

# Gliding Australia Training Manual

## Pilot Guide



### Unit 2

### Ground Handling and Signals

### WHAT THIS UNIT IS ABOUT

To develop the skills and knowledge required to safely handle gliders on the ground and use correct signals.

### WHAT ARE THE PRE-REQUISITES FOR THIS UNIT?

- Nil

### COMPLEMENTARY UNITS

- Nil

### KEY MESSAGES

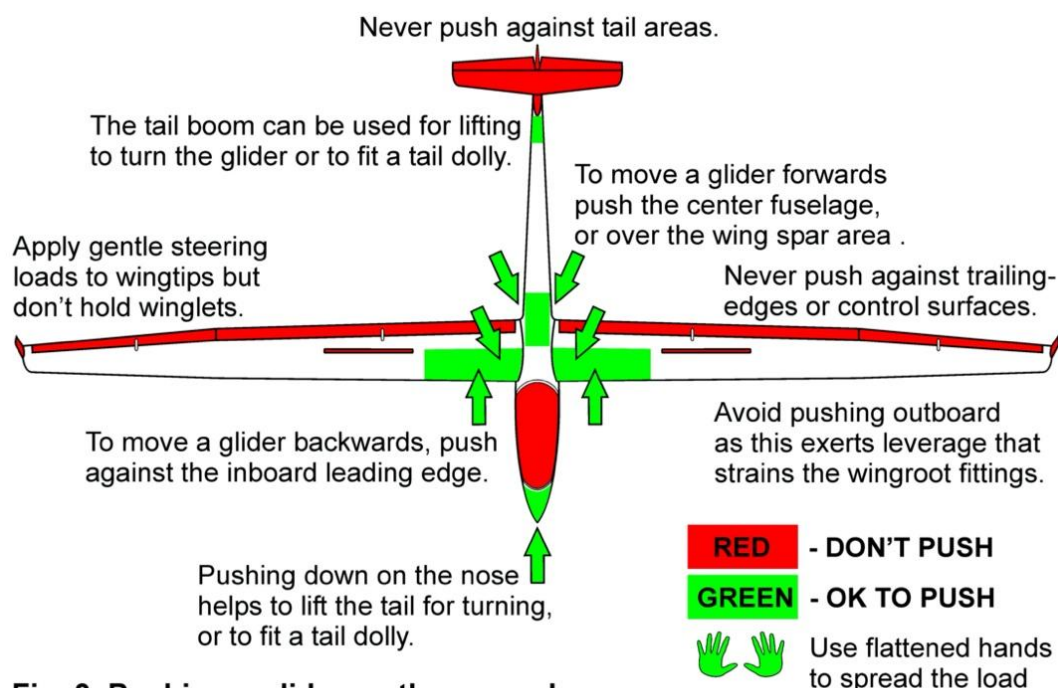
- Safety is a shared responsibility. Any person can call and signal Stop!
- When hooking on, check for knots, rope condition, correct weak link.
- Check “Airspace clear for launch” including ahead down runway and launch flight path. (All clear above and behind is insufficient.)
- Haste increases risks of damage or injury.
- Ensure distractions are minimised, to provide better focus on safety and checks. (Sterile environment).

### PILOT GUIDE FOR THIS UNIT

#### Moving the Glider on the Ground.

We are constantly moving our gliders from the hangers to the flight line and return. Gliders are built to withstand large forces for flying but they can be easily damaged on the ground through mishandling.

The diagram below shows the areas where we can push and no- go areas.



**Fig. 3 Pushing a glider on the ground.**

- This unit will be covered over several days of operations, in a variety of environmental conditions, with careful introduction and supervision by your instructor and experienced pilots.
- One item to watch out for is the glider's canopy. Canopies are very expensive, fragile and scratch and crack quite easily and a scratched canopy can be difficult to see through and therefore dangerous.
- Never leave the canopy open or unlocked when you are not right near the cockpit. Always close and lock the canopy when you move away from the glider for any reason, especially in a wind. Never lift a canopy by the clear view panel. Lift it by the frame or locking handle.
- When you're moving gliders around the strip, only one person should hold a wingtip. If you have one person on each tip, they may pull against each other and damage the glider. If the wind is very strong, make sure it's the upwind wingtip that you hold onto. If you have to swap to the nose or fuselage, make sure someone else holds the wing before you let go.
- When gliders are moved to the launch point or back to the hangar, it's normal to connect a rope from the aircraft (usually from a cable/rope connection) to a vehicle and tow them.
- The golden rule when towing any glider with a rope is to make sure that the tow rope is longer than two thirds of a wing span. This way, if the glider should decide to turn by itself or overtake the car on a downhill slope, for example, the person on the wing tip can hold back to swing the glider clear and there's no chance of the wing tip hitting the tow vehicle.
- The glider should never be towed faster than a moderate walking pace, so beware when using cars which have an automatic gearbox. Choose the smoothest path to the launch point and always keep a good lookout for obstacles near the wing tips.
- Some gliders are towed nose first with the tow rope attached to the cable release and others are towed tail first either with a rope or a rigid bar off the tail dolly. Tail dollies make manoeuvring on the ground a lot easier, but it's essential to make sure the tail dolly is removed before flight. The dolly should always be removed when you park the glider to make it more difficult for the wind to rotate it.

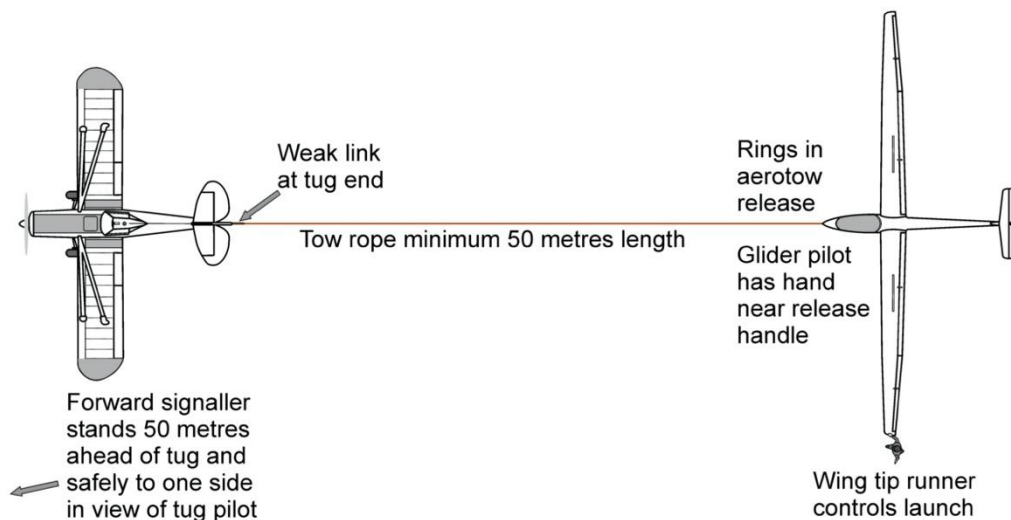
## Unit 2 - Ground Handling and Signals

---

- Some aircraft ground handling kits have an auxiliary wheel on a special fitting slid over the wing called a “wing walker” so a glider can be towed single handed with the wing walker on the wing and a tail dolly on the tail.
- If a glider is being towed from the tail with a mechanical wing-walker attached to a wing and that wing lifts, stop immediately. It’s possible that the ailerons on the low wing will hit the ground or a thick clump of grass and get damaged. Damage to control surfaces done when ground handling is one of the important items you will check in your walk-around before getting in the glider.
- If a glider is towed with a strong wind from behind, the control surfaces can flap up and down and can get damaged. When towing in a wind, control surfaces should be stabilised by tightening the seat-harness over the joystick and chocking the rudder.
- The rule when parking gliders outside during the day is to make sure the wings can’t develop lift. That means in effect, don’t park it nose into the wind, and make sure the air brakes are out to spoil the airflow over the wings.
- When it’s windy, gliders are normally parked tail into the wind at a slight diagonal with a tyre on the into-wind wing. If the strip has tie down wires, these can be used to secure gliders.
- There may be ropes attached to the tie down wire which you can use. It’s easy to loop a rope over the tail boom of a glider, but securing the wings takes more thought. You can’t loop a rope over ailerons or flaps without putting something like a seat cushion on top of the wing, and passing the rope over the cushion to avoid damaging the control surfaces.
- Alternatively, the cushion is put on the wing and two stakes or screw-its can be driven into the ground, one either side of the wing and a rope stretched between the two stakes. Before you go cross country, make sure the glider has a set of this tie-down equipment stowed somewhere secure.
- Always consider tying down aircraft that are not in use as strong thermals can lift aircraft off the ground and destroy them.

### Launching and Ground Signals

- For a launch behind an aircraft tug (aerotow) the diagram below that shows the position of the signaller and wing tip runner. The wing tip runner is there to ensure the glider’s wings remain level at the beginning of the launch as the pilot has limited control of this at low speeds.



**Fig. 2 Aerotow launch**

- In a winch launch the winch is at the far end of the runway and the wingtip runner is in a similar position to the aerotow launch.
- When a glider is ready to launch, there must be clear commands between the pilot, via the ground crew, to the operator of the winch, car or aircraft to begin the launch.
- The responsibility is shared between the ground crew, (which for aerotow ideally includes a forward signaller for maximum safety), a wing runner and the pilot.
- The wingtip runner has a responsibility to check that:
  - The glider's canopy is closed and locked.
  - The airbrakes are closed and locked.
  - That the strip is clear and that airspace is clear to launch.
- The ultimate responsibility for proceeding with any launch rests with the pilot in command. However, because the pilot does not have good visibility of the airspace, the launch crew must check if there is any traffic that could pose a hazard to the launch, such as on approach, from a cross runway, or from a glider conducting a modified circuit. This is the final safety check before launching and is never omitted. The glider wing is not lifted until the "Airspace clear to launch" check has been completed and conveyed to the pilot.
- When holding a wingtip during the launch, support the wing but do not hold it back. Allow the wingtip to slide through fingers without impediment this will allow the wing to move out of your hand once the aircraft is moving forward faster than the wing runner is moving.
- The tug often moves onto the strip when the canopy is closed and waits for the wing to be lifted and the signal to take up slack. Lowering of a wing always means the launch is on hold or aborted.
- If a pilot is unhappy in any way, or if a launch is delayed for any reason, the glider pilot should pull the release and unhook the tow cable from the glider. It doesn't take long to hook it up again and means that there is no way the aircraft can inadvertently launch.

## Unit 2 - Ground Handling and Signals

---

- There are three launch stages. The stages and commands are the same whichever launch method is in use. The commands to initiate these stages are: Take-up slack, Full power or All Out and Stop!
- These commands may also be given to the tow pilot on the radio.

**Take up Slack;** the tow rope is slowly taken up by the tug, car or winch operator until there's no slack in the cable.

**Full Power or All Out;** The tug, car or winch operator applies full (or appropriate) power to start the launch.

**Stop! Stop! Stop!** This signal is the most important of all and should be clearly understood by everyone near a glider being launched. Anyone can give a STOP signal.

- When the STOP signal is given, the person supporting or running the wing must immediately lower it to the ground and hold both hands above their head.



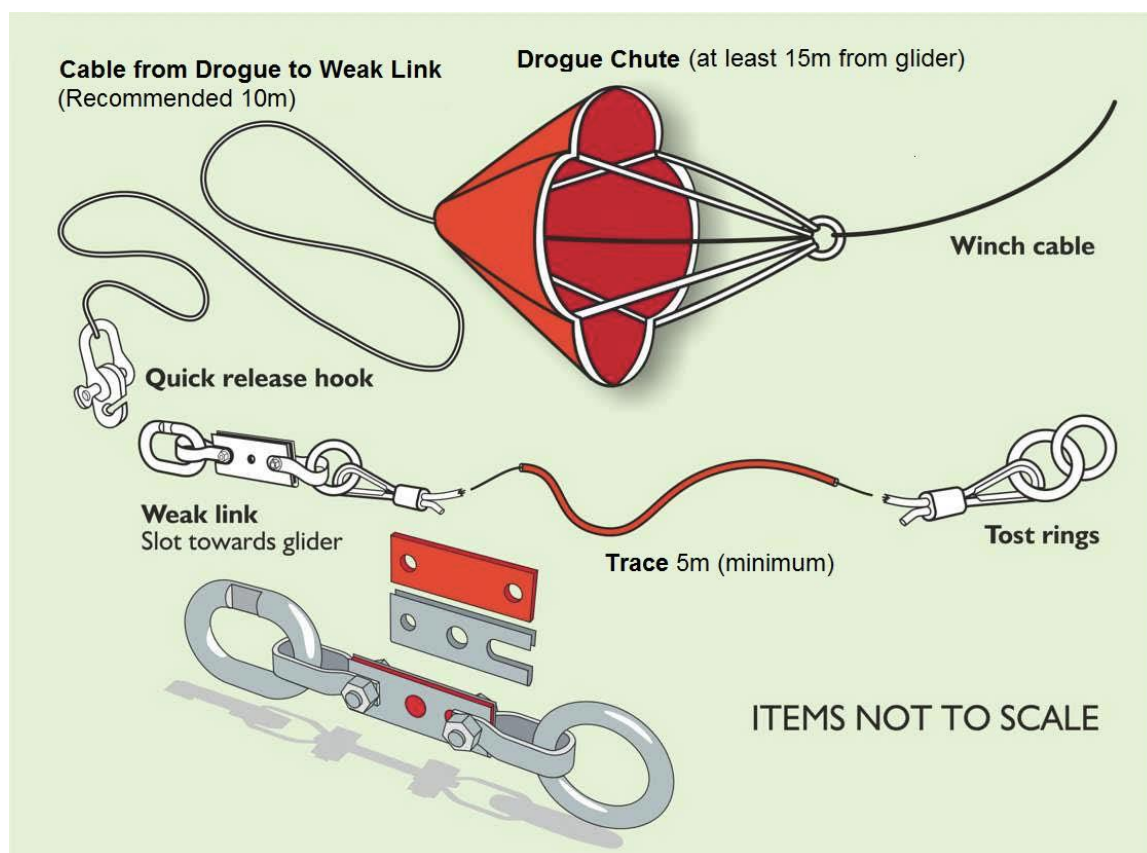
- The lowered wing alerts the pilot who may not be otherwise aware anything is wrong and it's normally seen by the tug pilot as well.
- When the pilot is aware of the wing being lowered and sees the crew with their hands in the air, the pilot should immediately release the cable.
- Nobody should ever be afraid of shouting Stop if it looks like something is not right.
- No-one will mind if there was no problem. The launch can easily be restarted and it is far more important that nobody gets hurt.
- Your instructor will show you the "take up slack" the "All out or full power" and the Stop signal.

### Launching

#### Winch Launching

At the end of the length of wire which is drawn out from the winch, there are certain items of equipment which play a part in the safe launching of the glider. A typical make-up of a cable- end is as follows -

1. **The cable itself.** Although traditionally known as "cable", the material commonly used (and recommended by the GFA) is "Range 2 spring steel wire" of either 2.8 mm or 3.15 mm diameter. This is the wire used to make bedsprings and is readily available from spring manufacturers in 300 kg rolls. Exceptionally, wire rope of 3 mm or 4mm diameter may be used, but only where fairly soft grass surfaces are available for launching, as wire rope is both expensive and susceptible to failure by abrasion and ingress of dust.
2. **Drogue parachute.** Usually about 1.5 metres in diameter, the drogue is used to stabilise the wire after release and keep it under some tension. Some clubs using stranded cable instead of the more usual solid wire do not use a drogue. However, such clubs are in the minority.
3. **Weak link.** This vital piece of equipment is fitted to protect the structure of the glider from damage due to overspeeding of the launch or the pilot trying to climb too steeply. The correct weak link must never be omitted.
4. **Release rings.** This is a linked pair of rings of standard "Tost" design. The smaller ring is inserted into the winch-release hook of all gliders. Two rings are used, rather than just one, in order to ensure that the force exerted on the glider towhook is a straight pull, no matter what the angle is on the cable itself.
5. **Trace.** This length of rope or stranded wire acts as a shock absorber for the launch and serves as a spacer to keep the drogue at a suitable distance from the glider. The minimum length for a trace is 5 metres.
  - A cable is never to be attached to a glider unless the pilot specifically requests it. The appropriate ring is inserted into the glider's towhook, the "belly" hook being used for winch launching, the pilot opening the hook to facilitate this. The hook's ability to release under some tension is required to be checked before the first flight of each day.
  - Belly-hooks are required to have an automatic over-ride or "back-release" mechanism fitted. This protects the glider in the event of failure to release when the pilot pulls the yellow handle. It does so by sensing the downward force on the hook and opening a back-releasing "cage" when an angle of just over 75 degrees to the horizontal is achieved. It is checked before the first flight of each day, by pulling VERTICALLY downwards under considerable tension.
  - Checking a back-release by pulling the cable back towards the tail of the glider is really not searching enough and such mechanisms should not be checked in this way. However, vertical pulls are not always possible on gliders with minimal ground-clearance. All you can do in this case is get the pull as vertical as you can.
  - As an absolute last resort, most winches are equipped with a means of cutting a cable, should it fail to release from the glider for any reason. With the reliability of modern tow-hooks and present-day maintenance practices, such action has not proved necessary for many years.



### Auto-towing

- For auto (motor-car) towing, everything is the same as for winch-launching, except that some autotow operators use polypropylene or polyethylene rope instead of wire. Parafil rope is another, although expensive, alternative method for autotowing. Such ropes may be used without a drogue or a swivel, although the rest of the equipment will still be necessary.
- As a precaution against the unlikely case of release failure in the glider or loss of control of the vehicle by the driver, the tow-car is required to have a means of releasing the cable.

### Aerotowing

- The attachment to the glider is the same in principle as for winch and auto-towing.
- Most gliders these days have a nose-mounted hook specifically for aerotowing. This hook should always be used in preference to the belly hook.
- The weak link on an aerotow rope is normally fitted at the tug end. This protects the glider against overstress on tow and also protects the tug in the event of the rope getting fouled in a tree or power line on the landing approach.
- In this method of launching, the distance between the glider and the towing aircraft is not great and in most cases the pilots of both aircraft can see each other. In spite of this we will ensure that we give clear signals to the tug-pilot so as to avoid confusion and keep the operation completely safe.
- As stated previously, all launch signals (apart from "Stop") originate from the pilot and no signals can be given unless the pilot has authorised them. So, we will assume the pilot has



## Unit 2 - Ground Handling and Signals

---

checked that all is clear for take-off and authority has been given to the wingtip holder to give the "take up slack" signal. The wingtip holder waves one arm to and fro in an underarm motion and keeps doing it while the slack is being taken up.

- This signal is relayed to another signaller standing forward and to one side of the tug aircraft. This signaller, who is easily visible from the cockpit of the tug, repeats the take up slack signal and the tug moves slowly forward to tighten the rope.
- Both signallers should continue to monitor for any conflicting traffic, and Stop the launch if any is identified.
- When the rope is tight the wingtip signaller gives the "all out" signal, which is an over arm wave.
- This signal is also relayed to the tug pilot by the forward signaller and tug pilot applies power to the engine to continue the take-off.
- The forward signaller may be omitted when using tugs with good all-round visibility and all involved in the launch are satisfied that safety is not being compromised. If the launch needs to be stopped for any reason, the wingtip holder shouts "Stop", puts the wingtip down on the ground and raises both arms above the head.
- When the pilot hears the word "Stop" being shouted, immediately pull the release knob to release the rope. Meanwhile the forward signaller repeats the stop signal by raising both arms above the head and the tug pilot stops the take-off. It is obvious that the pilot needs the left hand to be near the release knob during the take-off, so hand signals from the cockpit should not be used, as they are a major distraction.

### FLIGHT EXERCISES FOR THIS UNIT

There is no flight exercise for this unit. Your instructor will show you the launch operation and explain the actions of the launch crew.

### THINGS YOU MIGHT HAVE DIFFICULTY WITH

- Initially learning the names for various components of the glider and equipment.
- Remembering the checks and processes for launching the aircraft.

### HOW DO YOU DEMONSTRATE COMPETENCE?

You demonstrate competence in this unit by being able to:

- Safely move the glider on the ground and tie it down
- Explain and demonstrate the standard ground signals
- Correctly perform the wing-runner and launch crew duties to launch a glider without guidance.

### RESOURCES & REFERENCES

Australian Gliding Knowledge. Pages 83 to 99.

Theory Briefing: Ground Handling & Signals

### SELF-CHECK QUESTIONS

Use these questions to test your knowledge of the unit.

1. Who can stop a glider launching sequence when something is not right?
2. When manoeuvring a glider on the ground can you push on the tail?
3. What is the minimum length of rope attached to a car when towing the glider?
4. What are the three standard ground handling signals?
5. How should a wing-runner hold the aircraft's wingtip when performing a launch?