



AUSTRALIAN AIR FORCE CADETS Aviation Safety Bulletin

AAFC Aviation Safety Bulletin 1/2017 – Glider Finals & Landing Technique

Background

A review of the Gliding Federation of Australia (GFA) and Australian Air Force Cadets (AAFC) databases indicates that heavy landings are one of the most common incident types for gliders. Many of these incidents are a consequence of poor judgement of the base turn point, leading to an overly steep (or shallow) final approach path (perhaps due to a tailwind on base turn and/or finals), and/or an incorrectly handled flare prior to touch down.

Issue

The purpose of this bulletin is to reiterate guidance with respect to final approach and touch down technique. Other existing guidance and/or restrictions are available in the following documents:

- **GFA Basic Gliding Knowledge** (especially Chapter 5, dealing with Circuits and Approach and Landing);
- **GFA Instructors Handbook Part 2** (especially Circuit Approach and Landing – Bounced Landing/Landing Downwind/Wind Gradient/Sideslipping, and the Checklist of Potential Problems);
- **GFA Operational Safety Bulletin (OSB) 1/14** – Circuit and Landing Advice (especially Potential Problem Areas); and
- **CB-AF SI (OPS) 3-1** Version 4.0, 9 Mar 17 (especially sub-paragraph 29m, dealing with restrictions and Flight Manual recommendations for Final Approach and/or Sideslipping).

Guidance

The foundation for a good touchdown is a circuit which provides a stabilised final approach path. With a stabilised approach (correct glidepath, correct speed with about half airbrake) the flare and landing are relatively easy using the following technique:

- Approaching flare point as ground textures become clearer, transfer focus and attention towards far end of runway, allowing peripheral vision to provide appreciation of cockpit height. (This is important as many landing incidents can be directly attributed to pilots not transferring their vision and attention well forward to gain the appreciation of flight path and height above ground.)
- Reduce rate of descent by gently raising the nose until flying parallel to the ground keeping the aircraft clear of the ground.
- Maintain airbrake setting, while continuing to raise the nose as necessary to keep the aircraft flying clear of the ground (with increasing aft position of the control stick as the airspeed decays).
- When the nose of the aircraft reaches the landing attitude, hold that attitude, eliminate any drift with rudder and allow the aircraft to descend and touch down.
- After touch down, open the airbrakes fully (just short of the wheel brake activation point, if the landing area permits), keeping wings level using increasing aileron deflections until coming to a stop. Keep the nose wheel off the ground until full back stick is achieved.

Problems

Listed below are landing problems which could develop as a consequence of an un-stabilised approach and/or incorrect flare technique.



Un-Stabilised Late Finals

Airspeed excessive: If earlier attempts to correct a high finals approach have been unsuccessful, and/or it is recognised on late finals that airspeed remains excessive and the desired aim point will be overshoot, the pursuit of the desired aim point should be discontinued. Instead, accept the overshoot, focus well down the runway, being cognisant of the increased pitch response, and initiate the flare slightly early but at a reduced pitch rate so the aircraft decelerates as it levels at the standard height above ground and then continue with a normal landing. Do not adjust airbrake setting during the flare.

Problems can occur during a landing with excessive airspeed if flare initiation is taken as per a stabilised landing. Due to the typically higher rate of descent (higher speed, lower nose position) if flare initiation is taken at the 'normal' height, a rapid rotation is required, which, if continued too far, can lead to heavy tail wheel strikes. Alternatively, if rotation is inadequate, a heavy landing with potential pitch forward on to the nose wheel and corresponding rebound and leap back into the air may result. Focusing well forward with consequential peripheral appreciation of descent rate and flight path will appreciably help in avoiding a heavy landing. With the typically steeper approach in this scenario, a more conscious effort will be required to move eyes up to see and focus towards end of runway.

Airspeed Low: If airspeed is low and the desired aim point will not be achieved, pursuit of the desired aim point should be discontinued and a safe touch down should become the main focus. Options for the pilot are limited in this situation as energy level is low. Notwithstanding, if airspeed is low, likely the nose position is higher than for an on-speed stabilised approach. In this case the best action is to simultaneously close the airbrakes and lower the nose sufficiently to stop the aircraft 'ballooning' due the airbrakes being closed. Use any excess altitude to ease the glider down to the correct flare/level flight height used during a normal landing. After touchdown, open the airbrake as required. Again, focusing forward to the far end of the runway will provide the best basis for flight path control.

Flare Technique

Early Flare: An early flare can result in airspeed decaying to touch down speed well above ground level followed by high sink rate and heavy landing. If a high flare is recognised, a slower than normal pitch rate will be required or the flare can be momentarily paused and then completed once the correct level flight height above ground is approached. The danger of this second technique is if the flare is not resumed, the glider can bounce heavily on touchdown as per the late flare discussion below. If a high flare is not corrected and the aircraft reaches level flight, at more than normal standing height, then action as per Airspeed Low is the appropriate course of action i.e. close the airbrakes and ease aircraft down to correct flare height.

Late Flare: A late flare will normally result in a hard landing and bounce. Following a bounce, immediately close the airbrakes and adopt level flight. Level flight will be achieved by looking, and ensuring attention well forward, allowing peripheral vision to provide cockpit height appreciation. Now simply allow the aircraft to decelerate and gently control its descent back to the runway. If speed is adequate and pilot experience allows, slowly increasing the airbrake, during the flare will reduce 'floating' in ground effect and subsequent ground run.

Summary

Probably the two most important factors in executing a safe touch down are establishing a stabilised approach and transferring from looking at the aim/touch down points to focusing well forward allowing peripheral vision to support height appreciation.

Authority

This AAFC Aviation Safety Bulletin is issued under the authority of Director Aviation Operations – AAFC.