Safety Briefing

Aerotow Performance

Training, experience and awareness of the safe aerotowing guidance on the BGA website[1] will normally result in an uneventful aerotow.

Lightweight, efficient tug aircraft are being developed and are operating at a number of clubs. Glider manufacturers are producing gliders capable of operating with fantastic performance with high wing loading. And there are plenty of older, airworthy tug aircraft providing great service but which will not be quite as sleek and powerful as they once were.

An aerotow requires team work between the glider pilot and the tug pilot. Although the tug pilot is in command of the combination, it is incumbent on both the tug pilot and glider pilot to ensure their aircraft will have adequate performance for the proposed flight.

Normally, the pilots involved make reasonable assumptions about take-off performance based on many years of routine experience of the types involved and the launching environment. However, this can lead to a situation where pilots adopt similar assumptions when the situation is not normal.

This safety briefing – it is not a checklist - aims to remind glider pilots and tug pilots of many of the factors affecting aero-tow take off and climb performance.

Take-Off Decision Point

It makes sense to identify a runway point at which the tug and the glider can be safely stopped in the event of engine or other malfunction, eg low engine rpm, lack of acceleration or dragging brakes. If the grass is wet or damp, anticipate the extra space needed to stop. Do NOT become committed to a 'go-mode' to the exclusion of all else. If the tug is still on the ground and not accelerating, stick to the decision-point and abandon the launch. Either pilot can abandon a launch. Jettisoning the glider and climbing away may be an option.

Glider and tug pilots should consider this scenario in their individual eventualities brief as part of their pre-launch checks.

Factors Affecting Take-Off & Climb Performance

How much weight has been added? On many gliders it may not be possible to fill the glider's water ballast tanks without exceeding the maximum take-off mass. The same may apply to tugs and fuel tanks. It is good practice for the glider pilot to fully brief the tug pilot on the glider weight prior to take-off so that the tug pilot is able to make the correct assessment of take-off performance. The tug pilot needs to be aware of the maximum permitted towing mass.

Speed. Some gliders have a minimum tow speed required by the flight manual, which can be as much as 70 kts. This is likely to mean spending longer accelerating in ground effect before climbing away, thereby increasing the distance needed to clear an obstacle. The minimum tow speed for the glider should be passed to the tug pilot.

Wind. Even a slight tailwind increases the take-off and landing distances very significantly. Note that a 90° cross-wind gives no beneficial headwind component, and aircraft controllability may be the problem. It is recommended that not more than 50% of the headwind component and not less than 150% of the tailwind component of the reported wind should be assumed. Turning into wind (when taking off with any crosswind) and flying into the wind gradient adds energy and hence climb rate. It also provides better options if there were to be a launch failure.

Flap setting and take-off technique. Use the flap settings and take-off technique described in the Flight Manual

Glider handling. A glider that is being flown erratically or in the wrong flap setting (or with airbrake deployed) can produce a significant amount of drag. Glider pilots need to give 100% concentration to the tow. In most gliders, retracting the undercarriage on tow is an unnecessary distraction. Tug pilots should note that a pilot under training will probably not fly smoothly!

Rain drops, mud, insects, ice. All have a significant effect

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on aircraft, particularly those with laminar flow aerofoils. Stall speeds increase and greater take-off distances are required.

Note that any ice, snow or frost affects all aerofoils, including the propeller - it must be cleared off before flight.

Turbulence and wind shear. Both will adversely affect performance, including take-off distance and climbing angle.

Surface. Grass, soft ground or snow increase rolling resistance and therefore the take-off ground run. On soft ground, a heavy aircraft may 'dig in' and never reach take-off speed.

Engine failure. An engine failure or other power loss may result in an immediate need to release the glider and may involve a forced landing for either aircraft.

Aircraft maintenance. If the tug engine does not produce its rated power, or the airframe generates extra drag, the expected performance will not be achieved.

Tyre pressure. Incorrect tyre pressures for the surface you are operating on, perhaps not obvious because of wheel fairings (if they have not been removed), will increase the take-off run, as will wheel fairings/boxes jammed full of mud, grass, slush, etc.

Obstacles. It is essential to be aware of any obstacles likely to impede the take-off and to ensure there is adequate performance available to clear them by a safe margin.

Slope. An uphill slope increases the take-off ground run, and a downhill slope increases the landing distance.

Surrounding terrain. If there are hills nearby, check that you will have a rate or angle of climb sufficient to out-climb the terrain. Even a moderate wind may cause significant down draughts.

Temperature. Performance decreases on a hot day. On really hot days many pilots have been surprised by the loss of power/climb performance in ambient temperatures of 30°C and above. Temperature may be low on a summer morning but "very high" in the afternoon.

And finally...If the safety of the combination is being compromised by inadequate climb performance, releasing or guillotining the tow rope may be the only solution. If safe to do so, before the tug pilot releases it is helpful to ensure that the glider is able to reach a safe landing area.

Recommended Reading

1. BGA Web Site - Safe Aerotowing
https://www.gliding.co.uk/safeaerotowing

2. BGA Aerotowing Guidance Notes
https://members.gliding.co.uk/library/power-flying/aerotowing-guidance-notes/

3. Aerotowing Gliders by John Marriott published by AuthorHouse. Available from the BGA Shop.
http://www.bgashop.co.uk

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