

## 4,000-MILE TEST OF THE CITROËN DS19

"Motor Sport" Investigates One of the World's Most Advanced Cars. Extreme Comfort and Security the Highlights of this Spacious 2-Litre F.W.D. Saloon with Hydraulic Clutch, Gear-change, Steering and Brake Actuation, and Self-levelling, Oleo-Pneumatic All-Independent Suspension. Very High Average Speeds Possible due to Outstanding Cornering, Road-Adhesion and Braking Power.

ONE OF THE WORLD'S GREAT CARS.—The Citroën DS19, or "Goddess," has pleasingly aesthetic lines which look aero-dynamically efficient, make no concession to fashion and dispense with a radiator grille, air for radiator and front inboard disc brakes entering via the shallow nose slot. Technically the DS19 is a decade ahead of other cars.



WHEN you have established a definite and convincing lead in motor-car design and construction, the fame and commercial advantages such initiative secures are tempered by the need to maintain one's reputation and position. In 1934 the Citroën engineers evolved their front-wheel-drive, torsion-bar-suspended all-steel saloon which put them twenty years ahead of contemporary automobile design. These cars, particularly in Light Fifteen form, gained an enviable reputation for stability, safety and controllability. But as the years rolled by the three-speed gearbox, a rather awkward gear-change and rather sluggish performance dropped sales of this famous Citroën.

Having got the brilliant little 2 c.v. on the market the great Citroën concern had to produce a new car to replace its former Light Fifteen and six-cylinder f.w.d. models. They had already provided oleo-pneumatic self-levelling rear suspension as optional on the Six and a courageous step was taken when it was decided to replace the earlier models with the revolutionary DS19, with automatic clutch, assisted four-speed gear-change, power steering, power brakes and the ingenious oleo-pneumatic independent suspension front and back.

Having put this advanced car into production in France and at Slough in England, Citroën are once again twenty years ahead of other manufacturers. Their use of hydro-pneumatic automation befits a concern owned today by the great Michelin Tyre Company, not only because of Michelin's association with pneumatic products but because, as confirmed by an American authority, the excellent Michelin "X" tyre, fitted as standard to the DS19, is particularly suited to air suspension.

### THE DS19 IN DETAIL

With a view to discovering how the Citroën DS19 behaves and what disadvantages, if any, come to light when it is used as regular transport over an appreciable period, we completed recently a 4,000-mile test of this intriguing motor car. After this extended road-test of the DS19 we tend to deplore the labour involved in driving other cars and crave the luxury, riding comfort and sense of security imparted by this truly remarkable Citroën. Its makers, we feel, are justified in describing it as "The car of the future, for the roads of today." Apart from its hydraulically-operated components and ingenious suspension, it has many other unusual items of specification, such as front-wheel-drive, inboard disc front brakes, single-nut road-wheel fixing, absence of a hand-brake, deletion of the usual ignition distributor, a nylon cooling fan, automatically balanced braking, single-spoke safety steering-wheel, an aerodynamic appearance, pronounced crab-track, and roof and side-walls of plastics construction.

Because this Citroën is so unorthodox it takes even experienced drivers some time to become accustomed to its controls and to feel at home in it. All the controls work to a light touch but they are placed unconventionally, so that the effect of teaching oneself to drive the DS19 is rather like learning to read Braille. In the first place, there is no hand-brake, its place being taken by a knob under

the fascia which slides in a vertical slot. To hold the car a foot pedal is depressed and the knob pulled down and to the left, whereupon the pedal remains depressed and the car is held firmly. A tiny safety catch is provided which can be used to lock the knob in the "on" position, presumably on the basis that children or others strange to the car are more likely to fiddle with knobs, with possibly disastrous results, than with levers. As there is no clutch pedal this foot pedal can be used for holding the Citroën on hills or in traffic before the clutch takes up the drive. Although the subsidiary pedal and its retaining knob remained in correct adjustment, in combination their function is more clumsy than that of a hand-brake, although quite in keeping with the character of the DS19! This subsidiary brake pedal will stop the car in the event of failure of the power brakes but it does not possess any real retarding power.

Having released the retaining brake the DS19 driver is confronted with only three main controls—the light, excellently-situated treadle accelerator, the gear-lever, and the press-button for applying the power brakes. The gear-lever extends upwards from behind the top of the fascia, moving in an arc. It might with slight advantage be placed beside the wheel, because, as placed now, it is necessary to reach for it over the rim of the steering-wheel. First gear is selected by pushing the lever forward, after which it is brought back through neutral to select, respectively second, third and top gears by moving it from left to right. It is thus a quadrant change and it is necessary to go through the third-gear position to gain top from second gear, and *vice versa*. This is no particular disadvantage because it is possible to push the lever to the position corresponding to the next gear required, changes being encouraged by manipulation of the accelerator but otherwise accomplished fairly leisurely, so that the lever can be moved through one gear and the change into that gear by-passed, at the risk of a jerky change-down or terribly sluggish acceleration after a change-up unless such manoeuvres are allied carefully to road speed. If second gear is selected from top the car will continue in top gear until the accelerator is depressed or road speed falls to that for automatic engagement of second, so that some pre-selection is possible.

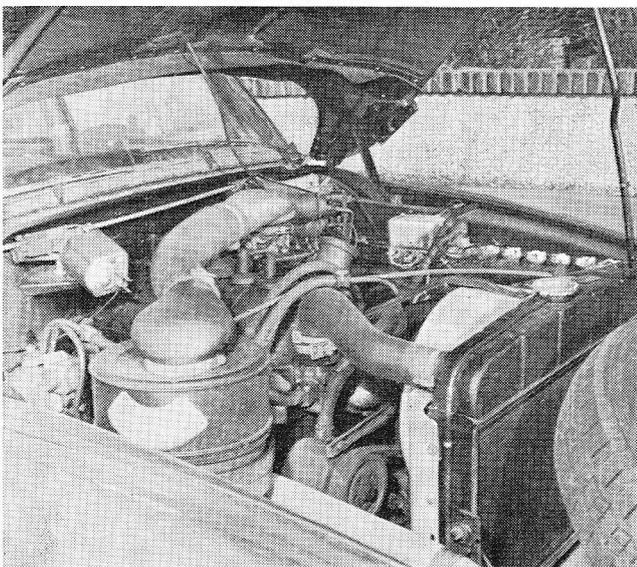
The gear-lever is finger-light and exceedingly smooth in operation. Three aircraft-style labels indicate the gear locations. The lever is moved left from neutral to actuate the starter, so that the engine cannot be started with the car in gear (an idea used, incidentally, by the late J. G. Parry Thomas for his Leyland Eight of 1919/20). Reverse gear is selected by moving the lever well to the right of the gate, beyond first-gear position.

Having started the engine the hydraulic storage cylinder is charged and the car rises up and levels itself. First gear is selected, it being necessary to be sure to push the lever fully forward, and on depressing the accelerator the automatic clutch takes up the drive smoothly, albeit it refuses to be hurried, the lag being disconcerting until the driver's mood has become attuned to that of the DS19's.

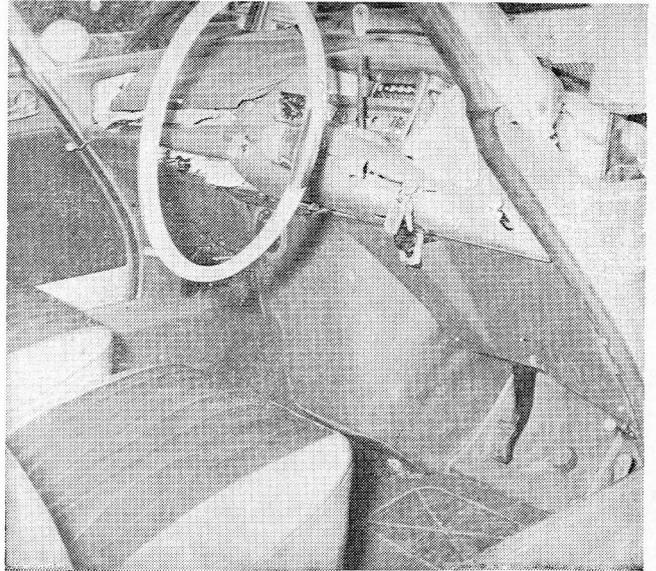
Even before driving off, the occupants of this Citroën are impressed by the appointments within this unusual car, apart from the comfortable ride they anticipate enjoying. This sense of luxury is

imparted by the wide, deep seats, beautifully upholstered in high-quality soft hide in the Slough-assembled cars, by floor carpets that feel like the thick pile found in Directors' offices, and by the splendid visibility through the wrap-round windscreen with its notably thin pillars, wide side windows, again with really slender pillars, and generous wrap-round sloping rear window. At night the interior is lit by subdued strip-lighting down the interior of the door pillars and in both the rear corners of the body—and we mean strip-lighting, those on the door pillars each being 14 in. long. This very pleasant interior lighting is put on by operating a pull-out switch on the fascia which, set in the halfway position, ensures that the lighting is actuated automatically when the driver's door is opened. A drawer-type ashtray on the fascia and a small ashtray for the rear-seat passengers are provided for those who must smoke in motor cars.

The front seats are separate and easily adjustable not only for 5½ in. fore and aft travel but with squabs which can be set at any desired angle or folded flat to form a bed in conjunction with the back seat, this squab adjustment being effected by unscrewing and relocking two screws at the seat base. The back seat easily accommodates three people and has a folding central armrest. All the seats are deep and extremely comfortable, the squabs of the front ones having roll-over tops. Two children can be accommodated beside the driver but the bulge accommodating the rear-set engine restricts leg room for a second adult front-compartment passenger. Otherwise the front-drive ensures a floor completely clear of obstruction. The frame side-members form deep sills over which all occupants have to step, but this offers no inconvenience and is in the Citroën tradition of having to step down into a low safe car. The only criticism that can be levelled at the seats is that when cornering fast lateral support is somewhat lacking, against which, useful grab-handles are provided on the doors, very necessary in view of the DS19's cornering adhesion! All four doors trail and possess windows that wind down fully, those in the front doors requiring 4¼ turns, those at the rear over 4½ turns, from fully closed to fully open. There are no quarter-windows. The doors close rather "tinnily." They have push-button external catches incorporated in sensible handles. Special catches are incorporated in similar interior handles, pulling the main catch forward locking the door, pressing a small catch and pulling back the main catch releasing the doors, which are light and incorporate effective "keeps." The interior handles are too far forward for these big forward-hinged doors to be easily opened in a single movement. Locking the back doors from the driver's seat is, however, simplicity itself due to this forward-location of the handles, a very useful feature. Both front doors are lockable with their own key, the key being easy to insert in excellent rotary locks embodied in the push-buttons. Each door, except the driver's, has a deep inclined armrest, and all doors possess kick-plates.



**MUCH MACHINERY!**—The engine compartment of the Citroën DS19 is well packed with mechanism, hydraulic storage reservoirs being located there as well as normal components. Note the large drum-type air cleaner, accessible battery and sparking plugs recessed in the valve cover, also the spare wheel ahead of the radiator.



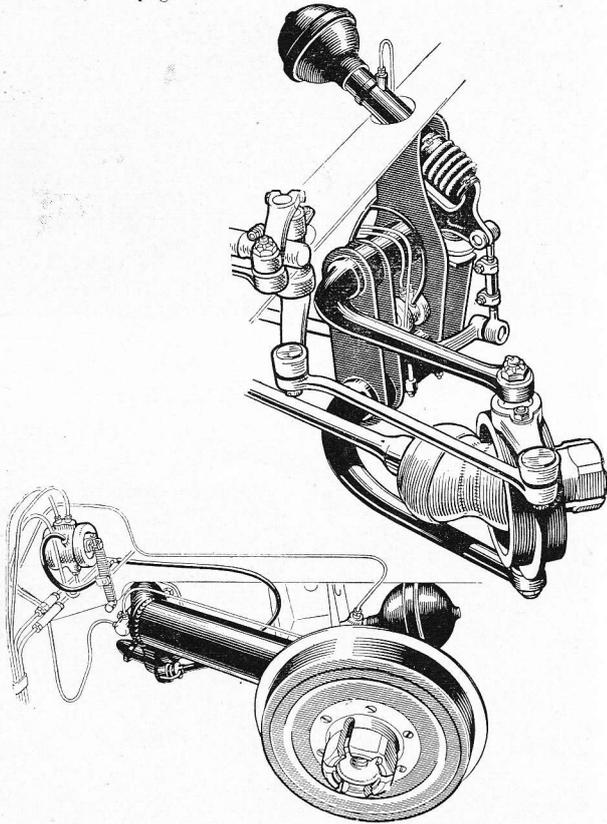
**CITROËN CONTROLS.**—This picture shows the finger-tip gear-lever, safety steering-wheel, and, on the floor the treadle accelerator (the button above it controls heat flow to the rear compartment), the brake button and, to the left of this, the parking brake pedal. Below the ignition key is seen the knob which locks the parking brake and on the extreme left of this right-hand-drive car is the aircraft-style lever actuating suspension heights

Study of the fascia layout of the DS19 confirms that, as with the exterior styling, the Citroën designers have made no attempt to ape American flamboyancy. The fascia is of plastic material, unimaginatively matching the body colour. We saw at Slough a Director's DS19 in which imitation wood-veneer had been applied over the plastic dash and we believe two-colour fascia schemes have been tried, to brighten up this functional aspect of the Citroën. At each side of the fascia two somewhat-crude ventilator grilles admit varying degrees of fresh air according to the setting of their control levers, while a flap at the base of the grille deflects cool air upwards away from the eyes if required. For hot-weather motoring this simple arrangement is admirable. In the centre of the fascia is a well-type storage space or cubbyhole, covered rather than closed by a non-lockable spring-loaded plastic lid. This well is lined and its floor is recessed in the corner adjacent to the passenger for the retention of a chocolate-box or suchlike, but this well is really too shallow and will not take, for instance, a large handbag or a camera. It has another serious disadvantage—with the heater in use the contents are baked, causing, we discovered to our dismay, a bar of chocolate to melt over our maps. On the other hand this storage well is easily accessible to the driver for quick manipulation of maps, etc. The Citroën is none too adequately endowed with stowage space, for there are no door pockets and no under-facia shelf. There is, however, the usual useful shelf below the rear window.

The minor controls consist of a row of small discreet knob-actuating, from left to right, interior lighting, screen washers, choke, self-parking screen-wipers and demister fan. There is also a knob for manual adjustment of ignition advance—rather archaic, but useful when fuels of low octane-rating have to be tolerated. A knob protruding through a hole beneath the instruments actuates the instrument lighting, with rheostat-control, speedometer lighting remaining brighter, however, than that of the adjacent dials. A finger-lever protruding from another under-facia hole serves to lock the clutch should a tow-start or servicing involving engine cranking be essayed. The Jaeger speedometer is of oblong type, reading to 110 m.p.h. in steps of 10 m.p.h., but with the more prominent figures spaced every 20 m.p.h. Its needle reads steadily and total and trip with decimal mileage counters are incorporated, but the face is set rather far back, behind the level of the other dials. There is a rather noisy, not entirely accurate, clock, an ammeter, and a petrol gauge, all by Jaeger. The petrol gauge, marked E, ½, F, has the disconcerting habit of reading mainly zero, even with some four gallons in the tank, but is reasonably accurate while the car is stationary.

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**THE SUSPENSION UNITS.**—Here are seen, above, the independent front suspension and, below, the independent rear suspension units of the Citroën DS19. This ingenious oleo-pneumatic system can be varied to provide additional clearance over bad roads and is automatically self-levelling according to the load carried. The controlling high-pressure hydraulic system is fed by an engine-driven pump, pressurised inert gas keeping the reservoir-stored fluid under pressure. The steering layout of the DS19 gives the lie to the theory that front-wheel-drive must spell a restricted steering lock.

On the right of the steering-column is the usual, excellent Citroën lamps' control, its lettered knob twisting to select side- or headlamps and its stalk also moving up and down to select sidelamps/dipped headlamps or dipped/full headlamps beam. Thus, at the slight risk of extinguishing the lamps by turning the knob the wrong way if absent-minded, the driver can instantly flash a warning of approach or go instantly from dipped headlamps to sidelamps. This is a truly praiseworthy arrangement enhanced by tiny sidelamp indicator-lights visible above each front wing. By depressing the knob the horn is operated, a low note or high open-road note being available, depending on the pressure exerted.

Reverting to the facia layout, three indicator lights are provided—for headlamps full beam (a bright, badly placed, blue light), lack of oil pressure, and to warn should pressure for power braking and steering fall too low. It is significant that, although the main reservoir operates at up to 3,000 lb./sq. in., this small red lamp is the only indicator considered necessary for the entire hydraulic system, apart from a float-level on the reservoir.

The minor control knobs are lettered for identification, except the screen-washer button, which is plated. Additional items include a retractable lever under the facia which can be extended to provide manual screen-wiper operation in the event of failure of the wiper mechanism, and a 6-volt socket for a map-light or other accessories. Lightly constructed anti-dazzle vizors, which swivel sideways, are fitted, the roof is generously crash-padded, and there is a rather inadequate central rear-view mirror. The heater is controlled by a single large knob on the engine-compartment wall. Knobs on each side of the facia control heat flow into the car and a knob by the driver's right foot regulates heating of the rear compartment. In the worst winter weather heating and demisting proved fully adequate. A control for the self-cancelling direction-flashers, incor-

#### TECHNICAL ASPECTS OF THE CITROËN DS19

The engine is that used for the Light Fifteen, but with inclined o.h. valves in hemispherical combustion chambers in an alloy head, higher compression-ratio and, on the British version, a Zenith-Stromberg carburetter. The plugs are recessed in tunnels in the Lancia Aprilia-like valve cover and fired by twin Marchal coils, fed with l.t. current from a contact-breaker, there being no room for a conventional h.t. distributor.

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The seven-cylinder swash-plate hydraulic pump for the high-pressure power system is belt-driven from the crank-shaft. The low-pressure pump for the "brain" which controls the clutch is incorporated in the belt-driven water pump.

\* \* \*

The drive goes through a single dry-plate clutch, engaged by spring pressure but withdrawn hydraulically.

\* \* \*

The servo disc front brakes have automatic adjustment for wear and their segmental pads can be easily renewed. The parking brake operates the pads by cable. Automatic balance is provided so that when passengers weigh down the back of the car a greater proportion of braking power is applied to the back wheels.

\* \* \*

Suspension is by transverse parallelogram i.f.s. and trailing-link i.r.s. Anti-roll torsion-bars couple front and rear oleo-pneumatic suspension units, self-levelling being prompted by a trimming-valve connected to the torsion-bars.

\* \* \*

The roof and facia are of plastic, the rest of the body-work being conventional pressed steel. That there is no need for an unsightly air-entry at the front of a car is emphasised by the narrow inlet on the Citroën which feeds air to the radiator, which is behind the spare wheel, and to the inboard disc brakes.

\* \* \*

The range of suspension movement between parking and jacking positions is approximately 5 in.

porating a warning light, is situated on the edge of the facia, convenient to the driver's left hand. The switch can also be used to cancel the warning before the automatic flasher has ceased to function.

The suspension of the remarkable DS19 is adjustable for height, apart from the automatic self-levelling action, which causes the car to rise up or sink down with an audible hiss. An aircraft-style lever at the left of the front compartment is set in line with a white paint mark for normal motoring. This lever can be moved upwards to two other settings, to increase the ground clearance very appreciably, at the expense of maximum comfort. To jack up the Citroën this lever is first operated to set the car in its highest position, the jack is inserted, and the lever then set to its lowest position, below the normal setting, whereupon the car lowers itself onto the jack, raising two wheels on one side clear of the ground! That concludes a description of the control arrangements.

#### ROAD IMPRESSIONS

The steering-wheel has a rim nicely bound in sweat-proof plastic cord. Visibility from the driving seat is excellent and the driver soon becomes completely confident in taking this quite wide car through gaps with bare inches to spare, while the 8-in. crab-track assists tight cornering. Visibility for reversing is not so good.

On the road, as experience over more than 3,000 miles and under almost every possible combination of weather and traffic, including driving over the sheet ice and snow of late February, taught us, the DS19 provides fast, safe, extremely comfortable transport, is interesting to drive, is at its best on long open-road journeys, and is even more "sure-footed" and foolproof under bad conditions than its famous predecessors.

Due to the fact that upward gear-changes cannot be hurried and the car takes its time in moving away from rest, and because the comparatively poor power/weight ratio is allied to high gear ratios, acceleration is the least impressive aspect of the car's performance. The s.s.  $\frac{1}{4}$ -mile occupies  $22\frac{1}{2}$  sec., 0-50 m.p.h. is achieved in 14.6 sec., 0-60 m.p.h. in 23.2 sec. On the other hand, once in its stride in the 3.3-to-1 top gear, cruising speed rises naturally to 80 m.p.h. and beyond. Let the pace drop and there is a sharp reminder of the high gearing, because second gear is needed where many drivers would

expect the car to pull away in third gear. The hydraulic gear-change renders this no particular hardship, however, except for the fact that the engine is noisy when accelerating, while the "clutch-slip" effect of too hurried throttle opening following hurried changes is also audible. In top gear the DS19 becomes a pleasantly quiet car, engine noise subdued, road noise, except for the characteristic sound from the "X" tyres, divorced from the occupants, and wind noise at a commendably low level. Given sufficient clear road this Citroën will achieve fractionally over 90 m.p.h. (Citroën modestly claim 87), but at least a mile of uncongested road is required in which to greatly exceed 80 m.p.h. Yet third gear can be held to fractionally beyond this speed and the indicated maxima in first, second and third gears are, respectively, 30, 60 and 90 m.p.h. There is no synchromesh for first gear, which engages with a faint "clonk" and must not be selected except from very low speeds. The gears are inaudible, enabling third and second to be used impartially in traffic driving, the gear-lever action can be likened to flicking ash off a cigarette, and, unless hurried, the changes are effected impeccably.

The rack-and-pinion steering becomes exceedingly light, as soon as the car starts to move and renders parking an effortless operation. The well-placed wheel calls for just under three turns, lock-to-lock—and the lock (turning circle averages  $36\frac{1}{2}$  ft.) does credit to a taxi-cab designer! Although this power steering is finger light on the move, if heavier for initial manoeuvring, and is completely devoid of kick-back, column vibration or castor-return action, it is not insensitive and the car can be steered accurately and "quickly" with this entirely effortless steering. If this is typical of power steering, we are all in favour. Only when driving at the limit are any disadvantages apparent, as will be described later. On the test car the steering-column, when turned, gave rise to a horrid screech, where it was binding in a tight bush.

In spite of the softness of the suspension, the Citroën rolls only slightly in normal fast cornering, although rally-type tests cause it to heel over rather a lot. Not only on account of its all-independent suspension but because, as a glance at the car reveals, Citroën have adhered to their policy of "a wheel at each corner," the DS19 is a commendably stable, safe car, which can be cornered exceedingly fast once the driver is accustomed to the light, high-geared steering action. On wet or icy roads the car shows up to advantage, nor is the driver conscious of the front-wheel-drive affecting control, either on drive or over-run. If pressed to the limit on wet roads understeer causes the DS19 to run wide.

The brakes are as interesting as most other aspects of this futuristic motor car. The rubber-covered brake button may at first confuse a driver accustomed to a normal brake pedal, especially in these days of high-set pedals not arranged for heel-and-toe manipulation. Confusion arises only because the foot *drops* from the Citroën accelerator to this button. There seems less likelihood of the foot slipping from it than from a pedal and certainly valuable time is saved by this ability to drop the foot straight down onto the brake. In action this button, which possesses only the faintest movement, has been criticised as not permitting progressive braking. The action is certainly sensitive and the driver is apt to apply too much pressure before backing off, resulting in slightly jerky braking; but, if the application is not always entirely progressive and if a rather unfortunate lag is apparent, actual retardation can still be achieved progressively. The stopping power of these disc-cum-drum brakes is exceedingly impressive, even apart from the very light button pressure required. The Citroën halts as if running into invisible sand without wheel-locking or deviation, even on slippery roads, and the only vice these superb brakes have, apart from the aforesaid sensitivity and lag, is occasional screech when applied at low speed. Certainly their power gives the driver of a DS19 great confidence when cruising fast in difficult conditions. The pedal-cum-knob parking brake holds securely.

Naturally most people, when invited to ride in the DS19, pay closest attention to the suspension. Although it is not perfect, quick negotiation of hump-back bridges having the same effect as on a vehicle with ordinary springing, except that the car lands squarely and without subsequent pitching, and bad road irregularities causing shock to be transmitted, the sheer merit of the hydro-pneumatic system is revealed by driving at, say, 80 m.p.h., over roads which shake up the occupants of normal cars, even those considered to be well sprung, at anything over 35 m.p.h. Moreover, in spite of this ability to absorb bad surfaces the Citroën does not suffer from undue sponginess, dipping its bonnet but slightly under emergency braking, wallowing very little when driven rapidly over inhuman pot-holes, and refusing completely to pitch.

The bodywork is mainly free from rattles, although a few mechanical tinkles emanate from near the dash. Gear-changing is apt to be followed by very discreet sighs, as of a maiden with something

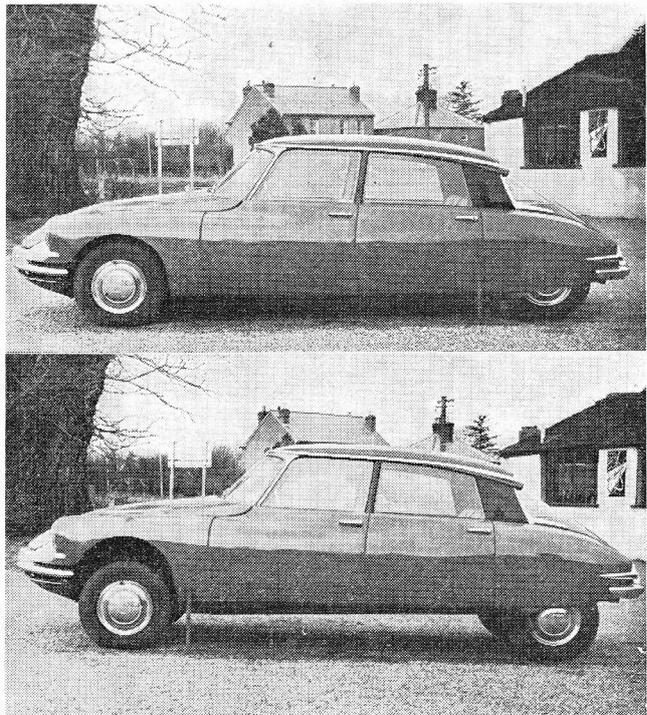
#### THE CITROËN DS19 SALOON DE LUXE

**Engine:** Four cylinders, 78 by 100 mm. (1,911 c.c.). Push-rod-operated inclined o.h. valves. 7.5-to-1 compression-ratio. 75 b.h.p. at 4,500 r.p.m.  
**Gear ratios:** First, 13.8 to 1; second, 7.35 to 1; third, 4.78 to 1; top, 3.30 to 1. Hydraulic non-automatic gear-change. Automatic clutch.  
**Tyres:** 16.5 by 4.00 Michelin "X" on bolt-on steel disc wheels.  
**Weight:** 1 ton 4 cwt. 3 qtr. 14 lb. (less occupants, but ready for the road, with approximately two gallons of petrol).  
**Steering ratio:** 2.9 turns, lock-to-lock. Power steering.  
**Fuel capacity:** 14 gallons. (Range approximately 305 miles.)  
**Wheelbase:** 10 ft. 3 in.  
**Track:** Front, 4 ft. 11 in.; rear, 4 ft. 3 in.  
**Dimensions:** 15 ft. 9 in. by 5 ft. 10½ in. by 4 ft. 10 in. (high).  
**Price:** £1,150 (£1,726 7s. inclusive of p.t.).  
**Makers:** Citroën Cars Ltd., Trading Estate, Slough, Bucks.

troubling her conscience. The noise of the demister fan, which, however, is rheostat-controlled for speed, intrudes to some extent on the otherwise praiseworthy hush. The flat floor and unobstructed driving compartment enable the owner to enter the car impartially from off or near side. The screen-wipers fail to wipe the outside edges of the wrap-round screen and tend to smear it in heavy rain, but the blades park effectively.

The farther we drove this Citroën the more we became attached to it. Many small, as well as its major, design features appeal. The choke, for example, has only a very small effect on throttle opening, so that manoeuvring from cold on the automatic clutch is not rendered embarrassing. Incidentally, choke is not normally required, even for starting after parking for a winter night in the open. Nor does the engine "pink" on good petrol. It runs-on only after

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**AT THE DRIVER'S DISCRETION.**—The ground clearance of the Citroën DS19 is variable for driving over bad surfaces and for self-jacking. In the top picture the car is riding normally, in the picture below it is fully raised. The clearances, at the ruler point, are, respectively, 10 in. in the upper picture, 14½ in. in the lower, at the front; 10 in. and 15¼ in., respectively, at the rear. When parked between two Rovers in Bournemouth it was pleasant to be able to elevate the DS19 to their level by operating the suspension control lever and letting the engine idle for a few moments!