Aerotow

An aerotow is where a powered aircraft tows the glider airborne. The height achieved is usually decided by the glider pilot, who can release from the tow rope at any time. After release, the towing aircraft (also known as a 'tug') returns to the airfield.

The launch is normally made into wind. Why? It is important that the flying controls are effective as soon as possible and that the glider accelerates to flying speed with the lowest possible ground speed and shortest take-off run. Let us consider the launch of a club glider which has a stalling speed of about 30 kts. At any speed greater than 30 kts this glider can develop an amount of lift equal to its weight and can therefore become airborne. If the surface wind speed is say 10 kts, the aircraft, if it is launched into wind, only has to reach a speed of 20 kts over the ground in order to take off. If the aircraft was launched downwind under these conditions, a ground speed of 40 kts would be required before flying speed was reached; this would involve a long run at high speed on the ground, it would take a while for the flying controls to become effective, and any unevenness in the surface would impose considerable stress on the aircraft.

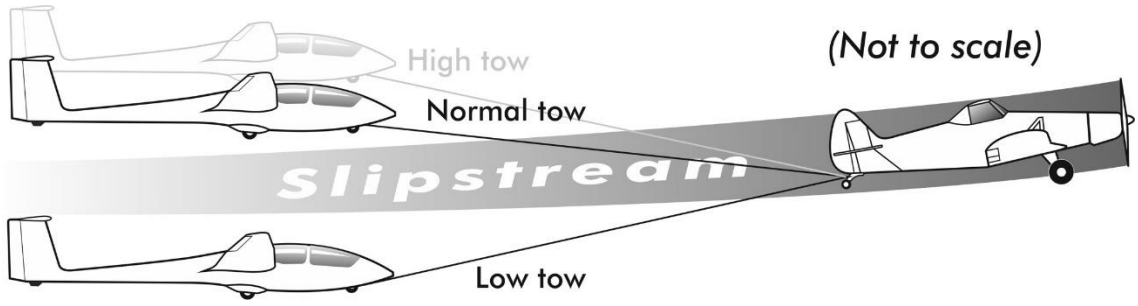
An aerotow launch accelerates quite gently. As a result, the glider pilot has to work at keeping the wings level.

From your earliest flights, you will hear your instructor referring to keeping a hand on the cable release. This is a critically important safety point. If during the ground run a wing tip 'drops' to the ground, the glider, which is being pulled by the rope, is likely to cartwheel resulting in a very serious accident. When a wingtip digs into the ground, there is not enough time to reach for and grab the cable release. **It is vital that the pilot carrying out the aerotow always has their left hand on the release knob during the ground run and is ready to pull the release in the event of a wing going down.** Your instructor will of course explain everything you need to know.

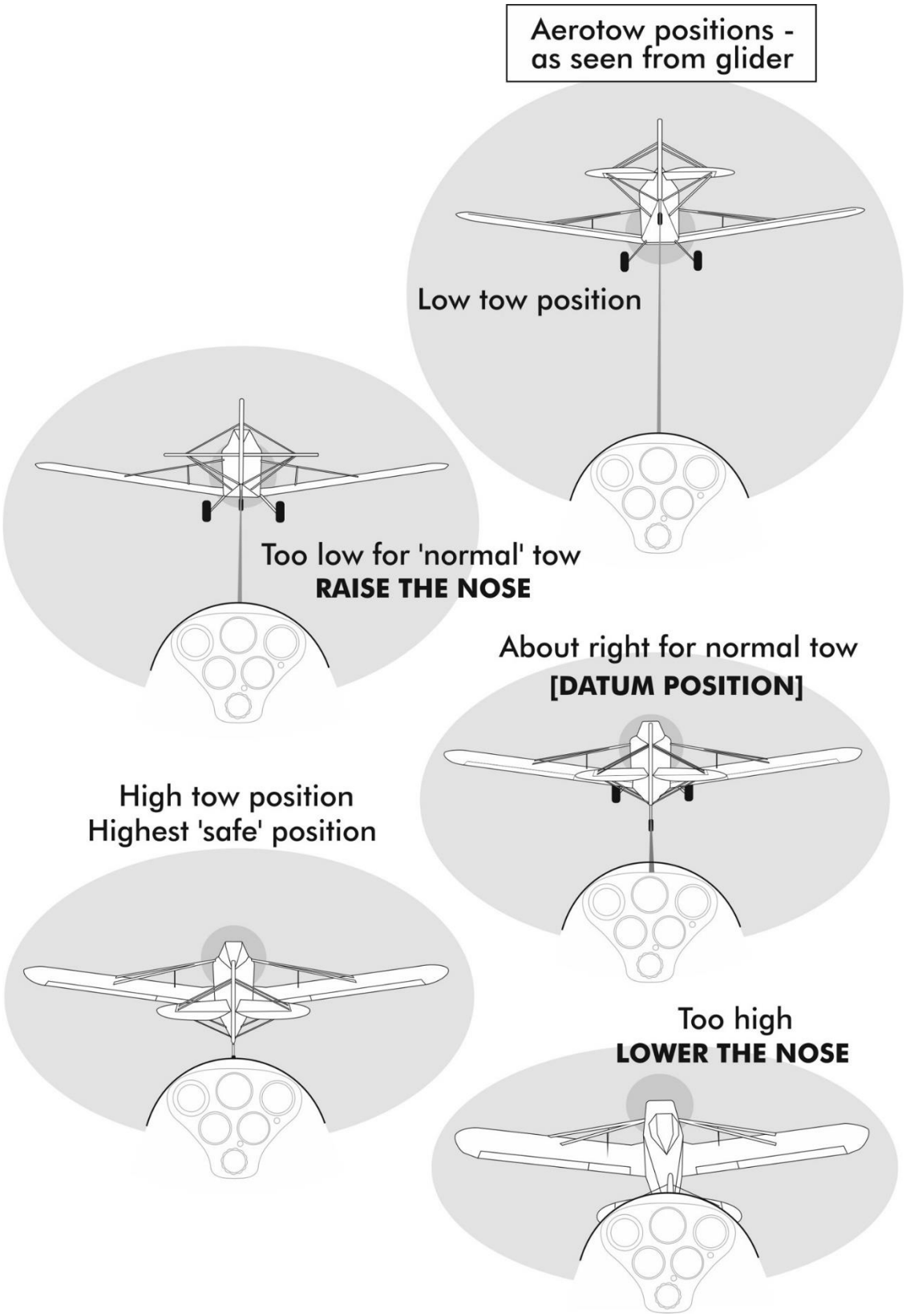
As the glider accelerates behind the towing aircraft, it generates an increasing amount lift. The glider will lift off before the (heavier) towing aircraft. After the glider lifts off the ground (ideally balanced on its mainwheel), the glider pilot needs to prevent the glider climbing too high behind the towing aircraft. Once the towing aircraft lifts off, the glider pilot then has to climb with the towing aircraft whilst maintaining the correct ie normal position.

Towing Positions

The normal towing position is directly behind the towing aircraft and just above the slipstream that flows down and behind the towing aircraft.

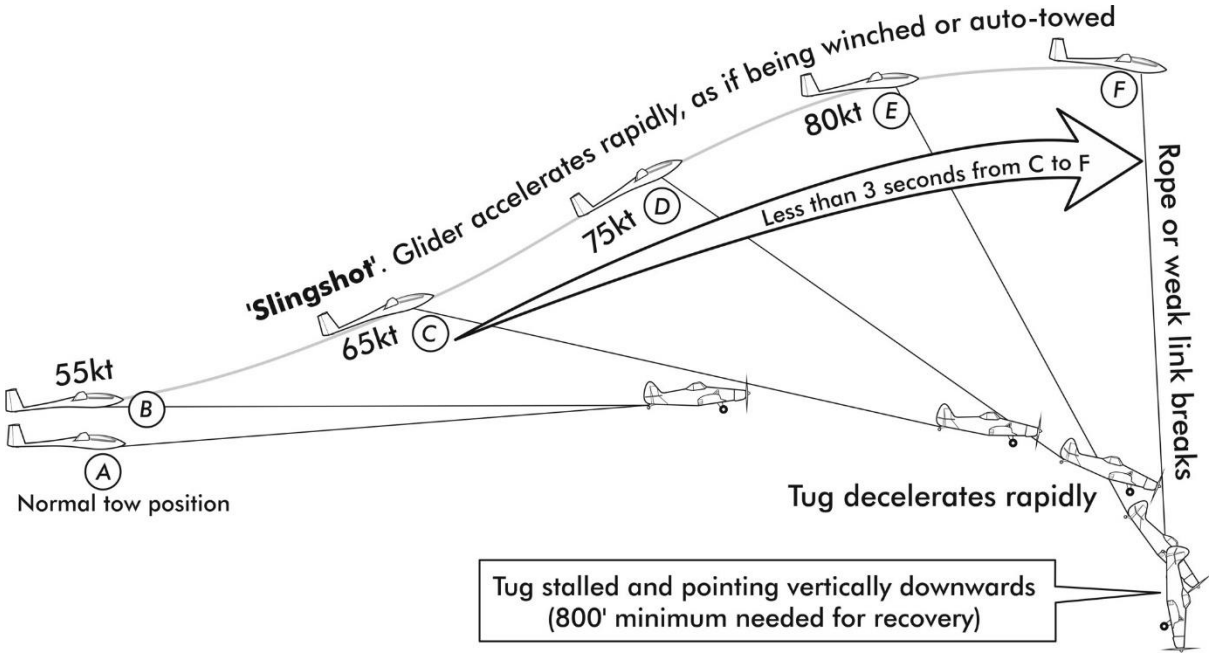


The various towing positions, including the low tow where the glider is deliberately flown beneath the towing aircraft slipstream, look a bit like this from the front seat of a glider. *Please note the 'highest safe' position and the 'too high' position.*



Please note that if the glider is dangerously high on tow, the towing aircraft pilot can rapidly lose control resulting in a steep nose down attitude. If a too high situation occurs during which the towing aircraft is starting to disappear under the nose of the glider, the glider pilot **must release immediately**. Any delay – even a second or two - could result in a what is known as a 'tug upset' accident. See the illustration below.

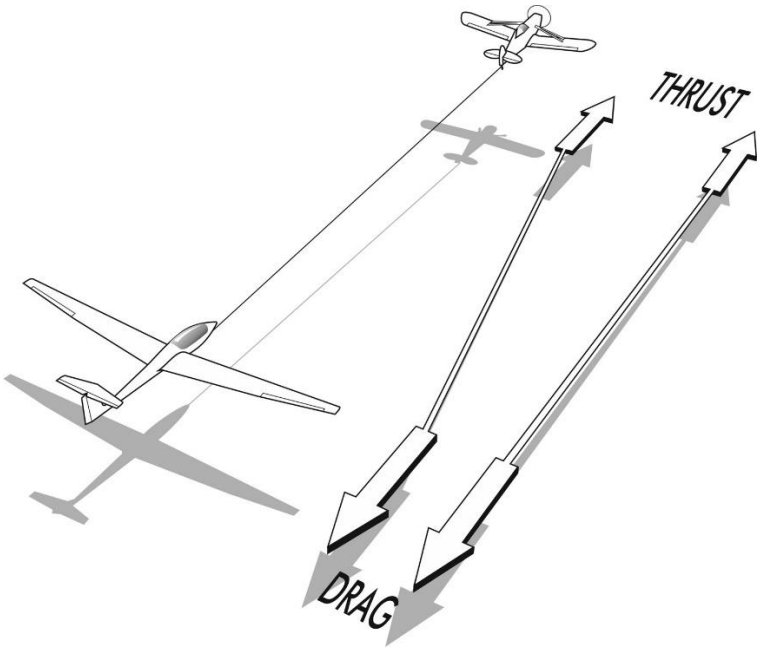
Your instructor will teach you everything you need to know.



Tug Upset scenario

Forces during the aerotow

There are forces during the aerotow that need thinking about if the glider pilot is going to successfully maintain the correct horizontal as well as vertical position behind the towing aircraft.



If the glider moves out of position to the side, the drag of the glider attached to the tow rope will result in the glider moving itself back into the correct position. However, the glider pilot has an important role to play in addressing other forces. Please read on!

'Don't let the wing go down'

Let's assume the glider is incorrectly positioned to the left side of where it should be (ie directly behind the towing aircraft). As the rope is attached to the nose of the glider, it pulls the nose to the right. If the glider pilot does not react, the yawing movement to the right will result in rolling to the right. In other words, the right wing will go down. Within seconds, the glider will move rapidly to the right of the correct position. As it crosses to the right, the nose is heaved across to the left by the pull of the rope and the reverse occurs, eventually resulting in an ever worsening – divergent - situation.

Whenever the glider is out to one side of the correct position (ie directly behind the towing aircraft), the glider pilot should adopt and maintain the same angle of bank as the towing aircraft. Invariably this will require the glider pilot to prevent the glider rolling as described above. In other words, don't let the wing go down. Providing the glider is held at the same angle of bank as the towing aircraft, the glider will move towards the correct towing position.

Your instructor will of course teach you everything you need to know to maintain and recover the glider to the correct towing position.

Emergency signals

There are three emergency signals.

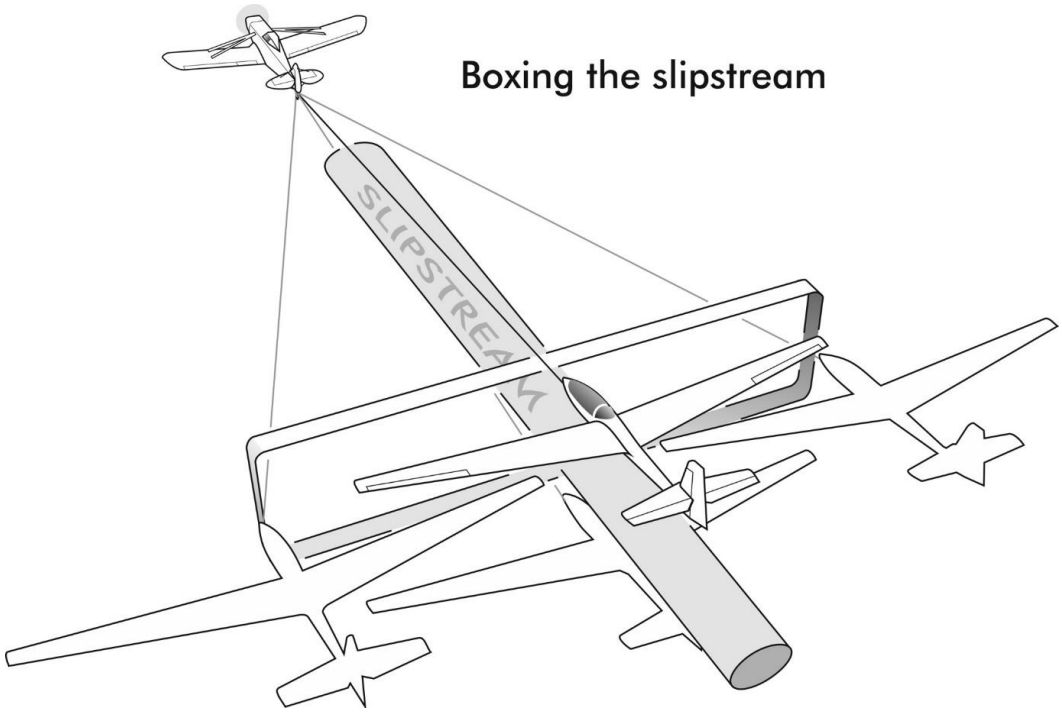
The towing aircraft 'waggles' its rudder. This is a signal from the towing aircraft pilot identifying a problem with the glider end of the combination. When a rudder waggle is seen, *always physically check the glider airbrakes* are closed and locked, as that is the most common problem. If the airbrakes remain open, the tug pilot will eventually order the glider pilot to release.

The towing aircraft rocks its wings. This is the 'emergency wave-off' signal from the towing aircraft pilot ordering the glider pilot to **release immediately**.

Glider unable to release. If the glider is unable to release from the tow rope, the first method of communication to the towing aircraft pilot should be the radio. If radio communication isn't available, the glider is flown out of position well out to the left – this will attract the towing aircraft pilots attention – and the glider pilot rocks the glider wings positively from side to side. The towing aircraft pilot will tow the glider close to the airfield and release the rope from the towing aircraft end.

Boxing the slipstream

You will hear other pilots and your instructor talking about 'boxing the slipstream'. This is a manoeuvre during which the glider pilot deliberately flies the glider around the towing aircraft slipstream. It's a great way of demonstrating the key skills and judgement that are needed to fly solo on aerotow.



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