Gliding Australia Training Manual

Trainer Guide

Unit 14W

Takeoff (Winch)

Unit 14W - Takeoff (Winch)

AIM

To develop and demonstrate the skills and knowledge required to safely commence a winch launch, from the cable hook on through to initial climb.

Note that this aligns with the normal training sequence and risk profile for these units. Upper air aspects of launch are taught first, then initial and full climb, then crosswind conditions. Several launches may be required to demonstrate competence and underpinning knowledge.

PREREQUISITE UNITS

- GPC Unit 2 Ground Handling, Signals
- GPC Unit 5 Primary Effects of Controls
- GPC Unit 13W Launch and Release (Winch)

COMPLEMENTARY UNITS

Where crosswind is a factor in the launch, consider complementary training in GPC Unit 19.

If radio calls are to be introduced for launching, training in GPC Unit 21 may be performed.

COMPETENCY ELEMENTS AND PERFORMANCE STANDARDS

ELEMENT	PERFORMANCE STANDARDS
1. Preparation for take-off.	• **Describe:** ○ The purpose of the weak link fitted to the winch cable. ○ Threats associated with a winch launch through the separation and initial climb. • **Demonstrate:** ○ Pre-take off checks with options for launch emergencies identified (ABCD-CHAOTIC). ○ Winch cable hook-on procedure. ○ Confirmation of correct weak link used.
2. **Ground run and separation.**	• **Describe:** ○ The stages of a winch launch up to the Initial Climb stage. ○ The airspeed limitations on the aircraft during the early stages of a winch launch. ○ The actions of the pilot in each stage of the launch. • **Demonstrate:** ○ Positive control of aircraft during ground run. ○ Holding the correct attitude for separation. ○ Ability to maintain wings-level in a variety of wind conditions. ○ Smooth transition to take-off attitude. ○ Separation and appropriate initial climb attitude. ○ Monitoring speed and direction and correcting accordingly.

KEY MESSAGES

- Winch launches progress quickly – pilot must plan ahead to remain ahead of the aircraft.
- The pilot must keep their hand on the release to ensure quick launch abort if required.
- On ground maintain positive control of aircraft in direction and keeping the wings level (or held into crosswind).
- Allow aircraft to take-off whilst running on the main wheel without using elevator.
- Always abort the launch if the speed is unsafe (fast or slow) or if a wing drops and hits the ground.

LESSON PLANNING AND CONDUCT

Notes:

1. Whilst the precursor for launch emergencies is discussed here (speed out of tolerance) the actual briefing and handling of the emergency is covered in GPC Unit 20.
2. Different winches use different types of launch cables such as single wire, multi-strand cable and Dyneema rope.
3. Trainers must ensure that they tailor the instruction in this unit to the cable type in use.

Briefing

General

- Describe winch launch stages.
- The structure of the trace, drogue, weak link and rings assembly.
- The purpose of weak links in the cable and how to identify them.
- How to determine the winch airspeed window and perform a launch failure briefing as part of the pre-take off check.
- Control actions performed during the winch launch stages.
- Pre-launch lookout is critical laterally to either side and up the launch path.
- Maintain positive control of the aircraft.
- Gentle manoeuvres close to the ground.
- Launch occurs quickly – issues need to be identified & resolved.
- Perform ground observation of launches from side to explain stages.
- Describe the effect of different cable release positions on fuselage and nose-heavy/tail-heavy aircraft on behaviour of aircraft in initial launch stages.
- Note the effect of fast (turbo) launches and need to ensure positive control of aircraft throughout.

Hook On

- Sterile environment – inside cockpit and with launch crew.
- Check the correct weak link used.
- Check cable is inserted & release closes smoothly.
- Check that airspace clear for launch is performed.
- Positive ready to launch signal from PIC.
- Monitor launch signals and cable tension.
- Locate & identify release handle. Keep hand close.
- Release immediately if an anomaly occurs.

Ground Run

- Control column starting position as required for aircraft.
- Control effectiveness & recovery of lowered wing at low airspeed. Release if it hits the ground.
- Use of aircraft controls on the ground to maintain wins-level (or appropriate for cross wind).
- Actions on cable overrun.
- Run the aircraft on the main wheel (take off attitude).

- Brief on problems that can occur at take-off (high speed launch, wing drop, loss of directional control).

Separation

- Aircraft flies when lift generated exceeds weight.
- Allow aircraft to separate.
- Why we do not assist take-off with elevator.
- Avoid large manoeuvres close to ground.
- Weathercock into crosswind.
- Use of flap as appropriate for aircraft.
- Climb not initiated in this stage.
- Transition to Initial Climb - allowing height & speed to build. Monitoring airspeed.

PRE-FLIGHT BRIEFING

- Be prepared for a launch failure on every flight.
- Any launch emergency will be handled by the trainer.
- Brief for maintaining view outside the cockpit. Cover instruments if this is a problem.
- If possible, position the student in the cockpit and elevate tail to demonstrate take-off attitude.

FLIGHT EXERCISES

Demonstration of Hook On

- Completion of GFA Pre-Flight checks. Trim forward in case of cable break.
- Ensure a sterile environment.
- Confirm correct weak link for aircraft in use.
- Identify and activate cable release as required by launch crew.
- Confirm that cable is inserted by ground crew pulling on cable.
- Maintain hand on release from this point in case of launch abort.
- Check airspace clear for launch.
- Ask for recheck if unsure or launch delay occurs.
- Perform radio launch broadcast if required.
- Monitor cable for commencement of ground run.

Ground Run

- Looking ahead, gauge wings level on horizon.
- Use rudders to maintain direction.

- Identify departure from wings-level. Use opposite rudder to pick up the lowered wing at low airspeed. Use aileron to keep wings level when airspeed allows.
- Use elevator smoothly and gradually to position the aircraft on main wheel only.
- Repeat launches as needed to acquire competency standard, particularly for control of aircraft on the ground.
- Where possible expose student to launches in varying wind conditions.

Separation and Transition to Initial Climb

- Identify increasing airspeed to generate sufficient lift.
- Identify aircraft separation from ground.
- Maintain take-off attitude.
- Confirm airspeed at or above $1.3V_S$ prior to continuing into Initial Climb.
- Once speed is positively increasing you can raise the nose to adopt the initial climb. Tell the student they must not pull back to a steep angle until they have enough height/speed to recover from a cable break.
- Progressively increase the climb angle monitoring acceleration and speed.
- Airspeed MAY exceed V_W (Max winch) at this point of the launch but not by more than 10%. Airspeed MUST be back within limits by the start of the full climb stage.

Student exercises

- Student practices launches from hook on of cable:
    - Trainer hands over to Student on the ground.
    - Student:
        - maintains positive directional control with wings level on ground run;
        - maintains take-off attitude until separation;
        - verbally identifies early stages of launch;
        - allows aircraft to lift-off and gain height in take-off attitude;
        - identifies criteria for commencement of initial climb.
- As skill is gained the student monitors launch airspeed and takes appropriate action. Student recognises:
    - loss of airspeed and reduces aircraft nose attitude;
    - increasing airspeed likely to exceed permitted upper limit (V_W) in Aircraft Flight Manual AFM (+10%) and provides effective signal.

Notes:

1. The student must have a relaxed grip on the control column and controls adjusted correctly for reach during flight. Ensure that the cable release is reachable, and student can operate it whilst on the ground.
2. Where radio calls are taught in parallel and the student has capacity to perform it, the pre-launch radio broadcast can be made.
3. Ensure lookout is maintained by all aircrew. Cover instruments (other than ASI) in the student's view if necessary, to discourage looking inside the cockpit.
4. Be careful with terminology and clarity of language. Make it clear when discussing control surfaces and control inputs (elevator, aileron, rudder), their effects in terms of motion (pitch, roll and yaw) and their effects in terms of attitude and flight path (attitude, bank angle, yaw angle or slip-skid angle).
5. Precision with terminology must be synchronised with demonstrations inflight. Patter must be concise and careful. Feedback from the student must be sought. “What did you see when…?”
6. Do not attempt to include all elements of this module in the first few launches. It is better to allow the student time for a good demonstration and opportunity for practice on a single learning outcome. Students are often overloaded when flying their first few winch launches.
7. Ensure that the student has been briefed on the correct hand-over/take-over procedure and their expected action and verbal response to each. There must be no confusion about terminology for transfer of control.
8. Remove all distractions from the exercise, for instance mute audio variometers.

COMMON PROBLEMS

PROBLEM	PROBABLE CAUSE
• Failure to transition aircraft to run on main wheel on the ground.	Not repositioning control column to neutral position as airspeed increases. Not exerting sufficient force on control column to overcome nose or tail mass. Ensure student briefed on need to reposition control column smoothly into take-off attitude position as airspeed builds.
• Inadequate or excessive pull up through initial climb.	Student fixation on cockpit instruments: Consider covering instruments in student’s view for the conduct of this unit. Encourage lookout to wingtips and over nose to assess wings level as part of launch work cycle.
• Coarse control of airspeed and climb angle.	Excessive force used on controls, explain correct grip on control column and ask student to hold column with just 2 or 3 fingers.

• Excessive drift port or starboard of runway.	Not keeping wings at appropriate angle to counter cross wind. Describe correct operation of rudder pedals during ground run.
• Aircraft separates at low speed and/or tail wheel/skid hits ground on rotation.	Student tries to pull aircraft off ground with elevator. Ensure enough time is allowed for sufficient airspeed to allow lift generation over aircraft weight. Explain potential for ballooning or stalling with consequence of uncontrolled roll.
• Student uses forward stick to hold aircraft on the ground after flying speed is attained.	Student may not recognise speed build up or hold aircraft in incorrect take off position. Demonstrate correct take-off position on ground and in flight to show how aircraft will lift off when speed is sufficient. Aircraft should not be held on ground with elevator.

Debrief

Review the student's ability with relation to their:

- Ability to ensure hook-on is effective.
- Control of aircraft on the ground.
- Ability to position aircraft running on the main wheel with directional control.
- Separation in correct take-off attitude.
- Effectiveness of speed-signals provided.

If student performance is affected by crosswind, consider concurrent instruction with GPC Unit 19.

THREAT AND ERROR MANAGEMENT

- Highly anxious "G" sensitive pilot.
- Moderate to high cross-wind or turbulence.
- Non-sterile launch environment.
- Poor winch cable or engine maintenance or operation leading to launch failures.
- Launch cable/winch failure or launch improper procedure by winch driver.
- Excessively slow or fast initial speeds from the winch at any launch stage.
- Other traffic entering the winch launch area.
- Collapsing seat back or soft cushions allow pilot to lose access to controls or release.
- Proximity of objects on ground near take-off path.
- Incorrect weak link used on the winch trace.

- Ineffective communication between student & trainer (including distractions, hearing difficulties or English as a second language).

TRAINING MATERIALS AND REFERENCES

- GPC Pilot Guide Unit 14W
- Australian Gliding Knowledge (AGK) pages 19,65,88,89,99-103
- GFA Winch Manual (OPS 0007)
- The Aircraft Flight Manual