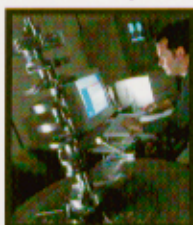


The International Journal

Racecar engineering

AOL Keyword: Racecar Engineering



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EXCLUSIVE

Citroën's intelligent suspension

Phonometrics
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Developing aerodynamics across continents





French KISS

The Citroën Xsara has proved to be the class act in the WRC. *Racecar Engineering* looks at the unique suspension feature that has contributed much to its success

Words	Martin Sharp
Photos	Sutton, Martin Sharp

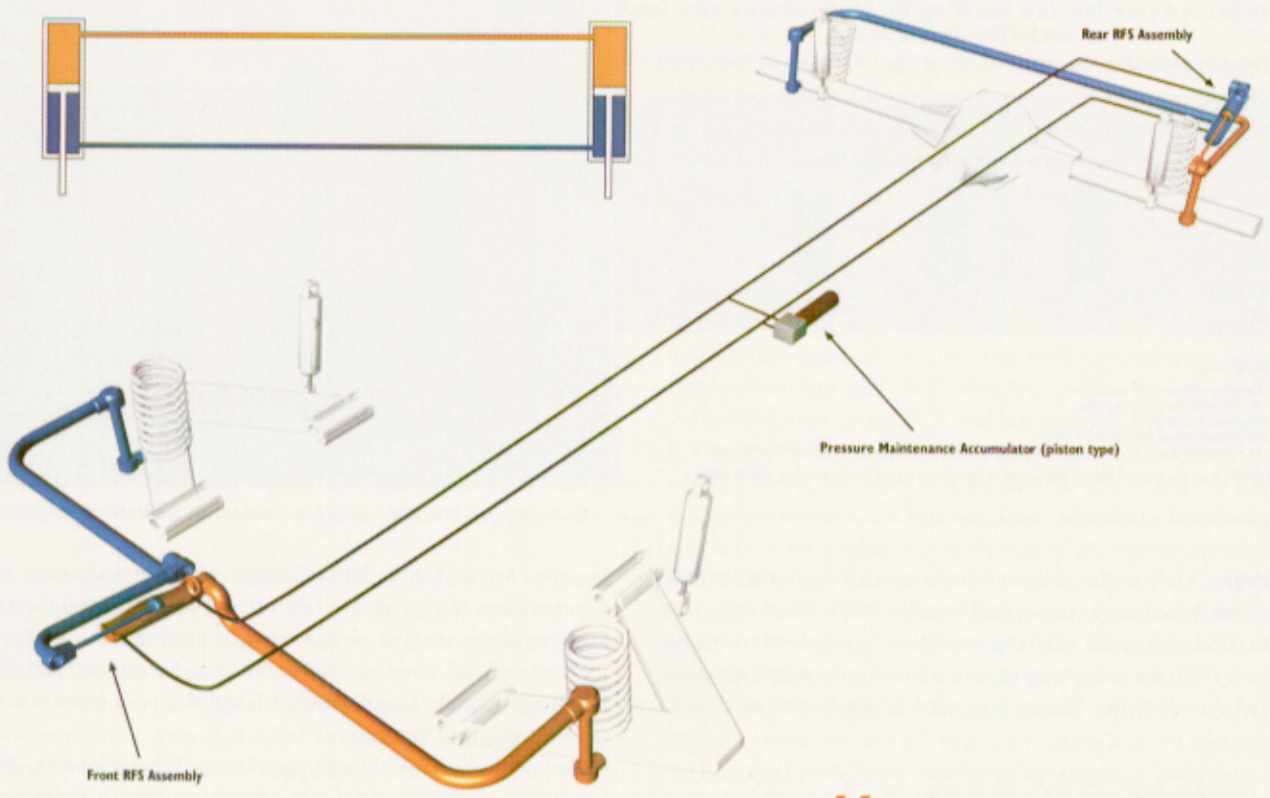
The Citroën Xsara WRC was always known as a particularly well-balanced and effective machine on smooth tarmac rally special stages, yet some felt that the Citroën team's comparative lack of immediate experience with the car on rough gravel stages could work against its competitiveness during its first full attack on the 14-round World Rally Championship this year – bear in mind this is a championship that contains eight gravel rallies.

This view, however, does not take account of the immense experience of Citroën's chief chassis engineer, Jean-Claude Vaucard. From the twice championship-winning Group B Peugeot 205 Turbo 16 in the 1980s, through multiple victories in off-road rally-raids with derivatives of that

mid-engined chassis, Vaucard has immense experience of designing rally cars which are robust and competitive on non-asphalt surfaces.

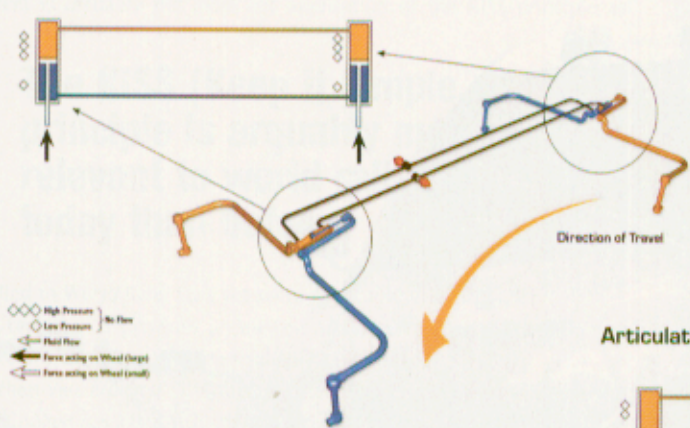
Fréquelin's pre-season predictions appear to have been overly cautious. As this was written Citroën led the 2003 WRC manufacturers' title battle, having won outright two of the first three events, including the latest addition to the World Championship, the Rally of Turkey, which is held on particularly rough and damaging gravel stages.

This, above all, was a vindication of the application of Vaucard's renowned chassis engineering talent and the principles he's picked up over the years. These principles encompass complex engineering solutions – facilitated through the development of electronics →

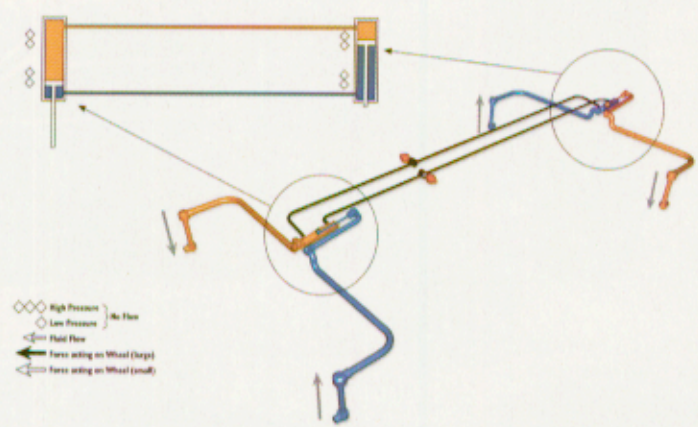


“The system fitted to the Citroën World Rally Car is simply a shrewd development of the way its anti-roll bars operate”

Cornering Roll Resistance



Articulation

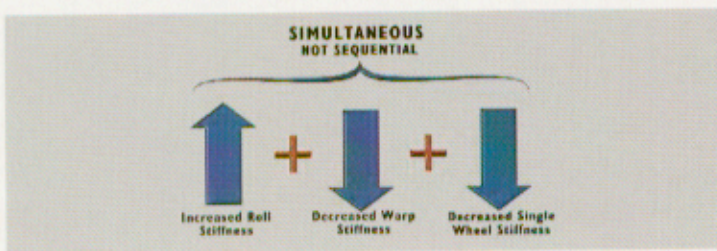


Schematics showing how the Kinetic developed hydraulically linked passive anti-roll bar system works

The Kinetic Principle

Improved traction and handling through reduced tyre load variation during warp.

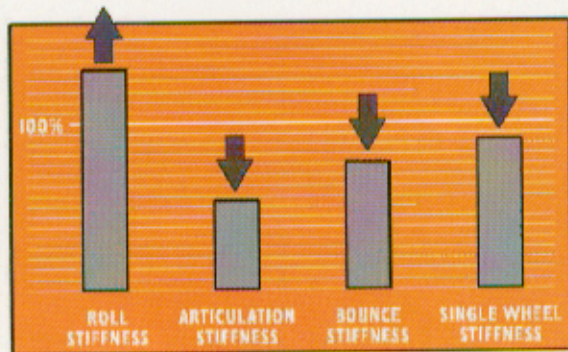
Achieved by passively mode decoupling roll stiffness from warp stiffness, which allows:



Passive System:

- Complies with most FIA regulations
- Has instantaneous response time
- No power consumption
- No sensors, processors, valves or pumps.
- Is a 'superimposition' mode decoupling system NOT a sequential 'mode switching' system

Leading WRC Team has adopted Kinetics RFS system and proven a competitive advantage on asphalt rallies.



technology – which enable enhanced performance from World Rally Car engine, transmission and chassis mechanical systems. World Rally Cars must be effective over the widest varieties of surface and environmental conditions there are in motorsport, and adjust to the widest variety of preferred driving styles. Simply; they must be easily adaptable. It is,

however, a crucial rule that no matter what the complexity of the required effect of a system in a rally car; it is preferable that that system operates in the simplest possible way: it must deliver, yet be easily serviced, replaced, diagnosed and so on. In modern popular parlance the KISS (Keep It Simple, Stupid) principle is arguably more relevant to world rallying today than ever before.

This principle flows through Jean-Claude Vaucard's veins. And no better example of this can be seen than his approach to the anti-roll (stabiliser) bar system which he has engineered into the Xsara WRC for the 2003 World Rally Championship.

“In practical terms these force transfers are instantaneous”

Drivers say the new suspension system makes the car easier to drive

