

SAFE AEROTOWING



Four tug pilots have been killed since 1974 from tug upsets while aerotowing. Six tug upset incidents were reported in 2012.

This leaflet offers advice to the glider pilot on safe aerotowing and in particular the avoidance of tug upsets.



INTRODUCTION

Aerotowing is safer than winch launching **for the glider pilot**. Since 1974, there have been 39 fatal injuries to glider pilots from winch accidents but only 2 fatal injuries from aerotow accidents. Taking into account the launch ratio of 7 winch launches to 3 aerotows, the aerotow fatal rate to the glider pilot is about 8 times lower than the corresponding winch rate.

However, seven tug pilots have been killed since 1974 while aerotowing. Two accidents stemmed from engine failure, one from a lack of fuel, and 4 from tug upsets.

The four fatal upsets took place between 1978 and 1985. The BGA made considerable efforts to educate pilots and instructors on how to avoid such accidents. The tug upset incident rate decreased, and the fatal accidents stopped. But the tug upset incident rate is now 7 times higher than 10 years ago. In 2012 alone, six tug upset incidents were reported. In one of these incidents the tug pilot recovered 100ft above trees. In yet another incident, in 2013, the tug pilot recovered 40 ft from the ground. Any tug upset incident has the potential to be fatal for the tug pilot. We must strive to reduce these upsets.

This leaflet offers advice to the glider pilot on safe aerotowing and in particular the avoidance of tug upsets. A short leaflet cannot cover everything. For additional guidance please ask an instructor.

Tug pilots are almost certainly aware of the possibility of tug upsets. If you are losing control of the tug do not hesitate to dump the glider. Guidance on all aspects of tugging can be found in 'Aerotowing Gliders' by John Marriott*.

The illustrations are stills from video simulations that are available on the BGA website - www.gliding.co.uk/safeaerotowing



Image 1



Image 2

In a vertical tug upset the glider gets high behind the tug and the tug nose is forced down. This can occur when towing using a nose hook (image 1) as well as with a belly hook (image 2)

*Aerotowing Gliders: A Guide to Towing Gliders, with an Emphasis on Safety. John Marriott: AuthorHouse, 2011

AEROTOWING ACCIDENTS

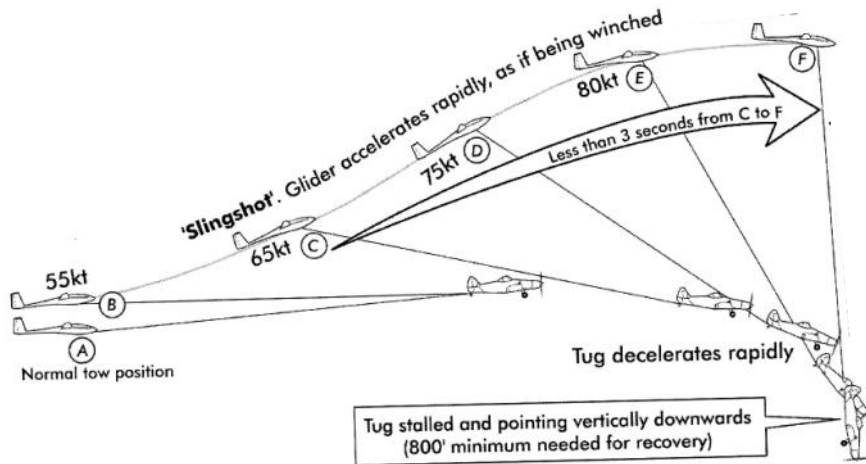
1. Vertical Tug Upsets

In a vertical tug upset the glider gets high behind the tug and the tug nose is forced down. The slingshot vertical upset is particularly dangerous. If the glider pilot is low in relation to the tug and the pilot moves back into position too quickly the glider in effect does a winch launch behind the tug which tips the tug into a vertical dive. In a lateral upset the glider is too far to one side.

The circumstances which make tug upsets more likely are:

- belly or C of G hook intended for winch launching
- short rope
- pilot with little aerotow experience
- near aft C of G
- turbulent conditions
- all flying tailplane, or light elevator forces

Vertical upsets are more likely with a belly hook but can occur with a nose hook. Image 1 (opposite) shows a nose hook launch; image 2, a belly hook launch.



A vertical upset can arise at the release height if the glider turns before the pilot has confirmed that the rope has separated. Image 3 shows what can happen.

A total of 46 tug upsets have been reported since 1974, of which 4 were fatal to the tug pilot. The glider pilot is also in danger - in the one fatal upset accident to a glider pilot the rope wrapped around the glider wing. In some accidents the tug pilot released to save himself, leaving the glider pilot without a safe landing area.

2. Wing Drop Accidents

55 of the 201 aerotow accidents to gliders since 1974 involved a wing drop. The necessary energy for a cartwheel is unlikely to be available, but the glider was substantially damaged in half of the instances.

As with winch launches, if you cannot keep the wings level, release *before* the wing touches the ground. Image 4 shows the tug yawing away from the take-off run, following a glider wing drop and failure to release.

3. Launch Failure Accidents

The 60 launch failure accidents to gliders since 1974 have led to just one fatality - from a spin after a return to the airfield following a rope break. After an aerotow launch failure in the air, the glider will probably be at its approach speed, in roughly level flight, so the pilot has a good view of the options, the airspeed is not reducing rapidly, and it should be straightforward to avoid a stall/spin accident.



Image 3



A vertical upset can arise at the release height if the glider turns before the pilot has confirmed that the rope has separated.



Image 4



A wing drop and delayed release can yaw the tug away from the take off run .

AEROTOWING TECHNIQUE

The way aerotowing is taught on instructors courses nowadays is materially different from the way it used to be taught. It is possible that some pilots may not be aware of some aspects of the currently recommended aerotowing techniques, in particular:

- While waiting for the tug to take off, fly at a height of 6-10ft . The top of the tug fin is a good marker.
- Control the vertical positioning of the glider by reference to the vertical position of the whole tug in the canopy. Techniques involving positioning the tug in relation to the horizon, or aligning fore and aft parts of the tug structure, are less reliable, and less stable in turbulence.
- The vertical position of the tug in the canopy at the beginning of the ground run will probably be roughly the correct position in flight. If you are unsure of the correct position, gently descend until you encounter the slipstream and then move up about 10ft.
- If you are displaced to one side of the tug, adopt the same bank angle as the tug, wait for the rope to pull the glider astern of the tug, and then gently dip one wing to stop the lateral movement of the glider. It is not necessary to bank towards the tug to recover from a lateral displacement.
- To release, check it is clear, pull the release, visually ensure the rope has separated from the glider, and raise the nose slightly before making a turn.

AEROTOWING ESSENTIALS

Should You Be Flying?

If you are inexperienced, do not aerotow on a belly hook and do not aerotow in turbulent conditions.

Avoid Distractions on the Ground and in the Air

Rushed checks may leave the airbrakes unlocked. During the tow, leave any instrumentation, ventilation, or similar problems until after release. Leave the undercarriage down.

Pre-Flight Preparation

- Are you within the CG limits? If you are inexperienced, ensure the cockpit load is at least 30lb more than the placarded minimum weight
- Precisely align the fuselage with the take-off direction
- Use the aerotow hook, if one is available
- Note the vertical position of the tug in the canopy; this will probably be roughly the correct position for the tug once the combination is airborne.

Ground Run

- Left hand on the cable release
- For flapped gliders, keep your hand on the release until positive lateral control is assured before changing flap setting, if required
- Use the elevator, ailerons, and rudder independently
- If you cannot keep the wings level, release before the wing touches the ground or the glider may groundloop and the tug may yaw uncontrollably.
- Balance the glider on its main wheel
- Keep the glider running straight behind the tug
- Wait for the glider to take off

Glider Airborne, Tug on the Ground

- Use the controls in a coordinated way
- Allow the glider to climb to 6-10ft; the top of the tug fin is a good marker
- In a cross-wind, keep the glider directly behind the tug
- Wait for the tug to take off

Tug and Glider Airborne

- Be ready for the tug to climb, and climb with it
- Continually update your launch failure options
- Maintain the correct vertical position of the tug in the canopy. Do not allow the glider to get too high.
- If you are too low behind the tug shortly after the tug take-off, or at any other time, move back into position SLOWLY. Being lower than the tug is not dangerous. An upset can follow if you pull up quickly.
- Release immediately if the glider is going high and the tendency cannot be controlled, or you lose sight of the tug.
- If you are unsure of the correct position for the tug in the canopy, gently descend until you encounter the slipstream and then move up about 10ft.
- If the glider is to the left or right of the tug maintain the same bank angle as the tug and allow the rope to pull the glider back into position.
- Fly the glider! Leave any instrumentation, ventilation, or similar problems until after release. Leave the undercarriage down.

Release

- Is it clear? Pull the release, visually ensure the rope has separated from the glider, and raise the nose slightly before making a turn.

Tug upsets. A thing of the past?



Tug pilots

Locate release before every flight
Jettison glider if it gets too high

Significant increase in risk where two or more of the following factors apply

- Does the glider have a CG hook?
- Is the glider CG at its aft limit?
- Is the tow rope short?
- Is there turbulence and/or rough ground in take-off area?
- Inexperienced tug or glider pilot?
- Light weight glider with low wing loading?

*Can you contribute to avoiding aerotow accidents
and, in particular, tug upsets?*



www.gliding.co.uk/safeaerotowing

British Gliding Association, 8 Merus Court, Meridian Business Park, Leicester, LE19 1RJ
Tel: 0116 289 2956 Email: safetyinitiative@gliding.co.uk www.gliding.co.uk
© British Gliding Association, 2013