

Short Field Landings

First of all, just a few notes on certification requirements. CAR 3 preceded FAR 23 and, for landings, it simply specified that exceptional skill was not required. There was no minimum approach speed specified. That carried through into the early versions of FAR 23 to which the Decathlon was certified. Some time later the requirement for a minimum approach speed of 1.3 Vs was introduced. Even later the bit about not requiring exceptional pilot skill was replaced by "The landing may not require more than average piloting skill". Back then, small aeroplanes were not required to provide landing distance data so that is why the Decathlon does not include it in the approved Flight Manual. That is why Decathlon landing distance data was not subject to approval by the FAA and no requirement for it to be "easily achievable and repeatable by the average pilot who is likely to be operating the aircraft type". Many of the aeroplanes used for tailwheel (jn particular) training have characteristics far short of modern certification standards so consider that landing distance data will not be accurate, nor achievable by an average pilot.

For aircraft certified to new versions of FAR 23, everyone should be aware that "the piloting techniques used are easily repeatable, to the 'average pilot' standard, and that the resulting aircraft performance is accurately presented."

However the FAA Approved Airplane Flight Manual for the Super Decathlon has absolutely nothing about short field landing technique or distance. The only information provided on short field landings is all unapproved so be cautious about undertaking short field landings using the technique described in the Operating Manual and accept that you will not be able to achieve the distances specified.

The manufacturer's Operating Manual (not the approved AFM) approach airspeed is 60 mph (52 kts) IAS for an aeroplane which has a stall speed of 54 mph (47 kts). Back when we had Australian specific flight manuals with our old "P" Charts the approach speed was 1.3 times the stall speed which seems quite sensible to me – per the Australian airworthiness requirements at the time and also newer versions of FAR 23.

(Incidentally, those old "P" charts done in the '70s are not applicable as they were for the early aeroplanes with a lower gross weight than the later ones.) CAO 20.7.4 allows us to use the manufacturer's data manual as an alternative to CASA's general requirements of an approach speed of 1.3 Vs and a 1.15 factor on distances. CASA's note in CAO 20.7.4 is relevant: "the data contained in some manufacturers' data manuals is unfactored and makes no allowance for degraded aircraft performance."

Think about the risks of approaching at 11% above the stall speed instead of the usual 30% for a short field landing. Not surprisingly, the manual has a warning about the high rate of descent while using this low approach speed.

How accurate is the airspeed indicator on a typical aeroplane in service? Refer CAO 100.5 Appendix 1 para 5 for CASA requirements. The aeroplane still stalls at the same airspeed but the airspeed indicator may be over-reading by a few knots – so the already marginal 11% over stall speed for a short field landing approach in a Super Decathlon may be reduced to 4% and that is definitely not safe in my opinion, especially with a pilot under training.

The Super Decathlon manual goes on to state that "Data presented in this table represents maximum airplane capability at speeds shown and requires aircraft in good operating

condition and a proficient pilot.” So, I recommend adding a 15% margin to the book figures for Super Decathlon landing distance and, ensure your slow flying skills are at a very high level prior to attempting short field landings per the book.

CASA’s Part 61 MOS

Consider some elements from the competency standard DFE1 in CASA’s Part 61 MOS for a tailwheel aeroplane endorsement:

- i. calculate landing performance.
- ii. land the aeroplane at the nominated touchdown point at minimum speed and apply maximum braking.
- iii.
- iv.
- v. stop aeroplane within calculated landing distance
- vi.

With nil wind, ISA+5 deg C and SL distance per “the book” is 153 m ground roll and 347 m to clear 50 ft. I am not quite sure if CASA intends us to measure distance from 50 ft or just the ground roll however I note that landing distance required is distance over 50 ft per CAO 20.7.4 Section 10 – no mention of ground roll there.

CASA's MOS has the requirement to “land the aeroplane at the nominated touchdown point at minimum speed” so the pilot under training can put in the time and effort to develop a technique to achieve just that.

However, the Part 61 MOS requires that the aeroplane be stopped within the calculated landing distance which I believe is distance from 50 ft rather than just the ground roll. It takes more effort to measure distance from 50 ft to a stop than it does to measure just ground roll but we can do it with the use of a video camera on the ground and some straight forward analysis.

So, we have a typical serviceable aeroplane set up within limits but nowhere near as accurately as I would set it up to conduct flight tests to determine landing distance for the manual. As I mentioned, the airspeed indicator may be a little bit out – let's say a couple of knots under-reading so actual speed at 50 ft AGL is now two kts faster than the book (safer than over-reading but only 1.15 times the stall speed compared with the 1.3 times that CASA specifies generally in CAO 20.7.4). Hard to fly exactly “on the numbers” isn't it so let's consider that the pilot under training is just two knots over the specified airspeed (incidentally, this is much closer than the tolerance specified in the MOS). I wonder how much further the aeroplane will float with that extra four knots?

There is likely to be absolutely no margin in those manual figures – flight test engineers generally reject test data which are not “on the numbers” and this manual does not have that 1.15 factor on distance that CASA mentions in CAO 20.7.4.

Engine idle speed at the high end of the range will increase the landing distance compared to probably what was used by the factory landing tests. Would you like to estimate those effects?

The Super Decathlon doesn't have flaps and if the touchdown speed is the same then it will float quite a long way from the 50 ft point to lose that extra 4 kts. i.e. airborne distance from 50 ft to touchdown will be very much longer than “the book figure”.

CASA requires the pilot under training to “stop aeroplane within calculated landing distance” - good luck with that in a typical training situation. It would be fine if the calculated distance had the usual 15% margin on test data but it doesn't – as the manual states, the calculated distance is “maximum airplane capability at speeds shown” - it means what it says – we will not be able to stop within that distance, but perhaps match it with everything going for us. We should get close if we use exactly that technique and speeds.

The other part of CASA's requirement is to “apply maximum braking”. So, here we are with a pilot under training in a tailwheel aeroplane which is relatively unfamiliar to the pilot. He/she gets it on the ground and then applies maximum braking per CASA's Part 61 MOS. However the Super Decathlon manual states “Brake as required.” It then gives a “WARNING As speed decreases, braking must be moderated to prevent possible nose-over.” If CASA had specified that the flight manual technique be demonstrated then I would have less of an issue with the MOS.

My opinion is that this CASA requirement will result in frequent instances of Super Decathlons nosing over while undertaking their mandated tailwheel training and suffering considerable damage. Certainly, the statements in the manufacturer's manual that I have quoted support my view.

The description of newer certification requirements: “Easily repeatable, to the average pilot standard” does not apply to older training aircraft where we see statements like this in the AFM: “maximum airplane capability ... a proficient pilot” attempting something which “may result in injury or fatality”.

So, there is a real safety issue in using a Super Decathlon to conduct short field landings per CASA requirements for a tailwheel aeroplane endorsement:

- pilots under training using an approach speed significantly less than the minimum generally specified by CASA
- the ability of an average pilot in a typical training aeroplane to equal or better distances known to be the maximum capability of that type
- the risk of nosing over as a result of applying maximum braking after touching down in a tailwheel aeroplane rather than following the instructions in the AFM to moderate braking as speed decreases

Well, that was the long story to explain why I do not recommend performing short field landings per the Super Decathlon Operating Manual in a basic training environment.