

# On Paramotors

What you should know about this growing niche of general aviation

BY JON EISELE



**A POWERED PARAGLIDER** — also known as a PPG and most commonly referred to as a paramotor — is an ultralight that uses a backpack-like engine and paraglider (similar in appearance to a parachute) to allow a person to fly like a legend of Greek mythology. Paramotor pilots can fly locally along the treetops, explore the countryside on a

cross-country adventure, or perform high-energy aerobatic maneuvers. One could easily argue that this pure flying experience is exactly what Orville and Wilbur Wright imagined when they first dreamed of powered human flight!

Undoubtedly the most popular category of ultralight aviation in the past decade, the sport of paramotoring is enjoying a golden age of exposure and rapid growth in the United States. This growth is largely due to its approachability and low barrier of entry into general aviation.

## MY JOURNEY INTO PARAMOTORING

Growing up in aviation, I'd seen paramotors from a distance and written them off as slow, awkward, boring, and unsafe. I wasn't interested in them until I read a magazine article written by a prior fixed-wing pilot who stumbled into the sport by accident and described his new ability to literally run into the sky, just like he'd always dreamed of. I remember thinking to myself, "Okay, now that does seem kind of cool." I was hooked on the idea. After getting training in 2014, I never looked back. Paramotoring changed the direction of my life.

I believe paramotoring and paragliding (also referred to as freeflying) to be not only among the purest forms of aviation, but also the perfect combination of sport, recreation, and fellowship. As an instructor, I enjoy teaching people how to fly paramotors just as much, if not more than I enjoy the act of flying them. It's as if the sport is a life-changing secret that's too good to keep to myself.

Airplanes will always be my first love, and I will always enjoy flying them. However, when compared to a paramotor, I feel more like I'm operating a machine when I'm flying an airplane. There's a lot more to think about and do in an airplane — instruments to monitor, controllers to talk to, headings to maintain, and systems to manage — rather than just being present in the moment. When I fly a paramotor, I'm not confined to the flying machine — I am the flying machine. It's as if the paraglider I'm connected to is an extension of my own body and the engine is a prosthesis that enables me to fly. With either paramotoring or paragliding, I feel a sense of connectedness with the environment that surrounds me. I can gently drag my toe across the glassy surface of a pond, participate in the sunset, or feel the air get warmer when climbing through an inversion layer. Unless you're doing something like an adventure race, there's rarely a mission or purpose. The mission is fun.

## PARAMOTOR 101

With about a week of proper training, paramotors are easy to launch, easy to land, and easily transportable. Pilots can take off and land within a football field-sized area, and a complete PPG setup is small enough to fit in the trunk of a compact car.

The paraglider itself — also referred to as a "glider" or "wing" — is elliptical in shape and has no rigid structure. The glider is inflated with ram air through an opening in the leading edge, which builds internal pressure and gives the airfoil its characteristic aerodynamic shape.

The pilot is suspended underneath the paraglider by suspension lines and secured in a harness that is attached to a backpack-like engine unit with a rear-facing propeller. Due to their mechanical simplicity and high power-to-weight ratio, virtually all popular powerplants are single-cylinder, two-stroke engines that burn about 1.5 gph of premixed auto fuel.

Cruising at an average airspeed of about 25-40 mph, paramotors can fly for about three hours with 5 gallons of fuel. However, most paramotor flights are no longer than an hour. Cruising altitudes vary, but most flights take place below 500-1,500 feet AGL in Class E or G airspace, with a service ceiling of about 9,000-10,000 feet.

## WORDS MEAN THINGS

Now that we've talked about what a paraglider is, let's talk about what it is not. A paraglider is not a parachute. A parachute is designed to be deployed in a freefall, withstand the loads of opening under terminal velocity, and slow a descent. A paraglider, on the other hand, is designed to be launched from the ground and generate lift. The biggest measurable difference in performance between a parachute and a paraglider is that a parachute typically has a 3-to-1 glide ratio (about the same as a basic paper airplane), whereas a paraglider typically boasts upward of a 6-to-1 to 9-to-1 glide ratio (about the same as a Cessna 172 or Cirrus SR22).



Although they're often confused with each other, paramotors are also not the same as powered parachutes (PPCs). PPCs are different mostly in that they are generally larger, are heavier, and use a less efficient but far more stable rectangular parachute. They have considerably more power, combine a three- or four-wheeled chassis with a 400-cc to 900-cc engine that produces between 40-100 hp, and are usually equipped to carry two people. While PPGs and some PPCs meet the criteria of ultralight vehicles, which are regulated by 14 CFR Part 103 (more on that later), most PPCs are certificated as light-sport aircraft, are required to be registered, and require a sport pilot certificate with PPC endorsement to operate.

Compared to PPCs, PPGs are simpler and more efficient, maneuverable, transportable, and affordable. Paramotors can either be foot-launched or wheel-launched, and some designs can transition between either in a matter of minutes without tools. A paramotor frame, harness, and engine usually weigh as little as 43 pounds empty and around 65 pounds when loaded with fuel, floatation devices, and a reserve parachute. The size of the engine itself is often dependent on the weight of the pilot. The most commonly used engines range between 185 cc and 280 cc in size, falling between 20-36 hp. However, they can be as little as 80 cc and 18 hp.

Paramotoring and paragliding (i.e., flying without an engine) share a lot in common, but they also have a few major differences that usually aren't as apparent to the untrained eye. I like to compare the disciplines

to basketball and soccer. While they're both team sports that involve a ball, scoring, offense, and defense, they're different in the way the games are played. One could also argue that experience and stamina gained in either sport would likely benefit an athlete if they were to trade cleats for sneakers. In the same way, I strongly believe that being a better paramotor pilot makes a better paragliding pilot — and vice versa.

#### WEATHER

Both paragliding and paramotoring are extremely weather-dependent, and the biggest differences between them are the conditions they fly in. Since powered paragliders have an engine that provides thrust, paramotor pilots seek the calmest, most stable atmospheric conditions they can find, with light and consistent winds on the surface less than 8-10 mph and winds below 3,000 feet AGL generally less than 15-18 mph. High-pressure systems with no frontal activity typically produce "bluebird days" with the best flying conditions paramotor pilots can hope for. The safest and most enjoyable flying windows for paramotors are generally during the first two hours after sunrise and the last two hours before sunset when thermic activity is at its lowest.

While paramotor pilots yearn for the smoothest and glassiest of conditions, paragliding pilots crave an unstable atmosphere that is conducive to soaring without power — without becoming too dangerous. Paragliders must be either towed aloft from a winch on the surface or launched from higher terrain such as a hilltop or mountain. They are

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dependent on rising air to climb or stay aloft. This atmospheric lift may come from sources such as thermals, convergence, or orographic lift. Orographic lift, more commonly referred to as ridge lift, occurs when wind blows against an upward slope, such as a mountainside, and is redirected upward. Thermic conditions occur when the sun heats the earth's surface, and the surface heats the air above it. Similar to a rising bubble in a lava lamp, this air mass will then begin to rise as it becomes lighter than its surroundings. Paragliding pilots will ride rising air like surfers on a wave or, more appropriately, birds that want to stay aloft for long periods without working very hard. Thermic conditions usually begin two hours after sunrise, get stronger as the day increases, and then weaken as the sun sinks closer to sunset. While midday conditions are the most favorable to soaring, inexperienced pilots are never recommended to fly in them as they may quickly become very dynamic, difficult to predict, and potentially unsafe.

#### HOW SAFE IS IT?

To outsiders, paramotoring often appears to be significantly riskier than it actually is in practice. To many, this perceived danger is typically one of the biggest mental roadblocks in embracing the sport. As with any form of aviation, there is a certain degree of risk inherent every time humans choose to defy gravity and leave terra firma, and paramotoring is no different in this regard — this is especially true when mistakes are borne out of inattention, recklessness, or any number of hazardous

attitudes. That said, while paramotoring can be dangerous, it is quite possibly the safest form of personal flight that exists.

One of the things I appreciate so much about the sport is the amount of risk I can mitigate and the large degree of control I have in any given situation; engine failure is a great example of this. Though not a frequent occurrence, engine failures do occur in paramotors at a higher rate compared to that of certified aircraft. This is largely due to the nature of lightweight, single-cylinder, high-rpm, two-stroke engines. Broken drive belts, seized pistons, and fouled spark plugs are some of the common culprits here. The good news is that the glider doesn't know the difference when the power goes away. Most of our landings are made with the engine shut off under normal circumstances, so as long as the pilot has proactively put themselves in a position with a good landing option, an engine-out landing is typically a nonevent.

Glider collapses are usually the thing the uninitiated fear most when they see a paramotor for the first time. Similar to stalls in an airplane, the potential danger of a collapse increases closer to the ground with less altitude for recovery. However, when flown in safe, stable weather conditions and performing normal, nonaerobatic maneuvers, collapses in paramotoring are exceedingly rare, avoidable, and benign (if they occur at all). Collapses are also similar to stalls in an airplane in the regard that many pilots will go their entire flying career without experiencing one or the other outside of a training environment. The likelihood of a collapse increases when performing dynamic maneuvers, flying more advanced

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wings, or flying in conditions where atmospheric effects such as thermals or rotor may be present. So, while it's important to be aware of collapses, know how to avoid them, and know how to recover from them, they shouldn't prevent you from getting into the sport if it's something you're considering.

I often remind my students that paramotoring is largely as safe as the decisions we make. For this reason, entering the sport through a comprehensive training program is critically important. One cannot begin to make the right decisions based on missing or faulty information.

#### PART 103, TRAINING, AND ASSOCIATED COSTS

Because paramotors fall under the beautifully brief regulations of Part 103, there are no standards of airworthiness, certifications, or inspections required for operators or equipment, making the sport one of the most affordable and accessible forms of personal aviation.

Even for a novice with only basic mechanical skills, the equipment itself is relatively low cost and simple to maintain. In fact, the equipment is so easy to maintain that it often serves as a gateway toward building mechanical skills for those with no previous experience, and most repairs can be accomplished on the kitchen table.

Paramotors are also ideal for someone who has dreamed of flying recreationally but perhaps never been able to afford a private pilot certificate, manage the costs of owning their own airplane, or been able to pass an FAA medical exam. The sport is also attractive to prior certified pilots

who want to diversify their flying experience, experience flight in an entirely new way, or fly recreationally at a very low cost.

For an average investment of about \$10,000-\$15,000, a person with little or no aviation background can go from "zero to hero" with all the training and equipment needed to get started in the sport, without the overhead costs of annual inspections, costly maintenance, or hangar rent. Although training is not legally required, as I wrote in the August 2019 issue of *EAA Sport Aviation*, the importance of starting with quality training cannot be overstated, regardless of prior aviation or skydiving experience. Overestimating your ability to self-train or learning through poor instruction can turn out to be significantly more expensive, painful, or frustrating in the long run.

That said, the transformative power of paramotoring goes far beyond aviation. It's truly life-changing. Looking back, my only regret about getting into this sport is not falling in love with it sooner. I believe it has not only made me a better aviator but also changed the way I see the world around me. Let us know what questions you have by emailing me at [jeisele@eaa.org](mailto:jeisele@eaa.org). Tune into a future episode of EAA's podcast, *The Green Dot*, where I'll answer your questions and dive into a deeper conversation on paramotoring. *EAA*

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