Synthesis cabrio

User Manual

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DUDEK Paragliders

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NOTE!
Please read this manual before your first flight

1. INTRODUCTION

CONGRATULATIONS!
We are pleased to welcome you among the growing number of Dudek Paragliders pilots. You've become a proud owner of state-of-the-art Synthesis Cabrio paraglider. Intensive development, application of the most modern methods and thorough testing make the Synthesis Cabrio a user-friendly paraglider, offering the pilot a lot of fun combined with great performance.

We wish you many enjoyable and safe flying hours.

DISCLAIMER

Please read this Manual carefully and note following details:

- The purpose of this Manual is to offer guidelines to the pilot using Dudek Synthesis Cabrio wing and it is by no means intended to be used as a training manual for this or any other paraglider in general.
- You may only fly a paraglider when qualified to do so or when undergoing training at an accredited School or with an Instructor.
- Pilots are personally responsible for their own safety and their paraglider's airworthiness.
- The use of this paraglider is solely at the user's own risk! The manufacturer and distributor do not accept any liability connected with this activity.
- This paraglider on delivery meets all requirements of the EN 926-1 and 926-2 regulations. Any alterations to the paraglider will render its certification invalid.

NOTICE
Due to the constant development process Dudek Paragliders warns that the actual paraglider may differ slightly from the manual.

2. THE WING

WHO SHOULD FLY Synthesis Cabrio?

You love paramotoring, but since you are not fond of running at launch and landing, you are using a trike.

Time and again you want to share your hoy with a passenger, but then avoiding heavy paraplanes you prefer a foot-launched tandem configuration. You've tried flying trike and tandem on many wings - some were too hard to launch, some flew too slow or were too big. You did not feel safe in turbulence. That's why you need a wing that is both agile and easy to control, with easy launch and pleasant handling, equipped with a set of trimmers allowing it a wide speed range. It has to be comfortable and as safe as possible at all speeds in any conditions.

Synthesis Cabrio fulfills all these dreams. Its design is a synthesis of all desired PPG features.

Synthesis Cabrio is designed for trike and tandme flying, yet different use calls for different weight ranges:
- trike flying is safe in the entire weight range,
- tandem flying (foot launched) is recommended in the lower half of weight range.

Such limitation is caused by relatively high take-off speed under heavy load, making launch in no wind a hard task. A trike will take-off all right at max load, yet two heavy persons will probably fail. Of course there should be no problem with foot launch when some wind is blowing.

2.1 DESIGN

While designing Synthesis Cabrio we put a lot of effort into flight safety, pleasant handling, simple usage, good performance and wide speed range.

Distinguishing feature of Synthesis Cabrio is its agility. Take-off is easy, provided that right technique and trimmer setting are used. With proper settings and good engine, pulling A-risers may be not necessary (canopy rises on its own) - a welcomed feature for trike use. In addition, it is possible to clip into A-risers special lines shortening them during trike launch.

A tremendous advantage of the cabrio is its wide speed range on trims. It is of special importance for tandem and trike pilots, as they have no way to employ standard speed system. But in reality everybody should be delighted with maximum speed, offering joy when overtaking others and broadening your operational envelope.

Additional TST system makes easy steering at high speeds. Incorporation of our novel Dudek Reflex Airfoil and corresponding rigging result in domfortable flight even in rough conditions due to great margin of passive safety.

We feel safe to declare the Synthesis Cabrio to be the best wing available in its class.

The fundamental feature a good PPG and PPGG wing should possess is its great stability and tuck-resistance. When this is achieved, the user does not have to concentrate all the time on steering, thus saving energy for other purposes like navigation, taking pictures or simply enjoying the flight. In addition the faster and safer your paraglider is, the more often you can fly.

While the Synthesis Cabrio was designed to retain all features of a conventional paralider, application of a reflex aerofoil section added several new qualities. First of all, using that profile means that the wing stability does not depend exclusively on the pilot's weight and actions anymore. It maintains its own pitch attitude, rising and sinking through thermals while remaining stable above your head, without need for so much pilot input.

Generally speaking the reflex profile is a special kind of aerofoil section. Specific static pressure distribution creates a situation where at low attack angles only the wing fore part (some 60% of the chord) is producing lift, while rear 40% of the chord creates an effective stabiliser against excessive decrease of the attack angle. The trimmer system allows you to considerably raise the airfoil's rear part, thus effectively reducing projected chord and surface area by some 30%, giving the paraglider a higher wing loading and increased speed without change in the angle of attack. The centre of pressure also moves forward, adding enhanced pitch stability. Such a shift of loading gives the wing exceptional tuck-resistance and increases its projected aspect ratio, resulting in much better flight data (especially at full speed).

Should you require more lift at lower speeds, the rear section can be pulled down to restore a full airfoil, effective along the whole chord.

Piloting the Synthesis Cabrio actually reminds flying a conventional powered aircraft more than a paraglider.

Below we will try to give you a closer look at some of the remarkable Synthesis Cabrio features.

2.2 CONSTRUCTION

Synthesis Cabrio is basically a Synthesis, yet a Synthesis that was redesigned, enlarged and adjusted to special needs. Retaining the same planform it has four cells more, strenghthened structure and enhanced rigging. Additional V-shaped mylar reinforcements contribute to exceptional durability and perfect aerofoil reproduction.

The entire Synthesis Cabrio 3D body was designed in our **CSG** (Canopy Shape Guard) system, comprising many elements resulting in exceptional coherence and stability of the shape.

Below you will find a short description of CSG subsystems.

Synthesis Cabrio has an elliptical planform with slightly rearward swept tips. Every second cell is divided in two, with ribs additionally supported by diagonal **VSS** (V-shaped supports) system. Such arrangement ensures a smooth top surface, exact aerofoil reproduction across the entire wingspan and yet more importantly, minimal number of suspension points.

The lower surface has a **RSS** (Reinforcing Strap System) applied in the wing's interior. RSS is a ballooning-independent reinforcements system made entirely of paragliding fabric, effectively stiffening and stabilizing the canopy.

Synthesis Cabrio's aerofoil is another product of our Dudek Reflex Airfoil technology (**DRA**). It was designed with our previous experiences in mind and thoroughly tested with numerical methods. It is a reflex profile, with all its typical features described above.

The suspension point areas are additionally reinforced with laminated fabric so that loads are equally distributed on three planes: vertically (with the ribs), diagonally (with VSS system) and level through RSS.

All crossports have been prepared using **OCD** (Optimised Crossports Design) technology. Carefully designed shapes of the openings and their optimal placement between stress lines guarantee efficient pressure distribution in the canopy and its quick inflation. These openings are scaled together with the ribs, so their replicability remains perfect and they do not disturb the aerofoil in any way.

The leading edge of Synthesis Cabrio is closed to airflow, and its precise shape is supported by reinforcements of laminated fabric.

Cell openings are positioned on the undersurface in the vicinity of leading edge. Their position was chosen very carefully, so that they got maximum ram effect in possibly many flight situations. In several places the leading edge features our **CCS** (Closed Cell Structure) system - this is a number of closed cells in most important locations. It's goal is to hinder the backflow from the cells out and thus to facilitate their refilling and canopy recovery in case of a collapse.

Each wingtip consists of four additional cells, creating stabilizers. They maintain correct tension of the canopy, improve directional stability and play important role in keeping your turns efficient and even. In the very tips there are CS cleaning slots, placed there for easy removal of dirt from inside the wing.

Careful selection of modern fabrics and design solutions brings about great strength and durability of the Synthesis Cabrio. All materials come from numbered production batches, and each production step can be verified down to identification of specific worker and controller.

Fabric

Each kind of fabric has its unique features and characteristics. We composed them so that their interplay creates a perfect blend.

The Synthesis Cabrio's upper surface is made of Porcher Skytex 45 Evolution fabric (formerly named Aquatic), perfectly proven in our earlier wings. Basically it's a nylon material covered with superb E85A impregnate, introduced into mass production in January 2002 after a series of extensive laboratory and real flying tests. Such covered fabric is not very stiff and - what's most important - has increased tear, stretch and UV resistance. It is not siliconed, so minor repairs can be easily made with self-adhesive strips.

The lower surface is made of Skytex 40 Classic with E38A impregnate. This fabric has a great weight/resistance ratio and is one of the greatest Porcher successes in providing proper materials for the paragliding industry.

The ribs must be as rigid and stretch-resistant as possible. We found these qualities in Skytex 40 Hard with E29A impregnate. All reinforcements are made of SR-Scrim.

RIGGING SYSTEM

All of the Synthesis Cabrio suspension lines are sheathed in a coloured polyester layer, covering brownish Technora core. Relatively low number of lines required such composition, featuring high strength and stretch-resistance.

The rigging system consists of individual lines looped and stitched at each end. The upper level lines (gallery) start at the attachment points. Each two lines connect to one middle layer line, and those in turn connect by twos and threes to main suspension lines, which are attached to the risers with triangular quick links (maillons). To prevent their slipping off, the lines are kept together with a rubber 'O ring'. All the maillons are made of corrosion resistant, polished stainless steel, ensuring excellent strength and durability.

Stabilo lines run from wingtips to the maillons using cascade principle as well.

Same scheme applies to brake lines. They run from the trailing edge through consecutive cascades to main steering lines, which are lead through pulleys connected to rear risers and then fixed to the brake handles. Steering lines

do not carry any load. Some of the steering lines (of the FC group) are additionally led through rings sewn into the trailing edge. Because of this feature the trailing edge is shortened on application of the brake, so that steering becomes lighter and more effective.

All the lines are distinguished with colours depending on their strength and diameter as follows:

diameter: 2.3 mm; strength: 420 daN; colour: celadon (willow green),
diameter: 1.8 mm; strength: 280 daN; colour: red,
diameter: 1.5 mm; strength: 190 daN; colour: violet,
diameter: 1.3 mm; strength: 140 daN; colour: green,
diameter: 1.2 mm; strength: 90 daN; colour: blue,
(colours are subject to slight changes).

The Risers

Synthesis Cabrio is equipped with four-way risers featuring:

- an ELR (Easy Launch Riser) system. This is an specially marked A riser (gold ribbon) with additional point for clipping in lines or straps assisting the inflation process,
- trimmers made of red band with visible scale, designed for quick and easy replacement in case of deterioration;
- two levels of pulleys, to be used depending on the hangpoint,
- Tip Steering Toggle system.

For quick and easy recognition some of the risers are distinguished with coloured band as follows:

A - gold (used for launching)

A' - blue (used for big ears)

B - red (used for B-stall)

D - grey (needed to keep the glider down in strong winds or interrupting the launch).

Main A row suspension lines connect to an A (gold) and A' (blue) risers. B row and stabiliser lines go to B risers (red), C lines go to C risers (no distinction band), and D lines to D risers (grey), which through pulleys keep the steering lines too. Brake handles are attached to the steering lines at optimal places, guaranteeing safe and effective operation. On the main brake lines there are two points marked, higher and lower, to be used depending on the harness hangpoint. On adjusting the steering lines see chapter 3.1.

Our newest brake handle used in Synthesis Cabrio besides its robust yet light design features:

- **DCT** (Double Comfort Toggle) system
- **EK** (Easy Keeper) system - look below

3. FLIGHT OPERATION

3.1 STEERING LINES AND LAUNCH ASSIST ADJUSTMENT

A brand-new Synthesis Cabrio has its steering lines positioned for powered flight in high hangpoint configuration.

Risers of the Synthesis Cabrio are shorter than in most paragliders, so the differences in hangpoints present somewhat smaller problem. Still, there are two sets of pulleys prepared, higher and lower (see risers scheme). On the main steering lines there are spots marked for brake handles to be accordingly fixed for high hangpoint configuration, as this will be used most often.

When flying with lower hangpoints brake lines are to be run through the higher pulleys only, and the brake handles should be adjusted for personal comfort (shortening lines some). General rule is simple - higher hangpoints require longer brake lines, lower hangpoints require shorter lines.

Before you take your Synthesis Cabrio in tha air, we strongly advise to try out everything first. Hang up the entire PPG unit with ropes, sit in the harness and have someone pull up the risers. You must make sure that in flight you will always be able to reach the brake handles, even if the airflow blows them away.

While being suspended in this way, you have a perfect opportunity to adjust the launch assist system too (if present). It should engage the A risers, shortening them while the canopy remains behind the pilot. During inflation its effect should gradually diminish and finally disappear completely as the canopy arrives overhead. If you think the paraglider is rising up too rapidly, lines or straps of assist system should be lengthened.

An additional way to check the whole configuration out is to visit take-off site in steady winds. Fill the wing and take it up over your head. When it stabilises, check that the brakes are loose and do not pull the trailing edge. There should be a spare inch or so before they activate.

Remember that it is always safer to set the margin of play too big than too small. And, most important, the setting must always be symmetrical.

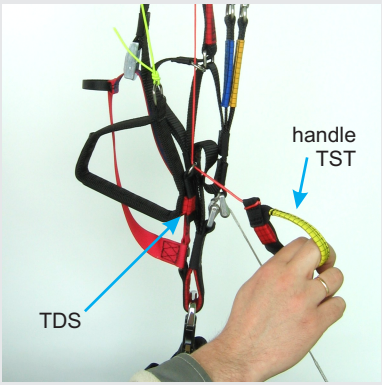
Double Comfort Toggle (DCT)

DCT: in order to satisfy different needs of our clients we have created a Double Comfort Toggle system. With this solution it is possible to have your brake handles in stiff or soft configuration, with no need to buy another set of toggles and replace them every time. All you have to do now is take out the stiffening rod and there you are - the soft handle is ready to use.

Easy Keeper (EK)

Easy Keeper is the name of our new indigenous way to hold the brake handles at the risers.
The strong neodymium magnets keep them firmly in place, while both attaching and releasing goes smoothly and easily. This idea was developed especially for the PPG dedicated paragliders, for there is often a need to take your hands off the brakes to check or fix things. With Easy keeper you can easily secure the brakes in flight, thus minimizing danger of their contact with the propeller.

Tip Steering Toggles (TST)



In order to facilitate steering the wing while at maximum speed configuration (opened trimmers and full speed-bar) we've invented our own novel system of controlling the stabilizers. Prior to grabbing miniature TST-handles (Tip Steering Toggles) pilot places the main steering handles in a special Toggle Docking Stations, equipped with strong neodymium magnets. In this way you can comfortably steer the wing via TST handles, not worrying about the brakes getting tangled.

Launch assist system

Additionally mounted straps shorten A risers during inflation (left photo). When the canopy is ready at 12 hrs position, A risers go back to their original length (assist system ceases to work - right photo).

3.2 FREE FLIGHT (no power unit)

Although the Synthesis Cabrio according to its design book is a fast PPG wing, it behaves surprisingly well as a classic tandem paraglider too and can be used as such without any changes.

The essential difference between Synthesis Cabrio and classic paragliders means that due to its increased tuck-resistance (both during start and flight) and greater speed range it can be safely flown in strong conditions. Generally (and paradoxically from traditional point of view) the faster you fly, the safer is your flight.

Most of tandem and practically all trike launches are executed as alpine (forward) launches due to considerable inertia of pilot/passenger combination. Reverse launches are being done only when it is really impossible to take off the classic way. A reverse launch with a trike is hardly possible at all.

3.2.1 TAKE-OFF

In case of **forward launch** we recommend that after laying out the wing all lines be taut, without unnecessary play. The Synthesis Cabrio is pulled up with A risers only. The optimal trim setting is “0”, i.e. fully closed. Applying steady pressure on the A risers (or engaging launch assist system) move forward. The wing practically does not overshoot, so the front collapses that otherwise happen quite often at launch, occur rarely with the Synthesis Cabrio. Instead it kind of waits for you to catch up with it.

In case of **reverse launch** we recommend the trims to be set depending on wind speed (the stronger the wind, the more open position). Due to lack of overshooting tendency take-off is easy, pilot only has to brake slightly beforer turning.

CAUTION

During take-off it is important to keep the risers under pressure until almost airborne. Reflex profile used has an inherent tendency to increase the angle of attack. In effect, Synthesis Cabrio can lag behind the pilot when not pulled up appropriately.

3.2.2 FLIGHT

The enlarged speed range of Synthesis Cabrio may demand some attention. Nevertheless, once you have mastered these additional aspects, flying will become pure pleasure. Good handling will let you make the best use of thermals, and increased speed on glides means that your presence in sinking air will be shorter.

To avoid stalls when braking at slow trims setting (low values on the scale), their movement is restricted by tape sewing. (Note: it is possible to push the sewn tape through the buckle with both hands to replace it, but normal operation range is restricted as said.

When the trims are fully opened (high scale values) the wing becomes faster and stiffer, increasing its stability even more. The brake forces increase too, as well as the distance to the stall point. The radius and bank angle in turns grow proportionately to the increasing brake forces. If the trims are set fast (or fully opened) and the wing is not flown near ground, a switch to TST steering is strongly advised (see page 10). Turns executed in this way will be slightly wider, but force needed to steer will be much smaller and, what's even more important, your airspeed will not be diminished by turning. TST system can be used in all speed system & trim configuration.

3.2.3 LANDING

With closed trimmers (slow position) Synthesis Cabrio lands like any other paraglider. The brake forces, initially low, are growing proportionally, giving ample warning before stalling. Still you should be careful when flying at low speeds until fully familiar with brake operation. When landing with trims set fast (above "0" position) your bigger speed may require proportionately more space. Note that the paraglider has a lot of kinetic energy and careless application of brakes may even cause the wing to climb.

Despite apparent ease of steering and most pilots quickly gaining enough trust to fly the wing in stronger conditions than usual, it is always advised to be careful when flying at low altitudes.

Remember that Synthesis Cabrio can fly faster than classic paragliders and sometimes it can be of importance (e.g. when landing on a slope).

After landing in strong wind the paraglider can be safely put down with a strong pull on the rear D risers.

3.2.4 WINCHING

Synthesis Cabrio is not designed for winching. As mentioned before, reflex profile used in the wing has an inherent tendency to increase the angle of attack. While in normal flight such a disposition makes it safer, during winch start it can be dangerous.

Nevertheless, a lot of successful winches on Synthesis Cabrio have been made. Experience shows that it should only be done with trims set a couple of centimeters above "0" point. Actual setting depends a lot on given take-off weight.

To sum it up: winching can be done, but proper attention must be paid.

3.3 POWERED FLIGHT

CAUTION: Before each start it is necessary to have a thorough check of the wing, harness and power unit (trike).

In powered flight most of the wing characteristics remain as described above (chapter 3.2). Still there is additional information needed, concerning power output, proper matching of the wing/engine/propeller/trike etc.

Dudek Paragliders cannot take responsibility for all possible combinations, but if you will contact us in doubt, we are always ready to help.

First flights

In order to get familiar with your wing we recommend flying with trimmers set slow, because in this configuration Synthesis Cabrio behaves as a standard wing. Flying like that try pulling the brakes until you feel resistance, usually it will be at about 1/4 of the range.

Once you feel competent with your wing, you can start experimenting with faster trim settings. Learn to use all the additional speed and safety of the Synthesis Cabrio .

3.3.1 TAKE OFF

Classic foot launch

Even when it seems that there is no wind at all, it is rarely so. Therefore always be careful in determining the conditions, as in PPG flying it is most important that the launch and initial climb are performed with a head wind (danger of losing your airspeed while crossing the wind gradient is greatly reduced). Special attention must be paid to trees, power lines and other obstacles, including the possibility of emerging rotors.

Wing preparation

Lay out the paraglider downwind of the power unit, with all suspension lines taut and pointing toward center of the power unit. The risers are to be laid on the ground. Set the trimmers at “0” (see fig. 2). In strong conditions faster settings can be advised. Make sure that you warm up the engine while standing windward of the wing. Stop the engine before clipping in the risers.

Now have a quick check whether:

- the helmet is on and locked,
- the risers are clipped in the carabiners,
- the trimmers are set,
- nothing will get in propeller's way,

- steering lines and handles are free and not twisted,
- engine is delivering full power,
- airspace is clear for take off.

When you are sure everything is OK, you can clip in the wing and execute launch as described in paragraph 3.2.1.a.

From now on you should steer the paraglider facing forward, without looking back over your shoulder (when the wing is low behind you, turning can cause some lines to get in the propeller). Also, possible stumbling and fall on your back with turning propeller is always dangerous (and costly), so this should be avoided at any price, even that of some damaged lines!

During launch, when you feel that the strain on both risers is equal, open up full power and lean back to counter the engine thrust, so that it can will you forward rather than towards the ground. The best option is not to use the brakes, allowing the paraglider to rise as it was laid out. If it starts to stray from its course, just pull the opposite riser and run under the centre of the wing while preserving starting direction. If the wind suddenly weakens, give a stronger pull on the risers.

If the paraglider drops to one side or back too far to be lifted again, kill the engine, interrupt launch and check the conditions once again.

As the wing comes up, its resistance grows lighter and it should stabilise above your head without overshooting. This is the best moment to check if it is inflated well and the lines are not tangled, but you should do it without stopping nor turning. If you feel the forces on the risers decrease, run faster and let go of the risers. See whether there is any opposition on the brakes and, if necessary, use them to correct direction or to increase lift at take-off.

Remember:

- If the cage of your power unit is not stiff enough, the risers strained during launch can deform it to the extent of collision with the propeller. Before giving it full power, check that the cage is free of any lines.
- Any brake operation (or steering input in general) should be smooth and gentle.
- Do not try to take off until you have your wing overhead. Hitting power before that can cause dangerous oscillations.
- Do not sit in the harness until you are sure you are flying!
- The faster the trim setting, the more brake input is required for lift off.
- The lower the hangpoints of your power unit, the easier is the launch.

Foraward launch with trike

Basic difference of the trike launch is that you are using your power unit to get the wing overhead, and instead of pushing the A risers usually a launch assist system is used.

After all preparations and checks, with the risers properly clipped in you can start the engine. If a launch assist system is used, there is just a steering handle in one hand, with the other hand grabbing the other brake handle and throttle. Depending on power output of your motor initially open the throttle only enough to fill up the canopy and get it above the propeller downwash. When the trailing edge gets some three meters above ground and both risers are equally loaded, open the throttle fully. Preferably you should not be using the brakes during launch at all and let the canopy rise as it was laid out. If you see it it getting off course, give a delicate counter brake and steer your trike under canopy root (center), while maintaining general take-off direction steady as possible. If the wing drops too far to the side or behind you to get it up again, switch off the engine, abort launch and re-evaluate conditions.

As the canopy rises, its resistance grows lighter and it should stabilise above your head without overshooting. Too hasty corrections of launch direction can result in sidewise oscillations – still, if they are not too deep, you can keep full power in order to get off the gound as soon as possible.

After lift-off canopy will stabilize itself overhead and throttle can be eased off a bit to get desired climb speed.

Reverse launch in strong wind

Reverse launch is possible only as a foot launch or with ultralight one-seat trikes. It can be executed holding both A risers and one brake in one hand, throttle and the second brake in the other hand. With a decent wind it is by far the best way. In weaker wind it is better to prepare a classic launch, as running backwards with an engine on your back is not an easy thing to do. It is reasonable not to pull the wing up until you are really determined to launch, especially when it is clipped in.

Lay down the rolled paraglider with the trailing edge facing the wind. Unfold the wing enough to find the risers and check that no lines are looped over the leading edge. Stretch the risers against the wind, separating left and right one.

We suggest that you lay the risers crossed in the same way you will be turning during a reverse launch, placing one riser over the other, with the rear risers upmost. It should be done this way because once you clip in, the cage of your power unit will make turning without help impossible.

Now run the pre-launch checklist.

After warming up the engine put the power unit on, turn to face the wing, go to the risers and clip them in appropriate carabiners.

Pulling on the front and rear risers open the cells. It is a good idea to pull up the wing briefly in order to check that the lines are not tangled. Holding risers, brakes and throttle as described above, pull the front risers and raise canopy over your head. On most occasions you will not have to brake it, especially if the trimmers are set for fast flight. Perhaps it does not agree with our experience, but this is the way the reflex profile works. When the trimmers are opened (set above “0”), the Synthesis Cabrio profile stabilises the wing and does not allow it to surge forward. It can even stay back a little - in such case pull the brakes a little and the glider will come forward.

Once you have it overhead, turn around, open the throttle and take off. As with the classic launch, in this case too you have to find such combination of trimmers, brakes and throttle settings that will give you the best speed and climb rate.

CAUTION:
You are launching with your hands crossed. You have to really master this technique before trying it with a running engine on your back.

When clipping in the crossed risers, you can find proper connection of the speed system particularly hard. Be careful not to confuse the risers!

Climbing

Once you took off safely, continue heading against the wind, using brakes to correct rate of climb. Do not try to climb too steeply - attempts to increase climb rate by pulling the brakes will have an adverse effect: due to the additional drag actual rate of climb will worsen, and with the throttle fully opened even a stall can happen.

In powered flight the Synthesis Cabrio behaves more like an aeroplane than a paraglider, and it is good idea to think about it in this way. If there are no obstacles present, it is by far safer (and more impressive for the spectators) to fly level for a while after take-off and gain some speed before converting it to height with a brief pull on the brakes.

Another reason not to try climbing too steeply is the risk connected with engine failure at low altitude. Although Synthesis Cabrio in a steep climb does not stay back so much as conventional paragliders do, low speed can easily lead to a stall. Besides, you should always be able to land safely in case of engine malfunction, so it’s better not to take unnecessary chances and fly with a safe margin of speed.

Depending on the power unit geometry, it is possible that after take-off you will notice a propeller torque (turning moment). It will try to turn you around,

so be prepared for counter-steering with a brake. If it happens during steep climb on slow trim and full power, beware of the stall possibility.

Due to typical PPG and PPGG feature - considerable vertical distance between thrust axis and wing chord - the range of safe power operation is closely related to your skills and equipment.

Power-unit induced oscillations

Certain configurations of engine weight, output, propeller diameter, and height & width of hang points can cause serious oscillations, during which pilot is lifted to one side by the torque effect, swings down due to his weight, then is lifted again and so on.

To avoid this you can:

- change the throttle setting and/or
- slighty pull (nort causing a turn!) and hold one brake to counteract the torque if there is one present and/or
- shift yourself to the other side of the harness and/or
- change the trimmer setting.

Such oscillations usually occur at full power - the greater the engine output and propeller diameter, the bigger the swings. In addition there are often too late or wrong pilot reactions, increasing the trouble instead of solving it. In any case the safest way to deal with this question is to reduce throttle and release the brakes.

Especially less-experienced pilots tend to overreact. It is called a pilot-induced oscillation, and proven solution in this case is to leave brakes alone.

3.3.2 LEVEL FLIGHT

Once you have gained safe height after take-off and wish to go for a route, you can turn onto right heading, fully open trimmers and let off the brakes. If the conditions are turbulent it can look foolhardy, but this is the essential feature of the reflex profile - the faster you fly, the safer your Synthesis Cabrio is. That's why you really can confidently release the brakes and enjoy your flight.

CAUTION: Some pilots with previous free-flying experience may have a well-grounded habit of keeping the brakes slightly applied at all times. Such a technique, while quite reasonable on a free-flying wings as it allows for quick pilot reactions and decreases sink, is not advisable on reflex-profile wings. When you pull the brakes, the Synthesis Cabrio profile actually loses its self-stabilizing character.

If you happen to have a variometer or altimeter aboard - watch it. In level flight it is very easy to start climbing unintentionally. The instruments will help you optimise speed and fuel economy. Of course the economy of each flight will depend on current configuration of your gear, but thanks to its ability to fly safely without constant piloting the Synthesis Cabrio will let you adjust everything to the best effect.

Good knowledge of weather conditions (e.g. wind at different altitudes) and intelligent use of thermals, convergence and other kinds of lift will help you greatly reduce fuel consumption and increase flight range. Of course the engine is always there to help you find the right spot. Once there, do not hesitate to lead the Synthesis Cabrio into thermalling in order to gain height and save fuel. Possible shortening of the trimmers will make the climb ratio even better.

Trimmers operation

The reflex wing section enables the Synthesis Cabrio pilot to use a wide range of trimmers action. You are free to experiment with all possible settings, as long as you are on safe altitude.

Fully opened trimmers increase the speed and stability of the wing, and with it also its ability to cope with turbulences and overall penetration. As forces on the brakes grow at high speeds, the weightshifting or steering with TST system becomes increasingly effective. Turns executed in this way are slightly wider, but needed steering force will be smaller and airspeed will not decrease.

With slow trimmer settings there is an improvement in sink and steering forces diminish, so exploring the thermals becomes possible.

Worth noting is Synthesis Cabrio's impressive speed range - maximum speed is almost three times greater than stall speed.

Study drawings that show trimmers setting and their influence on the wing shape.

Independent of the current wing configuration and speed, turns can be much tightened and more effective with differential brake operation. Slight use of the outer brake (with considerable amount of the inner one) will diminish the loss of lift during turn. Turns can be much improved by additional use of throttle as well. Once with growing experience you will master these techniques, you will be able to execute fully coordinated and effective turns, that will bring to mind the aeroplane handling.

Remember:

- Trimmer setting is yet another part of the pre-start check list!
- If it will be asymmetric, wing will be turning all the time. And if you will

inadvertently free them, reflex profile of the Synthesis Cabrio will keep the wing level, so after opening the throttle you'll start to descend with increased speed instead of climbing.

3.3.3 LANDING

In PPG flying there are two kinds of landing: with and without power.

Power off landing

At an altitude of 50 metres switch the engine off and start gliding as on a conventional paraglider. It reduces chances of damaging the propeller on landing, but on the other hand there is only one attempt possible - so it has to be done right!

With or without power Synthesis Cabrio better copes with turbulence on open trimmers. So, if the conditions are rough, it is better to make an approach with greater speed, plan a lot of space (as for a hangglider) and wear that speed off before touching down. Synthesis Cabrio preserves the energy well, so there is a long float necessary to exchange the abundant speed for lift.

If the landing field is not big enough and you have to land on the spot, we advise you to close the trimmers. It will increase lift coefficient of the wing, simultaneously decreasing its sink rate and speed. Such action is especially important when flying with high surface loading.

Landing with power on

Make a flat approach with the engine idling, then level out and lose the speed before final flare. Immediately after touchdown switch off the engine.

The main advantage of this procedure is of course possibility of a go-around in case of any misjudgement. Still, if you forget to switch off the ignition before the wing falls down, there is considerable risk of damaging propeller, catching lines with it or even suffering injuries connected with falling with your engine still running.

Remember:

- Whenever possible, get to know the landing field before taking off.
- Check the wind direction before planning the approach.
- Landing with power off requires much less space.
- In case of any doubt, practice the landing until you feel totally safe.

3.3.4 GOLDEN RULES!

- Never place the power unit downwind of the paraglider.
- Check, double check and then check once again if there is no fuel leakage.
- Do you have enough fuel for the flight? It is always better to have too much than too little!
- Check if there is nothing loose in the harness, that could possibly contact the propeller in flight
- Whenever you encounter a problem, fix it AT ONCE however small!
- Always put on and lock the helmet before getting in the harness
- Before each launch run a full pre-flight inspection
- After landing, control the wing facing the direction of flight, as on turning you always risk getting lines in the propeller. Turn only if there is danger of falling on your back
- Do not ask for trouble - do not fly over water, between trees or power lines and other places where engine failure will leave you helpless
- Remember turbulence caused by other gliders or even yourself, especially when flying low
- It is not reasonable to let go of the brakes below 100 meters, because a possible power unit malfunction may require immediate attention
- In general never trust your engine, as it can stop at any moment. Always fly as if that’s exactly what it's going to do
- Unless it is not absolutely necessary (e.g. collision avoidance), do not execute tight turns against torque. Especially when climbing you can easily enter a stall and consequent negative spin
- Do not fly at low altitude with a tail wind, as it pretty much narrows your options !
- Do not wait for the problem to grow - any change of engine sound or a vibration can indicate some trouble, or even serious trouble. You'll never know until you land and check it out
- Be certain of your navigation
- Remember that not everyone is fond of your engine noise. Do not scare the animals.

3.4 QUICK HEIGHT LOSS

3.4.1 BIG EARS

In order to get the big ears you have to pull down the outer lines of the A' risers (usually distinguished with blue colour) by about 50 cm.

While inducing big ears you should never never let the brakes out of your hands.

After tucking the tips in, Synthesis Cabrio will continue to fly straight with increased sink rate (up to 5 m/s). You can steer the wing pretty efficiently with weight-shifting.

After releasing the lines, the paraglider will usually open up on its own or you can assist it with a long stroke of the brakes until the tips fill again.

Executing big ears with open trimmers is very difficult due to reflex profile stabilisation.

CAUTION! See the PARACHUTAL STALL chapter.

Never try to pull big ears during powered climb, as the increased drag can lead to increase of the angle of attack and a parachutal stall.

Pulling the ears while climbing is pointless anyway.

3.4.2 SPIRAL DIVE

A spiral is characterised by highest sink rates possible. Significant G-forces, however, make it difficult to sustain a spiral dive for long, as it can place high loads on both pilot and glider. Never do this manoeuvre in turbulence or at too high bank angles. Control the dive and do not exceed 16 m/s sink. If the dive is not stopping after releasing the brake, assist the glider with the outer one.

NEVER DO BIG EARS IN A SPIRAL!

In this manoeuvre smaller number of lines is carrying an excessive load mulitplied by the centrifugal force, what can lead to damage of the lines or even the paraglider itself (load of a single line can be much higher than passed in certification trials (i.e. 8 G).

3.4.3 B-STALL

To enter a B-stall, simultaneously pull down both B-risers (red tape) by 10 - 15 cm. The wing will collapse across the entire span along its B-row, the airflow over top surface will break and canopy surface will be decreased.

Forward movement will be almost completely stopped.

Further pulling B-risers is not advised, as it increases wing instability. If the canopy forms a horseshoe with both wingtips in front of the pilot, gently apply both brakes to recover.

To exit a B-stall, the risers should be released in a smooth and decisive manner.

On quick and symmetrical releasing B-lines the airflow will reinstate and the wing will surge forward, returning to normal flight. In contrast to standard paragliders, in case of Synthesis Cabrio there is no need to counter this surge with brakes - yet another feature of the reflex profile!

CAUTION: see Parachutal Stall.

All rapid descent techniques should be practised in smooth air and only with sufficient height margin! Due to Synthesis Cabrio size and significant take-off weight many of the manoeuvres described above will be practically impossible .

BY FAR THE BEST TECHNIQUE IS SAFE AND SANE FLYING, SO THAT YOU WILL NEVER NEED TO DESCEND RAPIDLY!

3.5 ACRO FLYING

Synthesis Cabrio was not designed to do any aerobatics.

3.5.1 WING OVER

You make a wingover by performing a series of consecutive, alternating turns with growing bank angle. Too much banking connected with some flaws in co-ordination and execution can evoke pretty dynamic collapse.

CAUTION: Steep turn with bank angle over 60 degrees is a prohibited aerobatic manoeuvre!

3.6 EXTREME FLYING MANOEUVRES

CAUTION: EXTREME FLYING MANOEUVRES SHOULD ONLY BE CARRIED OUT DURING SAFETY TRAINING COURSE (INSTABILITY TRAINING) UNDER PROPER GUIDANCE!

WHILE PROVOKING OR EXITING REAL SITUATIONS THERE IS A DANGER THAT YOUR ACTIONS WILL PROVE TOO QUICK OR TOO STRONG, SO YOU SHOULD ALWAYS EMPLOY GOOD JUDGMENT, STAY CALM AND TAKE MEASURED ACTIONS.

Since all actions required to exit or prevent dangerous situations on Synthesis Cabrio are typical and pilots flying this wing should already have proper experience, we are going to describe only the characteristic features of this paraglider.

Description of standard methods dealing with extreme situations can be found in textbooks.

3.6.1 ASYMMETRICAL COLLAPSE

Even when the trimmers are fully opened, collapses practically do not occur and can be induced only by a very strong turbulence.

Still, if it happens, a little counter-steering is enough to keep the Synthesis Cabrio on course. In normal conditions with collapses up to 50% of the wingspan, paraglider will reinflate instantly and spontaneously.

3.6.2 FRONTAL COLLAPSE

The reflex profile of Synthesis Cabrio makes it practically impossible, especially at higher speeds.

During tests we succeeded in creating this situation only with fully closed trimmers and special technique. Unskillful execution can bring very deep collapses, so recovering will require pilot action (short and equal application of both brakes).

3.6.3 FULL STALL AND NEGATIVE SPIN

Practically do not occur, may happen only as a result of serious neglect or intentional action of the pilot. You have to be careful when flying at low speeds until fully familiar with brake operation.

Wing recovers spontaneously in initial phase of stall, otherwise use standard procedures.

3.6.4 PARACHUTAL STALL

Under normal conditions does not occur. If you want to prevent it happen at all, simply stick to a couple of rules:

- after B-stall, release the risers quickly and evenly. Don’t be afraid - Synthesis Cabrio does not
- jump forward excessively;

- before big ears execution, ease off the trimmers a couple of centimeters. This will increase both the sink rate and safety margin, as big ears constitute an aerodynamic brake with significant loss of speed.

Nevertheless, if such a parachutal stall happens e.g due to strong turbulence, release the trimmers or push the A risers forward.

3.6.5 LINE OVER and CRAVATTE

It is always possible that after collapse a stabiliser may tangle in the lines. Usually a couple of pulls with a brake settles the matter. If it's not enough, try to untangle it with big ears or stronger pull on the risers.

In case of any doubts you should always consider throwing a rescue chute. It is there as a normal equipment part, not just an ornament.

3.6.6 STEERING IN EXTREME SITUATIONS

In case of any malfunction rendering normal brake operation impossible, you can safely steer and land Synthesis Cabrio using D-risers (grey marking) or stabilo lines. For the heading control there is TST present.

4. CANOPY CARE

Looking after your paraglider will prolong the life of your Synthesis Cabrio.

STORAGE

Store the paraglider in a dry place, away from chemicals and UV exposure.

Never pack or store the glider when wet, as it significantly shortens life of the fabric.

Remember that the wing becomes damp even while lying on green grass in full sunlight, as the grass transpires.

A good precaution to avoid dampness and/or UV when you have to wait in a start queue is to use quick-pack after rigging up.

Always dry the glider thoroughly before packing or storage. While drying, never expose your paraglider to direct sunlight.

To avoid excessive paraglider fabric wear, do not pack it too tightly.

Please note that with frequent playing on a field or a small hill your paraglider will deteriorate faster due to its repeated rising, falling and being dragged around.

CLEANING

Clean the paraglider with water and a soft sponge. Do not use any chemicals or alcohol, as these can permanently damage the fabric.

REPAIRS

Repairs should only be carried out by the manufacturer, authorised distributor or authorised workshop. It is acceptable to fix minor cloth damage with the self-adhesive patches included in the package.

DETERIORATION: A FEW TIPS!

A paraglider is basically made of nylon - fabric which, like any other synthetic material, deteriorates through excessive exposure to UV rays that come with the sunlight.

Hence it is recommended to reduce UV exposure to a minimum by keeping the paraglider packed away when not in use. Even when packed in a bag, it

should not remain in the sun for long.

Synthesis Cabrio's suspension lines consist of Technora inner core and polyester sheath. Submitting them to excessive loads in flight should be avoided, as it can cause irreversible damage. Frequent bending is not desirable too.

Keep the paraglider clean, since getting dust in the lines and fabric will reduce their durability.

Be careful to keep snow, sand or stones from entering the cell openings: their weight can slow or even stall the glider, and sharp edges can damage the cloth.

Prevent lines from catching anything, as they can overstretch or tear. Do not step on the lines.

Uncontrolled strong wind launches and landings can result in the leading edge of the canopy hitting the ground hard, which may seriously damage the ribs, sewing and surface material.

Knots can chafe suspension and/or brake lines.

Check line lengths after tree or water landings, as they can stretch or shrink. A line plan is included in this manual or may be obtained from the dealer when needed.

After landing in water you should check the wing fabric as well, since the wave forces can cause the fabric to distort in some areas.

When taking the wing out of the water, always do it by trailing edge, so that water can flow out freely. After a sea landing, rinse the paraglider with fresh water. Since salt crystals can weaken the suspension lines even after rinsing in fresh water, you should replace the lines with new ones immediately after contact with salt water.

Every second year Synthesis Cabrio should undergo technical inspection by the manufacturer or authorised distributor.

5. TECHNICAL DATA

Synthesis Cabrio	42	46
Certification	pending	pending
Number of cells	54	54
Surface area (flat) [m^2]	42,00	46,00
Surface area (projected) [m^2]	36,05	39,48
Span (flat) [m]	14,78	15,47
Span (projected) [m]	11,79	12,34
Aspect Ratio (flat)	5,20	
Aspect Ratio (projected)	3,86	
Sink rate [m/s]	min = 1,8; trim = 2,0; max = 3,0	
Speed [km/h]	min = 35; trim = 45; max = 62	
Max. cord [cm]	351,10	367,50
Min. cord [cm]	77,30	80,90
Distance pilot to wing [cm]	946,00	990,00
Total line lenght [m]	569,00	597,00
Weight range [kg]	150 - 270	180 - 330
Weight [kg]	10,2	11,2
Lines	Technora: 1,2 & 1,3 & 1,5 & 1,8 & 2,3	
Fabric	SkyTex Evolution 45 g/m^2	
	SkyTex Clasic 40 g/m^2	
	SkyTex Hard 40 g/m^2	
	SR Scrim, SR Laminate 180 g/m^2	
Risers	PASAMON - Bydgoszcz, Polska	

6. WARRANTY AND AEROCASCO

Purchase of a new paraglider is a serious expense for any pilot. That is why we cover our paragliders with extensive warranties and additionally offer an AeroCasco insurance against damage and repair costs.

WARRANTY
Dudek Paragliders guarantees free of charge repairs caused by the material or production faults along following scheme:

For the free-flying paragliders warranty covers **36 months** (3 years) or 300 flight hours (depending on what comes first).If the paraglider is used for powered flights, every hour spent in the air should be counted as two (does not apply to dedicated PPG canopies).

For the PPG paragliders warranty covers **24 months** (2 years)/200 flight hours (depending on what comes first).

For the mountaineering (MPG) and speedflying wings as well as school and profit users warranty covers **18 months** (1.5 year)/150 flight hours (depending on what comes first).

WARRANTY DOES NOT COVER:

- canopy colour fading
- damage caused by chemicals or salt water
- damage caused by incorrect use
- damage caused by emergency situations
- damage resulting from accidents (airborne or not)

WARRANTY IS ONLY VALID IF:

- flight hours are correctly registered in the logbook of the owner (and possible earlier owners), distinctly marking PPG flights,
- the paraglider is handled in accordance with the operating manual,
- the purchaser has not carried out any repair by him/herself (excl. minor repairs with self-adhesive patches),
- carried out any modifications,
- the paraglider can be unmistakably identified
- the paraglider was being inspected according to prescribed timetable.

If you have ought your paraglider second-hand, ask its previous owner of the paraglider for a logbooks copy (total of flying hours since the date of first purchase).

AEROCASCO

Normal warranty does not cover repairs of damages caused by the user or a third party. As costs of such repairs can be considerable, Dudek Paragliders offer an AeroCasco insurance. It covers a one-off repair of any mechanical damage, no matter how big and whoever inflicted them.The only expenses the purchaser has to pay are shipping costs and so-called share-of-cost amount.

AeroCasco can be purchased only for a brand new paraglider (at the paraglider purchase). Its cost is 50 euro.

NOTE: AeroCasco is not available for all paragliders (check this before purchase). It can be obtained for privately used wings only.

AeroCasco applies only to damages that took place during take-off, flight or landing. Obviously, all faults in the material and manufacturing flaws are covered by normal warranty.

When handing the paraglider for the repair you have to present a card confirming its AeroCasco status. After the repair you will have to cover only the share-of-cost value of 50 euro.

AeroCasco is valid for one repair only.There is a possibility to extend AeroCasco for one more year. To do this you have to send your paraglider for inspection not later than a year after the date of purchase. Extension fee is 75 euro (incl. inspection).

Remember to attach the AeroCasco confirmation on expedition.

AeroCasco does not apply to any of the following: theft, colour fading, damage caused by incorrect storage or transport, damage caused by chemicals, salt water and force majeure.

7. WHAT HAVE YOU BOUGHT

The Dudek paraglider that you bought should have the following items:

- paraglider itself (canopy, lines and risers)
- transport bag (with compression strap)
- MotoBag - specialised double funcion backpack
- windsock
- pocket with paper work and repair wallet including:
  - piece of self-adhesive fabric (10 cm x 37.5 cm) for small repairs. Note that even small tears located in the vicinity of stitches have to be repaired by an authorised service.
  - looped and stitched suspension line longer than the longest line used in the paraglider that is to be used as a temporary replacement. Do not cut it if you have to replace a shorter line, just tie it at the length needed.
  - paraglider passport with entered date of purchase and valid technical inspection (please check the serial number with the sticker on the wing tip).
  - User Manual you are reading.
- Small gifts.

MotoBag

MotoBag is a dedicated solid backpack for PPG wings, made of proven Cordura fabric. Simultaneously it doubles as a quickpack if necessary.

Beside comfortable shoulder straps to hold it traditionally on your back it has side handles too, so that you can carry it like a suit-case when needed.

After turning it inside out it becomes a quickpack that will shelter your unfolded wing when you are in a hurry.

SUMMARY

If you respect the rules of safe flying and proper glider care, you will enjoy many years of pleasant airtime on Synthesis Cabrio. Still, you must be aware of possible dangers and face them wisely. You must accept the fact that all air sports are potentially dangerous and your actual safety depends solely on you.

We insist that you fly safely, and this concerns both the weather choice and safety margin during all manoeuvres.

FLYING THE PARAGLIDER IS ALWAYS YOUR OWN RESPONSIBILITY.

SEE YOU IN THE AIR!

8. RIGGING TABLES

Lengths are measured with a specialised, computer-operated device. All lines are stretched with a 5 kg load before cutting. Thanks to the abovementioned device and proper procedures, final tolerance of line lengths does not exceed 0.15%.

xP - main suspension line of x row,

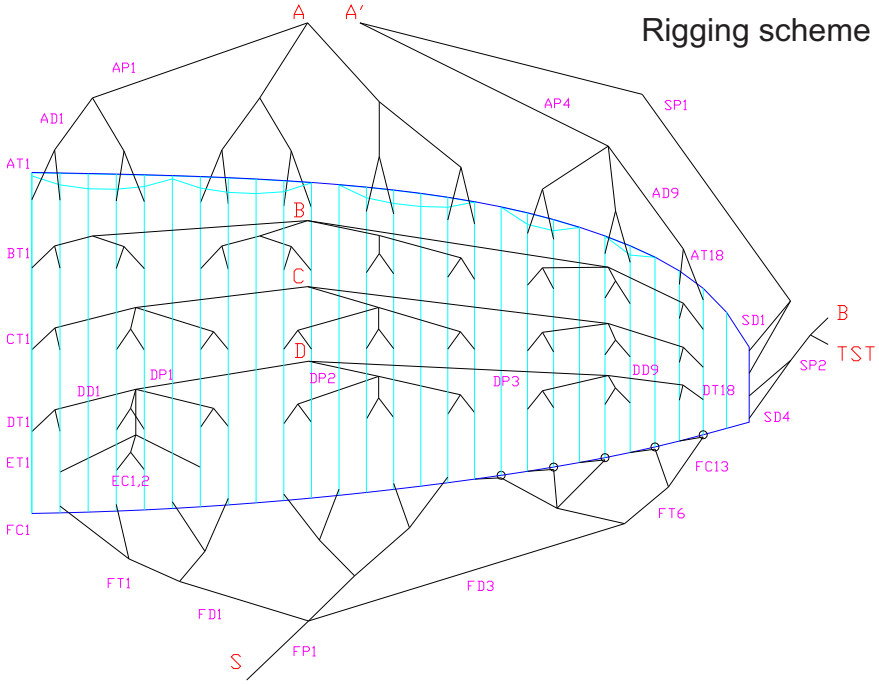
xD - secondary line of x row,

xT - third level of x row (near the canopy),

FC - fourth level of steering lines (near the canopy).

CAUTION!!! Distances given below are to be understood as distances between connection points. When cutting a line for repair, 20 cm extra must be added, as at each end a 10 cm stitch is required to fix the loop. The only exception is the main steering line (EP1), which is looped only at the upper end, while there is 20 cm left on the lower end for fastening brake handle (this means 30 cm extra is needed).

Rigging scheme



Synthesis Cabrio 42

	A Row			B Row			C Row			D Row			E Row			Steering lines				Stabilizer	
Lines	AT	AD	AP	BT	BD	BP	CT	CD	CP	DT	DD	DP	EC	ET	ED	FC	FT	FD	FP	SD	SP
1	835	1645	6755	830	1630	6700	835	3120	5315	845	2780	5875	675	2165	1620	1345	1540	4215	4400	515	7760
2	785	1630	6740	785	1620	6690	790	3045	5360	790	2675	5855	665	1385		1080	1030	3455		545	7615+
3	790	1625	6755	780	1610	6735	815	3085	5780	830	2715	6100		2110		1375	1470	2745		495	+245
4	815	1600	5580	810	1595	5715	805	3005		820	2690					1250	1045			550	
5	815	1565		810	1535		790	2940		800	2590					1320	915				
6	770	1545		765	1530		815	2985		835	2625					1075	1160				
7	780	2645		770	2495		810	2475		825	2255					1320					
8	805	2460		800	2335		770	2310		775	2055					1235					
9	795	2380		785	2300		790	2285		810	2015					2100					
10	755			750			785			795						1870					
11	755			740			755			775						1730					
12	770			760			770			795						1265					
13	760			735			750			770						1110					
14	700			680			685			695											
15	755			720			720			745											
16	700			670			665			680											
17	665			600			570			570											
18	635			575			525			515											
Type	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Diam.	1,3	1,5	2,3	1,3	1,5	2,3	1,2	1,3	1,8	1,2	1,2	1,5	1,2	1,2	1,3	1,2	1,3	1,5	2,3	1,2	1,5/1,3

Synthesis Cabrio 42

Nr Lines	A Row	B Row	C Row	D Row	E Row	Steering Lines
1	9240	9165	9280	9515	9675	11500
2	9190	9120	9235	9460	9570	11235
3	9180	9105	9185	9395	9560	11020
4	9205	9135	9175	9385	9620	10895
5	9185	9115	9200	9405		10645
6	9140	9070	9225	9440		10400
7	9125	9060	9185	9385		10220
8	9150	9090	9145	9335		10135
9	9120	9060	9100	9270		10160
10	9080	9025	9095	9255		9930
11	9060	9010	9110	9270		9790
12	9075	9030	9125	9290		9570
13	8990	8950	9015	9140		9415
14	8930	8895	8950	9065		
15	8800	8775	8820	8915		
16	8745	8725	8765	8850		
17	8630	8620	8645	8700		
18	8600	8595	8600	8645		
19	8295	8325	8370	8425		

Synthesis Cabrio 46

	A Row					B Row					C Row			D Row			E Row			Steering lines			
Lines	AT	AT	AD	AD	AP	BT	BT	BD	BD	BP	CT	CD	CP	DT	DD	DP	EC	ET	ED	FC	FT	FD	FP
1		870		1720	7090		870		1705	7030	875	3270	5425	885	2910	6020	705	2270	1695	1405	1610	4410	4450
2		825		1705	7075		820		1695	7025	825	3190	5480	825	2800	6000	695	1455		1135	1080	3615	
3		825		1700	7095		815		1685	7070	850	3225	5925	870	2840	6265		2205		1440	1540	2875	
4		855		1680	5870		845		1670	6010	845	3145		860	2815					1310	1095		
5		850		1640			845		1610		825	3080		840	2715					1385	960		
6		810		1620			805		1605		855	3125		870	2750					1125	1215		
7		815	2770				805	2610			850	2590		865	2355					1380			
8		845	2575				840	2445			810	2420		810	2150					1290			
9		835	2495				825	2410			825	2395		845	2115					2200			
10		790					785				820			835						1960			
11		790					770				790			810						1810			
12		810					795				805			830						1330			
13	795					770					785			810						1165			
14	730					710					720			730									
15	790					755					755			780									
16	735					700					700			710									
17	695					630					595			600									
18	665					605					550			540									
Type	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
Diam.	1,3	1,5	1,5	1,8	2,3	1,3	1,5	1,5	1,8	2,3	1,2	1,3	1,8	1,2	1,2	1,5	1,2	1,2	1,3	1,2	1,3	1,5	2,3

Synthesis Cabrio 46

Nr Lines	A Row	B Row	C Row	D Row	E Row	Steering Lines
1	9685	9610	9580	9830	10000	11875
2	9640	9560	9530	9770	9890	11605
3	9625	9545	9475	9705	9880	11380
4	9655	9575	9470	9695	9935	11250
5	9630	9560	9485	9715		10990
6	9590	9520	9515	9745		10730
7	9575	9505	9485	9695		10540
8	9605	9540	9445	9640		10450
9	9575	9510	9395	9575		10485
10	9530	9470	9390	9565		10245
11	9510	9450	9405	9575		10095
12	9530	9475	9420	9595		9870
13	9440	9395	9310	9445		9705
14	9375	9335	9245	9365		
15	9240	9215	9110	9210		
16	9185	9160	9055	9140		
17	9065	9055	8925	8995		
18	9035	9030	8880	8935		
19	8710	8745	8780	8840		

9. RISERS: DESIGN AND ACCESSORIES

Figure 1 Hangpoint setting: A - high, B - low.
Synthesis Cabrio 42

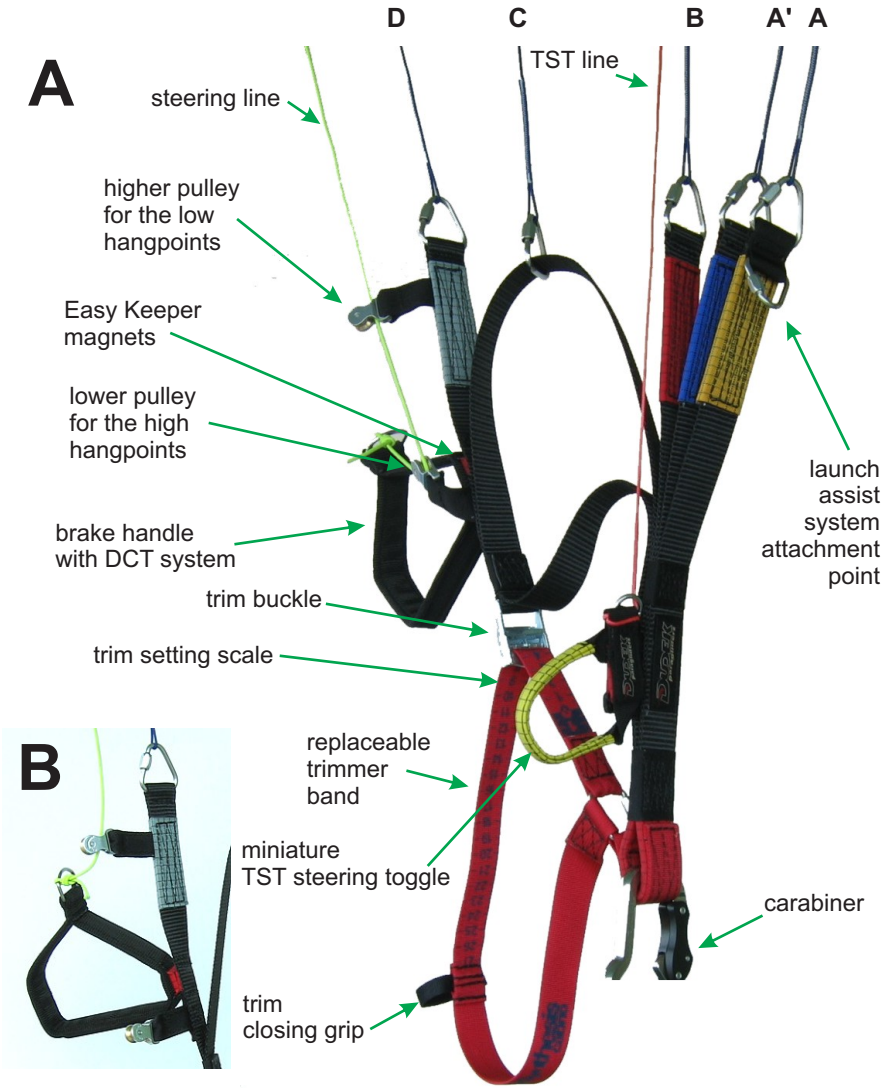


Figure 2 Hangpoint setting: A - high, B - low.
Synthesis Cabrio 46

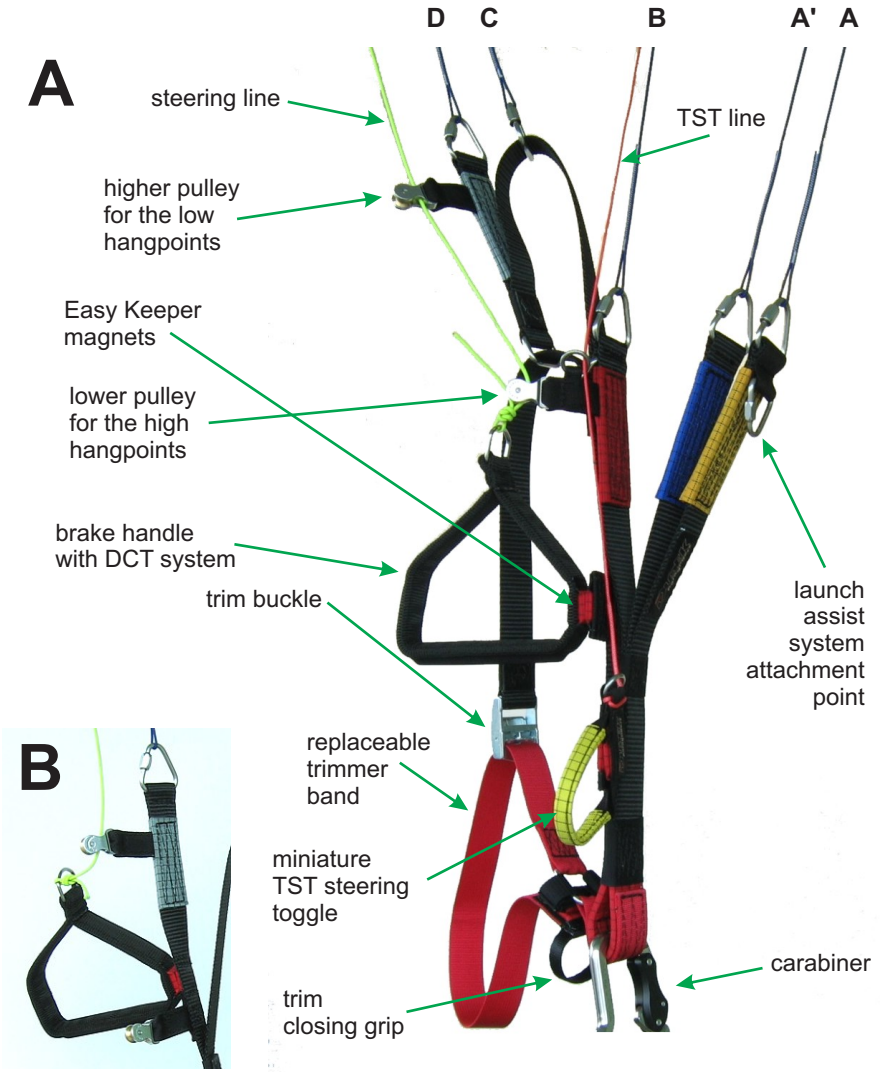


Figure 3 Trimmers influence on the wing profile **(Synthesis Cabrio 42)**

Trimmers closed

Minimal speed and
minimal sink

neutral configuration
all risers length: 380 mm

Trimmers fully opened

Maximum speed

neutral configuration
risers length: A, A', B: 380 mm

lengthening [mm]:

Figure 4 Trimmers influence on the wing profile **(Synthesis Cabrio 46)**

Trimmers closed

Minimal speed and
minimal sink

neutral configuration risers length:
A, A', B: 380 mm
C, D: 530 mm

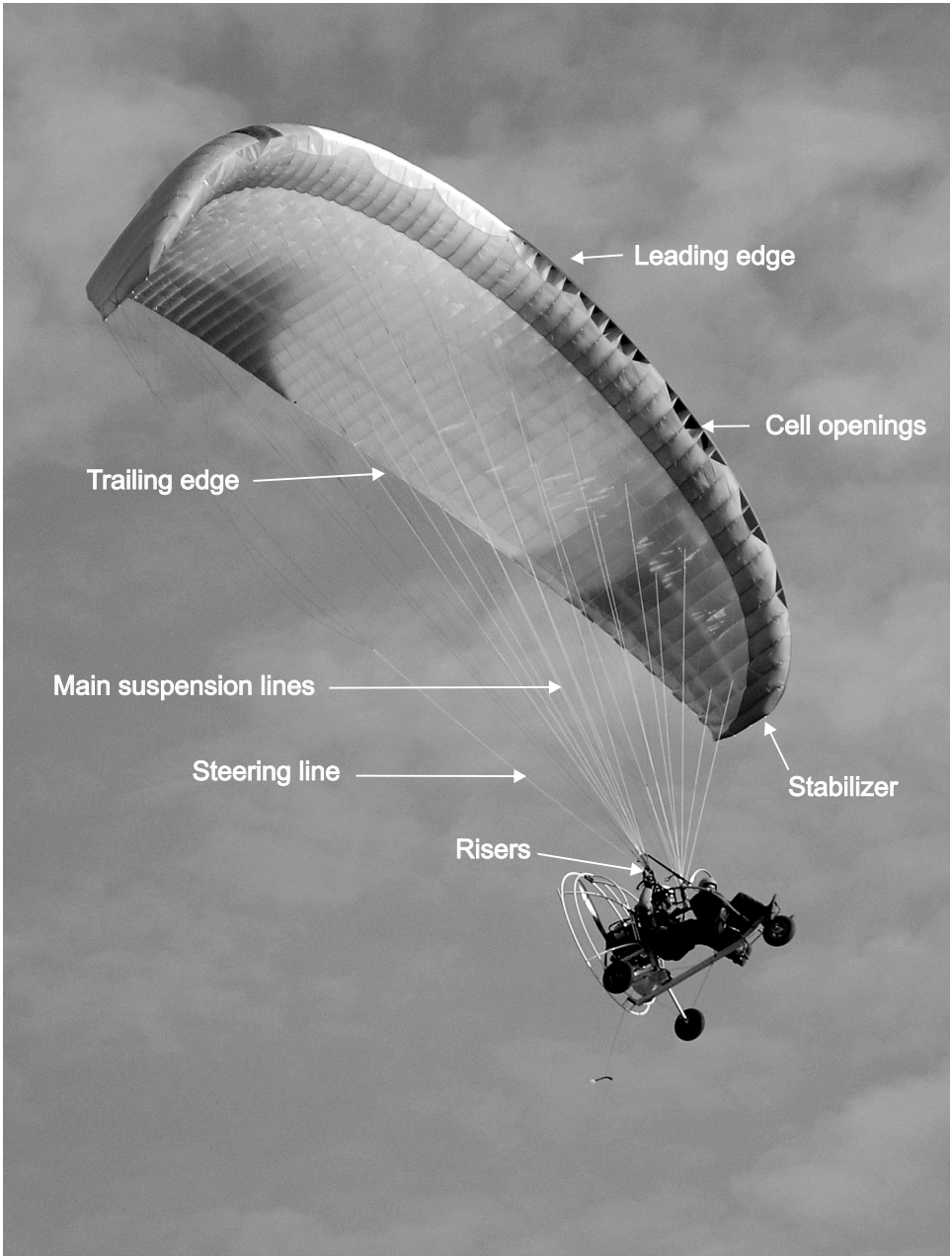
Trimmers fully opened

Maximum speed

neutral configuration risers length:
A, A', B: 380 mm

lengthening [mm]:

+210 +105


Leading edge
Cell openings
Trailing edge
Main suspension lines
Steering line
Stabilizer
Risers

V 08.05.2009

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