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Illustrations by Ada Márquez

# COVERING ALL THE ANGLES

## SAFETY ON HORIZONTAL SKYDIVES

**I**n the past few years, many jumpers have become interested in angle flying, dynamic flying and tracking jumps, known collectively as horizontal jumps. And why not? For many people, experimenting with angles, speeds and body positions is what flying is all about.

But the increase in the discipline's popularity also brings new challenges that require jumpers to pay special attention to its unique characteristics. Here are a few basics you should consider if you are a part of this growing community:

### KNOW WHERE YOU ARE GOING

Horizontal jumps naturally consume more airspace than those where jumpers are falling straight down. When participating in such a jump, your group needs to fly toward clean airspace where you won't interrupt other groups. You'll also want to be

able to get back to the DZ. Therefore, leaders of horizontal jumps should primarily fly on their bellies so they can see the ground and where they are leading their groups.

Jumpers need to have flight plans that take into consideration the restrictions of their surroundings. Answering the following questions before you take off will help you create a safe flight plan:

» **What is the jump run (heading, position and intended path)?**

Most jumpers know that they need to fly perpendicularly to jump run to avoid other groups. But you also need to consider how far the jump run is from the DZ and whether your group will be able to make it back. If the jump run is curved, you need to make sure to fly on the outside of the curve. Flying toward the inside of the curve, even

if you fly perpendicularly to the plane on exit, can put you in danger of colliding with other groups.

» **At what speed and in what direction are the winds aloft and on the ground blowing?**

If the winds are strong and your group is flying downwind, you might find yourself farther away than anticipated. If you are flying upwind, you might not get a lot of penetration and will end up very close to where you started (which also means closer to the groups that exited before and after you). The winds aloft might be different from the winds at deployment altitude and on the ground. A good flight plan takes into account the winds at all altitudes and will allow your group to deploy upwind of the intended DZ, or at least where the jumpers



## Helmets and AADs

Angle flying is a unique form of skydiving, and a cautious approach to the discipline can help you avoid experiencing a freefall collision. However, any jumper who does collide with the group during an angle jump is likely to generate a tremendous impact force. In this situation, as in any other form of skydiving, a hard helmet and an automatic activation device serve valuable purposes in different ways: The helmet may protect you from suffering head trauma and unconsciousness, and an AAD may be able to activate the reserve parachute if the impact is still hard enough to render you unconscious.

**Jim Crouch** | D-16979  
USPA Director of Safety & Training

can make it back to the DZ, regardless of the prevailing winds at canopy altitudes.

» **What are the other groups on the plane doing, and at what position and altitude are they pulling?**

Different groups have different drift and other flight characteristics. The combination of the groups on the plane will dictate your exit order and flight plan. (Generally speaking, the group with the lowest vertical speed and longest horizontal range will exit first, and groups will exit in order of speed and range from there, with students and those pulling high exiting last.)

» **What does the landing area look like? Where are the best outs (alternative landing zones)?**

Since getting back to the main landing area is a high priority, the size and sometimes even the shape of the landing area will be a significant factor in your flight plan. Although you should always plan to land in the main landing area, never underestimate the importance of plan B: your alternate landing zones. Take into account that some places with good topography may have owners who are unappreciative of uninvited guests coming out of the sky. A good flight plan will allow you to land in a safe spot even if your group doesn't break off where you originally intended.

» **Are there any considerations unique to the DZ?**

Every drop zone is different: Some drop zones run parallel jump runs, some have more airplane traffic than others, and some

may have situations you have not even considered. For instance, a DZ may have limited airspace—as small as a one-nautical-mile radius—for skydiving operations according to the notice it provides to the FAA each year. That's why it's extremely important to talk to an appropriate DZ representative before doing a horizontal dive. Ask the manifest staff whom the proper person is to consult.

As you can see, leading horizontal jumps requires considerable experience; just because you can fly it doesn't mean you can lead it. If your goal is to lead these kinds of jumps, get experience by asking the right questions, put together flight plans with experienced leaders and pay more attention when you follow others. If you are about to follow someone on a jump, make sure that the person is qualified and has taken into account all of the factors above.



# CORRECT LEVELS

If everybody is flying on the correct level, you should be able to draw a straight line connecting all of their heads.

KEITH CREEDY

## APPROACHING AND FLYING IN A FORMATION

As with any other formation skydive, the priority while angle flying is flying “on level.” However, the perception of levels on an angle jump is different because jumpers are traveling horizontally, as well as vertically, and being on level does not mean being at the same altitude. The term “level” refers to the position of your head relative to the other flyers in the group.

In other words, if you are flying on your belly you actually want to fly ahead of the leader so you can look back at him with your head tilted down. If you are in the second row of belly flyers, you should be ahead of the first row and so on. For the back flyers, it’s a different story. The closest set of jumpers to the leader should have their heads in line with the leader’s chest strap. The second set should have their heads in line with the rigs of the first set of jumpers.

Flying on level is vital for your safety and the safety of the rest of the group. It



# FORMATION QUADRANTS

The airspace around the leader is divided into four quadrants: the two sides of the leader, and above and below the leader.

KEITH CREEDY



JAVIER CONTRERAS

puts you out of harm’s way if someone corks or has a premature deployment. It allows you to see traffic, avoid burbles and, as an added bonus, it improves your performance, because it encourages a better body position. That’s why you want to get on level before you cover the vertical distance and get closer to your group.

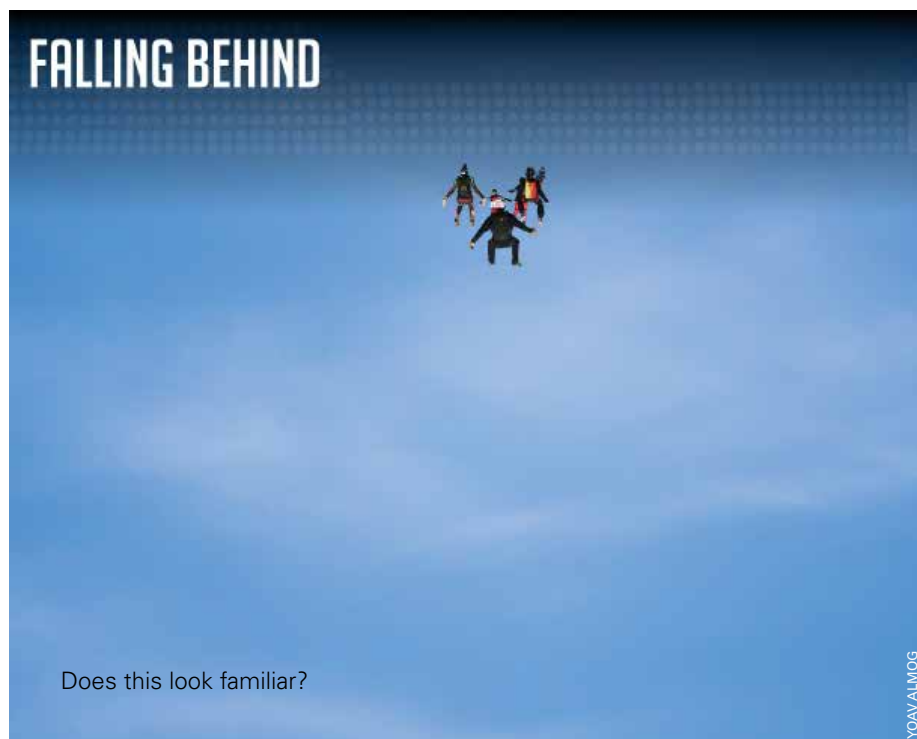
Think of the airspace around the leader as being divided into four quadrants: one area on either side of the leader, one above and one below the leader. When you approach and fly in a formation, stay in your

proper quadrant. If you are flying on your belly, always remain above the leader, never underneath. If you are flying on your back, you want to remain in the airspace under the leader, never above. Approach the leader from whichever side you are planning to fly in throughout the jump. Fly to that side as soon as you get out of the plane, and stay on that side for the entire skydive.

When approaching a formation at high speed, don't aim straight at it. It's safer to aim for a spot to the side of the formation to avoid hitting the group. Once you are on level, you can slide into your slot safely, at a controlled speed. Most importantly, keep your eyes open throughout the approach and look for other flyers. Remember, the goal is not just getting to the formation but doing it safely without any collisions or close calls. Never fly faster than you can think.

### **ALWAYS KEEP THE SAME HEADING (DIRECTION) AS THE REST OF THE GROUP**

Off-heading collisions are more dangerous than collisions between jumpers heading in the same direction. Never turn 180 degrees from the group's heading, even if you think there is nobody behind you. If you've passed the group, slow down and let it catch up. If you need to break off early, turn no more than 90 degrees from the group. And if you find yourself flying to the side of the group and the group starts turning toward you, turn toward the same heading it does, even if you are far away.



Be prepared for a few common scenarios:

#### » **Falling behind a group**

Our nature as skydivers (and maybe just humans) is to push ourselves and look for challenges. In angle flying that means faster dives, steeper angles and more aggressive turns. That's why it's only natural that you'll occasionally find yourself falling behind. If that happens, keep flying toward the formation while maintaining the same heading as the group. Being behind

is actually a good opportunity to discover speeds that you didn't know you had. As long as you keep your eyes on the group and make sure to turn when it does, you should remain safe. If you find yourself far from the group when it's getting close to breakoff time and realize you are not going to get there, start preparing yourself for an early breakoff. In a situation like this, it's OK to break off a bit early and fly 90 degrees away from the group. (A little early would be 500-1,000 feet above the group's intended breakoff altitude; until then, you should stay with the group.) Remember that people in the group haven't seen you throughout the jump and cannot anticipate where you will be on breakoff, so keep your eyes open.

#### » **Falling below or floating above the leader**

You always want to be able to see the leader. If you are a belly flyer who falls below the leader and you know how to fly on your back, flip to your back so you can keep visual contact with the group. If you are not proficient on your back, slide to the side of the group on your belly until you can clearly see the leader off to the side. Only then start floating back up, get on level and get back into your slot. The same principles apply when you are a back-flyer who floats above the leader; flip to your belly so you can see the leader, and then slide to the side to make your transition to your back. Whenever you slide to the side of the formation, be sure you look where you are flying to avoid collisions.



It's better to aim to the side of the formation instead of straight at it.

## » Crashes and burbles

If you feel unstable, whether it's because you are flying in somebody's burble or because somebody bumped into you, speed up. Whatever happens, always keep flying. The worst thing you can do is roll into a ball trying to protect yourself. This will only increase the chances of a collision. Speeding up, on the other hand, will help you fly out of the situation and get more stable.

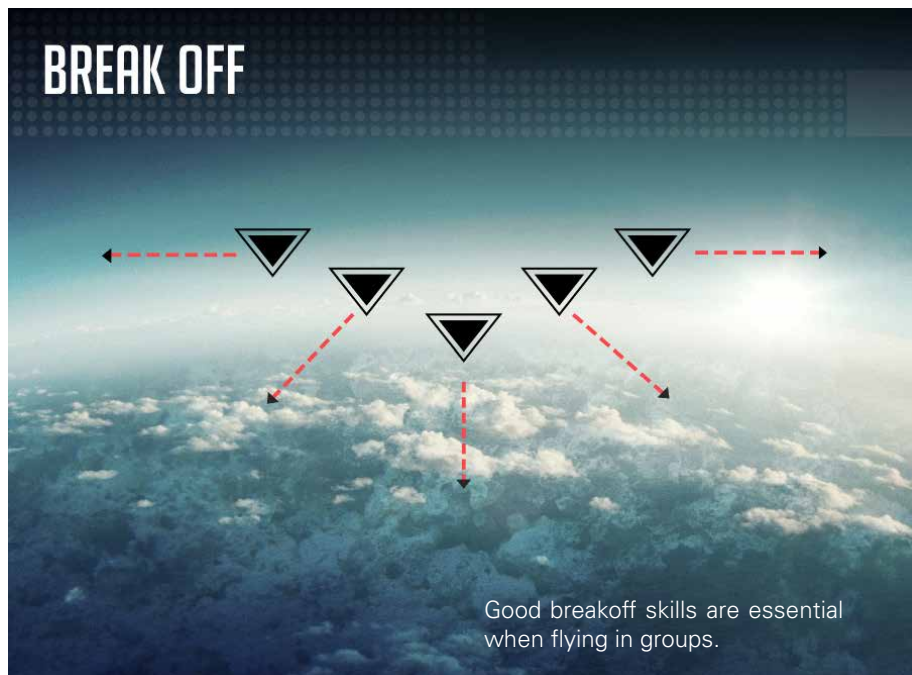
## BREAKOFF

Fan out relative to your place in the formation. The flyers on either side should fly 90 degrees from the base, while the rest find clear space in between. Avoid criss-crossing and make sure you look where you are going before you turn to break off. Some jumpers like to set their audible altimeters to sound 200-300 feet higher than breakoff altitude to give themselves extra time to assess their breakoff options and avoid mistakes.

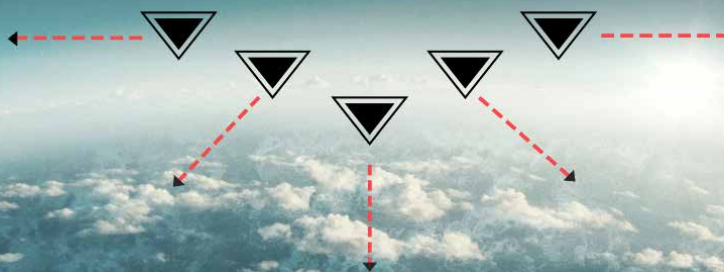
For a few seconds after breaking off, speed up and keep flying at the angle of the jump. Gradually flatten out only after you've created some separation. If you flatten out too quickly, you may collide with someone above you. The loss of speed could also cause someone breaking off behind you to catch up and collide with you.

Throughout the breakoff process, watch for other jumpers. People may not be in the slots or breakoff in the direction that they planned during the dirt dive.

At pull time, *you must always assume there is someone above you*. Check your airspace on all sides, even if you didn't see anyone for most of the breakoff process.



## BREAK OFF



Good breakoff skills are essential when flying in groups.

Some jumpers perform a barrel roll to clear the airspace above and below them, but you should only do so if you are confident in your skills and can perform the roll without losing too much altitude. (This is much more difficult than you would think.) If you do a barrel roll, spend enough time on your back to really see what's above you by breaking the roll into halves: Transition to your back, take the time to clear your airspace, then return to your belly. Finally, wave off before you pull.

## UNDER CANOPY

All jumpers should know where jump run is and their group's freefall flight pattern

in relation to it. Under canopy, make sure you are not flying toward other jumpers who are still in freefall. Once you are under canopy, fly away from jump run until you see that the canopies of the groups on either side of your group are open.

Angle flying draws on the lessons of other disciplines but also requires jumpers to learn new skills or sharpen existing ones. The most important thing is to know your limits: If you are not ready for a 20-way belly or freefly jump, then you are not ready for a 20-way tracking or angle-flying jump. Just because you aren't taking grips doesn't mean you shouldn't have goals and limits. At a minimum, jumpers in an angle-flying formation should be able to fly consistently on level and at a distance of no more than a few feet from the leader (or the jumpers nearest their slots in the formation). Those who can't do so should stick with small dives in safe learning environments.

The best way to get started is to invest in one-on-one coaching before tackling bigger and faster dives. Angle camps hosted by experienced coaches are also a great way to learn and improve in this discipline. Let's keep this a safe, enjoyable environment so we can all continue to play in the great blue skies.

## ABOUT THE AUTHOR



Sharon Har-Noy, D-33082, is a freeflying load organizer and coach. She was part of team BrainPOP, Israel's freefly national champion from 2007 to 2010, and is now a member of Joyriders XP.