

Gliding Australia Training Manual

Trainer Guide



Unit 10

Use of Ancillary Controls

Unit 10 - Use of Ancillary Controls

AIM

The aim of this GPC Unit is to:

- develop the practical skills and knowledge to operate the Airbrakes, Flaps, Undercarriage, Canopy and Tow release in various gliders.

PREREQUISITE UNITS

- GPC Unit 4 Orientation & Sailplane Stability
- GPC Unit 5 Primary Effect of Controls
- GPC Unit 6 Aileron Drag & Rudder Coordination
- GPC Unit 7 Straight Flight, Various Speeds & Trim
- GPC Unit 9 Lookout Procedures

COMPLEMENTARY UNITS

There are no complementary units for this GPC unit

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COMPETENCY ELEMENTS AND PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARDS
1. Airbrake controls	<ul style="list-style-type: none"> • Describe: <ul style="list-style-type: none"> ○ The purpose and limitations of the airbrakes on a glider. • Demonstrate: <ul style="list-style-type: none"> ○ Identification and correct operation of the airbrake to control the rate of descent of the glider.
2. Flap controls	<ul style="list-style-type: none"> • Describe: <ul style="list-style-type: none"> ○ The purpose and limitations of the various flaps on a glider. ○ The limitations on when flaps can be used. ○ The threats that flaps can introduce. • Demonstrate: <ul style="list-style-type: none"> ○ Identification and correct operation of the different types of flap on the glider.
3. Undercarriage controls	<ul style="list-style-type: none"> • Describe: <ul style="list-style-type: none"> ○ The purpose and limitations of the undercarriage controls on a glider. • Demonstrate: <ul style="list-style-type: none"> ○ Identification of the undercarriage lever and its action. ○ Raising and lowering the undercarriage in accordance with Flight Manual limits. ○ Confirming how the undercarriage is down and locked.
4. Canopy latches	<ul style="list-style-type: none"> • Describe: <ul style="list-style-type: none"> ○ The way that the canopy latches work on the aircraft in both normal and emergency operations. ○ How to avoid damage to the canopy. ○ Why an unattended aircraft must always have its canopies secured. • Demonstrate: <ul style="list-style-type: none"> ○ Appropriate care when handling the canopy. ○ Operation of the canopy in both normal and emergency operations.

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5. Tow release.

- **Describe:**
 - The purpose of the tow release handle and how it operates the aerotow and winch tow hooks.
- **Demonstrate:**
 - Identification and operation of the tow release.

KEY MESSAGES

- The airbrakes are used to control the rate of descent of the glider, typically on approach to land. They are not used to control the airspeed – the elevator controls airspeed.
- Extending airbrakes will increase the stall speed of the wing by increasing the wing loading.
- Flaps enable the camber of the wing to change and enhance slow and high-speed flight characteristics. Typically used on landing to allow a slower touch down speed and steeper approach.
- Canopies are expensive and easily damaged parts of the glider.

LESSON PLANNING AND CONDUCT

Classroom Briefing

Locate - Identify - Operate

All ancillary controls must be positively located and identified as the one required prior to use. This eliminates any possibility of error in selection of the wrong control.

The principle applies to all ancillary controls - airbrake, flaps, canopy, trim, tow release and undercarriage - and in the latter case extends to ensuring that the undercarriage selector is placed in the appropriate position (eg. Down and locked) in accordance with the placards fitted to the glider.

Standard colour coding of controls, which are:

CANOPY Normal Release	WHITE
CANOPY Emergency Release	RED
TRIM	GREEN (See GPC 7)
AIRBRAKES	BLUE
TOW RELEASE	YELLOW
FLAPS	GREY
UNDERCARRIAGE	BLACK

NOTE: Some manufactures may not conform to colours of flaps and undercarriage.

Airbrakes (**BLUE**)

- Explain the difference between spoilers and airbrakes.

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- Their primary purpose is to control the descent angle of the glider on approach to land or to reduce height.
- Emphasise that speed is controlled by the attitude of the glider on approach, not the airbrake.
- The spoiler/airbrake control colour is always BLUE.
- All spoiler and airbrakes have maximum speeds for activation. See Aircraft Flight Manual (AFM) and placards in cockpit.
- The control (BLUE) must be identified before use.

Flaps: (GREY)

- Explain the difference between the different types of flaps (plain, fowler and flaperons).
- The primary reason for flaps fitted to some gliders is to enable the camber of the wing to be modified to better suit the speed being flown.
- Flaps on gliders are lowered by a single handle moved aft which lowers them and forward to raise them.
- When the flaps are lowered, they will increase lift but also drag. Normally there are two settings down about 8 degrees for slow speed flight and 30 degrees for landing (more drag).
- Some gliders, to increase their performance, have flaps that can be raised above the neutral setting and may have 2 or 3 settings. This is known as negative flap.
- When flaps are lowered (positive flap) the stall speed will be lower. When flaps are raised (negative flap) the stall speed will be higher.
- In some gliders the flaps may be linked to the ailerons so that when the flaps are moved both ailerons move in the same direction to provide maximum lift and control along the full wingspan - Called Flaperon (flap and aileron)

Use of flap for take- off and landing

- Some gliders benefit from using a positive flap setting so that the glider will fly at a lower airspeed therefore reducing the take-off distance and landing distance.
- Some start the take-off ground run with a negative flap setting which provides better aileron control. Pilots then move them to positive flap to enable an earlier take off.
- Pilots need to maintain proximity to the release handle until aileron control is achieved before moving their hand back to the flap handle. Again, the handle must be positively identified.
- All flaps have airspeed limitations. Refer to the aircraft Flight Manual and placards.

Undercarriage: (BLACK)

- Understandably, the undercarriage must be down and locked when the glider is on the ground. Some undercarriages can be retracted to improve performance of the glider so care must be taken to ensure that it is checked down and locked before landing (FUST).
- Note any speed limitation for undercarriage deployment.
- Note the undercarriage placards which indicate which direction is down. This varies with different gliders. Some gliders have an audible alarm (buzzer or siren) if the airbrake is actuated when the undercarriage is not down and locked. However, these alarms may malfunction and must not be relied upon.
- You need to also check that the wheel is Locked in the down position, which requires clear focus and attention.

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Canopy: (WHITE Normal. RED EMERGENCY).

- Explain the glider types normal and emergency operating handles while sitting in the glider.
- Explain the dangers of reaching into the cockpit through the clear view panel.
- Describe the care and attention needed to control the canopy when open - especially in high winds.
- Explain why you never leave an aircraft unattended with an unlocked or open canopy.
- Note that for some aircraft designs, an open canopy can focus the sunlight onto the seat cushions or headrests and start a fire.

Tow Release: (YELLOW)

- Identify release to student and explain the positioning of hand during hook up and take off for winch and aerotow launch.

PRE-FLIGHT BRIEFING

- Note that this lesson is about the effects of individual ancillary controls.
- Remind the student that they have seen the use of the airbrake by the trainer when landing on previous flights.
- There is potential for a relatively large change in attitude with full activation of airbrake. If this causes discomfort, then please notify the trainer.
- Identify the correct blue control lever and practice on the ground and note the control surface movement on the aircraft.
- Student may have used the GREEN trim control in previous flight.
- Advise the student that they might feel the trainer using controls other than the one being used during their flying to damp out non-relevant effects due to turbulence.
- Emphasis the student to remain on controls and follow through with the trainer when requested.

FLIGHT EXERCISES

Undercarriage

- The student should at this stage have been aware of the undercarriage movement from previous flights.
- It is essential the trainer indicates to the student on the ground the lever and action required to raise and lower on the type being flown. This should include the up and down indicators and any electronic warnings.
- Demonstrate any potential down-but-unlocked scenarios if these are possible with the aircraft.
- It is very important to stress when these actions occur – raise undercarriage following release from tow, and down and locked PRIOR to the pre-landing checks

Airbrake

- Students should have seen the activation of the airbrake on previous flights, but this will be the first time they will have used it.

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- From level flight at 60 Kt get the student to identify the BLUE lever. Get the student to unlock the airbrake, ensuring it does not 'suck out' and then deploy half brake and notice the force required. Maintain speed with attitude and note new nose down position.
- Various positions of brake should be practiced. Thermal if possible, to regain height.

Flaps

- Emphasise check of airspeed prior to flap extension.
- If the training glider has flaps then the trainer should demonstrate the new attitude at 50Kt on the first position of positive flap.
- Emphasis on identifying correct control. Handover to the student to practice and maintain the new attitude and trim. Remind the student that this position can be used for Thermaling at slower speeds. If Thermaling, demonstrate and handover.
- Full positive flap and attitude should be demonstrated for landing configuration. Student practices maintaining correct attitude and trim.
- Demonstrate the correct landing position for flaps and what must be checked on the pre-landing check.

Notes:

1. Ensure lookout is maintained throughout.
2. Ensure the student verbally identifies (Locate-Identify-Operate) each control before movement.
3. Make sure the correct handover of control is maintained.

COMMON PROBLEMS

Problem	Probable Cause
<ul style="list-style-type: none"> • Student pulls out the airbrake quickly with a large extension. 	Airbrake over-centre lock may be hard for some students to overcome.
<ul style="list-style-type: none"> • Student has difficulty raising undercarriage. 	Undercarriage may be difficult to raise due to weight or position of lever in the cockpit. Provide guidance to student on how to achieve this.

THREAT AND ERROR MANAGEMENT

- Maintain effective lookout as the student will need to look inside the cockpit for this unit.
- In some aircraft the colour coding for ancillary controls may be different from that specified here.
- In older aircraft the colour coding of ancillary controls may have faded.
- Use of airbrake during yaw can create uncommanded pitch down in some aircraft.
- Maintain effective communications.
- Recognise an undesired aircraft state.

TRAINING MATERIALS AND REFERENCES

- GPC Pilot Guide Unit 10
- Australian Gliding Knowledge. Pages 45, 48, 58-61, 89
- Aircraft Flight Manual of the training glider (control limitations)