plug fouling and insufficient cooling air when the aircraft is not in motion.

HOT STARTING

It is usually difficult to start a fuel injected hot engine. One method of starting is to prime so that one knows that it is over-primed. Now use the 'hot-start' procedures as follows: Three-quarter throttle, Mixture at cut-off, Crank engine and as soon as it 'takes' engage mixture to full-rich and cut throttle to 1000 rpm. Ensure you hold the stick fully back between your knees and ensure the brakes are on.

TAXI

Taxi operations during high winds requires the conventional use of the flight controls. With a head-wind or quartering head wind, place the control stick full aft and into the wind. With a tail wind or quartering tail wind, use the opposite procedures. The use of the wheel brakes in conjunction with the rudder will assist the pilot in maintaining directional control.

BEFORE TAKE-OFF

1) Brakes – SET.
2) Flight Controls - CHECK freedom of movement, proper operation.
3) Elevator Trim - SET take-off position.
4) Flight Instruments / Radio(s) - CHECK and SET.
5) Flaps - SET as desired (7GCBC only).
6) Fuel Shut-Off Valve – ON.
7) Mixture - FULL RICH (lean as required for high altitude).
8) Engine Instruments- CHECK normal indications.
9) Engine Run-Up - 1800 RPM (Elevator Control - FULL BACK)

a) Magnetos - CHECK (200 RPM maximum drop, 50 RPM maximum differential).
b) Carburetor/Alternate Air - CHECK operation then return to COLD position.
c) Engine Instruments - CHECK normal indications.
d) Throttle - 1000 RPM

10) Fuel Boost Pump - ON (7KCAB only).
11) Cabin Door and Windows - CLOSED and LATCHED.
12) Seat Belts/Shoulder Harness - FASTENED

High power operation (above 2200 RPM) and engine run-up should be made into the wind and kept to a minimum especially during high temperature conditions. The stick should also be held full aft to prevent the possibility of the aircraft nosing over.

TAKE-OFF (Normal)

1) Flaps - UP (7GCBC Model)
2) Throttle - FULL OPEN applying smoothly.
3) Engine Instruments - CHECK normal indications.
4) Attitude - RAISE TAIL to level flight attitude.
5) Lift-Off - 55-60 MPH.
6) Climb - 75-~0 MPH 5

Take-off characteristics are conventional. It is recommended to raise the tail with the elevator as soon as possible for better forward visibility and directioM1 control.

CAUTION

In the level flight attitude, the wheel brakes are very sensitive. It is recommended that directional control be maintained with the use of the rudder only.

During crosswind conditions, place the control stick into the wind (up-wind aileron UP) and assume a tail high attitude with the elevator to prevent drifting or premature lift-off.

High altitude take-offs are accomplished by using the normal take-off procedures with the addition of leaning the mixture control for smooth engine operation.

TAKE-OFF (Obstacle)

I During an obstacle take-off, use the normal take-off procedures with the following exceptions:

1) Flaps - SET 140 (2nd notch, 7GCBC only).
2) Lift-Off - 50-55 MPH.
3) Climb - 58 MPH (best angle of climb)until clear of obstacle.

TAKE–OFF (Soft Field).

For soft field take-off, use the normal take-off procedures with the following exceptions:

1) Flaps - SET 14 degrees (second notch 7GCBC only).
2) Attitude- TAIL LOW but clear of ground.
3) Lift-Off - ASSIST using elevator.
4) After Lift-Off - LEVEL FLIGHT to obtain safe margin of airspeed prior to climb.
5) Flaps - UP (7GCBC only)

WARNING

The aircraft will lift-off at very low IAS but continued climb-out below 58 MPH immediately after take-off is not recommended.

CLIMB

1) Throttle - FULL OPEN.
2) Mixture - FULL RICH below 5000 feet.
3) Airspeed - 75-80 MPH

For maximum performance climbs. use full throttle and the following conditions.

BEST RATE OF CLIMB

1) Flaps – UP.
2) Airspeed - 69 MPH

BEST ANGLE OF CLIMB

1) Flaps - 140 (2nd notch 7GCBC only).
2) Airspeed - 58 MPH

CRUISE

1) Level-Off- TRIM.
2) Airspeed - ACCELERATE to desired cruise airspeed.
3) Throttle - SET RPM to cruise power.
4) Fuel Boost Pump - OFF (7KCAB only)
5) Mixture - LEAN when below 75% power

The fuel mixture should be leaned at any altitude when below 75% of maximum power. Lean to peak EGT if equipped. If no EGT is installed, lean until engine roughness is noted then enrich until smooth.

WARNING

Range and endurance information is based on a Properly leaned fuel mixture. Failure to lean the fuel mixture will increase fuel consumption appreciably.

AEROBATICS: (not applicable for CGC requirements)

DESCENT

1) Mixture - FULL RICH.
2) Throttle - REDUCE as desired.
3) Airspeed - AS DESIRED

The descent should be made with enough power to maintain cylinder head and oil temperatures in green arc. If possible, avoid wind-milling the engine with the propeller by reducing airspeed or increasing power.

LANDING (Normal)

1) Seat and Shoulder Harness – FASTENED.
2) Mixture – RICH.
3) Fuel Boost Pump - ON (7KCAB).
4) Brakes - CHECK FIRM (Park Brake - OFF).
5) Flaps - AS DESIRED (7GCBC).
6) Approach Airspeed - 60-70 MPH.
7) Throttle - AS DESIRED to control rate of descent.
8) After Touchdown - FLAPS UP (7GCBC) - Brake as required

Aircraft landing characteristics are conventional. Either wheel landings or full stalls (3 point) are permissible. During gusty wind conditions, increase airspeed approximately 5 MPH above normal followed by a wheel landing.

Full stall (3 point) landings are recommended :or soft or rough fields.

Crosswind approaches can best be accomplished by using the wing down top rudder method followed by a wheel landing. Keep the lower wing until airspeed is well below flying speed.

CAUTION

The use of wheel brakes is not recommended until after the tail wheel is in contact with the ground. For maximum braking, the control stick should be FULL AFT.

LANDING (Obstacle)

Use of normal landing procedures in addition:

1) Flaps FULL DOWN (7GCBC).
2) Approach Airspeed - 60 MPH.
3) Throttle - AS DESIRED to control rate of descent.
4) Slip aircraft as necessary to increase rate of descent

WARNING

A relatively high rate of descent is possible in this configuration when at full gross weight and the throttle closed. If airspeed is allowed to decrease below 60 MPH, level off can only be assured with an application of power.

SHUTDOWN:

1) Brakes – SET.
2) Electrical Equipment – OFF.
3) Mixture - IDLE CUT-OFF.
4) Magnetos/Master Switch - OFF after propeller stops.
5) Control stick only.
6) Wheels – CHOCKED.
7) Wing/Tail Tie Downs - SECURE

If high winds are anticipated, the aircraft should be hangared. If the aircraft must be left out, park into the wind and use additional tie-down ropes for security. Place the flaps in the FULL DOWN position (7GCBC) and secure the forward control stick with the lap belt.

SECTION 5:

NOISE ABATEMENT PROCEDURES

5.1.1 THE NEED FOR NOISE ABATEMENT PROCEDURES EXPLAINED

As a matter of policy a gliding club should be as good a neighbor as it can to the people living around the airfield. In practice this means minimizing the effects of noise from the aircraft within the club's control, motor gliders, visiting aircraft, and particularly tugs.
This can be managed in two ways, firstly by limiting the first aerotow times, and secondly by defining areas over which tugs must not fly while towing. Areas are preferable to defined flight paths for two reasons.

1) By ensuring the tug pilot knows exactly where the sensitive places are he can do his best to stay as far away as possible from them. (e.g. Worcester Town)

2) A defined flight path would not be able to take account of varying winds, the location of thermals, and the differing speeds and rates of climb that are an inevitable result of the many different combinations of tug and glider.

It may be possible to choose tugs that have the best compromise between power for a good climb rate, hence giving less time on tow, and noise.

There are two essential rules concerning tug noise.

1) Every Tug Pilot must be able to point out all the "Noise Avoid" areas.

2) On every flight Tug Pilots have to plan their routes to avoid these areas by as wide a margin as possible but not, in any circumstances, to compromise safety.

NOTE: Pilots who disregard these points will be grounded.

Generally it is possible to plan routes that minimize the effects of tug noise and keep the number of complaints to a minimum.
A map showing the noise-sensitive areas and preferred sectors should be displayed at the club.
Tug pilots have to be particularly concerned on no-wind days when sound travels furthest and the combination is often lower leaving the airfield.
Technical improvements have been centered on 4 bladed propeller trials and investigations into the suitability of fitting additional silencers.

SECTION 6:

GENERAL SAFETY

6.1. FACTORS IN TUG UPSET ACCIDENTS

INTRODUCTION
Over the years there have been a number of fatal accidents involving tug aircraft where the glider has gone too high. Whether the cause is the tug being rotated nose down, the tailplane stalling or the wing stalling is academic. It is the circumstances which combine to cause the situation that must be understood. The glider "getting too high" is an over simplification. In the critical situation

the movement is rapid and divergent and has become known as a “slingshot effect" The situation becomes critical faster than the tug pilot can react. Although such accidents are rare the only protection lies in high standards of training and supervision. Glider pilots are taught to release immediately if they loose sight of the tug.

CONTRIBUTORY FACTORS

It is unlikely that any single factor will be the cause of such an accident although it may need only two to occur together:

1. Rope Length - The recommended length of rope is 55 M (18O ft). The time taken for a “slingshot” to upset the tug varies with the square of the rope length (L2); therefore 180 ft gives four times the time of a 90 ft rope!
2. Glider Tow Hook Position - Most upset accidents have occurred with a glider being towed on the C.G. or belly hook. The pull of the rope causes a nose-up pitching tendency which, combined with other adverse factors, may not be controllable by the glider Pilot. The situation quickly becomes divergent, like the tendency for the nose to rise on a winch launch (even with the stick fully forward) and the tug can be "upset" in less than 2 seconds.
3. Glider Type - Older types of gliders (such as ASK 6, 8 and 18) seem more likely to cause the accident. This may be due to in part to towing at slightly higher speeds more appropriate to modern gliders. The quicker acceleration of high performance tugs may also be a contributory factor.
4. Pilot Experience - The less the glider pilot's aerotowing experience the greater the risk. First flights on critical types, especially with limited aerotowing experience, need thorough check flights. Consider a dual check using the belly hook and a take off with trim neutral to ensure the pilot is really controlling the glider.
5. Turbulence - Turbulence may cause the initial displacement which starts the "slingshot" effect. Only allow inexperienced pilots to aerotow critical gliders in smooth conditions. Make sure they are checked in turbulence and can cope or release promptly.
6. Wind Gradient - An aircraft descending through a wind gradient loses speed, and climbing through a wind gradient, speed is gained. The effect of a tug rotating into the climb (after accelerating) will also involve a further increase of speed and a steepening of the climb to offset this effect. The glider pilot may not anticipate this situation and, as a result, end up lower than he has previously experienced. A hasty correction may be compounded by the wind gradient effect and result in an overshoot.
7. Awareness – Awareness of all these factors and their combined effect is essential knowledge for glider pilots and tug pilots alike. The only means of preventing

accidents is high standards of training, checking and supervision.

6.2 TUG SAFETY FACTORS

1) Reduce the risk of engine failure by not abusing the engine. Practices will vary from type to type, but in general do not take off on a very cold engine, don't throttle right back and descend on a hot one.
2) Frequent short flights and short intervals between them means more efficient pre take-off checks, **not** missing them out.
3) Pilots should not be made to feel under pressure to operate at faster than their comfortable pace. The ability to operate quickly without delays comes from practice at doing the job. It should never feel rushed.
4) Signals. Never wave a glider off if you have a really serious engine problem such as engine failure. "**JUST DUMP"**
5) Glider brakes left open can prevent take-off in a poor performance tug and seriously reduce the rate of climb and ability to clear obstacles in any tug. *NOTE. Glider brakes closed but not locked will suck open in the ground roll.* Look before the rope is attached to the glider. Look in the mirror on take-off. Dump the glider to prevent accidents; waggle the tail to warn the glider pilot, do not "wave-off"
6) Wave-off's are reserved for minor problems; overheating engines, partial power loss etc. Tow the glider to a safe position (easy gliding range) if at all possible.
7) Always remember (particularly when landing) you have a long rope behind you.
8) Check sufficient fuel before every tow, even a five minute flight uses fuel !

FACTORS AFFECTING GLIDER SAFETY

1) Do not use high rates of roll or steep angles of bank, particularly near the ground.
2) Do not "zoom" up through the wind gradient on take off.
3) Know the glider you are towing, its weight and the speed at which it needs to be towed. Gliders towed too slowly are very difficult to fly. Some gliders can carry their own weight again in water ballast and the required towing speeds can vary by a large amount. Too fast is also uncomfortable and can lead to loss of control by inexperienced pilots.
4) So far as possible, know the experience of the glider pilot. You are taking the decision to take off with him in tow. It may be better to decide not to!
5) Do not tow inexperienced pilots up through gaps in low cloud. You have as much time as you need to relocate the airfield when you come down, they don't.
6) Do not tow gliders into cloud. (Cloud flying is not permitted in gliders). Avoid rain.
7) In moderate winds a glider's range into wind is about 1/3 of range down wind. Have a very good reason to tow gliders downwind of the airfield.
8) Normally put the nose down a little and increase speed when you feel and see the glider release. This is to ensure that the end of the rope

moves away from the glider and there is not a risk of entanglement.

9) Ensure that you can see the glider from the tug (either in a mirror or direct), before turning to return to the airfield.

EFFICIENT OPERATION

1) Use thermals to climb when practical, but only if the glider pilot is fairly experienced and other gliders are not already in the thermal. Exercise great caution in high-wing tugs.
2) The glider pilot is paying for the tow and presumably wants to soar. Tow him to where he is most likely to find soarable conditions and not to the place more convenient for you. This requires knowledge of soaring, the glider pilot's experience and something about the glider's performance. Usually, the glider pilot will radio to the tug pilot, while still on the ground, as to where he wants to be towed.
3) Within the constraints of (2) above, try and position the glider so as to need minimum time, fuel and power for the descent (subject to engine care considerations).
4) You will inevitably overtake gliders in the circuit from time to time. Bear in mind the pilots may be inexperienced. Do not crowd them away from the circuit, this can be difficult to correct with no engine!

Based largely on the SSSA Manual "Glider Aerotow Procedures Guide for the use of Tugs in the Republic of South Africa" with further input by Gary Pottage, Rien de Muijnk and the Editor.

The syndicate RF5 'Sperber' at Tanqua. *(photo by Adriaan Hepburn- 2005)*