
the
Jacobson
flare 1987 LITE
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The Jacobson Flare LITE (PDF)

For some time, we've been asked to produce a Jacobson Flare – Lite: a simplified version, free of diagrams and the geometry and trigonometry that underpins the Jacobson Flare. We understand that there are some who feel that they wouldn't understand a formal approach and landing technique, even if based on some very basic mathematics.

A picture is always better than a thousand words, but a real picture is unassailable; and we have a real approach and landing video, viewed from the cockpit.

This downloadable, no-frills PDF presentation presents the practical application of the Jacobson Flare at YPOK Porepunkah, a grass-surfaced country airstrip at the foot of Mount Buffalo, in NE Victoria, Australia, based on a video from the Jacobson Flare App. The example airplane is the C172 and the images are a carefully selected group of screenshots from the video assist pilots to identify, illustrate, resolve and integrate the five key elements of the approach and landing, namely:

1. Where to aim;
2. How to aim;
3. When to flare;
4. How much to flare; and
5. How fast to flare.

Each step is explained as simply as possible, through some brief notes, appended below each image. We suggest that you run the video through first, without any interruption, as an overview, before reviewing each of the selected screen images, in detail. While the concept of using individual pages allows reading in your own time, it is useful to re-run the video at any time, to visualise application of the notes in real-time; the more times, the better.

A fundamental aspect of the Jacobson Flare is the relationship between the pilot's eye position in the cockpit and the position of the main landing gear of the airplane. While the subject airplane was a late model C172, the criteria used in this example at YPOK is equally applicable for a wide range of comparable 4-6 place single- and twin-engine light airplanes.

The notes that introduce the following presentation define three key locations on the airstrip for an initial aim point 1 at approximately 300ft/90m from the approach threshold; a longitudinal flare cut-off point (used to create a visual fix in place of a conventional guess of flare height), located at 200ft/60m (or 100ft/30m short of aim point 1); and an additional aim point 2, located at the upwind threshold. These have been pre-calculated for airplanes of the above description and, in this case, located by measurement. (The Jacobson Flare App content and on-board calculators cover and simplify this once-only step.)

An unsealed gravel runway would be equally adaptable to the Jacobson Flare, as there are always discernible contrasting marks suitable for selection as the aim point 1 and flare cut-off point, respectively. (While these distances may need to be estimated, the use of a longitudinal flare fix is 400-times more tolerant of error, compared with a conventional guess of vertical flare height, when flying a standard 3º (1:20) approach path.)

A sealed and painted runway offers a calibrated ruler that removes all guesswork. For C172 and similar types, the 'top' of the first centreline mark beyond the threshold 'piano keys' at 300ft/90m from the threshold and runway numbers is suggested as aim point 1. This provides approximately 10ft/3m main gear threshold clearance.

The flare cut-off point, calculated and rounded to 100ft before aim point 1 (the C172 previously calculated and rounded flare cut-off distance), is located at the 'bottom' of this centreline mark (200ft/60m from the threshold). Aim point 2 is selected, as usual, on the runway centreline (i.e., on the ground) at the upwind threshold.

For smaller 2-place airplanes, such as light sport aircraft (LSA) or airplanes like the B77, C150 or PA38, the flare cut-off point would be around 60-80 ft/18-25m short of the same aim point 1.

For all other larger types of airplanes, a greater understanding and the one-off pre-calculation of these points, for each different airplane type/size, is necessary and it for this reason that the Jacobson Flare App was developed. We strongly recommend it, for the cost of flying just one less-necessary circuit.

We invite you to download and explore the Jacobson Flare LITE version, but please understand that this LITE version cannot and does not contain the comprehensive information that resides in the Jacobson Flare App for iOS and Android.

Captain David M Jacobson FRAeS MAP

Download The Jacobson Flare for iOS devices now.

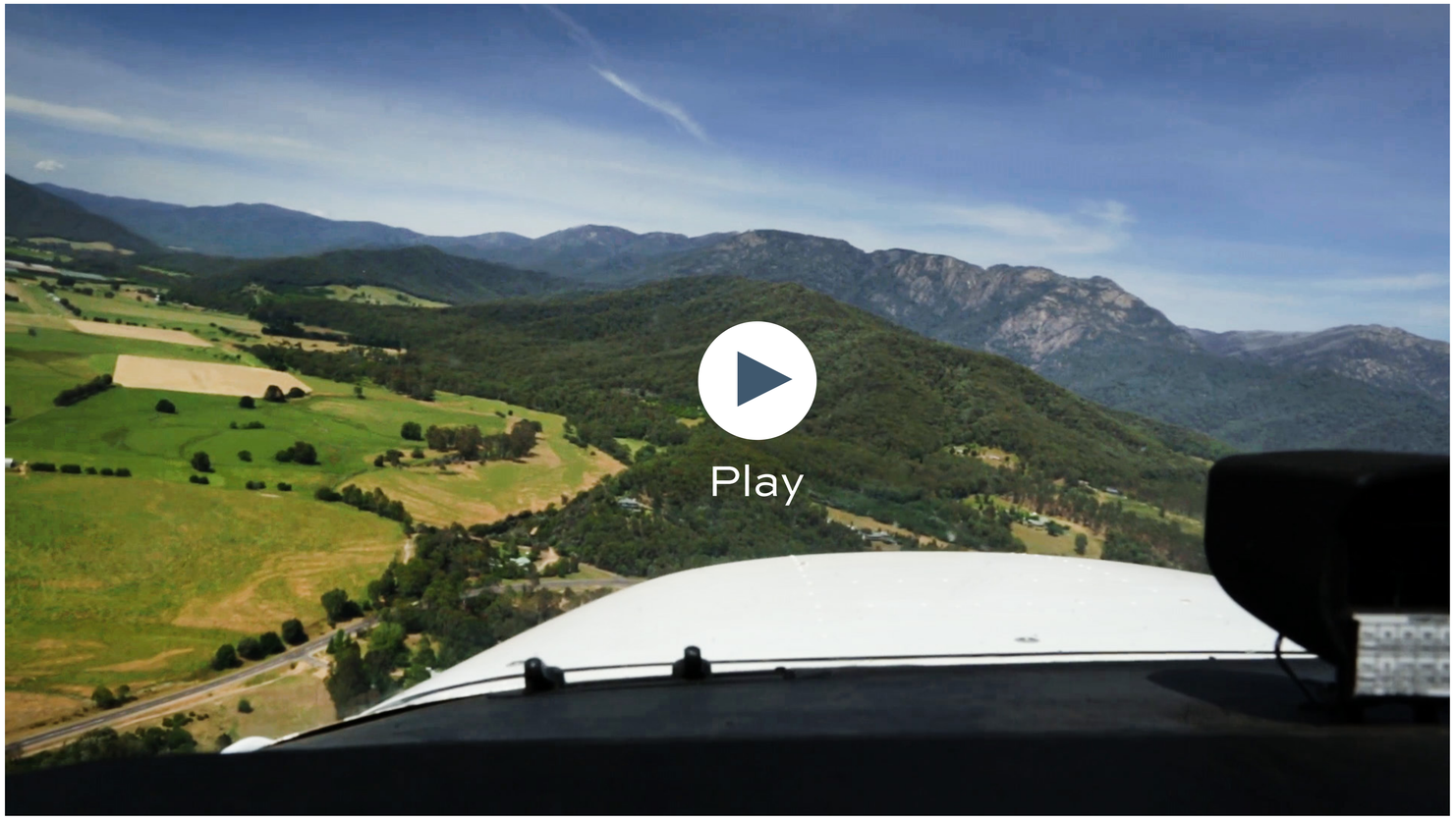
Download The Jacobson Flare for Android now.

We invite you, also, to **download** our **new, FREE companion app: the Jacobson Flare NEWS, on both** iOS and Android.

Note: On mobile phones and tablets, it is suggested that the Jacobson Flare LITE is opened in a PDF reader such as Adobe Acrobat. After the embedded video in the PDF is played, selecting 'DONE' should return the reader to the PDF, to enable further progress through the presentation.

C172 YPOK 18
Porepunkah, VIC, Australia

From the Jacobson Flare App



This approach to an uphill, grass airstrip demonstrates that unsealed and un-painted airstrips present no difficulties when using The Jacobson Flare. The wind was light and variable. The airstrip physical dimensions are: 2530ft (770m) x 30m.

From approximately 500ft on the approach, an eye path 'cursor' – resembling a head-up guidance system (HGS) flight-path symbol is presented, trained on Aim Point 1. This is withdrawn briefly, approaching the flare point (for clarity) and then re-presented to illustrate the pilot eye path through the 4 second flare.

Two identifiable pairs of white cone markers, beyond the threshold gable markers, are utilized as the flare cut-off point. Aim Point 1 is selected as the discernable start of a band of slightly yellowed (dried) grass, estimated as being 100ft (the C172 previously-calculated and rounded flare cut-off distance) beyond the flare cut-off point. In this case, the flare cut-off point is more prominent than Aim Point 1. Any longitudinal error caused by this estimation of distance is reflected as only 1/20th, vertically, providing a high level of tolerance. A 100% error of 100ft would be reflected as only 5ft, vertically – a better result than conventional flare practices can offer with any consistency. Aim Point 2 is located at the upwind end of this airstrip, defining the eye path during the 4 second flare and guiding the pilot in converging appropriately with the uphill slope. The stall warning sounds briefly before touchdown.

An unsealed gravel runway would be equally adaptable to The Jacobson Flare, as there are always discernable contrasting marks suitable for selection as the Aim Point 1 and flare cut-off point, respectively.

▶ tap video play button to open in web browser (internet connection required)

X close web browser window to return to app

Where to aim

Joining 2nm final around 600ft above runway threshold on airstrip centreline, configured for approach.

Aim point 1 (a patch of yellowish grass) located approx 300ft/90m from approach threshold. On a 3º flight path angle, the main gear will clear the threshold by 10ft/3m. Pitching with elevators to locate and hold aim point 1 in windscreen in same relationship as eye height above glare shield (top of black panel at the windscreen base, ignoring visible engine cowling).
IAS controlled with power. Airstrip 18 uphill to South. Wind light and variable.

How to aim

Fully configured for landing about mid final.

Introducing final approach work cycle: **> Aim point relationship > Centreline > Flight path angle > Airspeed >** etc.

Picture expanding around aim point 1. Maintaining constant relationship of glare shield with eye position and aim point 1, using the elevators. Approach IAS controlled with power. For a powered approach (rather than a glide approach), using the primary effects of the controls is vital to achieve a stabilised approach.

How to aim

Short final: Maintaining work cycle: Aim point relationship – Centreline – Flight path angle – Airspeed.

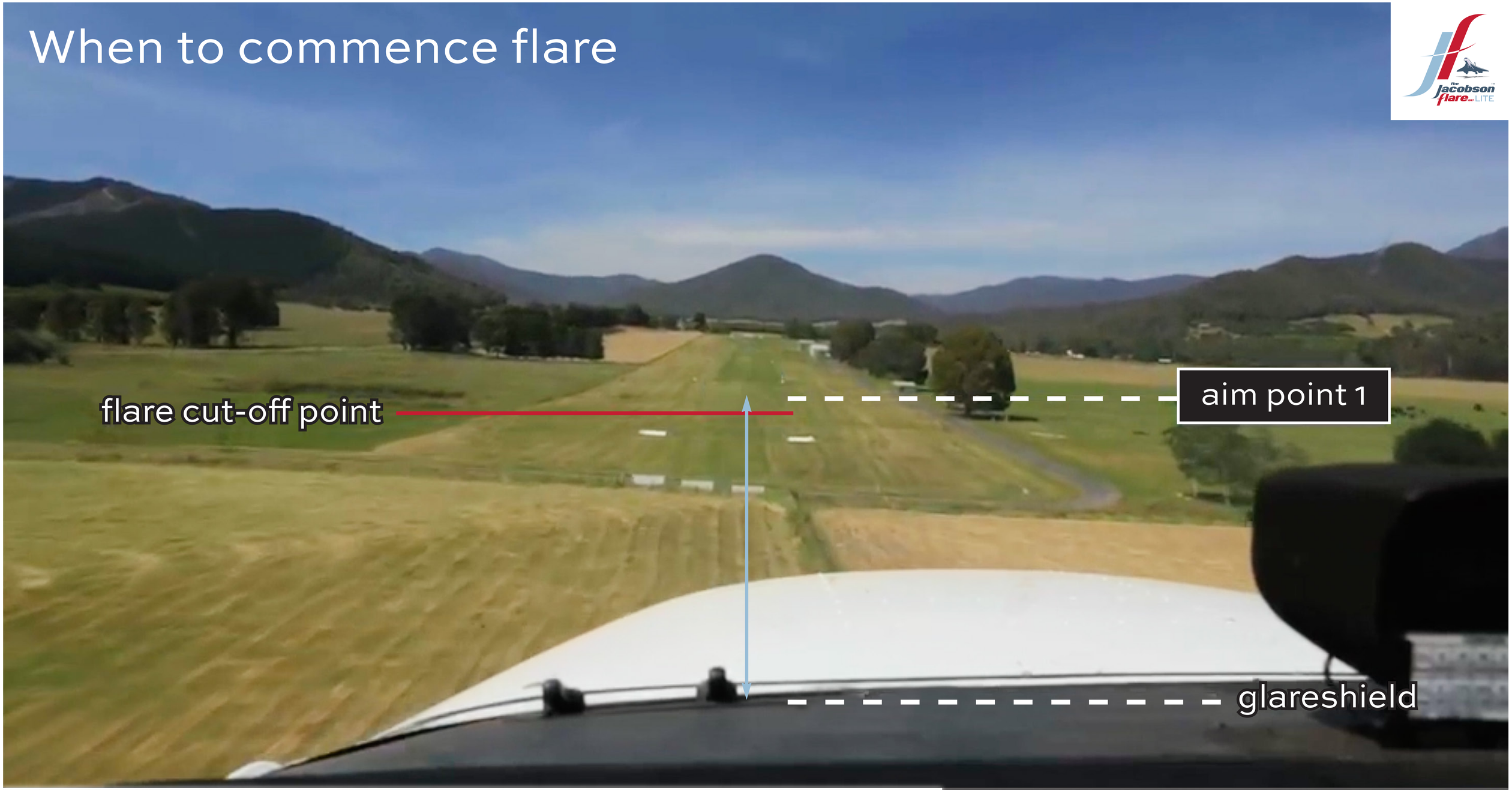
Picture expanding around aim point 1. Maintaining constant relationship of glare shield with eye position and aim point 1, using the elevators. Approach IAS controlled with power. Make minimal control adjustments. Landing checklist completed: propeller pitch, flaps, landing gear, kinetics, etc. Non-controlled airfield: Landing clearance not required.

How to aim

Very short final: Maintaining work cycle: Aim point relationship – Centreline – Flight path angle – Airspeed.

Picture expanding around aim point 1: Maintaining constant relationship of glare shield with eye position and aim point 1. Approach IAS controlled with power. Making minimal control adjustments and maintaining ‘big picture’ view of entire visual field; i.e., not ‘zooming in’ on any one point, such as the origin – aim point 1. Correcting for slight left X-wind component.

When to commence flare

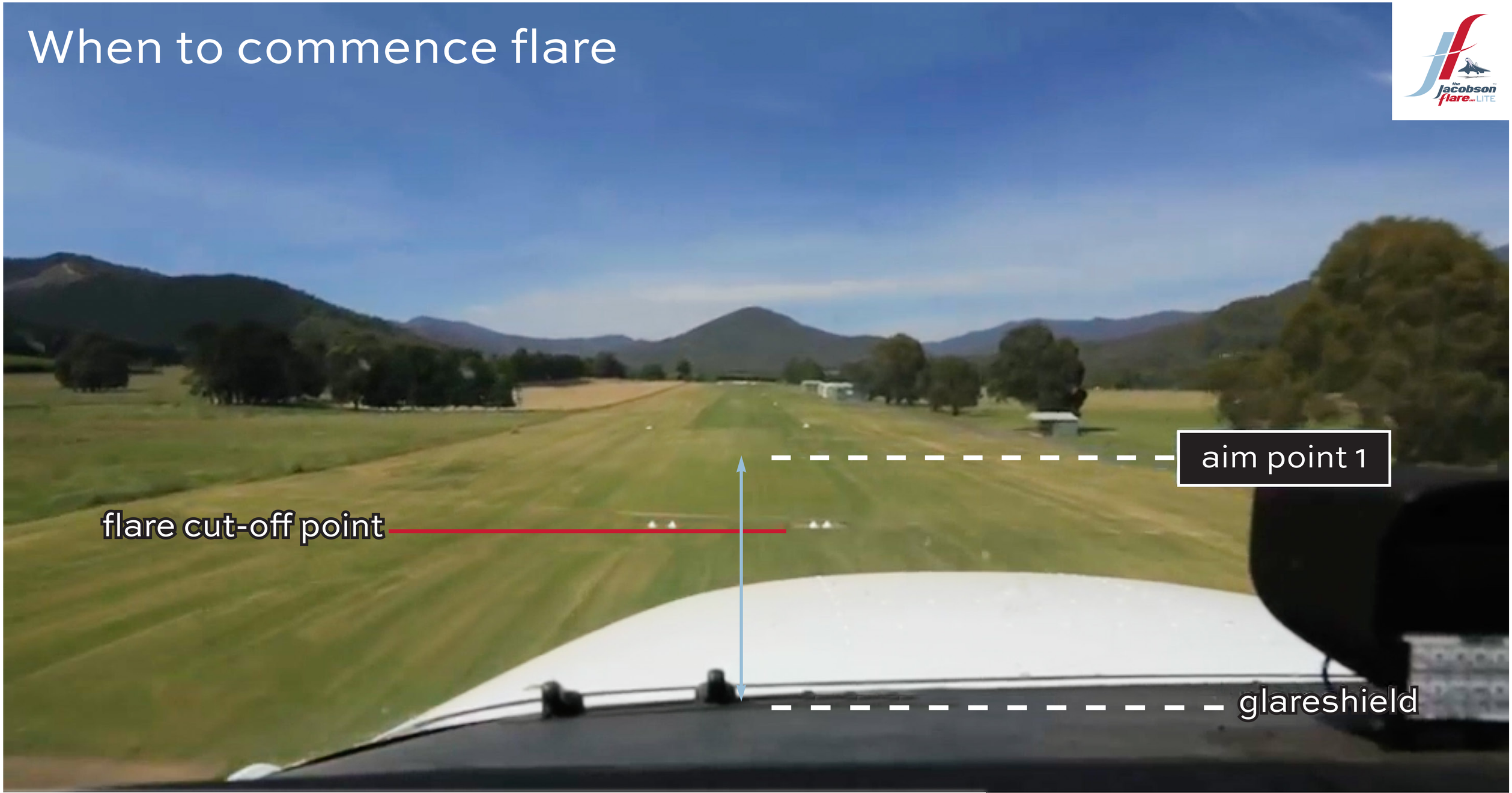


Approaching boundary fence:
Aim point 1 (start of yellowish grass) and flare cut-off point (2 pairs of cone markers – obscured under red line) clearly identifiable now.

Maintaining work cycle: Aim point relationship – Centreline - Flight path angle – Airspeed.

Picture expanding more quickly around aim point 1. Continue to make minimal control adjustments, not allowing the common tendency to overshoot aim point 1. Approach IAS accurately controlled with power (+5/-0kts).

When to commence flare



Approaching Flare cut-off point: Origin remains on aim point 1 (start of yellowish grass) but still viewing full visual field.

Picture expanding much more quickly now around aim point 1; flare cut-off point appears to be expanding ‘downwards’. Anticipate the glare shield overtaking it, very shortly; no need to look down – this transit is visible in lower peripheral field. Maintaining constant eye position/glare shield relationship. Continue to make minimal control adjustments, IAS accurately controlled (+5/-0kts).

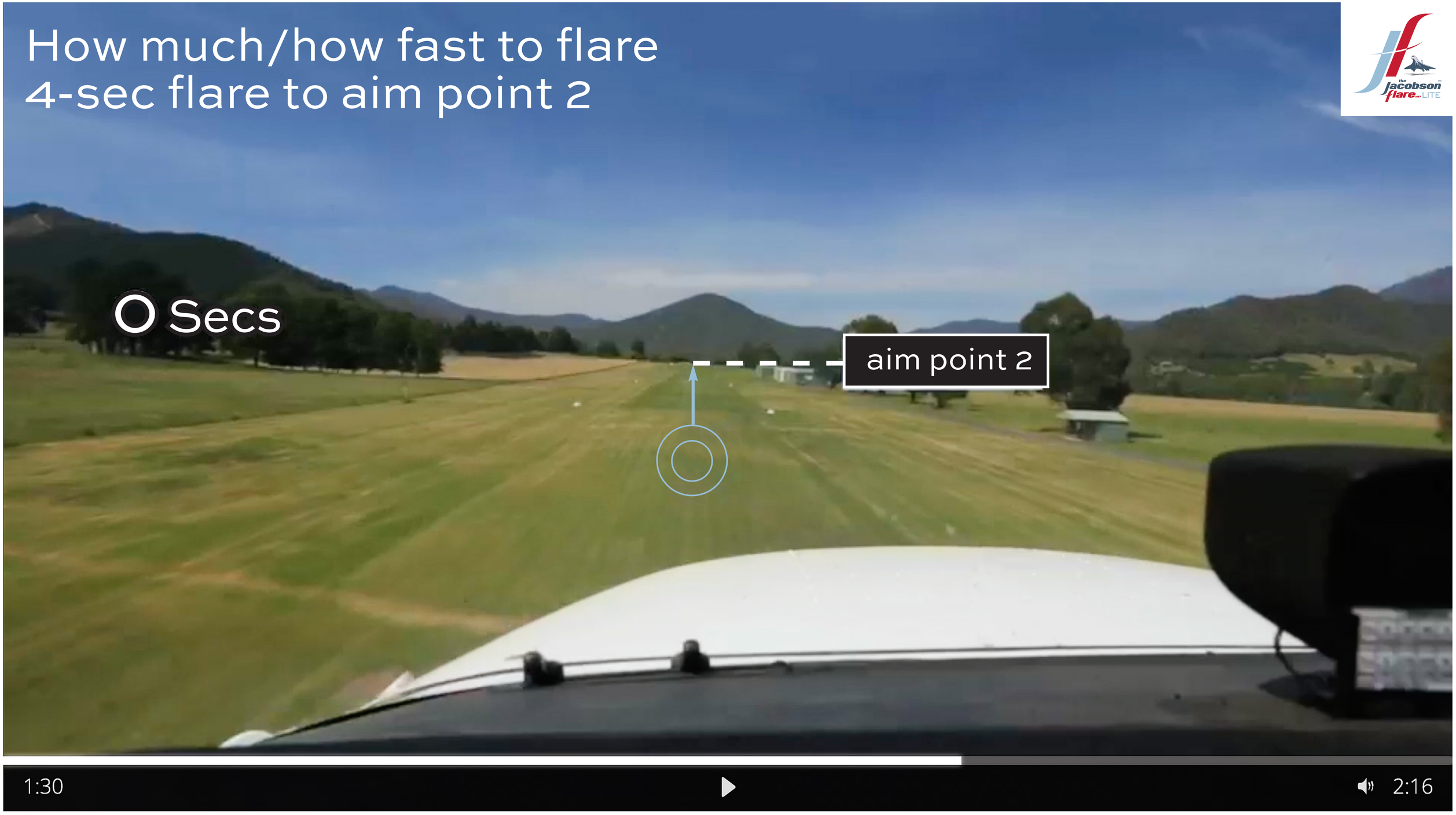
When to commence flare

Anticipating the flare cut-off point:

As the (black) glare shield (ignoring any visible engine cowling) is about to ‘overtake’ the flare cut-off point, and while maintaining the ‘big picture’ view, anticipate and commence a gentle mentally-counted 4-second flare, so the aircraft is responding by the flare point. Use the elevators to lift the eye path from aim point 1, gradually, towards the upwind threshold, which becomes aim point 2.

Assuming the correct approach airspeed has been maintained, simultaneously commence to retard the throttle(s) back towards idle, over the same 4-second timing, with both hands more or less synchronised in their movement.

How much/how fast to flare
4-sec flare to aim point 2



At the flare point: The flare commences.

The glare shield has overtaken the flare cut-off point; Gentle elevator input has been made to start ‘lifting’ the pilot’s eye path towards the new aim point 2, located and identified at the upwind threshold. The throttle(s) commencing the retardation towards idle.

If IAS is ‘hot’ approaching the flare point, start retarding the throttle(s) slightly earlier, before reaching the flare point. If the IAS is lagging slightly, delay the power reduction (or even make a slight increase), before retarding, the throttle(s) after commencing the flare, to prevent a premature touchdown.

How much/how fast to flare
4-sec flare to aim point 2

In the first second: The pilot's line of sight is transitioning gently up the runway towards aim point 2.
The throttle(s) are 25% retarded.

Monitor centreline tracking with wings level (assuming no prevailing crosswind component). The greatest change in the flight path angle occurs here and we are developing the gentle, curved eye path – and consequential flight path – that we used to strive for by guesswork and practice. The 4-second flare is completely visible to the pilot and instructor.

How much/how fast to flare
4-sec flare to aim point 2

In the second second: The pilot's eye path is about half-way, 'vertically', as it transitions gently 'up' the runway towards aim point 2. The throttle(s) are now about 50% retarded. Monitor centreline tracking with wings level. Think of 'flying your eyes' progressively up the runway, using the elevators.

How much/how fast to flare
4-sec flare to aim point 2

1:33 2:16

In the third second: The pilots eye path continues to transition gently ‘up’ the runway towards aim point 2. The throttle(s) are now about 75% retarded. Continue to monitor centreline tracking with wings level. Start interrogating progress of the eye path, in relation to aim point 2. The elevator inputs will start to suggest themselves, as pilot’s line of sight closes towards aim point 2. The flare curve, i.e., the flight path angle, is reducing every part second, but it never quite levels off.

How much/how fast to flare
4-sec flare to aim point 2

In the fourth second: The pilots eye path is now approaching aim point 2. The throttle(s) should be retarded at idle by now. Monitor centreline tracking with wings level. Take a critical look at aim point 2: If it appears to be ‘rising’, continue to flare a little further; if it’s moving ‘down’ in your visual field, then you have over-flared slightly. When it is moving neither up nor down, you are aiming correctly at it. The airplane is now converging only very slightly with the landing surface. Hold the inputs you have, check the throttle(s) are fully closed. The stall warning may sound and the touchdown should occur very shortly thereafter, on the main wheels.

How much/how fast to flare
4-sec flare to aim point 2

Touchdown: If the approach was well stabilised, the approach IAS was flown accurately, and the 4-second flare completed as described, then touchdown should occur between 4-6 seconds after the flare commencement, with the touchdown located very close to the original aim point 1. Continue to use judicious inputs on all flight controls through the continuing rollout, until runway turn-off. Test brakes gently, applying as necessary to make the desired turn-off point at a safe speed.

The landing is not complete until safely clear of runway

Continue to use judicious inputs on all flight controls through the continuing rollout, until suitable runway turn-off. Consider deceleration progress to turn-off point, to determine braking levels required to turn safely clear of the airstrip/runway. Ground speeds can be deceiving, especially at night.

A Final Thought

“Learning is finding out what you already know.

Doing it is demonstrating that you know it.

Teaching is reminding others that they know just as well as you.

We are all learners, doers, and teachers.”

– Illusions: The Adventures of a Reluctant Messiah – Richard Bach (1977)

Happy Landings

Captain David M Jacobson
FRAeS MAP