

Carve²

User manual

v1.0 October 2023



GIN

WARNING: Read this user manual before your first flight!

Like any extreme sport, powered paragliding involves unpredictable risks which may lead to injury or death. By choosing to fly, you assume the sole responsibility for those risks.

The safety advice and instructions contained in this manual must be followed in all circumstances. Failure to do so may invalidate the certification and/or result in loss of insurance cover.

Because it is impossible to anticipate every situation or condition that can occur while flying, this manual makes no representation about the safe use of the wing under all conditions. Neither Gin Gliders nor the seller of GIN equipment can guarantee, or be held responsible for, the safety of yourself or anyone else.

Gin Gliders reserves the right to alter or add to the contents of this manual at any time. You should therefore regularly visit our website:

www.gingliders.com

where you will find additional information relating to your powered paraglider and any changes to the manual. The date and version number of this manual are given on the front page.

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Thank you ...

... for choosing Gin Gliders. This user manual contains important information for the use and maintenance of your paraglider. Detailed knowledge of your glider and equipment will help you to fly safely and make the most of your flights.

The manual complies with the airworthiness standards and forms part of the certification. There are no special flying procedures and / or configurations apart from those detailed in this manual.

Your GIN paraglider has been designed to meet all safety and regulatory requirements. These requirements also include the need to familiarise yourself with this user manual and the information and instructions regarding safety, equipment and service prior to the initial commissioning. These operating instructions must be fully read and understood before the first flight.

If you have any further questions about these operating instructions, please contact your GIN dealer in the first instance, or Gin Gliders directly.

We wish you exciting flights and always a safe landing.

Your GIN team

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Gin Gliders

In forming Gin Gliders, designer and competition pilot Gin Seok Song had one simple dream: to make the best possible paragliding equipment that pilots all over the world would love to fly - whatever their ambitions.

At Gin Gliders, we bring together consultant aerodynamicists, world cup pilots, engineers and paragliding school instructors, all with one goal: creating better paragliders.

We're a "hands-on" company that puts continuous innovation and development at the centre of everything we do.

At our purpose-built R&D workshop at the head office in Korea, we are able to design, manufacture, test-fly and modify prototypes all in a matter of hours. Our international R&D team is on hand both in Korea and at locations worldwide. This guarantees that your equipment has been thoroughly tested to cope with the toughest flying conditions.

Our own production facilities in East Asia ensure the quality of the finished product and also the well-being of our production staff. Our facilities are independently certified to AS9100C (Aerospace standard) and also to ISO 9001:2008.

We believe that the product should speak for itself. Only by flying can the pilot understand the wing and develop trust and confidence in it. From this feeling comes safety, comfort, performance and fun. The grin when you land should say it all!

Gin Gliders website

Gin Gliders has a comprehensive website, which provides additional information about the Carve 2, any updates to the manual and many other issues related to powered paragliding.

www.gingliders.com

On the Gin Gliders website, you will find an extensive range of accessories for your powered paraglider and other useful products.

You will also find links there to other services and websites:

- Gin Gliders Shops
- Instagram, Twitter and YouTube

These websites and their content are provided for your use. The content of Gin Gliders websites has been made available for your use on an "as is" and "as available" basis. Gin Gliders reserves the right to alter the websites at any time or to block access to them.

Gin Gliders and the environment

Protection of the environment, safety and quality are the three basic values of Gin Gliders and these have implications on everything we do. We also believe that our customers share our environmental awareness.

Respect for nature and the environment

You can easily play a part in protecting the environment by practicing our sport in such a way that there is no damage to nature and the areas in which we fly. Keep to marked trails, take your rubbish

away with you, refrain from making unnecessary noise and respect the sensitive biological equilibrium of nature. Consideration for nature is required even at the launch site!

Paragliding is, of course, an outdoor sport – protect and preserve our planet’s resources.

Environmentally-friendly recycling

Gin Gliders gives consideration to the entire lifecycle of its paragliders, the last stage of which is recycling in an environmentally-friendly manner. The synthetic materials used in a paraglider must be disposed of properly. If you are not able to arrange appropriate disposal, Gin Gliders will be happy to recycle the paraglider for you. Send the glider with a short note to this effect to the address given in the appendix.

Safety

Safety advice

Paragliding demands a high level of individual responsibility. Prudence and risk-awareness are basic requirements for the safe practice of the sport, for the very reason that it is so easy to learn and practically anyone can do so. Carelessness and overestimating one's own abilities can quickly lead to critical situations. A reliable assessment of conditions for flying is particularly important. Paragliders are not designed to be flown in turbulent weather. Most serious accidents with paragliders are caused by pilots misjudging the weather for flying.

Paragliders are subject to specific guidelines for air sports equipment in each country. They must not under any circumstances be flown without a valid certification. It's your responsibility to know and observe the regulations of the region where you fly. Independent experimentation is strictly prohibited. This manual does not replace the need to attend training at a paragliding school.

The manual must be passed on to any new owner if the paraglider is sold. It is part of the certification and belongs with the paraglider.

Observe the other specific safety advice in the various sections of this manual.

Safety notices

Safety notices are issued when defects arise during use of a paraglider which could possibly also affect other gliders of the same model. The notices contain instructions on how the affected gliders can be inspected for possible faults and the steps required to rectify them.

Gin Gliders publishes on its website any technical safety notices which are issued in respect of GIN products. The paraglider owner is responsible for carrying out the action required by the safety notice.

Liability, warranty exclusion and operating limitations

Use of the paraglider is at the pilot's own risk!

The manufacturer cannot be held liable for any personal injury or material damage which arises in connection with Gin Gliders paragliders.

Pilots are responsible for their own safety and must ensure that the airworthiness of the glider is checked prior to every flight. The pilot should launch only if the paraglider is airworthy and must observe the relevant regulations in each country.

Liability and warranty exclusion

In terms of the warranty and guarantee conditions, the paraglider may not be flown if any of the following situations exists:

- changes of any kind (incl. paraglider design or changes to the brake lines beyond the permissible tolerance levels)
- incorrect repairs to the glider
- the inspection period has expired, or the inspection has been carried out by the pilot him/herself or by an unauthorized inspector
- the pilot has incorrect or inadequate equipment (reserve, protection, helmet etc)
- the pilot has insufficient experience or training

Operating limitations

The paraglider must be operated only within the operating limits. These are exceeded, if one or more of the following points are complied:

- the take-off weight is not within the permissible weight range
- the glider is flown in rain or drizzle, cloud, fog and / or snow
- the canopy is wet
- there are turbulent weather conditions or wind speeds on launch higher than 2/3 of the maximum flyable airspeed of the glider (varies according to the total take-off weight)
- air temperature above 50°C and extremely low temperatures, which can lead, in combination with moisture, to icing
- aerobatics
- modifications to the canopy, lines or risers which have not been approved

Before the first flight

Trike

For motorized flight, the engine, harness, rescue equipment and supporting structure have to be checked individually for their compatibility. The compatibility of the engine with the other components must be checked and confirmed if necessary. If you have any further questions, please contact the supplier of your engine.

Check that all connecting components used (maillons, carabiners, quick-outs, etc.) are suitable, and certified to carry the maximum load. Continue to follow the instructions of the trike manufacturer regarding the connection of trike and glider.

Harnesses

If you fly the Carve 2 with a backpack motor and harness, pay attention to the following:

It's important for your comfort and safety to fly with a suitable harness that is properly adjusted. When choosing a harness, remember that the height of the attachment points (i.e. distance from the carabiners to the seat plate) affects the sensitivity of the glider and the relative brake travel. The lower (shorter) the attachment points, the more sensitive the glider is to weight-shift.

Special attention should be paid to the angle of the paramotor relative to the horizon. Consult with the manufacturer of the paramotor and your instructor to determine the ideal angle while paying attention to the changing angle with varying amounts of fuel. Too far reclined and twisting can result. Too far forward and the cage and propeller are at risk of ingesting brake toggles and trim tab ends. Furthermore drastic pilot movements fore and aft can contribute to this dangerous condition.

The adjustment of the harness chest strap controls the distance between carabiners and affects the handling and stability of the glider. Excessive tightening of the chest strap increases stability but also the risk of riser twists following glider collapses. It also increases the likelihood of getting collapses due to poor feedback from the glider. The risk of twisting is also strongly influenced by the seating position of the pilot. Flying in a laid back (reclined) position makes it much more difficult to react in time to prevent riser twisting. With the chest strap in a more closed position the glider also has more tendency to maintain a stable spiral. With the chest strap in a more open position, feedback from the glider is increased but stability is decreased.

GIN gliders are developed with GIN harnesses, which have an attachment point of approximately 40-48 cm (depending on size and model). EN/LTF test flights are carried out with the horizontal

distance between the harness attachment points (measured between connector centrelines) set depending on the total weight in flight as follows:

Total weight in flight	< 80 kg	80 to 100 kg	> 100 kg
Width	40 ± 2 cm	44 ± 2 cm	48 ± 2 cm

We recommend initially adjusting the distance of the chest strap according to the table. Then if necessary, make slight adjustments. In general, the carabiner distance should not be set too narrow!

For flight comfort and safety it is very important that you fly with a suitable, properly adjusted harness.



NOTE: Don't adjust your leg and shoulder straps too tightly. If you do, you may have difficulty sitting back into your harness after take-off.

Reserve

It is a mandatory requirement to carry an approved reserve for use in emergency situations where the paraglider fails and recovery is not possible, for example after colliding with another aerial sports craft.

In choosing a reserve, you should be careful that you remain within the specified take-off weight. The reserve is fitted according to the manufacturer's instructions.

The DGAC also requires that before the reserve installation, the pilot or person installing the rescue system is obliged to ensure that the conditions in this document are met: "Additional technical conditions for ULM with rescue device." This document is available on the following website: www.ecologique-solidaire.gouv.fr/sites/default/files/Conditions_techniques_parachute_secours.pdf

Weight range

Be sure to fly your glider within the weight range given in the Technical Specification section.

If you fly at a high wing-loading be aware that the glider shows dynamic flight behavior with fast reactions. Considerable pilot skill is required. The dynamics are reduced somewhat in the middle and lower part of the weight range.



Note: Check your takeoff weight by placing yourself (and, if applicable, your passenger) on a scale with the complete equipment. Add the full weight of the trike including fuel, equipment and rescue system.

Remember that ballast can also be used to adjust wing loading to the conditions.

First flight

Your instructor, dealer or a specialist must test-fly and inspect the paraglider before your first flight. The test-flight must be recorded on the paraglider information label.

Carry out your first flights only during stable weather, and in a familiar area or on a training slope. You should steer gently and carefully to begin with so that you can become accustomed to the reactions of the glider without stress.

Flying the Carve 2

Gin Gliders cannot ensure that the flight behavior described in this chapter is accurate to all engines used with the Carve 2. The compatibility of a new combination must therefore be confirmed by a test flight by an accredited compatibility test pilot. Compatibility flights can be requested by the manufacturer of the engine or in the form of a single sample test by the pilot himself at a testing house.

Preparation for launch

Follow a consistent routine every time you fly. This is very important for safety. We recommend the following procedure:

General warnings and advice

Before flying, check the following:

- Are you in good physical and mental condition?
- Are you familiar and compliant with all applicable laws and regulations in your area?
- Are you within the weight range?
- Do you have the necessary insurance coverage?
- Are you briefed thoroughly about the site, airspace and expected weather conditions of the day?
- Is your equipment and choice of site suitable for your level of experience?
- Do you have a suitable helmet, gloves, boots, eyewear and adequate clothing?
- Are you carrying some form of identification, in case of an accident? Take along a radio and mobile phone if possible.
- Do you fully understand how to safely fly your new wing? If not, have your instructor or dealer explain anything you are not sure about.

Material check

Check the following condition of your paraglider and other flying equipment before every flight:

- Is the glider fabric free from tears or other damage?
- Are the lines free from knots, tangles or other damage?
- Are the brake lines freely and firmly connected to the handle?
- Is the brake line length correctly adjusted?
- Are the maillons connecting the lines and risers closed and secured?
- Is the glider dry?
- Are the risers and carabiners in good condition?
- Is your harness in good condition?
- Is your rescue handle secure and rescue pin in?

Pre-flight check

A careful pre-flight check is required for any type of aircraft. Make sure that you exercise the same level of care each time carry out the check.

- Once you have arrived at the take-off, you should first take a look at the conditions: observe wind speed and wind direction, airspace, turbulence and thermal cycles.
- Check your engine, paraglider, harness, rescue handle and pin, helmet and other equipment.
- Carry out the preflight control check of the engine.
- Choose a wide starting place, as uniform as possible and free from obstacles.
- Put on your harness and be sure to close the leg straps! Check that your helmet is on and fastened.
- Place the paraglider in a curved shape and sort the lines.
- Connect the riser to the paramotor trike carabiners. Make sure that the carabiners are closed and that nothing is twisted.
- Check one last time that there are no knots in the lines, nothing is twisted and that the lines are not caught in vegetation or rocks. You must be particularly attentive in lighter winds.



WARNING: If there are obvious creases in the glider as a result of tight packing or long term storage, carry out some practice inflations before your first launch and smooth out the trailing edge a little. This ensures that the flow profile is correct during launch. This is particularly important in low temperatures.

Start check

The start check is carried out immediately before launch to check the most important safety points once again. It should always be carried out in the same sequence so that nothing is overlooked. The points are:

1. Is your personal equipment in order (engine, harness, carabiners, reserve, helmet) and are all straps done up?
2. Is the canopy arranged in a half-moon shape and are all the air intakes open?
3. Are all the lines untangled and are any lines under the canopy?
4. Are the trimmer positions correct and symmetrical?
5. Is the brake toggle properly oriented with the tip steering line toward the outside (ref: 2D toggle)?
6. Does the weather, in particular wind direction and strength, allow a safe flight?
7. Is the propeller clear?
8. Does the engine deliver full power?
9. Are the airspace and launch area clear?

Launching

The Carve 2 has smooth and progressive inflation characteristics with no tendency to hang back or shoot forwards.

Trike take-off

If possible, start facing into the wind. The maximum lateral wind component at the start is 8 km/h. Place the glider behind the trike into the wind. Most trikes have a holder on the propeller cage, in which the lines are inserted. Check all the lines (parallel and without knots) and then get in the trike, buckle in and tighten the straps.

Check the wind direction and the glider position before starting. Then take both brake lines in your hands and start the engine. For the start, release the brakes as the engine speed is brought to the pulling performance. Carry out any directional corrections with your feet.

As soon as the glider is lifted, control it via the brake lines so that it rises as cleanly as possible and stays centered above the trike. Any overshoot may be prevented by slight braking. After stabilizing, the canopy position must be checked again. If necessary, steer under the glider to keep the canopy centered.

If the glider is stable above the trike, increase the motor thrust. This will quickly lift the trike.

Launching with backpack engine

Avoid lateral rotations with the upper body during the inflation, as otherwise the lines may fall into the propeller. If the glider does not rise in the middle, you should use the risers instead of the brakes to compensate. This prevents the wing falling down on one side. During the take-off run, it is important to stay under the glider and continue in the pre-determined take-off direction. If both risers have a steady tension and the glider is above the pilot, the take-off may be continued. Check that the canopy is completely inflated and that no lines are twisted or tangled. Do not stop and do not twist the upper body. If the wing drifts sideways/out of equilibrium or falls back, stop the engine and abort the take-off.

After confirming the glider above head, the take-off thrust may be utilized. A slightly reclined position supports the take-off as the full engine power is used. Release the risers, make positive contact with the brakes and accelerate until the Carve 2 is airborne.

When you launch forwards, keep the following points in mind:

- If the cage of the engine is not stable enough, the risers can deform the cage and push the propeller while it is being pulled. Pay attention to it before you fly with maximum power
- Apply the brake evenly and moderately during the take-off
- Do not start before the wing is over your head. Applying the throttle too soon can cause dangerous pendulum movements
- Wait to recline into your harness and stop running until you are a few meters in the air

Reverse launch

The Carve 2 is suitable for reverse launching from light to strong wind speeds. You can hook in the glider as for a forward launch, or as your training dictates for reverse inflation.

As with the forward launch, the correct combination of braking and engine power is important to achieve the best speed and the best climb. The right technique of hooking the riser in, pulling up the glider and turning is very important for reverse launching. This must be practiced by the pilot before executing it with the engine running.

Additional tips for take-off

- In stronger winds, be prepared to take a couple of steps towards the canopy as it inflates and rises.
- Launch the wing by lifting the A-risers upwards in an arc, avoid pulling towards you.
- Practice ground-handling regularly to improve your take-off skills!
- The pilot must work actively to keep the glider on the ground in higher winds (wind speeds from approximately 6 m/s), otherwise the glider may rise above the pilot unintentionally.



Note: During reverse inflation and ground handling, care should be taken that the brake lines do not rub over the riser. This may cause damage to the riser or brake lines.

Knots or loops in the lines

If you have taken off with a knot in the lines, you should wait until you have enough height and distance from other pilots before you attempt to loosen the knot. Control your heading with weight-shift and gently brake the opposite side before attempting to open the knotted side by pulling on the brake line. Make sure you don't fly too slowly and stall or spin the paraglider. If the knot does not open, land safely as soon as possible.

The initial climb-out

After a successful launch, continue into wind using the brakes to regulate the rate of climb. Do not try to climb too steeply. A powered paraglider behaves more like an airplane than a paraglider. If there are no obstacles, it is much safer (and more impressive for the spectators as well) to fly level for a while after take-off and pick up speed before converting speed to height with a brief application of the brakes.

An additional reason not to climb too fast is related to the risk of low-level engine failure. Although the Carve 2 does not hang back during a steep climb as much as some other wings, a stall is still more likely at low speed and high pitch angles. In addition, you should always be in a good position to land in case of engine trouble. Don't take unnecessary risks and fly with a wide margin of error.

Depending on the characteristics of your engine, once in the air you may be faced with a torque effect. This may cause the wing to turn, so be prepared to counteract this effect with suitable braking, and weight shift on the opposite of the turn, it will help you counter the torque effect without having too much drag. If such a situation occurs during the climb-out with "slow" trims and maximum power, be pay attention to the risk of stalling. Safe operations and management of your engine depend on your knowledge and equipment.

Engine-induced oscillations

Certain configurations of weight, propeller diameter, engine power and hang point positions on your engine frame may cause serious oscillations. The pilot is steered to one side by the torque effect, swings down due to his weight and then swings back the other way again and so on. To counter this effect:

- change the throttle setting
- counteract the pendulum movement with a slight brake input
- weight shift to the side opposite the engine torque
- adjust the trimmers to dampen the oscillation
- when a suitable altitude is attained, allow the glider to turn in the direction of the torque

These oscillations typically occur at full power. The greater the engine power and propeller diameter, the greater will be the oscillations. In addition, late or inappropriate pilot reactions may worsen the problem instead of solving it. Most inexperienced pilots tend to overreact, leading to "pilot-induced" oscillations. In the majority of cases the best way to handle this is to release the throttle and release the brakes.

In-flight characteristics

Cruising flight

Once you have reached a satisfactory altitude after take-off, you can turn in your chosen direction and adjust the trimmers as appropriate. If conditions are strong, you will need to fly actively.

For each paramotor, you must make an adjustment of the length of your brakes to prevent them interfering with the propellers when you do release in flight.

Naturally, the safety and success of each flight will depend on your piloting set-up, and thanks to the Carve 2's you should be able to fly comfortably.

Normal flight

“Trim speed” (brakes fully released) is the best glide speed in still air. Fly actively and steer appropriately for the particular flight and to achieve your desired flight plan.

Minimum sink speed on the Carve 2 is achieved by light braking. In a normal flying position (knees parallel to the ground and your body slightly reclined), your hands position will be determined by the specific motor being used and pilots are cautioned to do practice inflations or kiting in order to calibrate on the hand position for all of the phases of flight. It will take a few flights to learn where the useful brake range is. Try to make this calibration in calm air before flying in active air.

An extremely low hand position can result in a stall. Notice the changing wind noise and brake pressure as a caution to not fly too deep in the brakes.



WARNING: Flying too slowly close to stall speed increases the risk of an unintentional full stall. This speed range should therefore be avoided and used only on landing during the final stage of the flare.

Insufficient braking in active air or turbulence can result in deflation though very uncommon.

Accelerated flight

Once you have become accustomed to flying the Carve 2, you can practice using the speed system and trimmer, which allows improved glide in headwinds and greater penetration in strong winds. During your first few flights, familiarize yourself with your glider's speed range and corresponding brake positions and pressures.

The Carve 2 reflex design shows some unique features - it has a remarkably wide and relatively safe speed range. On the slower settings, sink rate improves and brake pressures are light. This enables you to make the best use of thermal cores. You will also have improved climb rate and shorter, slower take-offs and landings.

On faster trim or speed bar settings, brake pressures generally increase and weight-shift or outer wing tip steering becomes safer and more effective. With the trimmers fully off, the wing's speed and stability allow it to cut through turbulence and cover distance.

Trimmer and speed bar settings are additional points to include in your pre-flight checklist. If the setting is not symmetrical, the paraglider will turn in flight. If your trimmer is set on fast for takeoff the reflex profile of the Carve 2 will not support efficient climbing.

It is important to remember to release any wraps on the brakes when using the speed system. The brake length on the Carve 2 has been finely tuned to avoid any deflection on the trailing edge.

through the brake during accelerated flight. Applying brake while using the speed system degrades performance and increases the chance of collapse.

When flying accelerated the glider reacts much faster to a collapse. Also recoveries can be delayed during accelerated flight compared to flying at trim speed.

Apply the speed system by opening the trimmer buckles simultaneously and symmetrical. Avoid flying accelerated near the ground, and be careful using the accelerator in turbulence. If you do encounter a collapse while using the accelerator, the release and also immediately close the trimmer completely before taking any other corrective actions.



WARNING: A deep symmetrical braking with the main brake while using the speed system creates an unstable profile and there is an increased danger of a front stall or other malfunctions.

Turning

The Carve 2 performs best in turns when it is flown with sufficient speed and weight-shifting. Enter a turn with good airspeed, weight-shift and then apply the brake. Once established in the turn, regulate your speed and turn radius with weight-shift and the outer brake. Too much braking increases the sink rate.

Make your first turns gradual and progressive. Also remember that your harness and its set-up has an influence on the turning behavior of the wing. The Carve 2 is not prone to inadvertent spin but pilots should use caution when trying to turn too tightly and especially when turning against the torque of the motor so that they don't induce a spin.

Use caution as sustained brake input will cause the bank attitude to progressively increase and cab eventually become a spiral dive (further information on this is in the section "Spiral Dive").

Over significant flying hours pilots will learn to combine elements of trimmer adjustment, weight shift progressive brake application (inside and outside brake) and throttle setting to make a variety of different types of turns and combinations. This is the joy of flying the Carve 2.

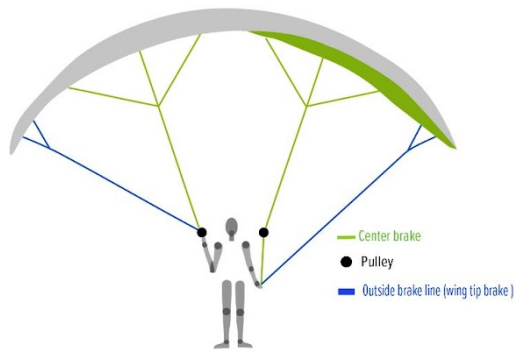


NOTE: In general, when flown with the higher hang-point motor units, paragliders have more of a tendency to dive when entering turns. This may also result in higher 'G' forces in tight turns and a big pendulum effect when exiting maneuvers. Note that while weight shift is usually less effective with high hang-points, extra pendulum and lateral stability is usually gained. Don't pull too hard when trying to make a turn avoid over turning or causing a spin. Use caution when changing from one motor to the next in combination with the Carve 2.

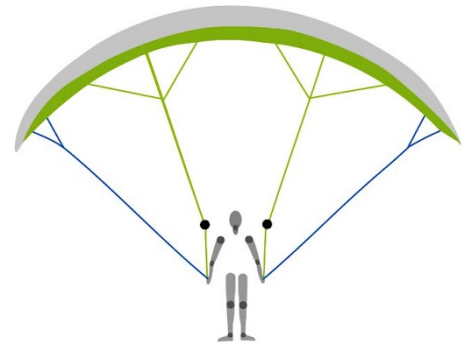
2D brake system

The 2D brake system has divided main brake lines and offers precise control of the canopy, which requires some training to get used to the different reflexes and reactions. Therefore it's recommended to spend some time exploring the system and perfecting the steering technique before flying in a demanding environment.

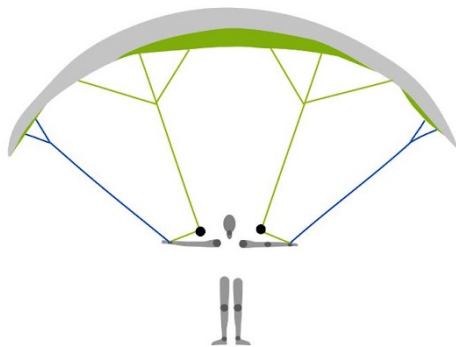
The following figures show the basic modes of steering with the 2D system. The demonstrated examples are far from comprehensive – there are a lot of transitional configurations, especially as you can fly them with different accelerated configurations of the glider as well as engine thrust. The most appropriate configuration for any given situation must be chosen by the pilot.



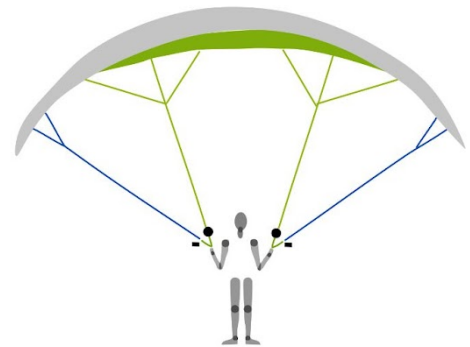
1. Conventional turn:
Pull down vertically on one brake handle



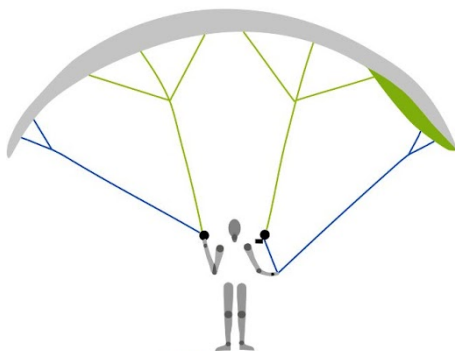
2. Conventional slow down:
Pull down vertically on both brake handles



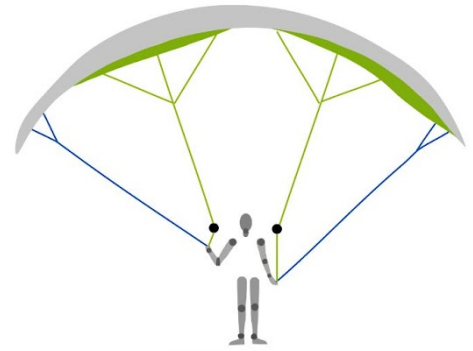
3. Strong slow-down:
Pull both brake handles sidewise



4. Extreme slow-down:
Pull down centre brake line



5. Tight turn:
Pull down outside brake line



6. Deep turn
Pull down brake handle of inner curve and
brake handle of outside curve a little aside

Figure: Basic modes of steering with 2D system

Steering with different speed configurations and settings

The following speed configurations and steerings can be defined, according to trimmer settings and speed-system operation:

Slow (trimmers closed)

Traditionally, steering is done with a flat hand actuating both main brake and tip steering lines. Pilots may pull 1) straight down 2) outward away from your body 3) inward toward. This enables the pilot to achieve the desired bank angle.

1. Straight down along your body - normal turn
2. Outward/away from your body - flatter turn
3. Inward toward the body - more dive



NOTE: Pilots may twist the hand (thumb up) to increase the diving effect in a turn but this is normally done with the trimmer set faster

Accelerated (trimmers open)

Steering as described above, brake pressure is higher, usually a flat hand. Twisting the toggle (thumb up) is a useful technique in this case. Small heading corrections are very easy using this technique.



NOTE: the trimmer is far from an on/off switch - pilots should modulate the trimmer as appropriate for the situation while managing safety, performance and turning. Slow trim should be used in turbulent conditions.

Full speed (trimmers open and speed system activated)

Especially recreational pilots are cautioned against using excessive amounts of speed bar and trimmer together. As always pilots should budget their use of both trim and speed as appropriate for their level of comfort with the increased speed and risk. Steering should be done using the hand twist method (thumb up) when the Carve 2 is accelerated. Remember to release the speed bar and return to slow trim in the event of turbulence or a malfunction.

Active flying

Active flying will prevent collapses in all but the most turbulent conditions.

Keep tension on the brakes approximately equal to the weight of your arms. This allows you to stay relaxed and sensitively feel the internal pressure in the wing through the brakes. If you feel a loss of pressure in one or both sides of the wing, quickly apply the appropriate brake(s) to regain pressure. Release the brake promptly as soon as normal pressure is resumed.

If you miss the above timing and get a collapse, be sure to first raise your hands and release the brakes before considering any other corrective actions.

The Carve 2 has excellent pitch stability. Nonetheless, in turbulence or during maneuvers, the glider may pitch. If the glider pitches in front of you, apply brake to slow it down. If the glider drops behind you, ease off the brakes to allow it to speed up. The objective is to reduce the pendulum effect by adjusting the speed of your glider so that the glider and pilot are traveling at the same speed.

The same general principles also apply when utilizing the speed bar.

Summary: "Active flying"

- The pilot sits upright in his harness, his view goes in the direction of the flight.
- He constantly responds to increasing and decreasing brake pressures with the aim of maintaining a constant pressure on the brake lines.
- The further in front of you the glider pitches, the larger the brake input required, but for a shorter duration.
- When brake pressures decrease, brake firmly; when brake pressures increase, ease off the brakes.



WARNING: Never release the brakes when the glider is behind you but accelerating forwards.

Rapid descent techniques

Many flying situations call for a very rapid descent to avoid a dangerous situation, e.g. the up current from a cumulus cloud, an approaching cold front or a storm front.

Rapid descent methods should all be practiced in calm conditions and at sufficient altitude so that a pilot is then able to employ them effectively if extreme conditions arise. Rapid descent techniques are divided into three different maneuvers which increase the sink rate in a safe and controllable manner.

Spiral dives attain higher rates of descent, but the g-forces can be significant and the maneuver is more technically demanding. Always try to avoid the need to use these descent techniques. Consider doing low intensity 360's in areas of sink air to descend in a comfortable way. Thoroughly check the conditions before launch, and pay close attention to how the day develops.

Neither B-Stall nor Big ears are endorsed as being appropriate techniques for descending with the Carve 2 and should not be attempted.

Many aggressive descent options will also strain your paraglider and should be avoided if you want to preserve your paraglider. We recommend that you only practice the rapid descent techniques under professional guidance during a safety training course.

Spiral dives

The spiral dive is the most effective, but also the most demanding, method for making a rapid descent, and can allow sink rates of up to 20 m/s to be reached. Learning to make spirals or any type of aggressive turn should be done with the guidance of a professional. Don't execute aggressive spirals without this essential training.

The Carve 2 fulfills the EN spiral dive requirements and has no tendency to remain in a stable spiral dive under normal conditions. Still, the certification test flights are carried out with a defined carabiner distance (see chapter "Harness"). Deviations from this setting including but not limited to, unapproved harnesses or spirals with excessive sink can change the maneuver considerably; pilot action may be required. In such cases, exit the spiral by weight-shifting to the outside and progressively applying the outside brake.

Before entering a spiral, make sure you have adequate height for recovery. To enter the spiral dive, weight-shift and progressively apply the inside brake until the glider enters the spiral. As the glider accelerates into the spiral, center your weight and control your rate of descent with weight-shift and outer brake.

To exit the spiral, check your weight is centered (or slightly towards the outside) and progressively release the inside brake. As the glider starts to exit the spiral, you may also choose to reduce the pendulum moment by briefly re-applying the inside brake.



WARNING: In the spiral dive, very high turn speeds can be reached with an increase in acceleration due to gravity (up to over 6g), so exercise care when attempting this maneuver.

Take note of the following:

- **The high g-forces experienced in steep or prolonged spirals may result in disorientation or even loss of consciousness.**
- **Always maintain ground clearance of 150 – 200m. The maneuver must be exited at this height above ground.**
- **Do not attempt to enter a spiral dive while in big ears. This places excessive forces on the paraglider and may result in structural failure.**
- **Spirals with open trimmers cause extreme high G-forces and may require an active recovery by the pilot.**
- **Frequent steep spirals may cause premature aging of your wing.**
- **Spirals with descent rates above 10 m/s are not recommended.**

You must immediately deploy your reserve if you lose control of the glider and the sink rate and find yourself in a stable spiral. The high g-forces in the spiral may rapidly lead to a loss of consciousness which prevent later deployment of your reserve.

Landing

Select an appropriate trim setting using a slower setting if you are less experienced. As you become more experienced and proficient then faster trim settings can be used but full fast landing is not recommended.

Before landing, you should slip out of the seat board of the harness and assume an upright position. Never land without being upright and ready to land ; seated landings are dangerous and can lead to injuries.

It is generally recommended to kill the engine before touchdown to avoid unnecessary risk.

Land on a large and obstacle-free landing site. Fly a straight final approach at trim speed into the wind. About one meter above the ground, pull a little brake smoothly to arrest the dive which should change your trajectory so that it is parallel to the ground. Immediately before touching the ground, both brakes should be pulled completely.

The weaker the headwind, the more energetic and deeper the final braking must be. In the case of stronger headwinds, the final braking must not be too abrupt. In very strong winds, the brakes are not pulled down completely to avoid the glider climbing rapidly upwards and backwards. Instead, turn to face your wing as soon as your feet touch the ground without pulling the brake. Pilots should practice disabling the glider with the rear risers. Be prepared to run towards your wing.



NOTE: The Carve 2 has good basic speed, good glide and excellent energy retention. Give yourself enough space and bleed off speed gradually before flaring.



WARNING: Although the Carve 2 is remarkably maneuverable even in the lower half of the brake range, do not be tempted to make an excessively slow landing approach. This will

compromise the energy which is needed to execute a proper flare to landing. If the pilot is too deep in the brakes for too long, it may stall.

Never let the leading edge crash to the ground, you risk damaging the seams and/or internal structure. Ground handling (especially on rough surfaces) will accelerate the aging process of your wing.

For landings, regardless of whether they are carried out with or without engine power, observe the following points:

- The Carve 2 reacts better with turbulence with neutral or slower trimmers
- Take a closer look at the landing/airfield before you take-off
- Before landing, check the wind direction and speed
- Practice landings as often as possible to become familiar with the Carve 2
- In the case of strong headwinds, apply the brake gently. After landing, turn in the direction of the glider if there is a danger of being pulled backward from the glider and falling
- Steep turns and rapid changes of direction must be avoided before landing due to the oscillating movements associated with them.

Power off landings

Power off landings reduce the chances of damaging the propeller on landing, but on the other hand there is only one possible attempt - so the landing must be done correctly!

For a power off landing, turn off the engine at a height of 30 to 50 meters. The lack of motor thrust reduces the angle of attack of the Carve 2 and the glider speed picks up noticeably. The sink rate also increases, so that the landing approach starts very quickly and with increased sink rate. Towards the lower end of the brake range, the Carve 2 then starts to retain the energy and the flare timing should be clear.

If you are attempting precision landings or landing in nil wind, it is recommended to use the trimmers to half or completely closed (maximum lift). The quality of your landings will be better. This choice is even more crucial at a high wing loading.

Additional information

The following points should be noted when flying with the Carve 2:

- Don't allow your Carve 2 to make contact with a hot motor or any gas/ oil
- Check whether you are carrying enough fuel for the planned flight
- Inspect equipment and harness for loose parts that might fall into the propeller
- Before each flight, carefully follow the individual points of the pre-flight check
- Immediately after landing, turn off the engine to avoid damage to the leash and propeller.
- Avoid flights over water and power lines, do not fly between trees and generally avoid areas where a motor failure does not offer a landing option
- If you recognize a change of the engine noise or increased vibration, you should land immediately to fix the problem
- Keep in mind that engines interfere with noise. Therefore avoid low altitudes over towns

Dangerous configurations and extreme flying



WARNING: Your Falcon2 was not tested for extreme flight maneuvers with full throttle. Any attempt to maneuver while utilizing the throttle is dangerous, potentially life threatening and should be avoided. The following chapter describes standard paragliding test maneuvers without engine, and how to avoid and correct such extreme situations.

The Carve 2 was not tested for the following maneuvers. As such, these maneuvers should be strictly avoided.

- **asymmetric collapse with open/fast trimmers**
- **asymmetric collapse with open/fast trimmers and speed bar**
- **front stall with open/fast trimmers**
- **front stall with open/fast trimmers and speed bar**

Dangerous situations

Many factors can lead a pilot to a position where very precise inputs will be needed to return to normal flight. These factors include but are not limited to pilot error, incorrect use of trim/ speed/ controlled flight into an object, over aggressive turning, and flight into excessively high wind and flight into turbulent conditions/ turbulence.

The best way to learn how to react calmly and correctly in a serious situation is to attend safety training, where you will learn how to manage extreme situations under the guidance of a professional.

Ground-handling is another safe and effective method of familiarizing yourself with your glider's reactions. Inflation and sustained kiting can provide valuable insight as to how the Carve 2 will fly. Pilots can also become familiar with the gliders stall/spin point and the anticipated behavior in an asymmetric or frontal deflation.

Any pilot who flies in turbulent conditions or who makes an error in the way that they pilot the glider is at risk of ending up in an extreme situation. All extreme maneuvers and flight attitudes described here are dangerous if they are encountered without adequate knowledge, or without training. Cultivating a healthy flying attitude and mindset is the only prevention.

Always keep within the recommended limits. Avoid aerobatics and extreme loading such as spirals and big ears. This will prevent accidents and avoid overloading the glider.

In turbulent conditions, always keep sufficient altitude from terrain and other obstacles. Recoveries from extreme situations requires able altitude and time.



WARNING: Deploy your reserve if the corrective maneuvers described in the following sections do not return the glider to a controllable flying position or if there is not enough altitude for correction.

SIV / Safety training

Due to the nature of certain paraglider designs, collapses incorrectly induced by the pilot may have more significant consequences than collapses which may occur in the course of normal flight (due to turbulence etc.).

Taking part in safety training is generally advisable in order to familiarize yourself with your glider and the correct reactions in extreme situations. However, the coach and pilot should be familiar with

the nature of reflex technology and its behavior in the safety training environment before the training begins.

Material stress

During a safety training course, avoid subjecting the materials of your paraglider to excessive stress. Some dynamic recoveries and decent maneuvers produce g forces which are outside the design/manufacture limits of the paraglider. This may cause premature aging, or even structural failure.

Stretching of the lines and/or canopy material as a result of safety training can lead to a general deterioration in flight characteristics.

Damage as a result of safety training is not covered by the warranty.



WARNING: Be sure to perform any simulated collapses correctly. In particular, full speed asymmetric collapses performed incorrectly may result in unpredictable collapse behavior and impulsive re-opening. This behavior may require considerable pilot skill to manage safely.

Canopy Collapses

Asymmetric collapses

Use active flying techniques and correct trimmer and speed system management to virtually eliminate collapses in normal flying conditions. Nevertheless, if you do get a collapse, stabilize your weight in your harness and do not allow yourself to fall to the collapsed side. Control your course with weight-shift and a little brake on the open side. The deflation should re-inflate spontaneously.

If the deflation does not re-inflate spontaneously, apply brake on the closed side in a smooth, progressive pumping action. Be sure not to apply too much brake for too long as this might induce a spin (one hand too deep) or stall (both hands too deep). Remember that a partly collapsed wing has a reduced surface area and thus a higher stall speed.

If you get a collapse while in accelerated flight, close the trimmers immediately. If on speed bar then release immediately. Then apply the normal procedure for unaccelerated asymmetric collapses.

Educational point: Asymmetric collapses are caused by the stagnation point moving to the trailing edge of the glider. A negative angle of attack makes part of the canopy collapse and tuck under, and the glider may plunge down, turn away or spin.



WARNING: After a large collapse, an instinctive reaction to the body falling is to attempt to brace which can result in the pilot unintentionally applying too much brake. On the other hand, grabbing the riser can keep you from steering the glider as needed. Keep the hands in the normal range, look at the glider and give it the appropriate input.

Cravat / glider wrapped around lines

A cravat occurs when a wing tip becomes stuck between the glider lines, for example, following a bad take-off preparation. In extremely rare cases it can also occur in flight. On the Carve 2, a cravat is unlikely to occur. If you do get a cravat, first control your direction. Do this by using weight-shift and enough counter-brake to stop the turn, but not too much to risk a stall of the opposite side.

A cravat can generally be opened by a short, fast pull on the brake line of the cravatted side. If not, on the Carve 2, there is a separate stabilo main line that goes down to the riser. This line usually

becomes slack in the event of a cravat. Pull this line down completely until it becomes tight and the cravat normally comes out.

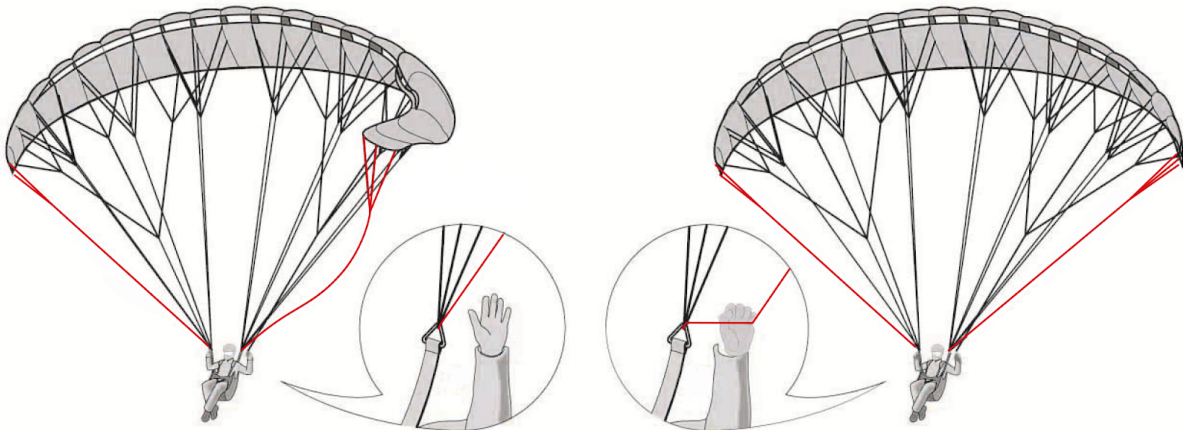


Figure: Grabbing the stablo main line



WARNING: Counter-steering too strongly on the inflated side of the glider can result in a stall and to further uncontrolled flight maneuvers (cascade of events).

Always remain aware of other aircraft and terrain when dealing with a problem on your wing. Do not hesitate to throw your reserve parachute if the rotation in a cravat is increasing uncontrollably, especially if you are at low altitude.

Full Frontal | Symmetric collapses (Front stall)

A negative angle of attack can also cause part or all of the leading edge of the glider to collapse.

Symmetric (frontal) collapses will normally re-open without pilot input. The paraglider will pitch forward and then regain speed. Assist this process if necessary with a symmetric application of the brakes. Take care not to apply too much brake for too long as this may stall the wing.

In the case of extreme frontal across the entire wing chord, the wing tips may move forward making the glider form a U-shape (front horseshoe). Again, recovery is by light symmetrical braking on both sides. Make sure that both wingtips return to normal flight evenly.



WARNING: If you get a collapse while in accelerated flight, close the trimmer and/or release the speed bar immediately. Then apply the normal procedure for unaccelerated asymmetric collapses.

Types of stall

Educational Point: When a paraglider flies through the air, a laminar and turbulent boundary layer is created. Extremely dangerous flight configurations can result if the laminar boundary layer is interrupted, with practically the entire airflow along the top surface breaking away. This happens in particular when the angle of attack is too great.



WARNING: Full stall and spin are maneuvers which can be fatal if recovery is not correct. These maneuvers should therefore be avoided. However, it is important to learn how to

recognise the indications that a glider is about to stall so that you can take immediate action to prevent it.

Avoiding stall/spin and recognizing when they are starting are the most important skills. It's also good to know about how to manage one if it does happen.

There are three different types of stall in paragliding.

Deep stall (parachuting, stable stall)

Paragliders can go into a deep stall for a variety of reasons: brake lines too short (no slack), old or damaged glider material which therefore has increased level of permeability, altered trim/line length and changes to profile characteristics caused by moisture (e.g. flying in rain). Paragliders have a particular tendency to stall if the wing-loading is too low. An out-of-trim glider, caused by changes in line lengths due to prolonged use, may also have a higher deep stall tendency.

In a deep stall, the airflow from the front reduces and the glider goes into a stable flight attitude without forward momentum. The paraglider sinks almost vertically at 4-5m/s and there is noticeably less flight noise.

The Carve 2 has no tendency to get into a deep stall. Should this nevertheless occur, make sure your brakes are fully released, the glider will then normally recover on its own immediately. If the glider still doesn't recover either put your hands on the A risers and push forward.

If you have a speed system or trimmer, you can also use either to accelerate, so that the glider goes into a normal flying position from the deep stall. After you have landed, the glider and the length of the lines must be checked.

You can recognize a deep stall by the glider getting "mushy" and the airflow around your ears decreasing. The glider may also compress span-wise. Flying in strong turbulence or exiting a full frontal deflation with too much brake applied can cause this situation. A wet glider, a glider full of snow or a glider full of sand also has a higher deep stall tendency, and you should do everything you can to avoid flying in the rain. If you do pass through some rain, never make big ears! Apply speed bar until you are confident that the wing has dried out.



WARNING: Never apply the brakes and do not take wraps if you anticipate or experience a deep stall.

Full stall (dynamic stall)

The full stall happens when the wing partially deflates and loses its arched shape. It is triggered when the maximum possible angle of attack is exceeded. The most common cause is going below the minimum speed or flying near the minimum speed combined with the effects of turbulence. As always, avoiding excessive brake inputs held for a long time is the most important way to avoid this potential malfunction. Many pilots will become aware that they are too deep in the brake for too long and then let off, thereby avoiding this problem all together.

In a manifested full stall, the paraglider loses its forwards travel, surges backwards and deflates. If the brakes are held down, the canopy comes up over the pilot again. The result is an almost vertical descent with a sink rate of approx. 8m/s.

Do not take wraps on the brakes during a full stall. Keep your hands close to the body and under the harness seat plate during the stall. If the canopy is in a stable full stall, it will move forward and backward. To exit the full stall, slowly release the brakes, making sure that this is done symmetrically.

After that, the brakes are completely released when the glider canopy is filled and in front of the pilot. This prevents the canopy from pitching too far forward.

As this is done, the canopy accelerates forwards dynamically and picks up speed. Do not brake too soon (otherwise it could go into a full stall again), and be careful to avoid a front stall by making sure that it does not shoot too far forwards. It's generally better to have a little frontal than to full stall again.



WARNING: If the canopy has gone back during the full stall, the brakes must be held down, otherwise the canopy may surge forward and, in an extreme case, end up underneath the pilot. Hold the brakes down until the canopy is above you again.

Spin

The spin is a stable flight maneuver, in which one side of the canopy stalls, while the other side continues to fly forward. The glider turns around the stalled side of the wing.

In normal thermal flight, you are not very far from the limits of a spin. If a spin occurs, just let up the brakes and wait for the glider to surge forward, checking it with the brakes if it surges too far. Never release the spin if the glider is far back behind you, always try to release it when the glider is above or in front of you!

Depending on the type of release and the dynamics of the spinning movement, the canopy may dive forward on one side and collapse asymmetrically. In the case of a longer duration spin, the pilot may release the brakes only at the moment when the glider is above or in front of the pilot.

If the spin does not stop, check whether you have released the brakes fully, including any wraps!

Other tips for dangerous situations

Cascade

Many reserve deployments are a result of a cascade of over-corrections by the pilot. Please note that over-corrections are often worse than no input at all.

Emergency steering (rear riser steering)

If for some reason the brake lines are not working, e.g. if the knot on the brake handle has come undone or a brake line is defective, the Carve 2 can also be steered and landed using both rear risers.

In this case, stall happens more quickly and the pilot must compensate for the changed flight behavior by pulling carefully on the risers.

Flying in the rain

We strongly advise you not to fly in the rain on any paraglider including the Carve 2. If you do fly in the rain, be aware that you will have a greater risk of entering a deep stall. If you find yourself flying in the rain, it is wise to apply speedbar or move the trimmers toward fast until you are confident that the glider is flying normally, and has preferably dried out so that there is no longer any risk of deep stall.

Flying in extremely humid weather or in rain is outside of the operating limits of the glider. If you are unable to avoid flying in rain, please observe the following:

- it is advisable to fly with slight acceleration during and after the rain (min. 30% or more)
- use no brake input or as little as possible
- avoid tight turns, especially in the final approach. If conditions allow, you should also fly slightly accelerated in this phase

- avoid big trim/speed adjustments and big brake inputs while on final and about to land

Advertising and adhesives

Always make sure before attaching advertising to the glider that the adhesive planned will not alter the glider's flight behavior. If you are in doubt, we recommend that you do not attach adhesive logos. Attaching adhesives to the glider which are large, heavy, or made of unsuitable material may result in revocation of the certification.

Overloading

The glider structure is put under high levels of strain in particular on extreme flight maneuvers, rapid descent methods (spiral dives) or prohibited aerobatic maneuvers. They considerably accelerate the aging process of the structure and should therefore be avoided.

The glider must be inspected earlier than is usually the case if it has been put under more than the usual degree of strain.

Sand and salt air

In many cases, sand and salt air cause the lines and fabric to age much more rapidly. If you often fly near the sea, the glider should be inspected more frequently than normally required.

Storing, care, maintenance and repairs

Storing the paraglider

Packing the paraglider

The Carve 2 can be packed with all the usual methods. To ensure a long life of the profile reinforcements it is very important that you pack the paraglider carefully. It is therefore recommended that you pack the Carve 2 as shown in the following illustrations.

The leading edge reinforcements (Mylar and Rigifoil system) on the front edge are placed on top of each other to avoid bending or misshaping them. This method of packing ensures that the leading edge is treated carefully, which will increase the glider's life, performance and launch behavior.

If the reinforcements have been bent or misshapen, they distort more easily during flight, creating an altered air inflow which can lead to a loss in performance and changes in flight behavior. The leading edge reinforcements also perform an important function on launch. Therefore, the less they have been bent, the more easily the glider will inflate and launch.

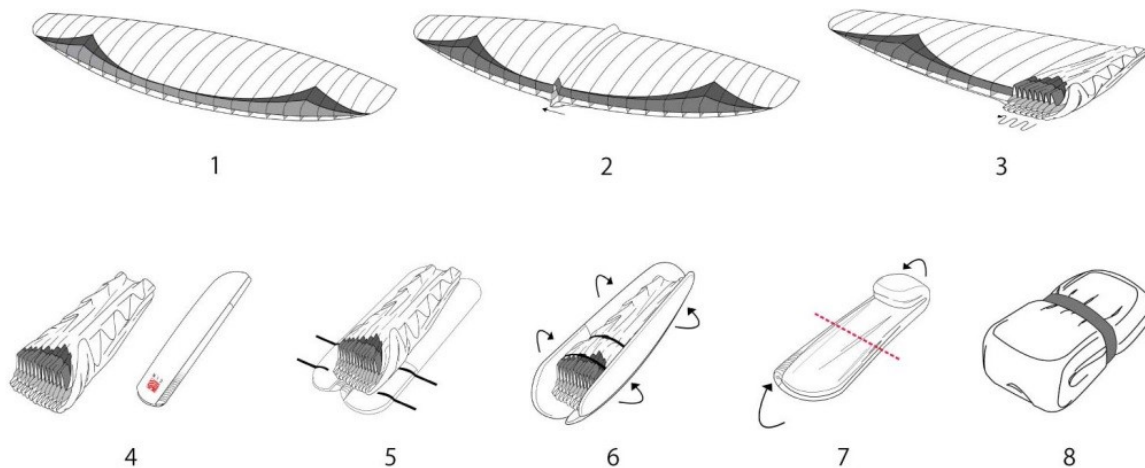


Figure: Packing the Carve 2

1. Spread out the paraglider completely on a smooth surface. Do not drag the paraglider across any rough surfaces such as gravel or asphalt. This may damage the seams and surface coating.
2. Start from the center to stack the profiles of each side of the wing on top of each other.
3. Proceed like this until the wing tip. All the ribs on one side are placed one on top of one another, so that the leading edges are not bent.
4. Then continue as in the second step, placing the leading edges of the other side on top of the next until you reach the tip of the glider. Place the concertina bag underneath the glider which has been folded together, so that the ribs are all lying along the length of the concertina bag.
5. The glider is now folded up along its length, and the leading edges are on top of each other without having been bent. Fasten the straps near the leading edges, so that they do not slip, and the straps in the middle and at the end of the glider.
6. Do up the zip, making sure that none of the lines or fabric is caught in the zip.

7. Fold up the glider along its length, with the first fold below the leading edge reinforcements. Pay particular care not to bend any of the rigid reinforcements!
8. Fold the glider again. Then place the compression strap around the glider and fasten it by pulling gently. Make sure that the glider is only loosely folded and is not bent or compressed excessively.

Rucksack

Gin Gliders has a wide range of different rucksacks. Choose between lightweight hike 'n fly or indestructible classic models, available in various sizes to match your flying equipment.

For details please see www.gingliders.com

There are different ways to pack the glider, depending on the personal preferences, the harness and the equipment. To maximize carrying comfort, the following method is recommended: First, place the glider inside the harness and then put the top of the harness in the bottom of the rucksack with the glider side next to the back of the rucksack.

The tighter the rucksack is packed, the more comfortable it will be to carry. Gin Gliders offers a wide variety of rucksack sizes and models. They are available as an optional extra for pilots that require it.

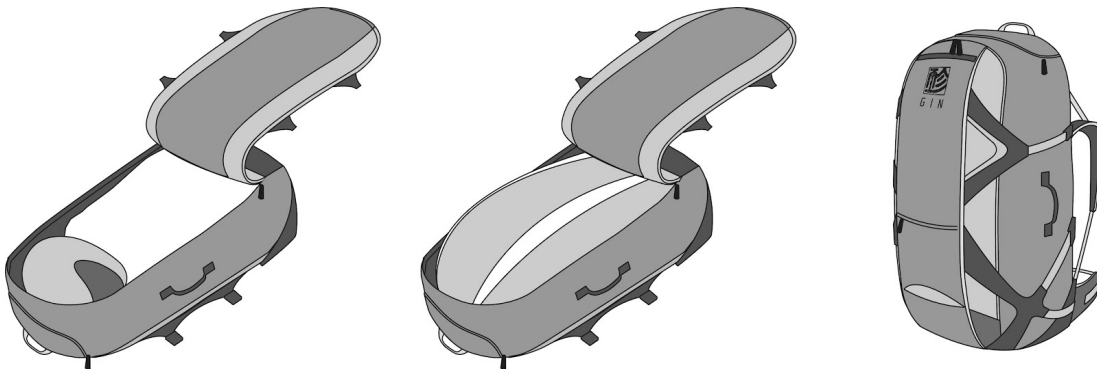


Figure: Packing the rucksack

Storing and transporting the glider

Even if your paraglider was completely dry when it was packed up after the final flight of the season, for long-term storage you should if possible take it out of the backpack and spread out the canopy a little in a clean, dry place away from direct light. If you do not have the space to do this, then open the backpack, internal bag and belt as much as possible and avoid compressing it. It must be stored at a temperature between 10° and 25° C and in relative humidity between 50 and 75%. Make sure that the paraglider is not stored in a place where animals such as mice or cats could use it as a place to sleep.

Do not store the paraglider near any chemicals. Petrol, for example, causes the material to disintegrate and can cause considerable damage to your paraglider. When your equipment is in the car, keep it as far away as possible from any spare gas cans or oil containers.

The Carve 2 should not be exposed to extreme heat (e.g. in the trunk of the car during summer). The heat may cause any moisture present to be pressed through the fabric, thereby damaging the coating. High temperatures accelerate the process of hydrolysis, particularly when combined with moisture, which damages fibers and coating. Do not store your paraglider near radiators or other heat sources. Always transport your glider in the special concertina bag and use the backpack provided for the rest of the equipment.

Care

The materials used in the Carve 2 have been carefully selected for maximum durability and performance. Nevertheless, following the guidelines below will keep your paraglider airworthy and will ensure a long period of continuous safe operation. Excessive wear is caused by careless ground handling and packing, unnecessary exposure to UV light, chemicals, heat and moisture.

Ground handling

The following should be avoided:

- Don't ground handle or take-off on abrasive surfaces.
- To move the paraglider to another spot, don't drag it across the ground. Pick it up and carry it.
- Violent shocks to the canopy (e.g. when the canopy crashes to the ground leading edge first while ground handling). This stresses the seams and can even cause the cell to explode.
- Don't repeatedly inflate the glider and allow it to crash back down. Step towards the wing as it comes down to take the force out of this action.
- Dragging the glider along the ground.
- Stepping on the lines or canopy. The Kevlar line inside the sheath can take lots of pulling force without stretching, but is sensitive to bending with small radius.
- Opening your wing in strong winds without first untangling the lines.
- Don't sit on your rucksack when your glider is packed inside.

Fabric

Care is essential to ensure that the fabric and glider remain durable and retain their qualities. The glider should therefore be protected from unnecessary UV light. Do not unpack your glider until immediately before flight and pack it up straight after landing. Modern paraglider fabrics have better protection against the sun, but UV rays in particular are still one of the decisive factors in how the fabric ages. The colors will fade first and then the coating and fibers will begin to age.

When choosing a place to launch, try to find somewhere which is smooth and free of stones and sharp objects. Do not stand on the glider. This weakens the fabric, especially if it is on a hard or stony surface. Pay attention to the behavior of spectators at the launch site, especially children: do not hesitate to draw their attention to the sensitive nature of the fabric.

When you are packing up your glider, make sure that there are no insects trapped inside. Many insects produce acids when they decompose, which can cause holes in the fabric. Grasshoppers make holes by biting through the fabric and also excrete a dark liquid which stains. Keep animals away when you are packing up. Insects are not attracted by any particular colors, contrary to what is commonly believed.

If the glider gets wet or damp, it should be dried as soon as possible in a well-ventilated room (but out of the sun). It may take several days before the canopy has dried completely because the fibers absorb water. Mould may form if the paraglider is stored wet and the fibers may rot, particularly when it is warm. This can make the paraglider unsuitable for flying within a short time.

A brand-new glider will often be compressed when delivered. This is solely for the initial delivery and the glider should not be compressed in such a way again. Do not pack your glider too tightly after use and, even though it is very comfortable, never sit on the backpack with the glider inside.

If salt water gets on the glider, it should be rinsed immediately in fresh water (refer to the section "Cleaning").

Lines

The Carve 2 has various different high-quality and accurately manufactured lines which have been selected according to the load and area of use. You should also protect the lines from unnecessary UV light because, as with the fabric, UV light in particular will weaken the lines.

Dyneema lines, for example, are very temperature-sensitive and can be permanently damaged at temperatures above 75° C. Therefore your glider should never be stored in a hot car, especially during summer.

Be careful that there is no abrasion caused to the coating on the lines by rubbing, particularly when ground-training with crossed risers.

Do not walk on the lines after the glider has been spread out and watch out for spectators or skiers who may inadvertently go over the lines.

When you are packing up the glider, be careful to avoid putting any unnecessary kinks in the lines and use only the overhand knot or bowline knots described for the brake lines.

Rigid construction

Various forms of plastic rods are used in the Carve 2 (rigid construction), which help maintain the shape of the leading edge and the stability of the canopy. To ensure that the plastic rods keep their shape, it is important that you pack the glider as described in the section "Packing the paraglider".

The plastic rods on the Carve 2 can all be replaced through small pockets. If you notice that a plastic rod has been damaged or misshapen because of incorrect use, this can be replaced by Gin Gliders or a Gin Gliders authorized workshop.

Cleaning

If you do have to clean the glider, use only lukewarm fresh water and a soft sponge. Use a weak soap solution for stubborn stains, and then rinse it out carefully and thoroughly. Leave the glider to dry in a place which is well-ventilated and in the shade.

Do not under any circumstances use chemicals, brushes, rough cloths, high-pressure cleaners or steamers to clean the glider, as these can damage the fabric coating and weaken it. The glider becomes porous and loses breaking strength.

Do not under any circumstances put the glider in the washing machine. Even if washing powder is not used, the glider would be badly damaged by the mechanical action of the machine. Do not put the canopy into a swimming pool - chlorine will damage the fabric. If you have no choice but to rinse the glider, e.g. following a landing in the sea, gently wash it down inside and out with fresh water. Frequent rinsing accelerates the aging process.

Maintenance

Type designation

GIN gliders have an exact identification on the underside of the wingtip or on the centre rib, which is obligatory for all paragliders. The information required is set out in the airworthiness requirements.

It is helpful to provide the type designation of the paraglider if you are contacting your Gin Gliders dealer with any queries or ordering replacement parts or accessories, to ensure accurate identification.

Regular inspections

The following parts and materials must be inspected regularly for damage, abrasion and correct operation, e.g. after landing:

- Risers and quick-links
- Lines
- Fabric

Lines

Measuring the length of the lines is part of the regular paraglider inspection. The lines have a considerable influence on flight behavior. Correct line length and symmetry are also important for performance and handling. Gin Gliders therefore recommends an inspection every 50 to 100 hours or once a year.

Environmental conditions such as high temperatures or moisture can affect line length. Check the line length regularly, particularly if you notice any change in launch or flight behavior. The line length should be checked if you have landed in water or if the lines have got wet through. Lines age and lose strength even if the paraglider is used infrequently or not at all. This can affect the safety and function of your paraglider.

Signs of wear are slight bumps or changes in flying characteristics. The lines must then be replaced immediately. Use only inspected and approved lines, which can be obtained through Gin Gliders.



WARNING: A damaged line can result in loss of control of the glider. Always replace lines which are damaged. If you need to replace damaged or worn-out parts, use only original parts or approved parts from the manufacturer.

Do not under any circumstances use knots to shorten the lines. Any knot will weaken the line considerably and may cause the line to break in case of high load. The overhand knot and bowline knots described are permitted only for connecting the main brake lines/brake handle.

Inspection periods

The inspection periods and instructions apply without restriction to all purposes in the private or professional sector as well as in training. Failure to observe the inspection periods shall render invalid the certification and warranty.

A properly completed logbook with details of all flying and training will help you to comply with these periods.

The following inspection periods apply to the Carve 2:

- 36 months or after 200 hours (including ground handling), whichever is sooner
- subsequent inspections should be carried out every 24 months or 150 hours (including ground handling), whichever is sooner

Ground handling time must be at least doubled when calculating the total hours of use because of the increased wear and tear on the glider.

If you use the Carve 2 in harsh conditions (sand, dust, stones etc.), we recommend a biannual check.

Additional inspections should be performed following a crash or violent landing on the leading edge, or if you note a deterioration of performance or behavior.

The condition of all components and materials must be checked with the utmost accuracy during testing in accordance with the GIN inspection instructions. These results, and an overall assessment of the condition, are part of the check log.

Service and repair shops authorized by Gin gliders are in possession of the Gin Gliders inspection instruction, which contains all the necessary procedures, equipment and additional technical information about the Carve 2, such as single line lengths, sewing and further material and processing guidelines.

Validity of inspection

It is very important that your glider is serviced at the required intervals throughout its entire life. In order to benefit from Gin Gliders warranty:

- You must have your paraglider inspected by Gin Gliders or an inspection agent authorized by Gin Gliders.
- The documentation and the result of the inspection must be clearly identifiable (date and place / name of the inspector) and be entered near the glider information/certification sticker.

Pilots are able to carry out the inspections themselves or appoint a third party to do so (e.g. manufacturer/importer), provided that the requirements are all fulfilled. However, if this is done, the liability and warranty of Gin Gliders will lapse.

GIN and the commissioned test laboratory recommends that inspection is carried out by the manufacturer/importer or by an authorized inspection agent.

Repairs

Gin Gliders workshops

All repairs and servicing should be carried out by a Gin Gliders authorized workshop or directly by Gin Gliders. Gin Gliders workshops have trained staff, original Gin Gliders parts and the necessary know-how, all of which will ensure top quality.

Major repairs at the Carve 2, such as replacing panels, should only be carried out by the distributor or manufacturer.

Small repairs to the glider

Very small holes in the sail can be repaired with the sticky back tape provided with your glider.

Damaged lines should be replaced by your GIN dealer. Before fitting a replacement line, check it for length against its counterpart on the other side of the wing. When a line has been replaced, always inflate the glider on flat ground to check that everything is in order before flying.



WARNING: Do not attempt to perform repairs unless you have the knowledge, experience, materials and tools needed to do the job properly.

GIN quality and service

We take pride in the quality of our products and are committed to putting right any problems affecting the safety or function of your equipment and which are attributable to manufacturing faults. Your GIN dealer is your first point of contact if you have any problems with your equipment. If you are unable to contact your dealer or GIN importer, contact Gin Gliders directly via our website.

Glider characteristics, illustrations and technical data

Glider categories and guidelines

Flight behavior and response to disturbances are loosely correlated with the results of the EN/LTF tests. The complexity of the paraglider system means that it is not possible to give any more than a partial description of the glider's flight behavior and reactions to disturbances. Even a small alteration in individual parameters can result in flight behavior which is markedly modified and different from the description given.



WARNING: The descriptions of flight characteristics contained in this manual are all based on experiences from the test flights, which were carried out under standardized conditions. The classification is merely a description of the reactions to these standard tests.

Glider category

The Carve 2 was developed and tested for use solely as a paramotor wing. Any use other than as intended is prohibited.

DGAC registration

The Carve 2 received ULM Class 1 registration (DGAC).

Description of flight characteristics

Paramotor with demanding flying characteristics and potentially violent reactions to turbulence and pilot errors. Recovery to normal flight requires precise pilot input.

Suitability for training

The Carve 2 is generally not suitable for use as a training glider.

Free Flying

The Carve 2 was not developed or tested for free flying.

Towing

The Carve 2 is not intended for towing.

Tandem powered paragliding

The Carve 2 is not intended for powered paragliding tandem use.

Aerobatics

Your Carve 2 Was not developed or tested to be used for aerobatics (acro).

Legal regulations differ greatly between countries. The respective national laws or guidelines must be followed under all circumstances.

When performing acrobatics, there is a risk of unpredictable flight attitudes, which could lead to damage to material and structural failure.

Description of pilot skills required

Target group and recommended flying experience

Designed for pilots familiar with recovery techniques, who fly “actively” and regularly, and understand the implications of flying a glider with reduced passive safety..

Reflex profiles require a correct assessment of operating limits in order to avoid canopy disturbances safely.

Gin Gliders recommend that paramotor wing pilots meet the following minimum requirements before flying the Carve 2:

- frequent flying experience of at least 75 hours airtime per year
- extensive knowledge of the special features of paragliders with reflex profiles

The Carve 2 is not suitable as a wing for beginner paramotor pilots. On the contrary, pilots should already have experience with paramotor wings and be familiar with the performance and safety of gliders with reflex profiles.

The Carve 2 covers many aspects of powered paragliding and offers various adjustment options according to the pilot's wishes. The adjustments require appropriate experience on the part of the pilot, in order to use the Carve 2's full range of performance and handling.

Normal flight requirements

Gliders of this class are designed to have maximum performance. Therefore the flight and control behaviour requires the pilot to have comprehensive, long-term flight practice and advanced technical knowledge.

Requirements for incidents and quick descents

The requirements for incidents request a maximum of practice and responsiveness of the pilot. The safe control of extreme flight behaviour after disturbances and demanding flight manoeuvres, such as fast descent, must be at the highest level through constant training. Even low pilot errors have to be eliminated in response to canopy disturbances and extreme flight conditions.

Manufacturing and delivery

All GIN gliders are produced in the company's own facilities using the most modern techniques. Highly skilled staff take extreme care during the entire manufacturing process. Stringent quality control is made after each step, and all materials that go into each wing can be traced. These measures guarantee that pilots fly with the assurance that their wing meets the most exacting safety standards.

Your glider will be delivered to you with the original trim settings which correspond to the tested configuration. Do not make any modifications, such as changing the risers or altering the line lengths. This would invalidate the certification and is potentially dangerous.

Overall illustration

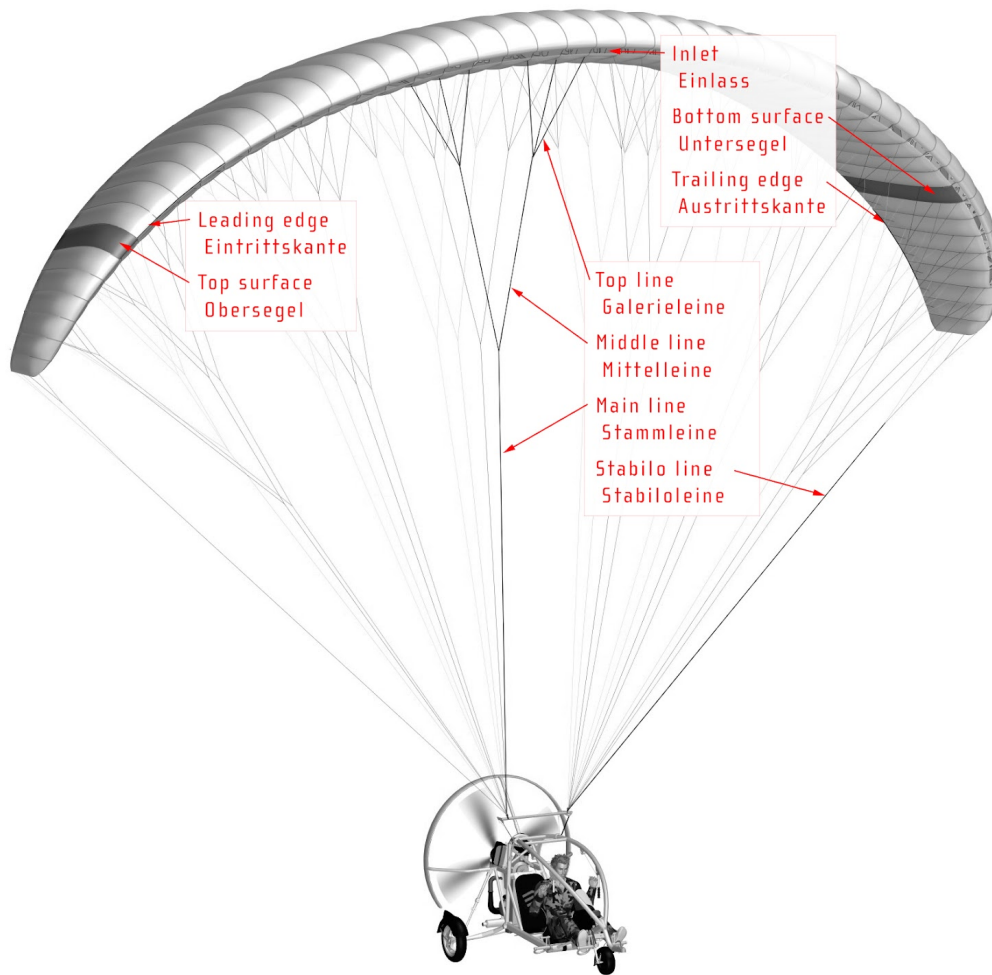


Figure: Overall Illustration

Technical data

Size	18	20	22	24
Area (flat) [m ²]	18.00	20.00	22.00	24.00
Area (projected) [m ²]	15.39	17.10	18.81	20.51
Span (flat) [m]	10.22	10.77	11.30	11.80
Span (projected) [m]	8.21	8.66	9.08	9.49
Aspect ratio (flat)	5.8	5.8	5.8	5.8
Aspect ratio (projected)	4.2	4.2	4.2	4.2
Cells	58	58	58	58
Glider weight [kg]	4.7	5.0	5.4	5.7
Weight in flight [kg]	65-110	75-120	85-130	95-140
Max. engine power [kW]	27	27	27	27
DGAC identification ULM	ULM Class 1	ULM Class 1	ULM Class 1	ULM Class 1

Riser and speed system

Riser

The Carve 2 riser changes the angle of attack during accelerated flight and has some features specially developed for the glider.

The Carve 2 is equipped with a speed system and trimmers. With both systems, the pilot can adjust the speed behavior of the Carve 2 in the respective operating mode. In addition, the trimmer can be used to counter the torque effect.

The Carve 2's risers, at 500 mm, are shorter than those of conventional gliders. This allows better adjustment of different attachment point positions of the motor unit/harness. The brake handles are attached to the riser by strong Neodym magnets. The advantage of the magnets is that the brake handles can simply be attached to the risers during flight. The chapter "Flying the Carve 2" has further information on using the acceleration system.

Riser diagram



Figure: Carve 2 riser

Riser lengths

Riser lengths [mm] *	A	A'	B	C	D
Trim speed	500	500	500	500	500
Trimmer open	500	555	615	670	725
Trimmer closed	500	500	500	500	500

* incl. carabiner (Maillions)

Speed System



Note: Please take extra care to connect the speed system if your paramotor is equipped with one. An unconnected speed system has the chance to go into the prop.

The speed system accelerates the wing by progressively shortening the risers towards the front. This decreases the canopy's original angle of attack and the speed of the glider increases.

The speed system must be correctly fitted and adjusted to ensure it operates smoothly during flight. Before first launch, the length should be adjusted to suit the pilot and the line duct should be checked.

The speed bar and the riser are connected by special Brummel hooks. Adjust the length to the speed system so that your legs are fully stretched when at maximum accelerated flight ("pulley-to-pulley" on the riser), otherwise you may experience symptoms of fatigue in long flights. You should still be in a comfortable flight position even when the speed system is used to its full extent.

You will not be able to use the full potential of your paraglider if the speed system is too long.

After the speed bar has been adjusted according to the length of the pilot's legs or the harness, the two-stage speed system is then adjusted. This system has two ball-bearing pulleys which reduce the acceleration pressure, thereby allowing comfortable acceleration even when the pilot's legs are bent. A stop ball then blocks the lower pulley, reducing the acceleration distance, effectively converting every centimeter into speed.

The two-stage speed system can be adjusted using a stop ball, which is attached to the speed system cord by a simple knot. The speed bar distance is increased if the stop ball is pushed upwards. If it is pushed down, then the lower pulley is locked earlier, which reduces the speed bar distance and increases the pressure. This allows pilots to alter the speed bar according to their own preferences, and to adjust the speed bar extension range and pressure ergonomically according to leg length, the harness and the speed bar used.

Fasten the speed bar to the harness before launch to avoid tripping over it when preparing to launch or taking off.



WARNING: Do not make the speed system too short. The glider must under no circumstances be pre-accelerated as a result of the adjustment being too short. Problems (such as collapses or tucks) have a more drastic effect with increased speed than in unaccelerated flight. It is generally strongly recommended that you do not use the speed system in turbulent areas and when flying close to the ground, because of the increased risk of collapse.

Trimmer

The Carve 2 is equipped with trimmers. With this acceleration system, the pilot can adjust the speed behavior of the Carve 2 in the respective operating mode. The trimmer allows the pilot to increase cruising speed and to counter the torque effect.

The B, C and D-risers can be altered in length using the trimmer. This decreases the canopy's original angle of attack and the glider's speed increases.

For take-off, a setting around the neutral point (all risers have the same length) is recommended. The trimmer is loosened by a trimmer buckle and closed over the trimmer band.



WARNING: It is generally strongly recommended that you do not use the trimmer system in turbulent areas and when flying close to the ground, because of the increased risk of collapse.

Line system and brakes

Line system

The Carve 2 has A, B, C and D line levels, which fork three or four times from the bottom (riser) to the top (canopy) and which are divided into "Main", "Middle", "Higher-Middle" and "Top" lines. The individual line levels are connected with one another using the "handshake knot".

With the brake lines, the individual levels are bundled at the end with the main brake line. This runs through the low friction ring attached to the riser and is knotted at the brake loop of the control handle. There is a mark on the main brake line which allows the control handle to be correctly positioned.

The main lines are all attached to Maillon quick links. They are fed through special elastic rings (or plastic clips) and attached to prevent the lines from slipping and to ensure that they sit in the correct position.



Note: Some GIN gliders are supplied with additional line loops on the carabiners of the riser. These may be used by professional check-up workshops to re-trim the paraglider during a scheduled service check.

Brake line adjustment

Factory setting

The brake lines of the Carve 2 are set to the length that was used for the DGAC test flights. These line lengths have been finely tuned by the GIN test pilots, and it should not be necessary to adjust them.

Special care should be taken for motors or trikes with a very high hang point as these motors make the brake line effectively very short. Do some kiting or inflations with the backpack motor to check the brake positions. When using a trike, have some helpers push or pull the trike a few times to practice some inflations and check the brake positions before attempting to take off.

The brake line length is tuned so that there is slack in the brake lines when the glider is in fully accelerated flight. Therefore, the brakes are quite slack at trim speed, and to take up that slack in soaring flight, it is common to fly with half a wrap on the brakes and hold the handles on the knot. However, care should be taken to release the wraps in any extreme situation.

If you do need to make adjustments to suit your harness, body and flying style, we strongly recommend that you test fly the glider after every 2 cm of adjustment. There should be a minimum of

10 cm of free brake travel when the glider is flown hands-off. This prevents the brakes being applied unintentionally when the speed system is fully engaged. We recommend a brake line knot for the brake handle attachment as shown in the diagram:

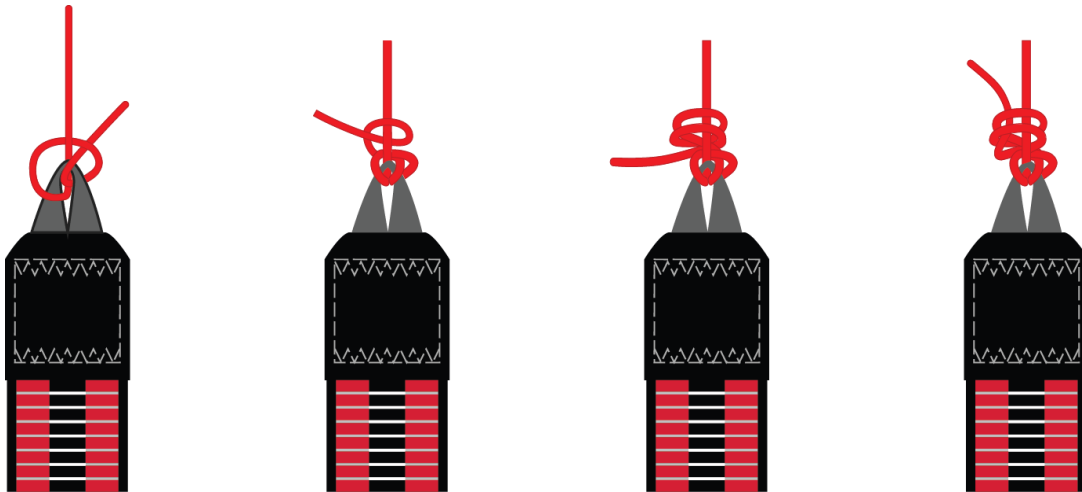


Figure: Brake line knot



WARNING: Loose, unsuitable or incorrectly tied brake line knots can cause the main brake line to loosen and then lead to loss of control of the glider.

Incorrect adjustment

If the brake lines are too long, the paraglider reacts slowly and is difficult to land. The brake lines can be adjusted during flight by wrapping them around your hands which will improve the flight characteristics. Adjust the brake lines to the correct length after you have landed. Changes to the braking distance should always be made in small increments of no more than 2 to 3 cm and must be tested on a training slope. The left and right brakes must be adjusted symmetrically.

If the brakes are shortened, care must be taken that the paraglider is not slowed down in trim and accelerated flight. Safety issues may arise and performance and launch behavior may deteriorate if the brake lines are shortened too much.

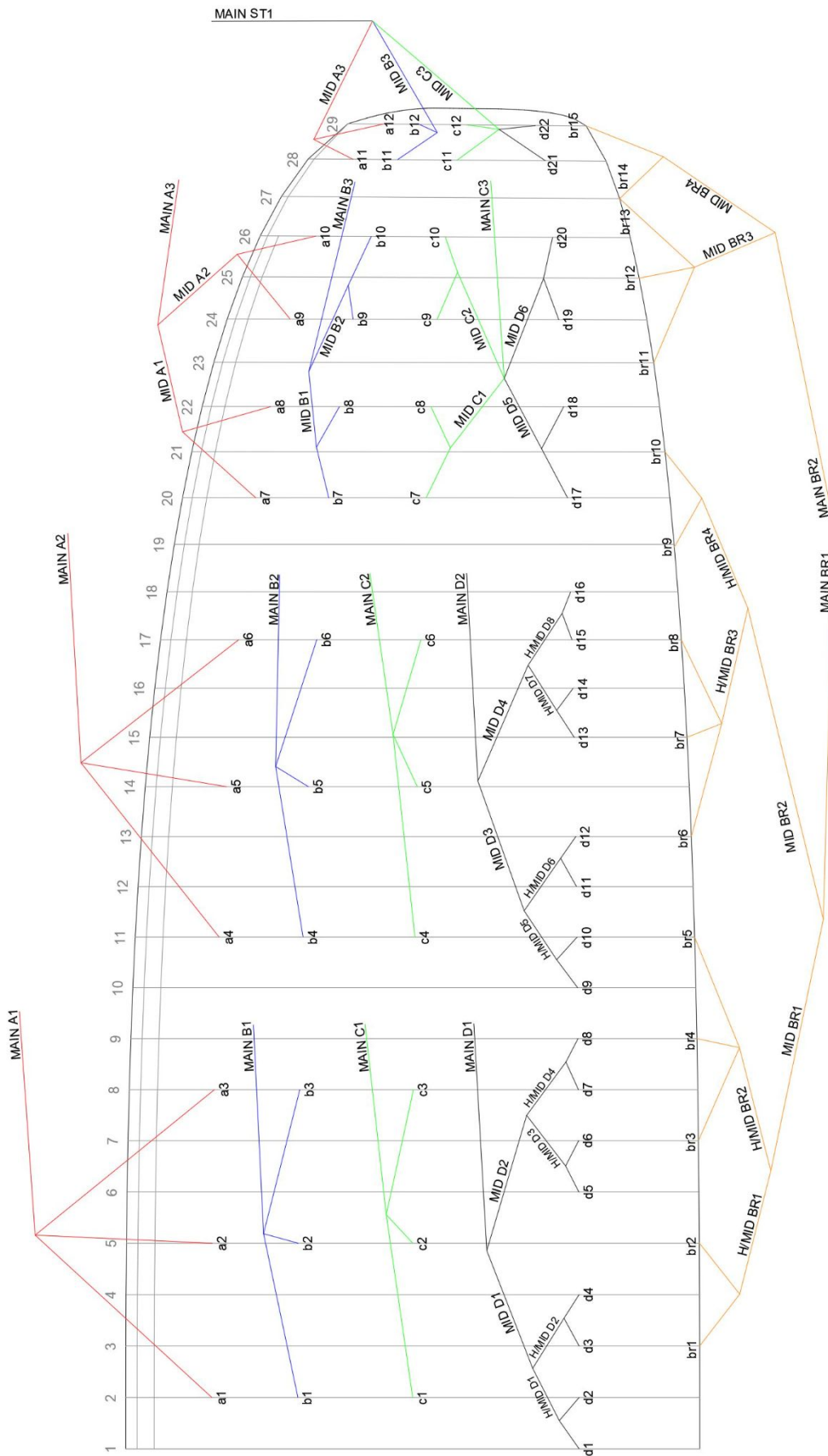
If the brake lines are too short, the following risks could arise:

- there could be an early stall
- the paraglider does not launch well and there is a risk of deep stall
- the paraglider shows dangerous flight characteristics
- the trailing edge of the paraglider is braked in accelerated flight which, in an extreme case, could cause a frontal collapse



WARNING: Environmental conditions can also lead to the brake lines shortening. You should therefore check brake line length regularly, particularly if there is any change in launch or flight behavior.

Line layout



Materials

Canopy fabric

Upper surface leading edge	Myungjin MJ40 MF
Upper surface trailing edge	Myungjin MJ32 MF
Lower surface leading edge	Myungjin MJ40 MF
Lower surface trailing edge	Myungjin MJ32 MF
Ribs	Myungjin MJ38 HF

Lines

Top	Edelrid 8001 050 070 090 190
Middle	Edelrid 8001 070 090 190
Main	Edelrid 8001 130 190 230 340
Main Brake	TGL 400

Riser

Güth & Wolf 20 mm Polyester

Line shackle

Stainless steel 3.85 mm
Soft link

Canopy thread

Amann & Söhne - Mill Faden 150D/3
Polyester bonded

Appendix

Glider details

Size:	Colour:	Serial number:
Check flight (date): _____		
Name and signature: _____		

Pilot details / Proof of ownership

1. Owner	
Name:	
Address:	
Phone:	
Email:	
2. Owner	
Name:	
Address:	
Phone:	
Email:	
3. Owner	
Name:	
Address:	
Phone:	
Email:	

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