

AUSTRACTION '30

AUSTRALIA'S ONLY CLASSIC CITROEN RALLY!
TOUR CLASSIC CITROEN, TALK CLASSIC CITROEN,
WATCH CLASSIC CITROEN.

June 14, 15, 16
(Queen's Birthday weekend)
Swan Hill.

Accommodation
available.
Application forms available.
from the Secretary, 878 1856.

BOOKING DEADLINE
30th MAY!

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CCOCA membership:

Joining fee (new members and late subscriptions) \$5.00

Annual Subscriptions:

Full member \$15.00

Associate member \$10.00

Joint membership available to spouse of full member, no cost.

Overseas postage rate \$5.00.

CCOCA meetings are held on the last Wednesday of every month at the Coffee Shop meeting room of the Nunawading Civic Centre, Nunawading, east of Springvale Road.

You may be a little surprised to see a DS encroaching on the cover of *Front Drive*. While the Traction is undoubtedly the centrepiece of the club's operation, we cover quite a range of vehicles, under the club's 20-year cut-off, and 'flexible' classic interpretation, from vintage tin to modern 2CV's and derivatives.

This year marks the 25th anniversary of the release of the DS, in 1955, so early D's are well and truly eligible for full membership.

These models certainly have their unique problems of maintenance and parts availability, and I believe that CCOCA could well provide a useful framework for the development of a 'D' group.

COMING EVENTS:

28th May, General Meeting, Nunawading — Talk by Bill King of Martin and King bodyworks. (8pm)

AUSTRACTION 80

Swann Hill

Queens Birthday Weekend

June 14, 15, 16

Accommodation: On site vans —

4 berth, 12.50/night

6 berth, \$14.50/night

Motel accommodation is available, by private arrangement.

Please note booking deadline of 30th May.

Application forms available from secretary.



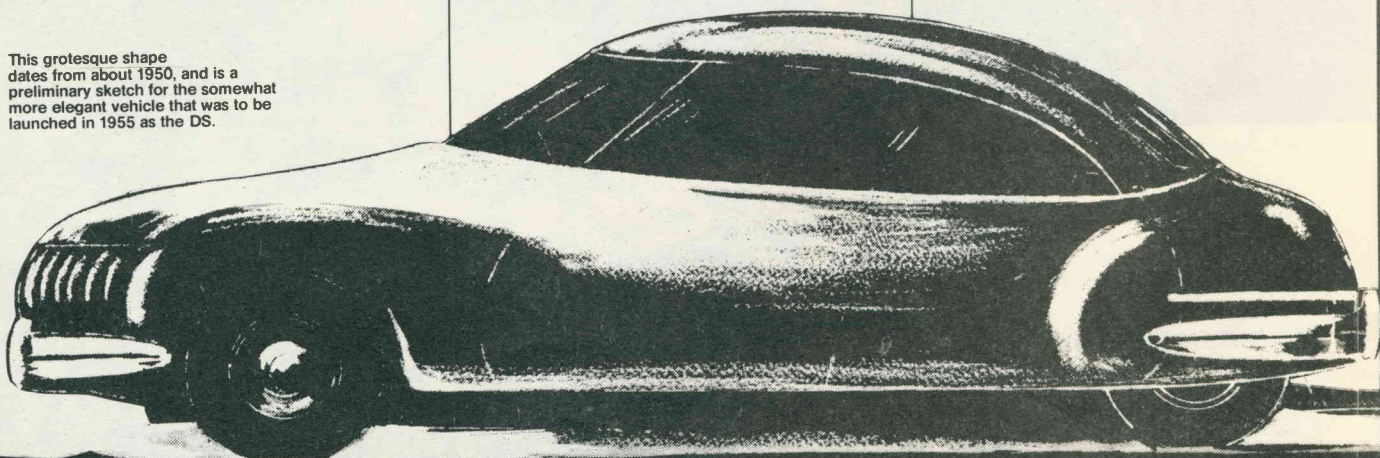
Vol. 4 Number 2
June/July 1980

The magazine of the
Citroën Classic Owners
Club of Australia

**THIS IS
YOUR LAST
FRONT DRIVE**

... if you have not yet paid your subscription. Subs deadline was 12th April — after this date, the joining fee of \$5.00 is payable, on top of the basic \$15 sub. Please forward to the Secretary, Tim Farmilo, 177 Central Ave., Nunawading 3131.

This grotesque shape dates from about 1950, and is a preliminary sketch for the somewhat more elegant vehicle that was to be launched in 1955 as the DS.



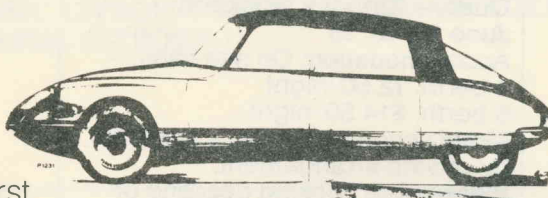
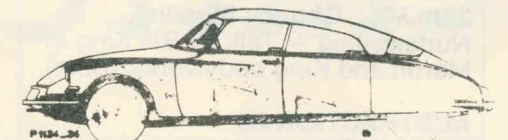
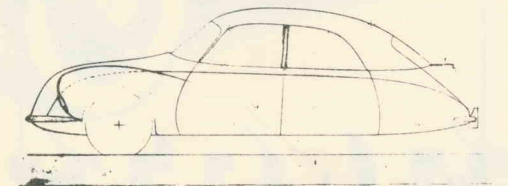
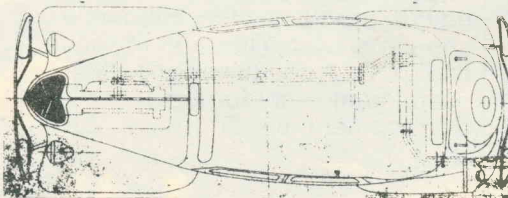
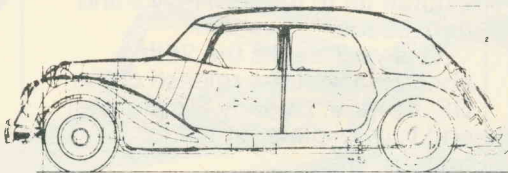
DS- BIRTH OF A LEGEND

If in 1934, the release of the Traction Avant series created a storm, then the 6th October 1955 must have made 10 on the Richter Scale.

This date saw the latest Citroën model unveiled at the Paris Motor Show. What a sensation! In ¾ hour — 750 orders. By the end of the day, 12,000!! Citroën had again produced an instant legend, the DS19.

This model, like the Traction twenty years earlier combined many advanced features into a standard production vehicle —

Front wheel drive (naturally),
Aerodynamic body styling with underbody fairing,
A hydraulic pressure system (hydropneumatic) that operated power steering, suspension with variable height, brakes (using a button instead of a pedal), gearchange, clutch (no clutch pedal),
Inboard disc brakes (the first

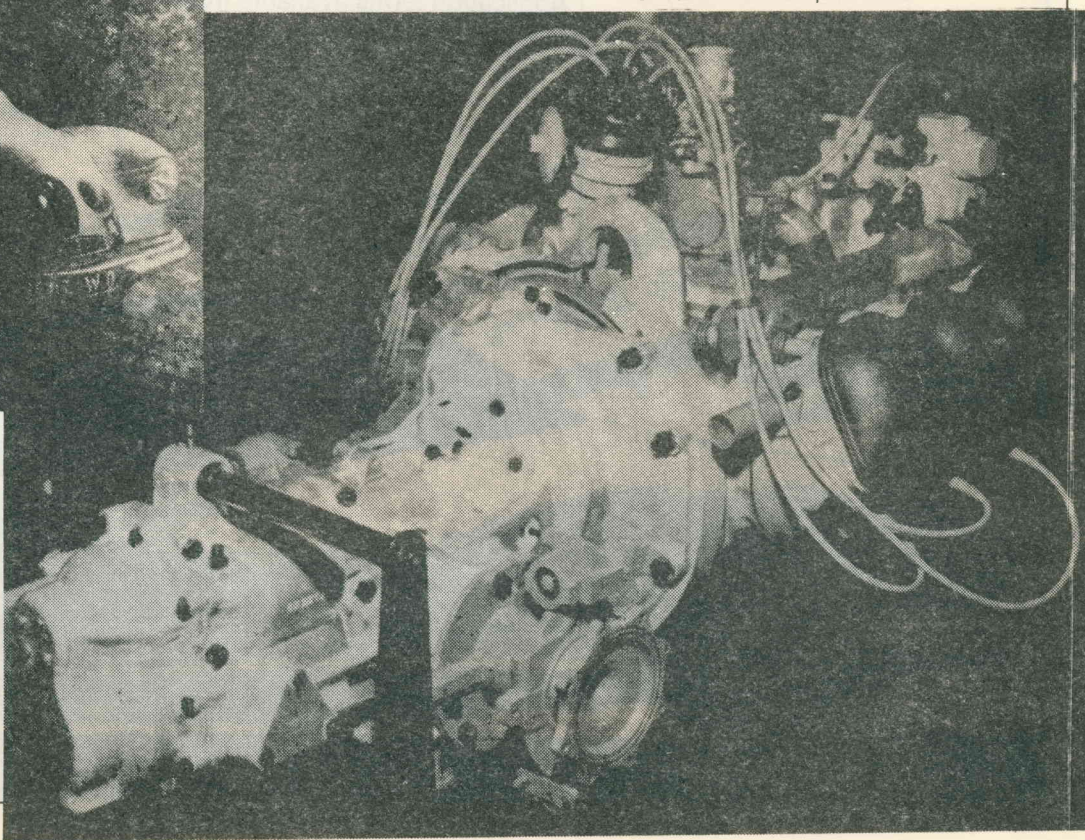
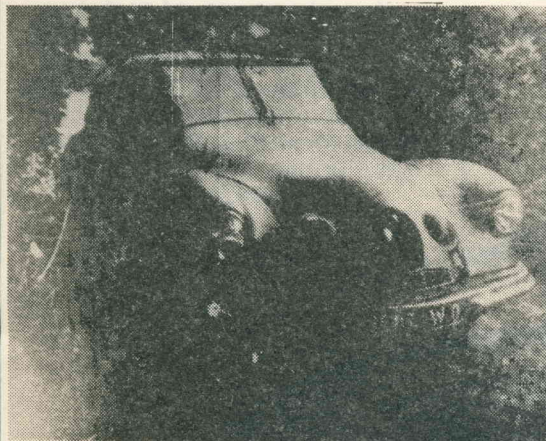


time on a standard production vehicle),
Liberal use of plastic (then considered avant garde),
Centre fix hubs on the road wheels,
Single spoke steering wheel.

Rumours had been circulating for some years (see FD Vol.2, No.1 for a 'leaked' story), of an amazing new Citroën model to be released, but Citroën secrecy ensured that not too much leaked — enough to ensure some curiosity, but not enough to make release an anticlimax. The final product caught most of the pundits off-guard with its totality of innovation.

The DS19 (Désirée Spéciale) was the brainchild of André Lefebvre (a bona fide automotive genius). The DS was not an isolated case, but just another in a long history of innovative thought brought to reality. Having acquired a formidable reputation before joining Citroën, Lefebvre did not disappoint. Over a 20 year period, he was the man responsible for the Traction (including the 6-cylinder), the 2CV, the TUB (a fore-runner of the H7 van still being produced) to name but a few.

The DS was not without its teething problems. The most fundamental proir to



production was the engine/gearbox. Original plans were to include a flat-six motor. The featured prototypes show two examples that survive. Traction owners can be thankful that the proposed powerplant was not up to standard. The final engine/gearbox layout was simply a re-hash (beautifully done of course) of the tried and true Traction configuration. Four-speed gearbox and cross-flow head with twin-throat carburettor gave the vehicle considerably better performance. At low speeds, the car was sluggish because the aerodynamics were useless at these speeds, but as any 'D' owner will tell you, over 100km/h, the vehicle comes into its own. The hydraulic system initially caused some problems, but were quickly solved by the combined efforts of Citroën technicians and adequate education of the users in service and maintenance.

The hydraulic system was not new. In October 1953, the 15CV/Big 6 was given an optional rear hydraulic suspension, which was the first public inkling that Citroën was experimenting with a different suspension. Reportedly, from 1948,

Traction had been quietly testing total hydraulic systems, and so the 15CV Hydraulic was probably more of a test of consumer reaction than a test of the suspension.

The following photograph is believed to be the earliest known picture of a DS prototype. Taken in 1951, it shows already the silhouette that was to become synonymous with the name Citroën. The stories of the the DS prototype are a fascinating insight into the company and its philosophy. Reportedly there is a DS model/prototype with torsion bar suspension which was used to test the aerodynamics of the shape. Rumours persist that this vehicle is still in use in Paris today.

Since 1955, the DS19 has undergone many changes. In 1956, the ID19 was released. This was essentially a manual version of the DS, the hydraulic suspension was retained, but the power steering was gone, along with the hydraulic gearchange and clutch. The vehicle maintained its integral brake system, but the button was replaced with a pedal. The trim also was spartan by DS standards. The cheapest, the ID19 Standard used the ex-Traction 11D head

rather than the cross-flow type.

Late 1958 saw the release of the station wagon (Break) versions. Originally only in ID19 form, they could be optioned up to DS specifications. Late 1960 saw the last of the body styles released — the soft-top 2-door *décapotable*. This was available in both ID19 and DS19 models.

After that, numerous changes took place — 5-bearing short-stroke motors, the famous swivelling, self-levelling headlights, 5-speed gearbox, fuel injection, and so on. The ID title was eventually dropped to become just the 'D', while DS continued to signify the top of the line. From the late 60's till the end of production in April 1975, the combinations and permutations available seem endless, so it appears academic to differentiate between the two.

Australia saw a number of DS19's arrive in early 1956, and since then most variations have appeared here. The early models suffered terribly in the hands of the ill-informed. Such infamous stories as replacing the suspension fluid with brake fluid etc. Very few DS19's survived. The ID19 being not so highly strung fared a little better. Unfortunately, they are at the ebb of their value, and can be bought cheaply, usually in a very sorry state. It's a pity — the early versions are becoming collectors pieces in Europe. A poor DS19 would be a nightmare to restore with all those miles of pipework, but if you can find a good one, it has to be the next best classic to a Traction.

Opposite page:

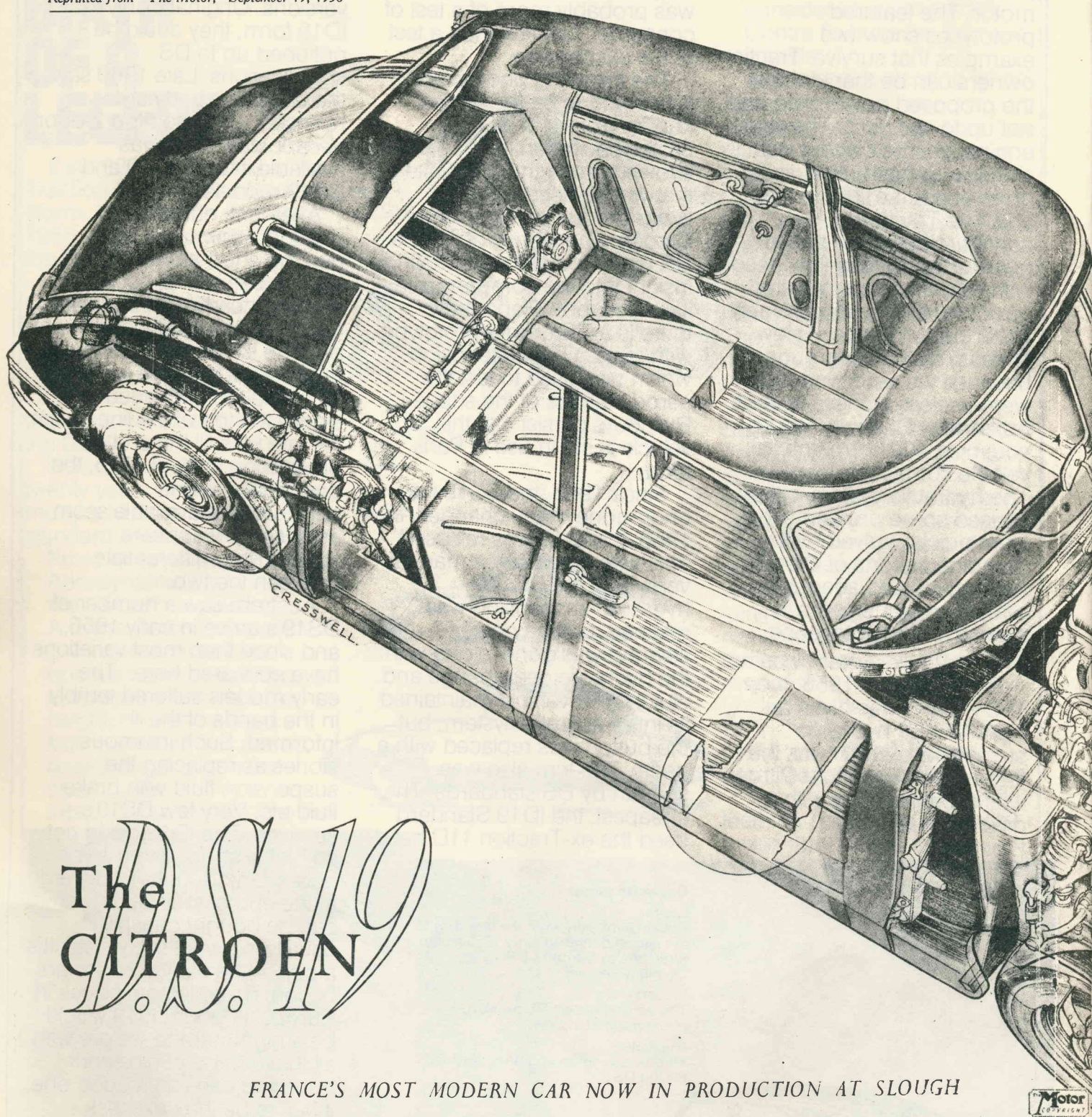
Centre:
Design evolution, from the late '40's to the almost definitive early 1955 study. Sketches by Citroën's DS stylist, Flaminio Bertoni.

Far left:
The earliest known DS prototype, photographed in 1951.

Opposite:
The flat-six motor, originally destined for the DS.



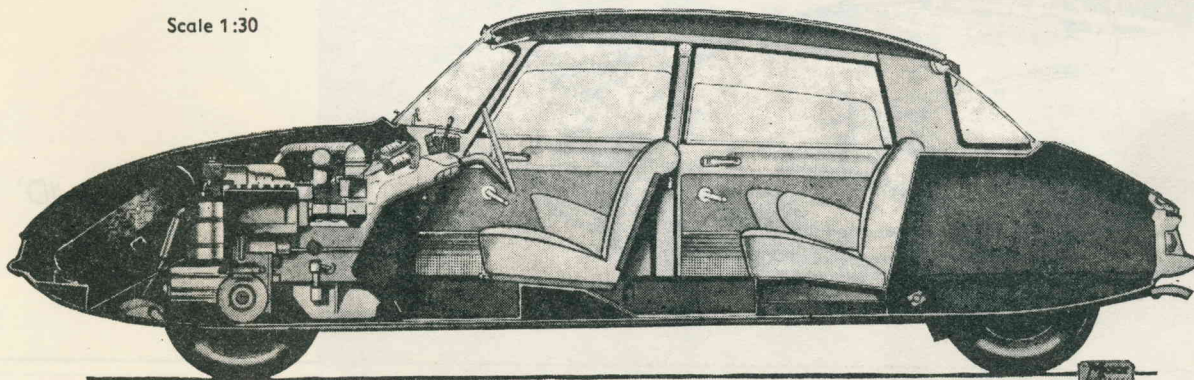
P.S. What do the letters 'ID' designate?
Mark Navin.



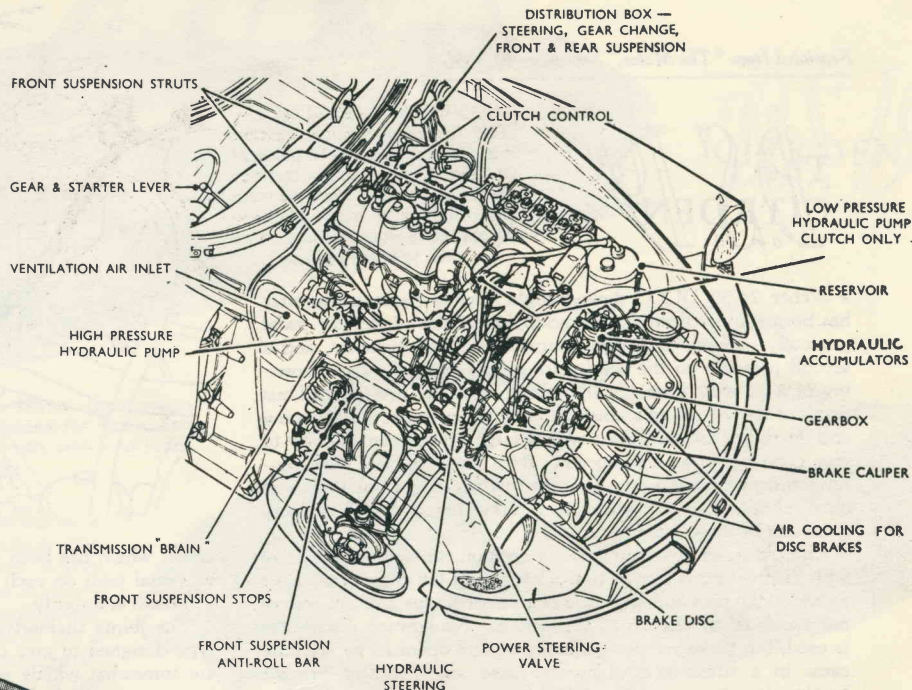
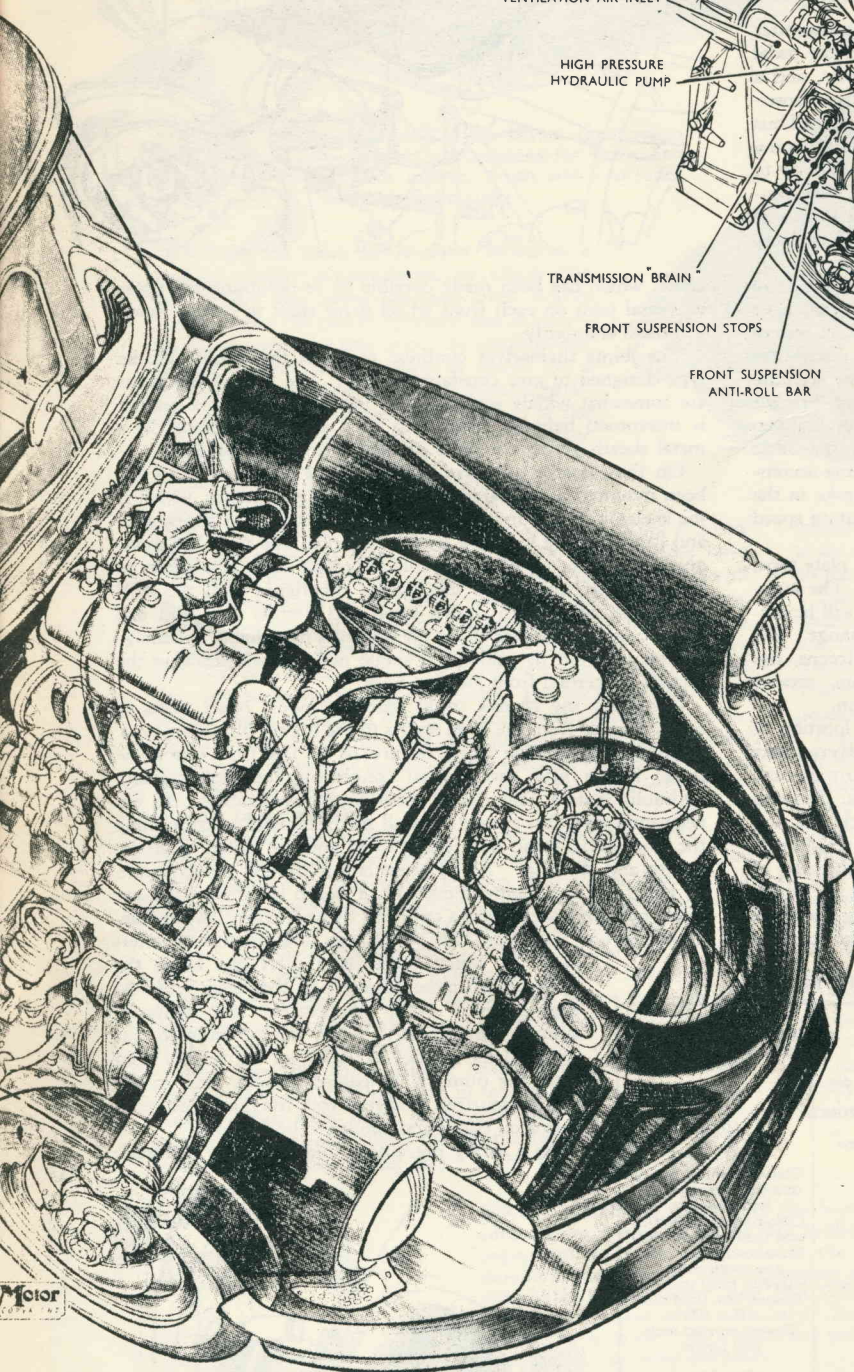
The DS 19 CITROËN

FRANCE'S MOST MODERN CAR NOW IN PRODUCTION AT SLOUGH

Scale 1:30



1957 CARS



wheelbase and broad track of preceding Citroëns, and so in much changed form is a 4 cylinder, 78 mm. by 100 mm. pushrod-o.h.v. engine. Seeing other car manufacturers adopting power steering and power brakes, and themselves requiring a source of power for the self-trimming pneumatic suspension system which so transformed riding comfort on the Citroën Six, the Citroën engineers evidently decided that if they were providing a high-pressure hydraulic system for one job they might logically use the same power supply system to take virtually all the physical effort out of driving. The D.S.19, it needs emphasizing, is not designed to make driving simple, but to enable intelligent men and women to drive enjoyably and well without fatigue.

As a basis for their exercise in applying hydraulic power to a car, the Citroën engineers designed a new chassis which, naturally enough, retains many successful features from earlier designs but eliminates some known faults. The word chassis is used deliberately, for the vital structure of the D.S.19 is the underframe comprising side members, cross members and floor. In contrast to recent Citroëns, the superstructure is a relatively light steel framework, serving only to protect passengers in a crash and to support the body panels. Of these latter the largest, the roof panel, is a reinforced plastics moulding which prior to painting is actually translucent.

Although very few components can be identified with earlier designs, the complete front-wheel-drive power unit of engine, gearbox and final drive gearing is closely similar in layout to that used in the Light Fifteen. The 4-cylinder engine has a flywheel and single dry plate clutch at the front of the crankshaft, driving to the upper shaft of the all-indirect gearbox, the lower shaft of which has on its rearward extremity the final drive pinion. Within this basic layout, however, there has been a big increase in engine power, four forward speeds replace three, and hydraulics now provide for clutch and gear operation.

Extra engine power, to the extent of 35% with only a 6% increase in the corresponding r.p.m., results mainly from use of a new design of cylinder head. In-line overhead valves have given place to inclined valves in hemispherical combustion chambers, an unsymmetrical layout of two rocker shafts allowing these valves to be operated from a single camshaft on the left of the engine. The sparking plugs are centrally placed at the bottom of long tunnels in the rocker cover, inlet ports are on one side of the engine and exhaust ports on the other, and the compression ratio is now $7\frac{1}{2}:1$ instead of $6\frac{1}{2}:1$.

To take advantage of the breathing potentialities of the new engine without sacrifice of low-speed economy and smoothness,

INTRODUCED as the sensation of the Paris Motor Show last autumn, the Citroën D.S.19 with hydraulic control of the clutch, gearbox, brakes, steering and suspension is now being built in right-hand-drive form, at the Slough factory of Citroën Cars, Ltd. Rumour suggests that when production catches up with the demand, a simplified version of this remarkable car may be added to the Citroën range, but the D.S.19 is quite the most interesting design to go into production anywhere in the world for many years past.

Despite its countless original details, the D.S.19 is very much a lineal descendant of the front-wheel-drive Citroëns which have been in production over a period of more than 20 years. Front wheel drive is continued, with the characteristically long

The Citroën D.S.19

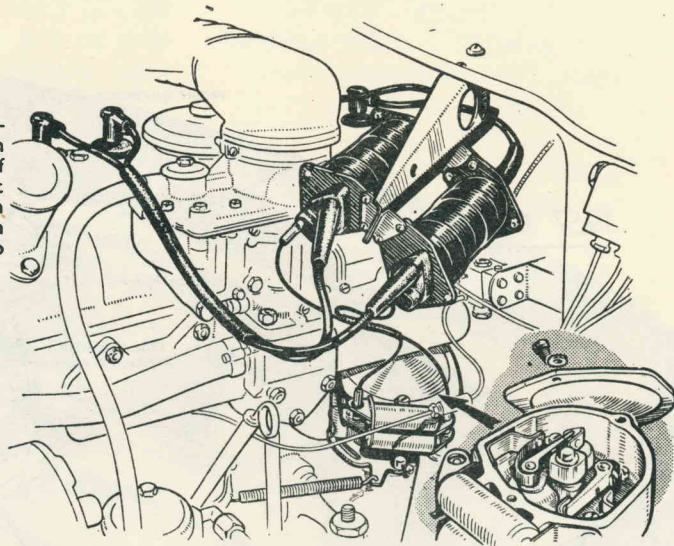
INDIVIDUAL ELECTRICS.—The Citroën ignition system has no distributor. In place of it there are two contact breakers passing low-tension current to a pair of twin spark coils each connected to two sparking plugs

a Weber 24/30 DCLC downdraught double-choke carburettor has been standardized, initial movement of the accelerator pedal gradually opening a 24-mm. diameter throttle butterfly, and a second pressure on the accelerator giving relatively rapid opening of a 30-mm. butterfly in parallel with the first one. Thus many of the virtues of a small carburettor in respect of economy and flexibility are combined with a large carburettor's ability to give good power at high speeds. Both throttles have slow-running and progression jets adjacent to their edges but the usual slow-running mixture adjustment screw regulates the delivery from one of these systems only.

Limited space above an existing ignition contact breaker drive with the inlet ports moved to the left side of the engine may have provided the provocation to use of an unorthodox ignition system not unrelated to Citroën 2CV practice. No ignition distributor is used, but there are two contact breakers operated by separate cams in a single contact-breaker case, each contact breaker passing low tension current to a twin-spark coil serving two cylinders. Thus one coil serves cylinders 1 and 4, the other cylinders 2 and 3, the firing spark in one cylinder being accompanied by an idle spark at the end of the exhaust stroke in the other cylinder served by the same coil. Halved operating speed should double the life of the contact-breaker points.

In unit with the engine, the clutch is of single dry plate type, with an external hydraulic cylinder to disengage it. The automatic control system used with this orthodox clutch will be discussed later, as will the power operation of the gearchange. The gearbox itself, of all-indirect layout as on other Citroëns, has synchromesh mechanism on the three upper gears, serious unorthodoxy being confined to the selector mechanism.

All wheels of this car are independently sprung, location of each front wheel being by a pair of equal-length transverse links with ball joints at their outer ends. A single trailing arm on each side of the car provides location of the rear wheels. Steering geometry is kept correct by use of a three-piece track rod, and an unusual single-stud fixing has been evolved for the steel disc road wheels; these fit over a split hexagonal hub, tightening of the single fixing bolt pulling outwards a conical "plug" which expands the split hub into the wheel. One of the valuable improvements over previous Citroëns is a very compact turning



circle, which has been made possible by re-designing the outer universal joint on each front wheel drive shaft to permit much increased angularity.

The joints themselves continue to be of the double Hooke type designed to give constant velocity. The axes of the joints are somewhat widely separated, an ingenious spherical bearing is interposed between them, and they are now enclosed in a metal sheath giving complete protection and oil retention.

On the massive punt-like chassis of the Citroën D.S.19 has been mounted a comparatively light-looking structure, which is the skeleton of a four-door saloon body. Striking in appearance and likely to have very low wind resistance, this body has mud-guard and other panels removable for repair or to give access to the car's mechanism. In this matter experience with the 2CV model has again been drawn upon and despite the solid and harmonious appearance of the car the areas most liable to damage can be removed by undoing a single nut and withdrawing the section concerned from locating pegs.

Obviously the chassis could readily support other types of body, ranging from the open sports to the luxury limousine type.

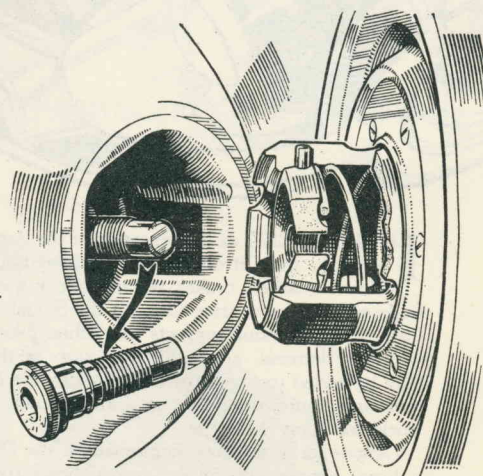
Having outlined the visible features of the D.S.19, it is possible to go into a little more detail concerning the high-pressure hydraulic system which is its most distinctive feature. As has been indicated, this system does all the hard work of controlling the pneumatic front and rear springs and the clutch, gearbox, brakes and steering. At its heart is a hydraulic pump driven by belt from the engine crankshaft, a pump in which there are seven cylinders with pistons operated by an inclined swashplate. High-pressure fluid from this pump goes to a pressure accumu-

lator, in which pressurized inert gas keeps the stored fluid under pressure so that even with the engine-driven pump inoperative the hydraulic systems can operate. When the pressure in this accumulator reaches 3,000 lb./sq. in., further fluid from the pump is by-passed directly back to the non-pressurized fluid reservoir, the fluid used being castor oil based and similar to brake-fluid.

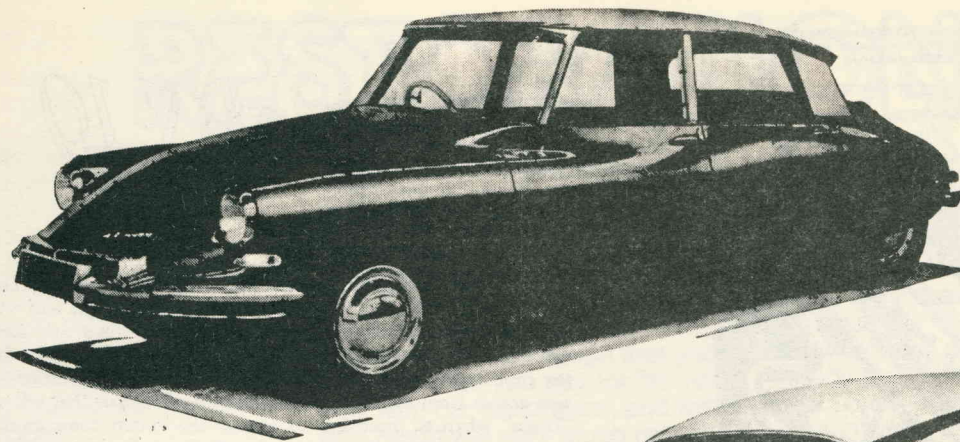
As a safety precaution, high-pressure hydraulic

CITROËN D.S.19 SPECIFICATION

Engine dimensions		Chassis details	
Cylinders	4	Brakes	Hydraulic power operated, disc front, drum rear
Bore	78 mm.	Front brake disc diameter	11½ in.
Stroke	100 mm.	Rear brake drum diameter	10 in.
Cubic capacity	1,911 c.c.	Friction lining area	81 sq. in.
Piston area	29.6 sq. in.	Suspension:	
Valves	Inclined o.h.v., pushrod operated	Front	
Compression ratio	7.5/1	Rear	
Engine performance		Shock absorbers	
Max. power	75 b.h.p.	Anti-roll torsion bars	
at	4,500 r.p.m.	Wheel type	Fitted at front and rear
Max. b.m.e.p.	121 lb./sq. in.	Tyre size	165 x 400
at	3,000 r.p.m.	Steering gear	Power-assisted rack and pinion
B.H.P. per sq. in. piston area	2.53	Dimensions	
Piston speed at max. power	2,950 ft./min	Wheelbase	10 ft. 3 in.
Engine details		Track:	
Carburettor	Weber 24/30 DCLC twin-choke downdraught	Front	4 ft. 11 in.
Ignition timing control	Centrifugal (7½° range) and manual	Rear	4 ft. 3 in.
Plugs: make and type	Champion H.10 Mechanical	Overall length	15 ft. 9 in.
Fuel pump	13½ gallons	Overall width	5 ft. 10½ in.
Fuel capacity	Citroën	Overall height	4 ft. 10 in.
Oil filter	7 pints	Ground clearance	6½ in.
Oil capacity	Pump and fan	Turning circle	36 ft.
Cooling system	19½ pints	Dry weight	22 cwt.
Water capacity	12 volts	Performance factors	
Electrical system	12 volt 57 amp/hr.	(at dry weight)	
Battery capacity		Piston area, sq. in. per ton	26.9
Transmission		Brake lining area, sq. in. per ton	73.5
Clutch	Single dry plate	Top gear m.p.h. per 1,000 r.p.m.	23
Gear ratios:		Top gear m.p.h. per 1,000 ft./min. piston speed	34.8
Top (s/m)	3.30	Litres per ton-mile	2,350
3rd (s/m)	4.78		
2nd (s/m)	7.35		
1st	13.8		
Rev.	14.8		
Prop. shaft	Nil (front wheel drive)		
Final drive	9/35 hypoid bevel		



QUICK RELEASE.—Each wheel is driven from the hub by a hexagon to which it is locked on by a hollow-headed set screw as shown above



The
CITROËN
D.S.19

ANGLICIZED.—British-built D.S.19s reveal their origin by right-hand drive, equal tyre sections for front and rear wheels and superior interior finish which includes real hide upholstery.

fluid from the main accumulator is led to a pair of smaller accumulators, of which one serves only the power-operated front brakes and the other the power-operated rear brakes—no failure should be able to put the whole power braking system out of action at once. As a further safety precaution, the mechanical parking brake is made of pedal type instead of the usual hand-operated variety, with a knob on the fascia to lock it on or release it.

Even when fully laden this front-drive car carries more than half the weight on the front wheels, so allowing for weight transfer during braking it is the front brakes which must do most of the work. These have accordingly been made of disc type, mounted on the inboard end of each front wheel drive shaft, a floating calliper unit squeezing the disc between pads of lining material when hydraulic pressure is applied. By allowing the calliper unit freedom to move laterally, one brake pad can be fixed to it and only the second pad need be moved to apply the brake. The backward movement of this pad is limited so that the brake is self-adjusting for wear. As a drawing shows, the pads of brake lining material have been arranged to be rapidly removable for eventual replacement when they become worn, and air ducts from the nose of the car provide brake cooling.

With much less work to do, the rear brakes are of orthodox internal expanding type, located on the hubs. In view of the wide variation in rear-wheel loading with the weight of passengers and luggage being carried, an interesting device has been provided to adjust automatically the front/rear braking ratio.

With full power braking, the D.S.19 brake pedal is in the form of a button with very little movement, its duty being only to open spring-loaded hydraulic valves. The valves for front and rear braking are surmounted by a balance beam, effort from the brake "pedal" being applied to this through a roller, which is moved along the short balance beam by a hydraulic cylinder connected to the fluid pressure in the car's rear oleo-pneumatic springs—thus when extra passengers enter the car, extra pressure moves the roller along the balance beam to apply a greater proportion of the braking effort to the rear wheels. The high

pressures used in the power braking hydraulic system have led to the usual flexible brake pipes being eliminated, rotating glands on the rear suspension pivots replacing them.

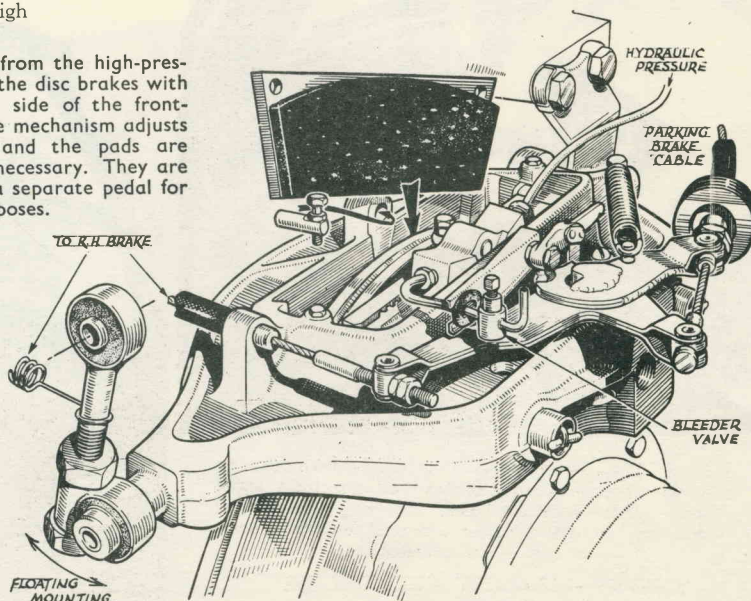
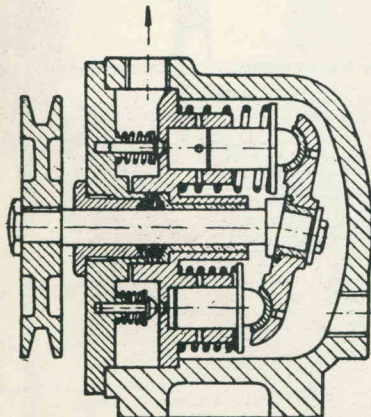
The combination of hub-mounted rear brakes with an I.R.S. system of the trailing arm type means that brake torque reaction tends to pull the tail of the car down on its springs, counteracting the usual nose-dipping tendency of a softly sprung car. There is no torque reaction from the front brakes on the suspension, due to their being mounted inboard on the chassis.

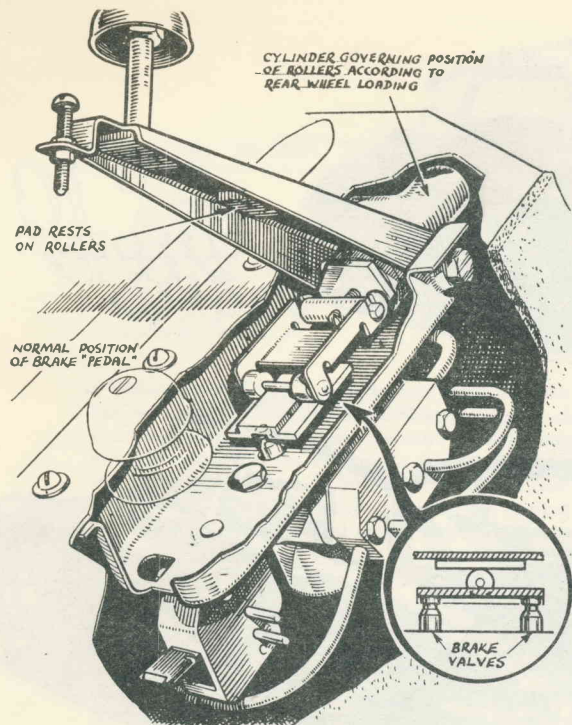
Suspension on the D.S.19 follows very closely the lines tried out on the Citroën Six. Each spring is pneumatic, with inert nitrogen gas enclosed in a sphere and compressed by fluid acting on the outer side of a flexible diaphragm. Fluid from the pressure hydraulic system is interposed between the suspension linkage and the spring, adjustment of the volume of fluid restoring the "trim" of the car if it rises or sinks on its springs due to altered passenger or luggage load.

For trimming purposes, the front springs work as one pair and the rear springs as another pair, each pair of springs being linked by a steel anti-roll torsion bar. From the centre of each anti-roll torsion bar, a rod runs to a trimming valve accessibly placed on the left side of the chassis, this valve allowing extra fluid to enter the pair of suspension units at a slow rate whenever the car drops below its "ideal" height, allowing fluid to return slowly to the reservoir whenever the car rises above its ideal height. A low centre of gravity is essential in a system of this

SERVO STOPPING.—Oil from the high-pressure system is applied to the disc brakes with segmental pads on each side of the front-mounted bevel gears. The mechanism adjusts automatically for wear and the pads are rapidly renewable when necessary. They are applied by a cable from a separate pedal for parking purposes.

PRIME PART.—This seven-stage hydraulic pump is of the swash plate type, and maintains a constant pressure of 3,000 lb./sq.in. in the central reservoir which serves the suspension system, steering clutch and gearbox servos and braking system.





TRUE COMPENSATION.—The fore and aft distribution of braking effort is varied by this ingenious mechanism which moves the pivot point on the braking beam in accordance with the weight carried by the rear wheels.

The
D.S.19
CITROËN

As has been indicated, a conventional single-dry-plate clutch is used on this car, with the usual spring engagement and with hydraulic withdrawal. Withdrawal and engagement are, however, effected automatically, by a "brain" unit mounted behind the engine, there being no clutch pedal. Power for clutch operation comes from the main hydraulic system, signals that tell the "brain" when to disengage or engage the clutch come from a low-pressure pump (incorporated with the belt-driven cooling water pump) which delivers a pressure varying with engine speed, from movements of the gear lever, and from movements of the accelerator pedal.

For the four-speed gearbox, a steering-column control is provided, of unusual arrangement and with powered action giving finger-light control. Each of the three selectors in the gearbox (reverse gear, 1st and 2nd gears, 3rd and top gears) is spring-loaded into the neutral position, but can be moved forwards or backwards from this neutral position by a hydraulic piston, there being five hydraulic cylinders into any one of which fluid under pressure can be directed by the gear lever.

The gear lever moves in an arc to engage successively 2nd, 3rd and top gears, and must be pressed across the "gate" (away from the steering wheel) for 1st or reverse gear. Pressing the gear lever further across the gate from the neutral position operates the usual electrical engine starter. The upper three gears, which alone will normally need to be engaged with the car in motion, have synchromesh mechanism.

It will be noted that the upper three ratios must be engaged in sequence during either the down or upward shifting process. In practice the element of time makes it possible to push the lever directly from, say, top to second with the lower gear engaged with only little more delay than will be occasioned by going one step from, say, third to second. Gear changes are, however, made at a moderate predetermined speed which cannot be beaten, and the driver must synchronize engine speed before the clutch will re-engage automatically.

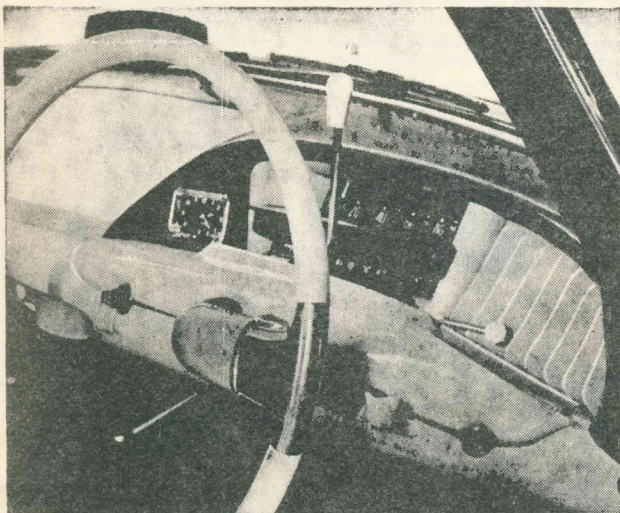
With the vital hydraulic system applying power to the clutch, gearshift, steering, brakes and suspension, the Citroën D.S.19 is a complicated car, but the individual components of it are all based upon straightforward principles well tried in other fields of engineering. With so many major features to be dealt with, it has been impossible to mention within the space at our disposal innumerable details, of which the flexible plastics fan which simplifies belt renewal, and the one-spoke steering wheel designed for safety in a crash, are typical. As production in Britain gains momentum, a widening public will be able to gain first-hand acquaintance with this most interesting product of the mid-20th century.

nature in which the roll couple is resisted (at least in theory) only by the anti-roll bar.

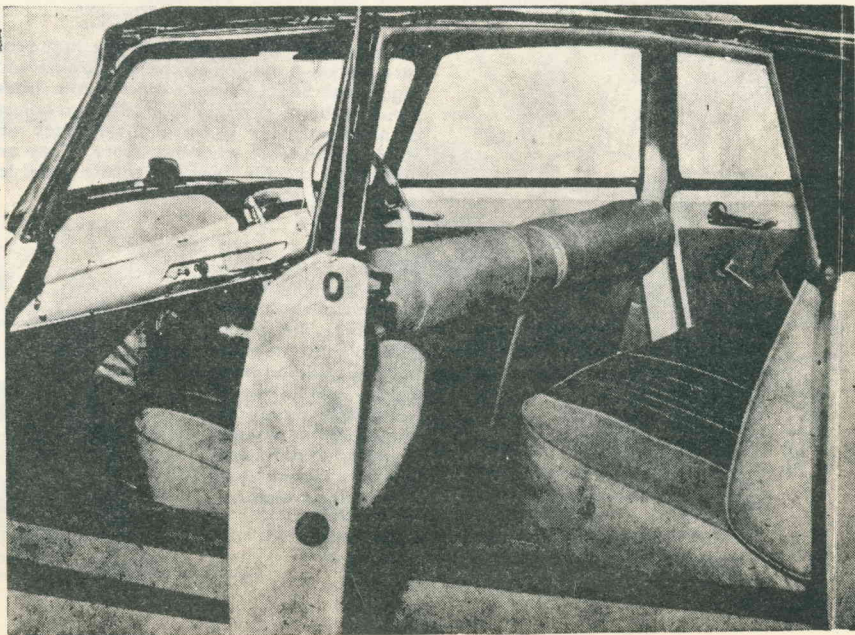
Both the front and the rear height control units are linked by rods to a control lever inside the car, which serves two purposes. The first two stages of movement merely "instruct" the height control valves to keep the car higher off the ground, leaving clearance for spring movement but allowing extra ground clearance for rutted roads. A third stage of movement on this control lever raises the car to the top limit of suspension movement, when it is possible to put a "prop" under it before moving the lever to the other extreme and causing the hydraulic suspension to move under power to the other end of its range of travel—thus without effort the car is left jacked up on the prop, to allow a wheel to be changed.

Recent large Citroën cars having been notable for very heavy but otherwise excellent rack-and-pinion steering, it is not surprising to find on the D.S.19 that power steering is added to a rack-and-pinion unit. The linkage is such that a hydraulic pressure failure would leave unaided rack-and-pinion steering in operation. There is, however, a compact hydraulic valve unit near the lower end of the steering column, torque in the column opening one or other of two valves against springs to direct pressure hydraulic fluid into the appropriate end of the steering-assisting hydraulic cylinder. By careful design of the valve unit, proportional "feel" in the steering can be retained, without the movement of the valves being such as to introduce perceptible backlash in the steering column. Glands take hydraulic fluid to and from the valve unit which rotates with the steering column.

VISIONARY.—The plastics roof and side walls of the D.S.19 are attached to an extremely stiff structure and themselves carry little stress. In conjunction with frameless windows and very narrow pillars this arrangement gives remarkable visibility for all the occupants.



PRACTICAL FEATURES.—The single-spoke steering wheel, the combined starting and clutchless servo gear change lever and slats directing the flow of incoming air, are valuable practical features clearly shown in this illustration.



RESTORATION

Part 2
Roger Brundle
and Mark Norvin.

The conclusion of Part 1 left the budding Traction restorer frozen alone in space and time, with the latest neighbourhood joke.

Having deposited said joke in the by now well organised garage, there is a great temptation to immediately dismember it down to the last rusted self-tapper. This urge should be resisted until a firm game plan is formulated.

Let's have a look at the realities of restoration, and decide on what is required of the project.

The end result can vary from a full-blown ground-up 'concours' effort to a car which is roadworthy, reliable and of 'honest' appearance. Concours cars are fine for winning concours, but a hassle in almost all other aspects. They don't remain concours for long unless an inordinate effort is devoted to their care; decisions on where to park can be agonising, and every other road user suddenly wants to use the same bit of roadway as you. If your psyche can cope with this, then spend the time and money by all means; if not, then it's the housepaint and bullbar treatment.

There are, of course, those Traction found in such good original condition, that extensive restoration is not necessary or even desirable.

The two factors that do, of course, determine to a large extent the end result are available time and money. The two are inter-related in that money can be saved by extra expenditure of time, and vice versa. Most first-time restorers fall into the trap of seriously underestimating both. Ignoring the original purchase price of the car, it is unlikely that a full Traction restoration will cost less than \$3000, assuming that specialist jobs like panel beating, spray-painting and trimming are farmed out to professionals. In round terms, a breakdown of costs would run out at: mechanicals 1200; bodywork \$1000; trimming \$800.

It is also unlikely that a full restoration will occupy less than 700—1000 hours of what to most people is laughingly referred to as 'spare time'.

Obviously, the figures given above are only guidelines, and subject to endless permutations. However, the old adage that you only get what you pay for fits very well with car restoration, and the end result will very much reflect the time and money expended.

As the major items of expenditure are in areas such as welding, panel beating, spray painting and trimming, where the restorer must pay a professional if he lacks the skills necessary, it is worthwhile enrolling in relevant courses offered by many technical education institutions to get a grounding in the basic skills.

Having settled on what end result is required, then a plan of action can be formulated. It is obvious that there must be logical order of progress — e.g., there is no point in trimming a car before it has been re-sprayed.

The following list is a typical sequence of events, assuming a full restoration. It can obviously be shortened according to what is required.

1. Dismantling.
2. Hull rectification — cutting out rust, straightening hull and repairing dents, cracks, etc. Repaired areas into primer and engine bay area into final colour.
3. Mechanical rebuild — overhaul and re-fit mechanical components to rolling chassis stage.
4. Repair detachable panels (inc. grille) — as for hull: cut out rust, repair dents, cracks, etc. Trial assemble to hull to check for fit, and adjust as necessary. Refit doors.

5. Prepare and finish painting hull and detachable panels. Rechrome grille, and other brightware. Refit panels, grille to hull.

6. Rewire, overhaul electrical components and refit.

7. Refit glass and trim interior.

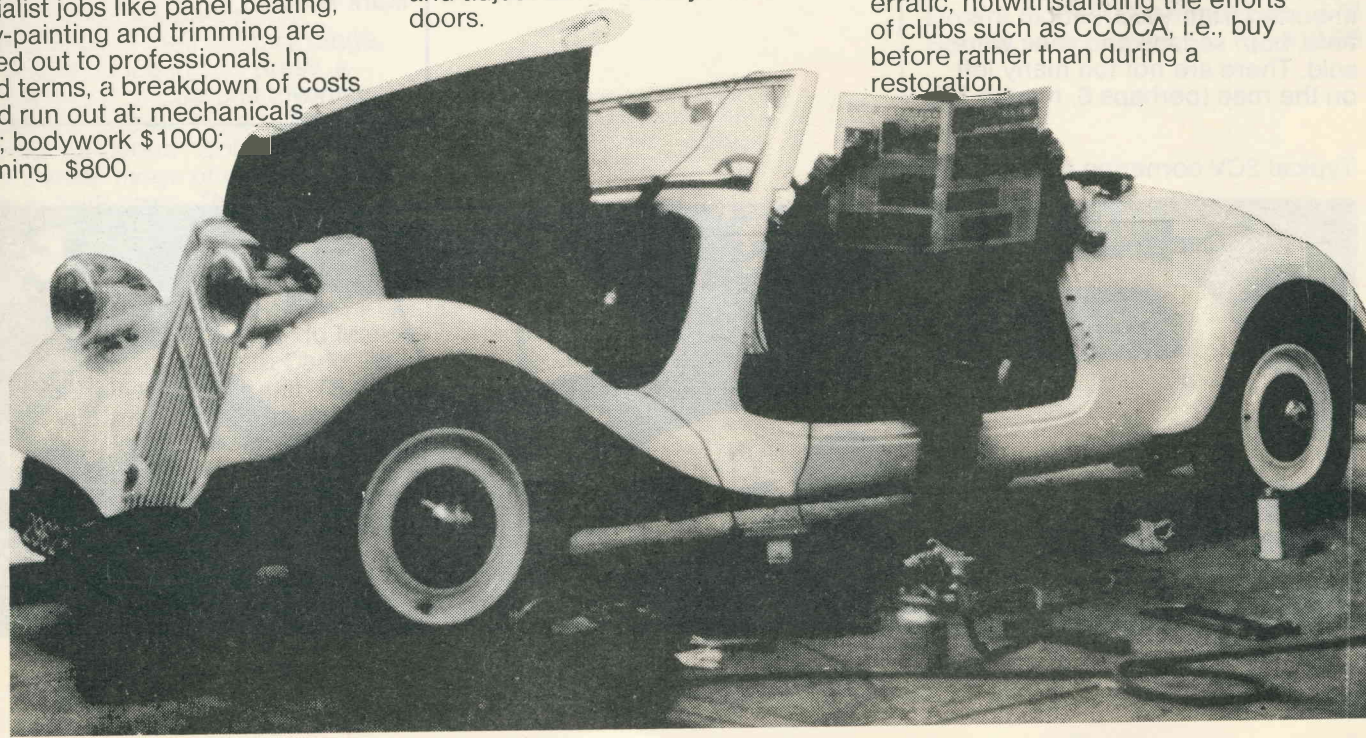
8. Detail car — refit bumpers, doorhandles, number plates, nodding dog on back parcel shelf, etc. Touch up inevitable battle scars in paintwork, and polish.

It is obvious that many of the events can take place concurrently whilst others are dependent of some events already having been completed, e.g., if the engine is to be rebuilt 'outside', then this could be done while work was progressing on the hull.

The trick is to ensure that things come together at the right time. A planning method that can be used is that known as the 'Critical Path Network', where all the events are listed and then arranged in a logical network illustrating their inter-relationships. From the network, it can be deduced which events are critical to the completion of the project in the minimum time.

An excellent method of planning it you are into that sort of thing, but it implies that sufficient funds are available as and when required.

In the world of car restoration, kids shoes tend to take a priority over new pistons and sleeves, and progress is generally determined by availability of cash. However, the point that is being made is that some sort of plan should be made before starting, however basic. Also, if you are planning a restoration, then it is a wise move to obtain those parts that you know will have to be replaced, before work commences. Spares availability is always going to be erratic, notwithstanding the efforts of clubs such as CCOCA, i.e., buy before rather than during a restoration.



Twin Pot Topics

Dirk Shervo

As *Brute* and I were quickly put-ting down the road last week, a maniac CX driver proceeded to drive me into the bushes, ostensibly to have what is known in CB jargon as 'an eyeball'. After such treatment, my framework of mind was more interested in connecting his eyeball to my knuckles, but 2CV owners are renowned for their restraint, so I contented myself with a cursory kick at the nearest tyre.

As any Twin Pot owner in Australia will attest, initial conversations follow a tried and true format, and this one was no exception.

CX — *Is this a 2CV?*

Self — *It will be when it grows up.*

CX — *Where did you get it?*

Self — *Mated a sardine can with a rollerskate (There are infinite variations to this answer, e.g., Got a DS pregnant, cornflakes packet, panel-beated my SM with a shovel, etc., etc.....)*

CX — *How did you get it registered?*

Self — *MRB was having a sale.*

CX — *Do you really get 50mpg?*

Self — *Only if I've got a headwind.*

CX — *'X' (pseudonym for reputable Citroën dealer) told me that there were no 2CV's in this country.*

Self — *They would know, this is in fact a mechanical illusion.*

After this, conversation degenerated into oohs and aahs, with much wondrous shaking of head. The only bit of excitement being that *Brute* managed to run over his foot as we were leaving (much satisfaction for both of us).

The point of above is not to show that 2CV owners are budding comedians, but to underline the incredible ignorance that exists about 2CV's in this country. Now, some facts:

The earliest 2CV in this country is circa 1953, they were dealer imported from 1953—58. In this time, both sedans and vans were sold. There are not too many left on the road (perhaps 6, maybe 10),

but there are quite a few languishing in garages.

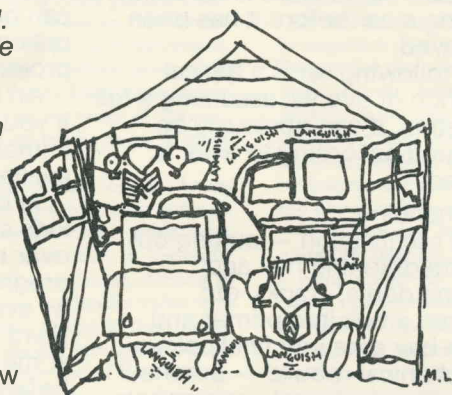
The latest known 2CV is a 1978 2CV6, registered here before Easter this year.

The following models are known to be in this country — 2CV (various '53—78), 2CV6 (AZAM), Ami 6, Ami 8, Ami Super, Dyane, Sahara 4x4, and Bijou. The only missing model was a late model 2CV van, and some enterprising lads have just rectified that.

Yes, there are some problems in registering, but it is possible.

No, a 2CV doesn't get 50mpg, early ones get 63mpg, and late models get approx 45mpg (depends how heavy your right foot is).

So, next time you see a 2CV put-ting down the road, you know it is a 2CV (nothing else looks like that), you know there is a few about (so it's not so surprising), you know it is registerable, and if it passes you, it's getting about 45mpg, and if a jogger passes it, it's getting 60mpg — Got it?



...THERE'S QUITE A FEW Languish in GARAGES.

Stanhope '80/Canberra '81

The 'national' Citroën rally (called 'Grrapple'), was this Easter organised by the CCC Queensland, and was held at Stanthorpe. Andrew Rankine and myself were among the eight CCOCA members attending.

The meeting is adequately covered in the May issue of the CCCQ magazine, and this is available through the club library.

There were a number of interesting Citroëns present — an M35 prototype (styled like 2-door Ami, but with a single rotary motor and hydraulic suspension), 2 vintage (the famous 5CV Bubsie II, and a B12 Tourer), and SM and a C35 utility. There was the usual rash of DS's and in growing numbers, GS's. The ubiquitous twin-potters were represented with a '78 2CV6 and a '77 Dyane 6.

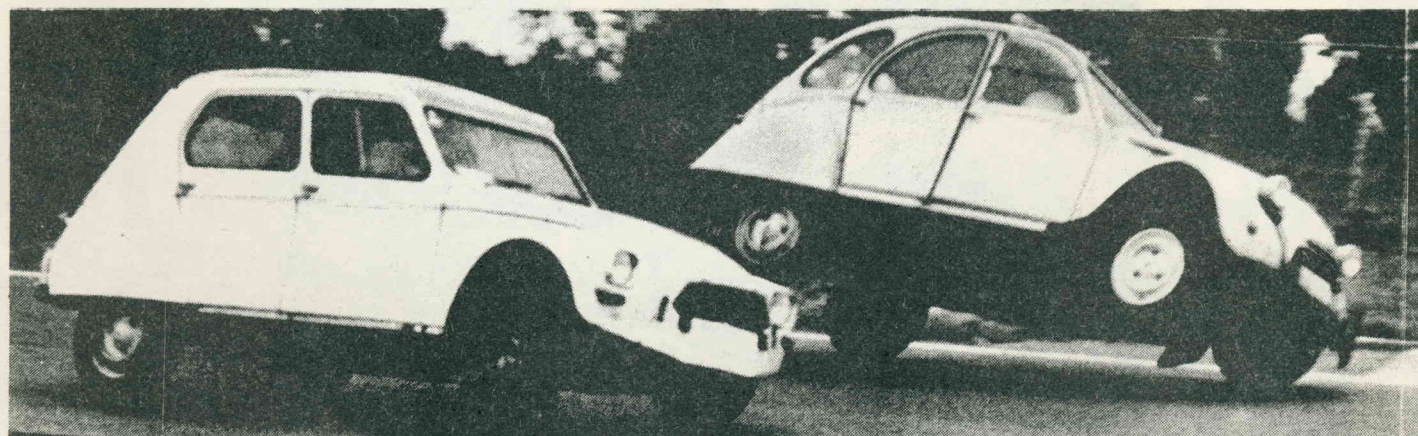
Three Queensland Tractions were also present, but these arrived courtesy of a road transport. Somewhat ironic considering CCOCA fielded some flak from the CCCQ for not attending with Victorian Tractions.

Next year, the national rally is to be held at Easter in Canberra (organised jointly by CCC Victoria and CCC Canberra). Again it is planned that CCOCA will attend. It is planned to book as a club for a communal campsite to give our members from all states a chance to mix. For the Victorian contingent, it is hoped to run a 'mini-Raid' of approximately a dozen vehicles. 2CV's will start a week earlier so to meet at Albury. Indications of interest by possible starters are asked for now as a dozen vehicles requires some organisation.

More details of Canberra '81 will be distributed as they are received.

Mark Navin.

Typical 2CV cornering technique.



Solido

The Solido model range offers almost all Citroëns you would wish to own. The exceptions are some of the commercial range and the pre-Traction range of vehicles. For those of you who have not been able to find many die-cast Traction models here, then Solido can offer you a choice of three. They are essentially the same model, but dressed up differently.

They are part of the Solido Age d'Or range, 1/43 scale metal models and come in their own plastic display box. They are, according to the catalogue, 1939 15CV's, but according to the label on the box are in fact 1938. You experts can spend hours discussing whether or not they are either.

The standard model is presented in black paintwork, and is a French model car. The two dressed up models are firstly 'Fire Chief's Car', which comes in bright red paintwork and a variety of stickers to apply to the car. The second is the FFI car, and comes complete with green and khaki camouflage paintwork appropriate to its supposed role in the French resistance. All models are left hand drive and have opening bonnets to reveal a gaudy silver engine of reasonable detail. They are currently available at a price of \$15.50 locally and are also available from overseas mail order companies (see Thoroughbred & Classic Cars, etc.)

For those of you who collect any Citroen model at all, Solido has a reasonable range of modern Citroens in the C series — 2CV, Visa, and LN lines. They range in price from \$6.95 to \$9.95 dependent on size. They are all 1/43 scale models. In the commercial range, they have a C35 truck, which appears as an ambulance in their Military range, and ambulance in civil dress, a coast guard rescue unit towing a boat, and as a part of a collection called 'La Cirque'. Solido also put out a small range of die-cast metal kits in 1/43 scale. There is one Citroen kit available in this range, notably the Citroen CX Rallye. Like most of the kits in this range, it can be finished in three alternative body details — the Rallye du Maroc '76, the Rallye du Monte Carlo '78, and the Rallye du Portugal '78. No doubt you will want to buy three of these and have all three finishes. Whether or not they are currently available in Australia, I am yet to find out. I have one on order with a local toy and hobby store, who inform me that the wholesaler has every intention of supplying said

article. (At what price I am yet to discover).

For many years, the distributorship of Solido was held by Cyclops. They let the dealership go, then took it up again, and eventually let it drop. For some time, any hope of getting Solido models locally was dashed, the only avenue open was to purchase by mail as before. It seems now, though, there is a distributor in Sydney who has taken Solido on again and will supply to agency shops within one week. This was the means by which we recently obtained two 15CV's, a 2CV, a LN, and a CX Break and Sedan. We didn't order any more of the range at that time because that little lot set us back a few pennies. I have the current 1980/81 and the just-superseded 1978/9 catalogues from my local shop, that is if you are interested in any of the Citroëns available, or any of the other many and varied range carried by Solido. My general opinion is that they are a good model, but are expensive for the size. Their redeeming feature is that they include the Tractions in their current range unlike most 'popular' model companies.

Parts Report

John Couche

WANTED — The spare parts department is looking for reconditionable Silent Blocs and clutch plates (four and six cylinder models) to enable a decent changeover service to be established. If you can help your club by donating any number please contact the Spare Parts Officer

SECOND HAND PARTS

Ask — if we haven't got it in stock, we will try and get it for you.

10% DISCOUNT for all participants in the parts loan.

(POA — part is presently out of stock and next shipment is likely to include a new price.)

Reconditioning Service

Reconditioning service is available on the following:

Radiators, brake shoes, brake wheel cylinders, master cylinders. Price of these services depends on condition of item submitted for reco, but will be at trade prices.

Changes and additions:

Please refer to the last issue of Front Drive for the parts list. Changes and additions to this list are as follows:

Bearings—

L15 Front Inner \$6.21

Gaskets—

L15 head gasket \$22.59

Big 6 head gasket (1 only) \$11.50

Big 6 rocker gasket (1 only) \$1.73

Rubber Parts

Rubber Parts—

L15 Fan belt \$5.98

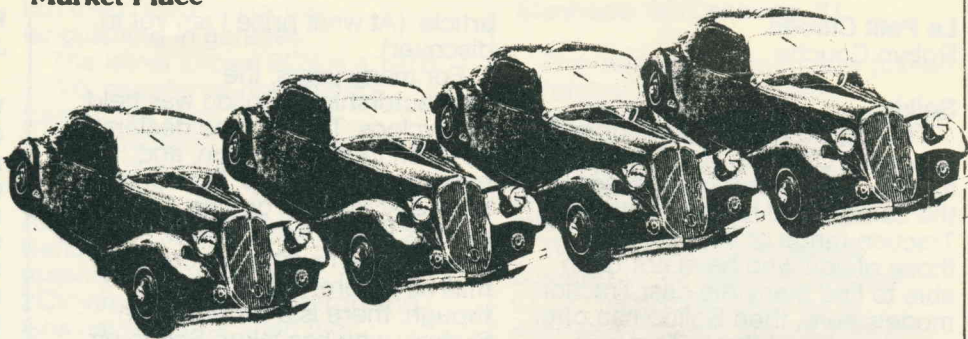
L15 Radiator Hose Upp. \$7.18

L15 Rad. Hose, Lwr. \$8.25

Door & Bonnet Grommets, ea. 57¢

Scuttle vent rubbers \$13.00

Market Place



FOR SALE

1952 Light Fifteen, Slough-built. Outstanding car in original condition, mechanically perfect. Engine just reconditioned (\$800), body excellent. Car has only travelled 60,000 miles.

\$3000. Ken Coldicutt 485260.

Club Shop

Pat Propsting
18 Bellara Drive
Mooroolbark

Metal Badges

A new order has been placed, and these will cost \$12 each. Place your orders now.

Lubrication charts are still available, at \$1.00 each, including postage if applicable.

Windcheaters are now \$12.00 each
— Order now for Austraction 80.

SPECIAL CITROËN TOOLS FOR HIRE BY MEMBERS

The club has for hire the following special tools for your Citroën. Tool hire rates are \$2 per week, for a period of one week, with a deposit of \$10.00.

To hire the tools, contact Rex Gercovich on (03) 874 3469.

*Spanner for adj. upper swivel ball;
Extractor for steering ball pin;
Spanner for steering rack tube cap;
Extractor for upper swivel ball;
Apparatus for checking concentricity of brake drums and linings, front;
Same as above — rear;
Front outer wheel bearing extractor;
Front Hub extractor;
Spanner for outer ball-race retaining ring;
Extractor for lower swivel ball;
Vice for holding driveshaft couplings during dismantling and refitting;
Stand for engine when removed.*

Contact Times

To ease the workload on the Spare Parts Committee, the following times have been set aside as the **ONLY** times that spare parts can be ordered or picked up, except in emergencies (which means the need to obtain a part to keep a registered and road-going car on the road following a break-down. Cars undergoing restoration do not qualify for emergency handouts.) To make this system work, your co-operation is requested.

The order times are 5pm to 9pm weekdays and 10am to 9pm weekends. John's phone number is listed in Front Drive.

Pickup Times

Parts may be picked up on the first and third Saturday of each month, except in emergencies.

Whilst every effort is made to ensure the accuracy of information and advice in this magazine, and in replies to readers queries, neither the Citroën Classic Owners Club of Australia nor the officers and members thereof nor the authors accept any liability.

Question:

HOW GOOD IS THE CITROEN DS-19 (GODDESS)



Answer:

IT'S JUST HEAVENLY

Probably no other car in the world today has made such an impact on the motoring public as the Citroen DS-19—the Goddess.

Its unveiling at the Paris Motor Show late in 1955 caused a sensation quite as remarkable as the car's design.

I reviewed one of the first Goddesses to reach Melbourne late last year. Now, a number of them has been landed and I have been able to renew the acquaintance with a test run of 100 or so miles in a fully run-in car.

Your whole conception of motoring changes after an hour behind the single-spoked Goddess wheel.

It rides and handles unlike any other car I have driven. Its performance is just as revolutionary as its shape.

The two-litre engine is extraordinarily flexible; top speed is close on 90 m.p.h.; acceleration times are good; and you feel as if the car rides on air—and, in fact, it does. (Hydro-pneumatic suspension.)

My favorite stretch of cobblestones and potholes has made some remarkably fine cars produce surprising noise. *Not so the Goddess.*

Out on a country road I approached a rough, raised wooden bridge at 50 m.p.h. In almost any other car I would have expected the bump to throw us into the air, or at least to produce a series of kangaroo-like bouncings. *But, no!*

There was a slight bump, but no bouncing. The hydro-pneumatic suspension took the knock and settled immediately.

The Goddess "straightened out" the bends. Really hard cornering produced a fair degree of roll, but it was

very hard to make the back end break away.

If you've already seen the Goddess at the Motor Show you probably noticed that little button on the floor.

It controls the power-assisted brakes. Many people believe it's hard to use. But it's not. Like any other brake pedal, it depends on how hard you press it.

The Goddess is one of the few production cars in the world to have disc brakes fitted as standard. They're on the front wheels only (conventional shoe brakes are at the back), and braking is most efficient.

There is no clutch pedal. The clutch is operated hydraulically as the gear selector, a short lever mounted vertically in front on the steering wheel, is moved to change ratios.

The gearbox is of fairly conventional pattern. The transmission is not automatic. Citroen engineers say this would use too much power from the 2-litre engine.

But just about everything else is either automatic or power-assisted. *And it all depends on a small pump under the car's low, curved snout.*

But with a fine Gallic distrust of mechanical things, Citroen engineers have built their car so that if the pump should fail the car can be driven like any other car.

The Goddess must surely be one of the most comfortable cars in the world. The English-built model sold here has leather upholstery over very deep foam rubber. There's even foam

rubber under the carpet, behind the light plastic headlining, and on all usually sharpish projections like the door pillars.

Any complaints? Just two.

The sloping windscreen could make the car pretty hot in an Australian summer. Some sort of anti-glare screen would be needed.

The accelerator "travel" is too long. It doesn't match the comfort of the car.

FIGURE IT OUT

Engine: 4 cyl., of 1911 c.c., developing 75 bhp at 4500 rpm on comp. ratio of 7.5 to 1. Fan is of nylon.

Transmission: Single-plate dry type, with automatic hydraulic release and engagement. Drive to front wheels by spiral bevel.

Suspension: Independent on all four wheels by hydro-pneumatic system, anti-roll bars front and back.

Brakes: Disc type on front wheels; drum type on back; hydraulic pressure distributed between front and rear brakes according to axle loading. Mechanical brake operates on front discs.

Dimensions: Over-all length, 15 ft. 9 in.; width, 5 ft. 10½ in.; height, 4 ft. 10 in.; turning circle, 36 ft. 1 in.; ground clearance, variable between 7 in. and 14 in.; weight, 24 cwt.

Performance: Maximum speed in top, 87 mph; third, 75 mph; second, 55 mph; first, 26 mph. Acceleration in top gear, 20-40, 15.7 sec.; 30-50, 16 sec.; 40-60, 21.5 sec. Acceleration through gears, 0-30, 7.3 sec.; 0-50, 14 sec. Standing ¼-mile, 22 sec. Braking, from 30 mph to stop, 30 ft. Fuel consumption, 29.6 mpg driven fairly hard.

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