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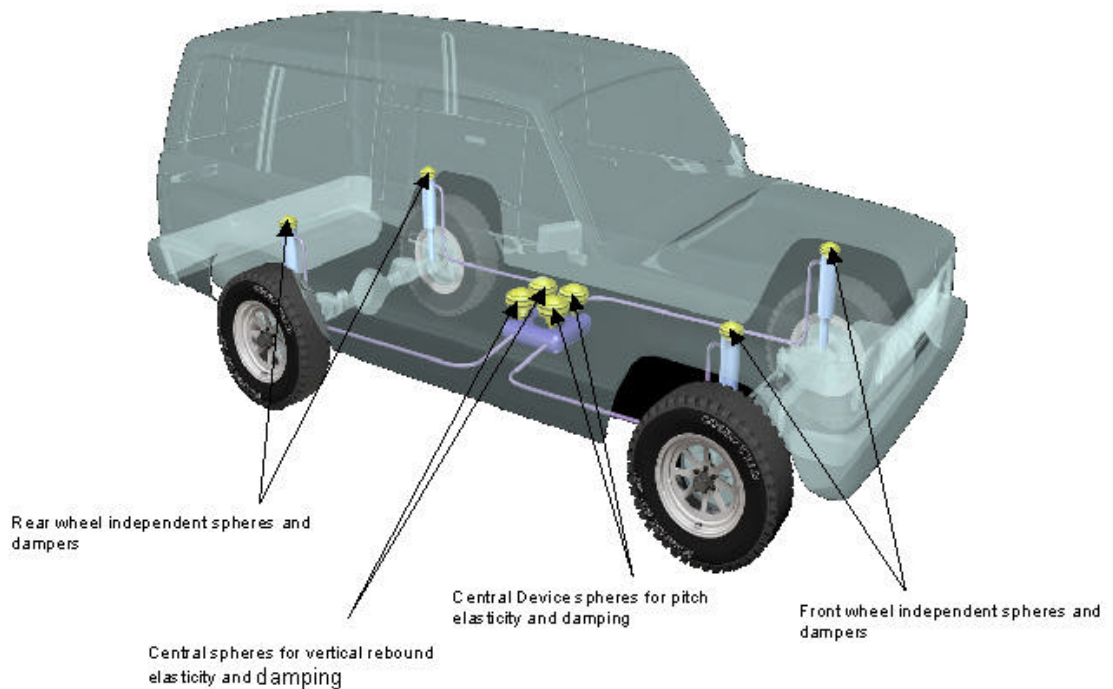
OFF ROAD SUSPENSION KIT



SYSTEM DESCRIPTION

The **OFF-ROAD KIT**, based on the Suspension System technology patented by Creuat, had been developed by **LLEIDA TRACCIÓ TECHNOLOGY, S. L.** and **CREUAT, S. L.**

The **OFF-ROAD KIT** is an integral suspension system, with an instantaneous reaction, and designed to separate the response to each movement of the vehicle such as roll, pitch, vertical movement and axle articulation.



The **OFF-ROAD KIT** provides the advantages of a specific configuration for each vehicle movement, without electronic components, and without the complexity of active suspensions.

The **OFF-ROAD KIT** design is simple and effective, it does not incorporate sensors or actuators, thus providing an immediate reaction to the wheel movements. In this way it provides greater stability without impairing the ability to absorb road bumps, better isolating the vehicle and the steering.

Moreover, the system provides a much better maneuver capability than the conventional system based on coilovers and antiroll bar.

The **OFF-ROAD KIT** suspension system works with high hydraulic pressure. It does not require any specific attention once it is correctly installed and operating.

The **OFF-ROAD KIT** advantages can be summarized as follows:

- It separates the response to each suspension mode, therefore it allows a higher level of optimization because each movement can be adjusted independently of each other.
- The lower axis articulation resistance increases traction and grip if compared to conventional suspensions, reducing the need to use the 4x4 traction mode.
- The stiffer pitch and roll settings provide more stability at higher speeds without impairing traction both at high and low speeds, and retaining the capability to absorb road bumps.
- It has been demonstrated that the **CREUAT** system isolates the steering from bump overreaction. It contributes specially the lower axle articulation resistance. This feature works in two ways: It distributes the vehicle weight on its wheels but it also distributes the bump reactions in one wheel among all other. This makes the vehicle easier to drive on difficult slow tracks, as well as on fast ones.

CONCLUSION: The **OFF-ROAD KIT** advantages can be resume as

- a) Body Control:
 - Increased stability
 - Improved Handling
 - Vehicle Dynamics Complete Control of Design

- b) Weight Distribution:
 - Better Traction on irregular surfaces
 - Increased Cornering Grip
 - Steering help

- c) Comfort & Safety:
 - Reduce effects of road irregularities on the steering
 - Reduced Tire load peaks
 - Reduced stress on terrain



- Rebound:
 - Elasticity
 - Damping
- Pitch:
 - Elasticity
 - Damping
- Roll:
 - Elasticity
 - Damping
- Axle Crossing:
 - Elasticity
 - Damping

The **OFF-ROAD KIT** is made of four hydraulic cylinders connected to a central device by means of hydraulic pipes and hoses. Between each cylinder and the central device there is a block, named "wheel block", for damping and spring media connection.

The **OFF-ROAD KIT** can be installed in a quick and easy way, replacing the suspension elements (shocks, springs and anti roll bar) with four hydraulic cylinders connected to a central device by means of pipes or flexible hoses. Once the **OFF-ROAD KIT** has been installed, purged and pressurized it is ready to use.

Spring Rates

The **OFF-ROAD KIT** has been designed with two spring rates, one for Off-road handling and the other for racing handling.

The gas volumes define the spring rates of the suspension in the system. Such gas volumes are enclosed either inside hydro pneumatic spheres connected to the wheel block or at the chambers inside the central device.

The spheres connected to each wheel block determine the roll spring rate. Each sphere has a known volume of gas at a fixed initial pressure that determines an equivalent spring rate when operating at a given working pressure

The central device gas chambers control combined movements of the system such as pitch and vertical movements. These chambers are included in the central device to provide the spring means of vehicle-combined movements, has a known volume of gas at a fixed initial pressure that determines an equivalent spring rate when operating at a given working pressure.

Damping Modules

All damping modules of the **OFF-ROAD KIT** have been calculated and tested to get the right adjustments for compression and extension for all vehicle movements (pitch, roll, vertical and cross axle)

➤ **Compression:** is the upwards movement of the suspension. A soft settings will absorb small bumps better, but will overreact over large bumps and will be too weak during jump landings. A hard settings, on the contrary can be too harass, becoming too uncomfortable.

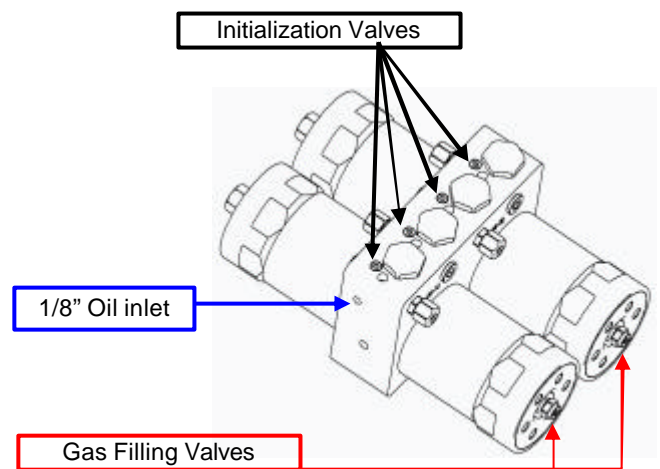
➤ **Extension:** is the downwards movement of the suspension. Helps to regulate the speed the suspension returns to its position after a bump. Normally this movement is set harder than the compression aiming for a higher stability with the least comfort tradeoff.

Tests in different circumstances and several pilots indicate an optimal configuration for the modules used in this kit.

- Wheel blocks use dampers in series that control the roll effects
- Central device has 4 dampers for the Pitch movement

Initialization Valves

The Central Device is provided with four valves, Wheel 0, 1, 2 and 3 showed in the picture below, that allow the initialization of the system and all of them are located in the central device and are operated by means of a 4mm hexagon socket-key.



There are also four gas filling valves to insert gas inside the central device, this means in the axle and diagonal cylinders.

Finally it is showed a 1/8" oil inlet. Meanwhile we need to pressurize the system we should use a 1/8" fast connector. Once all the circuits are pressurized and closed a 1/8" hexagon socket plug, as showed at the picture, should replay this fast connector.

OPTIONAL: RIDE HEIGHT CONTROL

The **RIDE HEIGHT CONTROL** unit permits to change the ride height of the vehicle. without altering the advantages provided by the **OFF-ROAD KIT** such as a greater stability, better bump isolation from steering, and a much better handling capability

The **RIDE HEIGHT CONTROL** incorporates an hydraulic pump control that permits a total variation of 10cms of the nominal height of the vehicle.