Ride th

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Gliding Your Way to

Signaled by the subtle snap of the towrope release and the immediate plunge into airborne silence, the transition from powered to unpowered flight in a glider might at first seem unnerving and unnatural to some pilots. Yet, that initial fear is often quickly replaced by feelings of sheer exhilaration and an unparalleled sense of freedom as you experience what many consider flying in its purest sense.

Relying solely on a combination of calculated control inputs, and a keen sense of weather and situational awareness, the art of gliding—or soaring—demands a great deal of precision and skill. Once you acquire the knack for it however, gliding can be an immensely enjoyable and often addictive endeavor. And for a powered pilot, learning the basics of gliding can be both a humbling and educational process that can literally take your flight proficiency to a whole new level.

Can I Get a Lift?

Among the first true airmen, Otto Lilienthal flew in what was considered the first successful glider flight 12 years before the Wright Brothers' historic powered flight. Lilienthal, with his various avian-inspired gliders, recorded more than 2,000 flights, reaching as far as a quarter mile and a height of 75 feet in his homeland of Germany, earning him the title of "Glider King." Although much different from the appearance of modern day gliders, the basic aerodynamic elements Lilienthal incorporated in his early designs did help influence the future of manned flight.

At first glance, the most striking and yet fundamental design characteristic of a modern glider (besides the fact that many power pilots won't miss the chance to point out it's missing an engine) is its enormous wingspan. Without an engine, the wing must act as the driving force to counteract the effects of gravity on a glider. And while the wings can't produce power per se, they do generate a copious amount of lift that can keep a glider safely aloft for hours at a time.

Much of that lift can be attributed to the wing's high aspect ratio, a value calculated by dividing the wingspan by the average wing chord (or wing length). For some larger wingspan gliders, that ratio can often reach 40:1. The high aspect ratio wings found on gliders are extremely efficient and produce a comparably high amount of lift at low angles of attack with less induced drag.

On a String and a Prayer

With that increased wing size though, there is a tradeoff—the likelihood of slipping or skidding turns caused by adverse yaw is much greater. Power pilots who sometimes overlook the need for well-coordinated climb-outs or turns might be in for a surprise the first time controlling a glider. Part of that surprise might also be caused by not finding an inclinometer on the panel. Instead, many gliders use a yaw string, which is simply a three to five inch piece of yarn attached to the outside of the canopy in the free airstream. Unlike using an inclinometer, when the tail of the string moves left, pilots will need to add right rudder to stay coordinated in a turn.

Other items on a glider that might seem out of the ordinary to an average GA power pilot include high drag devices like spoilers and dive brakes, which are generally reserved for controlling the sink rate during the landing phase. A spoiler, as its name implies, interrupts airflow on the upper surface of the wing to enable a glider to descend more rapidly using the increased drag. Dive brakes extend from both the upper and lower surfaces of the wing to help increase drag. Keep in mind that the cockpit location of spoiler or dive brakes control,

Photo by H Dean Chamberlain

Greater Pilot Proficiency

traditionally to the left of the pilot, presents another difference for power pilots who might be used to using their right hand to help control sink rate with the throttle.

And along with the airspeed indicator, altimeter, and magnetic compass found on most glider cockpit panels, you'll find another instrument extremely valuable to glider pilots: the variometer or "vario". Like the vertical speed indicator in an airplane but with a smaller rate scale, the vario indicates the rate of climb or descent in feet per minute or meters per second. Varios are also usually accompanied by short audio beeps which change in pitch and speed depending on the vertical speed and direction (higher pitch and faster equals going up). This helps glider pilots know when they hit the core of the rising air such as in a thermal, and conversely, when they need to find another area of rising air.

A Bird's Eye View

So by now you're probably now asking yourself - how can learning how to fly an engine-less sailplane with a 60-foot wingspan make me a better (power) pilot? You might even think soaring is just for the birds, literally. True, powerless flight is the natural domain for birds, but that doesn't mean we can't learn from our avian friends. With practice, you too can master the delicate balance between atmosphere and terrain and learn to safely leverage the many intricate interactions between them to your advantage.

In his book *Flying Conditions: Micrometeorology for Pilots*, author Dennis Pagen describes how glider pilots must be able to "see" the air in order to maximize performance and avoid dangers. Part of this special sensory skill, says Pagen, involves the ability for glider pilots to seek out and utilize the unseen forces of natural lift, such as thermals, mountain ridges, or frontal boundaries. This skill also demands an understanding of how different atmospheric conditions (e.g., lapse rates, wind direction, humidity) can affect these areas of lift and possibly require you to change your plans mid-flight. By no means is this skill instinctive; plenty of study and practice is required. In the end, fine-tuning these micrometeorology skills can make you a safer and more proficient pilot—glider or powered.


Photo by James Williams

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Speed is King

In addition to knowing where to find areas of good lift, glider pilots must also be astutely aware of airspeed at all times. For power pilots, an engine failure normally triggers an almost involuntary response of trimming for best glide speed, or $V_{L/D}$. Sure, that will usually get you the biggest horizontal bang for your buck, but maybe giving yourself more time to restart or prepare is more important when an airport is well within landing distance. In that case, using what glider pilots refer to as minimum-sink speed, you'll lose less altitude over a given period of time.

Another airspeed critical to glider pilots is the speed-to-fly, which refers to the optimum airspeed for flying between areas of lift for a given glider. Essentially, it's a matter of speeding up to expedite an exit from areas of sink while slowing down in lift to maximize the altitude gain. These speeds can be calculated with a chart (such as the airspeed/sink rate graph chart for the glider), or with readings from a variometer with speed-to-fly markings or electronic flight computer. A speed-to-fly may not be listed in your powered aircraft's POH, but understanding the concept is a good way to exercise your knowledge of flight dynamics.

Manager Experience Needed

Without an engine, you might think there's less to worry about in a glider. No carb heat to apply, no oil pressure gauges to watch, and no dipping tanks before a flight. While the cockpit (and checklists) might seem a little leaner than what you're used to, don't be misled into thinking there's any less work to do. On the contrary, you're using less to do the same, if not more.

"It's all about task management," says FAA Aviation Safety Inspector Lance Nuckolls. "With a glider, things tend to change more rapidly demanding a razor sharp focus on where you are and what you are doing at all times. You have to divide your focus on several things at once, but also know how to divert that focus on one task when needed—such as dealing with a low altitude rope/cable break during an aerotow or winch launch."

As an active glider instructor, Nuckolls also teaches his students about the importance of energy management and situational awareness, which is especially important during landing. "You don't stall a glider on to the ground like you would in many small GA airplanes. You roll it on the runway with the nose up just enough to have minimum energy to land."

Due to the range limitations of a non-powered glider, pilots must also always be on the lookout for a suitable place to land should the weather turn or something malfunctions. This increased situational awareness of the terrain around you can serve as an excellent safety habit, and one which can be easily carried over to your next powered flight.

"It's a feel," says Nuckolls. "A sight picture you acquire with time and practice that can help any pilot."

It's A Soar Subject

Flying a glider means different things to different people. Some see it as a way to escape and become one with nature. Others may see it as a competitive challenge against gravity—seeing how high they can go, hopping from thermal to thermal. It is what you make of it and what you put into it. Whether you aspire to have a glider rating and perhaps a sailplane of your own, or if you just want to enjoy the sensation of soaring, you'll soon realize why gliding is one of the most rewarding and educational experiences aviation has to offer. Soar safely!

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For More Information

Soaring Society of America
www.ssa.org

AC-00-6 – Aviation Weather, Chapter 16
www.faa.gov/documentLibrary/media/Advisory_Circular/AC%2000-6A%20Chap%2016-Index.pdf

Glider Flying Handbook
www.faa.gov/library/manuals/aircraft/glider_handbook/media/faa-h-8083-13.pdf