Parachute Operational Considerations

Unlike in the USA, parachutes are not required for aerobatic operations in Australia however many serious aerobatic pilots do use them.

Just to be clear, parachutes are not mandated for aerobatic operations in the USA either. Their regulation 91.307 requires parachutes for bank angles greater than 60° and pitch angles greater than 30° which encompasses aerobatics generally however that is not the definition of aerobatics. Regulation 91.303 defines aerobatics consistent with the ICAO definition however CASA changed their definition when Part 61 was introduced to be different from that of ICAO and the rest of the world. The FAA exempts parachutes for crewmembers so spin and aerobatic training does not require a parachute! Similarly, in solo flight, the pilot is not required to wear a parachute during aerobatics. The FAA's regulation goes on to state that when a passenger is carried during aerobatics then all must wear a parachute. However, the IAC mandates parachutes for aerobatic contests so all IAC members use them in solo aerobatic operations.

Consequently, all aerobatic flight schools practice the wearing of parachutes in training operations. I wonder if they all provide adequate ground training in the use of parachutes? In Australia, I recommend ground training by an expert in the use of emergency parachutes with refresher training as required. Some useful contacts:

- https://www.parachutesaustralia.com/product/the-slimpack-emergency-system/#tab-additional_information
- http://www.skywerx.com.au/index.html

Wearing parachutes in training operations introduces additional considerations beyond that of solo flying.

I was asked to conduct some spin tests of a Pitts S-2B by the Chief Test Pilot who wanted to ride along in the front seat to observe. He had conducted a number of flights with some rerigging however was not satisfied with its recovery behaviour. Avionics are not installed until after the factory completes production flight testing and a CofA is issued so I had a portable radio strapped to my left thigh as usual and a portable intercom strapped to my right thigh. We both wore flight suits, gloves, helmets and parachutes.

Pre-flight briefing included a decision height of 9,000 ft (ground elevation was 6,500 ft) – if we were still spinning then that automatically triggered the bail-out procedures. I would use the command "I will say bail-out three times and on the third one – I will not be there!"

The same principles and discipline must be used in spin and aerobatic training when parachutes are worn. Sport Aerobatics Magazine of May 2016 has an excellent article by John Morrissey. You must be outside the aeroplane by 500 ft above the ground. At least 500 ft!

"In a vanilla upright spin from the top of the box at 3,500 feet, one has approximately (~) 28 seconds and 3,100 feet to stop the spin and begin the pull to level flight. And to accomplish this, any spin recovery issues must be sorted out by at least 800 feet on the altimeter to compensate for altimeter lag and allow for the altitude loss experienced during the transition from autorotation to the downline where the pull to level can begin. Applying those figures to a basic one and one-half turn upright spin, a typical aircraft will lose ~450 feet and five seconds by the time the aircraft completes one and a half turns. At this point the pilot has ~3,050 feet of altitude remaining to stop the autorotation and complete the pull to level flight. Four hundred feet of that 3,050 feet is going to be required for the pull-out from vertical down to level flight. This leaves the pilots with ~2,650 feet (~23 seconds) to sort out any recovery problems. ***Only 23 seconds!*** And those 23 seconds are from the point where recovery should have begun. By the time the pilot begins to realize he is having a problem, as mentioned in the previous Primary flight example, fewer than 23 seconds are available. Said more realistically, if the initial spin recovery control inputs do not immediately produce normal, reassuring evidence of recovery, then exiting autorotation is highly unlikely for pilots with the limited spin training and experience previously mentioned. Once 23 seconds have elapsed, there may not be enough altitude left for recovery even if the spin is stopped. Throw in a few more seconds and recovery is impossible. We

can break the rules, but we cannot escape the laws of physics. When the time-distance equation begins producing negative numbers, ground impact is inevitable."

Training in something like a Pitts S-2B you can easily apply John's physics to determine your own decision height. If the aircraft is still spinning by, say, 3,000 ft AGL then that is an automatic decision to bail out. Easy: decide – eject the canopy – egress.

It gets much more complicated in a Super Decathlon as there is the extra time for these additional steps:

- Get the student to eject the door. How good was that ground training?
- Wait for the student to exit the aeroplane. Was there practice on the ground? A spinning aeroplane will be much more difficult.
- Now the instructor can exit the aeroplane.

How long will all of that take? How much height will be lost while spinning for those extra seconds? What decision height will you choose? Let's say 5,000 ft – that should do it – an extra 17 seconds?

The discipline of that automatic decision to bail out if the aircraft is still spinning at 5,000 ft AGL must be absolute. None of this thinking: "I think it is recovering so I will wait a bit longer …". NO, it is an automatic decision – no ifs or buts!

We don't want to be bailing out of perfectly good aeroplanes so practice spinning must be conducted high enough above 5,000 ft that it doesn't happen. Allow margins for student errors and for the instructor to take over and recover. Let's say a planned recovery height for practice spins is 6,000 ft. The minimum entry height is going to be 7,500 ft or more compared to the usual 4,500 ft for a typical short practice spin. Don't forget to add the ground elevation and that includes obstacles above the ground – about 300 ft in the northern part of Moorabbin's aerobatic area.

So, wearing parachutes we need a very much higher altitude for training. A further consideration for airspace and cloud base.

If wearing a parachute then you should also be wearing a Nomex flight suit with gloves and a helmet.

Another consideration is the aircraft weight and balance. Consider two people of CASA's standard weight in a Super Decathlon. Fuel is quite limited to remain within the aerobatic weight limit when the spin practice commences. Allow enough fuel remaining to transit back to base with the planned amount reserve fuel remaining. Incidentally, the planned reserve fuel should be significantly more than CASA's rule for minimum reserve fuel as, if we need it in this situation, we probably won't be using a low power setting for holding with the engine leaned.

A typical emergency parachute weighs about 15 lb. Take 20 litres less fuel and how long can you spend in the training area?

Pay your money and take your choice.