

## The Goddess – still amazing at 60!

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The Goddess at 60: Citroën's design icon retains its timeless beauty

Dave Randle is your guide to this sleek, evocative, ahead-of-its-time machine...

Although the years immediately following World War Two in Europe were a time of rationing and austerity, they also saw an upward shift in public expectations and the first



flowering (if that's the word) of consumerism.

Many returning service personnel had been taught to drive (by numbers, according to my dad) and were now in the market for civilian transport. Complete countries needed rebuilding and those who had been called up had discovered a whole new world beyond the corner shop.

This was to become the era of the 'people's car'.

Largely thanks to lucrative contracts during the late unpleasantness, the motor industry as a whole was far from being on its beam ends, although its products were still largely lumbering about on beam axles. The clothing styles of a Vauxhall Velox or a Hillman Husky might have been *à la mode*, but the underlying mechanicals were out of the ark.

Surprisingly though, when you think about it, demobbed manufacturers didn't take the easy option of turning out cheap makeovers of pre-war stalwarts. Instead, the cars that would lead the private transport revolution would be radical, innovative and bursting with engineering brio.

The name, Volkswagen, actually means 'people's car', and is what comes into most people's minds when they hear the term. Porsche's rear-engined 'beetle', with its flat four air cooled engine and Ledwinka swing arm independent suspension was radical and 'modern' enough to mobilise a lot more than its decimated homeland. Giovanni Agnelli's Fiat Topolino would not only do the same for Italy, but also provide a fair amount of competition for France's home-grown people's car in its licensed Simca variant. Pierre Boulanger's Citroën 2CV had been in development before the war, its prototypes concealed from the occupying forces. It would emerge in 1948 as the most radical of all, its form following functions other manufacturers hadn't even thought of.

But even the British entry was far from conservative. Alec Issigonis's Morris Minor adopted the chassisless monocoque body construction that had enabled Citroën's Traction Avants to be driven off cliffs to land intact. He also incorporated the Traction's longitudinal torsion



bar front suspension and, what would eventually become the industry standard, rack-and-pinion steering.

The chief Morris man, Lord Nuffield was of the old school and knew to beware of Greeks bearing new-fangled ideas. He could see the point of the above innovations but drew the line at the flat-four engine Issigonis would have liked to have put in the Moggie Minor.

André Citroën, on the other hand, was a *carte-blanche* man. The double-helical gears he had invented, and which are still commemorated in the Citroën logo, were a game-changer in their time and were in use all over the world. The Traction Avant had revolutionised design and driveability, and driven his automotive products way beyond the boundaries of France. Citroëns were built at Slough in the UK from 1926, and their reputation for comfort and economy had helped build a large following in the inter-war years.

Europe's first mass-producer of cars, he had been just as able a pioneer in the field of marketing, having practically invented the whole idea. He supplied Citroëns to celebrities such as Josephine Baker, made pedal-driven replicas of his cars to start his potential buyers early, and bought space on the Eiffel tower to put his own name up in lights for all the world and, in particular, his arch rival Louis Renault to see.

If *tout le monde* had been nonplussed by the 2CV, with its flat 2 engine, platform chassis, removable body parts and interconnected suspension, they would be positively minused seven short years later when all else at the 1955 Paris Salon was eclipsed by the arrival of the still astonishing DS19.

The look of Flaminio Bertoni's wind-tunnel developed body styling would have been enough in itself, with its exquisite frameless doors, its sweeping nose and chrome lines leading to high level flashing rear indicators (many cars were still using solenoid semaphores), its enormous, for the time, front and rear screens, plastic roof section, faired-in rear wheels and perfectly formed rear end.

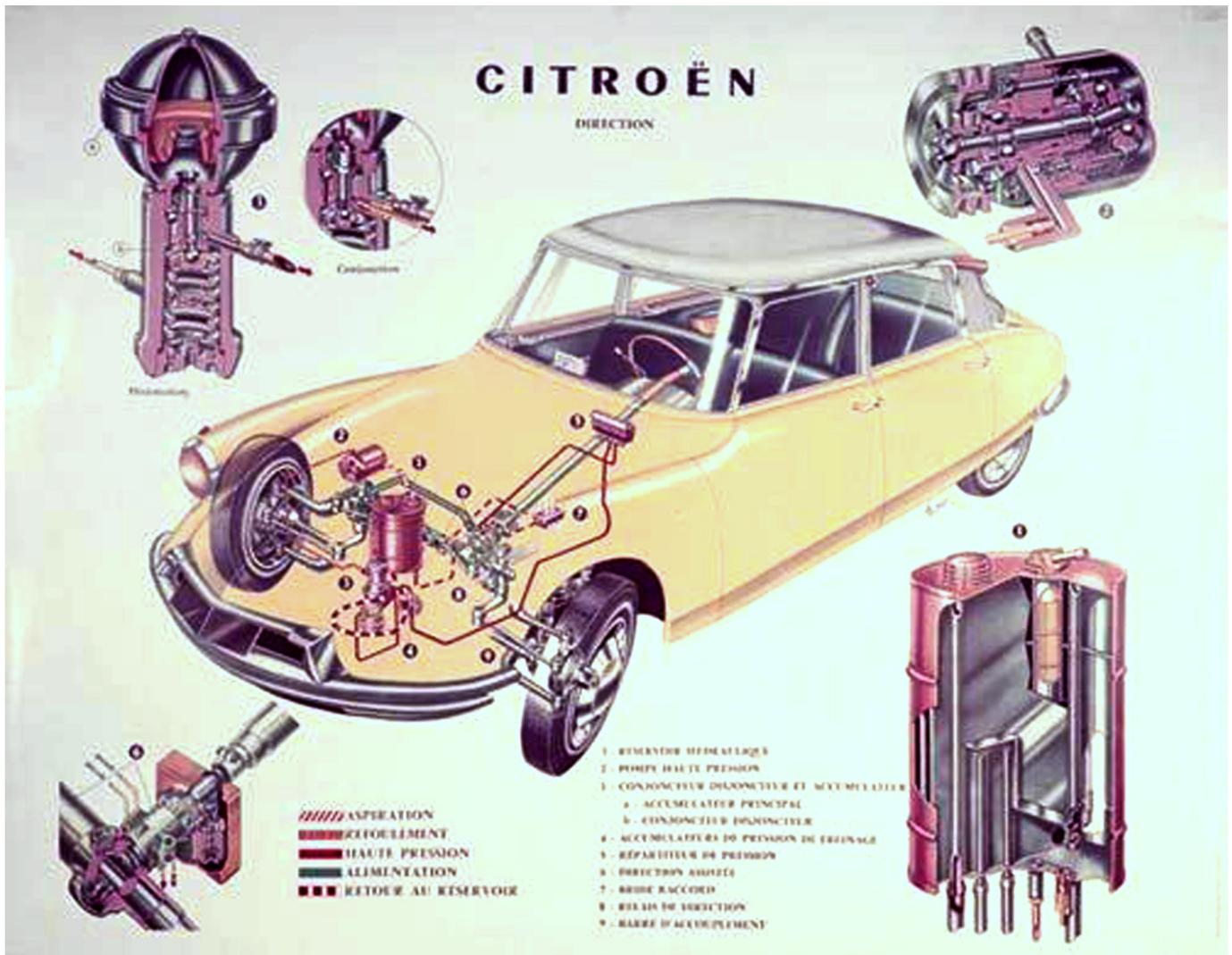
But the interior matched it with elegant door handles, an aesthetically fabulous single spoke



steering wheel, through or around which could be reached the dash-mounted slender gear-lever-cum-starter. Interior space seemed vast with acres of rear legroom, full-width front seats uninterrupted by consoles, gear and brake levers or transmission hump, and surprising amounts of headroom for such a streamlined exterior.

The driver and passengers in a DS positively sink into the upholstery as the seats mould themselves around them. Door mounted armrests are just as plush and yielding, combining to give a level of comfort not even imaginable in toffs' transport in the mid fifties.

And this was just the surface. Under the skin, mechanical innovations matched the promise of the design in every respect. The whole thing depended on brilliant hydraulic management. The hydropneumatic suspension that had been tried on the rear end of later 'Big Six' Tractions now took over all suspension and damping functions in the new car.



Often mistakenly likened to Issigonis's later 'hydrolastic', the Citroën system was - and is - very much more sophisticated. A high pressure pump stocks an accumulator, similar to a common rail in a modern diesel engine, which then feeds fluid to the four corners of the car. The accumulator and the suspension feature metal spheres, the top half of which contain compressed nitrogen. Fluid from the accumulator flows in and out of the lower half of the spheres.

The advantage of nitrogen as a springing medium is that its compression rate is not much affected by weight differences.



At the front and rear of the car lever arrangements similar to torsion bars, or anti roll bars, control valves to admit or release the suspension fluid. As weight is added to the car, it sinks a little, the valves open and it is pumped back up to optimum height. As people get out and the weight is reduced, release valves allow the excess fluid to return to the reservoir, again returning the car to its optimum ride height.

When the tiny mushroom-shaped brake button is applied, fluid is taken from the system, with the effect that the weight of the car adds to braking force. The system then ensures that the height is once more corrected.

In the original DS, the hydraulic goings-on went on even further than that, supplying power assistance to the steering - a rare feature in Europe for many years to come - and even actuating what was essentially a manual transmission. The driver moved the selector wand on top of the dashboard and the hydraulics went into action to depress the clutch, change gear and re-engage the clutch.

An early 'engine management' system ensured that the revs dropped off for changes, and also when idling in gear, so that the clutch remained disengaged.

This didn't make for racing changes, but the DS was too cool for that kind of desperation. Everything about it justified the comment from an American journalist to the effect that 'this car could only have been conceived in a country where they take two hours for lunch'.

Later, after Rolls Royce had adopted the Citroën system for the Silver Shadow, an anti-sink valve was added to cars such as the Xantia, XM, C5 and C6. When you stopped and switched off a DS, it would gradually sink down to the ground, and could take minutes to prime on restarting. A big red STOP light on the dashboard warned you about taking off before you had full ride height and brakes.

Every car on the road at that time had drum brakes - some still cable-operated. There had been some experimentation with discs, mainly in competition circles by the likes of Jaguar. No one expected them to turn up on a car such as the DS, but Citroën were building the car



of the future. Not only did it have front disc brakes as standard, but they were inboard mounted to reduce the car's unsprung weight - another area in which the company's engineers had led the way. This also freed up sufficient space at the wheel end to give the car a prodigious steering lock, though it also acted more as a 'transmission brake' than the more conventional arrangement, since by operating on the inner end, it allowed a certain amount of torque to occur in the drive shafts, adding to the car's tendency to dive under heavy braking.

The exquisite ride quality benefitted from the lack of mechanical restraint. There were no conventional shock absorbers - wheel resonances being controlled by fluid restriction - and there was no suppleness-defeating anti-roll arrangement beyond the car's inbuilt tendency to return to level, so along with the characteristic dive when braking and squat when accelerating was a marked inclination to roll on corners.

Strangely, and contrary to received wisdom, this was not that disconcerting to passengers, as the laws of physics thus obeyed are natural, and there was less tendency to slide and fall about than there is in a car that is prevented from gentle rolling. Riding in the back of a 2CV can demonstrate this. You are held by the car and flow with it, although the roll can be very dramatic. It is the act of resistance that brings discomfort. Citroën eventually bowed to pressure and showed the elegant way to eliminate roll with the Xantia Activa.

The pliability of the suspension also tended to keep the wheels on the ground, making the DS a safe and reliable vehicle in snow and ice and, despite its apparent softness, the car would later achieve victory in numerous punishing rally events.

Like the Morris Minor, which had to make do with the old Morris 8 side-valve, what was missing from the new car was a new engine. Boulanger had intended it to be animated by a specially-designed air-cooled flat-six - and, as with the Morris, the engine compartment had been designed to receive it - but it didn't happen. Tomorrow's car would have to make do with yesterday's engine: the long-stroke 1911cc unit that had been powering Tractions and H-Vans since Asteryx was a boy - although it was given a new head with hemispherical



combustion chambers and cross-flow valving, it was still not really up with the technology of the rest of the car.



1955 DS19 Berline ( Salon de l'Automobile . Paris )

Over seven hundred orders were placed for the car in the first fifteen minutes after its launch at the '55 Paris Salon, rising to eighty thousand at close of play. The factory at the Quai de Javel was overwhelmed and it took a number of years to satisfy these advance customers, with demand rising all the time.

Not all of those whose orders had been fulfilled were all that satisfied at the beginning, as the enormous leap forward in design and technology proved to be somewhat in advance of the components and materials available at that time and, a small proportion of cars suffered from hydraulic fluid leaks. These would be solved in later examples by new connections for the delivery and return of suspension fluid, and ultimately a change to the green mineral fluid LHM, that has been a trademark of hydropneumatic vehicles ever since, including Bentleys, Rolls Royces, Toyotas and even JCBs, all of whom have depended on the Citroën suspension concept.



Hydropneumatic systems - now become Hydractive - on present-day Citroëns are as reliable as any metal system and have the advantage that replacement or regassing of the spheres restores them to their original full-functionality, while metal springs sag and dampers wear out. Hydractive - although electronically tuned and managed, essentially the same hydraulic system as that of the DS range - not only keeps the newer cars at a constant ride height, but adjusts the height to correct the aerodynamic coefficient at speed, while the electronics respond hundreds of times a second to road conditions and driver inputs.

A year after the introduction of the DS, a simplified version, the ID was introduced, still with the benefits of the 'cushion of air' ride quality, but with manual (column-mounted) gearchange and clutch, and more basic trim levels. As time went on the distinctions were blurred, with manual versions of the DS culminating eventually in the DS Super 5 and Pallas top-of-the-range models.

Ten years after its initial launch, the 'D Series' as it was now known finally got a new engine, or engines. The completely new units further developed the hemispherical heads and cross-flow valves of the earlier arrangement, but left behind the antiquated long stroke design for a new 'oversquare' design with five main bearings. The '19' became '20' with a rise to 1985 cc capacity and would be joined by a DS21 of 2175 cc, and even a DS23 of 2347 cc, all of which variously bored out versions of the same engine which, in their turn would go on to animate the CX range, successors to the DS after its twenty year reign. The 23 would be about the first to market with electronic fuel injection, another standard item on modern cars.

As great innovators, Citroën inevitably experience the teething problems that were ironed out before more conservative manufacturers adopted them, the basis for a less than fair fixed notion of unreliability that persists in some quarters.

It was a nervous business trying to facelift a design of such cohesion, but the new head of design at Citroën, Robert Opron was made of stern stuff, and his new faired-in four headlight 'shark's nose' was a perfect new expression of the car's essential character.



Behind the shared glass, two lights were self-levelling to keep the beam on the road even during acceleration and braking and, unlike those on modern cars, prevent them from flashing or blinding oncomers on uneven roads, and two were able to turn through eighty degrees to shine 'around corners'. Both innovations were achieved through the use of complex cable linkages far more 'mechanical' and friendly than the cold electronics that would be put to such a use today - and actually more effective in both endeavours.

When the DS power unit had first been converted to fit transversely into the CX models, it was further developed into a diesel variant - the Citroën U25, which would be the mainstay of the 'Sevel' vans, built in partnership with Peugeot and Fiat and numerous pleasure craft, as well as becoming the first truly refined, high performance turbodiesel engine for passenger cars in the extraordinary CX25 Turbo 2, with its 'soft turbo' designed to offer smooth acceleration, intercooler, and record breaking economy. Another fitting first for the company that had commercialised the first diesel private car back in 1934.

For all that, being perpetually *en avance* was never going to be the path to riches and the company that created the blueprint for the future, had only one future for itself - amalgamation with solid, reliable Peugeot, a family firm with a tight grip on its finances and an according aversion to risk.

Citroëns became a little bit Peugeot for a while, but bit by bit, Peugeot also became more Citroën, and we can be grateful a company that has stared failure in the face so many times is still with us, still innovating with its Picasso, Cactus and new stand-alone DS models, and even making a worthy successor to the avant garde *Déesses* or 'goddesses' of old in the form of the divinely eccentric C6.

It's ancestors were, for this correspondent, the most beautiful and significant cars in motoring history. I am delighted that I had the chance to drive so many, and would still choose a DS Pallas above most things that came after it.

Sixty years on, the goddess still reigns supreme over ordinary mortal motors.



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