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May 1997 Vol 7 No 5

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The G

The world's most technically advanced car in 1955, the Citroën DS is still one of the world's most beautiful

Have Citroën ever made any ordinary cars? They have, but it was a very long time ago. We tend to think of Citroën as having built the advanced 'Traction Avant' in the '30s and then sat back on that for the next 20 years. But we couldn't be more wrong, because the successor was at least as advanced again.

Development work on this successor started almost as soon as the Traction Avant was well established. In fact, most of the same design team were able to simply carry on with their ideas.

When the DS19 was introduced in 1955, Andre Citroën would have been proud. The slippery design of the new 'Goddess', a big car, enabled them to continue with a small motor in the European tradition that had resulted from importing petrol and taxing horsepower. So 1.9 litres pushed the 22cwt car to over 90mph and

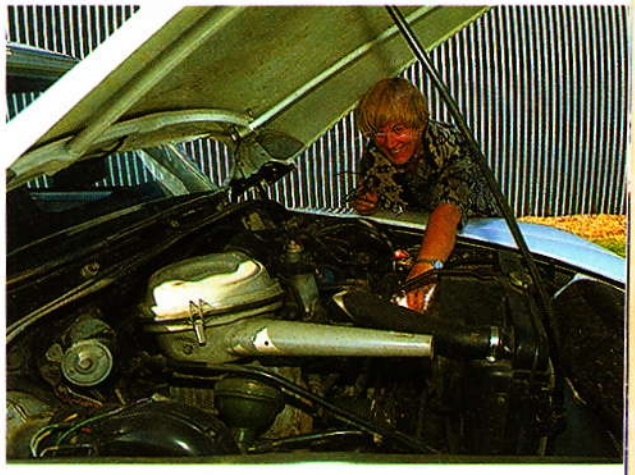
oddess

later upratings went to 117mph.

But it wasn't the motor – there wasn't much new there, and it wasn't the front-wheel drive, needless to say. It was the revolutionary hydraulics, managing steering, suspension, clutch, gear changes and brakes.

Even more though – while we can be impressed by the engineering – what blew most of the buyers' fuses were the looks. A mass-produced car offering an beautiful body with huge improvements in performance, safety and comfort.

I was a young man just into my first marriage, my first job and my first car (a 1938 Morris 14/6) when I saw the original DS19 to come to NZ at an agriculture show in Wanganui.



Under the bonnet looks very complicated

Like every other country hick, I stood around gawping at the car rising and falling on its suspension. No doubt the car was at that show because those were the days when cockies had first go at any decent cars because they were on metal roads (most of the Government were farmers too and this was a help).

For the youngsters amongst you, a metal road was one covered with crushed stones instead of concrete or tarseal. If you lived in Canterbury it wasn't crushed rock, it was little round water-worn stones from the rivers, and they were fun to drive on – like being on marbles. Citroëns love all that.

The owner

John Brough is an aircraft engineer by training, turned 747 driver by occupation. So he brings considerable skill and discipline to bear on his restorations. John believes in buying the best car you can for restoration – as I do.

This is the third one of these cars that he's had. He bought it from the first owner, a farmer in Tauranga. In top condition, it had always been garaged and

properly serviced but never polished.

It needed a paint job and a little bit of panel work. Then it needed a general going-over. The distance this car has travelled is only 140,000ks, which is low mileage relevant to the year.

The motor didn't need any work and still doesn't. The whole car has the feeling of a new car, and 'whole' means just that, every aspect of its driving behaviour, every facet of its looks.

To be precise, it's a 2.2-litre1974 D Super 5, the old DS21 with a 5-speed high-ratio box (20 years after the original car).

Hydro-pneumatic suspension was first tested on Citroën's 1954 15CV on the rear wheels only. It was then applied to all four wheels on the DS19

The Super 5 took over from the DS21 and was the only one after 1972 with the 21 motor. After 1972 they carried on with only the 20 or the 23.

John likes them for the ride and the engineering. "They drive well, are very fast point to point, and you are always going to get 30mpg" – although that's a classic rationalisation because petrol's the last reason for wanting a classic.

The fact is, he's passionate about Citroëns and has quite a few tucked away here and there. Most right-thinking people are passionate about one marque or another, and we really need to justify it when we've spent a couple of decades or so being abstemious, sensible and frugal. It takes a good rationalisation to enable us to overcome these cautions and do something as wildly wasteful as rebuild old motorcars.

Sculptured lines

Just as good bone structure is the basis of the human face, so the sculptured lines of this car are going to retain an ageless beauty that will always rank the Citroën Goddess as one of the most striking cars of the 20th Century.

Flaminio Bertoni designed this masterpiece of applied aerodynamics. He was a member of the design team led by Andre Lefebvre, who worked for Citroën right through all the important years.

The DS (Deesse = Goddess) design in each development never lost the original purity nor the impact of that first styling. No matter where you stand and look, there is no view that isn't satisfying. The Citroën DS is so totally photogenic Steve, our photographer, was delighted to carry out this shoot.

"How would you two-tone or otherwise fancy up the paintwork on a Goddess?" You can't, the purity of the design simply makes it impossible to gild this lily.

Andre Lefebvre (who reputedly drank only water or champagne) was so innovative that he was described as having too many ideas for the means available at the time.

The amazing hydraulics

The hydro-pneumatic suspension gives a floating sensation but not one that feels uncontrollable. The

Originally the team envisaged a flat-six air-cooled engine and a car with active suspension!

Right, spare wheel up front – sits over the gearbox

Below left, very roomy boot – it's deeper than it looks

Bottom left, here's looking at you, kid – and I can see round corners!

Below, look at that long wheelbase – 123" – there's heaps of room

hydraulic system keeps it all level – even if you fill the boot with lead-filled drums and this includes the immensely roomy Safari wagon.

Every two years you need to check the spheres above each of the four wheels for nitrogen pressure. This nitrogen takes the place of a spring, being compressed variably by the fluid. John replenishes this himself – he's set up for it and it's about a half-hour job, he says.

Early cars used LHS2, a red-coloured synthetic vegetable oil, with a lubricant in it for the rotary pump. It was a little corrosive and gave some maintenance problems, however when a new green-coloured fluid, LHM (Liquid manual Hydraulic), was developed, these problems disappeared.

When the engine pumps are not running, the DS settles down to rest like a dog, but once the engine is fired up it takes about 30secs for the two red lights to go out signifying that the system is pumped up to pressure and the car has 'stood up' and is ready to go. Provided that there are no leaks and the correct green fluid is used, the suspension gives no trouble.

In any warm-blooded body, if you go below the skin you find veins and arteries and capillaries carrying the blood to all the parts. This Goddess is very much like that because it's these hydraulics that make everything work.

Citroën Club

A nationally and internationally organised club it consists of 10 area clubs linked through an excellent national magazine and executive council – CCCNZ Secretary, Box 5457, Hamilton

A large hydraulic reservoir full of mineral oil – used instead of the vegetable oil more commonly used in brake systems – holds the considerable quantity needed for the total system.

A central pump keeps the system charged at up to 2450psi, which is a considerable pressure, and incidentally this makes the brakes more effective than vacuum assisted. Lines take this pressurised fluid to all parts of the Goddess.

Claude Leach (Dashboard Restos) who used to own one of the early cars and swears by them tells me that Rolls-Royce – who were never averse to using the best of engineering ideas – used the

Timeline

A couple of years ago when writing in the 'Which Classic' column, I got pulled up by a Citroën fanatic (David Carruthers, who I am sure will be reading this alertly, waiting to nail me again) for calling the engines 'old-fashioned and cranky,' and he fine-tuned me on a couple of other details.

So I've got smart and tracked him down. My thanks to David and to the firms listed elsewhere for their help.

The original DS came out with all the innovations. The later ID was a lower spec car and therefore cheaper to produce. Some even had the earlier Light 15 motors.

Because 1 ,455,746 were made between 1955 and 1975, it'll be a while before we get a proper classic value estimate on these – there are still too many of them. In addition the production run incorporated a steady development programme.

If you're looking for one you need to research first so that you get the model with the specs that you want.

1955	DS19. The original Goddess
1957	ID19 No hydraulic transmission, no power-steering, cheaper trim level
1958	DS Prestige and ID Estate
1959	New ventilation grilles
1960	DS Decapotable. About 1200 cars built by Chapron. Two in NZ maybe, including one ripe for restoration owned by John Brough
1961	83hp engine
1964	DS19 Pallas – top-of-the-line trimming
1965	DS21 & DS19A – new motors introduced
1968	DS20 & ID20 supersede earlier cars. First twin headlighters
1969	DS21 with fuel injection, D Super & D Special
1970	Five-speed box in the DS21
1972	DS23 2347cc introduced
1974	Production finishes

suspension system in the 1968 and other models. That same car had the braking also from the Citroën DS using two multi-cylinder pumps. They use one for the brakes and one for suspension.

The very high pressure means the system must be looked after and I'm told that lack of proper servicing is the only cause of problems in the restoration of these cars.

A passenger's view

The floors are deep wells giving lots of comfortable foot room. In the rear I sat on the very comfortable leather seat and found that my feet sank into sponge rubber – and it's the original under-carpet cushioning.

In the front I felt very safe and secure and tucked in. In mildly hard driving, the car had the feel of an easily controllable capsule.

Head-on collisions are ameliorated by the controlled collapsing built in by the frontal layout of the car – long bonnet, spare wheel, radiator severely raked back to take air from underneath, hydraulic pumps and accumulator, gearbox and fwd and finally the motor.

The single-spoked steering wheel is the most practical and safe wheel you can imagine. Doors shut in the way they should – as soon as you start the door on its way it swings shut perfectly and with a nice little clunk – thanks Stuart Craig!

This depth of footwells in the front and the rear is immense. The chassis side members are such very large boxes that it wouldn't have been a problem building the convertible version (especially when you consider that the roof is fibreglass or aluminium anyhow).

Driving is a little noisier than I expected. There's not the impression of being in a four-cylinder, but the motor, while not intrusive, is a presence, despite the sound-proofing.

Turn the engine on and it pumps up the suspension – takes about 30 secs – and the lights go out. Anti-knee-crusher padding which also covers the air con ducts adds to the feeling of being in a safe cocoon.

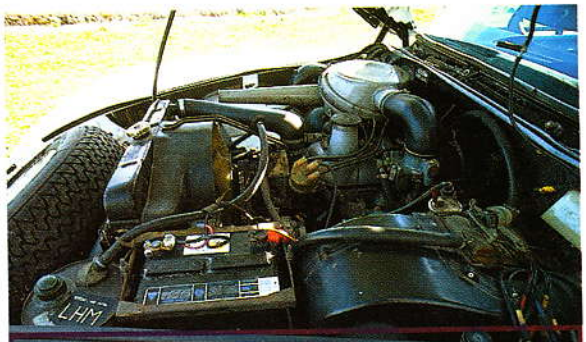
A neat little column-change works the five-speed box.

Until 1967, all bodies had single headlights with the option of an additional headlight mounted like a driving light

Swivelling headlamps linked to the steering and turning with the front wheels were first seen on the 1967 Citroëns

Below, visibility is excellent

Right, no transmission tunnel – the DS is built on a flat and strong platform frame



Parts and Suppliers

NZCC was helped by Citroën specialists:
Bishops Garage ("70 Years With Citroëns") Edinburg St, Auckland ph 09 379 3464.
Phil Jones of Auto-France Ltd, 7 Brett Av, Manukau City 09 278 4301 fax 2784 310.
(Stuart) Craig's Paint & Panel, New Plymouth, Ph/fax 06 274 8778 – very helpful people on the best approach to painting Citroëns. They're fanatics too – paint all panels separately then reassemble them in a special sequence otherwise the gaps and lines will be wrong (it pays to have a bucketful of assorted shims and packers at hand).
It can take several hours to set up the doors of ZXs properly so that there aren't whistles and draughts. Rustproof as you go of course.
If a car has been serviced all its life and had regular fluid changes, nothing much will go wrong, says aircraft engineer John Brough, who not surprisingly does most of his own servicing.
'Proper' servicing is extremely important. It's about using the correct mineral hydraulic green fluid. If you use ordinary hydraulic fluid you will ruin all the seals and get into a major restoration problem. If the hydraulic system has been abused it can be extremely costly – even too costly – to fix.
No rust problem as such but of course they can rust and this can be a problem because the panels are no longer available. Phil Jones makes the point that if rust gets into the base frame you could have a real problem. Construction is very like the Rover P6 body – removable panels on a base frame. That's why you can sometimes see multi-coloured Déesses getting around.

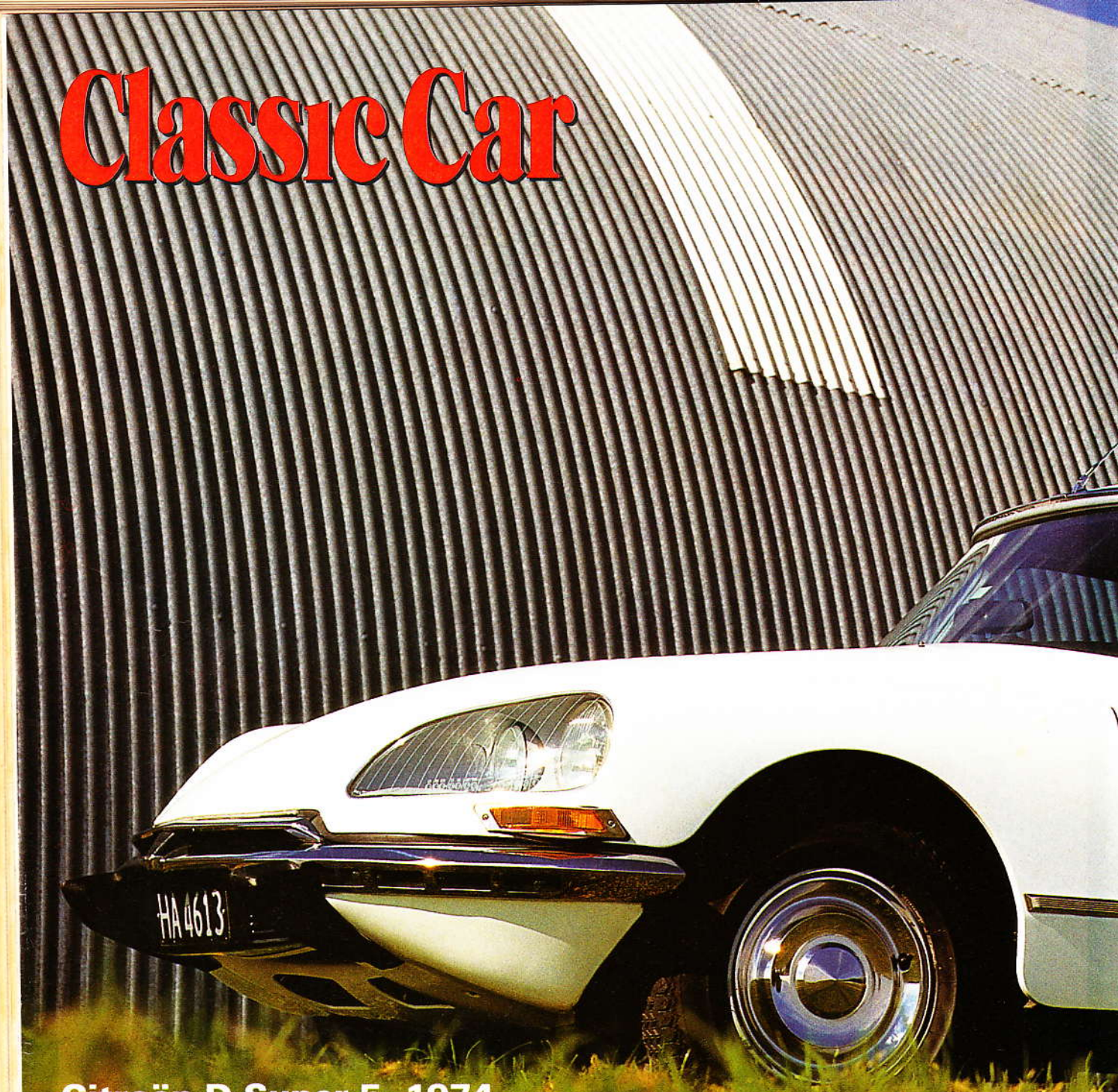
Prices

A very under-valued car

Concours:	$20,000
Cat A:	$12,000
Cat B:	$4-6000
Cat C:	$1-3000

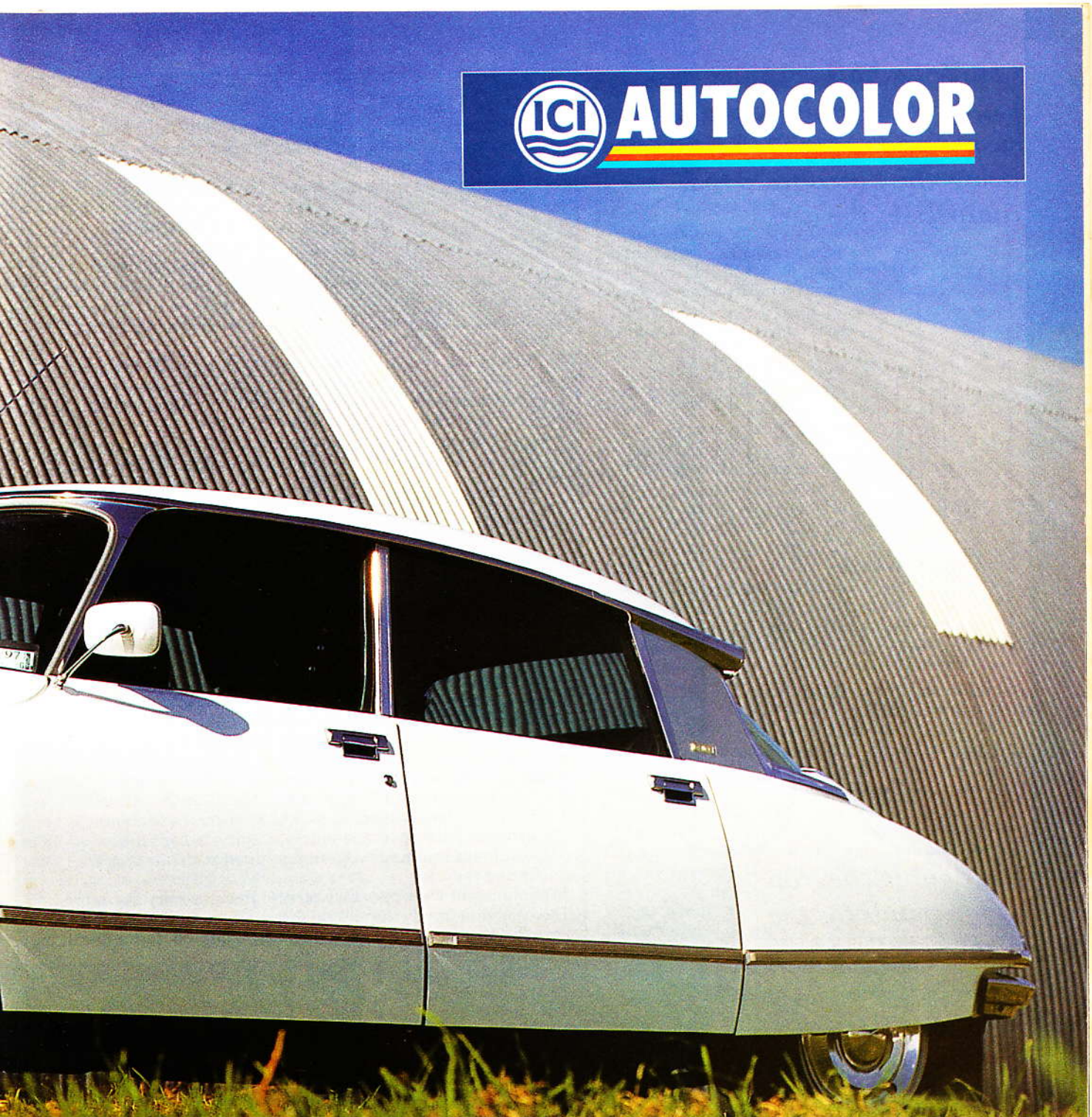
UK Cat A 1997: £7000
Classic Car Buyers Guide
UK Cat A 1989: £5000
Dalton Watson Car Value Guide

Classic Car



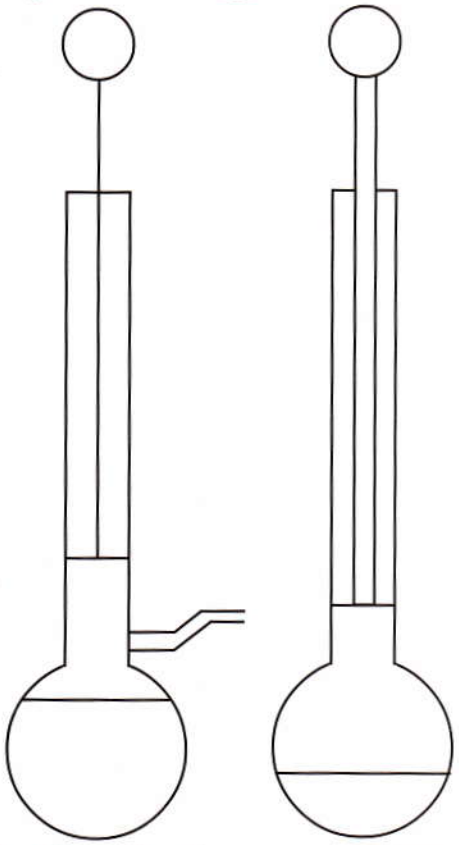
Citroën D Super 5, 1974

Engine	4 cylinder, ohv, iron block, alloy head, 5 main bearings
Bore/stroke	90 x 85.5 mm
Capacity	2175 cc.
Comp. ratio	8.7 to 1
Fuel system	Weber 28/36 DLEA d/draught carb, 14.3 imp gallons/65 litre fuel tank
Power	106bhp (DIN) at 5500 rpm
Torque	123 ft.lbs (DIN) at 3500 rpm
Transmission	fwd, five speed manual gearbox, all synchromesh, column change. 4 speed semi-auto and 3 speed auto optional
Final drive	4.37 to 1, hypoid, 22.mph/1000 rpm in in fifth gear
Brakes	Disc front, drum rear, power-assisted
Suspension	Front, independent by parallel double wishbones and hydro-pneumatic system, anti-roll bar, rear independent by trailing arms and hydro-pneumatics, and anti-roll bar, automatic levelling system



Steering	Rack and pinion, power-assisted, 3.2 turns for 12m/39.4' turning circle (between walls)
Tyres/wheels	185 x 380 (rear 165 x 380) radials on 5.5"J wheels
Chassis/body	unitary platform type frame, bolt-on panels. Safari wagon and convertible also available
Weight	1310 kg/2889 lbs dry
Dimensions	L 487 cm/191.73", W/B 312cm/123" , W 180 cm/70.87", H 147 cm/57.87". Track F 152/R 132cm (59.84/51.97")
Top speed	109 mph (175 kph approx)
Acceleration	standing $^1/_4$ mile in 18.5 secs approx
Economy	20-30mpg/14.1 -9.4l/100km
Production	Total D-series cars 1,455,746, from 1955-75
Notes	Almost the last model in the long-running DS series Data from World Cars 1974

Claude Leech's graphics explains the hydro-pneumatic suspension. At the top is gas and below the line is fluid that compresses the gas!



The double chevron badge stands for the silent bevel gears which Citroën manufactured before 1919

The Transmissions

The original models had a four-speed manual box that was assisted by hydraulic shifters, which were actuated by servos.

When the engine was buttoned off it would shift itself – the little lever on the dash was only there to indicate where you'd want to go next time a change was called for – a lot like a pre-selector box as used by Armstrong Siddeley and others.

Later cars went to straight manual, then manual five-speed – a Maserati box from when Citroën owned Maserati, or type 35 Borg-Warner auto used by so many other makers. John Brough's car has a conventional five-speed manual box.

The Origins

As you'd expect, the founder of Citroën was trained formally. He attended the prestigious Ecole Polytechnique – possibly at the same time as Renault.

His expertise was more with manufacturing and marketing than with designing and building cars. But deference must be paid to the man's ability to gather around him the right kinds of people and back them in their concepts.

He went to car-making from munitions and gears (WW1 and before). He set out to produce 100 cars a day as early as 1919. He'd not ignoreJ the mass-production lessons of Henry Ford, and 30,000 were pre-sold before he'd even made the first Citroën – the 10cv Type A 4 cylinder.

In the late 20s and early 30s he hired the Eiffel Tower and with electric light bulbs (250,000 of them) spelled out his name in fullsized letters vertically up the tower. I'm surprised nobody's thought of something like that on Auckland's harbour bridge.

He was one of the first to also follow the American lead and move to steel pressings for unit construction. This gave huge advantages including greater strength than the previous wood-framed efforts – he stood an elephant on a body and proved the point!

But it also changed the world of body-repairing dramatically, not because of the elephant – that was no problem – but because new techniques and methods had to be developed.

This willingness to be innovative did have its price unfortunately in that although the product of this brave use of lateral thinking – the Traction Avant – became a smash-hit, bankruptcy was the short-term result because there were a few bugs that needed sorting.

So the firm went to Michelin – the largest creditor. They reaped the long-term result – a virtually unchanged 23-year production run of a car that became a legend, before being replaced by another legend.

Andre Citroën was finished financially and became a victim of the final blow, death from cancer in 1935.

The Michelin family (sent in to take over by the French Government) changed absolutely nothing except the colourfulness that had typified the founder's approach to marketing the cars.

Michelin went the opposite way and became very secretive. The Michelin family appointed Pierre-Jules Boulanger (how French can a name get?) to take charge and oh, lucky day, he put engineering excellence ahead of commercial success. He was a keen driver himself and passionate about cars. The fact that he was an architect rather than an engineer helped too, especially in planning future models.

These future models were the 2CV, the Type H utility (corrugated panels van) and the VGD (Voiture de Grande Diffusion – the mass-market car) which became the Citroën Deesse, 15 years in the development partly because it took engineering some time to catch up with the ideas of these conceptualisers.

Michelin sold out in the mid-seventies and Peugeot took over.

On the dash, there are two circular instruments easily seen through the single-spoked wheel.

On the left, the rev counter has also got oil and temp indicators and the speedo has the battery and headlights.

Rack and rake adjustable seats in soft black leather hold you firmly.

The engine

Wet-sleeved variations using design differences in pistons on the basic Citroën motor allowed for development in capacity and power.

I'm surprised to find that the early motor had only three main bearings. A cast-iron block with a steel sump and an ohv aluminium head is always a good sound design.

In 1965, the new five main-bearing engines were introduced – one was still slightly under two litres and the other was the 2175cc for the DS21. Both of these motors were more sophisticated and the car was easily able to exceed 100mph.

At one stage in the '20s, 60% of the cars on French roads were Citroëns – using Michelins no doubt

On the day of its launch at the Paris Salon, the DS19 earned 12,000 orders

Phil Jones of Auto France in Manukau says that some motors run quite happily on 91, but most are OK on 96 and so far they've found no need for additives with any of the petrol.

The cross-flow head has pushrods crossing through the head to actuate valves on the other side of the hemi chambers. Also, on the dash was a manual timing adjuster for varying the timing according to the petrol you were using.

John's car uses a twin-choke downdraught Weber, but you can also get injection on some models.

The brakes are fed by the central hydraulic system at 2400psi, with discs inboard at the front and very large drums at the rear.

European Car Making

Many believe that European cars handle better than any other continent's products. It's a very competitive market with a history of racing and rallying for national prestige, and the roads vary from superb to the pavé that makes your teeth rattle.

Speed limits were much more flexible, so fast cars had to be able to travel quickly with some degree of real safety.

I've had a number of French cars, and the ride and the handling have always been superb in them.

This Citroën D Super is no different. You don't notice it until going hard into a roundabout where body roll can be mildly surprising – a candidate for active suspension, says John.

Going over a slightly humpbacked bridge at speed there is the momentary feeling of floating before the hydraulic struts are in control again and you feel the reassurance of a firm ride.

On the floor is a doughnut-shaped rubber rather like a dipswitch – it's the brake pedal and takes a little getting used to compared to the conventional.

This has been a very difficult car to do justice to because there's a limit to how much space can be given and there is so much of interest that I'm sure that I have left out plenty still.

I've had lots of help from the above specialists and I'm most appreciative. If you haven't driven one yet, you should. They're a wonderful car.

PENN MCKAY
PHOTOS, STEPHEN PERRY

These three rear views emphasise the careful aerodynamic shaping of the body