

STOP THE DROP

The BGA safety team looks at preventing cartwheel accidents

FOR decades until 2006, winch launch accidents killed over one glider pilot a year and seriously injured two more; and eight gliders a year were destroyed or substantially damaged. A new study of winch launch mechanics and a thorough analysis of our accident records then showed that almost all accidents resulted from just a few different causes, which seemed to be solvable. The BGA introduced its Safe Winch Launching initiative [1], revising training and promoting the revised techniques, and the rate of fatal or serious injury fell by a factor of 5.

The improvement was largely due to



Photograph by Mark Layton

STRAIGHTEN
UP & FLY
RIGHT

a tenfold reduction in the number of serious accidents involving a stall or spin. A more measured rotation into the full climb prevented loss of control during the launch, while a focus upon ensuring adequate manoeuvring speed addressed the hazard during recovery from a launch failure. If you took up gliding after 2005 and were taught the revised techniques from the start, you might not know what a big deal it was.

We had less success, though, addressing two further causes. Pilots continue to crash after a demanding circuit following a launch failure, writing off gliders but generally escaping without serious injury. And,

cartwheel accidents – the subject of this article – continue to cause serious injuries and fatalities.

Cartwheel accidents

A cartwheel accident begins when a wingtip touches the ground. A 'wing drop' such as this is usually benign, the pilot recovers and a normal launch ensues. Sometimes, when the grass is long, the ground soft or rough, or the wingtip shape particularly susceptible, the glider pivots about the wingtip causing a groundloop that can damage the glider. If the cable is released promptly or the launch is stopped, the pilot is not hurt. Occasionally, however, if the launch continues, the glider rotates violently, and the combination of low airspeed and winch power causes the free wing alone to lift: the fuselage leaves the ground and the glider performs a cartwheel.

What happens next is down to chance: roughly speaking, if the glider finishes the right way up, the pilot is seriously injured; if the glider ends up inverted, it could well be a fatality.

Wingdrop causes

For a wing to drop, there must be an imbalance between the forces on the two wings. There are several possible causes:

- **Crosswind:** a crosswind will tend to raise the upwind wing; it will also cause a moving glider to weathercock into wind, speeding up the downwind wing.
- **Offset cable:** as the winch hook is forward of the mainwheel, any sideways pull will cause the glider to yaw towards the cable.
- **Offset hook:** the winch will tend to straighten any offset of the winch hook from the glider axis, causing the glider to swing away from the hook side.
- **Wing runner:** if the wingtip is held back, the glider will swing towards the runner.
- **Water ballast:** if the wings are not held level, water movement in ballast tanks can cause the lower wing to drop.
- **Turbulence:** the wind strength may differ between the two wings.
- **Ailerons:** if the wings are not held level, the pilot may subconsciously try to raise the lower wing.

A number of people contribute to making the launch safer by preventing wingdrops:

Launch crew – The first line of wingdrop prevention is the launch crew, who should ensure that the glider and cable layout suit the airfield conditions. This begins with the choice of launch run, avoiding long grass and soft or rough ground, and correct positioning of the glider, which should be lined up with the cable and bows in the cable eliminated.

Wing runner – It's clear from accident reports that most wingdrops begin as soon as the wing is released. The wing runner's first job is to hold the wings level and STOP THE LAUNCH if there is an up or down force at the tip. A quick word with the pilot could sort out the imbalance. As the launch starts, the wing runner should run with the wingtip as the pilot gains control authority.

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(Aug/Sep 19)

The Effects of Wind Gradient
(Oct/Nov 19)

A Fun but Safe Introduction
(Dec 19/Jan 20)

■ Clubs can obtain printed copies of Safety Briefings from the BGA Office.

The wingtip should in general be supported without applying any lateral force, but a small correction from the wing runner can help keep the glider straight. This is a safety-critical job, and deserves proper training.

When choosing which wing to hold, the wing runner should take account of any crosswind or remaining cable bow, but be sure to avoid any other cables on the airfield.

Pilot – The pilot should insist that the glider is correctly lined up and any bow taken out of the cable. If this isn't possible, the glider should be moved. Once the cable has been attached, the pilot should keep a hand on the cable release and monitor the angle between the wings and the ground – it may be necessary to look sideways, especially in gliders with long or low wings. There isn't time to adjust the flap setting, so flaps should be left in a suitable position throughout.

It's important to have a firm hold of the cable release. Gloves can slip, so remove them for the launch unless you're sure they provide a good grip. You might wish to fit your cable release with a T-handle [3] and, if the release knob doesn't come easily to hand, an extended cable sleeve.

If it's not possible to keep the wings level, the pilot must **RELEASE THE CABLE** immediately, well before the wingtip touches the ground. Cartwheels develop rapidly, and remaining attached to a powerful winch while the wingtip is on the ground means being a passenger on a ride that could end very unhappily.

Signaller and winch driver – The final barriers to a cartwheel accident are the signaller and winch driver, who can **STOP THE LAUNCH** in response to the wing runner or when it is apparent that the wingtip can't be kept clear of the ground. The signaller must have a good view and act immediately without waiting to see whether the pilot can pick up the wing. The winch driver must respond promptly to the **STOP** signal.

The reason for stopping the launch is to prevent the fatalities and serious injuries that occur when a glider cartwheels. The aim is to stop the launch before the glider becomes airborne, but there could be occasions when the glider has taken off before the power is cut, leaving the pilot to handle an ultra-low launch failure. This is something that all pilots are trained to handle. Low-level launch failure accidents can damage gliders, but any injuries are almost invariably minor – and we believe that even if every incidence of a wingdrop

were converted into a low-level launch failure, the serious accident rate would still be modest.

Signalling equipment

To stop the launch before the glider is airborne, a means of quick communication is essential. Bats and flashing signal lights are too slow.

Walkie-talkie radios are more immediate: it doesn't take long to say 'STOP STOP', but the radio must be audible in the cab during the launch, and the command mustn't be muffled by wind noise. Beware also that many walkie-talkies send an identification code before opening the audio channel: to avoid this delay, keep the transmit button pressed until the glider is in the air.

Better still are direct radio links that drive lights and sirens in the winch cab. At least two clubs (Stratford and Kent) have developed excellent systems that alert the winch driver instantly: in one test, the glider had stopped before the radio 'STOP' message began. Skylaunch [4] is currently trialling a commercial version which should be available very shortly. Clubs have found that safety-related equipment makes a great case for grant funding – the BGA Development Team can offer advice if required.

Dropping a wing during the winch launch ground run is not uncommon; the pilot usually recovers, and it's easy to become complacent and assume this will happen every time. Cartwheels are rare, and most people will never witness one. But they're nasty accidents, so you really don't want to. Stopping the launch will, at worst, leave the pilot with a low-level launch failure to handle. Once a cartwheel begins, the pilot is just a passenger.

Tim Freegarde and the BGA safety team

REMAINING ATTACHED TO A POWERFUL WINCH MEANS BEING A PASSENGER ON A RIDE THAT COULD END VERY UNHAPPILY

■ For more information, see the [Safe Winch Launching website \[1\]](#) and section 4-16 of the [BGA Instructor Manual \[2\]](#).

[1] BGA Safe Winch Launching <https://tinyurl.com/flyright2001>

[2] BGA Instructor Manual, section 4-16 <https://tinyurl.com/flyright2002>

[3] EASA CS-22 Amendment 2, AMC 22.781 (2018)

<https://tinyurl.com/flyright2003>

[4] SkyLaunch Ltd www.skylaunch.com

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