

Gliding Australia Training Manual

Pilot Guide



Unit 19

Crosswind Take-off and Landing

Unit 19 - Crosswind Take-off and Landing

WHAT THIS UNIT IS ABOUT

To assess crosswind condition and describe their effects on take-off and landing operations and demonstrate the safe actions to take in the event of crosswinds on both take-off and landings.

WHAT ARE THE PRE-REQUISITES FOR THIS UNIT?

- GPC Unit 13 Launch and release
- GPC Unit 14 Take-off
- GPC Unit 15 Break-off and circuit planning
- GPC Unit 16 Circuit Joining and execution
- GPC Unit 17 Stabilised Approach and landing

COMPLEMENTARY UNITS

Nil

KEY MESSAGES

- Crosswind conditions can adversely affect glider operations and pilots need to know when this could occur with reference to:
 - The Aircraft Flight Manual limitations.
 - Personal minima and experience.
 - Club Operations Manual limitations.
- Pilots must be able to assess the crosswind component for a nominated runway.
- Pilots need to know how to use the aircraft's controls to counter drift in crosswind conditions on take-off and landing.
- Describe actions to abort a crosswind take-off safely.

PILOT GUIDE FOR THIS UNIT

- We normally take-off into wind as this provides air flow over the wing before we even move. The glider can lift off the ground earlier in the launch, and movement across the ground is slower when landing meaning a shorter ground run.
- Sometimes (often) the wind is not blowing straight along the runway, and we have a crosswind component, which impacts on the glider, making it drift laterally across the runway with the wind on take-off or landing.
- The aircraft controls are sufficient to cater for a small crosswind but may not handle a stronger crosswind. Towplanes are usually the limiting factor as they tend to have a lower crosswind capability. The Aircraft Flight Manual will provide details of the maximum crosswind component that can be accommodated (or has been demonstrated by the aircraft manufacturer). If it is too strong you need to operate from a different runway that reduces the crosswind component or leave the aircraft in the hangar.

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Crosswind Take-off

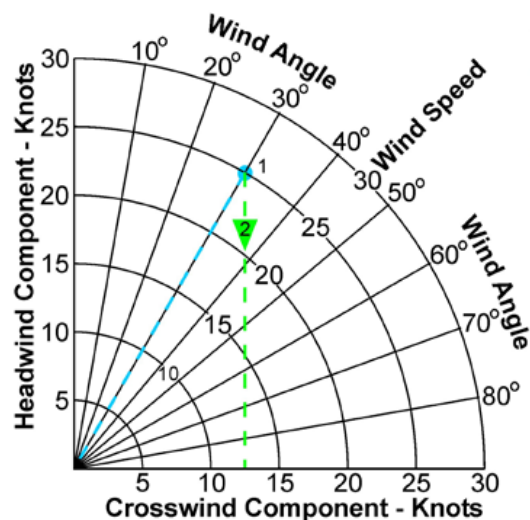
- With the main wheel on the ground, a wind from the side will push the tail of the aircraft, resulting in the nose weathercocking into wind. This can be countered by use of opposite rudder to keep the glider travelling straight, but the amount of rudder is limited and may not be sufficient if the wind is too strong.
- Wind from the right will try and lift the right wing and you may not have sufficient aileron control to hold it down, in particular at low speed. The wing tip runner will need to help by running the into wind wing and holding it lower.
- If you are unable to control the glider sufficiently during the ground run and separation, you should release immediately and land the glider, probably angling across the runway.
- If possible, delay separation from the ground until you have more speed and therefore greater control.
- Once the glider lifts from the ground the whole glider will drift downwind. In order to continue to fly along the runway you will need to 'crab' by pointing the glider in a direction upwind. So the nose of the glider will be pointing at an angle into wind and the glider will be tracking along the runway. The towrope should be aligned with the runway direction if you have this right. It is important not to let the glider settle back to the ground at this stage.
- If on aerotow, once the towplane lifts off the ground the same thing will happen to the towplane and the pilot will adopt the same angle into wind. At this time, you need to let the glider slip back into line behind the towplane and the tow pilot takes responsibility to ensure that the combination is tracking along the runway direction.

Crosswind Landing

- Crosswind landings are the reverse of this situation. To fly in the required landing direction on final will require a **Crabbing** approach or a **Wing-down** approach
- **Crabbing approach (primary method):**
 - Maintain track line by adjusting heading sufficiently into wind to adjust for drift.
 - During flare and hold off, rudder the aircraft straight on to the landing track line and maintain parallel heading with rudder.
 - Possibly using opposite aileron to counter the roll caused by the rudder. which takes some careful flying close to the ground
 - If drift is encountered, lower into wind wing sufficiently to stop drift.
- **Wing-down approach:**
 - Turn the glider directly into line with the landing path.
 - Lower the into wind wing sufficient to counter drift.
 - Maintain landing track with opposite rudder.
 - Flare, hold off and ground roll with above drift countering controls, taking care to ensure the lower (into wind) wingtip does not come close to the ground.
- Ground roll should be made as short as possible with full airbrake and wheel braking, maintaining directional control with rudder and finishing with into wind wing touching down at just before the glider stops.
- Be careful with canopy security when exiting the glider.

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GFA Crosswind Chart



Calculating the Crosswind Component

- ① Plot Wind Speed (refer to wind sock) & Wind Angle left or right of Runway Heading.
- ② Follow vertical line to Crosswind Component.

Quick Mental Calculation (approx)

Wind Angle	Crosswind Component
30 degrees	50% wind speed
45 degrees	75% wind speed
45+ degrees	Change runway?

RG

- Point 1 on the chart plots a 25 knot wind at an angle of 30 degrees to the runway.
- Following the vertical line shows a crosswind component of 12.5 knots, which is quite significant.

Orographic turbulence

Some runways may have trees, building or other barriers which block the wind, but often these obstacles create significant turbulence behind them.

This turbulence can create significant problems for the pilot, with both takeoff and landing. When landing, select a higher flying speed to give you more control.

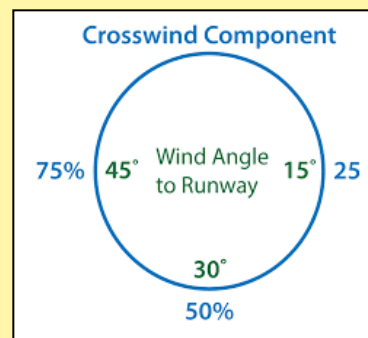
On takeoff beware of starting the launch in a wind shadow and then flying into a clear area where the wind suddenly impacts on the glider, and you find yourself drifting rapidly sideways, or weather cocking towards the obstacle.

FLIGHT EXERCISES FOR THIS UNIT

Your trainer will demonstrate crosswind take-off and crosswind landing, and gradually hand over responsibility.

Notes

- Assess trend of wind strength and direction from multiple forecasting sources allowing for the worst possible case.
- Ensure that the crosswind component is within the Aircraft Flight Manual and Club Operations Manual limitations.
- Set and observe personal minima.
- Maintain at all times situational awareness, aircraft control and safety including action on losing sight of the tug.
- Be alert for orographic turbulence set off from surrounding trees and/or buildings.



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THINGS YOU MIGHT HAVE DIFFICULTY WITH

COMMON PROBLEMS

- Drift with a crosswind can be surprisingly strong so you need to be prepared to act quite quickly
- A crabbing take-off or landing requires coordinated controls but appears 'wrong' when close to the ground.
- Do not let the glider touch the ground when you have an established crab. You must have the wheel pointing in the direction of landing when touching the ground.
- Correcting the crab angle too early will result in more opportunity for the aircraft to experience lateral drift across the runway in the final stage of the landing.
- When on aerotow take-off, do not let the glider drift downwind of the towplane as this will exaggerate the weather cocking tendency of the towplane which may not be controllable.

HOW DO YOU DEMONSTRATE COMPETENCE?

- State the crosswind limitations for gliders flown, referencing the Aircraft Flight Manual (AFM).
- Determine the crosswind component for a particular runway
- Describe the possible impacts of the crosswind on take-off and mitigators.
- Describe the actions to take to abort a crosswind take-off.
- Describe the difference between a crabbing and wing-down approach.
- Demonstrate safe conduct of a crosswind take-off unaided at least three times
- Demonstrate safe conduct of a crosswind landing unaided at least three times using the Crabbing approach.

RESOURCES & REFERENCES

- Australian Gliding Knowledge pages 111-112, 120, 136, 157
- Windy weather
- Skysight

SELF-CHECK QUESTIONS

- With a 25-knot wind, what is the maximum angle that the wind can come from so that you don't exceed a 10-knot crosswind limit for the glider you are flying?
- You are protected by trees at the launch point but it is apparent that there is a strong crosswind from the right. What possible impact could this produce?
- You expect strong turbulence behind the trees when landing. What action can you take to reduce the impacts of this turbulence?
- You have a medium strength crosswind on take-off. What advice would you give to the wingtip runner to help with your take-off.
- Describe the crabbing method for a crosswind take-off.
- Describe a wing-down method for a crosswind landing.