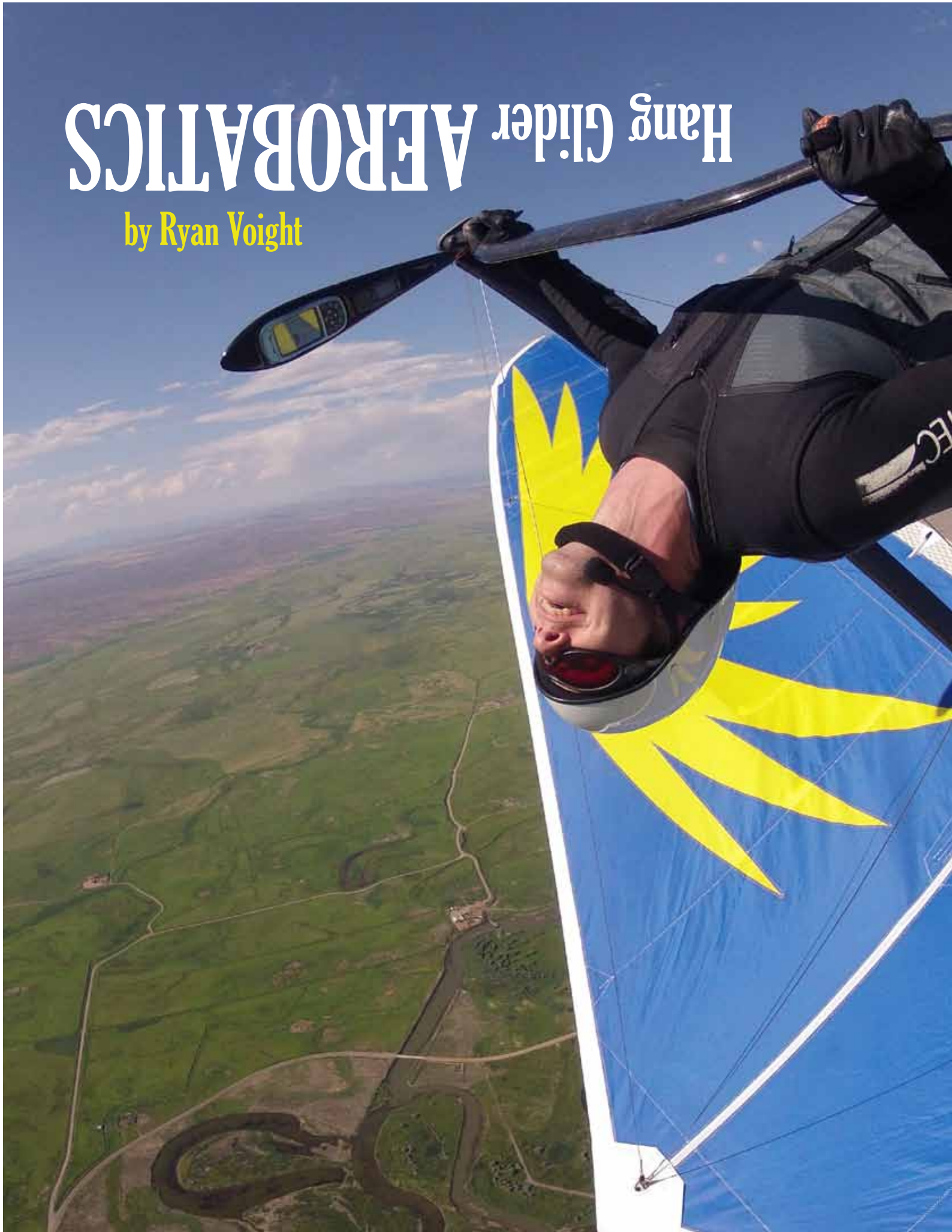


Hang Glider AEROBATICS

by Ryan Voight





This article will be controversial. But I'm not shy, so let the flames fly. I refuse to use the term ACRO. (Refer to the end of the article if you don't know why). I designate the style of flying as freestyle and individual maneuvers as aerobatics.

Freestyle flying isn't for everyone. But for those who are interested, there is a black hole of information available. Only a few people are willing to teach and share information, mostly in person. However, many people are unable to attend classes or find resources elsewhere. I hope this article will serve as a starting point for those who don't know where to begin (safely).

Section I. Safety

Freestyle flying, at least for me, is an expression of self. It's aerial art. And the last thing I want to do with my art is create a mess out of my glider or body. Safety is paramount for me and should be for you, too. Freestyle flying

doesn't need to be dangerous. It's about having fun and expressing yourself; it's not about taking risk for the sake of taking risk.

Many people believe aerobatics to be too dangerous. Many also believe hang gliding and paragliding to be too dangerous. News flash: Everyone is right. It's all dangerous! All flying is about risk management, not risk avoidance. We manage the risks of flying by our choices: what we fly, where we fly, and when we fly. Aerobatics require us to make the same choices: what equipment to use, where to fly, and when the conditions are good. And, like hang gliding, no one attempts the hardest maneuver first. We all started hang gliding on the training hill, and freestyle needs to be approached in the same way, with baby steps.

Section II. Preparation and Definitions

Before doing any aerobatic maneuvers, be sure your equipment is up to the

task. Check your airframe and side wires for imperfections. Check your harness lines and hang loop for wear. Make sure your reserve parachute was repacked some time this season.

Once your equipment is checked out, you need to prepare your mind. Review the key steps in a maneuver—the entry, the apex, and the exit. These are best defined as times when the wing achieves a keel-level orientation.

As you pull up from a dive, the entry is the point when you become keel level with the horizon.

As you perform the maneuver, whether you roll or climb, the apex occurs when you are once again keel level with the horizon. The apex is also typically the highest point of the maneuver.

As you dive out of the maneuver, the exit occurs at some point when you once again become keel level. At each of these points you need to pay attention to two things: your heading and

KNOW YOUR INSTRUCTOR

See Ryan doing his thing online!

<https://vimeo.com/airthug/willardwithsmokes>

<https://vimeo.com/airthug/overthetop>

bank angle.

This gives us the understanding to continue our aero-education. Next, let's DEFINE the maneuvers we are flying. Maneuvers can be broken down into three basic categories: rollovers, climb-overs, and spins.

In a rollover, your heading at the apex will be within 90 degrees left or right of your entry heading. By necessity, your exit heading will be beyond 90 degrees left or right of your entry. Imagine a glider that rolls perfectly upside-down, with the same heading as the entry...and with the exit exactly opposite the entry. This would be a "perfect" rollover.

The climb-over, on the other hand, is just the opposite. The apex heading is MORE than 90 degrees off from the entry heading, and the exit heading then will be within 90 degrees of the entry. A loop is a perfect climb-over, as the apex is exactly opposite the entry, and the exit then matches the entry heading.

Each name implies the method used to become inverted (if that is the goal). In a rollover, the glider is rolled upside-down. In a climb-over, the glider climbs until upside-down. Within these maneuvers, you are paying attention to bank angle as well. The bank angle of a maneuver is measured at the apex.

Spins are in their own class and are not for beginners. While they're not overly difficult to perform, the risk is extremely high. There's no "safe" way for a new aerobatics pilot to perform them. Just don't!

The last bit you need to wrap your mind around is that timing is absolutely critical when performing aerobatics.

It's much like landing; you might execute every landing in a different way, but you are aiming for the same result. In order to better understand the timing of maneuvers, you must understand two components: input and attitude. You manage the inputs you give based on the attitude of the wing in the maneuver.

Section III. Drills and Skills

A few drills are effective for developing the precision required to perform more advanced maneuvers. Again, the key is staying safe out there. The first drill I recommend is practicing entry and exit headings. At this point, we are not so much concerned with bank angle, and we are not getting anywhere NEAR upside-down yet!

Start this drill in smooth conditions. Launch, get high, and get FAR AWAY from everyone and everything. Once you've done that, pick an entry heading. Note that your exit heading should be 180 degrees (opposite) of your entry. Now practice linking turns that put you on those very specific headings. Speed is not a requirement; more speed means you might get yourself into trouble. Just focus on nailing those headings. Being close and calling it good is not doing yourself any favors. If you're close to doing a loop, you will stall upside-down, fall into the wing, break the glider, and die. We're striving for perfect here, and the more time and practice you spend, the better you'll be later on. These drills provide your foundation!

Once you've mastered the entry/exit headings, repeat the maneuvers, but now with a desired bank angle at the apex. In order to effectively hit an apex, you need to enter with a little

speed (trim+10mph is plenty; don't go crazy). While on your entry heading, pull in for extra speed. Pay attention to the attitude of the glider. The quicker you pull in, the more the nose comes down. As the wing picks up speed, the nose will begin to rise. Allow it to rise, getting maybe five-degrees nose-up as you roll into your "maneuver." As the glider climbs, it will slow to trim, and this is where you want your apex to be. Pushing out beyond trim is extremely dangerous, as it makes your glider pitch-unstable (easier to tumble)... so don't do it! I'd suggest starting with 45-degree bank angle.

Once you're consistently nailing 45-degree banked maneuvers on heading, it's time to move on. I usually suggest alternating the addition of more speed with more bank, to your maneuvers. So, from entering at trim+10mph, go to entering at trim+15-20mph. DO NOT CHANGE YOUR DESIRED BANK ANGLE! One new thing at a time. Once you are nailing these faster 45-degree on-heading maneuvers, you can ratchet up the bank angle a bit. It's not that everything up to about 90-degrees bank is relatively safe. Remember you are new at this, so if you aim for 90 and you're off a few degrees, you could be in trouble. If you aim for 70 degrees, and you're off by 10, you're still in a relatively low-risk situation.

If you DO find yourself in a bad situation, with low or no airspeed and a nose-high orientation, the best thing you can do is pull in ALL THE WAY and hold on tight. Just as pushing out makes your wing pitch-unstable, pulling in makes it MORE stable, increasing the tendency for the nose to drop and the wing to fly out of the maneuver. It's important you don't get yourself into this situation in the first place, but knowing what to do *just in case* is also wise.

Please remember we are after perfection here. If you do nine perfect maneuvers and you're off a little on the



10th, you'd still die if you were doing a riskier maneuver. Just as in regular hang gliding, we are managing the risk through training and preparation. Also, smooth conditions are key to your progression. You need to learn how your wing responds to your inputs at various speeds and attitudes, and you can't learn if it's not the same time after time after time.

Section IV: Progression

At some point following the above progression, you will not be able to add any more speed. You will be entering at max speed, climbing quite a bit to the apex and desired bank angle, and then flying it through the exit on heading. If you're very, very consistent, you can move on to varying your timing and learning how it impacts your input/attitude. To do a 90-degree maneuver, you can add a little roll right at the entry, and because of the high airspeed and the time between entry and apex, hit

your mark. OR you can wait, entering wings level and allowing the nose to rise, then add lots of roll, and hit your 90 degrees of bank. Note that waiting too long here means stalling in a nose-high orientation, which is very bad, so be careful. Take very small steps.

The progression outlined above should take YEARS to perfect, so don't expect instant mastery of these skills. But if you've got the drive to get radical, this is how to work up to it. And, when done correctly, it shouldn't feel as if you're taking any bigger risks than you do every time you launch or land. If you're feeling fear or uncertainty, you need to back off. My instructor always says "You should never do a maneuver if you are unsure of the outcome." Being sure doesn't ensure safety, either, but if you're unsure, you are just blindly taking risks. We strive to manage and minimize risks.

This progression, followed diligently,

is how I worked up to doing straight-over loops and 180-degree rollovers. But it's taken me over 10 years of practice and moving to a location that has smooth, consistent conditions for practice. I never said it would be easy! And that is my concept of FREESTYLE.

Freestyle, expressive flying is something we can all do, safely, if we so choose. Freestyle doesn't have to be crazy, it doesn't have to be dangerous, and it doesn't have to be upside-down... it just has to be FUN! 🇺🇸

DISCLAIMER: Aerobatics are defined, by the FAA as exceeding 30 degrees in pitch and/or 60 degrees in roll. Our wings and equipment are not certified for aerobatic flight (and would not pass such a certification). Performing aerobatics is dangerous. Only attempt under the direct guidance of an instructor capable of teaching the maneuvers.