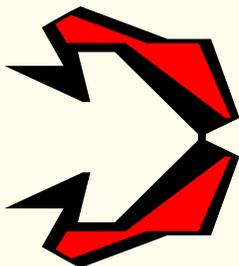


HADRON



guide



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Most important guidelines concerning Hadron use

A. Steering system of the Hadron consists of following parts:

1. **2D** - versatile control system with regular steering toggles attached
2. **TEA** (Torque Effect Adjuster) - allows for compensation of torque effect by making a knot and fixing it in the cleat. Exact position of the knot is to be adjusted to fit the extent of torque effect in individual paramotor. It is possible to use a number of knots, corresponding to preset propeller revolutions.
3. Classic trimmer
4. Classic speed system

Some elements of the above can function as well known (from our previous paramotor gliders) ALC and TST systems:

ALC - the outer 2D line attached to the break toggle - you can use it by grabbing the line above the toggle (with the toggle itself still kept in hand, attached to the magnet or dangling free)

TST - the line going through TEA cleat - apart of its nominal torque compensation you can use it for steering too, either by grabbing the line directly, or by pulling the small TST toggle (present in MK3 rigging version and above).

B. Speed modes

Three basic speed modes (configurations of trimmers/speed system) can be defined:

- a) **Slow mode** (trims closed): - pilot can use regular steering toggles
- b) **Fast mode** (either speed bar pushed, or trims released, but **not both at once!**)
 - pilot can use toggle, although it might be hard
 - it is more efficient to use ALC (outer line of the steering toggle)
- c) **Full speed mode** (trimmers released AND speed bar pushed):
 - pilot should never use neither main steering toggles, nor the ALC line,
 - pilot should use the TEA/TST only!

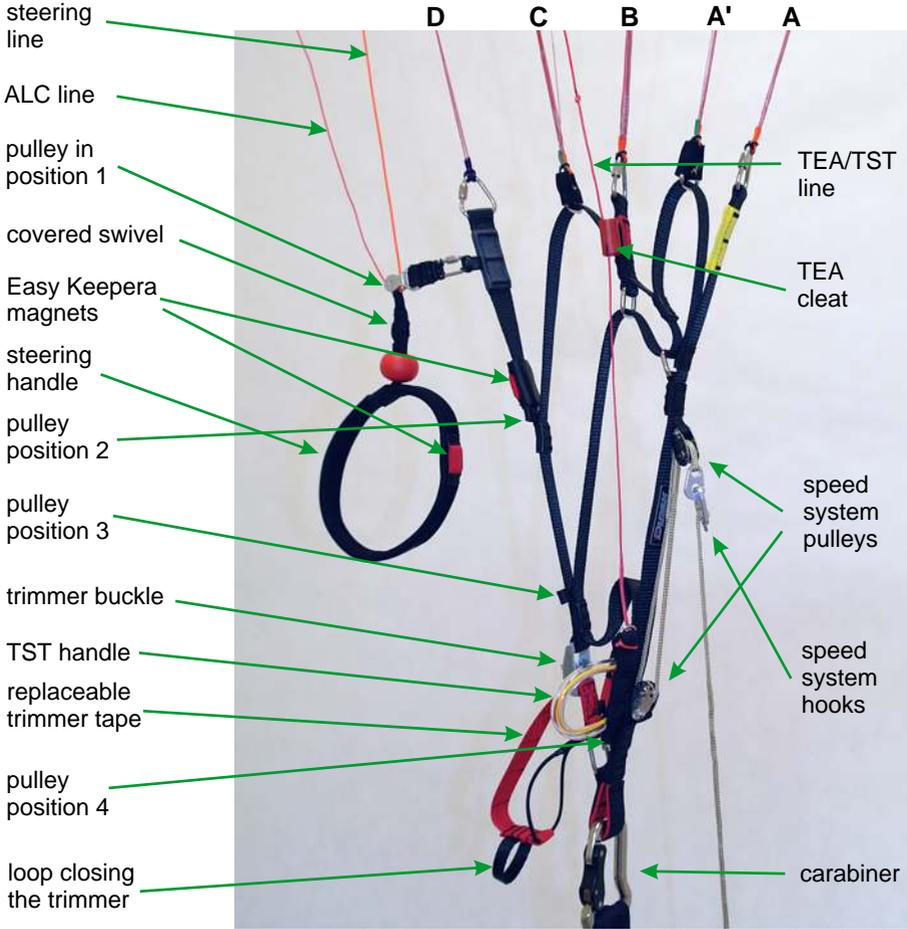
All above information constitute guidelines only. The whole 2D/ALC/TEA/TST system is very versatile, and each pilot will find his own way to use it. Even though, experimenting should be taking place only after getting familiar with the wing (several flight hours minimum). More detailed description of steering to follow in next chapters.

Speed system of the Hadron works exactly the same way and has the same range as trimmers system. Speed and trimmers are fully exchangeable in operation, so their exact proportion will depend on pilot's preferences only (considering the abovementioned rules of speed modes are kept).

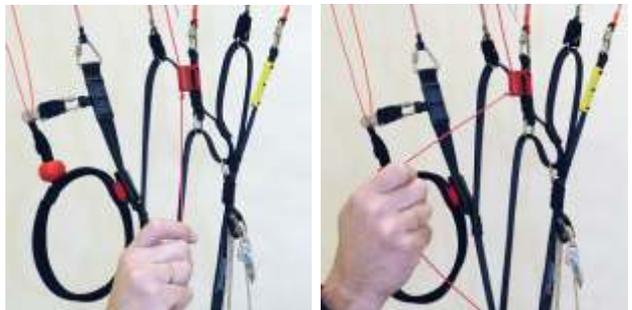
C. Reflex profile

The Hadron has full reflex profile already with closed trimmers. Releasing the trimmers or using speed system further enhances that feature.

Risers in low hangpoint configuration (pulley placed high)



Locking TEA line in the cleat. The knot should be placed for optimal torque effect compensation.



D. Adjustment of steering lines length and placement of the pulleys

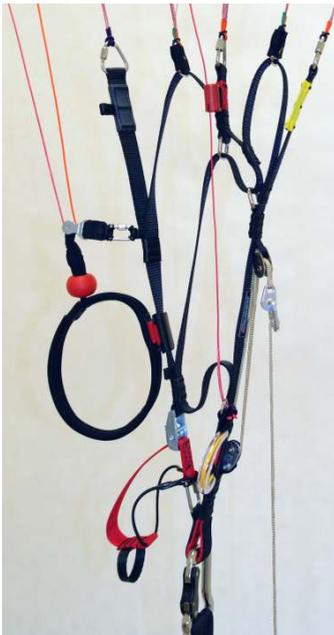
There are as much as four possible positions of each pulley.

As standard, the pulley is placed in the highest position (close to the quicklinks).

The lowest (4) position of the pulley should be used in extreme situations only, when it is really necessary and founded on pilot's own experience. Please note that when placed that low, the pulley does not move upwards when you open the trimmers. Thus, significant lengthening of the steering lines may be necessary. If they are not long enough, a longer set has to be ordered.

Moving the pulley from highest position (1) to lower one (2) practically does not require adjustment of the steering lines. Next transition, from (2) to (3) will certainly call for increasing the steering line length by the same amount the pulley was moved.

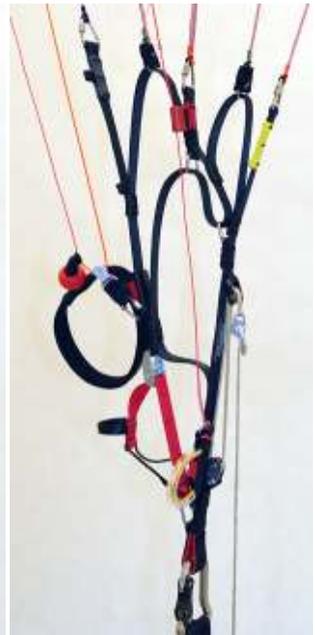
Adjustment of the Easy Keeper magnets on the risers is possible as well. At highest



The pulley in 2nd position with closed trimmer; EK magnet is fixed above the trimmer buckle



The pulley in 3rd position with closed trimmer; EK magnet is fixed above the carabiner



The pulley in 3rd position with partially opened trimmer; EK magnet is fixed above the trimmer buckle

pulley position the EK magnet is at its highest too; in lower positions it is fixed lower or even at the carabiner (see picture).

Length of the steering lines should be adjusted so that when flying at full speed (open trimmers + speed system engaged) the brakes would not in any way affect the trailing edge.

Steering lines progression, i.e. the difference in length between central line going through the pulley and the outermost (red) line is standardized, and some pilots may deem it not effective enough. If you feel like that, you can change the progression according to your preferences. In any case it is better to keep that change reasonable (+- 10cm max.) and all rules listed above must be observed in full.

E. Operation in flight

Take-off: Trimmers fully closed (0) or slightly let off (2 to 3 cm) depending on individual preferences and weight of the pilot. Trimmer scale is marked every 3 centimeters.

Flight - trimmers closed (slow mode):

Steering is done with main brake handles. You can pull them straight down along your body or sideways, away from the body, thus differentiating progression and bank angle in turn.

1. Straight down along your body - bigger progression, sharper turns.
2. Away from your body - lesser progression, turns with less banking.
3. Combined technique - "inner" hand along the body, "outer" hand moves away to keep central part of the canopy solid and stay ready for necessary corrections.

Flight - trimmers off or speed-system engaged (fast mode):

In general, steering is the same as described above. However a lot more force is needed, so you should consider grabbing the outer steering line above the handle. In this way you will be steering mainly via the outer part of steering system (much like ALC).

While on long routes, it is definitely recommended to steer using only the TEA line (low hangpoints) or TST handle placed at lower end of TEA (high hangpoints). TEA line works exactly like the TST system - you got "two in one" here.

With low hangpoints some pilots can find the TST handle superfluous at all. In such case it can be taken off completely, and the end of TEA line can be permanently fixed at DCT docking station.

Flight - trimmers off and speed-system engaged (full speed mode):

Due to relatively high aspect ratio of the Hadron and consequent short aerodynamic chord of the outer canopy segments, steering the paraglider with main brake handles at full speed configuration becomes impossible - all attempts to use the main brakes result in collapses. As such, this is not dangerous, it will even hardly alter the flight path (given that pilot won't be keeping the brakes down for long). However, this phenomenon is undesirable, unpleasant and - most of all - not effective as a means of directional corrections.

It follows that steering at full speed should be done **only with the TEA line** (low hangpoints) **or TST handles** (high hangpoints). Those systems do not distort the reflex profile, thus guaranteeing safety and efficiency of operation.

Every pilot should find out for himself how much trimmer can be let out before steering with main brakes at full speedbar becomes impossible, or - alternatively - how much speedbar can be used with trimmers fully opened. This will depend on a number of factors, including size of the canopy.

Finding that range is especially important in case of slalom competitions. Common technique calls for flying at full speedbar and specific trimmer setting which enables good canopy control without any collapses. When exiting sharp turns the speedbar has to be pressed too, since not doing so will result in rapid climb on dangerously high attack angle, with associated risk of losing lift and entering stall or deep stall.

For example, pilots have found out that for smaller sizes (20 and 22, most often used for slalom), trimmers release that still guarantees stable flight amounts to some 3 cm. In each individual case this setting can be different and it is quite possible that even greater release of the trimmer will allow safe use of main brakes in fast mode.

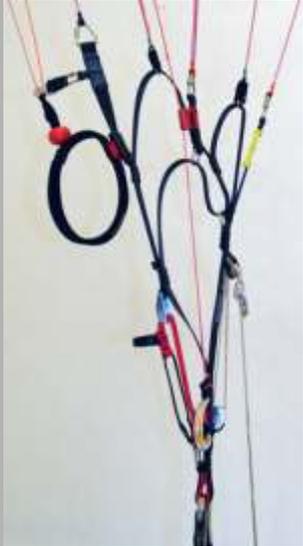
Whenever you fly at high speed - be it on open trimmers or speedbar - smooth steering inputs are recommended. In accelerated flight of the reflex canopy the last rows of suspension lines often happen to be slack. Abrupt pulling on the steering handle causes immediate change of pressure & trimming of the aerofoil, resulting with rapid collapse.

F. Landing

For landing trimmers should be set as fully closed (0) are slightly released (2 to 3 cm), depending on individual preferences and weight of the pilot.

Since wing loading of the Hadron is usually higher than of our other paragliders, landing with slowed-down canopy with little speed should be definitely avoided. In contrast, a full-speed landing with flare is recommended. Hadron is very efficient at converting airspeed for lift, so you can glide a long way slowing down with gradual increase on the brakes. Finally the level flight is stopped and soft touch-down ensues.

Trimmers and speed-system influence on the aerofoil

<p>Slow mode</p> <p>Trimmers fully closed (0) Speedsystem inactive</p> <p>Slowest speed, minimum sink. Take-off setting</p>  <p>All risers neutral at 490 mm length</p> <p>D C B A' A</p>	<p>Fast mode</p> <p>Trimmers fully released Speedsystem inactive (alternatively - applied speed and closed trims)</p> <p>Increased speed</p> <p>Trimmer: Speed: A - 490 A - 320 A' - 515 A' - 350 B - 540 B - 380 C - 585 C - 435 D - 630 D - 490</p> <p>D C B A' A</p>	<p>Full reflex mode</p> <p>Trimmers fully released Speedsystem applied in full</p> <p>Maximum speed</p>  <p>Trimmer + Speed: A - 320 A' - 370 B - 420 C - 525 D - 630</p> <p>D C B A' A</p>
		

Different steering modes

Steering by main brake handles only (slow or fast flying mode)

Effects differ depending on the direction of pulling the brakes (details on next page)

Main brake handles + ALC line (fast mode)

Adjustable steering progression depends on the extent of the pull

Steering by ALC line only

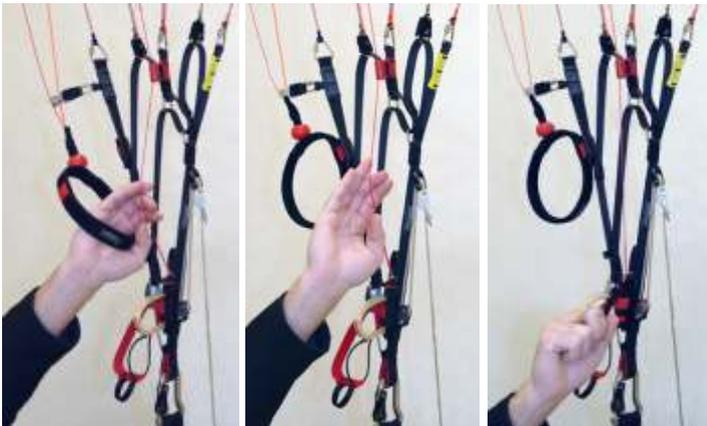
Brake handle can be placed at its magnet or hang freely



Steering by TEA/TST line (necessary in full speed mode)

- use the very TEA/TST line (with brake handle either held in hand or placed at the magnet), or:
- use the TST handle (depending on hangpoint height)

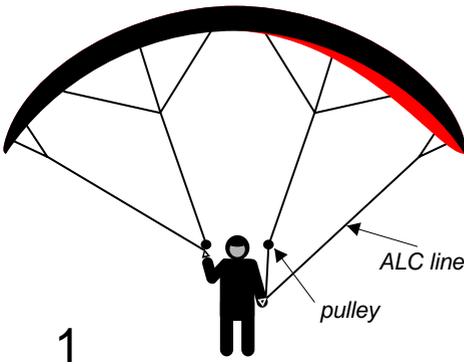
The TEA line used for torque effect compensation:



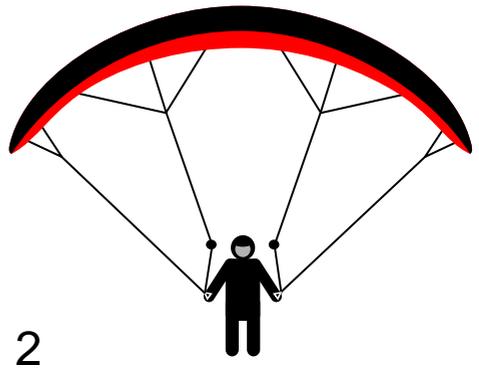
G. 2D steering system - examples

Below you will find typical steering moves taking advantage of the 2D system. The examples shown do not constitute a complete list - a lot of midway configuration exists and it's up to each pilot to discover his favourite.

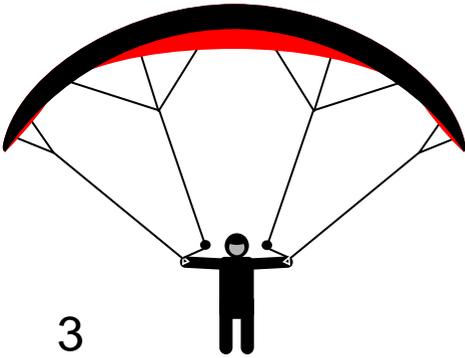
2D steering is considerably different than classic steering. Its possibilities are dazzling, especially for the pilots seeking top performance in the competitions. 2D offers much greater canopy control, but requires learning new (different) reactions. The pilot should take his time in order to learn all possibilities of this system and work out his own techniques before he would be able to use 2D system in challenging environment of competition flying.



Conventional turn - pull down vertically on one toggle

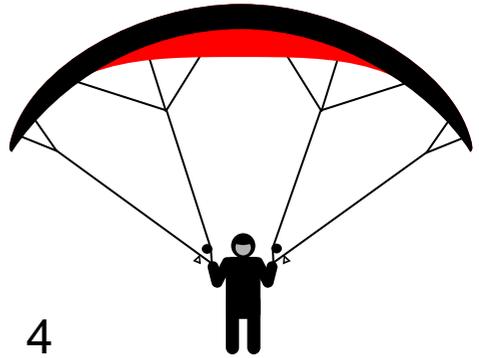


Conventional slow-down - pull down vertically on both toggles



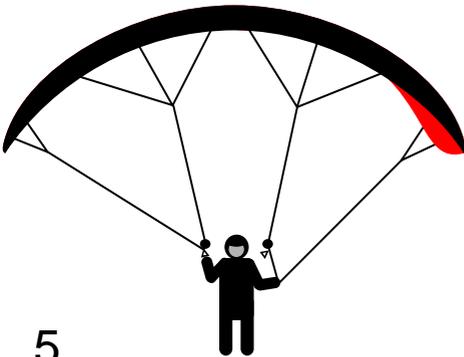
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Strong slow-down with central part - pull both toggles sidewise



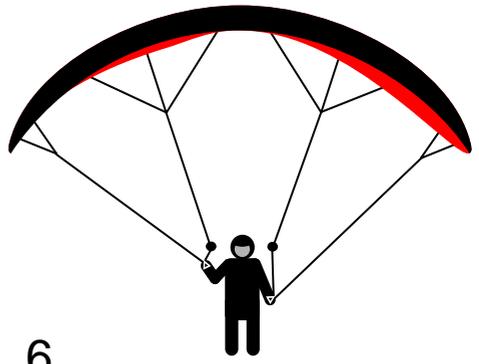
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Extreme slow-down with central part - pull inner lines down



5

Tight turn - pull down the outer ALC line



6

Deep turn - pull down the inner brake handle and the outer toggle little a bit aside



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