

Flatlands Tow Tips

By Terry & the 'Locals'

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Foreword

This article was written with the following system in mind:

Skyting tow bridle
Fixed length rope
Motor vehicle for towing.

However many of the points discussed apply to other types of hang glider towing systems. I have seen various systems come and go in the Flatlands over the years and the 'KISS' car tow has remained clearly dominant - more than 90%. It wins on all accounts - cost effectiveness, simplicity, ease of training an operator, initial financial outlay and able to acquire equipment to assemble a system at short notice.

Those who have been flying the Flatlands for a few years or regularly tow in a group on weekends will be familiar or identify with many of the points raised in this article.

Collectively our team has well over 4000 tows and has developed these guidelines over 11 years of towing together recreationally and in the Flatlands. The main thrust is efficiency and convenience, through preparedness and anticipation of problems to fine tune team work.

It is not a guide on how to learn to tow and assumes you are already familiar with basic procedures and safety obtained from a tow endorsement course.

So don't just stand about! Why aren't you hooked onto that tow rope!!

Len Paton

For the Pilot:

1 Equipment Ready

Make sure all your equipment is functional and preflight checks are done **before** lining up to hook onto the tow rope:

- * Radio can Tx & Rx, ie battery not flat.
- * Mike or headset plugged in.
- * Able to lock on mike.
- * Bridle attached to correct points, waist and keel.
- * Release is functioning.
- * Release line for Skyting bridle not too short which will cause a premature release as the glider rises off your shoulders.
- * Bridle untangled and stowed tidily, ready to hook on.
- * Hang check.
- * Weak link ready.

Do a radio check before the driver leaves for the other end (start point). The driver could be sitting at the other end of the tow strip, oblivious to your radio problem.

You should be hooked on and completely ready by the time the driver is attached at the other end otherwise you will be a hindrance to the team. If there are a few disorganised ditherers in your team have a second pilot also ready to go.

Make sure all equipment you need is out of the tow car before towing begins. In a competition, once the towing starts, do not engaged the driver in a discussion about your last tow or stop the car to get some equipment out. The driver should be focused on one thing – to get back down to the end of the rope ASAP and declare “ready to take up tension”. This also applies when there are more than 2 pilots towing recreationally. A lot of accumulated time can be wasted.

2 Vehicle Through-way

Leave the launch spot clear until the driver has dropped the rope at launch. This allows the driver to come right up and drop the rope in the correct spot, continue through the launch area and do a U turn behind launch. The pilot will still have time to carry the glider to the end of the rope and be hooked on before the driver is ready at the other end. This avoids such things as:

the rope being dropped short of launch;

the vehicle having to manoeuvre and driving over the rope to turn around;

the need for another person to pull the rope up to the hang glider or;

the pilot moving forward to hook on and obscuring their view of the windsock or streamer.

3 Standard Radio Procedure

Follow a standard routine radio procedure:

Acknowledge each other's primary transmissions. It can be worrying to a nervous pilot when they hear no response to a request. ("Is my radio working?!!")

Give your driver warning before you say "**go, go, go**", for example "**picking up glider**" and wind conditions.

It is a common mistake for nervous pilots, when hearing the driver has hooked on and waiting, to simply pick up the glider and say "**go, go, go**".

4 Pretension

The pilot should decide how much tension or lack of (s)he wants to start with but should always take up tension to approx 15 kg first. Do not launch without having pulled out the bridle firmly away from the pilot. I have seen some experienced pilots (not tow) take off with one arm over the top bridle line to the keel. This usually ends in a ground loop and a broken upright. I've also seen the top rope caught under the side of the helmet and pull a helmet or headset off. Also if the release line is too short, or is wrapped around the base bar or a grass tussock, taking up line tension will reveal this. This is preferable to an accidental release after you say "go, go, go" and having to get the rope back for another attempt. If the driver is not ready to take up tension, walk backwards with your glider to pretension the bridle and lay out your release line.

5 Launch Conditions

The wind does not have to be 5kts straight up the strip for a successful launch. True, this will allow an easy, effortless launch but on light wind days the thermal is probably behind you and you will be back on the ground in 5 mins wondering why everyone else is away 1st tow.

I mention this because after a great day I get back to the pub to hear how a team only achieved a launch every hour because "the wind wasn't coming up the strip much of the time". Half the team didn't get away and the others launched so late that they only flew 10km just before dark!!

I am not advocating launching tail wind. It is just possible to foot launch with up to a 2 kts of smooth constant tail breeze and the ability to sprint very fast, but it is very risky in thermic conditions. Also if you get a low weak link break or an early tow vehicle problem, you'll be landing tail wind as well. A dolly is preferable in these conditions and reduces wasted launch time in variable

conditions. However with any significant tail wind ie > 5 kph the pilot must consider landing in these conditions if there is a low weak link break?

These are my personal limits: - from 900 cross - 1-2 kts (kicked dust drifts about ½ m/s).
- " 600 " - 5 kts.
- " 450 " - 10 kts, etc.

Also consider point #1 in advice 'For The Driver'.

Turn the glider slightly into the wind (10-200) but not fully and keep the upwind wing slightly down.

Be prepared to do a weight shift jab to the side to keep that wing level just as you launch. As you ground skim you may slide sideways across the ground. It is not necessary to fly the glider back over the strip but keep the wings level. I have experienced cross wind launches where I was sliding sideways across the ground at 10+ kts.

(If you are towing on a road with a fence either side you would need to maintain your crab angle to prevent drifting onto the fence.)

If you are not very tow experienced, when trying something new like this, gradually increase your limits of acceptable launch conditions along with your confidence.

Place a windsock 50 to 100 metres in front of launch to the upwind side to gauge what type of air you will encounter early on the tow

6 PTT Locked On

Unclip your radio once at a safe height to reduce annoyance to other radio users (eg 300'). Ensure you have heard the driver or other transmissions to confirm you have unclipped your mike. The newer radios have a "Time Out Transmit" which automatically switches off Tx with a warning beep – normal tows do not take longer than 2 minutes. Because most of the UHF frequencies will be in use during a competition your team will be unable to change to another channel. The other unlaunched pilots will be effectively grounded until you remember or your battery goes flat. In the latter case you will be unable to give a position report for retrieve; not that anyone will be inclined to go looking for you.

Local rule - Leave your mike clipped on and you buy a carton of beer for the team.

7 Hang vs Prone

With a Skyting bridle, if you are comfortable in semi-hang while on the tow, stay in semi-hang until you release. Feet in your harness (to stop pendulum swing), knees bent and hands on the uprights to give more lateral control, making it easier to dampen out oscillations leading to a lock out when a thermal pops a wing up. Also your helmet stays clear of the top bridle line when higher on the tow.

8 Release under Tension

When in lift, release immediately even with full tow line tension. Many pilots call out "stop stop stop" and wait for the tension to drop before releasing. **Too late!!** The thermal is behind you and on marginal days, chances of finding it are slim. Releasing under tension usually ensures your release operates cleanly anyway. Releasing with no line tension is a habit from winch tow training to prevent wire tangles. If you have a stretchy bridle and a heavy release mechanism on the end of your bridle, you're more likely to get a nasty surprise with a low altitude weak link break, not at hight.

Never loose contact with the lift. This golden rule with any competent mountain pilot also applies to towing. Even a disorganised slow thermal will get better. As long as you are going up, even very slowly, stay with it unless you are drifting outside of a glide back to launch. If you op for a relaunch it may be another hour before your next tow. With the remote start gate there is usually no disadvantage in a slow initial climb.

For the Driver:

1 Pretension & Launch Technique

In different wind conditions the pilot can benefit from different vehicle start techniques.

In light winds are your pilots getting a lethargic take off, moon walking until the glider is properly airborne or wafting into the air barely above the stall then pancaking onto the ground? **After** taking up the tension perhaps you could try the following techniques in different wind strengths.

> 10 kph head wind component: start with the "take up" tension (approx. 15 kg).

5 - 10 kph head wind component: After taking up the tension reverse up until the tension is nil.

< 5 kph head wind component: After taking up the tension reverse up until the tension is nil, then another 3 - 5 metres. Don't do this if the tow gauge is mounted to one side of the vehicle as a wheel will reverse over the rope and may damage the gauge.

Above all, always use maximum acceleration (without wheel spin) until you have normal towing tension except in strong wind (ie > 20 kph). You might think this will abruptly snatch the pilot into the air but there is adequate stretch in 600 metres of 5mm rope for this to become just a quick and smooth increase in tension at the pilot's end.

What happens in a nil wind launch with the standard 15 kgs of pretension? The vehicle travels about 3 metres in a couple of seconds reaching maybe 10 kph before the rope tension is enough for the pilot to take their first step for launch. The glider will have a ground speed of approx 30 kph from the moment of launch at the same time. So what happens when the glider which is attached to the tow vehicle with a fixed piece of rope is travelling 20 kph faster? To make matters worse there is some stored elastic energy in the rope and the glider is able to accelerate quickly but the 1-2 tonne vehicle can only accelerate sluggishly especially on loose dirt.

At the moment of launch the above recommendations will have **the vehicle travelling at a similar speed** to the hang glider and avoid that sudden loss of tension just as the pilot leaves the ground. **It is the pilots responsibility** to tell you how much pretension or slack (s)he wants or inform you of wind conditions at launch. Otherwise the general conditions of the day will give you an idea what type of launch technique may be use.

2 "Airborne!"

Many drivers do not realise that for the first couple of seconds the pilot is holding back allowing the tension to build up before taking the first step. Meanwhile the driver who sees the alarming increase in tension hesitates

or even brakes just as the pilot decides to go. Before you can get the vehicle moving again you may lose most of the tension. This also occurs with dolly launching, because of the initial high rolling resistance, and since the pilot is already in prone is more vulnerable if there is a sudden loss of tension as they rise off the dolly.

In light winds do not hesitate until the tension is at least up to a strong tow tension. We have found it very helpful if the pilot can say "**airborne**" when they are a couple of feet into the air. Only then should the driver begin to adjust back to normal tension. Before this, accelerate at maximum to achieve a high tow tension. Consider that up to 20 kg of rope tension is due to the full rope length being dragged along the ground. At this phase there is less danger of breaking a weak link than you think.

3 Meter Monitoring & Tow Tension

Always give the pressure gauge 90% of your attention and 10% to steering the tow vehicle down the strip. Forget the speedometer. Do **NOT** look in the rear vision mirror as the tow tension can drop or rise very suddenly and break a weak link. Be ready to brake the tow vehicle suddenly. The quicker the tension rises the more urgent a response is required.

The more thermic the conditions, the lower the desired tension. In strong thermic conditions maintain the tow line tension near 50% of the weak link rating to give adequate margin to avoid a weak link break. Once the weak link breaks the tow is finished and the pilot can only make the best of their present situation. The pilot can aid the driver by telling them they are encountering a thermal or "noisy air". This warns the driver before any indication on the tow gauge and if their attention is wandering, brings it back to the tow gauge.

4 Rope Return - U turn

Clear your rope from adjacent strips ASAP and return it to the launch area quickly. The time proven method is to simply do a U turn without pausing and head back to launch. 50 kph is a reasonable speed. Stationary ropes are quickly sliced by other ropes being pulled over them, so keep yours moving. Do your U-turn away from the side that the rope has fallen towards, so you don't drive over it or drag the rope across itself. A U turn means you do not have to leave your mowed strip to find the other end of the rope nor get out of the vehicle to pick up the end.

However it does mean a different end of the rope is at launch each time.

5 Rope Return - Ahead

Sometimes it may be better to initially drive forward after the hang glider has released.

a) After an early glider release the glider end of the rope may fall well before the vehicle start point.

If you immediately do a U turn and return the rope, you may find it trailing off to one side or doubled back on itself at the tow vehicle end. Ensure you take the

rope forward by at least its own length from the start point before doing the U turn. If you do find the rope trailing off to one side, as you proceed back to the vehicle start point, run it through a carabineer attached to the vehicle (like a pulley) to feed it back onto the tow strip. Make sure any knots will run through the carabineer. Someone may have to anchor the rope back at launch.

b) Driving ahead initially keeps the whole rope moving and gets the glider end of the rope off the adjacent strip quicker. The need for this depends on the activity on adjacent strips at the time, the cross wind and if the rope was released at a low angle. If you see a vehicle about to drive over your rope, stop momentarily until crossed, then keep your rope moving so it does not get cut by the rope attached to the other vehicle.

Driving over a moving rope quickly will not damage it, but don't be in 2 minds and pause on top of it - you will shred it. Similarly don't stop near a rope so that it is pulled up to your vehicle and wedged under the tyres. This will also shred a rope.

6 Driver Cooperation

Know the radio frequency and the names of drivers on neighbouring strips in case problems occur requiring co-operation.

7 Beside Fences

If your team is towing near the edge of the paddock your rope may drop over the fence. Continue up the tow strip until the tow rope is pulled off the fence and back into the paddock before doing a U turn. To judge this, after the rope has fallen estimate how much rope is over the fence and use your odometer or trip meter to indicate when to turn around. It is better to go a bit further than necessary than to leave the rope partly over the fence as you will need to pull it off the fence by hand on the way back to launch. Check that the rope has cleared the fence as you drive back. Alternatively, once you have pulled the rope off the fence you could drop the vehicle end and pull the rope back by the glider end. This reduces rope wear (and is the technique used when towing on roads with a fence either side).

Any hardware such as metal rings on the rope ends are likely to flick around the top wire of the fence and anchor the rope. Keep your speed near 10 kph and either watch the gauge closely or constantly look behind at the rope for signs of sudden tension otherwise you may break the rope, damage your gauge or pull the fence over. It is much safer to pull the rope off the fence with the rope end in your hand as you continue driving ahead. However make sure that it is not wrapped around your hand or fingers in case it is suddenly snatched from your grip. It would be safer to fix a small snap hook to the right rear corner of the vehicle with a light weak link. This position allows the driver to observe the rope in the side mirror. 1 strand of #8 twine is approx. 25 kg. Have several weak links tied to the vehicle ready.

With only a small spliced loop or a bowline on the end of the tow rope and no hardware, it rarely gets caught on fences, bushes, etc. You can confidently pull the rope off fences at faster speeds with it still attached to the tow

gauge. However the pilot's system to hook onto the rope may leave a snap hook or ring on the end of the rope.

8 Rope Return after Early Release

If there is an accidental or early release in the first 100 metres of the tow it is often quicker for an extra person to run forward and drag the rope back. Remember if the rope was released under tension it may have sprung forward a considerable distance.

It is usually better for the driver to disconnect the rope, follow it back in reverse, and then hook on again. This is far better than somebody pulling on the rope against the vehicle and trying to wave to the pilot to ask the driver to reverse up over the radio. There is also a danger of reversing back over the tow rope while still attached to the vehicle and damaging the tow gauge. For this reason it is preferred to **mount the tow gauge centrally** on the vehicle rather than to either side.

If there is no extra person available the driver should (a) drive forward until they are the **length of the tow rope** from the vehicle start point and then do a U turn to return, or (b) drive forward until they are reasonably sure the rope is straight and pulled back onto the tow strip before unhooking, driving back, finding the glider end and towing it back to launch. (b) is appropriate if the glider released very early and reduces wear on the rope.

9 Reversible Rope Ends

Have your rope set up so it can be end-for-ended. This may involve each pilot being responsible for their own weak link system and be able to quickly hook onto either end of the tow rope that has no hardware attached.

10 Streamer at Vehicle Start Point

Stand a small windsock or streamer just in front of the vehicle start point. This makes it easier for the driver to quickly find the end of the rope as (s)he drives back to the start point, especially when looking into the sun. The pilot can also ask the driver what the wind is doing near the vehicle as a gauge of thermal activity.

11 Remote Release

Install a remote release on the vehicle tow gauge which the driver can operate while driving. The driver will only have to get out of the vehicle once per tow, to attach the tow rope just before each launch, saving minutes. When returning the rope to launch, glance behind occasionally to check that you still have the tow rope attached. It is a bit embarrassing if you turn up at launch empty handed and also time consuming to find the end again. A remote release also adds safety if a pilot locks out or gets into other difficulty. Some remote release ideas: a lanyard routed outside the vehicle to a roof rack above the driver's window, an arrangement similar to a bicycle brake cable or an electric solenoid mounted in front of the release.

12 Tow Gauge Weak Link

Install a weak link at the vehicle end about 50% stronger than the pilot weak link. This will protect the rope from being damaged if it should snag on a fence or become tangled with another tow rope. It will also protect hydraulic tow gauges which are often damaged and lose calibration if subjected to pressures above full scale deflection. A suggestion is 6 strands of #8 nylon bricklayers twine. Replace this weak link daily. If you have a remote tow car release consider what will happen if this weak link breaks. Don't do what others have done in the past - put the weak link between the vehicle and the tension sensing unit!

13 Rope Join & Repair

The driver should be familiar with an appropriate in-line knot for joining the tow rope in an emergency. This knot should be quick to tie and of minimum bulk. This is to reduce wear while dragging the rope along the ground and to assist it to run around objects or over a fence. A suitable knot is a "single fisherman's knot" (Love Knot is a more appropriate name) with approximately 20mm free ends that are easily included in a protective wrap. The following knots are **not** suitable: 2 opposing bowlines, reef knot, over hand knot, figure 8 knot, etc. Keep a sharp knife or scissors in the vehicle, and tape to wrap up the joining knot. Brown packing tape seems to resist reasonable wear and is cheap. Electricians tape and ducting tape wear too quickly. Cloth reinforced tape is the best but is expensive (called 'Duck' tape in USA).

14 Rope Knots

After release from the hang glider a loose falling rope can put knots in itself. This is more likely after a high release in light and variable wind conditions. Typically, knots form near the glider end of the rope as it falls through itself. Most are within the first 10 feet but may be up to 50 feet from the end.

The tension of a couple of tows will seat these knots firmly and you will not be able to undo them.

If ignored the knot will be a wear point leading to a rope break. Glance back down the rope as you attach it to the vehicle to check for these knots and undo them **then**. If you find a knot a bit too late, run some tape around it to prevent wear.

Similarly but less common, loop-through knots can form anywhere along the rope.

Cast an eye along the rope as you hurry back to the vehicle end for the next tow.

15 Rope Storage

Roll your rope up each day before leaving to retrieve the pilots. There is no guarantee that you will be on the same strip the next day due to wind changes and strip rotation. The next morning when other teams drag their rope around the paddock to a different strip over your rope it will be cut in half in less than a minute. If you are last onto the paddock it could be in several pieces. Similarly it is not a good idea to leave your rope laid out until you return that evening to roll it up. There may have been a wind shift after you left the paddock and every one moved to cross strips. No one is going to roll up your rope in the

hurry and confusion. Also, at the end of the day, Free Fliers may have a tow in another direction. Even with towing continuing on the same strips it is possible your rope could have others falling over it and be damaged or get caught up and dragged away.

16 Rope Maintenance

Before towing commences each day take a knife and tape and walk along the rope inspecting it for worn joining knots, accidental knots and pulled strands. It may only be necessary to add more tape to the joining knots. Otherwise cut out any problem areas and replace with the in-line knot. This 15 minute chore could save at best a 15 minute delay in the middle of peak towing time. At worst most of your rope may be unfindable after a pilot drops it from 1000 feet and/or it gets caught up and dragged away by another rope.

The best way to join a rope is a butt splice. It gives only a slight increase in rope diameter thus reducing the wear associated with knots. With protective tape a splice will last a long time before needing attention.

17 Spare Rope

Have a spare tow rope in case yours is severed and half is dragged away by another team's rope.

Remember Murphies Law manifests itself most potently during towing. Do as much as you can to neutralise its effect.

If you are not averaging less than 10 minute turn around times your team needs to polish its procedures, (disregarding voluntary waiting for conditions). I hate to rub it in but in the 1994 Flatlands our driver put 4 pilots into the same thermal one above the other in a release time spread of 12min 39sec without compromising any safety guide lines.

You have probably realised the driver is really the key person of the team. If there is any lack of harmony and the driver is not attacking the job with enthusiasm and anticipation, you are disadvantaged from the start. Cajole, praise, and charm them and don't be stingy rewarding them for a top effort.