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1969 Cars

Rare event

New Peugeot model - the 504

A NEW Peugeot is always an important event, not only for its comparative rarity, but also for the certainty that the new arrival will be with us for a very long time and, if past experience can be relied on, will set several new standards in its class. Just such a car is the new 504, an extension of the conventional 404 range with an enlarged version of the four-cylinder cross-flow engine, a completely new four-door body, independent rear suspension with hypoid final drive and four wheel disc brakes. There will be two versions, the standard model with single Solex 34 PBICA 5 carburettor which will sell in France for 13,100 NF (£1,100) and another with Kugelfischer indirect fuel injection which costs 1,500 NF (£126) more. These prices fall well within the spread of the Citroën range whose market Peugeot are obviously intending to tap. A left-hand drive version will be shown at Earls Court and deliveries of right-hand drive models priced at around £1,500-£1,600 will start in the UK next April.

The 504 is better than the 404 in almost every respect: more roomy, quieter, more comfortable, faster with more stable handling, steering and braking. Externally it is only slightly larger than the 404, 3 in. longer and 2 in. wider, but it has 3.7 in. more in the wheelbase and a 3 in. wider track front and rear which, combined with curved side windows, ensures far more interior space. Like the 404's, the basic styling is by Pininfarina and without special distinction except perhaps for the attractive blend of a simple horizontal barred grille and trapezoidal headlights by Marchal, ordinary tungsten type for the carburettor model and quartz iodine for the injection.

Considerable emphasis is placed on safety: the body is a modern unitary design with an immensely strong centre section and progressively collapsible extremities. All four doors have burst-proof locks (the rears are childproofed), the steering column has two universal joints and the wheel a large padded centre boss. All fittings are well rounded and padded and the tops of the front seats can be raised to form head-rests. With all this it is strange to note that the French still seem to have very little use for seat belts.

The engine is derived from the 1,618 c.c. 404 unit by increasing the stroke of the five-bearing crankshaft from 73 to 81 mm, retaining the same 84 mm bore. It has the traditional Peugeot cast-iron cylinder block with wet liners and a cross-flow aluminium alloy head. Combustion chambers are roughly a segment of a hemisphere or lenticular in shape with the largest possible valves very close together, displacing the sparking plug slightly off centre. A single side camshaft operates the valves, inclined at different angles to the vertical with more bias for the inlets, through crossed pushrods and two rocker shafts.

The larger engines are about 10% more powerful than the corresponding 404 units, maximum output with the electromagnetic fan disengaged is 82 b.h.p. (DIN) for the carburettor engine and 97 b.h.p. (DIN) at 5,600 r.p.m. with fuel injection. Both engines develop their maximum torque at 3,000 r.p.m. (99 and 101 lb.ft. respectively). There are also several design differences: the injection model has four separate ports but the carburettor feeds to a combined induction chamber; the blocks differ in detail; the injection engine has more sporting timing, different plugs, coil, oil and air filters, fuel pump and make of alternator. As in the 404, the engine is inclined to the right at 45° which not only reduces engine height and concentrates its weight lower down but simplifies the task of providing engine mounts capable of maintaining Peugeot's legendary standards of engine smoothness and quietness. Any in-line four-cylinder engine produces unbalanced secondary forces acting in the plane of the cylinder axes. If the engine is set vertical these can only be minimised by making the engine mounts as pliable as possible in this direction. This can lead to unpleasant body shake if the mounts are soft enough to have a natural frequency which can be excited to resonance by bumpy road surfaces or unbalanced wheels. Inclining the engine redirects the secondary forces and divides them into horizontal and vertical components each with a magnitude of only 70 per cent of the total force. This way some of the effect can be reacted in a lateral direction by mountings which can be quite soft in this plane without unpleasant effects. The mounts themselves are set on pedestals attached to another traditional Peugeot feature, the massive cast cross-member which supports the inboard mounts of the MacPherson strut control arms and no doubt plays an important part in ensuring that road noise is kept down to uncannily low proportions. Moreover since no rubber engine mount can be a complete isolator, suspension disturbance will tend to be transmitted into the engine whose mass will provide a degree of inertial damping.

A Ferodo hydraulically operated diaphragm clutch transmits power to the normal 404 fully synchronised four-speed gearbox with steering column shift. ZF automatic transmission is optional. Ratios are unchanged but a higher final drive, 3.89:1 for the carburettor engine and 3.77:1 for fuel injection, raises the top gear m.p.h. per 1,000 r.p.m. from 17.7 to 18.4 and 18.9 respectively. It is interesting to note that Peugeot have finally abandoned their worm and wheel final drive in favour of a more orthodox hypoid bevel arrangement in the 504. After investing in elaborate new plant to build worm drives only a few years

ago, it may be assumed that they had more practical reasons than mere nostalgia for retaining the principle on the 404. The most obvious are greater silence than is usually possible with bevels and a lower propeller shaft line. The fixed differential mounting in the independent suspension of the 504 Peugeot lessens the importance of drive line height, but the problem of isolating gear noise is more complex than when the differential is attached to the body only through the much longer path of the springs and location links for a live axle.

The propeller shaft is totally enclosed in a torque tube rigidly attached to the gearbox housing at one end and to the differential casing at the other, which has interesting consequence. Engine and pinion drive torques are completely self-contained so that their respective flexible mountings are relieved of torque reaction effects about a longitudinal axis. Reaction from the drive shaft, which tries to raise or lower the nose of the differential, is transmitted right up the torque tube to the engine, mounts and since the length of the lever arm is so great the magnitude of the vertical reaction force is very small, making little demand on the compliance of the mounts. Relieved of twist the differential is located by two rubber mounts attached to the upper rear cross-member which also supports the top of the coil spring damper units and these may be quite soft. Similar arrangements were used on the curved prop shaft Pontiac of 1964 and the Ferrari 365GT in which the gearbox was integral with the final drive. There are a few difficulties with it: at certain frequencies the tube will want to oscillate in bending like a violin string or vibrate in torsion, so diameter and section must be carefully chosen so that the natural frequencies of these modes are never excited under service conditions.

Rear suspension is by a semi-trailing link arrangement and very well executed. The trailing arms are substantial boxed pressings attached by two pivots to a sturdy cross-member isolated from the body by rubber. The pivot axis is almost at right angles to the centre line of the car so rear wheel camber changes with deflection are only a little more than with a straight trailing link arrangement: in fact the virtual swing axle length is more than 2.25 times the track and the static roll centre height correspondingly low, about 3 in. above road level. With MacPherson struts at the front, this roll centre is also low, about 2.5 in. above road level. Drive shafts are slightly articulated in both vertical and transverse planes and have Glaenzer-Spicer constant velocity pot joints at each end, all four incorporating a roller spline sliding mechanism to permit drive shaft elongation which, in view of the small changes in camber, will be quite large between full bump and rebound.

Front suspension is similar to that used on the 404. In addition to the main cast cross-member and second fabricated member ahead of it carries the bushes for the trailing locating links. This front one also carries the bushes for a substantial anti-roll bar and the rear one supports the rack-and-pinion steering gear. The wheels are pressed steel discs 14 in. diameter with 5J rims and carry 175x14 radial tyres either Michelin XAS, Dunlop SP Sport or Kléber V10 GT. Girling disc brakes are used all round of 10.8 in. diameter with two-piston floating caliper operation and servia assistance by a Bendix Mastervac. The system also incorporates a Bendix compensator valve to bias hydraulic pressure to front or rear brakes according to load as indicated by the position of a sensor attached to the rear anti-roll bar.

Driving impressions

The suitability of the 504 for effortless cruising at high speeds was confirmed in a test session arranged by Peugeot over a route running southwards from Paris past Montlhéry to Orleans. Unfortunately much of it was on the N20 giving little scope for assessment other than main road cruising and rumour had it that guards had been deployed at the Montlhéry Autodrome with instructions to turn away all Peugeots. For the outward journey we had an injection model, for the return a carburettor-engined car. First impression was of the exceptional comfort obtained in a comparatively inexpensive car. Individual front seats have fully reclining squabs and adjust freely on rocking levers which raise the leading edge as the seat is moved closer to the wheel. Upholstery is either in pvc with cloth centres or leather though the extra 1,200 NF (£100) asked for the latter seems unlikely to make it a firm favourite. On the other hand a very well made sunshine roof costs only 200 NF (£17) extra. The rear seat is also extremely comfortable with a folding centre arm and even with the front seats as far back as they will go (perhaps not quite far enough for a tall driver), there is ample rear leg room. Instruments are set in a binnacle in front of the driver with a thermometer, battery charge indicator and a large clock plus warning lights which include one to indicate low level in clutch or brake reservoirs or worn brake pads. Pushbars at the ends of the steering boss pad sound the twin air horns.

There is a comprehensive through-flow heating and ventilating system with four slides to control volume, temperature, distribution and a variable boost fan. Fresh air ducts with forced flow swing upwards and inwards from the top of the fascia.

Even in cobbled Paris suburbs the occupants are almost completely immune from shock and vibration though the suspension is well controlled and never feels soggy. We were told that Peugeot have worked hard to maintain their unequalled reputation for low road noise, which proved more difficult with i.r.s., and they have succeeded remarkably well since the most appalling surfaces produce only a faint, muffled rumble inside. The same can hardly be said for wind noise which is quite prominent at high speed, a noticeable source being the sunshine roof; on one of the cars the front window did not seal properly. Apart from this the sensation at speed might be of a much more expensive car; the ride is superb, with negligible deviation from surface or wind, and at steady speeds the engine is almost silent. It is not quite so impressive when accelerating hard through the gears when both carburetted and injection engines begin to feel a little fussy towards the top end. The gearchange is very good for its type and you can run up and down the box quite smartly which compensates for the rather wide spacing of its ratios. We were unable to verify performance figures but Peugeot claim a top speed of 104 m.p.h. for the injection and 0 to 60 m.p.h. in 12.0 sec; 97. m.p.h. and 14.5 sec. with the carburettor car.

Steering giving 4,5 turns lock to lock seems low geared when related to the turning circle of 36 ft. but it is still a little on the heavy side and calls for some judicious winding in town, particularly as castor seems insufficient to centre it completely at low speeds. On the move it feels about right, direct and positive, with no lost motion or trace of kick-back. From what we could gauge of the handling, the car has a remarkably high limit of adhesion though it does roll quite a bit, to the accompaniment of protesting howls from the tyres when really pressed. It is basically neutral, a little understeer developing with increased exuberance but it seems impossible to move the back end even with the most flagrant abuse of the throttle in a turn.. Brakes are powerful and progressive with a light but not insensitive feel and the pedals well arranged for heel-and-toe changes.

With a car combining so many features ideal for a large family touring fast over long distances on unrestricted, often poorly surfaced Continental roads, the 504 seems certain to keep the lines at Sochaux occupied for some considerable time to come. Coupe and convertible models are planned to join the saloon shortly but the estate car function is to be left to the 404.

James Tosen

Specification

Engine

Cylinders	4 in-line at 45°
Bore and stroke	84 mm. x 81 mm.
Cubic capacity	1,796 c.c.
Compression ratio	8'35:1
Valvegear	Pushrod o.h.v. with inclined valves
Carburation	Solex 34 PIBICA5 or Kugelfischer fuel injection
Electrical system	12V, 55Ah battery charged by Ducellier alternator (Paris-Rhone for injector)
Cooling	Water pump. thermostat and magnetically clutched fan
Maximum power	82 b.h.p. (net) at 5.500 r.p.m, (with injector, 97 b.h.p. at 5,600 r,p.m.)
Maximum torque	99 lb.ft . at 3,000 r.p.m. (with injector, 101 lb.ft. at 3,000 r.p.m.).

Transmission

Clutch	Ferodo diaphragm spring 8.5 in. dia.
Gearbox	4-speed all synchromesh
Gearbox ratios	
Top gear	1.00
3rd gear	1.41
2nd gear	2,17
1st gear	3 66
Reverse	3.75
Final drive	Hypoid bevel, 3.89:1 (3.78 with injection)
M.p.h. at 1.000 r,p.m. in top gear	18.4 (18.9 with injection)

Chassis

Brakes	Girling discs front and rear with servo and pressure. limiting valve.
Brake dimensions	10.8 in dia front and rear.
Brake area	236 sq.in. front, 202 sq.in. rear.
Front suspension	Independent. MacPherson struts, coil springs, tewscopic dampers. Anti-roll bar
Rear suspension bar	Independent, semi-trailing arm, coaxial coil spring and telescopic dampers, anti-roll
Wheels and tyres	Steel disc wheels with 5J rims. 175 x 14 Michelin, Dunlop or Kleber tyres.
Steering	Rack and pinion.

Dimensions

Length overall	14 ft, 9 in.
Width overall	5 ft. 6.5 in.
Height (unladen)	4 ft. 9,5 in.
Turning circle .	36 ft.
Kerb weight	27.75 cwt.