INADVISABLE TURN

The BGA Safety Team discusses the dangers of making a low unplanned turn

Power pilots speak of 'the impossible turn' back to the airfield should power be lost during the climb-out. In the much-practised simulation of engine failure after take-off (EFATO), pilots are trained that, once a glide speed and attitude have been established, they should pick a landing area within a modest angle (typically 30-60deg) of the aircraft's initial heading and fly a controlled approach that avoids major obstacles, keeps the cabin intact, and makes the best of the situation [1]. Under no circumstances, they are taught, should they attempt to turn back to the airfield, because so often such manoeuvres have led to loss of control.

Low turns have proved dangerous for glider pilots, too. In principle, our aircraft

benefit from much better glide performance, and we shouldn't find ourselves low down as close to the stall as a powered aircraft departing at its best-climb speed. Deaths and serious injuries have nevertheless resulted when pilots turned back to the airfield from a low launch failure, and similarly nasty accidents have followed impromptu positioning turns late in circuit.

WINCH LAUNCH FAILURES

We should not launch unless we have thought through good options for failure at any stage, but it's still a surprise when a winch launch fails. Therefore, as well as considering 'eventualities' as part of our pre-flight checks, we regularly practise recovery from winch launch failures. Before the BGA's Safe Winch Launch initiative [2], too many pilots suffered serious injuries by stalling or spinning during the recovery. Training now emphasises the need to restore manoeuvring speed before turning, and to avoid low level turns by landing ahead if it is safe to do so – if it isn't, there's generally enough height for an unhurried return to the airfield. Practising launch failure recovery helps to reduce the startle factor [3] when they occur.

AEROTOW FAILURES

Just as with winch launch failure, a prompt recovery is required after an aerotow failure – including inadequate climb performance – followed, unless there's a good reason not to, by the actions decided in the pre-flight 'eventualities' assessment [4]. Unlike winch launch failures, though, the land-ahead option is likely to end up outside the airfield: this is inconvenient at best and, unless a motor-glider or realistic simulator was available, practice failures will have been high enough for a return to the airfield to be flown safely. It's natural to fly the practised option when it also holds the prospect of the best outcome; and, if the startle factor prompts a desire to flee to safety, that favours a return to the airfield too.

Unfortunately, whereas controlled flight into a field rarely results in more than minor injuries, losing control in a low turn can be fatal. Stalls and spins generally result in a nose-down descent rapid enough to cause serious injury, particularly if the glider pivots around a wingtip before doing so. The glider is often damaged irreparably. If the ground intervenes before the turn is completed, the results are generally similar – and trying to complete the turn can itself result in loss of control [5].

LOW TURN HAZARDS

Once you've committed to a turn, your attention will inevitably be to the landing direction: with your neck craned round, it's impossible to monitor the glider's attitude; and at low level there may be no clear horizon against which to judge it. If the intended destination doesn't appear quickly, it's natural to pull back on the stick to increase the rate of turn. As the adrenalin flows, less sensitive hands may not notice the aircraft's stick-force cues. The ASI and yaw string may be out of view. If the ground starts to appear near – those wingtips can seem a long way down – there could be a tendency to over-rudder the turn. And below 200-300ft [6], that wingtip in a balanced turn will appear to move forwards rather than backwards over the ground – which has also prompted pilots to over-rudder the turn in compensation. Such aspects can tax even the most experienced and capable pilot, even if in theory there is enough height to complete a low-level turn.

These human factors can make it particularly challenging to handle the effects of wind gradient [7]. Descent into wind will lose energy, reducing whatever margin may initially have been assumed; and during a downwind turn the lower wing will experience a lower wind speed, requiring more aileron thus taking it closer to the stall or steepening the turn and hence elevating the stall speed. Downwind, the tailwind will cause the ground to whip past quickly, prompting a subconscious raising of the nose and perhaps an urgency to complete the turn. The final stage may occur more slowly if the upper wing is blown downwards, resulting in greater height loss; and during the final descent into wind, it's again easy to lose airspeed.

Armchair pilots of both powered aeroplanes and gliders seem to enjoy debating the lowest height from which a return to the airfield might be achieved. This risks the key point that even if a low turn back might be physically possible, natural, normal pilot behaviour means it's rarely a wise choice: it may promise the best outcome, but it also risks the worst.

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APPROACH CONTROL

Glider pilots have also made impromptu turns on finals and in circuit when they judged their height to be too high. A power pilot would open the throttle and go around, but glider pilots of course lack this option.

Sometimes, the judgement is incorrect: it's only possible to assess the glide slope properly from a stable approach, and a pilot recently crashed turning when logger traces showed the approach to have been on track to an undershoot.

Pilots also underestimate how steeply they can approach with full airbrakes: even in still air, a glider conforming to CS-22 [8] will lose 450ft over the length of a 1km airfield. Short-field techniques, including side-slipping, can steepen this further, and it's often possible to manoeuvre gently to give more space for the descent or landing. In the worst case, just as with a low aerotow failure, it's better to fly slowly into the far hedge than spin in from approach.

STRAIGHTEN UP AND FLY RIGHT

Historically, inadvertent stall and spin have been the most common cause of fatalities in UK gliding – even without including those that Safe Winch Launching techniques should have eliminated. Many of these occurred from unneeded or inadvisable low-level turns. If we could convince pilots to:

- plan for launch failure eventualities,
- judge angles from a stabilised approach,
- understand what their glider's performance means in real situations, and crucially
- choose the option with the best worst outcome, rather than the best best outcome,

– then stall or spin from an unplanned low turn might become a thing of the past.

Tim Freegarde and the BGA safety team

■ The BGA's Instructor Manual [9] has further discussion and advice about launch failures, approach control and adapting to conditions in circuit.

[1] FAA, The Impossible Turn *https://tinyurl.com/flyright2401*
[2] BGA, Safe Winch Launching *https://tinyurl.com/flyright2402*
[3] *Startling Events, S&G* (June/July 2022) *https://tinyurl.com/flyright2403*
[4] *Aerotow Eventualities, S&G* (June/July 2023) *https://tinyurl.com/flyright2404*
[5] AAIB, report into Swift S-1 G-IZII (2014) *https://tinyurl.com/flyright2405*
[6] The 'pivotal height' h below which this occurs at airspeed v is given in SI units by $h = v^2/g$, where g is the acceleration due to gravity.
[7] *The Effects of Wind Gradient, S&G* (Oct/Nov 2019) *https://tinyurl.com/flyright2406*
[8] EASA, CS-22 amendment 2 (2009) *https://tinyurl.com/flyright2407*
[9] BGA, Instructor Manual, *https://tinyurl.com/flyright2408*

PREVIOUS 'FLY RIGHT' ARTICLES

■ The perils of distraction (Apr/May 19)
■ Keeping safe in thermals (June/July 19)
■ Why it is good to think ahead (Aug/Sep 19)
■ The effects of wind gradient (Oct/Nov 19)
■ A fun but safe introduction (Dec 19/Jan 20)
■ Stop the drop (Feb/Mar 20)
■ Avoiding upset (Apr/May 20)
■ Backroom boys (June/July 20)
■ Cockpit muddle (Aug/Sep 20)
■ Safe rotation (Oct/Nov 20)
■ Cockpit remedies (Dec 20/Jan 21)
■ COVID currency (Feb/Mar 21)
■ Eroded margins (Apr/May 21)
■ A good lookout (June/July 21)
■ Trouble with turbos (Aug/Sept 21)
■ 'Hopefully' is not an option (Oct/Nov 21)
■ Act when the launch fails (Dec 21/Jan 22)
■ Time to solve a knotty problem (Feb/Mar 22)
■ RTFM: Read the flight manual (Apr/May 22)
■ Startling events (June/July 22)
■ Collision risks (Aug/Sep 22)
■ Winter hazards (Oct/Nov 22)
■ Swiss cheese (Dec 22/Jan 23)
■ An expensive mistake (Feb/Mar 23)
■ What's changed? (Apr/May 23)
■ Aerotow eventualities (June/July 23)
■ Problems with probabilities (Aug/Sept 23)
■ Winch nuances (Oct/Nov 23)
■ Heart troubles (Dec 23/Jan 24)