

Gliding Australia Training Manual

Trainer Guide



Unit 19

Crosswind Take-off and Landing

AIM

The aim of this Unit is to enable the student to assess cross wind conditions and describe their effects on take-off and landing operations with regard to different gliders. The student will describe and demonstrate the safe actions to take in the event of cross-winds on aerotow take-offs and landings.

PREREQUISITE UNITS

- 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

This unit is a prerequisite for solo crosswind operations but can be subsequent to a first solo in suitable into-wind operations.

COMPLEMENTARY UNITS

This unit should be read in conjunction with:

- Unit 14 Takeoff
- Unit 17 Stabilised Approach and landing

COMPETENCY ELEMENTS AND PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARDS
1. Assess Cross wind conditions and glider limitations.	<ul style="list-style-type: none"> • Describe: <ul style="list-style-type: none"> ○ The crosswind limitations for gliders flown, referencing the Aircraft Flight Manual (AFM). ○ Any crosswind limitations defined in the Club's Operations Manual (if any). • Demonstrate: <ul style="list-style-type: none"> ○ Assessment of the crosswind component for a particular runway direction using: <ul style="list-style-type: none"> • Weather forecasted winds. • Wind socks. • The GFA cross-wind chart.
2. Crosswind Take-offs.	<ul style="list-style-type: none"> • Describe: <ul style="list-style-type: none"> ○ The possible impacts of the crosswind on take-off and mitigators. ○ The actions to take to abort a crosswind take-off. • Demonstrate: <ul style="list-style-type: none"> ○ Safe conduct of a crosswind take-off unaided at least three times.
3. Crosswind Landings.	<ul style="list-style-type: none"> • Describe: <ul style="list-style-type: none"> ○ The possible impacts of the crosswind on landing and mitigators. ○ The difference between a crabbing and wing-down approach. • Demonstrate: <ul style="list-style-type: none"> ○ Selection of safe approach speeds countering turbulence and/or wind shear. ○ Safe conduct of a crosswind landing unaided at least three times using a crabbing approach.

KEY MESSAGES

- Cross-wind 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 cross-wind component for a nominated runway.
- Pilots need to know how to use the aircraft's controls to counter drift in cross-wind conditions on take-off and landing.
- There are two methods for flying a cross-wind approach (crabbing and wing-down) – crabbing approach is taught as the primary method, but either can be used.
- Describe actions to abort a cross-wind take-off safely.

LESSON PLANNING AND CONDUCT

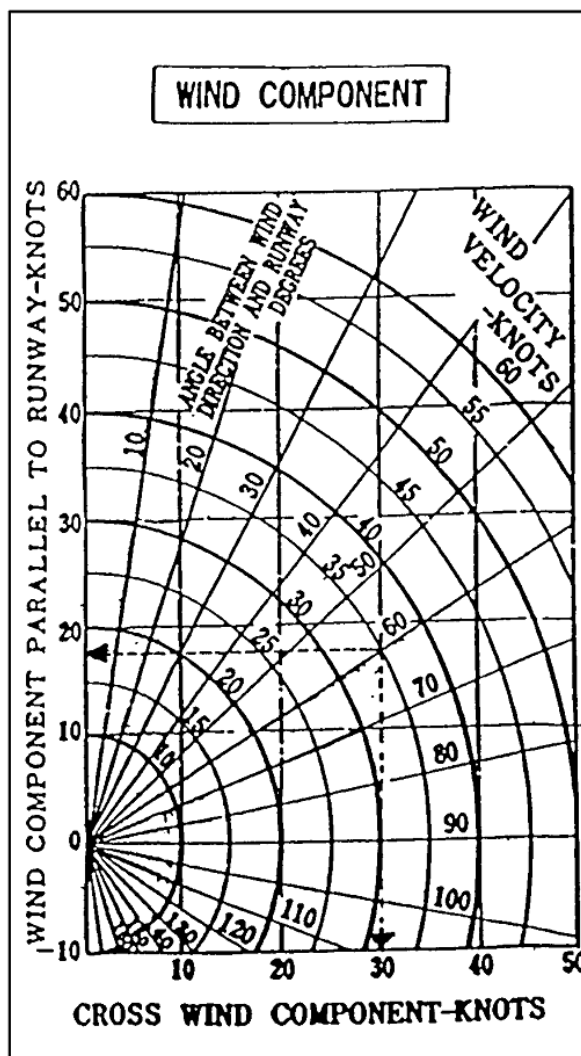
Classroom Briefing

Required Equipment

Whiteboard, model aircraft, PC with Internet access, PowerPoint presentation, GFA Cross-wind Chart, handouts, Videos, AGK, Simulator (if available).

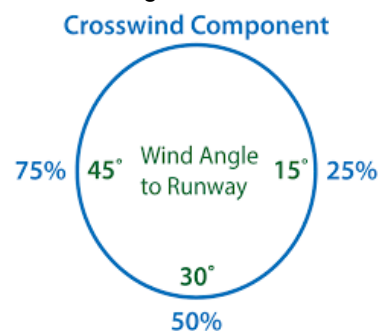
Briefing Points

- Assess the cross-wind component for a particular runway direction using weather forecasted winds by reference to one or more of the following:
 - NAIPS
 - GFA MET
 - Willy Weather
 - Wind socks
 - The GFA cross-wind chart
 - Clock face cross-wind rule of thumb
- List the cross-wind limitations for any given glider using the Aircraft Flight Manual
- List any cross-wind limitations defined in the Club's Operations Manual (if any).
- Use the chart to show how a 30 knot wind at 30 degrees to the runway direction equates to approximately 15 knots crosswind and 26 knots headwind component.



GFA Crosswind Chart

- A simple rule of thumb to estimate the cross-wind using a clock face. If the angle of the wind from the nose is:
- 15° (quarter past the hour), crosswind component is $\frac{1}{4}$ (25%),
- 30° (half past the hour), crosswind component is $\frac{1}{2}$ (50%),
- 45° (three-quarters past the hour), crosswind component is $\frac{3}{4}$ (75%).
- 60° (on the hour) or more, use 100% crosswind.



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- List the causes and effects of orographic turbulence on cross-wind take off and landings:
 - Trees.
 - Buildings.
- Describe the effect of windshear from such turbulence and how to select a suitable approach speed.

Take-off Techniques

- Wing runner should be holding the into-wind wing.
- Maintain directional control on ground roll with rudder.
- Keep into-wind wing low to counter drift (but not so low as to touch the wingtip).
- Delay lifting the aircraft into the air.
- On take-off on aerotow either:
 - Keep into wind wing low to counter drift or;
 - With level wings, yaw nose into wind sufficiently to keep rope parallel to runway heading behind tug and help tug stay straight on runway heading.
- As soon as the tug is airborne, ease off into-wind adjustments to adopt normal line astern tow position.
- On take-off on winch:
 - The pilot will need to apply some rudder against weathercocking in the early part of the ground run.
 - The pilot must ensure that the cross wind during the early part of the launch does not force the downwind wing onto the ground - if this happens the pilot must immediately release.
 - Once airborne, keep into-wind wing down to counter drift during full climb.
 - The student should be briefed on the operational limitations of the gliding site using winch launching. This may include whether launching in some cross winds is not permitted due to the potential for the winch wire to drift onto power lines, roads or public areas, or the potential for the winch driver to terminate the launch if adequate drift correction is not performed.
- If at any time on the ground roll direction control is lost – release immediately and land on the runway, diagonally across it if needs be.

Landing Techniques

- Crabbing approach:
 - 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.
 - If drift is encountered, lower into-wind wing sufficiently to stop drift.
- Wing-down approach:
 - Maintain track by turning the aircraft directly into line with the landing track.

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- Correct lateral drift by applying bank (into wind) and opposite rudder (to remain on approach path) so that the path in line with the landing track is made good.
- The angle of bank is reduced as the aircraft approaches the ground to avoid any risk of touching the wing tip on 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.
- Note: Approach maybe a combination initially a crab approach and then convert to a wing-down flare and hold off for landing. Ensure touchdown occurs with the aircraft nose pointing in the direction of travel to avoid damage to the undercarriage.
- If the crosswind is extreme, ground roll may be permitted to finish into wind (runway width permitting) to enable safer and easier cockpit exit.
- Be careful with canopy security when exiting the glider.

PRE-FLIGHT BRIEFING

- Compare forecast crosswind with actual crosswind using windssock(s).
- Assess whether the operation is within the cross-wind limitations for the given glider laid down in the Aircraft Flight Manual or the Club's Operations Manual (if any).
- Review the crosswind take-off technique appropriate to launching method.
- Discuss the effect that orographic turbulence and wind shear has on the approach and how to select a suitable approach speed.
- Review the crosswind approach and landing technique to be practiced (crab or wing-down).

FLIGHT EXERCISES

Specific demonstration and practice required:

- Flying for this unit requires at least a five to eight knot crosswind component on the duty runway.
- Trainer demonstrates:
 - Crosswind take-offs.
 - Landings using:
 - Crabbing approach.
 - Wing-down approach.
- Student practice (under supervision):
 - Crosswind take-offs.
 - Landings using:
 - Crabbing approach.
 - Wing-down approach (where opportunity permits)

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Notes:

1. Skilled demonstrations by the trainer are essential.
2. Don't let the student be too enthusiastic with keeping the into-wind wing down on take-off and landing thereby touching the wingtip and causing a ground loop.
3. Watch for the tendency to be too early or too late in aligning the aircraft with the landing track when using the crabbing approach.
4. Be vigilant, ready to take over on first signs of mishandling in the student's first attempts.

Advice to trainers regarding their responsibility to maintain safe flight.

- Ensure that the glider does not prematurely lift off on take-off resulting in loss of drift control.
- Ensure that the glider does not drift downwind of the tug on the take-off roll or early airborne phase before the tug is airborne as this will compound the cross-wind effect on the tug.
- On landing ensure that all drift is countered before touchdown to mitigate any adverse strain on the undercarriage.
- If drift is still apparent before touchdown, take over, close airbrakes and eliminate drift prior to subsequent touchdown.
- The flight is not finished until the aircraft is stopped and the into-wind wing is on the ground.

COMMON PROBLEMS

Problem	Probable Cause
<ul style="list-style-type: none"> Crosswind conditions exceed student's (or trainer's) capabilities. 	<p>Set and don't exceed personal minima.</p> <p>Reschedule exercise for another time.</p> <p>Check potential for using a different runway with more acceptable crosswind component.</p>
<ul style="list-style-type: none"> Student is overloaded if they are still mastering normal take-offs and landings. 	<p>Allow student to gain pre-requisite skills first.</p> <p>Monitor student closely for overloading and don't hesitate to take over if necessary.</p>
<ul style="list-style-type: none"> Student fails to maintain position behind tug (aero-tow). 	<p>A thorough ground briefing must be undertaken to emphasise the danger to the tug of the glider drifting downwind after airborne before the tug has taken off on ground roll.</p> <p>The tow pilot may at any time release the glider if the tug is considered in danger.</p>
<ul style="list-style-type: none"> Student fails to correct for crosswind drift (winch) and aircraft is approaching position where the cable will fall outside a safe area. 	<p>A thorough ground briefing must be undertaken to emphasise how the pilot will correct for drift in the full climb portion of the winch launch.</p> <p>The winch driver may at any time terminate the launch if the glider is considered to be approaching a position where dropping the cable will result in damage or injury.</p>

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<ul style="list-style-type: none"> Aircraft track departs from runway heading and approaches hazards. 	<p>Student has not identified cross wind or has not applied sufficient cross wind correction.</p> <p>If the former, point out visual clues (windsock, dust, wind indications in crops). If the latter demonstrate required correction technique and get student to repeat.</p>
<ul style="list-style-type: none"> Aircraft starts to drift laterally on runway during late final. 	<p>Student has aligned glider track with runway (crabbing approach) or levelled wing (wing-down approach) too early.</p>

THREAT AND ERROR MANAGEMENT

- If uncurrent on type with some of these exercises trainers should undertake refresher practice with their CFI or a more experienced trainer prior to conducting training in this unit.
- 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.
- If orographic turbulence or wind shear is expected, adopt a higher approach speed.

TRAINING MATERIALS AND REFERENCES

- Whiteboard
- Model aircraft
- PC/iPad with Internet access
- GPC Theory Lesson 5.
- Video demonstrations
- Handouts
- GPC Pilot Guide Unit 19
- Australian Gliding Knowledge Pages 112-113, 134-135
- Simulator (if available)