Gliding Australia Training Manual

Pilot Guide

Unit 20W

Launch Emergencies (Winch)

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WHAT THIS UNIT IS ABOUT

To:

- Understand the actions to take to safely handle a winch launch failure.
- Recognise the threats and errors that can occur during a winch launch failure.
- Demonstrate the ability to handle a winch launch emergency at all stages of the launch.

WHAT ARE THE PRE-REQUISITES FOR THIS UNIT?

- GPC 13W – Launch & Release (Winch)
- GPC 14W – Take-off (Winch)
- GPC 16 – Circuit Joining & Execution

COMPLEMENTARY UNITS

- Nil

KEY MESSAGES

- Launch failures are easily managed by the pilot. Accidents that occur after a launch failure are generally caused by mismanagement of the aircraft after the launch failure, not through the failure itself.
- A launch failure can occur at any time from the point of cable hook-on to release. The launch may also be abandoned by the pilot (for example if the airspeed is trending towards the upper winch limit).
- Launch problems do not always manifest themselves as a sudden loss of power – gradual failures can and do occur and require the pilot to recognize that a launch failure is occurring and take appropriate action.
- Pilots must ensure that they never allow the aircraft's airspeed to drop below the minimum winch speed during the launch.
- When a launch failure occurs, no bank must be applied until the aircraft's airspeed is returned to and maintained at or above safe speed near the ground.
- Whilst a launch failure requires specific recovery processes, it is not difficult to recover and providing the aircraft has not entered the Non Manoeuvring Area it will either be able to land ahead or conduct a modified circuit back to the airfield.

PILOT GUIDE FOR THIS UNIT

- The winch launch can fail at any point for any number of reasons – these could be due to the equipment or the actions of people involved (including the pilot!). All pilots need to know how to deal with these failures so that they can continue the flight safely.

What is a Launch Failure?

- Launch failure is the situation where a glider is unable to continue with the launch or where it would be unsafe to continue the launch. This includes being unable to maintain speed above the absolute minimum winch airspeed of 1.3VS when in a climb attitude
- Launch failure must be expected at any time during launching operations. Provided that correct procedure is followed, launch failures present no greater difficulty than any other training sequence.
- Launch failures occur from one or more of the following conditions:
  1. Mechanical failure or power loss at the winch or autotow.
  2. Faulty judgement of speed by the winch or auto-tow driver.
  3. Cable or weak-link failures.
  4. Cable release maladjustment or failure.
  5. Accidental operation of the release.
  6. Faulty procedure by the pilot (e.g. glider over-running the launch cable) or ground crew (e.g. failing to hold wingtip).
- You were introduced to the launch failure briefing in GPC 14W.
- One of the major contributions towards safe flying is that you can anticipate the potential failure situations and not be surprised or startled into doing the wrong thing. Before take-off there must be full awareness of as many factors as possible that will govern the probable actions following a launch failure:
  - The wind direction and strength.
  - In the case of crosswinds, the preferred direction to turn if a failure occurs at height, taking into account aerodrome layout, etc.
  - Possible overshoot areas or emergency landing areas.
  - The point at which to abandon a slow launch to avoid being placed in the non-maneuvering area.
  - All of these elements need to be considered by you in the Options check item of the pre-take-off check.

Launch Failure on the Ground

- If you find your aircraft overruns the winch cable, or a wingtip drops to the ground, or you hear a STOP STOP STOP signal from the ground crew or radio, or any other situation occurs that could jeopardise the flight immediately terminate the launch by:
  - Pulling the cable release handle twice.
  - Apply full airbrake.
  - Move the stick full forward.
  - Steer the aircraft away from the cable using rudder.
- Under no circumstances should you allow the aircraft to fly. It is far better to be conservative and terminate a launch before it starts than to allow the aircraft to fly into a far worse situation.

Launch Failure in Flight

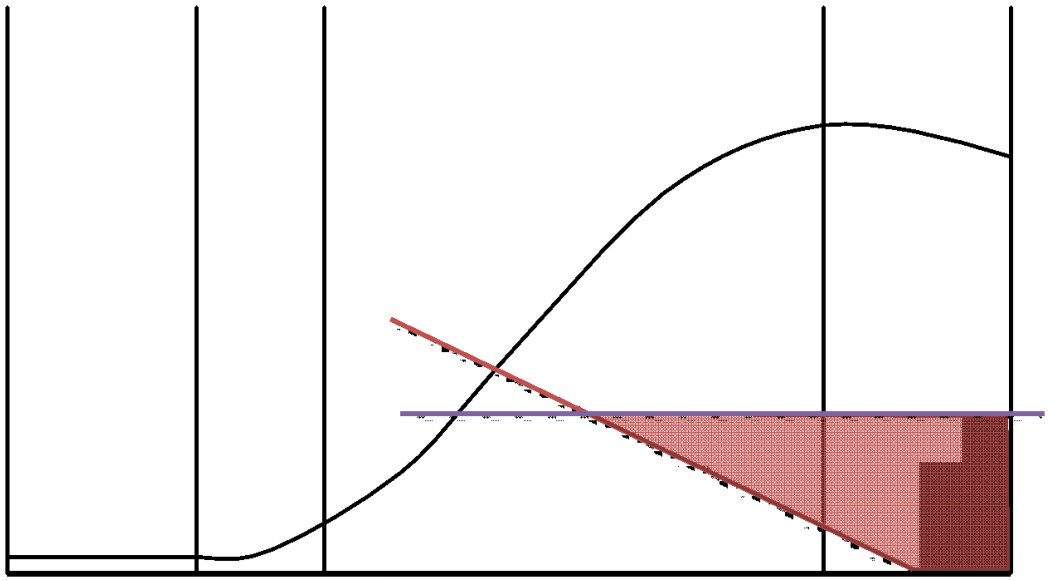
- The first step in managing a launch failure in flight is to recognise that the launch has failed!
- Not all launch failures are cable/rope breaks with an associated jolt or noise.
- Some launches fail 'softly' due to a build up of problems or issues with the winch motor.
- Remember the definition of the launch failure is the inability to maintain the minimum winch speed on the launch during the climb, regardless of the reason.
- After a launch failure in flight you must maintain control of the aircraft and return it to a safe landing by performing the following actions:
    - Action 1. Regain and maintain the safe speed near the ground (l.5VS).
    - Action 2. Operate the cable release mechanism twice.
    - Action 3. Land ahead unless there is insufficient space to land safely.
- The training aims to make your performance of Actions 1 and 2 instinctive and automatic. In contrast, Action 3 is taken after calm assessment of the situation and after the airspeed has reached the safe speed above ground (1.5 VS).
- In launch failures at low level (say <200' AGL) the climb angle should not be very steep and the lowering of the nose is not an extreme manoeuvre. The speed should not decay very much during the "pushover" from the climb attitude to the approach attitude and there is no great inertial problem to overcome, as the glider does not have to climb to the apex of a steep "hill" then come down the other side to build up speed.
- This is the very reason the glider is not allowed to climb steeply during the early stages of the launch.
- The full climb stage of the launch however is characterised by a very high climb rate, typically in excess of 2,000 ft/min (20 knots).
- Height is obviously gained very rapidly, and it is quite safe to climb steeply during this phase, provided that the speed is safely within the working band.
- If a cable-break occurs during this phase, the bad news is that you must take prompt and positive action to ensure that the glider's nose attitude is changed from the steep climb attitude to the "approach to land" attitude necessary for re-establishing a safe speed.
- This change in nose attitude must be commenced immediately the launch failure is recognised. Prompt and positive action is not the same thing as panic-stricken.
- There are two additional factors to be considered. These are jointly the most important of all and persistently responsible for causing winch-launch accidents year after year. These factors are inertia and time.
- If a glider is held in a climb attitude after a launch failure it will stall within a few seconds. To prevent a stall the attitude of the glider must be quickly changed by lowering the nose from the climb attitude to one that achieves safe speed near the ground (1.5 VS).
- During the change in attitude there will be a noticeable delay of several (minimum of 5) seconds before speed builds up to 1.5VS and stabilises, even when the nose is pointing downwards. If a turning manoeuvre is attempted before the speed stabilises there is every possibility that the glider will enter a spin. (refer GPC Unit 18).
- If the airbrakes are opened before sufficient speed has been obtained, it is likely that the glider will either stall or sink extremely rapidly. If the glider is close to the ground, either of these is likely to result in serious damage and injury.

Land Ahead or Modified Circuit?

- A launch failure can occur at any moment of any launch. Having completed Actions 1 and 2 the normal alternatives are for (a) a landing straight ahead or (b) a modified circuit.
- You should ALWAYS plan to land ahead unless you are satisfied that there is insufficient space to land ahead safely, considering the conditions and the performance of the glider.
- The circuit is 'modified' in the sense that is likely to be conducted at a lower height and closer to the runway than a conventional circuit.
- It is important to understand that when carrying out a circuit from a launch failure you must never feel under an obligation to land at the normal touch-down point and that a modified circuit with a down-field landing is quite acceptable.
- This is certainly much better than getting very low (thus closing off the last escape route) in an attempt to land back at the usual take-off point.
- Your Instructor will discuss with you the landing options at various stages of the launch. Instructors can assess your grasp of the landing situation by asking you during the launch what you would do in the event of a launch failure.

Non-Manoeuvring Area (NMA)

- The non-manoeuvring area is the area of sky on a winch/auto launch in which, if a launch failure occurred, the glider is too high to land ahead in the remaining strip length and too low to carry out a circuit. See the red shaded area in the diagram below.
- A guaranteed way to end up in the non-manoeuvring area is to be launched by a low-powered winch or autotow vehicle on a short strip. If the strip happens to be surrounded by unlandable terrain, wall-to-wall trees for example, the scene is set for a nasty accident.
- The obvious answer to such a situation is not to let it occur. Any indication that poor acceleration on take-off might lead a glider into the non-manoeuvring area, especially on marginal strips, must cause a pilot to abandon the launch to avoid getting into trouble. Stay out of the non-manoeuvring area.



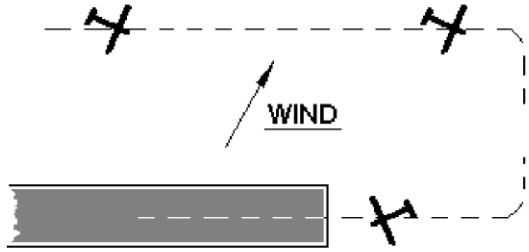
Non-Manoeuvring Area (NMA) overlaid on the normal winch launch profile

- You will note that there are no heights mentioned in the description of the non-manoeuvring area. There are many variables to consider for example, glider performance (sink rate and glide angle), strip length and shape, wind velocity and effectiveness of airbrakes/spoilers. You must decide in each situation whether a landing ahead is possible or not in the conditions of the day and in the particular aircraft being flown. Such decisions can only be made if the exercise has been practised a number of times during pre-solo and post-solo training.

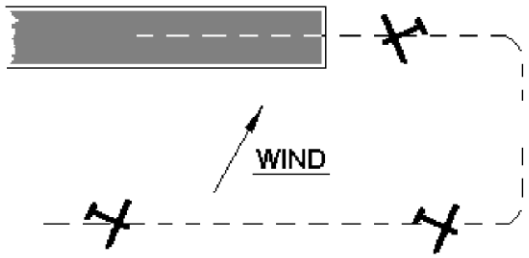
Effect of Crosswind

- When a launch failure occurs and there is a significantly strong cross-wind in a situation where you cannot land ahead and you have decided you need to conduct a modified circuit, you should turn in the downwind direction. Do not allow the glider to drift away from the strip. This is the preferred option in the absence of any local constraints such as obstacles or terrain at and around the airfield.

Modified Circuit when a turn downwind is made after the launch failure. You have clear vision of the landing area improving judgement



Modified Circuit when a turn upwind is made after the launch failure. Poor visibility of the landing area throughout the circuit.



- The turn to downwind will be through an arc of approx. 225 degrees (see first diagram). As the aircraft is flying with the wind it will require less height to move away from the runway centreline and out to a position where the modified circuit can be flown. The glider will fly the downwind leg along a track parallel to the strip, with the nose of the aircraft angled towards the airstrip to correct for drift and providing greater visibility. The base leg will also be flown against the wind giving more time to adjust.
- The landing is conducted into wind if possible, or crosswind in the original take-off direction. Note that these are preferred situations, but they may need to be modified if circumstances dictate.
- If the glider initially turns into wind (second diagram), it will consume more time (and height) to move away from the runway centreline to a downwind position and the glider is forced to point away from the strip on the downwind leg, making the task much more difficult due to a tailwind on the base leg.

What Happens if the Cable will not Release (Hook-Up)

- Thanks to the virtually foolproof hook design and greatly improved maintenance of the cable release mechanism, release failure is extremely unlikely. If it should occur, fly straight ahead after pulling the release to allow the automatic back release mechanism to operate.
- If the back release mechanism does not operate, you have exhausted all the options which are under your control and you are now must focus on flying the aircraft whilst the winch or car driver will jettison or cut the cable at their end. The glider must then be flown in continuous descending circles within the aerodrome boundary and drifting downwind, if possible avoiding overflying of people. You will need to cease turning and straighten out at a safe height and land ahead over the cable which will have laid on the ground. It is highly likely that during this process the cable will release by itself but this may not be obvious to you in the cockpit.

FLIGHT EXERCISES FOR THIS UNIT

- The instructor will demonstrate the rate of airspeed decay in the full climb configuration – this will be done after the launch at height to show how long it takes to recover to a safe speed configuration.
- During each launch you should be calling your options to when to land ahead or complete a circuit.
- During your training you will experience a number of simulated launch failures at variety of heights, to develop:

  (a) Your conditioned response of acquiring and maintaining a safe speed near the ground (l.5Vs).

  (b) Your flexible response of correct use of the height available after the failure, in accordance with all the relevant factors.
- The aim of the instruction is to ensure that when the pressure of a real failure is present, you will inevitably draw on your training, which will provide you with the ability to handle the aircraft correctly.
- Your instructor will give you the opportunity to practice recovery from launch failures using both a land-ahead action and conducting a modified circuit.
- Winch cable hook ups are not practiced as flight exercises.

THINGS YOU MIGHT HAVE DIFFICULTY WITH

COMMON PROBLEMS	
Problem	**Solution**
• Inability to detect a gradual failure of the launch.	Monitor airspeed as part of the launch work cycle to ensure that any degrading of speed is noted early.
• Failure to move control column forward fast enough to ensure airspeed is promptly regained to 1.5 VS.	Follow your instructor's advice and note how rapidly the control column is used when the instructor demonstrates the sequence.

• Trying to commence a circuit without ensuring that safe Speed has been attained.	You must confirm that you have achieved 1.5Vs through reference to the ASI before turning.
• Using airbrakes in order to land straight ahead without ensuring that safe Speed has been attained	You must confirm that you have achieved 1.5Vs through reference to the ASI before using the airbrakes.

HOW DO YOU DEMONSTRATE COMPETENCE?

- Describe the actions to take in a winch launch failure at all launch stages.
- Demonstrate recovery from a winch launch failure at different stages of the launch.
- Explain the threats and errors that apply to recovery from winch launch failures.

RESOURCES & REFERENCES

- GFA Winch Manual (OPS 0007).

SELF-CHECK QUESTIONS

Use these questions to test your knowledge of the unit.

- At what stage of the launch can a launch failure occur?
- What are the things you should do if a launch failure occurs on the ground?
- What are the immediate actions you should do if a launch failure occurs in the air?
- What is the NMA?
- What circumstances could occur to place an aircraft in the NMA?
- Why is the Options check of the pre-take-off check important for launch failures?
- How does a significant crosswind influence the recovery from a launch failure?
- What is the procedure in the extremely rare event of a cable hook up?