



Appendix 3

Tow Car Driving at Aston Down

By Brian Gilmore

The reverse pulley system, as developed at Aston Down, works reasonably well. The single strand, high tensile piano wire is used because it is (a) cheap, (b) easy to join and (c) wears reasonably well when abrading against a high friction runway. The disadvantages are that it is sensitive to wear on the knots and is likely to revert to coils unless tension is maintained. It also suffers from work hardening, leading to embrittlement but this can be countered by regular monitoring of launch rate and good daily inspections. However, this well-balanced state can easily be upset by careless towcar driving which can very soon shorten cable life.

In providing guidance to other drivers, it might be best to analyse the "perfect" launch, as follows: -

(i) Taking over the Vehicle

- Talk to the current driver about the launch - acceleration, drift, speeds, wind gradient, etc.
- Check remaining fuel
- Check which side of runway to come up - it may be different from the usual

Many of the above points can be determined by riding with the previous driver for at least two launches. Taking over "dry" is asking for trouble.

(ii) Driving Down

Assuming you have done some sort of transitional handover, drive down the runway at no more than 45 m.p.h. to minimise wear and tear on the car (excessive speed is not necessary), noting wind speed and direction. You will, of course, have previously noted which aircraft you are about to launch - hence which weak link it is using.

(iii) Connecting Up

At the pulley, stop parallel to the cable / parachute, engage PARK and get out of the car. Connect up the cable ensuring the release hook is fully engaged and the weak link / parachute assembly is stowed in the back of the car so it will eject easily. Check the pulley has rotated correctly and the cable is not twisted. Move forward to

take up any excess slack and await launch signals.

(iv) Taking up Slack

Check your end of the runway for clearance from obstructions that would affect the launch e.g. tractors working nearby, aircraft overhead etc. At "UP SLACK" signal, engage DRIVE (not D1 or D2) with foot on the brake. Ease forward using engine idle and brake pressure. There is sufficient power at "idle" to take up slack. Check again that pulley hasn't rotated and watch the strain gauge for a small movement to show there is something on the other end. This is not always apparent on aircraft fitted with tail wheels. Check launch signals.

(v) The Launch

At "ALL OUT" signal, ease off the foot brake and smoothly but quickly accelerate the car. Drag starts are not necessary and will only cause snatching and over-runs. Keep watching the signal lights for a potential STOP signal. Continue accelerating until the glider appears over the brow. (This is when you discover that the launch point has switched aircraft!).

As the glider rotates into the climb the cable load will rise - sometimes dramatically. You will have anticipated this and will be easing the throttle back to compensate. Aim to stabilise the load at about 80% of normal range for the chosen weak link, keeping out the "Red" sector - but don't be mesmerised by the gauge, it is only a reference. Keep watching the glider as much as possible. Note the angle it climbs at, the speed it passes visual references on the cab ie. window frames, sunroof etc. and store for future use in case you have to adjust your launch speeds. Note the drift, if any, for when the cable is released.

Assuming a reasonable pilot, there will be a "slogging period" when the aircraft will try to achieve maximum climb within its speed envelope and you are trying to match or anticipate it, maintaining a load within the weak link range. Who will win? The answer is the aircraft because if the weak link breaks it is your fault and you will have to find it. If it breaks at the top of the launch then the aircraft will fly away, leaving you with the hassle. If it breaks low down, then the next launch will be held up





by low flying aircraft or aircraft on the runway. Therefore, don't let them do it! Continue, if possible, to ease the power back because the pilot will be flying "the great circle" and will naturally be increasing speed. To compensate, he will pull harder to try to slow you up towards the top of the launch which will cause the needle to head towards the "Red" sector on the strain gauge. His correct action should be to release the cable and gain height in the "pull-up" - but it doesn't always happen.

(vi) The Release

Normally, the aircraft will lower the nose and release the tension before releasing the cable. Back-off the power to assist and watch for the cable to detach from the aircraft before accelerating to keep the tension on the cable. If it is evident that the aircraft is not going to lower the nose, or it is likely to overfly the pulley wagon, then chop the power immediately. If this happens, there will be a major foul-up, which will take ages to clear! Check that the cable parachute has inflated and accelerate the car to about 50mph back to the launch point. Watch the chute and try to "fly" it to the pulley wagon to minimise damage to it or to the crop.

Slow up as you approach the launch point and try not to aim for people or parked aircraft - allow an escape route if the brakes fail. Operate the cable release while still slowly moving so that the cable falls off the back by the next aircraft to launch. Check that the cable has come off before moving away from the launch point - it is very easy to forget, especially if distracted.

Now repeat the above, ad nauseam, or until you can find someone else to drive.

Foul-ups or Emergencies

(i) Drift

(a) Low Down

Occasionally pilots over-correct for drift and the cable comes dangerously close to the tow car. If there is real danger, pull the cable release and get out of the way, preferably off the runway as the glider will be making a surprise visit!

(b) At Height

If the pilot has not anticipated the upper wind and drifts downwind, then it is up to the tow car driver to make sure that the cable does not break and to retrieve the cable as quickly as possible. If the cable does break, carefully retrieve it avoiding damage to property.

(ii) Releasing Under Tension

Usually due to bad flying, either releasing in haste or trying to hang on to the launch, causing it to back-release, or failure of the tow car to anticipate the end of the launch. This can also sometimes occur due to the premature release of a wrongly adjusted Tost hook on the aircraft.

If the cable tension shoots into the "red" sector, slow down sharply or even stop. Avoid a broken weak link at height. If the cable releases under tension, then the cable acts like a big spring, coils are formed due to the parachute not opening in time and the cable is pulled through the pulley, causing kinks. Major damage can be limited by accelerating quickly to try to tension the cable, inflate the parachute and avoid kinking. The cable must be carefully checked before the next launch to avoid the kinks breaking at the pulley.

(iii) Cable Breaks (Real)

If a cable break occurs, STOP the car and RELEASE the cable immediately which will allow the cable to clear the aircraft. Check that the cable has released and move off the runway to give the aircraft manoeuvring room.

Note. The cable does not always come off the car as there is no cable drag.

(iv) Cable Breaks (Simulated)

Hopefully, you will be quietly warned by the instructor. If it is low down, STOP and try to lay the cable onto the runway immediately. Release the cable and clear the area, as above. Do not attempt to pull in the cable as the parachute will inflate and it will "fly" into the path of the glider.

(v) Mechanical Breakdown or Lack of Fuel

Faults can occur with any mechanical device and launches can be as subject to "Engine Failure on Take-Off" as an aerotow. As a pilot, always fly the launch as though it will happen and as a tow car driver, drive the launch the same way.





Running out of fuel puts people's lives at risk unnecessarily. If fuel is low, check before doing another launch. Don't be cajoled into doing another launch if you are in any doubt.

(vi) Cable Hang-Ups

Failure to release or back-release is rare but it can happen. If a glider is clearly unable to release, give it a lot of slack to allow it to dive. Do not take up the slack until a release has occurred.

Summary

The reverse pulley system works well, provided that a few basic rules are followed: -

- Always keep tension on the cable, otherwise it has a life of its own.
- Remake all the knots every day, regardless.
- Change the cable regularly.

Drive to give the best launch, the most efficient operation and the minimum wear and tear.

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