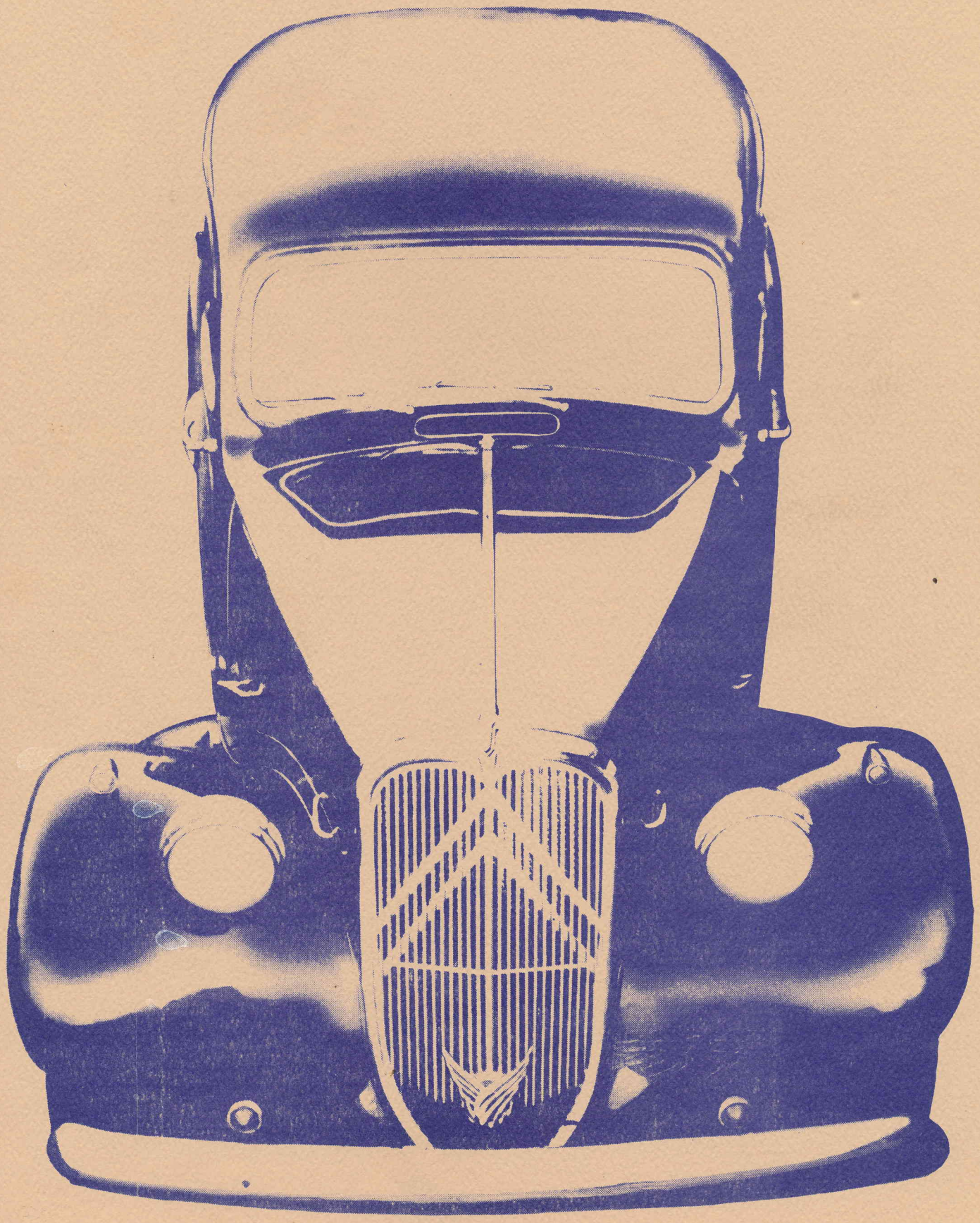
FRONT DRIVE



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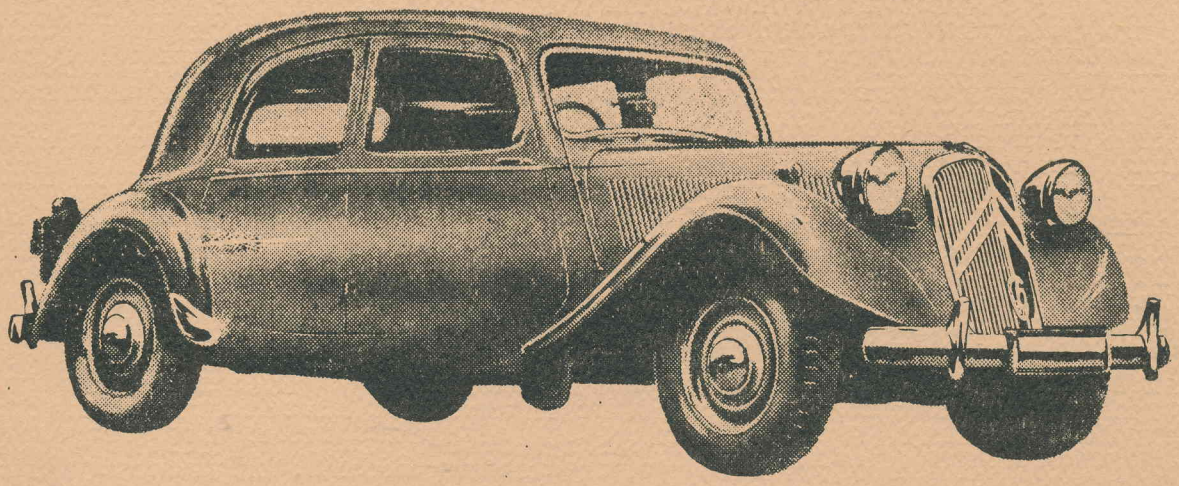

CITROEN

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FRONT DRIVE

Volume 1 Number 2 December 1977, January 1978.

Traditionally, the second editorial of a new magazine basks in the glory and praise heaped on the first edition. We are pleased to be able to do that too, and thank those who helped us to produce it. We hope you will like this second edition even better. A little more 'Local Content' would be good – do you have access to any old photos, articles, tests, ads, etc.,? (Any contribution to our Secretary, Mark Navin). The Register is really starting to show signs of life. The start of regular Register meetings and this magazine will go a long way towards solving our communication problems, particularly for our country members. It is no coincidence that our first meeting should be such an important one – to discuss the shape of our future within the CCCV. It is most important that every member be there, or let the committee know what you think so that we can use your proxy vote.

STOP PRESS: We have just been able to supply Steve Hines with a set of reconditioned drive shafts from the Dutch club at the very favourable price of $185-00. If we are able to supply shafts for reconditioning in bulk, our costs will be reduced substantially.

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Spare Parts Officer:
Kym Harding
26 Tyrrell Avenue
Blackburn 3130
Phone 877 4853

Dates to keep

7th December	Classic Register meeting to discuss future within CCCV, 8pm, 19 Holland Road, Blackburn.
11th December	MG Concourse, Berwick.
14th December	CCCV General Meeting, Christmas break-up.
1978	
5th February	Centenary of Andre Citroen's birth
1st March	Classic Register Annual General Meeting
8th March	CCCV Annual General Meeting
24 – 27 March	Beechworth – Easter Rally

"WHY is it ridiculous to suggest putting sacks under the rear wheels?"

From the Archives.....

Two of Harry Marshall's cars:
A B14 about '26 vintage, taken around the early 1930's, and Light 15, early '50's. Note the non-standard wheel trims – the original Flash Harry?

Our wish to all motorists....

...A Happy Christmas

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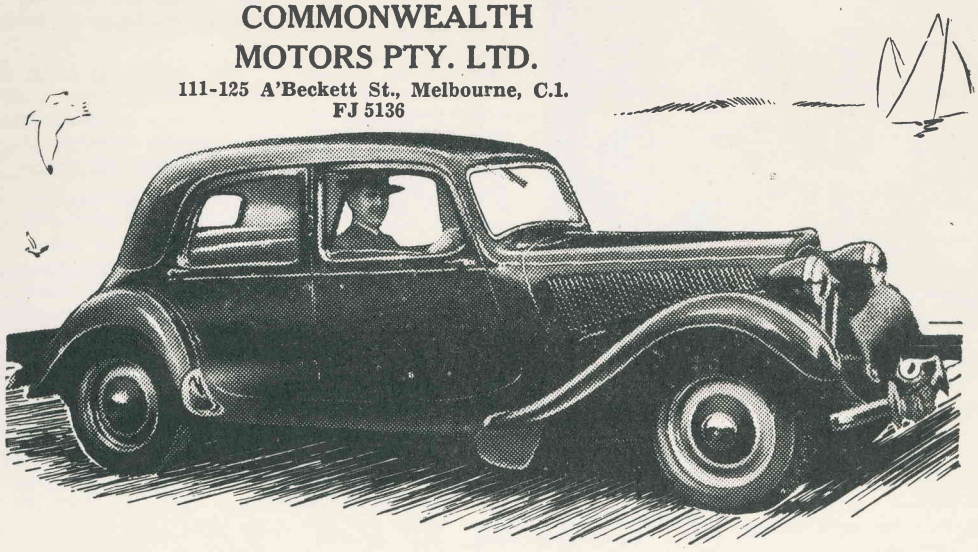


The Citroen Light Fifteen

UNCONVENTIONALITY STANDS THE TEST OF TIME

IT is true to say that if the Citroen Light Fifteen had been making its first public appearance to-day instead of continuing where it left off at the outbreak of war, it would have created a buzz of sensation as the latest in advanced automobile engineering thought. In point of fact, of course, the car arrived way back in 1934 exactly as it is to-day, but for subsequent detail changes, and still features characteristics which are reflected in the latest designs of the post-war world.

The Citroen is rather unusual than unorthodox, but there is technical reason backed by years of success behind every departure from the conventional—the chassis-less construction, the front-wheel-drive, the proven success of the torsion-bar independent suspension, the detachable wet barrel-type cylinders—even a simple solution of the interior heating problem.

This 2-litre 5-seater saloon weighs only 21¼ cwt., and is the lightest car per foot of wheelbase of any car on the British market, yet no light metal enters into the design apart from the pistons. Those who still regard front drive as undesirable may also remind themselves that among pre-war Continental sales, one car in four was f.w.d.

Placing the gearbox in front of the engine brings the weight distribution as between front and rear axles to something closely approaching the recognized optimum (for f.w.d. designs) of 60-40 per cent. while retaining the known advantages of front drive. The suspension design has reached what is possibly the best compromise yet achieved between the conflicting demands of constant wheel track and parallel motion, while the carefully thought-out, torsionally sprung back axle preserves parallel motion and ensures that the wheels remain vertical during fast cornering. This last is, of course, of major importance with a front-driven vehicle in eliminating the tendency of independently sprung wheels to bank with the body on curves, resulting in over-steer, which constitutes a particularly distressing vice with a front-wheel-driven car.

With these features, the Citroen presents a modishly sleek, low vehicle, capable of racing-car stability on corners, which will not slide under even abnormal surface conditions, and which is capable of very high average speeds without a very high maximum.

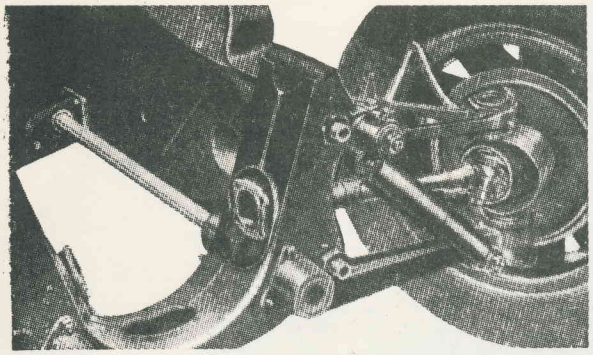
The engine is specifically designed for limited output and long life. It peaks at 4,250 r.p.m., which cannot be exceeded in top gear, at which speed the piston is moving at only 2,788 ft. per min-

CITROEN DATA

	Light Fifteen Saloon
Cubic Capacity ..	1,911
Cylinders	4
Valve position ..	o.h.v. in line at 10 degrees
Bore	78 mm.
Stroke	100 mm.
Comp. ratio	6.2
Max. Power	55.9 b.h.p.
at (A)	4,250 r.p.m.
Max. torque	88.2 lb./ft.
at (A)	2,000 r.p.m.
H.P.: Sq. in. piston area (A)	1.89
Wt.: Sq. in. piston area (B)	80.4 lb.
Ft./Min. Piston speed at max h.p. (A)	2,788
Carburetter	Solex 35 F.A.1.E. down draught
Ignition	Lucas coil
Plugs: Make and type	Champion J8-B
Fuel pump	A.C. mech.
Clutch	Citroen 9 in. diam
1st gear	13.1
2nd gear	7.3
3rd gear (top) ..	4.3
Reverse	17.5
Final drive	Spiral bevel (f.w.d.)
Brakes	Lockheed hydraulic
Drums	12 ins.
Car wt. per sq. in (B)	24.4 lb.

	Light Fifteen Saloon
Suspension	Independent front; dead axle rear; torsion bar springs
Steering gear	Citroen rack and pinion
Steering wheel diameter	16¾ in
Wheelbase	9 ft. 6½ in.
Track, front	4 ft. 4¾ ins.
Track, rear	4 ft. 4¾ ins.
Overall length ..	14 ft.
Overall width ..	5 ft. 5¼ ins.
Overall height ..	4 ft. 11¼ ins.
Ground clearance	7 ins.
Turning circle ..	41 ft.
Weight—dry	21¼ cwt.
Tyre size	160 x 400
Wheel type	Michelin pressed steel
Fuel capacity .	11 gals.
Oil capacity	8 pints
Water capacity ..	14 pints
Electrical system	Lucas 12 volt c.v.c.
Battery capacity ..	57 amp./hrs.
Top Gear Facts:	
Engine speed per 10 m.p.h.	575
Piston speed per 10 m.p.h.	377
Road speed at 2.500 ft. / mim (piston)	66.25

(A) With normal setting of carburetter, etc. (B) Dry weight



INDEPENDENT FRONT SUSPENSION on the Citroen is by means of parallel torsion bars and swing arm, married to front wheel drive in a design which successfully masters the problems of parallel motion and constant track. The suspension is mounted in a massive pressed steel cradle.

ute. Engine performance is meant to be of that type that goes on going on without frequent maintenance.

Two-part Construction

The Citroen can be regarded as fabricated in two major component parts—(a) the front end, including engine, gearbox, transmission, front axle, assembly and radiator, and (b) the back end, meaning the welded steel body and integral floor, together with the rear wheels and springing.

and free to twist at the outer extremities. Swinging from each free end is a trailing arm, on the end of which is mounted the wheel, moving in a vertical arc and controlled by a direct-action Newton hydraulic shock absorber (which, incidentally, can be easily got at for refilling). The assembly is located transversely by a Panhard rod and the trailing arms are flexible so as to accommodate the necessary distortion when the vertical motion of the wheels is unequal.

The tubular cross-member is not merely bolted into the body sides, but is carried in very long longitudinal castings of immense rigidity.

The back-axle is in the form of an X-section beam which does not, of course, revolve, but maintains the desired vertical position of the wheels when cornering.

The body is built of steel pressings, welded to the floor where it is reinforced to take it. The sum total of body and floor, trussed and cross braced, is a steel cage of box-girder-like construction, of remarkable strength.

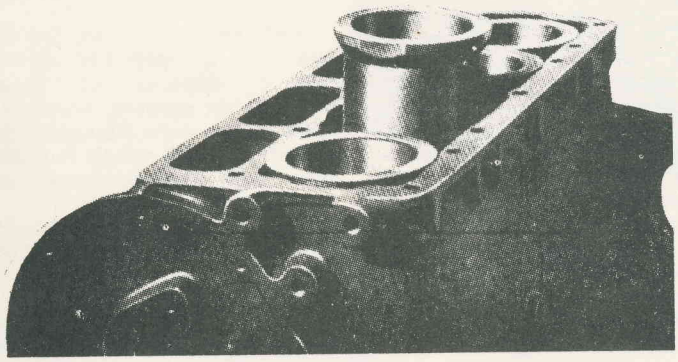
The welding process is continued ahead of the front screen, where the scuttle divides into the form of two open "jaws" to take the engine unit. Four long tubes in pairs run right forward through these jaw-like bulkheads to take the cradle of the front assembly.

This pressed-steel cradle carries the entire front assembly, and is in the form of a flattened U. Two torsion bars run through the bottom of the cradle longitudinally, one on each side, free to twist in bonded rubber bushes. The anchored ends run right back to a stout cross-bar between the jaws of the body and are serrated for adjustment.

Front Suspension

A single girder-type link is forked on to the front or free end of the torsion bar on each side, while above, just below the shoulders of the cradle, a pair of wishbones swing in unison with the link below, moving on lubricated and adjustable bronze bushes of great length. It is the good geometry of this suspension layout that successfully compromises between the opposed factors of constant wheel track and parallel motion. Front tyres do not show unusual wear rates.

The swing arms top and bottom terminate in ball joints, swivelling

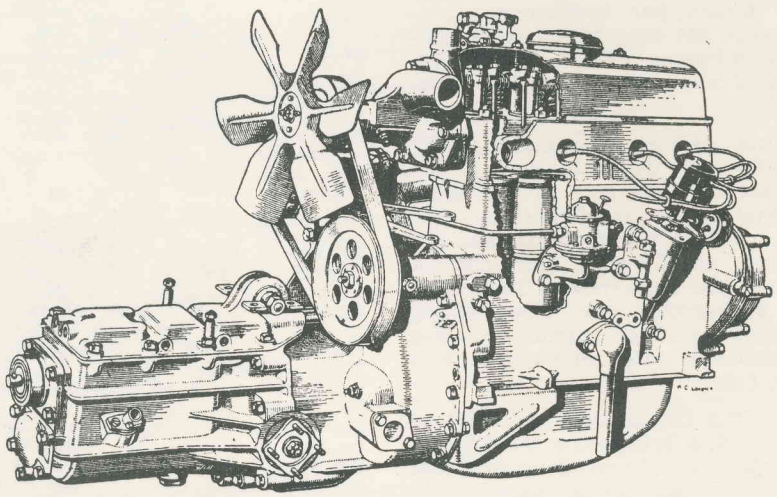


DETACHABLE CYLINDER BARRELS

The cylinder bores are the most vital part of any car, and with this design an extremely long life is assured. The cylinder block is no longer a complicated casting, but a clean casing having separate detachable cylinder barrels cast in a different material, specially selected for the conditions they have to withstand. The even thickness of the cylinder walls and uniform cooling obtained by the unrestricted water space ensures freedom from distortion. After long service they may be easily renewed.

The chassis must be considered in one with the body and is based on a flat steel floor, crimped up at the back to form a rest for the rear seats and formed with shallow sides of immense strength, due to a special construction which turns the floor-sides into box girders. So low is the floor (but not the ground clearance) that the seats feel unusually high, and the driver has the sensation of sitting in a pre-war Grand Prix car. In point of fact, although the seats are 13½in. high in relation to the floor they are lower than on most cars. An average seat height above the ground, taken on a dozen comparable cars, is 26½ ins., while the Citroen figure is 24½ ins.

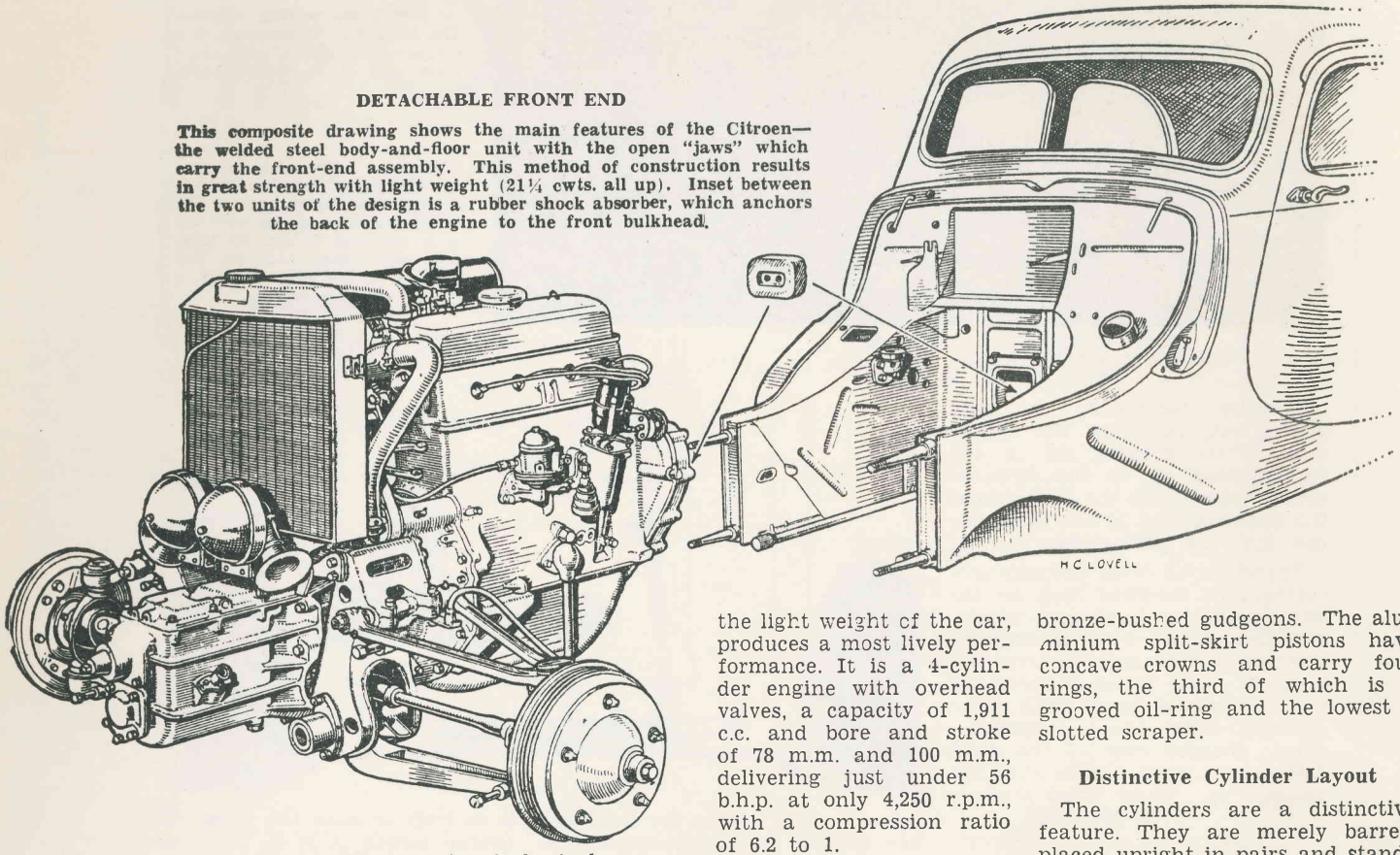
Across the back of the floor runs a massive tubular cross-member with, in the middle, a bracket which holds the fixed ends of the two transverse torsion bars, running one to each side of the vehicle,



The three-gearbox on the Citroen is mounted ahead of the front wheel centre as clearly shown in this drawing, the drive being taken over the crown wheel and pinion by an extension shaft. The above drawing also indicates the principal. Of particular interest is the way in which wet cylinder liners are inserted into the water space of the crankcase cylinder casting.

DETACHABLE FRONT END

This composite drawing shows the main features of the Citroen—the welded steel body-and-floor unit with the open "jaws" which carry the front-end assembly. This method of construction results in great strength with light weight (21¼ cwts. all up). Inset between the two units of the design is a rubber shock absorber, which anchors the back of the engine to the front bulkhead.



on a large- diameter hemispherical casting which cups the double universal joints of the short drive shafts and forms a sturdy knuckle joint. The universals, running on Hardy Spicer needle bearings, are spigoted together for axial rigidity. To the hemispheres the brake back-plates and stub axles, with the steering arms, are attached.

The suspension is again controlled by direct-action Newtons, mounted transversely at an angle of about 45 degrees.

Steering is by means of rack and pinion. The enclosed rack is fitted horizontally across the car, on a tube enclosed within a slotted sleeve with central ball joints locating the twin track rods. When the steering wheel is turned, the rack travels left or right and controls the track rods and wheels so that a very light, positive and self-centring steering action is obtained.

The gearbox protrudes through the middle of the U-shaped cradle, and is slung on a cross-member by a large rubber-lined mounting forming the forward engine anchorage, while the radiator is carried overhead.

The engine-gearbox unit is held in four mountings. There is the flexible mounting just mentioned, a large rubber shock absorber at the back which fits into a port in the dash, and on each side volute springs which sit on brackets formed in the steel bulkheads of the body jaws.

The Power Unit

The power unit is of robust design, made for longevity and a medium power unit at medium speeds which, in combination with the light weight of the car, produces a most lively performance. It is a 4-cylinder engine with overhead valves, a capacity of 1,911 c.c. and bore and stroke of 78 m.m. and 100 m.m., delivering just under 56 b.h.p. at only 4,250 r.p.m., with a compression ratio of 6.2 to 1.

The in-line overhead valves, set at 10 degrees from the vertical in the head, are opened by inclined pushrods, themselves raised by plunger-type tappets bearing on a camshaft set rather high in the block on the near side of the engine and running in three bearings. At the front end of the shaft an extension carries the big pulley which belt-drives the fan and dynamo; farther back the shaft drives the petrol pump and, at the rear, the distributor.

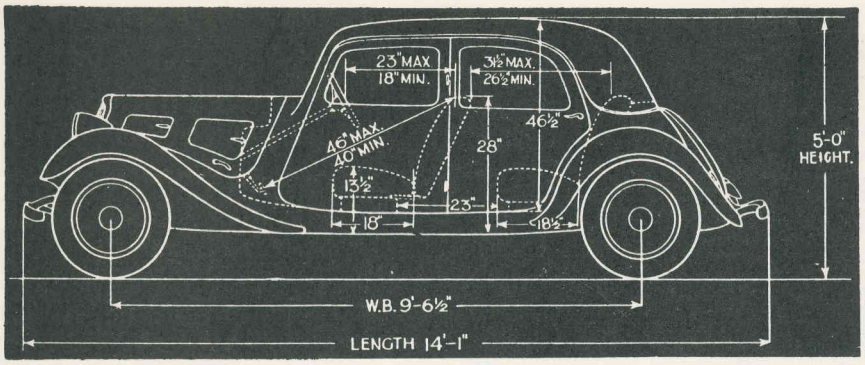
The crankshaft is carried in three bearings and is turned by light steel stamped connecting rods with white metal big ends and bronze-bushed gudgeons. The aluminium split-skirt pistons have concave crowns and carry four rings, the third of which is a grooved oil-ring and the lowest a slotted scraper.

Distinctive Cylinder Layout

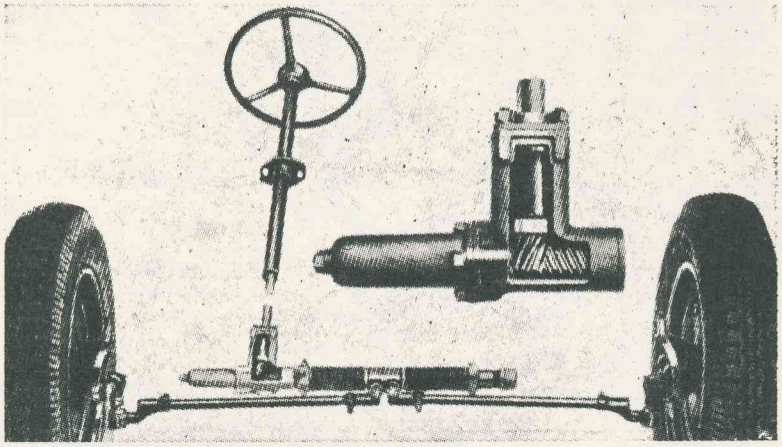
The cylinders are a distinctive feature. They are merely barrels placed upright in pairs and standing on shoulders at their lower ends in a block that amounts to a cast-iron box full of water, so that the coolant reaches almost the whole depth of the barrels. At the top they stand above the face of the block proud to about two thousandths of an inch. In this way, when the gasket is in place and the head is bolted down, the barrels are held immovable. To prevent any tendency to rotation, they are positioned in pairs, side by side, with the contacting tops flattened to make firm contact.

Thanks to this method, a better wear-resisting cast iron can be used for the barrels than could be used

FLAT FLOOR and inter-axle seating are features of the Citroen. Simple and effective interior heating is arranged by a pipe sucking up warmed air from behind the radiator and delivering it into the front compartment. Front seats are 22 ins. wide and 18 ins. deep. The rear seat is 49 ins. in width.



A 1:40 scale section showing the principal dimensions. The luggage boot has a 21-inch platform and is 41 inches wide.



The direct acting rack and pinion steering of the Citroen with (inset) the engagement of the steering column pinion with the rack enclosed within its tube. The twin track rods are ball jointed to the rack through a slotted sleeve.

in block-casting in the more normal way.

Pressure lubrication is used throughout, including the rocker gear, where grooves cut in the rockers send oil to the inverted sockets which take the ball-ends of the pushrods and to the face-contact with the valve stems.

The 35 FA 1E Solex downdraught carburetter, mounted high on the off side, has a diaphragm accelerator pump and what amounts to a complete miniature starting carburetter. This latter is controlled from the facia board with three positions—start, run and normal—which changes over to the main carburetter when the engine has warmed up. There is no thermostat.

Fuel arrives via an A.C. mechanical pump (with auxiliary hand-trigger) driven by the camshaft, drawing petrol from the 11-gallon rear tank and pumping it around the front of the engine.

Ignition is by Lucas 12-volt battery (ensconced in a shelf in the scuttle) and coil, with automatic advance and retard to the distributor by dual means—centrifugal governor and inlet-manifold depression. The coil is bracketed accessibly on the near side of the scuttle a matter of inches away from the distributor. On the other side of the scuttle, equally to hand, are the fuses, cut-out, constant voltage regulator, and brake fluid reservoir.

Cooling is by means of thermo-syphon and pump. The radiator holds 14 pints of water and the draught is from a six-bladed fan, belt-driven on a long spindle which also drives the big water pump.

Transmission

The transmission is extremely compact. The drive passes through a 9-in. single dry plate clutch with flexible centre to a three-speed gearbox (synchromesh on top and middle gears) with ratios of 4.3, 7.3, 13.1 and (reverse) 17.5 to 1. The two gear selector rods in the top of the box are locked into position by a special shaft which lies between them and which, spring loaded, drives two balls into corresponding sockets in the rods to hold them firmly in position. By a neat arrangement of a T-piece at the back end of this rod, the clutch pedal withdraws the rod when depressed, thus freeing the balls and the selector rods until allowed to spring back into place when the pedal is released.

The gearbox is in unit with the differential, crown wheel and bevel pinion, and the pinion is integral with the layshaft. Large bearings are used throughout. The transmission shafts are short and robust, with universals at the gearbox end and double universals at the driving end. Owing to the distance of the "umbrella" type gear lever which projects through the facia board, two rods are required to move the selectors, and by an ingenious inter-connected compensating device, one rod shifts first and reverse while the other changes middle and top. The change is very light in consequence and behaves like any conventional gear-change system.

Lockheed hydraulic brakes are used all round, with 12-in. drums, plus an independent hand brake working cables to the rear wheels.

The wheels are very Continental, pressed-steel disc type by Michelin with handsome "dish-covers," and are again unusually light but strong, carrying 160 x 400 tyres.

The body style of the Citroen has not altered with the years. It is a smart, modern saloon, measuring only 5 ft. in height, with a clear 7 ins. underneath. The general contour is well formed and, with the front-wheel-drive layout, presents an uncommonly small frontal area, which accounts for a good deal of the "urge" of the car. The wheelbase is on the long side (9 ft. 6½ ins.), providing plenty of passenger space, which, by the way, is entirely between the axles. The overall length is 14 ft. 1 in., with a track of 4 ft. 4¾ ins., and an overall width of 5 ft. 5¼ ins.

Interior Arrangement

The interior of the four-door, four-light body offers what one would expect — an atmosphere of quiet quality and long life. The seats are in leather, deep and comfortable, and provide really ample leg room. The rear seat measures 49 ins. from side to side, and seats three with some ease.

There are all the usual fitments, from walnut trimmings to sun-vizor by way of glove pockets and door pockets and ashtrays and carpets, and wide parcel shelf behind the back seat. What is more important, the visibility is excellent, and the feeling of controllability from the driving seat breeds immediate confidence.

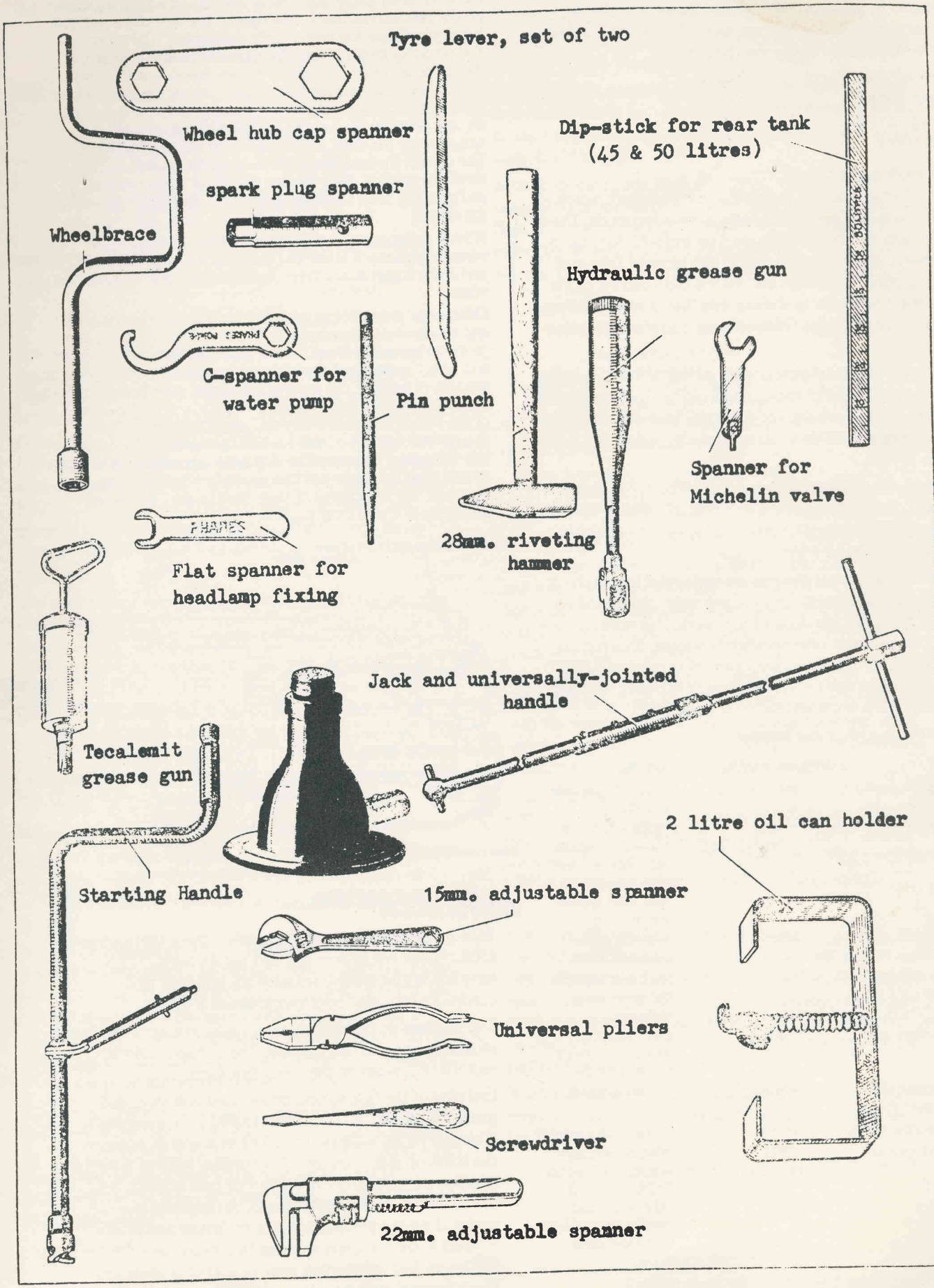
As the rear seat finishes in front of the back wheel arches there is obviously plenty of luggage space in the boot. The spare wheel is slotted into the lid and covered with a metal sheath, while the wheel fastening is on the inside, so that, once locked, the wheel is thief-defying. To carry extra luggage or a trunk, the lid can be left open, in which case a flap lets down to bridge the space below and extend the platform. Under this bridge in the hinge-space of the lid go the tools.

A normal screw-type jack, is supplied, fitting beneath special jacking pads on the rear wheel swing arms so that the wheels rise and not the body only, and there are similar pads for the front end.

Reprinted from "The Motor," March 20, 1946.

"Post" Print, Mornington

The Original Toolkit.



OVERHAULING FOUR CYLINDER TRACTION GEARBOXES

[Continued from last issue]

Apologies to those readers confused by some of the part numbers referred to in the first issue. The correct numbers for the illustrations finally printed are:–

Mainshaft end cap nut	500965
Output flanges	508012
Bearing cap nuts	2669-S
Bevel pinion	507239

Examination (continued)

Apart from cracking of the second gear mainshaft pinion teeth, the helical gears don't seem to wear too much. The straight-cut first/reverse mainshaft pinion(500756*) teeth however, can show surface pitting due to metal fatigue at high mileages. This pinion also suffers from burring of the ends of the teeth due to shifting into first or reverse before the gears are stationary (Motorkhanas?) so check for either condition.

The crown wheel and pinion teeth should be evenly polished over the tooth contact areas and should be free from ripple or score marks. Such signs of abnormal wear will mean that they will be impossible to set up correctly and will be noisy in use.

Although the differential planet gears(408632) generally last well, the satellite gears(408355) almost always show tooth surface pitting after considerable use. Replacement with less worn gears is the only cure.

All the ball and roller bearings are quite reliable, but check all ball and roller tracks for excessive wear, pitting and corrosion. If the box has done a lot of work, it is worth replacing all the available bearings while it is apart. This particularly applies to the pinion shaft rear roller bearing(500367) and differential taper roller bearings(2x 408451), especially if a new crown wheel and pinion is being fitted.

Following is a list of the bearings:

	Citroen Part No.	SKF No.
Main shaft, front	500535	3305/C3 Available as 3305.
Main shaft, rear(2 off)	89461 (30x62x11mm)	98206 and 99206 No longer available but could use one 4206 (30x62x20) with 2mm approx. spacer.
Pinion shaft, front	500535	3305/C3 As for mainshaft front.
Pinion shaft, centre (thrust)	89455	No longer available but rarely needs replacing.
Pinion shaft, rear	500367	F-UC 1306TM Available as 5F-UC 5F-UC 1306TM
Differential, side (right and left)	408451	30208 Available.
Reverse idler, thrust	2713-S	¼" balls. 26 required.
Clutch throwout	89971 (35x72x17/14mm)	306629 No longer available but can use 7207C or 7207B (35x72x17) and modify shroud to fit over wider outer sleeve.

(*See Front Drive Vol. 1 No. 1 for illustrations.)

The bronze bush in reverse gear idler pinion(508069) and the floating bush in the first/second pinion shaft gear(507 270) are not prone to excessive wear. Those in the top gear mainshaft pinion and the first/second mainshaft pinion are however but this does not seem to cause problems other than an increase in the noise level. Replacement is tricky, as the bushes have to be line-bored in place using the imaginary pitch line diameter as the concentricity datum. In practise, the worn bush inside diameter is used as the setting up datum on the assumption that it was right in the first place and that subsequent wear has been evenly distributed. The other complicating factor is that the mainshaft journals wear and should be ground true and the bushes bored to suit. This is OK for top gear, but the second gear journal diameter is the same as the splined section of the shaft where the ball-races sit, and grinding the journal and splined section undersize would allow the shaft to flop about on the bearing bores. The correct method would be to build the journal up by short arc welding, hard chrome plating or metal spraying and grinding back to the original size – probably not worth the effort!

If bush replacement is attempted, allow a minimum diametral clearance of 0.04mm otherwise the bush will seize, and don't forget to machine the oil grooves and drill oil holes.

Other wear prone points are synchromesh splines, dog teeth and synchromesh bronze rings. These synchro rings are also prone to becoming loose. Check that they are solidly located and note the depth of the oil breaker grooves to gauge the amount of wear. If the grooves are almost non-existent and the synchro cones have been chewing away at the rear face of the recess, it explains why the gears crunched at every change and means you will have to hunt around for some bits that aren't so worn. The dog teeth can even wear down to half their thickness without seriously affecting their function, but this degree of wear adds to the "sloppiness' and noise of a well used gearbox.

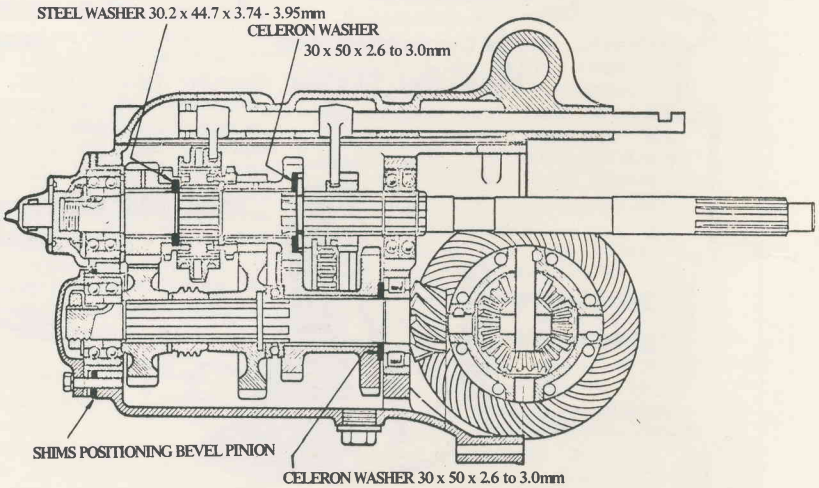


FIG. 1. CROSS-SECTION ON LONGITUDINAL CENTRE-LINE SHOWING WASHERS CONTROLLING END PLAY AND POSITIONING.

With the synchromesh hub dismantled, check that springs (506294) are not broken and that the six balls(2713-S) have not worn excessive tracks in the hub face. Both conditions can cause poor synchromesh action.

The selectors do not seem to wear much, but again check for broken springs and ball tracking. The T-shaped interlock rod(501182) wears on the contacting faces.

End play of the first/second pinion shaft and main shaft gears(507270 and 500763) is controlled by a non-metallic (Celeron) thrust washers. These DO wear and on occasion can break-up due to old age. Tractionistes seem to collect a selection of washers out of boxes that have expired, but there is no reason why they cannot be machined from a similar cloth re-inforced resin or even bronze and finally finished to the thickness required by rubbing on a sheet of fine emery laid on a surface plate or a sheet of plate glass. Don't forget the oil grooves.

Overhauling Four Cylinder Traction Gearboxes (Contd.)

Check the split locking collars(500533) on the pinion shaft, and the mating groove in the pinion shaft for chipping and other signs of distress. It is essential that these faces are sound, as they take the load of tightening the pinion shaft nut to the specified torque (110 lb/ft).

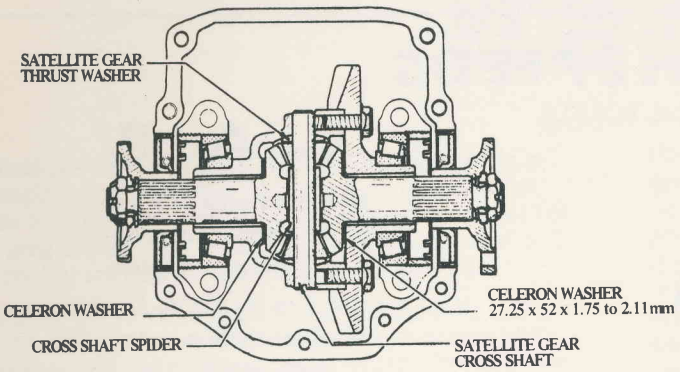


FIG. 2. CROSS SECTION OF DIFFERENTIAL

Turning to the differential, apart from the satellite gears mentioned earlier, the wear points are the cross shafts (40828 and 408333), the satellite gear thrust washers (408304) and the thrust washer mating surfaces in the differential housing(408463). Wear of the shafts doesn't matter too much unless obviously excessive. A method of taking up the thrust washer wear was given in the Classic Register Restorer's Guide of 1976 and copies of this article are available from the Technical Officer. The Celeron thrust washers(408467) and output shaft bushes(408442) show little wear.

The output shaft oil seals(408453) have a habit of weeping oil and wearing grooves in output flanges(508012). These seals are spring loaded leather lip seals (TypeA1) 83 x 36 x 12mm, and the Super Seals (Repco) part no. is P3074. There seems to be no stock of them in Melbourne and it is unlikely that another batch will be run off. Have the output flange journals ground and polished to 35mm diameter and use P6147 seals(63.5 x 35 x 13 T2) together with an aluminium spacer ring to make up the outside diameter. The P6147 seal is a rubber dual lip seal with metal case.

Reassembly:

In general the workshop manual should be faithfully followed. Reprints of the workshop manual gearbox overhaul section are available from the Classic Register Technical Officer.

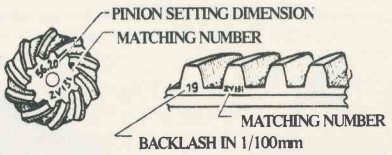
All locking tab washers should **never** be reused. These are fitted to the mainshaft and cap nut, pinion shaft nut, crown wheel retaining set screws and diff. bearing saddle nuts. In all cases these can be dispensed with entirely, as long as LOCTITE 242 is used on assembly. When using LOCTITE, ensure surfaces are free from oil and grease by cleaning with a solvent such as trichloroethylene, or lacquer thinners.

Similarly all paper gaskets can be dispensed with by using DOW CORNING SILASTIC RTV 732 as a sealing medium. This is a viscous liquid rubber in a tube which cures at room temperature when exposed to humidity. Incidentally, although RTV732 is not attacked by oil, petrol causes it to soften and loosen.

When assembling the mainshaft don't forget the locking key(500528) which spaces the washers retaining the synchromesh hub and ensure that the key engages in both washers. End play, 0.05 - 0.10mm, of the second gear idler(500763) is controlled by the thickness of the Celeron washer(500774 etc., – 30 x 50 x 2.6 - 3.0mm) and that of the top gear pinion, 0.10 - 0.20mm, by the synchro hub steel washer (500776 etc., – 30.2 x 44.7 x 3.75 - 3.95mm). Try to achieve these clearances by selective assembly, as excessive end play affects the synchromesh operation.

Check that the synchrohub travel doesn't exceed 4.2mm – it probably will if the synchro rings are badly worn, so back to the spare parts box for a hub that is less worn. Selective assembly at its best!

Setting up the pinion shaft and crown wheel backlash was covered by an excellent article by Gerald Propsting in the Sept. 77 issue of the CCCV Newsletter, so we will not repeat (to be reprinted in a future edition – Ed.), other to say that it is quicker with clock gauge than feeler gauges.



NOTE: FIGURES ON CROWN WHEEL MAY BE ON BACK FACE

FIG. 3. CROWN WHEEL AND PINION SETTINGS

Without Stop Tool MR3139, it will be necessary to alter the official assembly sequence and fit the main shaft assembly and select two gears to enable the pinion shaft nut to be tightened during the pinion shaft positioning procedure. It is still possible to insert feeler gauges to check the pinion position with the mainshaft in position.

End play of the first/reverse pinion shaft gear(507270) is controlled by yet another Celeron washer which is identical with the second gear idler washer. If there is appreciable wear in the pinion shaft front bearing it will be impossible to accurately set the position of the pinion shaft.

Regarding the crown wheel backlash, it's useful to note that with a 9 x 31 crown wheel and pinion there are 270 odd meshing positions. Obviously it is impractical to check the backlash of all, but select a few at random. With a well-used CWP it is surprising what variation can be observed.

For those who decide to adopt the use of LOCTITE, use the 242 grade for the main shaft end cap nut, pinion shaft nut, differential retaining set screws, differential bearing saddle nuts, output shaft nuts(408633), and reverse idler shaft retaining set screw(500786). LOCTITE grade 601 can be used for retaining the differential bearing inner sleeves (408451) where the journals have worn.

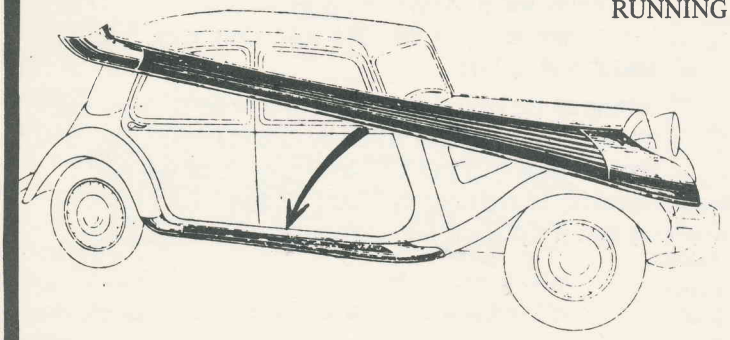
If after all this care and 'selective' assembly your gearbox crunches, rattles and howls, don't despair – c'est la vie (et 'Traction')!

Roger Brundle

The Latest Accessories

MARCHEPIEDS

RUNNING BOARDS

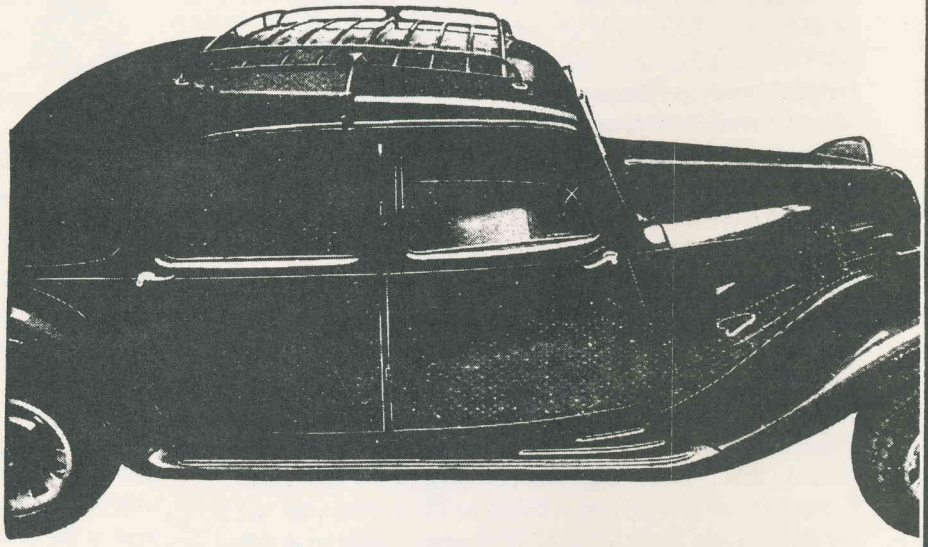


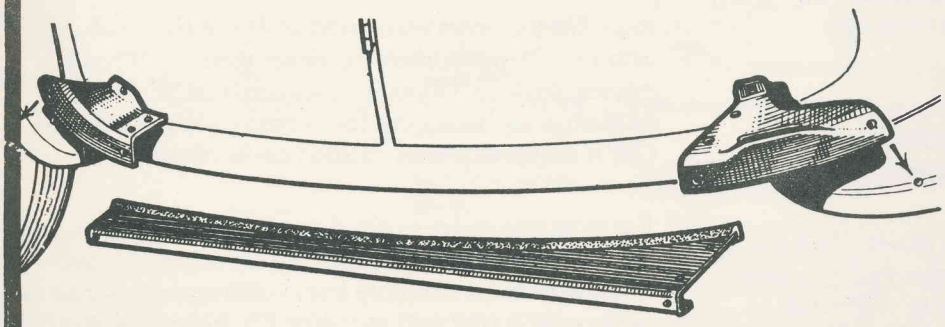
C. A. P.

Rubber-covered with heavily chrome plated brass end trims.
Please state whether
Light 12 or 15 - Big 15 - Familiale - Roadster - before 1st Jan 1938
or Pilote type 1938-39

O. L. D.

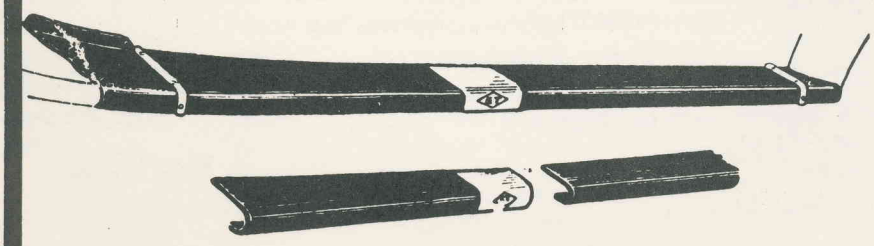
Black enamelled with polished aluminium with rubber inserts.
Extra charge for different colours.
Please state model when ordering.





SPEED

With aluminium wing trims.



"E. T"

Completely Rubber covered,
fully adjustable to ensure a perfect fit.
This type is only suitable for
cars equipped with Pilote wheels.

RUST

What to do about it

How to prevent it

Whether you're restoring or maintaining, driving or garaging your Traction, rust is one of those things you will probably put off doing something about for as long as you can. If you do succumb, the rust will probably eat heavily into your wallet as well.

Because the Traction has no chassis, the fully integral body shell gets its strength from lots of angles and boxes all welded together. Rust doesn't have to bite very deeply into the thin sheet metal for whole sections to become weak. It is usually on the parts you seldom see that rust gets a hold. Rust is promoted by corrosive fall-out from industry, moisture retained in seams and caked up mud, condensation inside box sections, and even airborne agricultural chemicals.

Killing rust and protecting metal against it in the future is possible, but it is a long and messy job. It is not something to be done for a couple of dollars and half a days work. It is necessary to remove seats, carpets, and trim – the best time of course is at the start of a complete restoration.

The first and most arduous job is cleaning the car down, stripping off all the bituminous goo, mud, grease, etc.,- steam cleaning is the qickest and easiest, or you can try blowtorch and scraper and lots of care on the bitch-uminous goo. Rust in **any** structural part must be cut out and a new section welded in – plastic and fibreglass are a definite health hazard here. What you do with rusty doors, boots, etc., is up to you and your conscience.

In parts where the rust isn't serious, the best treatment is to remove as much as possible with wire brushing and emery paper, then apply a rust neutralising liquid over affected areas to dissolve and convert the rust. There is a great difference between brands – One I have used and can recommend is Ferropro Rust Converter. This is brushed on, left, and washed off. Parts should be out of direct sun or wind to prevent drying out too quickly. Preparation must be stressed — rust converters can't be expected to penetrate thick layers of rust and scale — sometimes the top layer can be converted, and forms an impervious layer to further treatment.

When this treatment is complete, a rust preventative primer should be applied. Ferropro make one for use with the converter, or one for use on all bare metal including treated areas is Brolite Portetch, a metal etching primer with rust preventative properties. Both are compatible with any type of paint. Some other types are only compatible with enamel. (Portetch must be used with Portetch Thinner).

Having treated the underside, mudguards, inside the doors, boot, interior floor, etc., you are now ready to tackle the greatest danger spots — inside the box sections — the sills and front 'forks'. One problem is their inaccessibility — you can't hose off any converter or get in to brush on any rust-killing paint. Another problem is what to put inside the sections. I don't know of any do-it-yourself treatment available here which will stop the rust and go on protecting. Does anyone know of such a product? Because of the terrifically corrosive properties of de-icing salt on British roads, there are several products there made especially for this type of job. Finnigan's Waxoyl is claimed to completely stop the spread of rust. You may write to Finnigan's Ltd. (CRW) Eltringham Works, Prudhoe, Northumberland, U.K. Waxoyl may be applied with an adapted garden-type spray, or Finnigans supply a special spray for about $2. It may be necessary to drill a couple of small holes for access — these must be in the centre of a vertical surface so as not to affect structural strength, and should be plugged when the job is completed. It is interesting to note that Rolls-Royce tried two methods of preventing condensation – sucking all the air out and sealing the section, and filling them with dried nitrogen, but both failed.

Having completed this large task, you will be interested in the best ways of preventing its recurrence. Forget the old wives tale about aluminium paint preventing rust – it doesn't. Waxoyl may also be used under the mudguards under the car, and inside the doors. If you are using Portetch, you have a choice of subsequent finishes. On an exterior panel the sequence might be: Portetch (2 coats), Primer-surfacer (approx. 3 sanded coats), perhaps spray putty if necessary, then your normal finishing coats of lacquer/acrylic/enamel. Under the car and mudguards, an ideal sequence might be: Portetch (2), primer, normal finishing coat, then either chassis black or underbody sound deadener or both. These last two are bituminous and should not be applied over bare metal, except on a Holden, where it really doesn't matter. This is because they eventually dry out and trap moisture. A finish which is extremely tough and has a deep gloss is two-part polyurethane paint. The exrent of its use depends on your budget, at about $15 - 20 for 2 litres (1 litre colour, one hardener). It is ideally suited to the engine bay (acid, brake fluid resistant) and suspension components.

This article is not intended to be exhaustive — if you know other products, methods, services relating to this article, share your knowledge with other Tractionists.

Kym Harding

Spares News

At last we seem to be in second gear! The spare parts area has been grinding along in first for some time now with response, and the level of activities, frustratingly sporadic. Happily, more people are starting to use the Register's services, and our Parts Fund is giving us much needed buying power.

Our account with Traction Avant Nederland is established (see Correspondence, and the list below), and we have placed orders for tie-rod ends, and four sets of bumper supports. Svenska B11 Klubben are supplying us with vent rubbers and big and small boot rubbers. Prices will depend on costs of freight and duty. We are also arranging to buy in every day items like radiator hoses, fan belts, points, gaskets, etc., at reduced cost, and we may also be able to supply wheel bearings. Negotiations are under way too for the purchase of a substantial quantity of second-hand parts.

Because we are still relatively small, we cannot afford to have large stocks of these parts on the shelves, so you will need to plan ahead and buy parts as they become available — we cannot guarantee that they will be available when you want them.

The fifteen Parts Fund members will have first choice of parts as we get them – that's less than a third of the Register – if we can get another fifteen, we will double our buying power – and get into top gear!

Remember that the $40 is refunded on leaving the Register.

PRIORITY LISTING

After a part for your Traction? Don't forget our priority list.

OILS

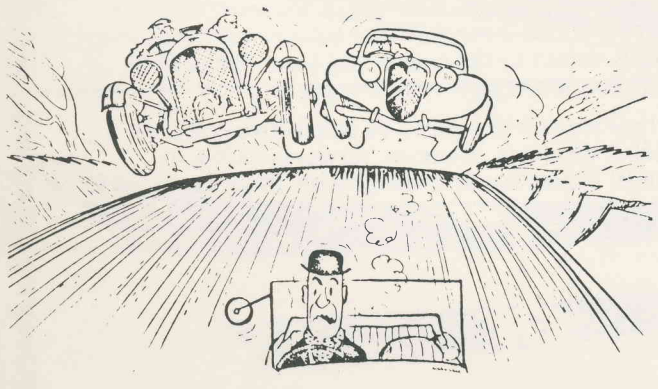
Some GTX left at $3.50 for 5 litres. Available at December 7th meeting - *Bring own 5 litre containers.*

CITROEN T-SHIRTS

Seconds on sale at Dec.7th meeting, at $3.00, or $5.00 for two. We have two size 14 pale blue, and six size 18 turquoise.

PARTS STORAGE

We need strong boxes, shelves, old cupboards, or wood for shelf construction, PLUS local storage for some of the larger parts such as mudguards, blocks.



PARTS FROM TRACTION AVANT NEDERLAND.

Care must be taken to ensure from part number that any part is exact part you require - many parts have several alternatives depending on type and year of Traction. Also some parts which appear at first glance to be complete assembly may only be part of assembly. Prices are in Dutch Florins = approx. $A 0.40. Freight and duty costs are added to this.

This list is to give members an idea of what is available from T.A. Nederland.

TRACTION AVANT NEDERLAND PARTS.

Part	Number	Price(Dutch florins)
Windscreen rubber		40
Bonnet rest beading	216107	10per length
Wing piping	298814	2.50 per metre
Window runner		4 per metre
Boot weatherstrip	224257	15
Door rubber (round)		25
Boot rubber post '53	802676	10
Boot rubber .post'53	802779	25
Scuttle vent rubber	221134	17.50
Knob(windscreen winder)	804104	3
Door anti-rattle buffer	233400	1

GEARBOX

Thrust washers for synchro	500776	
	507272	
	500527	
	508335	ea.1
Bush– Rear of 1st/Reverse	500523	
Front of 1st/Reverse	500893	ea.5
Splined washer 2nd mainsh. pin.	500534	1
Celeron washer 50x30x : 2.6, 2.5,2.8, 3.0		o.25
First/Reverse gear (20 teeth)	500756	15
" "(21 teeth)	500500	15
Outer circlip (rear mainsh.ballrace)	506979	1
Thrust washer 39.5x18x :2.8, 2.6, 3.0,. 3.2, 2.7, 2.9, 3.1		1
Thrust washer (Reverse gear) 33.5x23.7x2	508070	1
Thrust washer (Reverse gear) 33.5x21x2	500719	1
Intermediate bush with flange(rev.) 32x18x36	508068	5
Reverse gear(16 + 32 teeth)	508069	30
Locking nut- front ball bearing on layshaft	500375	2.50
Third gear (28 teeth)	500515	20
Second gear(34 teeth) (layshaft)	507206	20
Lockwasher 1st/Rev. laysh. pinion	500533	5
1st/rev. layshaft pinion 26, 29 teeth	507270	30
Bush casing for differential	408463	25
Celeron washer 52x25.5x var.sizes		0.25
Planet gear 16 teeth,16 splines	408236	
	508329	20
Spindle for satellite pinions-long	508425	5
short	598426	2.50
Crosshead for satellite pinion	508330	2.5
Packing washer - various sizes		0.50
Double lock washer(fixing cup to diff.)	508427	5
Adjusting nut(For tapered roller b'ng)	408452	5
Coupling flange(up to 1950)	508012	10
(since 1950)	508354	10
Bolt (8 diam)	40830	1
Bolt (10diam)	508512	1

CLUTCH AND GEARBOX

Pressure plate with exchange		95
Clutchplate with exchange		85
Housing clutch thrust race		7.5
Bush for clutch withdrawal fork	451670	2.5
Bearing cap layshaft front bearing-10mm	501001	5
- 12mm	508275	5
Bearing cap mainshaft fr. bear'g.	501005	5
Cap for starting handle	500539	2.50
Cork gasket for st. hand. dog cap	500532	1
Front cap Reverse gear inter.shaft	501002	1
Speedo drive pinion socket	500504	5
	507244	5
Fixing plate for speedo socket	500837	1
Drain PLug	2950	6
1st rev. selector fork	500537	5
Shaft 2nd/top sel. fk.	501180	5
Shaft 1st/rev. sel. fk.	501181	5
Mainshaft with 25 spline for clutch disc –	515702	75
End cap for mainshaft	508006	5
Pin for startet handle dog	500840	1
Washer- fr. mainsh.& fr. m. locknut	508052	1
Lock washer with tabs	500374	1
– for fr. ends of main- & layshafts	611007	1
Housing for front ballbearing-mainsh.	501003	5
Washerbetween mainsh.fr.ballbear'g and top speed pinion	500526	1
Bush – Mainshaft top speed pinion	500521	5

Front End

Front Axle cradle complete -11B	308505	100
Lower link arm left	441290	50
Upper link arm right	426565 D	50
" "left	426517G	50
Nut(locking upper ball joint)	426531	7.50
Shim for regulating up.ball joint)	426606	1
Packing shim for lwr ball joints	426201	0.25
Leather oil retainer	426618	4
Shock absorber rubbers		1
Shock absorbers(2) Koni		165
Torsion Bars ea.		15
Drive shaft with exchange		100
Ring nut,fixing stub axle outer ball race		5
Wheel nut		2.50

BEARINGS AND CUPS

Outer wheel bearing 72x32x17	425654	16
72x32x19	441510	16
Inner wheel bearing 72x35x17	88091	10
" " (sealed one side)	88091	12
Timken roller bearing rear stub axle (62x30x16)	420962	12
As above for 5or6 stud wheel (72x35x17)	89964	14
Bearing front crankshaft spigot housing (40x17x12)	89500	5
Clutch thrust withdrawal bearing (72x35x17)	89971	15
Roller forlayshaft rear (30x72x19)	500367	20
Tapered roller diff bearing 80x40x19.5	408451	20
Bearing front of shaft driving dynamo and water pump (47x20x14)	89475	6
As above, for front (42x 20 x14)	89482	6
Bearing, water pump shaft (42x15x13)	89951	5
Dynamo bearing 47x17x14	6303/702252	6
40x17x12(ducellier)	6203/89500	5
	88067	7
	88066	7
	600897	7

SEALS

Outer oil retainer for stub axle	425948	7
Inner oil retainer for stub axle	426020	7
Oil retainer rear stub axle (7–11BL)	2165 S	5
" " (11B)	2185S	5
Oil retainer for diff.	408453	10

REAR AXLE

Torsion bar		15
	441584	25
Rod for link arm adjustment (7&11)	420920	7.50
Suspension link hub-inner splines at end	421325	20
Rear link arm Left	421185G	15
Right	421186D	15
Rear axle buffer(rubber)	421363	10
Double cored rubber bush for tie-rod clevis	421014	1
Shock absorbers Koni(2)		165
Shock absorber rubbers(2)		1

CABLES

Clutch pre- & post-1952	20
Handbrake 3 lenghs	25
Speedo	20
Windscreen wiper	10

MISCELLANEOUS

Windscreen wiper blades		10
	721081	1
Front bumper bracket RH	299806	30
LH	299807	30
Citroen name plate, rear bumper	299782	2.50
Gearplate in dashboerd	232763	2.50
Outside door handle plate	215009	6
Return spring door lock remote control	132 232	o.25

For anyone who is still labouring under the impression that I live in Oakleigh or Carrum, please note that my address is:
26 Tyrrell Avenue, Blackburn 3130, and my phone no., 877 4853.
Kym Harding.
Most of the spares are being kept at Norm Sterling's,
10 Sycamore Street, Camberwell.

PARTS FUND MEMBERS

Roger Brundle
Arthur Clarke
Kenn Gilbert
Bryan Grant
Kym Harding
Ray Hobbs
Oliver Moles
Mark Navin
Alec Protos
Andrew Rankine
Norman Sterling
Pat Stewart
Alan Thomas
Mike Veevers
Walter Burkhardt
Peter Day

ROUTINE MAINTENANCE

Daily: Check oil level, petrol and tyres.
Weekly: Check battery electrolyte and tyre pressures.

Running-in Period
(new or overhauled cars)
After the first 300 miles
B1. Engine sump: drain and refill.
C1. Gearbox/differential: drain and refill.
A1. Kingpins: lubricate with grease (two nipples).
A2. Universal joint splines: lubricate with grease (two nipples).
B2. Fulcrums on front and rear spring rods: lubricate with grease.
Lubricate with engine oil: pedal linkages and joints, clutch cable joints and remaining joints and hinges (except upper joint of gear shift lever under bonnet and control rod bush in scuttle).
Carburettor dashpot (if fitted): check oil level and top-up if necessary; check function when the engine is warm.
Remove bonnet and front wings.
Engine: check idling speed; adjust valve clearance; check and regap the spark plugs (spark plug gap 0·6mm); check, and if necessary, adjust contact breaker point gap 0·4mm).
Clutch pedal: check free play of pedal.
Brake system: check, and if necessary, bleed brake system.
Wheels: check front and rear wheel alignment; tighten wheel bolts.
Check, and if necessary, adjust riding height.
Check electrical equipment; aim headlights; check battery and charging current.
Check, and if necessary, adjust door locks.
Check brake fluid reservoir and top-up if necessary.
Check foot-brake and parking brake.
Check tyre pressures.

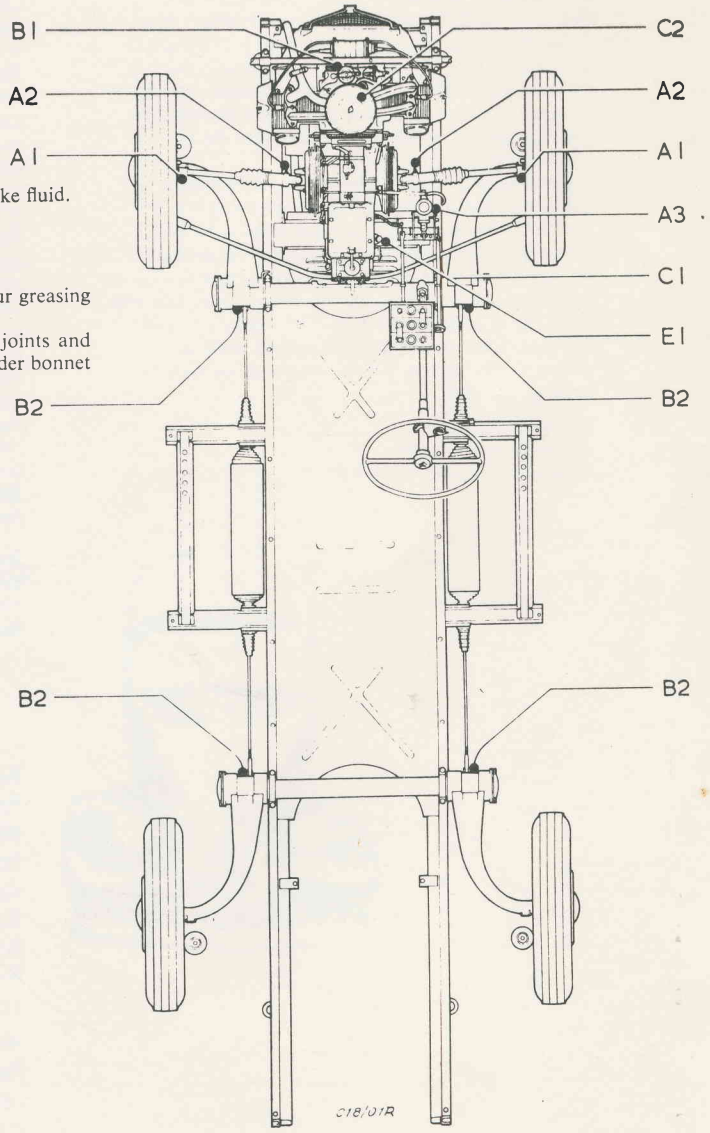
A. Every 1000 miles
*A*1. Kingpins: lubricate with grease (two nipples).
*A*2. Universal joint splines: lubricate with grease (two nipples).
*A*3. Brake fluid reservoir: check fluid level, top-up if necessary with brake fluid.

B. Every 2000 miles
As at 1000 *miles, plus the following*
*B*1. Engine sump: drain and refill.
*B*2. Spring rods: lubricate fulcrum points at wheel arms with grease (four greasing points); grease compensating springs (if so equipped).
Lubricate with engine oil: pedal linkages and joints, clutch cable joints and remaining joints and hinges (except upper joint of gear shift lever under bonnet and control rod bush in scuttle).

C. Every 4000 miles
As at 2000 *miles, plus the following*
*C*1. Gearbox/differential: check oil level, top-up if necessary.
*C*2. Air-cleaner: remove and clean (see instructions on filter casing).
Lubricate locks and hinges of doors and windows.
Lubricate windscreen wiper shafts.
Clean crankcase ventilation valve. Change wheels.
Clean, check and regap spark plugs.
Check, and if necessary, clean and readjust contact breaker points.

D. Every 8000 miles
As at 4000 *miles, plus the following*
Check, and if necessary, adjust valve clearance.
Clean fuel pump and filter.
Check riding height, wheel alignment and turning circle.
Check, and if necessary, readjust brakes; check brake system.
Check and tighten brake drum nuts.

E. Every 12,000 miles
As at 4000 *miles, plus the following*
*E*1. Gearbox/differential: drain and refill.
Lubricate clutch control cable.
Lubricate speedometer cable and drive housing.



Lubrication Chart

2CV Lubrication Recommendations:
BP products [or their equivalents].

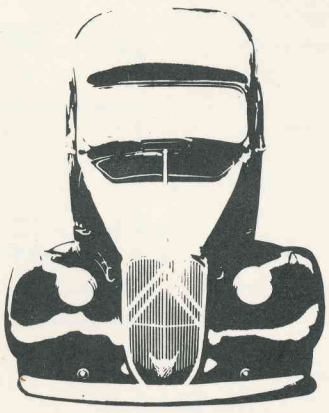
Engine: Visco 2000
Gearbox: Gear Oil 80EP
Steering, Ball joints and uni. joints, suspension units: Energrease AO
Wheelbearings: Energrease L2.

Correspondence

The Classic Register,

Thanks for your letter of October 27th; I'm very glad that the oil retainers arrived in good condition.
Thanks too for the cheque of Hfl 500,- I don't know whether this amount will be sufficient: it depends on your orders.
Concerning the tie rod ball set, it contains: 2674-S Ecrou Nylstop; 602062; 602048; 602046; 2 x 601876; 601846; 89048; 601877; — see catalogue p.247.
By the way, we can send you these catalogues at Hfl 32,- We will send you this week the Cardan and Driveshafts by SAL. Until we receive the old transmissions, we have to calculate the double price of them, so it is in your interest to send them back soon. Normally we only sell transmissions by exchange at the same time. The normal price is: cardanshaft Hfl 55,-; driveshaft Hfl 100.
With this letter I send you a few lists of spare parts; I hope someone can translate it for you. When you order in the future, please nominate type of the car and year and the Citroen No., of the parts you wish, so there can be no misunderstanding.
Concerning the revision of the driveshafts, if you can find a manufacturer who is able to revise them, we think we can send you the parts you need, but isn't it easier to gather within your club a stock of, for example, 10 drive- and cardan-shafts, which you can send send us to recuperate? In that case you will have sufficient stock for a longer period.
Enough for today, I hope everything will be arranged well.

Yours sincerely,
Herman Koekkoek.
Traction Avant Nederland.



Sir!
I have been stirred to put pen to paper by the first edition of 'Front Drive'. It really is a very impressive publication; of such quality that it is hard to believe the register has only about fifty financial members. Something to be really proud of!!
I am aware of the lack of communications between the country and other members and feel that something like 'Front Drive' does reduce this.
Personally, joining the CCCV was a means to meeting people of mutual interest as are now in the Classic Register. Combined, the two groups make a good social group but because of the natural polarization of interests I think the forming of the register as a separate entity is a natural evolution.
Combined the two groups offer many more resources – contacts, experiences, and support in numbers for social function group bookings. Matters of particular interest to register members would be better served if separate meetings were held.
In a local garage I have found a box of Citroen goodies. They have been stored for up to 12 years in the good oily environment of the back shed so are in good condition. Few are of inerest to me but if anyone is interested they should contact me. I suspect they could be given them if interested. They are a completely disassembled L15 engine and bell-housing. Missing is the gearbox and engine block.
Included are pistons, sleeves, sumps, head, valves, water pumps, oil pumps, carby, fuel pump, fan, distributor, and all those other forgettable things involved in holding the engine in and making it work. The crankshaft is there but I can't vouch for its condition.

Regards,
Geoff Thomas,
c/o Ellinbank Dairy Research Station
Warragul South 3820.

Welcome to new members:
Peter Day
William Darvall
Peter Macdonald
Walter Burkhardt
Robert Belbin
Ken Coldicutt
Rex Gercovich
Tony Scrivener

We will soon publish a complete list of all members and their cars and addresses, so if yours have changed since last list, or are about to change, please let Mark Navin know as soon as possible

CLASSIFIEDS

FOR SALE

'49 ENGLISH Light 15. Needs restoration. Almost complete. $250 ONO. Robert Belbin, 94 4785.

'53 ENGLISH Light 15, Just rereg., well restored, good engine, diff., gearbox, reco., shafts, Includes many spares off second car. Towbar, radio – $2500. Peter Macdonald, 578 7950.

'53 ENGLISH L15. Recent engine overhaul, rebuilt gearbox, Reg. till March. Needs front-end work. $600 or offer. Andrew Rankine, 489 7635.

ENGLISH 2CV. 1955 model recently restored, exc. mech. condition, reg., roadworthy, best offer.
and FRENCH 2CV, 1965 (RHD), Fully restored, excellent condition, RWC. $2000. – Both 2CV's interstate – contact Mark Navin for details.

OIL: Some Castrol GTX left at $3.50 per 5 litres. Bring 5 litre containers along to Dec. 7th meeting for exchange.

ORDERS are now being taken for Citroen Exacto windcheaters. Please state size and colour preference. Choice of two designs. Price approx $12. Contact the chairman, or spare parts officer.

T - SHIRTS: Roadster design – see spares news.

SALES brochure 1938 – Reprint. Contact Secretary.

OIL retainers as previously advertised – only two sets left (four per sets) at $14.

SPECIAL TRACTION TOOLS
The Classic Register Technical Officer has the following for hire (Phone 509 0441)
Prices are for the hire period of one week.
Spanner for adjusting brake shoe eccentrics 50c.
Tool for adjust. synchromesh,50c.
Valve spring compressor,$1.
Vernier gauges, $1.
Stub axle nut spanner,$1.
Steering ball pin extractor,$1.50.
Block for removing rear torsion bar,$1.50.
Front hub extractor,$2.
Upper ball joint extractor,$2.00.
Outer front wheel bearing extractor,$2.
Stub axle inner ring nut extractor,$2.
Upper swivel ball spanners,$2.
Extractor body for drive shaft spigot cup or ball joint,$2.
'A' frame for towing Light 15's.$2.
Lower ball joint extractor, $3.
Colletsfor ball pin extractor, $3.
Collets for spigot cup extractor,$3.
Chain block & tackle,$3.

DEPOSIT: One tool, $10; two +, $25.

Revenue from this source goes to enlarging our stock of special tools.