UNDERSTANDING YOUR WING - A Basic Instructional Primer For Beginning PPG/Paramotor/Paraglider Pilots

IMPORTANT: This text is not intended for self-training purposes. Do not practice these techniques without the guidance of a qualified instructor. By reading this text, you agree to not hold the author responsible for any injury, discomfort, financial loss, death, or other negative outcome experienced by practicing anything described in this text. Using a paraglider can be a dangerous activity, even when ground handling, and the intention of this article is NOT to cover safety topics in depth. You need to learn about those topics elsewhere before flying. The author claims no useful knowledge of these activities, and assumes no risk for any actions taken by anyone who reads this text. If you hurt yourself, someone else, or damage any property, it's entirely your fault. If you don't agree with that, do not read any further, and certainly don't try anything described here.

.

Contents:

1. Warning to Those Considering Self Training

There are skills and knowledge not covered in this text that, without an understanding, can lead to your death or the death of the sport. Airspace rules, many emergencies, weather, equipment adjustments and more are not included here. You must seek out that information separate from this primer. For more information, see http://footflyer.com. Reading the PPG Bible and watching Risk and Reward will help you understand why it's so critical to get training if you want to live through your first flights. For a list of instructors, see http://www.usppamembers.org/school/school_search.cfm. Even if you can't afford training, free and capable instruction is available at http://flightjunkies.com. Do not try to train yourself. It's not worth it, and it's not necessary.

2. Some Essential Definitions

"Wing"/"Kite"/"Paraglider"/"Glider": The piece of cloth that enables you to fly.

"Leading Edge": The 'front' part of the kite. The leading edge has a number of large openings that allow air to enter and inflate the wing.

"A", "B", "C", and "D" lines: The many thin 'ropes' that are attached to the bottom of your kite. "A"s are the row of lines attached near the leading edge of the kite. "D" lines are attached near the back of the kite, and the others are in between.

"Risers": Two heavy cloth-like webbing straps at the end of all the lines, where they come together near the pilot. Lines attach to the risers via small metal carabiners called "mallions". The other ends of the risers form loops which connect to the carabiners on your harness.

"Brakes": A special set of lines attached to the very back, trailing edge of the kite. They're used for stearing the kite in flight. They roll through pulleys which are attached to the risers. On the ends of each of these 2 lines, there is a single loop which the pilot holds on to, called the brake "toggle".

3. 1st Things 1st: Packing And Unpacking

The most important concern in packing your wing is assuring that your risers stay straight, so that no lines are passed through one another to form a tangle. Whether you fold or crumple your wing into a sack, if you keep the ends of the risers straight throughout the process, your wing will most likely be ready to fly, without line tangles, the next time you open it up. The instant you pass one end of a riser through any of the lines, you're far more likely to experience a confusing, messy tangle. Some pilots like to pack one riser through the end loop of the other riser, so that either end is less likely to pass through the lines. Whatever packing procedure you use, just be sure to leave plenty of slack on the risers, so that they don't get dragged on the ground or twisted around unintentionally while you pack up. Pack your risers so that they are outside of the kite, away from the rest of the length of the lines, so that they don't accidentally get passed through one another, and you can be certain to avoid any generally messy situations.

If you do find that your lines are truly tangled, the way to work out the mess is to follow your "A" lines from the riser to the kite. Hold the "A" lines above all the others, and clear them, one riser at a time, so that there are no other lines hanging from them or twisted around them. If you have twisted the risers, turn them around until the "A"s are on top. In a normal situation, other lines will typically hang from the "A"s, but pulling them upwards and shaking them out will cause the others to fall away. Typically, if your "A" lines are straight, you will find that all your other lines are most likely arranged in proper order too, without doing anything else. If you've gotten yourself into a really tangled situation (this can happen if the wing ever lands on top of you and you walk through the lines), you may need to clear each additional row of lines, from the "B"s, through the "C"s, "D"s, and brakes. In this situation, it can help to have a friend hold up the cleared "A" lines above all the rest, along with the "B" lines next, and so on while all the other lines are cleared in order.

When packing your kite, be sure not to put undo stress on any particular seams. Fold or crumple your wing loosely, so that the Mylar separators on the leading edge are not crushed. Avoid repeatedly making tight folds along any particular seam, as this can weaken the stitches over time.

Make sure the fabric and lines are dry before storing for any long period, and keep the wing out of sunlight, in a cool, dry storage location.

4. Kiting

The point of kiting is to learn how to control your wing. When practicing kiting, it's helpful to keep in mind the imagined goal of launching. You should practice getting the kite inflated, raised into the air, and positioned directly over your head in the 12 o'clock position, with your body centered directly underneath. You should practice running forward and maintaining that centered position continuously for as long and far as possible. Developing that skill is not only required for safe launches, it also provides an absolutely essential understanding of how your wing "works", and helps to develop an instinctive "feel" and habitual response to managing the wing. Understanding the way your wing moves through the air, and how you can affect its movement and position is critical to all phases of flying.

4.1 Setting Up

Practicing kiting is easiest if you have a 5-9mph wind. Gusts above 10mph can easily drag you, and gusts above 14mph should be absolutely avoided if you're inexperienced. They can pull you up, over, sideways, and slam you downwards, all very quickly.

Look for fields that are as wide open as possible, with as few wind obstructions as possible in the direction from which the wind is blowing. Trees, buildings, hills and other obstacles will cause disrupted and unpredictable air flow, called "rotor". Be sure that the spot you choose has no sharp or hard objects on the ground that could cut or catch any part of your glider.

To start out, unpack and lay out the wing in its natural arch shape, with the back of the wing on the ground, and the openings on the leading edge of the kite facing up towards the sky. The wing should face DIRECTLY into the wind, so that when it's pulled up, the air flows straight from you, down the lines, and into the kite. Walk along the leading edge, straightening each cell, hand over hand, to make sure that edge is as evenly taught as possible from one side of the wing to another. The kite should basically be completely unfolded, without many significant wrinkles or loose folds. The trailing edge (where the brakes are attached) is less important - just make sure each of the cells of the leading edge is open and ready to fill evenly with air. Pull your risers out in front of the kite, making sure the "A"s are on top, and that there are no twists in the lines. All your other lines should drop clear of the "A"s when you pull upwards and shake a few times. If you've packed well, this should only take a few seconds. As you're setting up the kite, make sure none of the lines have passed underneath the wing, especially at the wing tips.

If there is a bit of wind, you can "pre-kite" the wing to help more quickly and easily inflate it and lay it out. To do this, unfold the wing loosely, and then grab the "A" risers in one hand, the brakes and "D"s in the other, and pull the wing up into the air using the "A" lines. With 5mph or more wind, the kite will pop open and raise up as soon as the openings on the leading edge get a gulp of air. Pulling on the "A"s directly into the wind, with both risers together in one hand, is all it takes to open the kite. Use your other hand to control the direction and movement of the kite, holding both brake toggles, together with the "D" lines in your other hand (keep the brake toggles snapped into their magnets/snaps, put your thumb through the brakes, and grab the "D" risers with your fingers). Walking backward into the wind as the kite raises up will help increase airflow over the wing, and will help improve the inflation. Pull the kite up, let the wind pop it open, and then gradually release pressure on the "A"s to let it down gently, with the leading edge facing upwards as described above. Leave a good amount of slack in the lines so that if the kite is moved at all by the wind, the risers aren't dragged, and the lines aren't tangled.

4.2 Reverse Kiting

Before doing any kiting, fasten yourself completely into your harness. Make sure that both leg straps and the chest strap are snapped together and locked closed.

When there's a little bit of wind, it's easiest to work with the kite by standing in a position in which you're facing the wing. To hook in this "reverse" position, lay the risers straight out in front of the kite, with the "A"s on top. Grab them in that position, and bring them right in next to each other, holding them together with one hand. Next, TURN THEM 180 DEGREES COUNTER-CLOCKWISE (from your view down the lines

toward the kite). In this position, with risers turned upside down and the "A"s facing the ground, hook into your harness. With the carabiners pulled out in front of you, the risers should hook in exactly as they're positioned, with the "A"s pointing downward. Don't twist the riser loops any more than 180 degrees. Be sure to lock the carabiners closed once the riser loops are attached. The riser coming from the right side of the kite (as you look at it) should hook into the left carabiner on your harness, and visa-versa. The lines should criss-cross in front of you, with the lines from the right side of the kite passing over the lines from the left. In this configuration, after you've raised the kite above you, you should be able to turn your body around counter-clockwise (towards your left), so that you end up in a forward facing position, as if ready to fly. In that position, the "A" lines should be facing forward, with the brakes in back. There should not be any twists between the harness, carabiners, risers, or lines. If you're unsure that your risers are properly attached in reverse position, turn around to your left, flipping the lines from your left carabiner over your head, and check that they're all aligned straight in the forward position. If not, flip back around, and follow the directions above, until you've got the setup completely clear.

Before trying to raise the kite, make sure you've got plenty of slack in the lines. You don't want to pull the kite over onto itself, or raise it up into the air unintentionally. Walk with the risers in your hands toward the kite several feet, tossing the loose lines in toward the kite. Don't worry about tangling lines at this point. Unless you walk through the lines, or spin your body or the kite completely around, they will stay straight.

Grab one brake in each hand. In reverse position, with the lines stretched out in front of you, the "A"s should be pointing downward, and the brake snaps should be on top. Remove one toggle at a time from its snap, and pull it outwards (sideways, away) from your body, so that the brake lines do NOT wrap around any other lines. This is important. Next, with the brakes firmly clasped in both hands, reach DOWN BETWEEN the risers and grab both of the "A" risers in one hand. Your choice of hand will be determined by which hand will be most likely needed to brake first. If the wing is not laid out completely straight into the wind, one side of the wing with likely rise up first. Anticipate having to pull a little brake on that side, and be sure to leave that brake hand free - i.e., grab the "A"s with your OTHER hand. Be sure to grab the riser material immediately below the mallions. Don't grab the lines directly, as they can give you rope burn if a gust comes along. Be prepared to switch the "A" lines from one hand to another. You can't pull left brake if the "A"s are in your left hand, and visa-versa.

With one of the brake toggles in each hand, and both risers together in one hand, you're ready to pull the kite up into the air. At this point, pay attention to wind around you. Use the air flow against your ears to judge the direction of the wind, and align your back DIRECTLY into the wind. Be sure to position your body so that YOU and the CENTER OF THE KITE form a STRAIGHT LINE INTO THE WIND. If the wind has shifted directions, you can pop the kite open again by pulling on the "A"s, as in pre-kiting. If you're positioned straight into the wind, in relation to the center of the kite, it will pop open and straighten out, aligning itself again into the wind. Keep tension on the "A"s while letting the kite down, so that the leading edge doesn't fall forward and fold over the rest of the kite.

When you are aligned into the wind, pull the kite up into the air by pulling on the "A" risers. At this point the kiting begins. Your goal is to pull the kite directly over head, and keep it centered there above you. To make this happen, there are several main factors involved:

1. The wind speed
2. The forward motion speed of your body as you run into the wind
3. The amount of tension you hold on the "A" risers
4. The movement of your body left and right under the kite
5. The amount of tension you pull on each brake line

Each of those factors affects the movement of the kite, and its position in relation to you. To keep it simple, you're just trying to pull the kite up, move your body straight into the wind to get the wing flying, and then stay under it, continuously moving the wing straight into the wind. Here are some of the things that will typically happen during your first attempts:

1. One side of the wing will pull up first, move faster than the other side, and the kite will spin around upside down (or raise up vertically before crumpling back down to the ground).
2. Not enough force will be exerted on the "A"s, and the kite will just fall back to the ground before getting over head.
3. Not enough forward motion will be maintained to keep the kite flying, once it's positioned over head, and it will just fall back down to the ground.

4. If too much force is exerted on the "A"s once it's overhead, and it will over-fly you, crashing down in front of you.
5. If you move sideways in relation to the wind, it's easy to pull it away from the direction of the wind, and deflate it or spin it over sideways.
6. If you pull too much brake, the glider will spin sideways, or get pulled back down to the ground.

To avoid these problems, here are some fundamental thoughts and responses you should always be working to maintain:

1. Always keep constant pressure on all the lines, and make all body movements, brake inputs, etc. SMOOTHLY. The kite will very rarely pull straight up, and fly straight forward. Tiny shifts in wind movement and your own input will force you to keep every motion in balance. It's a gentle, active dance, and it requires constant pressure and immediate, small adjustments to keep the wing up and moving forward.
2. Pull the wing overhead right away - don't leave it hanging back below the 10 o'clock position. In order for the wing to fly, it needs to get all the way up to 12 o'clock, and have air flowing quickly over its top surface.
3. Until the kite is overhead, keep constant pressure on the "A" lines. That's what pulls it up into the air. If you let go of the "A"s too soon, the kite will fall back down toward the ground. Don't let up on the "A"s until the kite is at the 11-12 o'clock position above you. Don't yank at it - just keep CONSTANT PRESSURE on the "A"s and move consistently forward into the wind.
4. In order for the wing to fly (to stay above your head - that's the goal), it needs to maintain a constant speed through the air. That speed is typically 8-12mph for most wings. That means that if you've got a 5mph wind, you're going to have to move your body and the wing into the wind consistently at a speed of 1-7mph, the whole time you're kiting. If you have absolutely no wind, you'll need to RUN, the entire time you're kiting the wing. Trying to kite with even a slight tail wind is almost impossible for anything more then a few seconds. What this means is that you need to get the wing up, and then maintain CONSTANT forward motion on yourself and the wing, into the wind, the entire time you're kiting (in reverse position, walking/running backwards). The instant the air speed over the wing stops, it will fall back down to the ground.
5. There are two basic ways to control the side-to-side motion of the kite: 1) Move your body side to side to straighten out your position in relation to the center of the wing 2) pull brake. Shifts in wind direction will also move it side to side. Remember, you're always trying to move the kite forward into the wind. One of the most common occurrences you'll experience in the beginning is that you'll tend to stop the forward motion while adjusting side to side to straighten out a tilting kite. Typically, because you always need to move forward to maintain the kite's air speed, when adjusting your position sideways, you should actually be thinking about pulling your body *diagonally* forward (running backward when in reverse position). That's absolutely critical to understand. Moving sideways is typically combined with pulling brakes to get the wing to move where you want it. Brakes work to slow the back side of your wing, for the side on which they're pulled. When you're pulling the kite up into the air, if one side raises faster than the other, you can pull a little brake on that side, and it will come back down towards the ground. Remember though, you're trying to pull the wing UP, so pulling too much brake is counter-productive. Just put enough gentle brake pressure on the side that is rising and overshooting the other. If you over compensate, the other side will over-shoot, and you'll need to brake it. Remember, your goal is to get that kite above you and moving though the air. Every time you pull brake, you're countering some of that forward motion. The key is to make gentle, smooth, and consistent corrections with a combination of brakes and body moments to keep the kite going up and above you. When the kite is over your head, if one side dips downward or falls back, you can move your body to that side (run diagonally forward to that side) to center yourself with the wing, or you can pull a little break on the other side, so that both sides keep flying forward evenly. Conversely, if one side of the wing shoots forward, you can either brake that side and/or run diagonally forward, pulling the other side forward to speed it up. Either way, pulling brake on one side has a very similar effect to running diagonally forward in the other direction, speeding up the slower side. Always keep this thought in mind: running one way sideways will get you centered in much the same way as pulling brake on the opposite side. Typically, you'll do a little of both at the same time, all the time trying to adjust your movement, and that of the kite directly into the wind. It's very simple once you get it: Move straight into the wind - if the kite veers to one side, center your body under it and pull a little opposite break to help direct it back into the wind.
6. Once the wing is directly over head, let go of the "A" lines and keep moving forward into the wind. If you hold the "A" lines too long, it'll over shoot you, and land on the ground in front of you.

7. If the wing shoots forward as a result of increased air speed (i.e., a wind gust), pull both breaks just enough to center it back over your head. Constantly managing both the side to side movements and the fore to aft movements of the kite, is what kiting is all about. Responses need to be constant, instantaneous, and fluid.

With all that said, the biggest things you should keep in mind are to keep moving forward, and stay centered under the kite.

If at any point you feel that a wind gust could drag you, be prepared to drop the kite the ground, pull both brakes hard, and simultaneously run toward the wing. Do not allow the kite to stay in the half-way up position. Allowing the wind to blow straight into a wall of cloth will drag you the hardest. Pulling the brakes will help keep the wing on the ground, and running toward it will keep it deflated. If you resist, it will stay inflated and pull you harder. In really serious situations, wrap your hands around the brake lines to pull in more line, and reach for any of the back riser lines to help pull the kite down - pulling "D" and "C" lines will also assist in dropping the kite to the ground. Reeling in one side more than another will also help disable the wing by forcing the wind to flow sideway across it, instead of straight into it. Try to get downwind of the wing as quickly as possible so that you can get it wrapped up. Always wear a helmet while kiting if there's any chance of significant winds.

4.3 Important!

Once you've got the kite moving in reverse position, your goal should be to turn around and kite the wing, running forward. Kiting in reverse position is fun and instructional because you can look at the wing and watch it respond. BUT YOU FLY IN FORWARD POSITION, so that's where most of your practice should really be spent. Get used to kiting in reverse to understand how the wing works, but to really "get" how the thing works when flying, you should be able to keep it centered over you indefinitely in forward position.

Always plan on spinning around (to your left, if you set up as described earlier), and kite as if you're about to launch. You should be able to steer it side to side, and if the wind is strong enough, move with it backwards. You should eventually be able to do this completely by feel, without having to look up at the wing at all. When you can do that, you've got a good fundamental understanding of how to move and maneuver the wing.

4.4 Forward Inflations

When wind is low (less than 5mph), you'll need to pull the kite up in forward position. Pulling up the wing and running backwards in nil wind is not only extremely difficult to do, running backward quickly can also be dangerous in its own right. Hooking up in forward position allows you to run straight forward immediately to generate the required air speed to get the wing flying.

To perform a forward inflation, set the kite up as normal, with both risers on the ground and with the "A" lines on top. For a forward inflation, you want the kite to be laid out as straight as possible, directly into the wind, with the leading edge pulled taught along the entire length of the kite. Stand in between the risers, face forward (so that the wing is behind your back), and attach one riser at a time to the carabiners on your harness (be sure they lock in). Grab one brake toggle in each hand, pull them out of their clips, and be sure to pull them sideways, away from your body, so that the brake lines do NOT wrap around any other lines. Next, use the thumb and forefinger of each hand to reach around (outside) the risers and grab the "A" risers on each respective side, one in each hand (i.e., don't cross hands in front of your body - just reach each hand down and grab the "A"s). Be sure NOT to wrap the brake lines inside or around the others while you do this. With a brake firmly in each hand, stretch out your arms to either side (in crucifix position), and flip the rest of the risers over each forearm so that they hang down, back behind your arms.

Now center yourself with the middle of the kite, to form a line directly into the wind. Make sure your "A" lines are completely clear - hold them up, and shake any others free. Now walk forward and find the point where you can begin to put tension on the kite. Be sure not to pull the wing over on itself. When you're sure you're centered, and that you're lines are clear, lock your hands in front of you at shoulder height, and shoulder width, with arms bent and knuckles pointing toward the sky, and run forward with force. Focus all of your forward moving energy directly into the "A" lines, so that it lifts the kite up off the ground and into the air. As you move forward, alternate between watching where you are running, and glancing straight up to watch for the wing to get over your head. Once the kite is above you, let go of the "A" lines, and continue to run and

kite it as usual. During the forward inflation, the wing relies entirely on the forward motion of your running to create "wind". This is what provides necessary air speed for the kite to fly. If you stop or slow down even for a moment, the kite will fall to the ground.

Forward inflations are tough work, and great exercise, and they're entirely necessary for flying ppg. Many of the calm conditions that PPG pilots prefer to fly in tend to involve slow wind speeds on the ground. Unless you regularly fly from a beach or some other place with consistently smooth laminar winds (or if you fly in rough air), expect to do the majority of your launches with forward inflations.

4.5 A Note About Harnesses

On many PPG setups, the harness is not removable from the machine frame. In this type of setup, you'll need to purchase a separate harness to practice kiting. In some setups, especially those with high attachment points and removable harnesses, the way you hook in for kiting is totally different than the way you hook in to actually fly. On machines with J-bars, the riser loops of your kite actually attach to bars that come over your shoulder, and a bit of meshing material hangs down from those bars - that material connects to your harness carabiners. Having the point of connection up over your shoulders feels much different than having it down near your waist. You'll want to practice kiting your wing in both configurations. Inexpensive adjustable practice kiting harnesses are available which allow you to change the carabiner connection point from low on the waist to high on the shoulders, and everywhere in between. Those harnesses are a worthwhile investment, as kiting is not just for beginners - it's great exercise, and continued kiting practice through the years only helps to improve your flying abilities.

4.6 Rosettes (Pulling Your Kite Into a Mushroom Shape to Move it Around)

In any kiting situation, you'll typically need to move the kite and reset it over and over again. When you get done running with it across a field, you'll need to move it back to your starting point. If the wind shifts, or if you flip your wing, or if it over-shoots and lands in front of you - all those things will require you to pick it back up and lay it out again.

You don't need to unhook from your harness - in fact, you shouldn't. Remember, every time you unhook, you run into the possibility of tangling the lines. If you stay hooked in, tangles are virtually impossible.

So to move your kite, put both risers together into one hand, so that all the lines come together into one bundle. Walk toward the kite and use your other hand to run down those bundled lines, and gather them into consecutive loops. Place each consecutive loop into the hand that holds the risers, until you get all the way to the kite fabric. As you get closer to the kite, the wing tips will come together - you'll need to pull on the lines with some force to bunch up the kite. Keep going until you can't roll up any more lines. Pick up the bunched up, mushroom shaped kite by its lines and put it over your shoulder so that it doesn't drag on the ground. Turn and walk with the kite, so that the openings on the leading edge of the kite face away from the wind. This will keep you safe, even in cases of the biggest wind gusts. If the opening on the leading edge faces away from the wind, the kite will not open up.

To open the rosette back up, put the still bunched up wing back on the ground, and drop the loops of lines directly in front of it. You don't need to worry too much about tangles, as long as you never walk through the lines, or spin the kite around its risers. If you've got enough wind to do a reverse inflation, you can typically pop the wing open with a little tug on the "A" lines, pulled directly into the wind. If you don't have any wind, just walk the wing tips out on each side. You don't need to get out of the harness - just try to keep all the lines in front of the kite as you walk around to each side.

5. Launching

Launching typically means just adding a bit of thrust to a properly moving, fully inflated kite, with a pilot moving in forward position. Being able to kite well is therefore a prerequisite to launching. You need to be able to either start with a forward inflation, or pull the wing up in reverse and spin around into forward position, keeping it stable the whole time. If you can't do that, don't even think about taking off.

DON'T TRY TO LAUNCH WITHOUT AN INSTRUCTOR'S HELP. You should have plenty of training in a simulator (even if the "simulator" is just some straps hanging from a tree branch or cross bar). You should

run through the entire flight plan many times in the simulator. You need to feel the motions of strapping in, starting the engine, running up the power with your hands on simulated brake toggles, getting into and out of your seat with the motor running, and really feeling that engine push you around as it will in actual flight. The whole flight plan should be completely habitual, and the feeling of the engine on your back and the force it exerts on you, should be natural before you ever actually try to fly. Your equipment should be properly configured for your body, especially the hang points (the angle you face when seated, so that your thrust line points forward/up/down appropriately). You should be used to kiting your wing with the engine on your back, the throttle in your hand, and the risers hooked in as they are in flight. Most important, you should have a qualified instructor there to help you set up and to guide you through every step of your first flights, by radio. You should have multiple flights with radio contact and assisted kiting and launching help (someone there to make sure your kite is not oscillating, hanging back, or shooting forward as you launch). An instructor should also be there to help you learn how to turn, maintain level flight, and adjust to changes in wind speed and direction while you're flying. He'll help keep you calm, and help you enjoy your first magical moments in the air. He'll also guide you into a landing path that's lined up straight into the wind at the appropriate height. He'll tell you when to shut off your engine, and exactly when to flare as you come in to touch down. All those elements are critical to staying safe. You should get as many such assisted flights as you need to become completely comfortable with the routine, before you ever try it on your own. DOING SO WITHOUT AN INSTRUCTOR IS A RECIPE FOR CERTAIN DISASTER.

5.1 Practicing

You can practice launches while kiting by having a friend push you into the wind. To do this you'll typically need wind conditions at least strong enough to easily pull up a reverse inflation. Once you've stabilized the wing over your head and are running as fast as possible, a strong push from behind should be enough to get you up in the air a few feet. Be sure to manage the fore to aft motion of the kite above your head while you're descending. Braking too hard can stall the kite. Allowing it to surge forward in gusts can make it tuck and dive in front of you. Either of those outcomes can have painful results, even if you're only a few feet off the ground.

5.2 Before You Do Anything, Check the Weather and the Launch Area

Before ever taking off, always check the weather conditions. Watch for dangerous fronts that can cause gusts. Watch for low pressure zones, high temperatures, and high humidity, which can cause high density altitude, reducing your available lift. Watch for middle of the day thermals, especially on days when temperature changes are dramatic between night and day. Watch for possible precipitation. Check the wind speeds aloft and make sure the conditions you're feeling on the ground aren't deceiving you about what's going on above. If the winds are shifting dramatically from one direction to another, you may very likely have strong thermal conditions, even if the winds on the ground seem entirely docile. If you kite your wing a bit, and it behaves erratically, collapsing and changing directions, expect those kinds of conditions up in the air too. Don't fly if you're not sure.

Check your launch area. Make sure you've got a completely clear flight path with plenty of clearance around any objects. Do not fly into rotor created by wind coming over and around trees, buildings, hills, or other obstructions. Rotor can knock you out of the sky and kill you very quickly. In heavier winds (8+ mph), expect powerful swirling, messy air to extend twice as high and ten times as far downwind of any object. That's no joke. Rotor can completely collapse your wing, and the stronger the wind, the stronger the rotor. Avoid it just as carefully as you avoid strong thermals and bad weather.

Most PPG pilots prefer to fly during the first 3 hours of sunlight in the morning, or the last 3 hours of light at night. For really calm air, you can wait for the last hour of sunlight - wind conditions tend to settle to almost nothing at the end of every day (you'll become very familiar with this daily cycle as you fly more). The middle of the day is characterized by stronger thermals and faster winds, and generally provides more dangerous conditions in which to fly. Until you're very familiar with controlling your wing in those conditions, you shouldn't plan on flying at all in mid day thermals. Flying in the morning, especially during the summer when the sun is shining straight down through the atmosphere, you need to be careful not to fly so long or far away that you encounter rougher air than you can handle.

Also, before you launch anywhere, be sure to check that you're flying in legal airspace. Not only can you get in trouble for flying somewhere you're not supposed to, being anywhere near the rotor caused by a large

aircraft coming in on final approach could likely knock you out of the sky. Talk to other experienced PPG pilots and learn to read FAA sectional charts to be sure that you're taking off in an appropriate location.

5.3 Committing the Deed

First, decide whether the predominant wind speed calls for a reverse or a forward inflation. Kite your wing a bit to feel the wind conditions, and then lay it out nicely. Complete all your preflight checks on your engine and other equipment. Hook in, and check that your leg straps, chest strap, carabiners, J-bars, and all other connections are locked tight, without twists. Check that your throttle is moving correctly, is solidly attached to your hand, and that the cruise control has proper tension. Be absolutely sure that your carburetor is not stuck in the open position (don't ever let the engine start out of control at full power). Position yourself for the inflation, check that there is no one in the path of your propeller (behind or beside the blades) and then start your engine, yelling "clear prop" to be sure everyone knows your intentions.

Get the kite inflated and stabilized over your head, running in forward position, and add some throttle to help push you forward and up. Add power gradually, and CONTINUE TO RUN until you are completely off the ground, and then continue to run some more :) Add a little bit of brake pressure to help you climb upwards (not much!). Be prepared for sinking air or other conditions that could bring you back down. Gain height quickly and smoothly to get out of the danger zone and up to an altitude of 300' or higher.

Be prepared for and aware of your engine torque. At full throttle, it will pull you hard in one direction. Make sure all of your throttle motions are smooth, and avoid spinning yourself hard in any direction. Whatever you do, do not apply full throttle and full brake at the same time to counter it and fly straight. That can cause a stall or a spin. Taking off and turning against your torque should be left until you have more experience understanding all the forces at work while you're flying, and when you know the limitations of your equipment. In the beginning, plan clear flight paths from extremely large fields, during which you can plan on comfortably turning the direction of your torque, without the possibility of approaching any obstructions.

Get up to a safe altitude, and get into your seat (you will be hanging from your leg straps until that point - that's safe, but not as comfortable as sitting). If you use your hands to pull the seat out underneath you, be very careful not to stop the engine by accidentally hitting the kill switch on your throttle.

Always, always be aware that you may need to abort your launch if something goes wrong. Don't take off if your wing is oscillating wildly. Don't take off if any of your lines are caught in places they shouldn't be. Don't take off if you're not 110% sure that you can clear the obstacles at the end of your run way. Don't take off if you know something in your equipment is about to fail. Don't take off if you realize at the last moment that you forgot to latch a chest strap, helmet strap, or any other strap. Just kill the engine and kite the wing to a stop.

Launches are optional, landings are not.

6. Flying In Perfect Conditions

Once you're up in the air, the physics of your position underneath the kite helps to take care of many of the things you have to do manually when kiting. Because you're a pendulum under the wing, you will always tend to stay underneath it. Instead of having to run side to side to center yourself under the wing, you'll constantly swing toward that position automatically.

6.1 Turning: Brakes and Weight Shift

If you're flying in absolutely still air, the kite will respond to brake inputs very naturally and intuitively. Pull right to turn right. Pull left to turn left. Be aware that the harder you turn, the more quickly you will descend. *This is an extremely important fundamental concept*. In anticipating every move you make, you should expect that, without adding power, you will "dive" a bit into every turn. This effect becomes much more obvious with tighter turns.

You can also turn by shifting your weight from one side to another. Just crossing one leg over another and leaning your body to one side in the harness is enough to effect a turn. Weight shifting to the left will turn you left, and weight shifting to the right will turn you right. The effects of weight shift are slightly different than

pulling brake, only because pulling brake slows down that side of the wing. Weight shift turns enable slightly higher airspeeds over the wing, and therefore, slightly less sink. Typically, most pilots combine some weight shift and brake to enable tighter turns.

6.2 Throttle and Wing Speed

Adding more throttle pushes you out in front of your wing, which changes its angle of attack (it tilts upwards), and you climb. Releasing your throttle allows you to hang directly below the wing, and you descend in a slow and steady glide. Maintaining level flight in still air, with no climbing or descending, typically requires approximately 1/4 to 1/3 throttle. It's important to understand that the speed of your wing through the air basically remains constant, whether you're adding throttle or sinking. Adding throttle simply pushes you out in front of the kite, and that energy is converted to increased height - NOT increased speed. The throttle does increase your relative speed and force against the wing, changing your entire craft's angle of attack, and moving you upwards, but you do not move faster in relation to the ground. In fact, the farther you tilt upwards, the slower you will move across the ground.

Remember also that your thrust line will never be exactly straight ahead. Adding more throttle will always turn you in the opposite direction of your spinning propeller, and you must compensate for that torque to fly straight.

6.3 Trim Tabs

Trim tabs work by changing the relative length of the "A" lines, "D" lines, and all others in between. On wings that don't have any trim tabs installed, all of the riser lines always stay the same length, and the wing flies in its slowest possible configuration all the time. When trim tabs are adjusted, the "A" through "D" mallions are moved into a position in which all the lines are set to different lengths, angled low to high from front to back. When you move both trim tabs into this uneven angled position, the trailing edge of the wing moves higher in relation to the leading edge. That changes the wing's angle of attack so that the front of the wing "dives", and the wing moves faster. Moving both trim tabs into the uneven position can be used to increase the wing's overall flying speed. This is helpful to penetrate more quickly into wind or to match the speed of other pilots flying different wings. A "speed bar" is another piece of equipment that has a similar effect on the wing's angle of attack, by pulling the leading edge down.

Wings intended for PPG typically have trim tabs installed to counteract torque. By keeping one tab straight (flying slow), and one tab uneven (flying faster), the side of the wing with the unevenly set tab consistently "dives" and flies a bit faster than the other side of the wing, causing a consistent turn. This helps to maintain straight and level flight when the engine consistently torques slightly to one side. Without trim tabs, the only way to control torque effects when flying straight and level is to weight shift or turn slightly away from the direction of the torque. Typically, just crossing one leg over another is enough to counter the torque turn, but using a little trim relieves you entirely from that necessity, and makes for more comfortable flights.

Be sure to pull the trim back to neutral position (all lines even length) before you land. If your trims are left in the uneven position, your final glide with engine off and without torque will be slightly sideways. If you leave both trims in fast position, you are more susceptible to fast and active recoveries in situations such as collapses. The wing tends to be safest with both tabs set to slow, even position.

6.4 Being Aware of the Wind

The presence of wind does not necessarily mean that flying conditions will be bumpy. On days with high pressure, with no fronts near by, with little thermal activity, and with calm winds aloft, you'll often find that the air flow can be consistent and smooth to fly in, even with the presence of wind. Days like this provide some of the nicest flying conditions possible. Launches are easy, and landings are slow and soft.

Being aware of how you move with the wind, though, even if it's totally smooth, is very important. Be sure to set up, take off, and land directly into the wind. Don't try to execute forward inflations if winds are strong - you'll likely get pulled back and fall into "turtle" position on top of your engine. It's better to inflate in reverse position so that you can move easily toward the kite if the wind pulls you.

Be aware that flying in moving air will dramatically change your ground track when you make turns. As you fly into the wind, you'll move much more slowly over the ground. Very little throttle will be needed to climb. The airspeed over your wing is created not just by the motion of your glide through the air, but also by the movement of the air mass you're in, so you'll appear to glide downwards more slowly towards the ground (your wing's glide ratio stays the same - your forward motion is just slowed by the movement of the air you're in).

Turning downwind (so that you're flying in the same direction as the wind), you'll move faster along the ground. Be very careful to make downwind turns with plenty of height above the ground. As you turn downwind, you'll appear to sink, as your body needs to accelerate to a new flying speed, causing your kite's angle of attack to tilt downward slightly. Low turns downwind impose the greatest risk of impacting the ground hard if something goes wrong. Avoid them.

Be sure to practice turning up high before trying to fly close to the ground in any significant winds. In even a 7mph wind, the difference between your upwind and downwind speeds is dramatic. Flying with trims flat, your kite's consistent air speed is likely approximately 22mph. That means, upwind, you'll be traveling about 15mph over the ground - a runnable speed, even with you and your kite in full flight. Flaring in that situation will bring you to a virtual stop in relation to the ground. Downwind, in the same air, you'll be traveling 29mph. You do not want to accidentally come in contact with the ground at that speed. Even a full flare at that speed will likely not even be runnable.

Flying in smooth laminar winds on nice days, near beaches, and in other situations when wind speeds are consistent, can be fun. They're the perfect conditions to practice foot drags and other low/slow maneuvers. Just be sure to do all maneuvers INTO the wind, and make sure you are totally comfortable with the reactions your kite makes to turns into and out of the wind. You should respond to these reactions absolutely by instinct before flying anywhere near the ground in windy conditions.

7. Landing

Flaring is the procedure of pulling on both brakes simultaneously to slow your descent rate and the speed of your forward motion. It allows you to touch down slowly and gently. The biggest problem that beginners have with landing is that they invariably want to slow their descent rate by flaring too soon.

The process of landing softly is definitely counter-intuitive. In order to flare properly, you need a lot of air speed. That means you must come in with you're brakes completely off (hands up). In the beginning, the sight of the ground approaching quickly will make you instinctively want to grab the brakes too early. You need to wait until the last instant, when you're 1-2 feet off the ground, and then pull with smooth force. The instant you begin your flare, your flight path will level out - in fact, if you pull too hard, you will actually go back up in the air. As your wing slows to a stop and stalls, you will drop down to the ground. The key is timing that final glide ideally, so that you stall the wing at the exact same moment that your feet lower to the ground. Many pilots "skate" to a landing, and basically slide their feet over the ground until the wing stops providing lift.

The most dangerous possibility comes from flaring too soon, while still too high, and/or flaring too hard and rising back up too high, then falling down to the ground when the wing stalls.

One possibility that many beginners try is to land with the engine on, slowing the rate of descent, and then skidding to a standing stop. The problem with that is two-fold: 1) Unless you're flying directly into fast wind, your forward speed at the point of landing can be much too high (as much as 20-25mph ... can you run at 25mph?) 2) The moment you stop moving, the kite will fall down. If your prop is still spinning when that happens, it's very likely that you'll have some expensive repairs to make on your kite lines and/or fabric.

The solution is to follow this routine:

1. Line up for your landing approach directly into the wind. This makes an absolutely dramatic difference in your landing speed! With only 7mph wind, if you land into the wind, you'll land as softy and slowly as can be hoped for, even if your technique is not so good. If you land down wind (with the wind to your back), that same wind speed will almost certainly result in a painful crash.
2. Cut your engine absolutely no less than 50' above the ground - it's much better to do that even higher: 100-500ft. Cutting your engine causes your wing to dive, because the angle of attack is shifted down

and forward towards the ground. If you shut off the engine too late, this final dive will slam you down into the ground pretty quickly, and with more force than your flare can counteract. The only danger in cutting your engine too high is that beginners may misjudge their glide ratio, and overshoot/ undershoot their exact landing spot. Having a large landing area eliminates that danger. Cut your engine high enough that your final dive can straighten out into an even, predictable rate of descent.

3. Put your hands all the way up during your final descent (no brake at all!). This will create the maximum amount of energy to use in your flare. If you come in too slowly, with your brakes on, the wing will stall and drop you to the ground after only a short flare. On the other hand, if you're moving as quickly as possible, you have as much kinetic energy built up in the wing as is possible. By going fast, your flare is not only capable of slowing your descent, but can actually lift you back upwards into the air.
4. Don't make any significant steering corrections near the ground. You should make all of your final course adjustments well before the 35' mark (preferably higher), and then glide straight in. Oscillating your wing during the final moments of approach can crash you sideways into the Earth.
5. The last important element is timing the final bit of lift from your flare so that you set down softly. Pull too soon, and you'll stop and fall from higher than you want. Pull too late, and you'll hit your feet harder than you want. You'll intuitively want to do it earlier because you will be moving downwards quickly. You must force yourself to counter that intuition, and wait until you're 1-2 feet above the ground. Trust your wing - the flare WILL immediately slow and the stop your descent. Don't pull too hard or fast, because you could rise back up and fall from there. Just pull solidly and smoothly, with force, at about 1-2 feet. If you're landing into the wind, you'll land soft and smooth :) Bunch up your wing into a rosette, and prepare to fly again!

8. Active Flying

"Active Piloting" refers to flying in anything but still, predictable air. Wind gusts, thermals, rotor, wind gradient, wind shear, and other natural factors require you to respond with proper brake, weight shift, and throttle adjustments to keep your wing flying straight and level, and to keep you out of danger. Most PPG pilots do their best to avoid dangerous conditions (by flying in non-thermic times of day, in calm weather conditions, in locations without rotor, etc.), but it's important to know how to handle such conditions if you want to stay safe. You can find yourself in troublesome conditions when you least expect it!

8.1 Wind Gusts

Gusts can come from approaching or receding weather fronts. They can also be created by thermal activity. They can even be caused by the changing temperature in the evening, when conditions are _supposed_ to be at their most calm. When wind gusts speed up the movement of air over your wing, they can push your wing in the direction of the gust, and it that will change the angle of attack of your wing. Gusts can also speed up the wing's air speed faster than your air speed, causing it to surge forward and dive. Knowing what to do when you feel a gust should be instinctual, and that requires practice.

The basic guidelines are as follows:

1. If the gust pushes your wing back, and makes you climb, let up on your brakes and reduce throttle. When you first hit a gust that changes your angle of attack upwards, if you are pushing the throttle and/or adding brake to climb, you could reach an angle of attack at which the wing stalls, or stops moving forward, and drop you parachutally. Reducing throttle and letting up on brakes initially will keep you flying straight for the first moment.
2. If the gust creates wind speed over your wing that causes it to move faster than you, the wing will dive forward, and you'll descend. When this happens, stop the surge by pulling brake and adding throttle.

The force and drama of these reactions is determined by how quickly the wind speed changes, and how consistent that change is. A very quick airspeed increase on the front of your wing could cause a frontal collapse and a resulting quick dive, or if it comes at you from a different vertical plane, it could push you into a steep climb, which could result in parachutal stall. This is where lots of kiting practice can help. It's critical to have an intuitive feel for what to do when the wing surges forward or falls back, and kiting can really help build that instinctive feel. An intuitive understanding of how changing your position under the kite changes the kites movement, as well as how pulling brakes affects the kite's movement - that's essential for

understanding how to deal with similar changes and inputs that occur when you're in the air, and it can be learned to a degree by kiting on the ground.

8.2 Thermals - Rising and Sinking Air

Thermals are upward rising columns of hot air. They form when spots on the Earth are warmed hotter than their surroundings. Thermals are strongest during mid-day, especially in the summer time, when the sun has baked the ground all day. Dark colored surfaces are most likely to get hot in the sun's rays. Black top gets particularly hot. When flying over a field of brown dirt, surrounded by fields of white flowers, on a hot day, you should anticipate some thermal updrafts. You can also expect to find thermals under big, billowing cumulus clouds. Those clouds are formed when hot rising air carries up moisture to the height at which the vapor condenses. If you see a big thunder cloud anywhere nearby, don't even think of flying. They can suck you up to deadly altitudes, and they're typically surrounded by very rough air.

Thermals can be fun when you know what to expect and how to handle them. Paraglider pilots, sailplanes, etc. can stay aloft all day on the rising air in thermals. But if you don't know what to expect, and if you don't understand just how hostile they can get on bad days, you can very quickly find yourself in real danger.

When flying into a thermal, be prepared for your angle of attack to point upwards. Flying out of a thermal, prepare to dive downwards. In general, put your hands up (release brake) and release throttle when entering a thermal. When exiting a thermal, pull more brake to slow the wing's surge forward. In dramatic situations, it's possible for the wing to surge all the way out in front of you, or in the worst case scenario, beneath you. If that ever happens, and you become "gift wrapped" by the wing, you're probably going to die.

The solution is to anticipate and understand where and when thermals are likely to occur, and how to fly in them. Prepare to enter and exit them, keeping your angle of attack even, and your wing inflated over your head. Again, an intuitive understanding of how the wing will move in these situations can be helped by the first step of kiting practice. Beyond that, you should learn how to fly in light conditions - nothing dangerous, but requiring a bit of input and reaction to keep flying under control. Fly with more experienced pilots who can explain what to expect on any given day, and gain every bit of experience you can by being aware of the movement of the air you're in, and knowing how to react to those movements. Learn to slow surges by pulling brake and adding throttle, and dampen quick upward tilts in angle of attack by releasing brake and reducing throttle. Don't fly in conditions which more experienced pilots tell you may be beyond your skill level.

8.3 Rotor - Messy Swirling Vortices

Wind coming over obstacles can get messy and unpredictable. Think of water flowing over rocks in a creek. Even a small twig can cause serious disruption and violent spays of water, if the creek is moving fast enough. The same is true of the air you fly in. The faster the wind around the obstacle, the more serious the disruption.

You need to watch out for trees, buildings, vehicles - even little things like light poles when you're close to the ground. Watch out for hills, ridges, and mountains when you're up high. As a rule of thumb, the wind shadow of an obstacle can extend twice as high, and six to ten times as long as it is high, downwind of the obstacle.

Heavy winds coming over a mountain top at high altitude can very easily collapse your wing in an instant. Landing next to a building, with strong wind coming from the opposite side could put you in a violent down draft just as you approach the LZ. Taking off with a row of trees upwind will likely rock you around, even if the winds are light.

To really understand how rotor works, try kiting your wing on a day with significant winds, and do it in front of a hedge or some other obstruction. Move around the object as you kite, and you'll see just how violent and unpredictable rotor can be. Until you are comfortable managing collapses and many other serious situations, totally avoid flying anywhere near potential rotor on windy days.

8.4 Wind Gradient and Wind Shear - Changes in Speed at Different Altitudes

Wind traveling nearer the ground is slowed by friction with the ground. This effect is called wind gradient, and you can expect that winds will typically get stronger as you get higher. As you come in to land, and when you're launching, wind gradient can have a significant effect on your flight path. If it's blowing 10mph on the ground, its quite possible that the air at 500' will be moving 25mph, in which case, you'll be flying backwards along the ground. Being aware of this effect can save you the potentially dangerous situation of being blown back behind your safe landing site, and into dangerous territory.

It's also not at all unusual to see wind speeds on the ground at 5mph (that's beautiful), while winds at 6000' are blowing 50mph (that's deadly). The wind shear that can be experienced as you move from one layer of atmosphere to the next can be powerful enough to take down a jet airliner. It's possible for winds to be moving in one direction at one level of altitude, and a totally different direction at another level. The turbulence found between such clashing layers is likely too much to handle in a paraglider, no matter what your skill level. Be sure to check your local winds aloft predictions. They'll at least give you a ball park figure of what to expect. If winds aloft are dramatic down low (3000' or so), it's smart not to fly, even if the wind speeds on the ground are predicted to be slow and gentle.

If you do fly high, be aware of changes in direction and speed. Even if they happen gradually, fast moving air can blow you into unlandable territory, into flight paths of other aircraft, etc.

8.5 Prop Wash and Wing Tip Vortices

If you must fly behind another PPG, be sure to stay ABOVE the path of its prop wash and wing tip vortices at all times. Prop wash and other wake disturbances sink and travel down wind. If you fly behind and below another PPG, you're in for a nasty surprise. It's also possible to fly into your own wake if you're executing tight turns. It feels like a slap on the face when it hits you - try hard not to let your wing go through it.

Watch out for even the smallest planes. Their wake is much more intense than that of a PPG. And don't EVER get anywhere near the underside of a helicopter's prop wash - it'll knock you violently out of the sky.

8.6 Mechanical Failures

Always expect your engine to fail. It happens all the time to 2-stroke PPG machines. If your engine cuts out while you're pulling a tight turn 10 feet above the ground, the outcome will not be pleasant.

One of the fundamental tenants taught to all new PPG pilots is: don't ever fly any where a potential landing zone isn't within your potential glide distance. Landing on an open field with an engine out is hardly more than an inconvenience. Gliding down into trees, water, or power lines is a far different story.

8.7 Recovering From Collapses

In the case of small partial collapses, you may not even realize that they've occurred, and in such benign situations the glider will recover quickly with no more than a small turn.

To help deal with larger collapses, it helps to always fly with a slight amount of pressure on the brakes (dangling the weight of your arms on the brakes). This can help you feel the wing as it depressurizes, providing an extra moment to react. If you experience any sort of large assymetrical collapse, your main focus should be on steering the currently inflated portion of the wing. A safe beginner wing will likely re-inflate on its own, but in the meantime, your efforts should be spent on avoiding any unnecessary spinning or stalling that could lead to further collapse, loss of control, or collision with obstacles. When an assymetrical collapse occurs, the wing will immediately drop and turn quickly towards the side that collapses. Weight shift as much as possible away from the collapsed side. That will help you avoid spinning, by turning away from the collapsed side. If the spin is severe, you may also need to pull some brake to slow the fast moving side of the wing (the side that's still flying), but be careful not to stall that side. Doing so could cause a complete collapse of the wing, the worst outcome of which would be having the wing drop below you and falling down into the wing. Getting gift wrapped like that is the worst possible situation to find yourself in.

8.8 Reserve Parachutes

In the worst case scenarios, having a reserve parachute, and knowing how to use it can save you from some certain death experiences. If your kite ever locks into a spin which can't be stopped (too fast to slow down even by doing a pull-up on the brake), throwing your reserve is one thing that can save your life. Gift wrapped falls are another situation where a reserve provides you a second chance to live. Know where your reserve handle is, and be ready to use it in such a situation. G forces in a spin are dramatic and can quickly make you lose consciousness. G forces also make it very hard to move around, reach, and grab for a reserve handle. You should practice finding the handle while in flight, and visualize grabbing/throwing your reserve into clear air. Every year when you get the reserve repacked, practice an actual throw on the ground so that you know how it feels.

Reserves are only meant for use when the absolute worst has occurred, and there are no other options. Throwing a reserve in any other situation is a dangerous gamble. The rate of descent is much faster than in a paraglider, the location you land is typically left to fate, and it's possible to get paraglider lines and reserve lines tangled. Only throw in an absolute emergency, and in the meantime, practice your PLFs (parachute landing falls) to avoid breaking your body any more than necessary if you ever do take a reserve ride.

9. About Wing Safety Ratings: DHV, Afnor, CEN, and DULV

The DHV is the German organization that tests paragliders for safety characteristics. DHV pilots run through a variety of intentionally induced deflations, dives, stalls and other maneuvers. They carefully record the specific responses to every maneuver, and give each wing a rating based on how it responds to all the tests. Wings that respond most benevolently, without requiring any pilot input to recover from collapses and other maladies, are rated "1". These wings are the safest to fly when you're just starting out, or if you only fly occasionally for leisure. DHV 1 gliders typically fly more slowly then those with higher ratings, and are harder to zip around into acrobatic maneuvers, but they require very little skill to maintain stable flight. DHV 1-2 wings are slightly more responsive, and should be considered the upper limit which new and unskilled pilots should consider flying. DHV 2 and 2-3 wings should only be flown by experienced pilots who know how to handle quicker diving turns, how to actively recover from asymmetric collapses, and how to intuitively control every movement of the wing, since the wing will not automatically do the right thing on its own. It's much easier to lock into deadly spins and to unsuccessfully recover from collapses with these wings. Wings with a DHV 3 rating should only be flown by expert competition pilots. They move very quickly, and need to be controlled just to maintain a position above you. Unless you've been flying hundreds of hours per year, for several years, you could likely find yourself in a deadly situation in one of these gliders.

Afnor (formerly Acpuls) is the French organization that tests wings for safety. Instead of a number scale, they use three main ratings: standard, performance, and competition. Only standard rated gliders are appropriate for low air time pilots. CEN is another European organization that uses a letter scale: "A" for the safest beginner gliders, through "D" for competition wings. DULV is another German testing organization - they're the only ones who specifically test gliders for appropriate use in powered flight. DULV has 2 ratings: Standard, for beginner and leisure pilots, and Advanced.

Here's a basic listing that compares the rating systems of each organization:

```
Beginner Pilots:
    DHV 1 to low level 1-2, Afnor Standard, CEN A to B, DULV Standard
Intermediate Pilots:
    DHV 1-2 to low level 2, Afnor Standard to low level Performance, CEN B
to C
Advanced Pilots:
    DHV 2 to 2-3, Afnor Performance, CEN C to D
Competition Pilots:
    DHV 2-3 to 3, Afnor Competition, CEN D
```

See this page for more information about wing ratings.

10. General Safety Guidelines

1. Fly high enough that you can recover from problems. Dealing with collapses, dives, stalls, engine-outs, and any other maladies is far safer and likely to end well if you've got significant altitude. 300' feet is a good bare minimum, but higher is generally better.
2. Know how to look for potential weather problems. Avoid hot thermally mid day activity. Avoid hot, humid, low pressure days, when the air is thin, and you can't get as much lift as normal. Avoid flying anywhere near storm fronts.
3. Avoid flying into rotor caused by wind hitting and flowing around obstacles.
4. Stay way away from power lines, water, trees and any other areas where landing would be dangerous.
5. Learn to kite your wing. In the beginning you should be doing much more kiting than flying. Launching is very dangerous if you can't kite the wing stably and intuitively.
6. Fly with others who are more experienced than you. They can help determine locations and conditions that are good to fly in.
7. Practice landing safely and with precision. In an emergency, you may need to land somewhere unexpected.
8. Carry a reserve and know how to use it.
9. Learn to work on your machine, keep it well adjusted, and perform a pre-flight check every time you fly. Be sure that nothing is going to break or fail in flight.
10. Wear a helmet and good boots.
11. Get good training, and don't ever stop learning. The more situations you know how to handle and the more problems you know how to avoid, the better.
12. Learn to abort launches if something goes wrong. Launches are optional, landings are not.

11. A Final Reminder

And just so it's absolutely clear ... here's your last warning:

WARNING: Attempting to use a paraglider and/or paramotor may result in serious injury or death. The reader of this document is solely responsible for his/her safety when attempting anything described in this document, and assumes all liability of risk. Using a paraglider and/or paramotor improperly greatly increases the risks involved. Never use a paraglider and/or paramotor without proper and thorough instruction from a qualified instructor. By reading this document, you accept all risks involved with attempting anything described herein. The author cannot and will not guarantee your safety when attempting anything described in this document. By reading this document, you agree to not hold Nick Antonaccio liable for any injuries to yourself or to third parties resulting from reading this document.

Just get some training. Don't try to do any of this yourself. Our PPG freedoms are treasured. If you do experience an accident, not only could you ruin it for yourself, you could potentially ruin it for the rest of the PPG community too. You don't want to be that person.