Microlighting and Hang Gliding's

NEW ZEALAND AEROTOW MANUAL

Final Copy

Acknowledgments.

To be consistent with Aerotowing Overseas, the Australian and English Towing manuals were used as a reference to compile this manual. A special thanks to Anton Lawrence for his contribution to the drafting of “NEW ZEALAND AEROTOW MANUAL.”

There have been a number of people from both the Microlight Organisation and from the Hang Gliding Organisation, who have contributed to the development of AeroTowing in New Zealand.

Listed below are the people who have freely devoted their time and experience for this activity to be safely enjoyed by all who may choose to participate in this exciting progression of flying.

Laurie Weake	MAANZ
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Thank You

Laurie Weake	President MAANZ
Ross Gray	President NZHGPA

Distribution.

This manual is available from affiliated clubs (Microlight or Hang Gliding) or directly from MAANZ or NZHGPA

 Ideally each person who either ‘Tows’ or is being ‘Towed’ should have his/her own personal copy.

Alterations to this manual may occur from time to time and will be notified in the respective MAANZ and NZHGPA Publications.
Aerotow Manual revision dates and/or numbers will be listed in the Operations and Procedures Manual’s of each Organisation. It will be the responsibility of those participating in this activity to ensure that they are using a currently authorised edition of this manual.

New Zealand Aerotow Manual

Table of contents:

Section 1. Introduction.

1.1 General Guidelines.

Aero towing involves the participation of more than one pilot from different organisations namely MAANZ and the NZHGPA. It is therefore very important that both parties understand the procedure that each will be using during the towing operation.

It is the tug pilots responsibility to make sure that the pilot being towed understands what is required, and that he has the appropriate rating or has been briefed correctly for the training process. Failure to do this could well result in injury or death.

This manual has attempted to be as thorough as possible but does not waive either pilots right to use common sense should situations occur which aren't covered within.

This manual has also been compiled using current information and is based on current glider performance, it is intended to be an open document allowing for change as necessary.

MAANZ or the NZHGPA welcome any advice, information or assistance which will help to make aerotowing safer or more efficient.

1.2 Preliminary Recommendations.

Criteria for safe and efficient Aerotowing.

1. Constant direction.
   The direction of the tug should remain constant throughout the tow. Turns should be made as slowly and as smoothly as possible. The Hang Glider pilot should follow the line of the tug at all times. On launch, the tow line should be no more than 20 degrees off centre.

2. Constant tension.
   The tension on the tow line must remain essentially constant through out the towed flight.

3. Center mass Attachment.
   The towing force must be attached as closely as possible to the center of mass of both the tug and glider.

4. Gradual Transitions.
   Any changes to tow tension or direction should be of a gradual nature.

5. Reliable release.
   Both parties must have an approved and reliable release.

6. Weak link.
   The system must include an infallible weak link at both ends of the tow line.

7. Safe learning Method.
   The system must include a safe method for learning and gradually advance the student from one level of experience to another.

8. Adequate power.
   The tug must have adequate power to maintain a safe mode of flight while towing.

9. Capable crew.
   The system must be operated by crew who are familiar with all aspects of the operation and are of a number to ensure the operation functions properly.

10. Reliable Communication.
    The system must provide a means where by the pilot of both craft can reliably communicate their instructions to each other and to the rest of the crew.

11. Suitable environment.
    The system must be operated from a site and within Meteorological conditions which will be conducive to safe operations throughout the tow, and in the event of an emergency.

“If at any time either pilot is not happy with the progress of the tow they should end the tow immediately!!!”

Section 2. Operational Requirements.

2.1 Aerotow Operations. MAANZ Procedures Manual 28.9.

Aerotow launch and in flight operations and procedures are specified in the “NZ Aerotow Manual, and shall be complied with at all times.

2.2 Pilot qualifications.

2.2.1 Tow Rating (Tug Master). MAANZ Procedures Manual 28.1.

No person shall act as pilot-in-command of a microlight engaged in towing operations unless that person:

a. Is the holder of a current Microlight Pilot Certificate - Advanced or higher, issued by MAANZ; and-

b. Has completed a minimum of 100 hours total flight time in Microlight aircraft, which includes a minimum of 80 hours pilot in command; and-

c. Has completed a minimum of 20 hours total flight time in type of aircraft to be used in the towing operation; and-

d. Has satisfactorily completed, within the last 24 months, an oral and practical test to be conducted by either the holder of a Microlight Senior Instructor Certificate with a Tugmaster endorsement, OR the holder of a NZHGPA Instructor Rating with considerable aerotow experience. The syllabus and standards for this test are contained in the “N.Z. Aerotow Manual”.

The granting of a Tow rating shall be entered into the pilots logbook and signed by the Instructor

Tow Rating (Tugmaster) - Recent Experience Requirements. MAANZ Procedures Manual 28.2.

No person shall act as pilot-in-command of a Microlight engaged in towing operations unless that person complies with the recent experience requirements of the Microlight Pilot Certificate held.

Tow Rating (Tugmaster) - Privileges

a. The holder of a tow rating is authorised to tow Hang Gliders subject to the following limitations.

b. The Hang Glider pilot being towed must comply with all necessary NZHGPA requirements and approvals.

c. The Microlight and towing apparatus being used must comply with the provisions of this manual.

d. The towing operations must comply with the provisions of this Manual and those in the “NZ Aerotow Manual”.

2.2.2 The Hang Glider Pilot.

a The Hang Glider Pilot must be a current member of the NZHGPA and have an Aerotow endorsement ; OR

b. Hold a minimum of novice rating and be under the direct supervision of an appropriately rated NZHGPA instructor whilst undergoing training to gain an Aerotow endorsement.

NOTE **: ‘‘Direct supervision’’** means the detailed on site personal direction and supervision of the aerotow operations.

“At no time should Aerotowing be conducted with both an inexperienced Tug Pilot and an inexperienced Glider Pilot!!!”

2.2 Duty Pilot.

For each towing operation there shall be a duty pilot appointed from the people available on the day.

The duty pilot should have a Hang Glider Aerotow rating or Tug master endorsement and be familiar with the site.

The duty pilots responsibilities are;

a. To co-ordinate towing procedures.

b. To ensure that the operations are properly managed.

c. To ensure that both the tug pilot and glider pilot have been briefed and know what procedures have been adopted and endeavour to have all pilots adhere to these procedures.

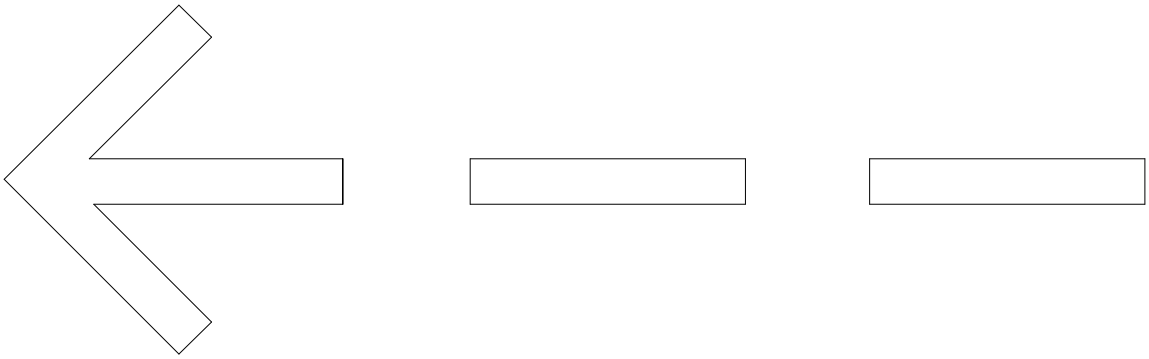
d. To determine the most appropriate launch area, the flight plan and the circuit and landing patterns they will use.

e. To coordinate and liaise with other operators which may be using the same site, and to ensure that all mixed operations are carried out safely with due regard for other airspace users.

f. When operations are being carried out at an airfield which may be in use by general aviation aircraft:-

   i. to ensure a gliding operations signal is in place
   and
   ii. to ensure that the appropriate VHF radio channel is monitored and any incoming traffic notified of towing operations.

NOTE: A “gliding operations signal” is in the form of an arrow placed flat on the ground adjacent to the wind direction indicator. This symbol is in the shape illustrated.



Section 3. Equipment.

3.1 The Tug.

Tow aircraft Requirements. MAANZ Procedures Manual 28.3.

Any microlight used for towing operations shall:

a. Be an approved type under C.A.A. Rules Part 103 and comply with the provisions of those Rules.

b. Be a Class 1 or Class 2 Microlight aircraft, but may NOT carry a passenger during the towing operations.

c. Be either Type A (Weight shift) or a Type B (2/3 Axis) Microlight only.

d. Be capable of straight and level flight at 32 Knots (35 MPH) T.A.S.

e. Be capable of a climb rate of 350fpm with the towed aircraft attached.

f. Be capable of taking off and climbing to a height of 50 feet A.G.L. within 85% of the available runway length with the towed aircraft attached.

g. Be fitted with a convex mirror of such a size and in such a position that the pilot can see the towed aircraft at all times.

h. Be fitted with towing apparatus that conforms to the provisions of this Manual.

It is recommended that suitable 2-way communication equipment be fitted to enable contact between the towing aircraft and the towed aircraft pilots.

3.2 The Glider.

The glider must have a current WOF and have a sufficient speed range to tow safely at speeds up to 35 knots.

If the bar pressure at speed is very high then it is most likely that the glider will be unsuitable for Aerotowing. The main danger is that the glider will quickly rise above the tug and adversely effect the pitch of the tug.

It is recommended that wheels are fitted to all gliders involved in towing operations and is mandatory for pilots under Aerotow training.

Towing of low performance hang gliders at speeds in excess of 28 knots is not recommended.

Towed Aircraft Requirements. MAANZ Procedures Manual 28.4.

The Hang Glider under tow shall comply with all requirements and approvals laid down by the NZHGPA.

The Pilot of a Hang Glider under tow shall comply with all requirements and approvals laid down by the NZHGPA.

3.3 Releases.

3.3.1 Tug releases.

Tow Rig Requirements - Release Mechanism. MAANZ Procedures Manual 28.8.

All tow rigs shall contain a release mechanism at the forward end AND rearward ends, the forward end release mechanism being operable by the tow pilot and the rearward end release mechanism being operable by the towed pilot. Each release mechanism will:

a. Be easily operable up to 1.5 times the tow line breaking strain.

b. Be easily operable under conditions of no load (i.e. slack line).

c. Be subject to testing prior to the first tow of any day.

3.3.2 Glider releases.

All releases **MUST** release at any angle, and at any load. Weak links built into the bridle system are not to be used. All releases must be infallible and only release upon pilot activation.
Bridles which automatically release in the event of a nose-in are acceptable but the release cord must be attached to the pilots shoulder and not the base bar.

The two most common forms of release are discussed below.

a. Two ring release.
This is by far the most common release in use today. It is cheap to make and virtually foolproof. It is used almost exclusively with a bridle set up, the only difference between ground towing is that with aerotowing the release line must be attached to the shoulder straps and not the base bar.
The only possible failing with this is that of the tow line twisting the release, but if swivels are in the line this will not happen.

b. Chest release.
This release is very popular in Europe and has many variations in construction, mostly of a mechanical nature. It utilises a lever to release a pin to which the tow line is attached. The release is normally attached to a tube about 250mm long which is in turn attached to the harness at the upper webbings or the shoulder straps.
The mechanical units are now giving way to a two ring system, similar to that described in 3.3.2.a, attached directly to the tube.
This system has the advantage of being very simple to use. There is no release line to worry about and when you have released and there is no bridle left hanging in the way.
It has the disadvantage that on lower performing gliders with high bar pressure, the tow will be more strenuous as the pilot will have to overcome more bar pressure than if he was using a one to one bridle system.

3.4 Tow bridles.

3.4.1 Bridle construction.

Bridles should be constructed from non-stretch rope of around 4mm diameter. This is necessary to prevent injury to the pilot in the event of a weak link break or release under tension. A bridle with too much stretch can flick back to the pilot if the load is suddenly released.
Seamless stainless rings should be used so as to prevent any unnecessary wear to the bridle.

3.4.2 Types of bridles. (refer Appendix 1 for diagrams)

a. The usual two to one bridle used for ground towing can be used but the release line length will have to be changed and should be attached to the shoulder strap and not the base bar. This is to prevent a pre release as the bar comes back to keep the speed on behind the tug. The time this is most likely to happen is close to the ground as the tug gains speed for it's take off, the glider pilot pulls the bar hard in to maintain a constant height above the ground and then finds that he is released.

b. Alternatively a one to one bridle can be used. In this configuration the bridle comes down from the keel passes through the ring to which the release is attached and is then attached to the harness. The distance from the harness attachment point to the apex should be approximately two metres. This bridle is the most desirable when aerotowing as it helps to relieve the bar pressure. Low performance or intermediate gliders will find that this is the only system which will allow them to tow.

c. The most common form of bridle used in aerotowing is just a short bridle connected to the harness only. The length can be short enough so that the pilot can reach the release directly. The bridle can be connected to the harness anywhere from the lower webbing to the shoulder straps.

"When aerotowing the bridle ropes attached to the harness pass through the control frame and not underneath as is usual with ground towing."

3.5 Attachments.

3.5.1 The Tug Attachment.

i. Tow Rig Requirements - General. MAANZ Procedures Manual 28.5.

All tow rigs will be inspected and approved in writing for the specific Microlight aircraft to which they are fitted, by **EITHER** a MAANZ inspection authority holder **OR** an NZHGPA inspector.

It is recommended that tow rigs manufactured or approved by the aircraft manufacturer be used where possible.

ii. Tow rig Requirements - Bridle. MAANZ Procedures Manual 28.7.

Any bridle arrangement used during Aerotowing operations shall;

a. Provide for the towing point to be on or near the thrust line of the towing aircraft.

b. Be unable to foul the towing aircraft's propeller under any circumstances.

c. Be unable to foul or hinder the towing aircraft's control system under any circumstances.

3.5.2 Glider attachments.

Most harnesses have some form of tow loops sewn on from new, some older harnesses may not but they are easily retro fitted. They should be sewn through the main webbings as there can be a lot a force on them, which may damage the harness if sewn through fabric only.

For ground towing these are usually attached to the lower webbings but for aerotowing it may be more convenient to have them sewn to the upper webbings or even the shoulder straps.

If a chest mounted release is to be used it should be attached to the upper webbings or shoulder straps only.

If a two to one or one to one bridle is being used then the keel attachment point should be about 300mm in front of the king post. It should be restrained from moving further forward by a rope around the king post.

3.6 Weak Links.

3.6.1 Glider weak link.

The weak link should have a breaking load of approximately 1g. This is normally around 90 to 100kgs dependent on the pilot weight.

Each pilot should have his own weak link of the appropriate strength.

Tests have shown that Donaghys 40W breaks at approximately 90kgs.

Always test the breaking strain of a weak link to ensure you are using the correct line.

The weak link should be between two rings approximately 150mm apart. One ring is attached to the release the other to the tow line.

3.6.2 Tug weak link.

Tow Rig Requirements - Tow Rope. MAANZ Procedures Manual 28.6 (c).

Any rope used to connect the towing and towed aircraft during aerotow operations shall:

> Contain a weak link at each end with the forward link being 10% stronger than the rearward link. The forward link shall have a maximum breaking strain of 100kg or 85% of the towed Hang Glider and pilot weight, which ever is lesser.

3.7 Rope Types.

The most suitable rope for aerotowing is 4-5mm polypropylene or polyester. These ropes are cheap and are available from most fishing or marine outlets. They are normally twisted which means that they must have a swivel at both ends. This is to prevent the tow line twisting around the release and preventing it from working properly. A heavy duty shark swivel is acceptable for this job.

All tow ropes should be stretched out on the ground before use and checked for any knots or wear which may cause its failure while in use.

A brightly coloured streamer attached at about 1/3rd the length of the tow line will help in its retrieval once released from the tug, and will also enable the tug pilot to see where the glider pilot is if he moves out of the field of vision of the rear vision mirror as the streamer will most likely still be in the field of vision.

Tow Rig Requirements - Tow Rope. MAANZ Procedures Manual 28.6.

a. Be a minimum of 50 metres and a maximum of 100 metres in length.

b. Be of a minimum breaking strain of 150 kgs and be of non stretch material.

c. Contain a drogue device situated at least 75% to the rear of the rope and of sufficient size to prevent excessive droop when towed unattached.

3.8 Launch Trolley (Dolly).

The launch trolley has become the most preferred method of take off while aerotowing. It is essentially a triangular trolley with two castering front wheels and one fixed rear wheel, and a rear support for the keel of the glider.

The trolley has a seat on either side for the base bar to sit in and has a cord running the width of the trolley under the base bar. The glider pilot holds on to this until he feels the glider and trolley start lift off.

The height of the rear support can be adjustable and should be set at such an angle that the glider lifts off at about best L/D speed.

The wheels should be free running and be large enough to allow for a fast acceleration.

"The maintenance of the trolley is just as important as that of the tug

3.9 Protective Eye Wear.

Protective eye wear should be worn by the glider pilot to prevent injury from the rope or bridle in the event of a high load weak link or line break.

3.10 Knife.

It is recommended that the glider pilot carries a sharp knife, preferable a parachuting type hook knife. This should be in an accessible place on the harness to be used in the rare event of a release failure.

Section 4. Communication.

4.1 Radio procedures.

The use of radios is recommended for all towing operations, particularly whilst training.
As radios can be unreliable, both pilots must be conversant with all forms of communication, including signals.

When using radios the following guidelines should be used.

a. When a tow is under way, other pilots should refrain from using the tow channel.

b. When towing in groups, different frequencies should be used by each tug and glider combination. The pilots should be referred to by name or call sign.

c. While aerotowing it is prohibited to permanently activate the microphone. This is so the tug pilot can communicate with the glider pilot.

d. The duty pilot shall have a radio and will relay commands in the event of a radio failure or if the glider pilot has no radio.

e. The following commands are to be used.

Glider pilot	“Pilot ready”	the glider pilot is ready to start.
Glider pilot	“Take up slack”	put some tension on the line.
Glider pilot	“All out All out All out”	smoothly apply full power.
Glider pilot	“Stop Stop Stop”	stop the tow and if air born release.
Glider pilot	“Releasing”	Self explanatory
Tug pilot	“Tug ready”	These commands are self explanatory.
Tug pilot	“Move up”	
Tug pilot	“Move down”	
Tug pilot	“Move left”	
Tug pilot	“Move right”	
Tug pilot	“Release”	

These are all the commands that are required to be used. They should be repeated at least twice to ensure the message is understood.

The tug pilot should not start if he has not heard “All out” three times.

It is not advisable for the tug pilot to say much more during the tow as his commands may well be drowned out or misunderstood due to the noise of the motor under full power.

4.2 Signals.

The following signals are to be used if radios are not being used. It is recommended that they be used in conjunction with radios to prevent any form of confusion.

4.2.1 Ground signals. (refer appendix 2 for diagrams)

Ready
One out stretched arm is used to indicate the pilot is ready to start the towing sequence.

Take up slack
A one under arm wave from side to side across the body. Keep waving until the slack is completely taken up.
The tug pilot should keep one eye on the mirror to see when the line is tight.

All Out
A one arm wave above the head. Keep this going until it is obvious the message has been received, or if foot launching, the hang glider pilot may give the command by waving one leg out to one side.

Stop
One arm held stationary above the head.

Wait
Two out stretched arms are used to indicate that there will be some delay before the next phase.

Release
One out stretched arm moving up and down. This can be performed by the duty pilot or the glider pilot on the ground or in the air.

4.2.2 Signals to be used by the tug pilot. (refer to appendix 3 for diagrams)

Tow higher
A stationary arm pointing out and up at 45 degrees.

Tow lower
A stationary arm pointing down at 45 degrees.

Move Left
A stationary arm pointing left.

Move right
A stationary arm pointing right.

Release
An up and down waving arm with a clenched fist.

Section 5. Procedures.

5.1 Site considerations.

The strip must be smooth enough to allow the tug to take off and land safely without risk of incurring damage, and must be of adequate length for the performance of the tug. The strip should be no less than 10x the take off roll for the given aircraft, and be clear of obstacles and hazards.

5.2 Weather considerations.

Training flights for either the tug pilot or glider pilot should be carried out in light wind conditions free from thermal or rotor activity.

As towing experience is gained so can the wind strength be increased.

Cross wind launches are permitted providing a launch trolley is used.

Aerotowing in strong or overly turbulent conditions should be avoided.

It is not recommended to foot launch in winds of less than 5 knots.

5.3 Training Considerations.

5.3.1 Tug pilot Training.

The tug pilot will already be an experienced pilot preferably with some hang gliding experience.

Before the first tow the tug pilot will be briefed with exactly the same procedures as the glider pilot.

5.3.2 Glider training.

Before commencing towing, trainee pilots must be thoroughly briefed on the procedures and techniques to be used.

Pilots must gain an understanding of the following:

a. The flight plan and any predetermined circuit procedures,

b. Emergency procedures,

c. All signals that are to be used,

d. The pilot actions that are required whilst launching, towing and releasing.

Prior to being towed:

a. the pilot shall have had at least one tow demonstrated to him/her.

b. the pilot shall have correctly answered all Oral Questions in 6.1 of this manual

Although there is no height restriction for the first aerotow, the glider pilot may become nervous so it is recommended that the first tow is only to 1000'.

"Only Instructors with Aerotow experience are permitted to supervise Aerotow training operations, and they must endorse the pilots log book, or rating card when an acceptable standard has been achieved."

5.4 Launch procedures.

5.4.1 Tug launch procedures.

When the command is given to take up the slack, the tug pilot will apply enough power to roll the unit forward at a slow pace, keeping an eye on the mirror and the power on, until the line is tight.
When the “all out” command is given the tug pilot will smoothly apply full power and endeavour to get the tug airborne as quickly as possible. Once airborne, the tug pilot should hold the nose down to gain air speed, and then slowly let the nose up to best climb angle.
If the tug pilot lets the nose up too quickly he will rise above the glider before the glider has sufficient speed to be able to climb as well. This will allow the rope to go slack and the glider pilot to become very low. The result of this can be a weak link break and a sharp rearward pull on the tug.

“Be prepared to release the rope if in any doubt.”

Power **must** be kept on until you have visually ascertained that the glider pilot has either released or is under a successful tow. If the tow launch was successful maintain full power.

While undertaking the launch procedure it will not be possible to constantly look in the rear vision mirror, as you will be watching where you are heading. Special care must be taken to do a similar take off every time so that the glider pilots know what to expect.

5.4.2 Glider launch procedures.

To avoid delays, pilots should carry out all pre flight checks prior to being connected to the tow line. These checks should include the standard preflight checks as well as checks to ensure radio, bridle, release and weak link are all in order.

When using the trolley launch method an additional preflight check to ensure that harness and variable geometry ropes are located to prevent them snagging on launch.

Slack rope launches are to be avoided.

Once the pilot is connected to the tow line a final check with the tug pilot or duty pilot should be made.

Once ready for launch the glider pilot should give the “all out” call. As the tow begins the glider pilot should allow the rope to pull the pilot and glider, taking quick short steps whilst offering very slight resistance to the tow force.

When using the launch trolley, the glider pilot should pull himself through the control frame to the trim position (bearing in mind that trim will be at tow speed). Care must be taken to ensure that the glider does not rise from the trolley prematurely.

5.5 Procedures under tow.

5.5.1 Tug procedure while towing.

Once a successful tow is under way the main concern is then to keep a watch out for other aircraft and to keep an eye on the position of the glider pilot, giving hand signals as necessary.

If the glider pilot gets **low,** it may be necessary to **increase** speed to allow the glider to climb back up to the correct position.

If the glider gets too **high**, it may be necessary to **decrease** speed by ***raising the nose, not by reducing the power.***

There is no need to announce a turn but they should be made slowly and smoothly with constant angle of bank. If the turn is too tight the tow line will go slack, or worse the glider may be catapulted into a lock out situation. The weak link should break if a lock out occurs but it is best left untested in this situation.
Care must be taken not to take the glider too far down wind has he may be unable to get back to the landing area should the weak link break.

5.5.2 Glider procedures under tow.

Glider pilots should fly level at between 10 and 20 feet above the ground to avoid prop wash from the tug. The glider will lift off before the tug.

When foot launching, to ensure being able to achieve tow speed immediately after launch the pilot must quickly transfer his hands to the base bar. This should be done smoothly to ensure sufficient control is maintained.

As soon as the tug lifts off and starts to climb, the glider will also climb and should remain in a position referenced by the tug pilot, this is usually slightly lower and directly behind the tug. As a guide, the glider pilot can ascertain the correct station by keeping the rear wheels of the tug on the horizon.

If the glider is too high the glider pilot should pull in until the correct relative position has been regained. Conversely glider speed should be reduced to move up to the correct station.

The tug pilot may request the glider to alter position by giving the appropriate signals.

When turning while under tow, the glider pilot should maintain a position slightly inside the track of the tug, so that the glider can fly at an acceptable speed.

Glider speed varies with tow position in turns, with the inside slower and the out side faster. The glider pilot will tend to point at the tug due to the tow tension and should fly the glider so that the line of the keel always points directly at the tug.

5.6 Release Procedures.

5.6.1 Tug after release.

Once the glider has released the tug pilot will accelerate forward and upward. The tug should continue until well clear of the glider then turn left and descend to stay well clear of the glider.

Before landing the tug should do a low pass over the strip into wind and release the tow line.

Always check to see that the tow line is falling away from the tug. The tug can now land safely.

If a strip is being used of such a length that the tug can land safely without the risk of catching the tow line on any obstacles then it is acceptable to land with the line still attached.

5.6.2 Glider release.

The release procedure is to check for traffic to the right, increase speed to reduce line tension and then release.

The glider pilot will then turn to the right. It is advisable to turn your head to one side as you release just in case the bridle flicks back. This will not be a problem with chest mounted releases.

“Always watch the rope fall away from the glider to ensure that the

5.7 Emergency procedures.

5.7.1 Line or weak link breaks.

A line or weak link break will not adversely effect the tug, but the pilot should check that the glider is no longer attached to the tug before reducing power.

If the weak link breaks at low level, the glider pilot should continue in the direction of the tow and not attempt to make it back to the launch site. Only when the glider has ample height, should an attempt be made to get back to the launch site.

If the line breaks at low level, then the glider pilot should release what is left of it right away. It may be that the weak link on the tug has gone in which case you will have the full length of line attached to the glider.

If however the line breaks with good height then the line should be carried back over the launch site and then released. You will make no friends if the line is lost.

5.7.2 Release failure.

If the tug pilot can not release the tow line once the glider pilot has released then he should land up the strip as far as possible to ensure that the line does not catch on any obstacles.

In the event of a release failure, the glider pilot should try to communicate to the tug pilot that the he cannot release by using the ‘waving arm’ signal or signaling by dangling his legs below his harness, the tug pilot will then be able to release from his end.

The glider pilot can then choose to land with the rope attached, (assuming the landing area is long enough) or cut the rope away.

5.7.3 Lockouts.

A lock out occurs when the glider being towed moves off the direction of the tow.

This will usually increase the tow tension, thus aggravating the situation. If this continues the weak link should break, if not, the tug pilot will either reduce power or release the tow line depending on how serious the situation has become.

The glider pilot can recover by speeding up and weight shifting back toward the center line. If the glider pilot holds the nose up he will not be able to recover with out releasing first. Once released full control will return.

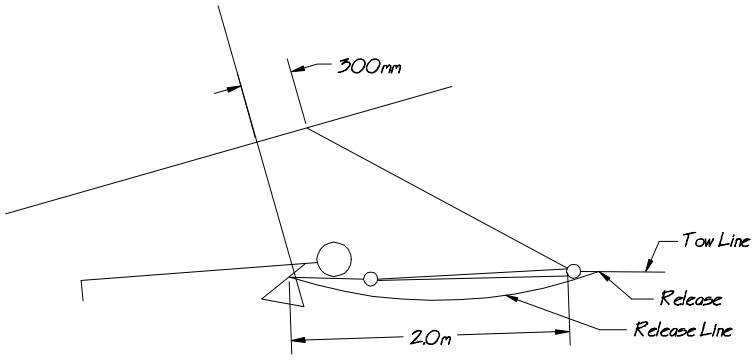
6.1 Oral Questionnaire for Tug and Glider Pilots.

1. Describe the ground to ground hand signals and their meanings.
2. Describe the air to air signals and their meanings.
3. Describe the radio commands for the above.
4. Describe the take off procedure and the initial climb.
5. What position should the glider be in relation to the tug during the tow?
6. Describe the release and direction to turn after release.
7. What should be done before landing the tug?
8. When should the tug pilot release the tow line whilst under tow?
9. When should the glider pilot release from the tow line?
10. What is the minimum and maximum tow line length allowed?
11. What is the recommended weak link size for the forward and rearward ends?
12. What is the minimum strip length permitted for aerotowing operations?

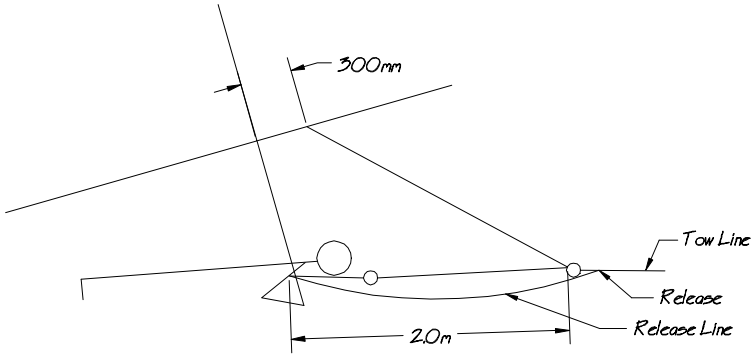
“Instructor to endorse pilots logbook or rating card upon satisfactory answers to the above questions.”

Appendix 1

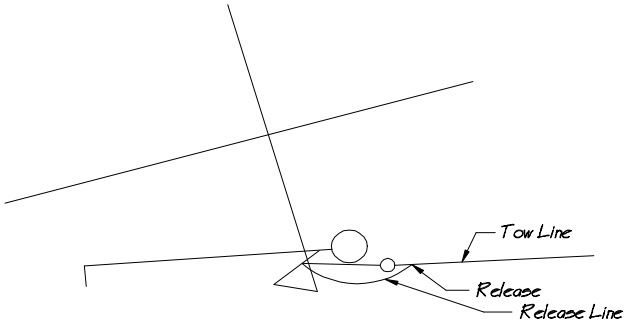
Bridle types.



Two to One Bridle



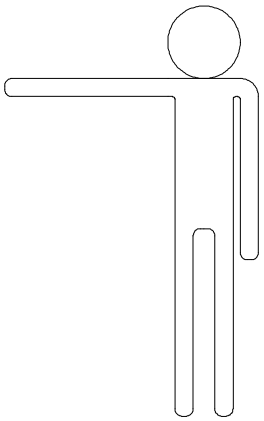
One to One Bridle



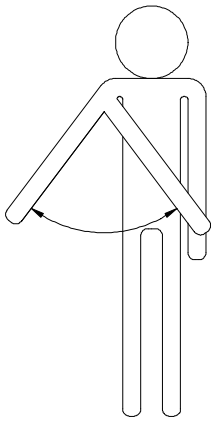
Short Bridle

Appendix 2

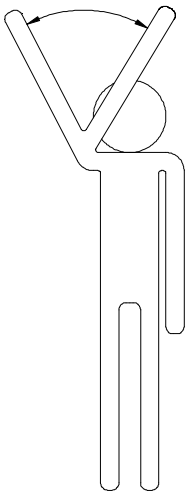
Ground hand signals.



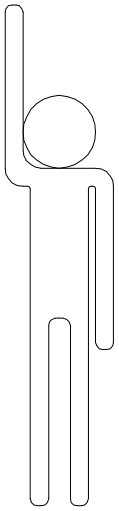
Pilot Ready



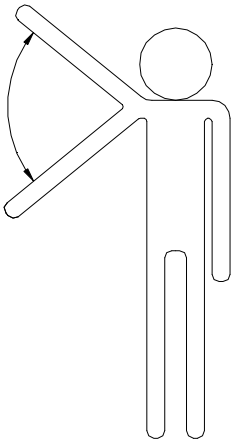
Take up Slack



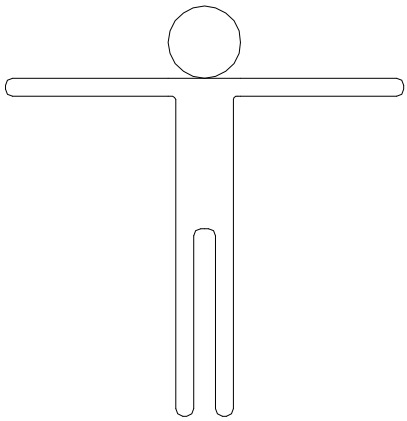
All Out



Stop!



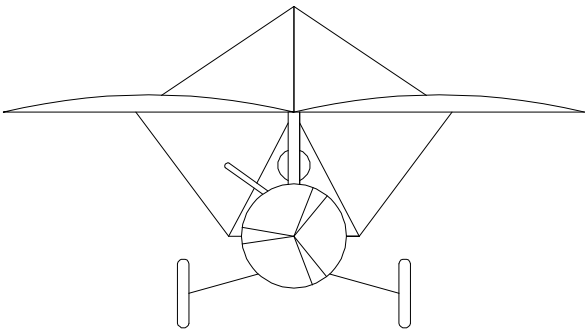
Release



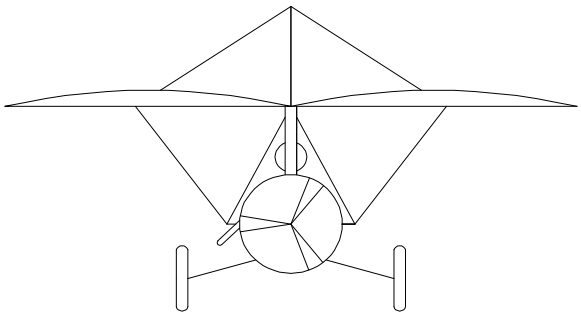
Wait

Appendix 3

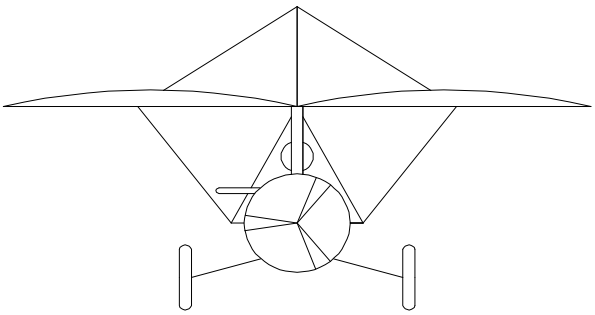
Tug Signals.



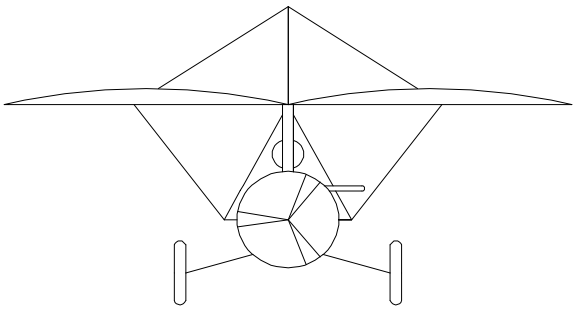
Tow Higher



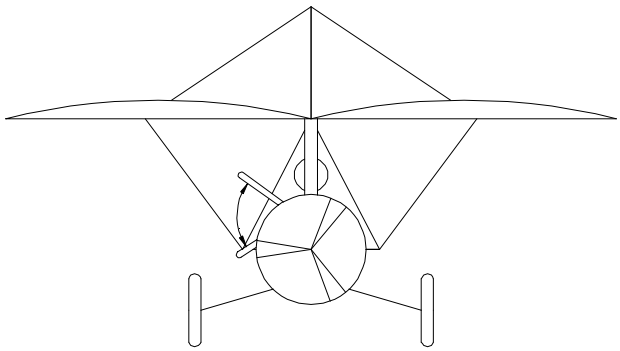
Tow Lower



Move Left



Move Right



Release