OPPOSITE LINK SUSPENSION SYSTEM

The OLS system is a patented rear suspension system from the **"High Virtual Pivot Point"**.

It consists of a main or front triangle, a swingarm triangle and two links (upper and lower links) that control the movement of the swingarm relative to the main triangle and define the trajectory of the rear wheel axle.

The feature that makes the OLS system unique is the lower link, which rotates counterclockwise and supports an idler pulley, which acts as a floating chain deflector.

The upper link can rotate in both directions. This allows us to create two groups with different kinematic characteristics. Within these two groups, we can play with the arrangement of the pivot points and the way the shock absorber is compressed to create a multitude of versions.

What does the OLS system offer over other suspension systems?

The answer is that **it allows us to create rear axle trajectories with rebound, with Anti-Rise values lower than other systems with the same rebound, and to separate the Anti-Squat and Pedal-Kickback curves.**

By playing with these elements and the shock absorber/wheel compression ratio, we can optimise different kinematics for each type of MTB and obtain the desired bike performance in each case.

GENERAL FEATURES OF THE OLS SYSTEM IN EACH PARAMETER

LEVERAGE RATIO

It is the ratio between the rear wheel axle travel and the shock absorber travel. What can be gleaned from this parameter is the behaviour of the suspension system in terms of the system's ‘sensitivity’ or ‘stiffness’. It is often said that high Leverage Ratio values translate into high “sensitivity” or low ‘stiffness’ and vice versa.

Our view is that the optimal values are different for each type of MTB, which is why we adapt the OLS system for each one.

SAG

This is the point in the suspension travel caused by our weight when we get on the bike. It is therefore the point in the travel where the suspension system works the hardest.

It is measured as a percentage of the total suspension travel and it is important to adjust it correctly so that the suspension system performs as we want it to.

ANTI-SQUAT

It indicates the efficiency of the force generated when pedalling being transmitted to the rear wheel. Specifically, this parameter compares the force that ‘attempts’ to compress the suspension, due to the transfer of mass to the rear wheel as a result of acceleration when pedalling, with the force that ‘attempts’ to decompress the suspension, due to the force exerted by the chain on the rear axle sprocket when pedalling. Generally, this parameter is calculated graphically, as it is easier than finding the resultant forces at each point of the travel. In general, it can be said that:

efP o Anti-Squat = FChain/FAc*100

Where:

- FChain: Resultant force on the rear axle due to chain tension when pedalling..
- FAc: Resultant force on the rear axle due to the transfer of mass produced by acceleration.

From this, it can be deduced that 100% pedalling efficiency indicates that the force that ‘attempts’ to compress the suspension is equal to the force that ‘attempts’ to decompress it, so that, ideally, no energy is lost and the swing amplitude is 0 mm. Values above 100% indicate that the suspension will decompress and vice versa.

Unlike most systems, the OLS System allows you to:

- Achieve ascending Anti-Squat curves that help provide a firmer feel when pedalling.
- Maintain values close to 100% across the entire SAG range, which is the range in which you pedal most of the time. This gives you greater freedom to choose the desired SAG percentage.
- Adjust the Anti-Squat independently of other parameters. We are free to choose the location of the floating pulley, thereby optimising the Anti-Squat values in relation to the desired chainring, sprocket, size and performance.
- Increase the diameter of the chainring without decreasing the Anti-Squat values. Although we have the freedom to adjust the parameter during the design, it is good to know that if we fit a larger chainring, the efficiency will increase rather than decrease.

PEDAL KICK-BACK

It consists of the backward rotation of the cranks caused by the increase in the distance between the bottom bracket and rear axle when the suspension compresses. In other words, the chain pulls on the chainring and causes the cranks to rotate backward.

In general, high Anti-Squat values imply high pedal kickback, but thanks to the floating derailleur featured in the OLS System, this effect can be reduced to values close to 0.

In practice, this means that we will not notice any pedal kickback or chain slack when pedalling on uneven surfaces, and that the suspension will work freely, maintaining traction at all times.

AXLE PATH

This is the trajectory described by the rear wheel axle. It is undoubtedly one of the most underrated parameters in suspension systems. However, with the recent trend towards high pivot point (HPP) systems, we are becoming increasingly aware of its importance.

To efficiently absorb a shock, the direction of the shock absorption and the direction of the shock must be the same. The worst case scenario would be if the direction of shock absorption and the direction of the shock were exactly perpendicular, rendering the shock absorption completely useless, as if it were a rigid shock. If the bicycle fell vertically to the ground, the optimal direction of shock absorption would be vertical. This is never or almost never the case, as the bicycle is always travelling at a certain speed, so the direction of impact can be defined as a straight line inclined backwards. The higher the speed, the greater the angle of inclination of the impact relative to the vertical. It is no coincidence that downhill bicycles have the most inclined head tube angle relative to the vertical.

So why should it be any different for the rear wheel trajectory?

In short, a rear axle trajectory with recoil implies a smaller decrease in linear momentum, which means less speed is lost. It should be noted that the fact that the rear wheel moves away from the bottom bracket has significant implications for the behaviour of the system, and excessive wheel recoil would also be undesirable. As with everything, virtue lies in the middle ground, and we believe we have found it.

ANTI-RISE o BRAKE-SQUAT

This is a guideline parameter that indicates the behaviour of the suspension system when braking with only the rear brake. Like the Anti-Squat parameter, it is also the relationship between two forces, the one that 'tries' to compress the system due to the action of the brake on the rear wheel and the one that 'tries' to decompress it, due to the transfer of mass to the front wheel as a result of deceleration when braking. Generally, this parameter is calculated graphically, as it is easier than finding the resultant forces at each point of the travel. In general, it can be said that:

$$\text{Anti-Rise} = \text{FBrake}/\text{FAc}*100$$

Where:

- FBrake: Resultant force on the rear axle due to the force of the rear brake.
- FAc: Resultant force on the rear axle due to the transfer of mass produced by deceleration..

From this, it can be deduced that an Anti-Rise of 100% indicates that the force that 'attempts' to compress the suspension is equal to the force that 'attempts' to decompress it, so that, ideally, the behaviour of the suspension system is independent of the braking force and the geometry is maintained during braking. Lower values mean that the suspension extends and vice versa.

Since it is impossible to always have 100% Anti-Rise (I think it is possible), the big question is: which is better, values above or below 100%? If the values are higher than 100%, the suspension compresses, the centre of gravity lowers, the steering angle relaxes and the bike, if it has rear wheel kickback like OLS, lengthens and becomes more stable. The downside is that you lose a few millimetres of suspension travel. From our point of view, when descending and at high speeds, it is best to have values above 100%, so that the suspension compresses slightly and makes it difficult for you to fly off the front of the bike. High pivot point (HPP) suspension systems tend to have high Anti-Rise values. Compared to these, for the same rear wheel setback, the OLS System has lower values, because it would not be good to lose too much suspension travel.