POISE WITHOUT POWER

Sailplanes—a whole new meaning to the term "engine-out training."

BY MARC E. COOK

As I pull on the bright yellow knob in front of the Grob's pencil-thin stick, the towline jumps away like a recoiling snake. The blue Cessna that I have been concentrating so hard on staying behind falls away to my left; I pull the G103 sailplane up and to the right. As the airspeed decays, the sound of

tells a different story, seeming to say: "'You did fine, but, well . . . is that what you call a landing?"

By the sweat dripping from the Grob's stick, one might get the idea that flying sailplanes is tougher than performing origami with boiler plate. Requiring concentration and well-honed judgment, the sport is, more than anything else, different. In some respects, power pilots come to the sport with a disadvantage. Certain procedures, like the landing, are remarkably different from powered-airplane practice, and making the transition requires one to discard old habits and learn new ones. On the other hand, pilots already know about aerodynamics, pilotage, and basic airplane control. Typically, it takes fewer lessons before a power pilot is ready to solo than would be the case starting someone from scratch. It might not seem so to the power pilot during the first flights.

The pilot's view is impressive and panoramic. The demon yaw string is above compass; savvy sailplane pilots can keep it straight all day, the rest of us just curse it.

One such task required of the sailplane pilot that might make power pilots believe their learning centers have been switched off is the aerotow. In concept, the aerotow is straightforward: All you have to do is follow the towplane to altitude, disconnect, and you're on your way. Staying in precise position, 150 to 200 feet behind the towplane, however, is anything but easy.

The takeoff roll starts innocently enough, preferably with a wing runner holding the wing tips off the ground and signaling the towplane pilot. With slack removed from the towrope, the towplane begins the roll. At first, it takes full deflection of the ailerons to keep the wing tips off the ground and a delicate touch on the elevator to bring the nosewheel off the ground. Because it's lighter and cleaner, the sailplane wants to fly well before the towplane is ready to rotate. So you let it, holding the sailplane off the ground five to 10 feet until the towplane begins climbing.

Sailplane pilots are warned time and again to not climb until the towplane is flying. This is especially true when the tow is a taildragger. If you initiate a climb prematurely, the sailplane can overpower the towplane's elevator, pulling the tail up and, in the worst case, flipping the airplane over. A savvy towplane pilot will disconnect and leave you holding the towline if he senses something amiss, though.

Once off, following the towplane requires only that you anticipate its every move and respond with deliberate, yet delicate, corrections. The task becomes less tiresome with experience but still requires intense concentration. What's more, in the Grob, the towplane appears in a small sliver of windscreen below the yaw string. As long as the air is relatively smooth, following the towplane in flight is no more difficult than using an Etch-A-Sketch while wearing boxing gloves. One technique that seems to fly in the face of good power-airplane technique is the use of rudder. It's considered proper to slew the sailplane around behind the tow primarily with the rudder; changes take place more gradually than would be the case banking, and the drag produced by the uncoordinated flight helps keep the towline taut.

To prove my ability to maneuver the sailplane behind the tow, Douthit asked me to box the wake. This means moving from the high-tow position (where the top of the towplane's tail appears level with the top of its wing) to low-tow position and then around, describing an imaginary box behind and below the towplane. What makes this difficult is not so much the maneuvering, but the wake turbulence encountered in moving from high- to low-tow position. In the wake, the Grob shudders intensely. Learning the control inputs necessary to horse the Grob around proved helpful those many times I found myself out of the desired in-trail location in the tow.

Stalls and steep turns were next on the syllabus. Douthit says that the G103 is one of the most docile trainers in the stall; it will shake and shimmy but will only drop the nose if severely provoked. And if the yaw string is kept straight, there's no tendency to drop a wing. Such gentlemanly manners are welcome when cruising for thermals. Often when I worked on the edge of the stall, especially in steep turns, the Grob's T-tail would chatter a warning well in advance of the stall.

Steep turns in a sailplane require more care and finesse than is the case in most powered airplanes. Stick forces are lighter, and the Grob's generous wingspan gives the ailerons plenty of leverage to produce adverse yaw. As a result, it's better to lead the turns with rudder, then plenty of aileron deflection, and then neutralize rudder in the turn. Steep turns of more than 30 degrees require opposite aileron to maintain bank angle. All the while, you're making gross rudder applications to keep coordinated. The Grob is nowhere near as well-harmonized as a Bonanza, for example, and has neutral roll stability; you cannot expect it to stay put in a turn.

Demanding, yes, but the Grob is nonetheless exhilarating to fly. It's responsive, and the handling quirks quickly become nonquirks. Once accustomed to it, a pilot can rack the Grob around the sky with the dexterity of a 10-year-old playing Super Mario Brothers on Nintendo. A version of the G103 is approved for aerobatics.

Instructor Douthit owns a trainer him-

self, a Blanik L–13, that he says can show a pilot a real stall, a real spin. His eyes glimmer when he says that; I'm secretly glad we won't have time for any of that.

Compared to the Schweizer 2-33, by far the most prevalent sailplane trainer in the United States, the Grob is more modern and has superior performance. The G103 handles more like high-performance, single-place sailplanes than does the 2-33. Some instructors bemoan the Grob's lack of flaps (the Schweizer's are substantial) and the fact that it is difficult to coax into a textbook spin; the Grob enters a tight spiral dive instead.

Other than becoming comfortable with the airplane, getting the basic glider rating is simple. For power pilots wishing to add a glider rating, the Federal Aviation Regulations are reasonable: for private pilots with more than 40 hours, 10 solo flights in which 360-degree turns are made. For those with no private pilot certificate with an Airplane category rating, the FARs require either 70 solo flights, including 20 flights with 360-degree turns, or seven hours of solo flight, including 35 glider flights launched by ground tows or 20 flights by aerotow. The glider rating carries limitations concerning the type of launch method: If you took your instruction and check ride using aerotow, your certificate will limit you to that type of launch.

I flew 10 flights with Douthit before solo, slightly more than he considers average due to the constraints of photography for this story. Most power pilots, Douthit says, can complete the transition in a leisurely three or four days or one busy weekend.

Like other areas of aviation, once the rating is gained, the real learning begins. Learning to ride thermals or coax the most out of ridge lift takes time, and the old pros have been honing their techniques for years. Perhaps the most rewarding aspect of soaring is that it pays back smoothness and precise airmanship handsomely, yet it will suffer hamfistedness without becoming dangerous. What's more, soaring is not expensive. A good used Schweizer 1-26 (by far the most popular single-place sailplane extant) runs from $5,000 to $9,000, depending on equipment; renting a sailplane tops at about $40 an hour. Aerotows can cost $15 and up, depending on the release altitude. Compared to power flying, soaring is downright cheap.

So what do you get with the rating? I know that the next flight in a power airplane after working with the Grob was interesting. I became more aware of altitude and gliding ranges; after the Grob, even a clean airplane seems to have the glide ratio of the space shuttle.

The training also made me wish for the time and altitude to shut down that noisy old piece of metal up front and enjoy, as do most sailplane pilots, flying in its purest sense. □

Sometimes form does follow function: The slender fuselage and long, thin wings combine to give the Grob good soaring performance and a graceful, athletic shape.

SOARING SOCIETY OF AMERICA

HIGH SOCIETY

Voice of the powerless

Executive Director Larry Sanderson describes the Soaring Society of America this way: "Imagine a smaller AOPA. We support the sport, lobby for it, and take steps to ensure its survival." Headquartered in Hobbs, New Mexico, SSA has been providing representation for enthusiasts since 1932; current membership is 14,500, the vast majority of which, says SSA, are active sailplane pilots.

One recent SSA goal might sound familiar: to convince rulemakers that soaring is an endeavor just as needy of unrestricted airspace as the rest of general aviation. SSA has put together a drug-testing consortium for its members. Land use is also an issue. Soaring, like the rest of general aviation, is finding it more and more difficult to keep landing facilities in urban areas. "Outward compression," Sanderson says. "It's hard for the owner of an airport or gliderport to stand fast in the face of rising land costs. When a developer offers an owner three or four times his annual gross income to sell the land, well, it takes a real enthusiast to hang on."

While SSA is active on some of the same issues as AOPA, it goes about its work differently. "We are a group of volunteers," says Sanderson. "Each director on our board commits untold time and resources to SSA. Our efforts in Washington are also from volunteers. We have just a handful of paid staff here in Hobbs, so we rely heavily on our volunteer support."

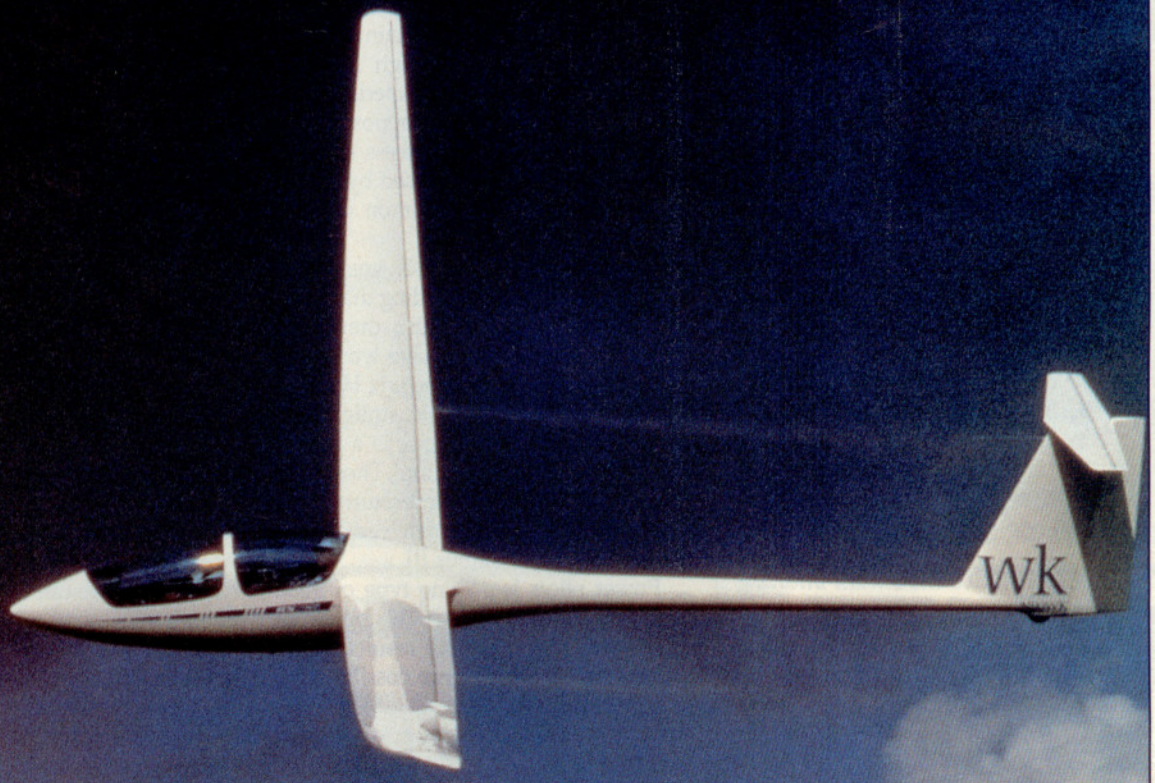
SSA also is aggressive in marketing the sport. The product sales department overflows with texts, pilot supplies, videotapes, and other soaring paraphernalia. "We are really the only ones to develop a market strategy for the sport," Sanderson says. The strategy apparently has worked: SSA derives about a quarter of its income from product sales. The association also sponsors major international sailplane competitions and sanctions many meets in the United States.

As for the future of SSA, Sanderson says that it will continue its work in Washington and expand its marketing involvement. SSA is also looking to better get the word out to the general public about the sport. "That's one of our toughest tasks. We compete with many things for a person's discretionary time and income." SSA believes that if it is successful getting people into sailplanes, the sport could sell itself. That theory should sound familiar to power pilots, too. —*MEC*

SOAR POINTS

Putting the wind to work

BY BARRY SCHIFF



IF I were asked to dictate how people should learn to fly, my first order would mandate that student pilots should make their first solo flights in a sailplane. This is because soaring offers a purity of flight that teaches the essence of basic airmanship. Fundamentals are not masked by power and speed. ■ It is, of course, never too late to get a glider rating. It can develop

PHOTOGRAPH BY GLEN STILES

and sharpen skills that significantly improve the way we fly other types of aircraft.

A noteworthy example of the value of such basic skills occurred on July 23, 1983. This is when an Air Canada Boeing 767 ran out of fuel at Flight Level 410 (41,000 feet) over Manitoba. The captain, who was a sailplane pilot, established the jetliner in a normal glide and headed toward 60-mile-distant Gimli, a former Canadian air force base.

While on final approach to the 8,000-foot-long runway, the captain realized that the "glider" was too high. Drawing further upon his soaring experience, he lowered a wing, applied opposite rudder, and slipped off the excess altitude. (Slipping is a technique used by power pilots, but it is more common in soaring.) No one was injured.

Sailplane pilots learn a great deal about the principles of gliding that is applicable to powered flight; they have chalked up some impressive world records to prove it. These include Hans W. Grosse's 789-nautical-mile, straight-line flight across Central Europe in a Schleicher AS-W 12 sailplane and Thomas L. Knauff's 889-nm, out-and-return flight from Williamsport, Pennsylvania, in a Schempp-Hirth Nimbus III.

Power pilots learn one type of glide and one type only. It is the optimum glide, which presumably results in flying the maximum distance possible from a given altitude. For any given gross weight, we learn that only one indicated airspeed will result in such a glide.

But glider pilots know better than this. While on a cross-country flight, for example, they use "speed to fly." This is the speed normally used for an optimum glide corrected for the vertical velocity of the surrounding air. In other words, if the glider is in rising air, the pilot reduces airspeed to spend more time taking advantage of the benefit; in sinking air, he increases airspeed to expedite passage through the condition.

The same principle can be applied when flying an airplane through convective turbulence. When penetrating updrafts, power pilots typically lower the nose to maintain altitude. The effect of this is to increase airspeed, which decreases time spent in the rising air. Instead, a pilot should consider taking advantage of updrafts by accepting altitude gains and reducing airspeed slightly to remain longer in those surges of lift. When in a downdraft, resist the urge to raise the nose to avoid losing altitude; this prolongs exposure to the sinking air. Instead, accept the altitude loss (and possibly increase airspeed) to escape more readily the deleterious effects. Obviously, this should not be attempted when flying IFR on an assigned altitude.

Sailplane pilots also learn that the speed to fly increases when gliding into a headwind and decreases when gliding under the influence of a tailwind. An airplane also glides farther by adjusting airspeed in a similar manner.

Single-engine pilots learn to maintain the best glide speed following an engine failure because this presumably results in maximizing glide range (ignoring the effect of wind). But this advice assumes that the pilot needs to maximize range. Usually he does not. This is because the selected landing site often is nearby, and extending glide range is unnecessary. This is when we can take another lesson from glider pilots. When soaring in thermals and attempting to gain (or maintain) altitude, they use the minimum sink speed, which is the indicated airspeed at which a glider or an airplane loses altitude most slowly.

A glider rating can develop and sharpen skills that significantly improve the way we fly other types of aircraft.

When a power pilot uses such an airspeed, it maximizes the time required to lose a given amount of altitude. This, in turn, affords more time to attempt an engine restart, formulate a plan of action, brief passengers, and so forth. For example, a Cessna 152 gliding at 60 KCAS would have an average sink rate of 685 fpm when descending from 10,000 feet to sea level and would take 14.6 minutes. But when airspeed is reduced to the minimum sink speed of 53 KCAS, the rate of descent is only 545 fpm. A glide from 10,000 feet would last 18.3 minutes. Glide endurance increases by 3.7 minutes, which can be of considerable value to a pilot in distress.

Unfortunately, the pilot's operating handbook for most airplanes does not provide the minimum sink speed. Typically, it is about one third of the way between the flaps-up stall speed and the maximum-range glide speed. But be careful to avoid steep turns. When nearing 1,000 feet agl during the descent, resume the normal glide speed to increase maneuverability and establish a safer margin above stall.

The wingspan of a typical sailplane is almost 50 feet (15 meters), with many stretching to 60 feet and beyond. When the ailerons are this far apart, they naturally create a substantial amount of adverse yaw effect. Consequently, those who fly gliders need to be more adroit with stick and rudder. Sloppiness or inattentiveness to the rudder is not tolerated. This is why a small piece of yarn, called a yaw string, is taped to the canopy immediately in front of the pilot. Any slipping or skidding becomes immediately obvious, and the student who fails to straighten out the string is certain to attract immediate admonition from his instructor.

Assume, for example, that the yaw string moves left during a left-turn entry. This indicates that insufficient rudder has been applied. The pilot is expected to apply more rudder or back off on the ailerons. Inattentiveness to inadvertent slipping and skidding is unacceptable in soaring circles.

Because glider pilots generally operate in relatively remote, uncontrolled airspace and do not have to deal with air traffic controllers, airspace restrictions, and other distractions common to powered flight, they spend more time mastering fundamentals. Power pilots have so much more to learn that stick-and-rudder coordination does not receive the attention it deserves.

During a normal turn in some sailplanes, the overbanking tendency caused by a large wingspan is more noticeable than when flying airplanes. As a result, top (opposite) aileron often must be applied to maintain a constant bank angle. Another by-product of the outer wing tip moving significantly faster than the inner wing tip is additional drag, which may require holding a tad of bottom rudder while turning a sailplane. Consequently, it often is necessary to cross the controls (top aileron and bottom rudder) to maintain a coordinated turn. No wonder sailplane pilots are so skillful at manipulating stick and rudder.

Sailplane pilots also develop an ability to visualize the movement of air. Some are so proficient at finding lift that it is said they have special sunglasses that enable them to see thermals, mechanically lifted (orographic) air, and mountain waves. (It must be true. How else can one explain Robert Harris's

flight to 49,000 feet in a Grob 102?)

The duration, range, and altitude of a sailplane flight obviously depend on how well a pilot learns to envision the motion of the atmosphere. Such skill and knowledge is directly transferable to powered flight.

A single thermal ordinarily is not of much value to those of us who fly airplanes. But cumulus clouds, which usually represent the uppermost limits of thermals, often form cloud streets, which are long parallel rows of clouds. Most of us opt for flight above the clouds, where the air is smoother. But if a pilot is in a hurry (or is racing the pilot flying above the clouds), he can follow the cloud street and take advantage of the thermals found beneath the scattered clouds. Instead of allowing the airplane to gain altitude, simply lower the nose and use the thermal energy to gain additional airspeed (within safe limits, of course).

F. W. (Bill) Woodley, chief game warden for Kenya's mountain national parks, used a Piper Super Cub to search for missing mountain climbers at the summit of Mt. Kenya. He had an intimate knowledge of the mountain and knew precisely where and when to expect thermal activity. This allowed him to operate routinely above the normal operating ceiling of his aircraft.

Most of us will probably never need to have such an intimate knowledge of local conditions. But some experience in locating and taking advantage of thermals and ridge lift can significantly improve performance when operating in mountainous terrain, especially at high density altitudes. Some soaring experience can go a long way toward helping a power pilot visualize how sun, wind, and topography combine to produce rising and descending currents of air. It is not difficult to learn how to find what sailplane pilots call green air. More important is knowing how to avoid sink.

Inattentiveness to inadvertent slipping and skidding is unacceptable in soaring circles.

Other soaring experiences that are of value to power pilots include:

- an aerotow, which offers limited experience in formation flying while maintaining position 100 feet or so behind the towplane (usually called a tug).
- ridge soaring, which teaches the procedures required to operate safely in proximity to mountainous terrain.
- sharing a thermal or a ridge with other sailplanes (and birds of the feathered variety), which requires extraordinary vigilance for close traffic. (When thermaling, it is not uncommon for sailplanes to operate within 100 feet of each other.)
- low-speed flight, which highlights the effects of drift, gusts, and wind shear. This makes the effects more observable and teaches the object lessons more indelibly.
- flying a glider obviously provides experience in power-off approaches and landings, which are invaluable experiences for every pilot accustomed to relying on the availability of power.

Although many reasons justify learning to fly a sailplane, this discussion has ignored what I consider to be the most compelling. Soaring is an infectious and aesthetic elixir; it is washing your wings in the wind and flirting with the breezy whims of Mother Nature. It is sliding on quiet wings over wind-swept ridges and inhaling a sense of freedom and exhilaration like none other. □