Captain David M Jacobson MAP

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I welcome the Australian Government's Aviation Safety Regulation Review and would welcome the opportunity to participate, offering certain, strong recommendations for a serious look at the landing flare manoeuvre, in particular.

It is the least understood and the worst taught sequence in the flight-training syllabus, civil or military, here in Australia and throughout the world.

Until I first published my Jacobson Flare paper in 1987, there was no quantitative technique ever developed. The training manuals and the conventional practices draw from the days of the Royal Flying Corps in World War 1 and have simply regurgitated the same material over and over, without any fresh thought. For over 100 years, flight instructors, civil and military, cling to this material in much the same way that a drunken person might cling to a lamppost - more for support than illumination!

Let me illustrate the point, simply, in two different ways:

1. I have attached two .pdf files, extracts from the A5-sized Australian Department of Transport Flight Instructor Manual from 1975 and from a glossy well-produced CASA Flight Instructor Manual (Issue 2) 2006. Only the design and print quality improved in 31 years.
   THE WORDS ON THESE PAGES HAVE NOT CHANGED!

I presented The Jacobson Flare around this nation for CASA during their 1997 Flight Safety Seminar series, but their interest went no further. The policy seems to be that the industry knows what it is doing. I believe they are mistaken.

The flight training industry treats the landing manoeuvre like the three classic taboo subjects of politics, religion and sex. Junior instructors are not encouraged to think and develop new ideas. They are told to recycle the tired old myths and mysteries, because 'this is the way we teach it'. Everything else in aviation has moved on, but not the landing. GPS has replace astro-navigation and even dead reckoning, but we continue to tolerate 'circuits and bumps'!

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2. Ask any pilot: 'How do you land your aeroplane?' I'll bet that the first response is a look of terror, followed by a nervous giggle. Next will come one of three well-weathered and worn-out clichés:

- 'Stuffed if I know';
- 'I just close my eyes and hope for the best'; and
- 'Oh, you just get the hang of it.'

History

Of all manoeuvres flown in fixed-wing airplanes, the landing flare remains an enigma. It should be the most precise flight manoeuvre that pilots are required to master as it is critical to the safe and satisfactory conclusion of every flight; historically, however, it has attracted little serious thought and attention.

Today, the landing flare persists as one of the most challenging disciplines to learn, teach and apply at all levels. Students, experienced pilots and flight instructors alike regard it alternately as satisfying or frustrating, simple or complex, safe or hazardous. It is also the final long-lasting impression of the flight for all passengers and crew members.

In this age of technical precision, consideration of the manual landing flare manoeuvre has remained imprecise. Conventional flare practices have involved a critical estimation of height above the runway and are subject to a number of variable factors summarised as airplane, pilot and environmental. From the dawn of aviation until 1987 there was no definitive, universal landing technique and, even more puzzling, little recognition of the need for one.

The original pilots were self-taught. Their haphazard trial and error practices gradually blossomed into a loose collection of landing methods and myths that ultimately came to be regarded as gospel. Surprisingly, these have remained for the most part unchallenged by generations of flight instructors. The best explanation for this may be the law of primacy in education: people tend to believe implicitly what they are first taught, creating unshakeable views about any given subject. In accepting that "This is how it's done" and passing the baton on, pilots using conventional flare practices have:

- Used educated guesswork and repetition to solve only the immediate problem – what about the next airfield, or a future airplane endorsement? And the next?

- Prolonged unnecessary stress, affecting students, instructors, passengers and airplanes;

- Accepted the lack of consistency and predictability;

- Wasted valuable training time and expensive resources on trying to teach landing judgement;

- Had no logical and constructive means to critique and troubleshoot the landing flare manoeuvre;

- Suffered far too many landing accidents and incidents – worldwide statistics in this category have remained unacceptable for decades.

Conventional training practices have assumed manual landings to be non-quantifiable. This is no longer the case. Since 1987, The Jacobson Flare has enabled precise comprehension and command of a manoeuvre historically regarded as an "art".

The Jacobson Flare Treatise, shortly to be released as an Application for iPad, discusses the development of a practical and tolerant technique for establishing a universal and consistent landing flare that does not rely solely on a pilot's peripheral perception of vertical height. Simple triangulation principles are applied to determine a visual fix for commencement of the flare.

The flare fix is derived from triangulation between a pilot's eye path and a supplementary, pre-calculated longitudinal point on the runway centre-line, positioned short of the aim point.

While maintaining an accurate eye path to the aim point, the pilot simply observes this supplementary flare cut-off point being ultimately superimposed by the cockpit lower visual cut-off angle. This defines the accurate and consistent flare fix, from whence the eye path to the aim point diverges and the landing flare commences.

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"This (the path flown) is exactly what we have all been trying to achieve by guesswork; what is different here is the quantified explanation."

The most common response (in summary) to The Jacobson Flare by experienced professional pilots since 1985.

The Jacobson Flare offers the following advantages over conventional practices:

- Landing an airplane can now be regarded as a skill that can be logically taught and learned, rather than as an art to be mastered eventually. This consistent innovative technique defines the entire landing flare manoeuvre for any airplane from day one, greatly enhancing self-confidence for all pilots;

- Most of the variable factors affecting perception and estimation of flare height may be discounted because pilots can fly a clearly delineated eye path, from final approach through to a predictable touchdown;

- The concept of a longitudinal flare cut-off point on the runway is extremely tolerant as any errors in the selection or identification of this position are greatly diminished vertically;

- Elementary and advanced pilot training is simplified for student and instructor, representing a meaningful reduction in time and costs;

- This pilot-portable technique adapts simply to successive airplane endorsements throughout a pilot's career. The distinctions are in the aim point and flare cut-off point positions;

- Experienced pilots, especially when returning from a period of leave or non-flying management duties, can achieve better landing consistency by using the visual flare fix to complement their highly developed levels of judgement, coordination and skill;

- Runway occupancy times are minimised, assisting ATC units with traffic flow. Airplane tyre and brake wear may also be reduced by more consistent touchdown points and damage to runway surfaces, caused by deep touchdowns followed by heavy braking, are minimised.

- Safety is greatly enhanced, because pilots no longer need to guess flare height and feel for the ground; the entire manoeuvre is virtually visible to the pilot;

- No device or modification of the airplane is required to apply The Jacobson Flare – therefore no additional costs are incurred;

- The approach path, flare fix and flare rate are very similar to, and compatible with, those commanded by Head-up Guidance Systems (HGS) on the B737NG and other airplanes.

"Simple Unassailable Aerodynamic Logic"

The Jacobson Flare, conceived in 1965 when the author was learning to fly, was inspired by the celebrated Dambusters operation of 617 Squadron RAF, in 1943. It was developed, presented and first published between 1985 and 1987, by which time the significance of the earlier inspiration had become apparent.

In the second half of a career that spanned 45 years and accumulated over 24,000 hours, including 5000 hours as a flight instructor, the author applied his Jacobson Flare technique to every single landing flown and taught in DC-9-30 and B737- 300/-400/-800 jets and a range of light airplanes and sailplanes.

The Jacobson Flare technique is not a hypothesis seeking validation. It has been thoroughly flight tested, over more than 28 years, by many accomplished and experienced exponents in Airline, Australian Defence Force and GA operations and has gained wide acceptance.

"The greatest single advance in flying training in many, many years; and represents simple unassailable aerodynamic logic."
John Chesterfield A.M. MRAeS, Air Commodore RAAF; CFI/Manager Phoenix Aviation (Ret'd).

The Jacobson Flare has been adopted as a standard landing technique by several major training organisations and by hundreds of professional pilots. It was recognised in 1998 with a Certificate of Air Safety awarded by The Aviation Safety Foundation Australia.

I believe that it's about time the regulator showed some leadership and started recommending, even mandating better systems where they have shown great advantages over traditional practices. If the Government, through its Minister, is serious about reducing landing incidents and accidents, reducing runway occupancy times (which has the potential to extend the capacity of busy airports, such as Sydney), minimising runway maintenance, and greatly enhancing flight safety, then it must convince the industry to consider the only quantifiable, universal landing technique in the world, the Jacobson Flare – Made in Australia since 1987.

As I stated earlier, I would welcome the opportunity to contribute meaningfully, in any capacity, to the forthcoming Review. Please advise how that might be possible.

Further information is available from my website, www.jacobsonflare.com

I look forward to your response.

With kind regards,

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12
APPROACH AND LANDING

AIM

To teach the student to land safely under various wind and runway conditions.

INSTRUCTIONAL GUIDE

Before the first solo flight the student must be able to make competent engine assisted approaches and landings and be able to go around again safely. Glide approaches and landings must also have been practiced sufficiently for the student to be able to attempt a landing in the event of engine failure and still land if the aeroplane is slightly high on final. The remaining sequences of the Air Exercise should be covered after the first solo.

Many students have difficulty in mastering the approach and landing. This is a matter of judgment and there is no simple way of teaching judgment to those to whom it does not come easily. Proficiency is attained mainly through practice and although the instructor's advice and guidance is of great help in the early stages any attempt to analyze the student's difficulties too specifically should be delayed until he or she has had a fair amount of practice. Until this practice is gained the errors are likely to be of a random nature while the student is becoming accustomed to the appearance and feeling of a good landing. After the student has grasped the basic requirements any errors will normally form a consistent pattern which can be recognized, analysed and corrected.

It is important that the instructor demonstrates quite frequently the type of approach and landing being taught.

Many instructors are reluctant to do this as they feel that they are depriving the student of one more approach and landing. This is not true. Only by seeing and retaining a mental picture of this exercise can the student learn to land the aeroplane.

The completion of the touchdown should be judged by the change in attitude of the aeroplane rather than by movements of the control column. The attitude should be changed by reference to the landing horizon (edge of airfield) and the front of the aeroplane. The idea may be helped if the instructor places the aeroplane in the approximate position on the airfield where it will be touching down, then shows the student the sight picture that will be seen during the landing. In the case of most nose wheel type aeroplanes the attitude in which it rests on the ground has to be modified slightly and this can be done by visualizing the attitude resulting from the main wheels being on the ground and the nose wheel a few inches above the ground.

During the float or hold off period the instructor should watch the student's eyes to see where he or she is really looking. Students normally tend to look too close. Advise them to look ahead and slightly to the left at a point about 50 to 100 meters away. The student's gaze should not be rigid, this point being the centre of what he can see. If the student looks too far ahead objects will hardly appear to move, if too close they will appear to move too fast and become blurred. Both these conditions make judgment very difficult.

Remember that students will rarely make a good landing unless they make a good approach. Good approaches rarely follow bad circuits. It therefore follows that the instructor should not allow the student to attempt landings until he or she can fly a reasonably accurate circuit and approach.

To do so will, in most cases, only discourage the student when the almost inevitable bad landing follows. It is well to remember that the aim in teaching consistent square circuits is to develop judgment as rapidly as possible by repetition.

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ıctising this exercise on a surface where loose stones are present, point out that the take-off run is only reased if power is applied whilst rolling forward er than while stationary against the brakes, when age may result from stones being thrown up into r.

ate that should engine failure occur during the ngle climb a very positive forward movement of column is essential if control of the aeroplane is ined.

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:olling and lack of co-ordination are usually caused tenseness brought about by the high degree of required in the initial attempts. Encourage the lax and help him as outlined in the instructional uiring him to use only one or two controls at

EXERCISE 12

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