

# GA1357

*Posted on 27.02.2024 by Steve Forward*

**Category:** [General Aviation](#)

**Report Title** Near-miss between skydivers

## Initial Report

On a busy day at [Skydiving airfield], [more than 1] aircraft were operating for skydiving. The weather was clear with light winds. [Aircraft 1] had just dropped skydivers as [Aircraft 2] was approaching the drop zone to drop another load of skydivers (both from approximately [height ] AGL). When the pilot of [Aircraft 2] requested to drop, the Drop Zone Controller (DZC) gave "clear drop" to [Aircraft 2] before all skydivers were clear from the previous lift (on [Aircraft 1]).

One of the skydivers dropped from the first aircraft was jumping with a wing-suit, resulting in a longer than average freefall time. They were still under canopy as the skydivers from [Aircraft 2] were in freefall. 16 skydivers exited [Aircraft 2] together in a single group and tracked away from each other at 5000ft to achieve separation before deploying their parachutes. As they tracked away, some were in freefall in close proximity to the wing-suit skydiver already under canopy.

The closest skydiver in freefall saw the wing-suit skydiver under canopy just before deploying their own parachute; they estimated the separation to be approximately 50m. The wing-suit skydiver saw others in freefall tracking towards them but had no time to take any avoiding action. Had there been a collision between a skydiver in freefall and the skydiver under canopy, it could have resulted in serious injury or fatality to both skydivers.

Lessons learned: The DZC should not have given a clear drop to [Aircraft 2] before all skydivers were clear from the previous lift. They may have been overloaded or under pressure due to the busy operation that day, or there may have been other factors. I reported my concerns to the Chief Instructor.

## Comment

This is the first skydiving report that *CHIRP* has received so, for all those experienced skydivers, please forgive the extensive 'Skydiving 1.01' explanation included for the benefit of us non-parachutists!

If all drop-zone aircraft climbed at the same rate, all parachutists were dropped at the same height and location, fell at the same speed, opened at the same height, descended under canopy at the same speed and no one moved horizontally (apart from wind drift), then the job of a DZC would be

relatively simple and there would be virtually no risk of a free-faller from one aircraft meeting an open canopy from a previous aircraft load. The reality is so different. It is also important to note that the DZC is not in fact a controller but an advisor; they cannot give a clearance to drop *per se*, although jumpmasters would not release their skydivers without the DZC having given the “clear drop” call. Avoidance of each other is a collaborative endeavour between the DZC, those in the air, and the jumpmaster in the aircraft; with the skydivers themselves bearing most responsibility for avoiding others. All that the DZC can do is offer their opinion that there appears to be clear airspace to drop within.

Most commercial parachute centres in the UK use aircraft carrying 15-20 skydivers dropping from between FL120 and FL150. Most skydivers will be dropped individually or in groups on a single pass over the DZ, with the aircraft covering a distance of well over a mile between the first jumper or group leaving the aircraft and the last jumper or group exiting. Most parachutists aim to have their parachutes fully open between 2500ft and 5500ft above DZ level. Once parachutes are open, smaller highly-loaded canopies may descend at over 2000ft/min, while larger or lightly-loaded canopies may descend as slowly as 600ft/min, or even go back up a bit on thermally days. Whilst some canopies will be on the ground within 1.5mins of opening, others may take over 6mins. As a result, canopies from just one aircraft may spread out horizontally over a few square miles of sky, at a range of heights, and with a range of canopy sizes that make it difficult for a DZC to accurately assess height, let alone determine the exact time to descend below 2000ft. Canopies up-sun of the DZC or transiently behind small clouds add to the difficulty.

Wing-suited skydivers can descend relatively slowly (they may have fall rates as low as a third of normal freefall speeds), and can glide relatively large distances away from and back into the DZ area such that they might come into potential conflict with faster falling non-wing-suiters dropping from later aircraft. This means that they are very difficult to track by the DZC, jumpmaster and other skydivers, compounded by the fact that all this is done visually whilst trying to maintain contact with potentially quite small parachute canopies that can give an illusion of being at different heights depending on the size of canopies.

Even with this complexity, an experienced DZC can usually make a realistic assessment of whether it is advisable for the next load to drop. When this is combined with pilots monitoring each other's calls and planning at least a 6min separation (and preferably 8min separation), then it is unusual to have significant conflicts. One obvious way to ensure no conflict between loads would be to allow no further dropping until all canopies are on the ground, but this would be commercially costly and very unpopular with skydivers wishing to do as much jumping as possible. Having aircraft hold in the air is not only commercially costly and unpopular but sometimes introduces other safety concerns, particularly concerns about hypoxia when the aircraft is on hold at over FL100. Skydivers are allowed 30mins above FL100 without supplementary oxygen, but only 6mins above FL120 before the drop has to be aborted. Although it is not too bad in summer, hypothermia is also a

significant factor in some jump-aircraft if kept on hold during colder months of the year.

A jumpmaster in an aircraft can look down for other canopies before starting to jump and can request a "go around" if they suspect a conflict. However, from 3 miles up at FL150 it is difficult even to see a canopy, and quite impossible to decide at what height it is. In freefall, the most immediate risk of collisions comes from other skydivers jumping from the same aircraft, and it is appropriate that attention is focussed mainly on this area. In the 10-15secs before opening their parachutes, many experienced jumpers will be on the lookout for open parachutes nearby (whether from their own aircraft or from another) but many jumpers will not yet have developed the skill or situational awareness to allow them to do this.

It is easy for jumpers leaving an aircraft to assume that a "clear drop" from DZ control means there is no possibility of a conflict. Careful consideration of timing makes it clear that this is not the case. When a pilot calls "two minutes to drop" and receives the "clear drop", the "two minutes" is a rough estimate rather than a promise, and the "clear drop" simply means "no obvious conflict seen at present". After the first jumper begins to climb out of the aircraft door, it is not unusual for a further 60-70secs to elapse before the last group or individual leaves the aircraft. There is then up to 75secs of freefall time before the last canopy is deploying. Thus almost 5mins can elapse between the "clear drop" and the last canopy deploying. That is enough time for an already open canopy to travel horizontally across 1-1.5 miles of sky. The "2min" call could be reduced to "1min" or "30secs" in order to slightly reduce the large interval but this may produce chaos in other ways due to busy radio frequencies and failure to obtain a response in time.

It is interesting, and perhaps significant, that although this organisation has a safety management system and a safety committee, and had clearly already given this topic considerable thought, the verbal report of the skydiver to the Chief Instructor did not find its way into the SMS and it was the report to *CHIRP* that brought it to their official attention. The DZ company SMS should have logged the incident and so it's not clear why the company had no record of the incident being reported. A SMS cannot review the efficacy of its SOPs if it does not reliably gather data on near misses as well as the rarer major incidents. Is there a clearly visible supply of "near miss" or "concern" forms and pens at manifest, DZ control, packing area and reception so that it is easy for any jumper to make a report to them as soon as they walk back from their jump? On that busy day, perhaps the DZC was too occupied with other immediate concerns to get all the appropriate information (including from pilots and the wing-suiter) and feed it into the SMS. At the time of the initial verbal report it may have been possible to identify the closest free-faller and the wing-suiter and then to confirm opening heights (often logged electronically), opening locations (on POV videos) and post-opening navigation. This would have allowed for a more informative debrief and safety committee discussion. However, it would have required significant time from a senior member of the management team on what was already one of their busiest days of the year.

There is an education piece for wing-suiters to highlight that they should not fly through the DZ

stack due to the risk of collision, and the DZ operator might need to think more about wing-suit procedures to allow for their increased drop time. Additionally, skydivers who usually frequent a DZ with only one aircraft may never have considered the possibility of conflict with another aircraft and may need very specific briefing when visiting a multi-plane operation. Organisations with a multi-plane operation may need to add specific information or cautions to their DZ Briefing for visiting licenced jumpers. It is very easy to assume that “everyone knows”.

Jump composition can be available to DZC and to the pilot flying them (noted on the aircraft manifest) but may not be available to pilots on the following load. It is not known if the DZC was actively aware of wing-suiters being present on the affected load. Likewise, it is not known if distraction could also have played a part for the DZC on this occasion. At some DZs, the DZ control is isolated from other activities, while at others it is in the middle of the throng of jumpers preparing for the next load; this throng inevitably provides distractions (but also sometimes increases awareness of what will happen on that next load).

Communication between jump aircraft about wing-suiters/high openers may also have been a factor. It may be possible to highlight wing-suiters on the pilot's copy of the manifest so that it becomes standard practice for the pilot to pass this information to following pilots when calling “drop complete”. This would allow the following aircraft perhaps to plan a longer interval.

Finally, the “big sky principal” means that, even under non-ideal conditions, collisions or even near misses are infrequent; this can lead to complacency and, occasionally, normalisation of deviance by DZCs, management systems, pilots and ordinary jumpers alike. Jumpmasters at multi-aircraft drop zones may wish to remind their jumpers about the possibility of conflict with previous or following loads, and about the DZ's SOPs which are aimed at reducing this risk.

## Key Issues

### Dirty Dozen Human Factors

The following ‘Dirty Dozen’ Human Factors elements were a key part of the CHIRP discussions about this report and are intended to provide food for thought when considering aspects that might be pertinent in similar circumstances.

**Resources** – deconfliction relies on Mk1 eyeballs and individuals' situational awareness.

**Distraction** – a busy jump programme means scope for the DZC being side-tracked or overwhelmed.

**Communication** – information flow between aircraft/jumpers/jumpmasters regarding jump compositions.

**Complacency** – acceptance that multi-drop ops ‘are what they are’ and that ‘everyone knows the risks’.

**lack\_of\_resources**Resources

**distraction**Distraction

**poor\_communication**Communication

**complacency**Complacency



