

# CITROËN

Instruction Book

for

“ Twelve ”

(“7”)

“ Light Fifteen ”

(“ 11 Lég ”)

and

“ Fifteen ”

(“11”)



CITROËN CARS LTD.,  
TRADING ESTATE,  
SLOUGH - BUCKS.

TELEGRAMS :  
CITROWORKS.

TELEPHONE :  
SLOUGH 1600



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# CITROËN INSTRUCTION BOOK

for

## “TWELVE” and “FIFTEEN” FRONT WHEEL DRIVE MODELS.

The similarity in design enables all details of the above models to be incorporated in one instruction book. Full particulars are given in cases where details of design differ.

This book is up-to-date in every particular at the time of publication. Modifications may be made from time to time and the customer's car may, therefore, differ in some respects from the description given. Our Service Department will gladly give any information relating to such modifications on request.

One copy of this book is issued free of charge with each car, further copies are chargeable at 2s. 6d. each.

CITROËN CARS, LIMITED,  
TRADING ESTATE,  
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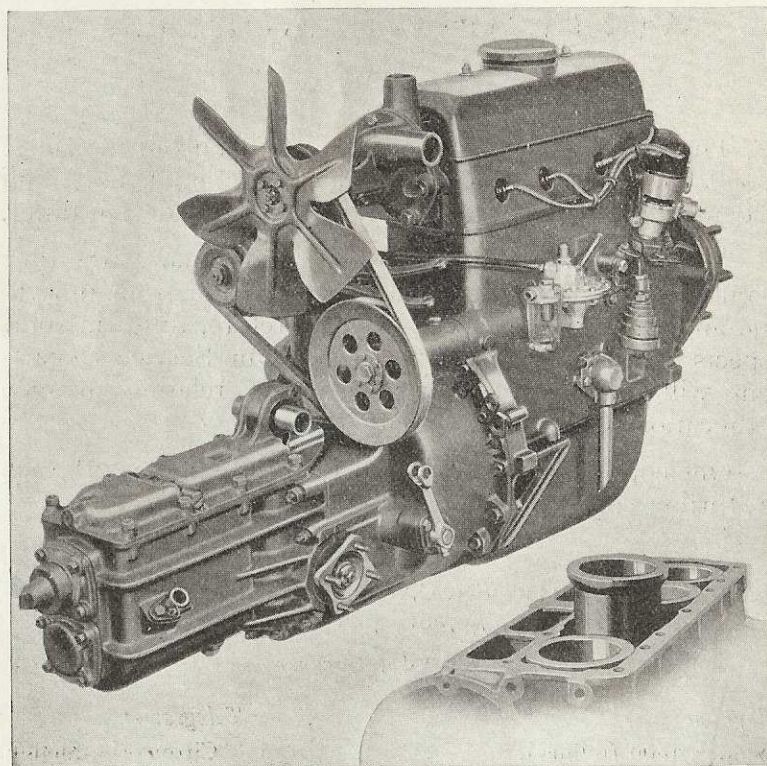
Telegrams:  
Citroworks, Slough.

July, 1938.



## DESCRIPTION AND MAINTENANCE.

The amount of service, efficiency and sustained reliability obtained from a car depends on the regular attention given to lubrication, adjustments, etc. It cannot be over emphasized that the small expense and trouble involved by the regular attention to the points indicated in this book, are negligible compared with the cost of repairs which are inevitably necessitated by neglect.



Engine and Gear Box Unit.

## ENGINE.

The **Cylinder Block** and top half of the crankcase are cast in one piece. Detachable and interchangeable chromium-iron wet barrels have been adopted for the cylinders. This method simplifies the cylinder block casting, and ensures even thickness of the cylinder wall. Thin gaskets seal the bottom joint of the barrels with the cylinder block, and the cylinder head gasket seals the top joint.

If it is found necessary for the cylinder barrels to be replaced, it is advisable to fit new gaskets between the barrels and the crankcase, and also see that the barrels are standing .002" to .004" proud of the top of the cylinder block, so as to ensure that the barrels are firmly secured when the cylinder head is re-fitted.

The cylinder barrels are easily removed by hand.

The **Balanced Crankshaft** runs in three white metal bearings. Ducts of ample proportions ensure adequate lubrication of the connecting rod big end bearings.

**Pistons** are of the split skirt type with concave heads. Four piston rings are fitted, the two top rings being compression rings, the third is a grooved oil ring and the bottom is slotted and acts as a scraper ring. When fitting new rings to the pistons care should be taken to ensure that the ring gap of .008" to .010" is correct.

The **Connecting Rods** are light steel stampings with white metal linings for the big end bearings and bronze bushes for the gudgeon pins.

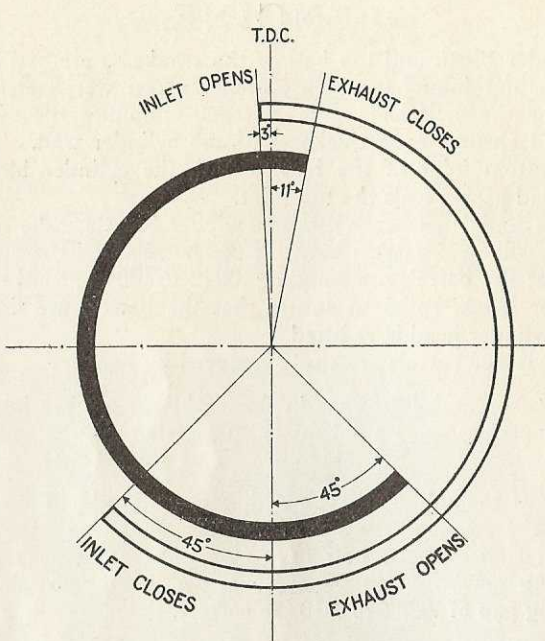
The **Camshaft**, which is driven from the crankshaft by a double silent roller chain, runs in three bearings lubricated by ducts from the crankshaft journal bearings. A helical gear integral with the camshaft drives the ignition distributor and oil pump driving shaft.

The **Cylinder Head** has received particular attention in design so as to afford efficient combustion space and adequate water passages, particularly round the valve seats.

**Valves and Valve Gear.** The tappets are in the form of inverted hollow cylinders in which are spherical sockets to take the ball end of the push rod. The camshaft is positioned high in the cylinder block casting, thus the push rods are short. The rockers, which are mounted on a hollow shaft, have pressure fed lubrication.

A groove in the top of each rocker feeds oil to the socket for the push rod ball end and to the pressure face bearing on the valve stem. The valves are inverted and inclined and are fitted with detachable guides. The valve springs are secured by split collars and in order to prevent the valves dropping into the cylinders in the event of spring breakage, small retaining rings are fitted to the valve stem.





Valve Timing Diagram.

**Valve Tappet Clearance.** The clearance of the valve tappets should be checked every 4,000 miles. The correct clearances when hot are:—

Inlet	...	...	...	...	...	...	...	...	...	.006 in.
Exhaust	...	...	...	...	...	...	...	...	...	.008 in.

**Valve Timing.** If for any reason it is necessary for the timing chain to be removed great care should be taken to ensure that the valve timing is reset correctly or unsatisfactory running of the engine will result.

The correct valve timing is as follows:—

Inlet Valve opens	...	...	...	3 deg. before T.D.C.
Inlet Valve closes	...	...	...	45 deg. after B.D.C.
Exhaust Valve opens	...	...	...	45 deg. before B.D.C.
Exhaust Valve closes	...	...	...	11 deg. after T.D.C.

It is important that the tappet clearance should be adjusted correctly before checking the valve timing.

**To Replace a Valve Spring.** Remove the cylinder head cover which is fitted to the top of the engine, depress the valve to enable the push rod to be moved away from the rocker arm and lift the rocker arm away

from the valve. Remove the sparking plug from the cylinder in which the valve spring is to be replaced and insert a tommy bar through the hole to enable the valve to be kept in position. Take away the split cotter and broken spring and fit the new spring, keeping the valve on its seating by means of the bar while depressing the spring to insert the split cotter. After fitting the new spring re-position the rocker arm and push rod and adjust the rocker arm screw to the correct clearance. Replace the sparking plug and refit the cylinder head cover, making sure that a good joint is made to prevent oil leaks.

## TO DECARBONISE THE ENGINE.

It is advisable for the engine to be decarbonised and the valves re-seated periodically.

Decarbonisation can be carried out without difficulty and after removing the cylinder head, the re-seating of the valves can be done on the bench. To remove the cylinder head, first drain the water from the radiator, remove the cylinder head cover so as to obtain access to the cylinder head nuts, depress the valve rocker arms to enable the push rods to be removed (these should be placed in such a manner that they can be easily replaced in their respective tappets), unscrew the cylinder head stud nuts, remove the fan belt and the wires from the sparking plugs, disconnect the oil feed pipe from the crankcase, the petrol pipe, the water hose connection from the water pump and the throttle controls, remove the radiator stay rods and the nuts securing the exhaust pipe to the manifold. The cylinder head complete with valves and water pump can then be lifted from the engine. Remove the valves, and when doing this do not forget that each valve is fitted with a small retaining ring, so that until this is removed the valve cannot be drawn through the valve guide. The valves can be re-ground by hand or by means of suitable precision tools. After the valves have been re-seated, the valves and seating should be thoroughly cleaned and all carbon removed from the combustion chambers and piston heads. The valves should then be re-fitted, not forgetting to re-fit the small retaining ring to each valve stem after it has been passed through the guide, and before fitting the spring. **This is very important because if the retaining rings are not fitted and a valve spring subsequently breaks, the valve will drop down on to the piston and may cause considerable damage.**

When re-fitting the cylinder head a new gasket should be used, but before fitting this, make sure that all traces of carbon and dirt have been removed from the faces of the cylinder casting and the head. When fitting the gasket, sealing compound should not be used but both surfaces should be lightly coated with black lead. Make sure that the gasket passes easily over the studs and that it is not damaged during this process.

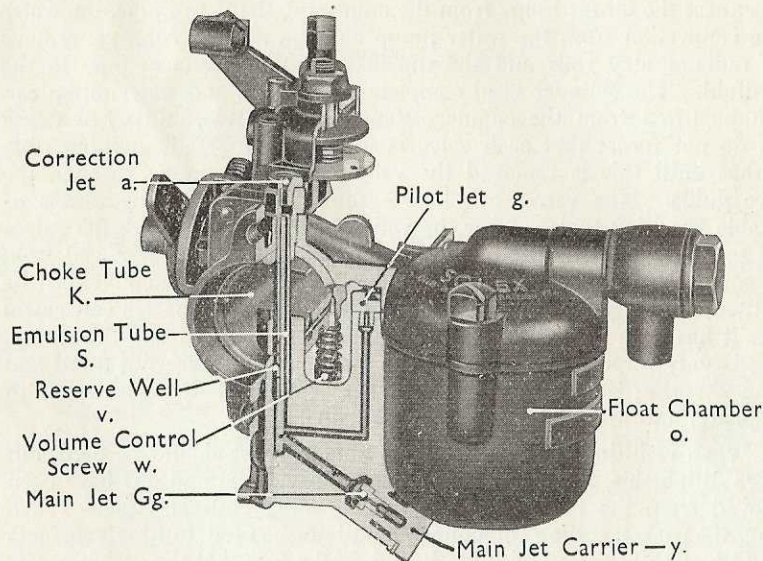


Re-fit the cylinder head, and to avoid the possibility of the gasket leaking or distortion occurring, carefully tighten the cylinder head nuts as follows:—

After fitting all the nuts and screwing them down lightly, commence tightening the centre nuts of both rows and continue outwards diagonally along both rows until all the nuts are securely tightened without using undue force. After tightening down the cylinder head, re-fit the push rods to their respective tappets and adjust the rocker arm screws to the correct clearance. Connect up the water hoses, oil and petrol pipes and controls and all other parts, excepting the cylinder head cover. Re-fit the radiator with warm water, start up the engine, and after allowing it to run for a short time in order to warm up, re-tighten all the cylinder head nuts, again checking the tappet clearances, afterwards re-fitting the cover, taking care to see that a good joint is made to prevent oil leaks.

It is advisable to check occasionally the exhaust and inlet manifold nuts and the cylinder head nuts for tightness.

## THE SOLEX HORIZONTAL "ASSEMBLY 22"



## CARBURETTOR.

The Solex horizontal type carburettor is fitted.

In certain cars the starter carburettor is thermostatically controlled—in others a hand control is fitted to this starter. The diagram shewn is the one with the hand control but the rest of the carburettor is the same. It is advisable to leave this instrument untouched unless trouble is experienced.

It is advisable to check occasionally for tightness the inlet manifold nuts and the carburettor flange nuts and controls. (See Special Solex book supplied with car.)

## PETROL FEED.

One of three types of Petrol Pump is fitted, and the method of cleaning the filter for each of these types is given below:—

**A.C. Pump.** Undo the knurled nut, push the clip sideways and remove the metal cup at the top of which will be found the filter. After cleaning re-assemble and if necessary renew the joint of the cup, screw up tightly to prevent any petrol leakage.

**Guoit Pump.** Disconnect the flexible petrol pipe, unscrew the inlet unions on the pump in which the filter is fixed. After cleaning re-assemble and tighten up securely to prevent petrol leakage.

**S.E.V. Pump.** Unscrew the knurled nut, unhook the clip from R.H. side, raise the glass cup, withdraw carefully the cork joint and draw out the metal filter. After cleaning re-assemble and if necessary replace the joint of the cup. Tighten up securely to prevent petrol leakage.

## IGNITION.

The ignition is by coil and distributor in conjunction with a 6 volt battery.

The correct firing point is at 8 degrees before T.D.C. fully retarded, and therefore the ignition timing should always be checked with the distributor in the retarded position. If it is necessary for the timing to be re-set, it can be altered by slackening the bolt fitted to the control arm transversely across the base of the distributor and rotating the distributor to the required position. In order to advance the ignition timing the distributor must be turned in an anti-clockwise direction.

In order to obtain the correct position of the piston so that the ignition timing can be set, a locating hole has been drilled in the flywheel housing and a corresponding locating hole drilled in the flywheel. When



these two holes are opposite each other No. 1 piston is in the correct firing position, that is 8 degrees before T.D.C. By placing a suitable pin through the hole in the bell housing and by turning the engine with the starting handle until the pointer is located in both holes, the correct position of the piston is obtained.

The ignition equipment is provided with an automatic advance mechanism, which consists of a centrifugally operated governor housed in the distributor body in which moving weights cause angular motion between the cam and the driving shaft, thus causing increased ignition advance with increase of engine revolutions.

In order to obtain satisfactory results from the engine, the distributor contact breaker points should be checked at intervals and adjusted if necessary to the correct clearance of .012 in.—.015 in.

**Sparking Plugs.** The cleaning and adjusting of the sparking plugs at intervals of 4,000 miles will help to keep the ignition system in good order. The gap between the electrodes should be adjusted to .025 in.

## WATER COOLING SYSTEM.

The cooling system is of the pump assisted thermo-syphon type. The **Water Pump** is driven by the fan spindle and has an accessible gland which can be repacked in position if necessary. If leakage occurs, the gland nut should be turned in a clockwise direction so as to compress the packing, but care should be taken to ensure that the nut is not tightened beyond the point of stopping the leak.

It is important that the water in the radiator be maintained at its proper level which is 1 in. from the top of the overflow pipe. It is advisable to examine this daily and add water if required. Failure to maintain the water in the cooling system at a safe level may lead to a cracked cylinder head or possibly engine seizure.

It is advisable to wash out thoroughly the radiator and cylinder block every 10,000 miles with a solution of 5 per cent. soda and water the following procedure being adopted. Drain all water from the radiator and cylinders and fill with the solution. Run the engine for a short period to circulate the solution, drain off, flush and replenish with soft water.

**The Fan and Dynamo** are driven by a Vee belt from a pulley on an extension of the camshaft. The belt when properly set should be just in tension and is adjusted by altering the position of the dynamo pulley in relation to the other pulleys. In order to carry out this adjustment slacken the nut of the bolt passing through the bracket at the top of the dynamo, move the dynamo into the correct position and tighten the securing nut.

## CLUTCH.

The clutch is of the single dry plate type fitted with a flexible rubber centre.

If clutch spin or slip is experienced, check the movement of the clutch pedal; there should be approximately  $\frac{1}{2}$ -in. movement on the pedal before the toggles come into operation. The pedal movement can be altered by the adjusting nut at the front end of the operating cable after the lock nut has been slackened. Ensure that the lock nut is tightened after the adjustment has been carried out.

Should it be found that slip or spin is not eliminated by the above, let back the adjusting nuts on the front end of the clutch operating cable to allow the clutch thrust race to return freely to its "off" position.

Adjust each toggle by turning the adjusting nut on the toggle bolt to give a clearance of 1 m.m. between the toggles and the face of the clutch thrust race.

To ensure that the toggles are evenly adjusted, the nuts at the front end of the operating cable may be taken up so that the toggles can be adjusted to a fine clearance of .006". After finally adjusting the toggles, ensure that the adjusting nuts are re-locked to the toggle bolts, and let back the nuts on the front end of the operating cable to give the necessary running clearance of 1 m.m. on the toggles.

## GEAR BOX AND DIFFERENTIAL.

The gear box which is located in front of the engine provides three forward speeds and reverse with synchronised change on second and third. It comprises one unit with the differential, crown wheel, and bevel pinion, the bevel pinion being integral with the gear box layshaft.

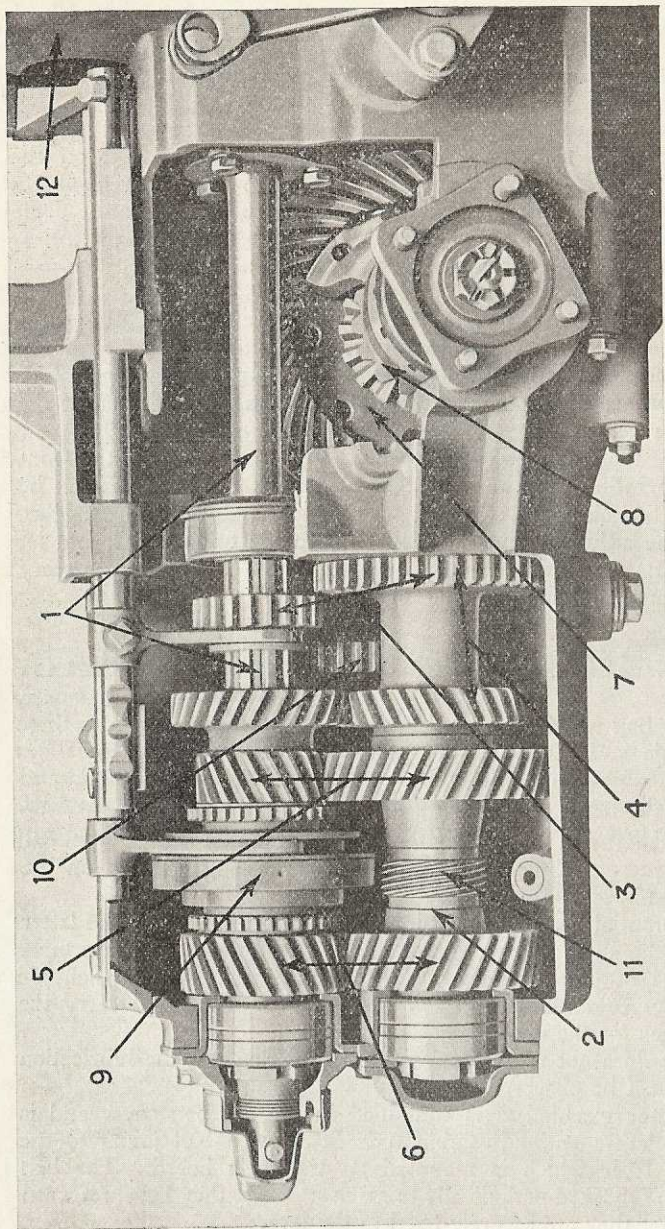
The mainshaft and the front end of the bevel pinion shaft run on ball bearings of generous dimensions, and a roller bearing is fitted on the rear end of the bevel pinion shaft.

The differential has four star pinions and two bevel gears, the latter integral with the short driving shafts. These shafts are carried in taper roller bearings of large diameter. The ends of the shafts which are splined, project beyond the sides of the gearbox casing and carry the coupling flanges for the driving shafts.

This unit does not require any special attention but the lubrication instructions must be observed.

The selector mechanism is contained in the gearbox cover and is connected by levers and adjustable rods fitted with ball joints to the change speed lever which is mounted on the fascia board. The ball joints should be checked periodically to make sure that they have not worn unduly and that they are securely fixed to the levers.





**Gear Box and Differential.**

1. Drive shaft.
2. Driven shaft.
3. 1st speed gears.
4. Driven shaft idler gears.

5. 2nd speed gears.
6. Top speed gears.
7. Crown Wheel.
8. Differential.

9. Synchronized sleeve.
10. Reverse gear.
11. Speedometer drive.
12. Clutch casing.

If any difficulty should be experienced in engaging the gears the length of the operating rods should be checked and if necessary adjusted, so that when the gear lever on the fascia board is placed in each gear position separately, the selector rod in the gear box for each gear is fully in position without any strain on the operating rods. It is important that these rods should be in correct adjustment, or else in addition to difficulty in changing gear, the gears will not be fully in mesh, causing uneven wear and the possibility of them jumping out of mesh.

## STEERING.

The steering gear, which is of the rack and pinion type, requires no adjustment after the car has left the factory. The gear is packed with lubricant when assembled and should require no further lubrication until the car has run 12,000 miles. In order that the smoothness and precision of the steering may be maintained, the following procedure should be adopted after the car has completed the running-in period. The front axle should be raised on jacks, and the set bolts A. at the bottom of the two split securing brackets for the horizontal steering tube, loosened (see illustration). The securing brackets are bolted to the underside of the body. The steering should then be worked to the full extent of its travel in both directions several times by means of the steering wheel. The two set bolts for the securing brackets should then be re-locked.

This procedure will ensure that all parts of the steering gear settle down in their most satisfactory working positions.

## BRAKES.

Lockheed Hydraulic Brakes, actuated by the foot pedal, operate on all four wheels. When the pedal is depressed, pressure is created in the master cylinder forcing oil into the cylinders inside the four brake drums and causing the shoes to move outwards against the drums with equal pressure. Perfectly balanced brakes are thus assured.

The hand or parking brake is cable operated and acts independently on the rear wheels only.

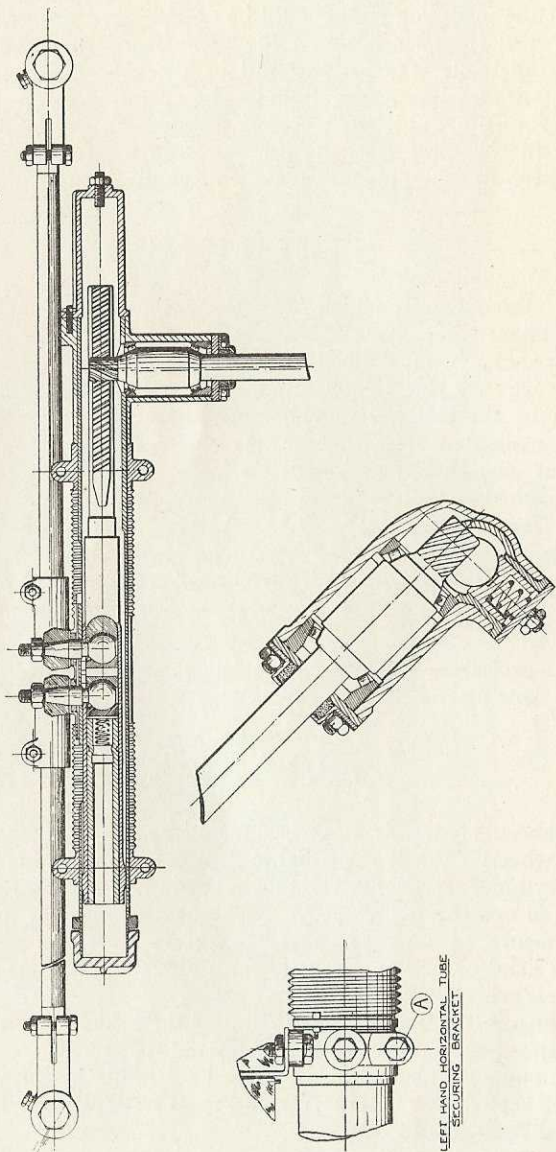
To ensure the correct functioning of the brake system the following maintenance instructions should be adhered to.

The supply tank which is attached to the dash beneath the bonnet should be kept three-quarters full, and must be replenished with genuine **Lockheed Brake Fluid only.**

The vent-hole in the filler cap of the supply tank should be periodically examined and kept free from obstruction.



—STEERING GEAR.—



To ensure correct functioning of the master cylinder, it is important that there should be a slight amount of free movement on the foot brake pedal before the piston in the cylinder commences to move.

When the brake pedal almost reaches the floorboards it is necessary to readjust the brake shoes into closer relation to the drums, by means of two adjusters with hexagon heads which are positioned on each brake shoe back plate almost at the top and on either side of the brake pipeline connection. This adjustment is carried out as follows:—

Jack up the car until the wheels are free to rotate and by means of the adjusters which are attached to the brakeshoe cams, turn the cams until the shoes come into contact with the drum. Then turn the adjuster in the reverse direction until the wheel can just be turned freely. Repeat the adjustment for the other wheels. It should be noted that a **partial** turn of the adjusters is usually sufficient to bring the shoes into contact with the drum.

If the level of fluid in the supply tank drops abnormally, check the the pipe lines and connections for leaks.

If the pedal feels springy when applying the brake, it indicates that either there is no fluid in the supply tank or that air has entered the system, in which case it will be necessary to "bleed" the system to expel the air. The bleeding should be done by a Citroen Agent or a Repairer who is conversant with Lockheed Brakes.

Inequalities in braking may be due to oil or grease on the brake shoe linings in which case it will be necessary for the shoes to be re-lined or the oil or grease thoroughly cleaned off.

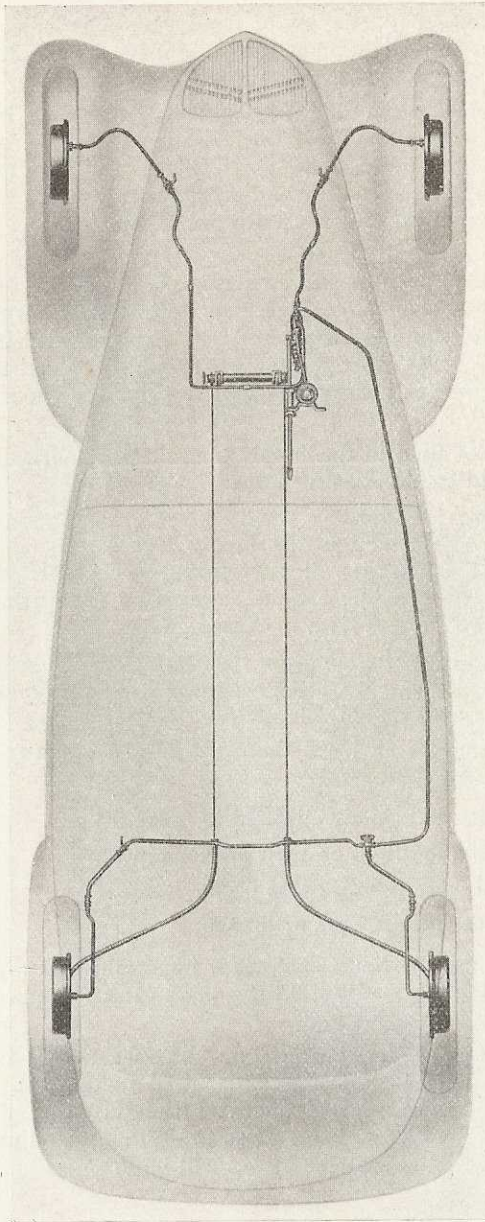
If the brakes stick on when the pedal is released, it may be due to any of the following reasons:—

1. Brake shoes too closely adjusted to brake drum.
2. Brake shoes too tight on their anchor pins.
3. No initial clearance on brake pedal.
4. Brake shoe springs weak or broken.

When re-lining the brake shoes it is important that the same make and quality of lining is used on all the shoes otherwise unequal braking will result.

The handbrake which operates on the rear wheels only, can be adjusted by turning the adjusting nuts fitted to the front end of the brake cables. In order to take up the brake turn the adjusting nuts in a clockwise direction, care being taken to see that the adjustment is **not** taken up too much otherwise the brakes will bind.





Lockheed Braking System.

## REMOVING FRONT AND REAR WHEEL BRAKE DRUMS.

Jack up the car until the wheel is clear of the ground. Remove the wheel embellisher by using a screwdriver, unscrew the wheel nuts and remove the wheel. The hub nut can then be unscrewed after removing the split pin. It should be noted that the hub nuts on the left side of the car have right-hand threads and *vice-versa* on the right side. The hubs being fitted to the front and rear stub axles on tapers with keys, it will be necessary for a special extractor to be used. Before removing the drum make sure that the brakes are off so that the shoes are not binding on the drum. When re-fitting the hub and brake drum, position the key correctly and ensure that the hub is a good and tight fit on the taper of the stub axle. Under no circumstances must the lock nut be turned back after tightening for the refitting of the securing pin. Make sure that all nuts are fully tightened when re-assembling.

## FRONT AXLE ASSEMBLY.

The front axle consists of a pressed steel cradle secured to four horizontal tubes which extend from the front of the body. Two link arms which are free to move vertically are attached to each side of this cradle, the upper arms which can be adjusted horizontally, being mounted on substantial bronze bushes, and the lower arms on rubber bearings. The outer ends of both upper and lower arms are machined to take ball sockets. Located between the arms are swivels which carry the wheels and brake gear. These swivels have journals at top and bottom to which are fitted balls, which work in the ball sockets of the link arms. Thus owing to the above arrangement each wheel can move independently of the other when any unevenness in the road surface is encountered. The inner ends of the lower link arms are splined to take the front ends of the torsion bars, which take the place of the ordinary laminated spring.

The drive to the front wheels is through large diameter driving shafts and "Spicer" couplings fitted with needle bearings.

Any play which may develop in the upper and lower swivel ball joints can be taken up by removing one or more of the adjusting shims located together with a distance washer between the ball sockets. When the joints are perfectly adjusted there should be no apparent play and the balls should be just a slight friction fit in their ball sockets. It is most important to note however that the distance washer between the sockets must not be modified in any way in order to obtain the necessary adjustment.



Any side play of the upper link arms where they join the cradle can be taken up by means of shims at the end of the securing pins. If correctly adjusted the arms should only just be able to fall under their own weight and the side play of the arms must not exceed .002 in.

## SUSPENSION.

The torsion bars for the front suspension are located on the body at each side of the engine sump. The front end is fitted in splines in the lower link of the axle and the rear end is fixed to a cross member attached to the body and, as the lower link rises and falls with the unevenness of the road, the torsion bar is twisted, the suspension depending on the resistance the bar offers to this twisting. The bars must on no account be turned, filed, hammered or straightened. The torsion bars for the rear suspension lie parallel to the tubular cross member, at the centre of which there is a splined bracket to accommodate the fixed ends of the bars. The outer ends of the bars are fixed in splined sleeves attached to the longitudinal links which carry the rear axle.

Hydraulic shock absorbers of the "Spicer" type are fitted at the front and rear.

The front and rear torsion bars are fitted with adjusting screws which are located at the rear end of the front torsion bars and at the outside end of the rear torsion bars, for the purpose of ensuring that the car is maintained at the correct ground clearance and that the weight on the wheels of the front and rear axle respectively is equal.

The correct heights from the ground for the various front wheel drive models are given in the Data Sheet (inside front cover). The heights are measured from the centre of the hinge pin of the front axle lower link arm for the front, and from the bottom of the rear tubular cross member for the rear.

**Jacking up the Car.** Metal sockets are incorporated in the front lower link arms and the rear longitudinal links so that whenever the necessity arises for the car to be jacked up for any purpose, the Head of the jack can be positioned in the socket.

## WHEELS AND TYRES.

The alignment of the front wheels should be checked carefully every 4,000 miles as incorrect setting will affect the stability of the steering and cause undue tyre wear. It is also advisable to have this tested if by any chance the front of the car is involved in a collision at any time.

The front wheel alignment should be so adjusted that the wheels TOE-OUT from 1/16 in. to 3/32 in. **It is most important that in no circumstances should they be adjusted to "Toe-in."**

In order to adjust the track loosen the lock bolts of the two ends of the two track rods and adjust by turning each rod the same number of times. Check in the usual manner until the wheels toe-out 1/16 in. to 3/32 in. measured on the rim at the same height as the hub centres.

Ensure during the adjustment that the steering ball joints do not tilt and that before tightening the track rod ends they are absolutely horizontal. After adjustment the difference in the over-all length of the track rods must not exceed .040 in.

It is important in order to ensure satisfactory tyre wear that the recommended tyre pressures are adhered to and the pressure of each tyre, including the spare, should be checked at least once a week.

The following factors have a large bearing on the mileage obtained from each tyre:—

**Braking.** When a car is driven "on the brakes," and especially where frequent stops are made, the rate of tyre wear is considerably increased.

**Acceleration.** The tyre wear is considerably increased by rapid acceleration, which results in excessive friction taking place between the road surface and the tyre.

**Speed.** Increase in speed increases the tyre wear and thus an owner who normally drives at high speeds will not obtain such a good mileage from the tyres of his car as one who normally drives at much lower speeds. It is not generally known, but the tread wear at speeds of 50 m.p.h. is double that at 25 m.p.h.

**Temperature.** Road tests have proved that the rate of wear on roads at temperatures of 100 deg. F. is often as much as five times the rate at 40 deg. F. This explains why a greater mileage is obtained from tyres run both in winter and summer than from those run in the summer only.

**To Remove a Wheel.** In order to remove a wheel, the hub embellisher must first of all be removed from the centre of the wheel hub. This can be done by inserting and twisting a screwdriver between the edge of the embellisher and the wheel centre. If the embellisher has a small hexagon head on the outside, this should be unscrewed to release the cover. Access is then obtained to the wheel nuts and it should be noted that they all have right hand threads. When re-fitting the wheels make sure that the wheel nuts are tightened up evenly and securely. It is advisable to check them from time to time to make sure they are tight.



## ELECTRICAL EQUIPMENT.

It is advisable occasionally to examine the connections to the various electrical units to see that they are quite tight at the terminals and that there are no stray ends of wire.

A diagram is given showing the wiring to all units.

**Dynamo.** Both "Twelve" and "Fifteen" models are equipped with third brush control. This comes into operation when the headlamps are switched on, and increases the output of the dynamo to balance the load of the headlamps.

It is advisable to check the commutator bushes occasionally to see that they are not unduly worn, and that they are bearing evenly on the commutator. All traces of dirt and grease should be removed from the commutator.

**The Battery** is located under the bonnet. Its action is electro-chemical entirely automatic and provided the simple maintenance instructions are observed, absolutely reliable.

The level of the electrolyte in each cell should be checked at frequent intervals and if necessary distilled water only should be added to each cell until the level is 1/2-in. above the top of the plates. At the same time the battery terminals should be cleaned, all traces of deposit removed and lightly coated with Vaseline and a check made to ensure that the terminals are tight.

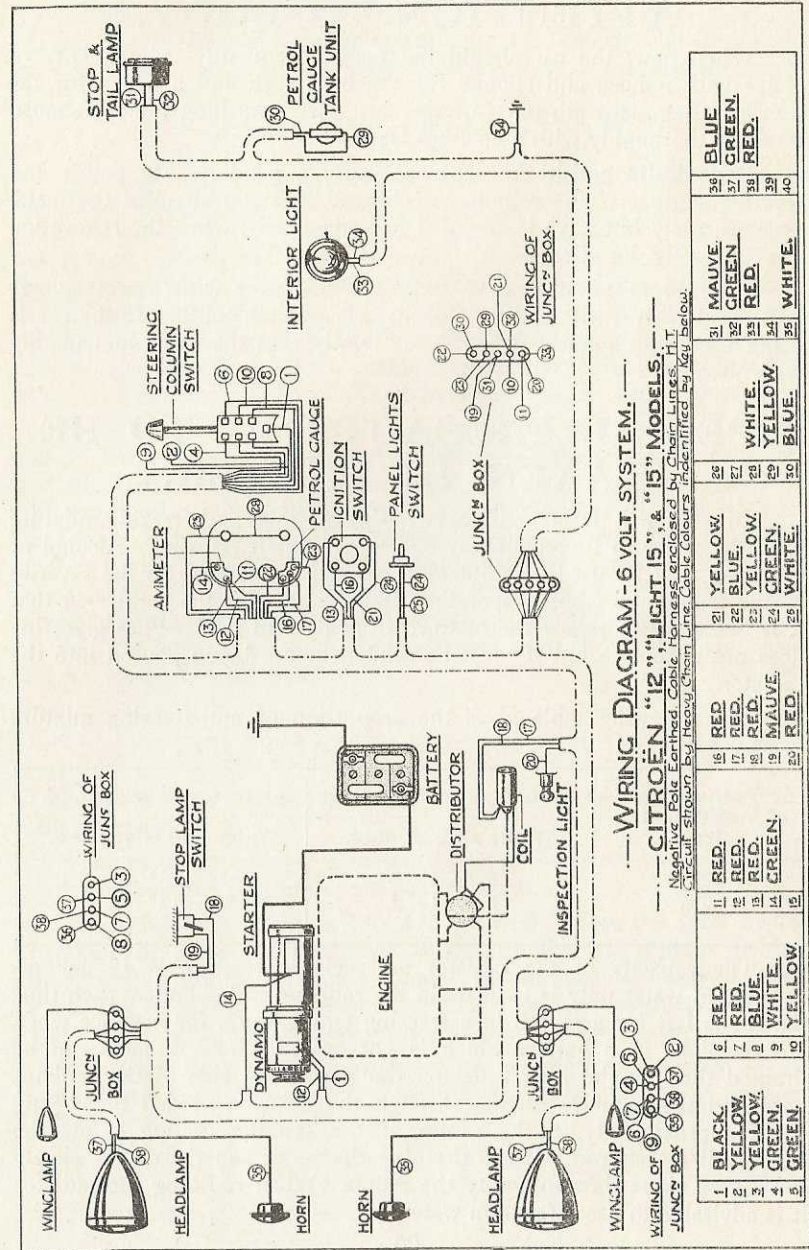
If the battery has been in a discharged condition for some considerable time it is advisable to have it re-charged in a suitable charging plant.

**The Starter Motor** is fitted with a pinion which on rotation runs into engagement with the toothed ring on the flywheel. Immediately the engine fires the pinion is automatically thrown out of engagement and will remain out provided the starter switch is released.

**Horns.** Two tuned and matched horns, high note and low note, are fitted under the front cowl and are operated by a single push button on the steering column arm.

**Windscreen Wiper.** The wiper is fitted above the windscreen and works two wiper blades.

**The Petrol Gauge** on the facia board is operated by a rheostat in connection with a float fitted in the petrol tank. It should be noted that the gauge is connected to the ignition switch and will indicate only when the ignition is switched on.





## ATTENTION TO BODY.

When new, the car should be washed frequently using plenty of water with a hose and sponge for the bodywork and a brush for the wheels and underneath parts of the car. After washing the car should be dried thoroughly with a chamois leather.

Periodically polish the cellulose using a good quality polish and soft dry cloth. If the cellulose is chipped do not wait until the metal becomes rusty but have it attended to immediately, when the renovation can be easily localised.

The chromium plating should be wiped over with a wet sponge and dried with a soft cloth. Do not use a metal polish. If the car is being used continuously near the sea lightly coat the chromium plating with Vaseline.

## SPECIAL PRECAUTIONS TO BE TAKEN IN WINTER.

In winter it is sometimes advisable to mix anti-freezing mixture with the water in the cooling system to prevent it freezing. Alcohol or glycerine may be used in suitable proportions according to the severity of the temperature but evaporation takes place with the former so that it is necessary to renew the mixture from time to time. Pure glycerine does not evaporate but it must be diluted before being poured into the radiator.

The following table gives the proportion of anti-freezing mixture to be used.

Percentage of Anti-Freezing Mixture.	Min. Temperature which mixture will withstand.	
	Water and Alcohol.	Water and Glycerine.
10%	Fahr. 23° 9	23°
20%	Fahr. 13° 1	12°
30%	Fahr. 3° 1	1° 5

The capacity of the radiator and cylinder casting is  $1\frac{3}{4}$  gallons. When water only is used drain the radiator and cylinders each time the car is left for a period in a freezing temperature, for instance when left at night in a garage which is not heated. The radiator can be drained through the plug fitted on the right-hand side of the radiator base and the cylinder casting through the hexagon-headed brass plug fitted approximately in the centre of the cylinder casting below the engine oil dipper rod. When draining the water run the engine slowly for a very short time to empty the pump. When re-filling the radiator it is advisable to use soft warm water.

Change from Summer to Winter grade of oil for the engine and before starting the engine in the morning turn it with the starting handle to free the pistons. After starting the engine allow it to warm up slowly.

## STORING THE CAR.

Before storing, thoroughly wash and dry the car, lightly coat the chromium plated parts with Vaseline and place it in a garage with a uniform temperature. Raise the car so that all wheels are clear of the ground, remove the tyres and tubes and store in a dark place with the tubes deflated. Drain the water from the radiator and cylinder casting, remove the sparking plugs, inject oil into the cylinders and turn the engine by the starting handle so as to lubricate thoroughly the pistons and cylinders. Fully charge the battery and disconnect the terminals. On completion of the above cover the car with a dust sheet.

When preparing the car for use after storage, first check the battery and re-charge if necessary. When connecting up the terminals make sure they are tightened securely. Drain the oil from the engine and re-fill with fresh oil. Empty the carburettor float chamber in order to start the engine with fresh petrol. Turn the engine a few times by means of the starting handle. Fill the radiator with soft water and start the engine allowing it to run slowly to warm up. Do not race the engine until all the moving parts have had time to become thoroughly lubricated. Fit the tyres and tubes, clean the chromium parts, body, etc., and make the car ready for the road.

## DRIVING THE CAR.

**Controls.** All the controls are positioned so that they can be operated easily by the driver.

The change speed lever is mounted on the facia board and is marked clearly to show the position of the various gears.

The hand brake lever is fitted to the dash below the facia board. To apply the brake turn the lever at right angles and pull to the full extent of its traverse. The hand brake should normally only be used for parking or in cases of emergency. The ignition switch and electric starter switch control are conveniently placed on the facia board.

The head light, wing light and horn switches are carried on an extended arm from the steering column in the most convenient position for the driver.

**To start the Engine.** Ascertain that the radiator is full of water, that there is the correct quantity of oil in the engine sump and that there is sufficient petrol in the tank.



Ensure that the change speed lever is in the neutral position. The ignition switch should now be turned to the "on" position and the starter switch control operated only for short periods at a time until the engine fires. The accelerator pedal must not be touched when starting from cold.

The control should never be left out unnecessarily, as, if this is done, petrol consumption will be adversely affected. The engine should never be run at an excessive speed immediately after it has been started but should be allowed to run slowly in order to warm up and thus ensure perfect lubrication of the engine.

In very cold weather it is advisable to turn the engine a few times with the starting handle before starting in the usual way with the electric starter. This procedure will "free" the engine and considerably relieve the load on the battery. In addition it is advantageous to depress the clutch pedal as this will relieve the starter of the resistance offered by the lubricant in the gear box.

If the car has been left standing for a period and difficulty is experienced in starting, it may be due to the petrol level in the carburettor float chamber being low, in which case the hand primer on the petrol pump should be used.

**Running-in Period.** When the car is new it should never be driven at speeds in excess of those shown in the following table, as good bearing surfaces will only result if care is taken to ensure that the engine is not overdriven during the running-in period.

	First 500 Miles.	500 to 1,000 Miles.	1,000 to 2,000 Miles.
<b>1st Speed</b> ..	12 m.p.h.	15 m.p.h.	18 m.p.h.
<b>2nd Speed</b> ..	22 m.p.h.	25 m.p.h.	28 m.p.h.
<b>Top Speed</b> ..	30 m.p.h.	35 m.p.h.	45 m.p.h.

The use of running-in compound containing "dag" colloidal graphite is recommended.

#### A Few Driving Hints.

1. Always use the brakes with care. When approaching a corner or sharp bend make a practise of slowing down the car early in order to avoid the necessity for a sudden application of the brakes.
2. Never engage reverse gear when the car is moving forward or first gear when the car is moving backward.
3. Always change into a lower gear before the engine commences to labour.

4. It is advisable to pause in the neutral position when changing gear and also to double de-clutch when changing from 2nd to 1st speed.
5. Do not rest the foot on the clutch pedal unnecessarily or premature wear of the clutch thrust race may occur. It is not necessary to depress the clutch pedal when braking under normal conditions but it should be depressed at the moment of stopping the car.
6. Do not run the car down hill with the engine switched off and in gear as the oil film on the cylinder walls will be washed away by the petrol drawn in, resulting in cylinder wear and the dilution of the lubricating oil in the engine sump.

## LUBRICATION.

The lubrication of the car should be carried out as indicated on the oiling chart and all greasing points should receive the necessary attention with the recommended lubricants at the mileage given on the chart.

Careful attention to the lubrication of the car is very important, as, unless all moving parts are satisfactorily lubricated excessive wear is bound to take place.

**Engine.** The oil in the engine sump should be changed after the car has run the first 500 miles and again after it has run a further 1,000 miles and then at every subsequent 1,500 miles.

Every 7,000 miles the engine sump should be removed and thoroughly cleaned out with one of the special flushing oils which are obtainable for this purpose. It is important that this should be done as any possibility of the oil ways being choked will then be avoided and the adequate lubrication of the engine assured.

Oil replenishment is made through the filler incorporated in the cover for the overhead valve gear.

The oil level in the sump can be checked by the dip stick situated on the left side of the engine. Care should be taken to see that any oil on the dip stick is wiped off before the oil level is checked. The oil level in the sump should never be below the level of the minimum mark on the dip stick. The capacity of the engine sump is 8 pints.

Perfect lubrication of the engine can only be assured by maintaining the oil at its correct temperature and this is only possible if the correct oil level is maintained. When the oil in the engine is too low it tends to overheat and to prevent this, the level should be checked often. When doing this make sure that the car is standing on level ground so that the dip stick records accurately. If the level is checked with the car standing at an angle an inaccurate reading will be obtained.

The main and big end bearings are lubricated under pressure by oil drawn by a gear type pump from the sump.



The piston and gudgeon pins are lubricated by oil sprayed up from the main and big end bearings. The overhead valve rocker gear is lubricated by oil delivered under pressure.

The oil pump is provided with a ball relief valve which is set during the engine bench test and should therefore not be interfered with.

If it should be necessary to examine the pump proceed as follows:—

Remove the engine sump. Disconnect the oil feed pipe. Loosen the locknut of the pointed set bolt which is positioned outside the crankcase below the distributor and which holds the pump in position. Unscrew the set bolt and remove the pump.

**Fan Pulley Drive Shaft Bearing.** A greaser is provided for the lubrication of this bearing in the drive shaft housing.

**Water Pump.** Two greasers are provided for the lubrication of the fan spindle bearing and water pump bush respectively. It is important that only the specially recommended lubricant for these points is used as it is heat-resisting and if an unsuitable lubricant is used water leaks and the fouling of the water cooling system may result.

**Clutch.** An oiler for the lubrication of the clutch withdrawal ballrace is located on the top of the clutch bell housing. This race should be lubricated with a few drops of engine oil every 250 miles, but over lubrication should be avoided or trouble due to clutch slip will be experienced due to the excess lubricant working on the faces of the clutch linings.

**Gear Box and Differential.** A level filler plug is fitted on the right-hand side of the casing. The level should be checked every 1,000 miles more oil being added if the level is one inch below the filling orifice.

The oil should be drained from the casing every 5,000 miles by means of the drain plug provided. It is preferable to drain the oil when it is warm and the re-filling should be done slowly to enable the oil to find its correct level.

The normal capacity of the gear box and differential is 3 pints.

A greaser is fitted to the bracket for the selector lever shafts located on the clutch bell housing for lubricating the shafts. The ball joints for the change speed control rods should also be lubricated from time to time by oil can.

**Drive Shafts.** A greaser is fitted for the lubrication of each of the ends of the driving shafts. These points cannot be over-lubricated.

All the universal joints are mounted on needle bearings which are packed with grease when assembled and oil sealed and thus need no further attention.

**Front Suspension.** A greaser is provided for the lubrication of each bearing of the upper link arms where they are attached to the cradle. Greasers are fitted to the upper and lower link arms for the lubrication of the swivel ball joints.

**Rear Hub Bearings.** To lubricate these bearings it is necessary to remove the rear hub caps which should be packed with grease and refitted.

**Steering Gear.** The steering box is packed with lubricant when first assembled and requires no further lubrication until 12,000 miles have been run, after which it should be attended to by the Agent. We recommend that only Mobilgrease No. 2 is used in this unit.

A greaser is fitted to each outside end of the track rods for the lubrication of the ball joints.

**Body Fittings.** Every 1,000 miles lubricate the door hinges, locks, ventilator controls and the bonnet hinges with a few drops of thin oil.

**Dynamo, Starter and Ignition Distributor.** The lubrication of these components should be carried out by applying two drops of light oil to the following points every 500 miles:—

Lubricators at the front and rear end of Dynamo.

Lubricator on the rear bearing of Starter Motor.

Lubricator on Distributor bearing and on the felt to which access is obtained by removing the top cover and lifting off the distributor finger.

**Hydraulic Shock Absorbers.** It is important in order to ensure satisfactory operation of the shock absorbers to see that they are filled only with the correct fluid which is MOBIL OIL "BB" Oil.

When topping up these components great care should be taken to ensure that they are filled with the right quantity of fluid, which is 140 c.c. or 5 Fl. ozs. for the front shock absorbers and 160 c.c. or 5.7 Fl. ozs. for the rear shock absorbers. A variation of  $\pm 5$  c.c.'s in these amounts is permissible. The most satisfactory way to do this is first to remove the shock absorbers from the car, which presents no difficulty. The existing fluid should then be removed and the shock absorbers re-filled with the correct quantity. When filling, the shock absorbers should be extended and held at an angle of approximately 30 deg. so that the filler will be in a vertical position. After filling, compress and extend the shock absorbers about twelve times in order to work the fluid thoroughly through the valves.



## LUBRICATION SUMMARY

### Recommended Lubricants for Chassis Lubrication.

PART OR UNIT	No. of Pts.	LUBRICANT				
		Esso	Prices	Shell	Castrol	Vacuum
Rear Hub Bearings	-	Esso Grease	Belmo-line C	Shell R.B. Grease	Castrol Heavy	Mobilgrease No. 4
Fan and Dynamo Pulley Bearing Drive Shaft.	1	Esso Grease	Belmo-line D	Shell Retinax Grease	Castrol Light	Mobilgrease No. 2
Water Pump Bush	1	Essoleum Water Proof Grease	Belmo-line A	Shell W.P. Grease	Castrol Water Pump Grease	Mobilgrease No. 6
Fan Spindle Bearing	1	Essoleum Waterproof Grease	Belmo-line A	Shell W.P. Grease	Castrol Water Pump Grease	Mobilgrease No. 6
Selector Lever Shaft	1	Esso Grease	Belmo-line D	Shell Retinax Grease	Castrol Light	Mobilgrease No. 2
Drive Shaft Sliding Ends	4	Esso Grease	Belmo-line D	Shell Retinax Grease	Castrol Light	Mobilgrease No. 2
Upper Link Arm Pins and Bearings	4	Esso Grease	Belmo-line D	Shell Retinax Grease	Castrol Light	Mobilgrease No. 2
Upper and Lower Swivel Link Ball Joints	4	Esso Grease	Belmo-line D	Shell Retinax Grease	Castrol Light	Mobilgrease No. 2
Track Rod Ball Joints	2	Esso Grease	Belmo-line D	Shell Retinax Grease	Castrol Light	Mobilgrease No. 2
Clutch Thrust Race	1	Essolube 30	Motorine M	Double Shell (Medium)	Patent Castrol AA	Mobiloil Arctic

### LUBRICATION SUMMARY.

RECOMMENDED LUBRICANTS	CHANGE OIL	CHECK LEVEL	
<b>Winter</b> Essolube 30 Motorine M Double Shell (Medium) Patent Castrol AA Mobiloil Arctic	Every 1,500 miles	Daily	Every 5,000 Miles
<b>Summer</b> Essolube 40 Motorine C Triple Shell (Heavy) Patent Castrol XL Mobiloil "BB"			
Essolube Gear Oil Medium Motorine Amber A Shell Spirax Gear Oil Castrol Swanshot Mobiloil "CW"	Every 1,000 miles		
<b>Engine</b>			
<b>Gear Box and Differential</b>			

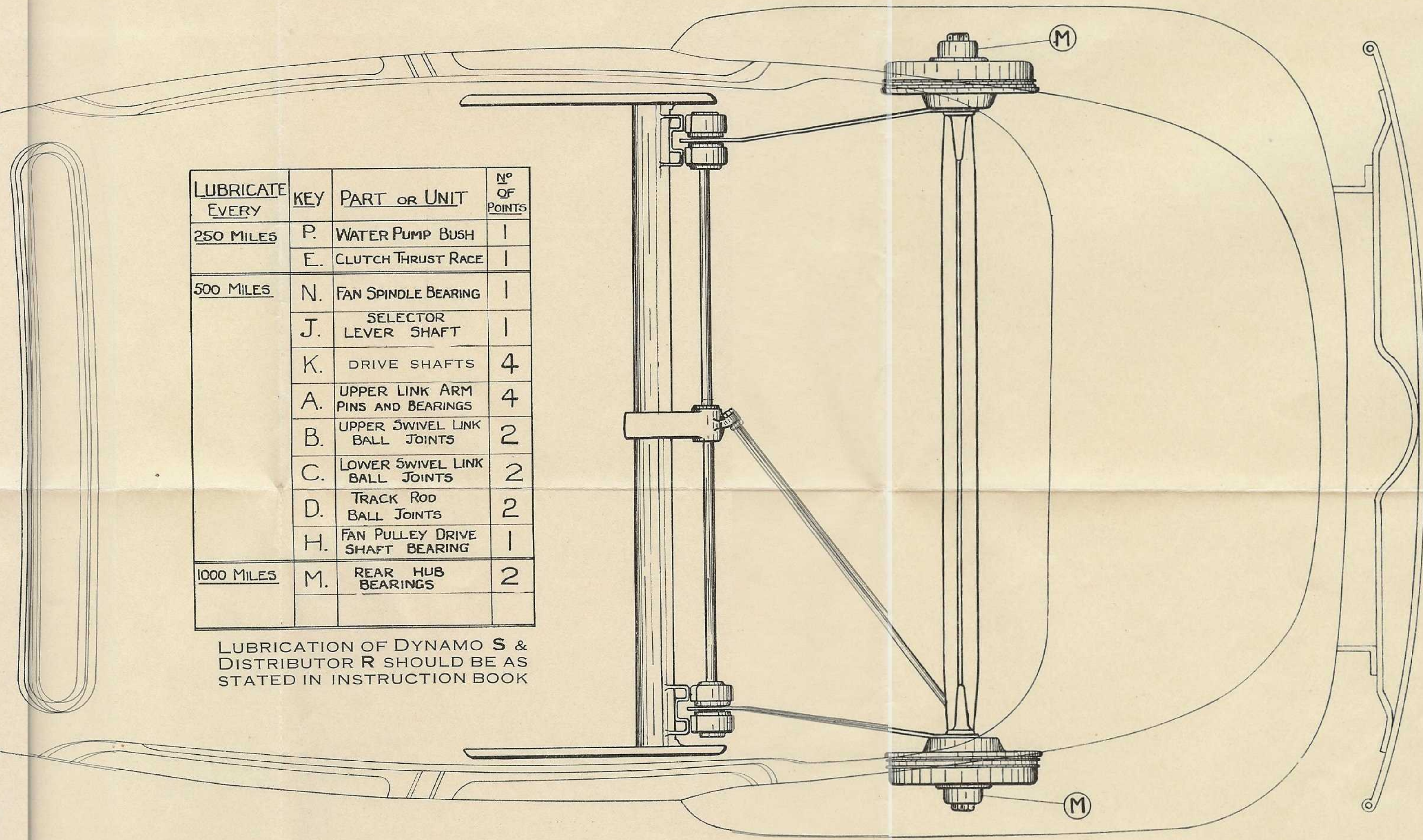
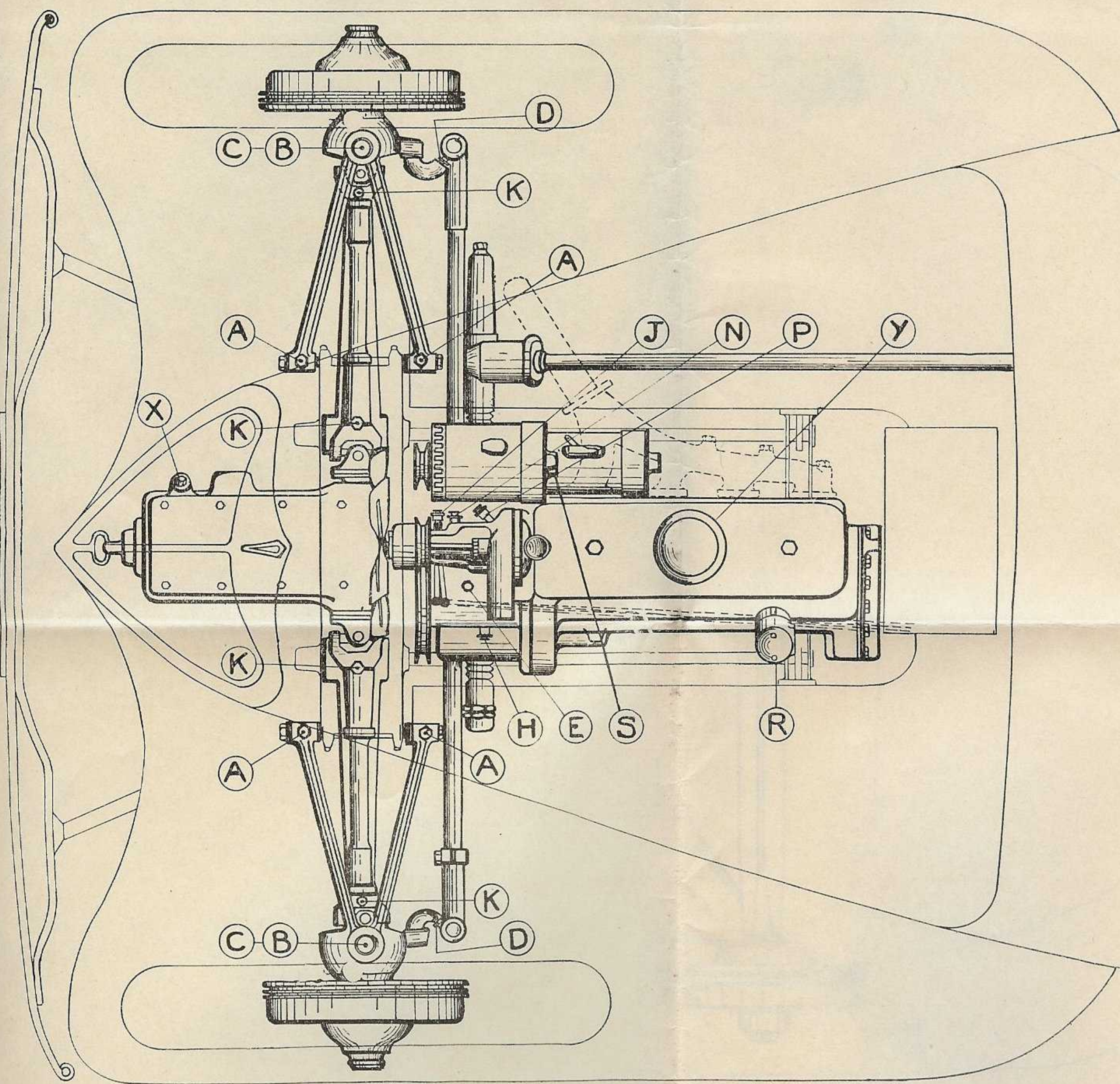


— OILING CHART FOR CITROËN FRONT WHEEL DRIVE MODELS. —

— LUBRICANTS AS RECOMMENDED IN LUBRICATION SUMMARY ONLY SHOULD BE USED. —

Y. ENGINE OIL FILLER.  
INSPECT DAILY FOR CORRECT LEVEL.  
CHANGE OIL IN SUMP EVERY 1500 MILES.  
CLEAN OUT SUMP EVERY 7000 MILES.  
ENGINE SUMP CAPACITY 8 PINTS.

X GEAR BOX AND DIFFERENTIAL FILLER.  
CHECK EVERY 1000 MILES AND REPLENISH  
TO LEVEL OF FILLER PLUG. CHANGE OIL  
EVERY 5000 MILES. CAPACITY OF GEAR  
BOX AND DIFFERENTIAL 3½ PINTS.



LUBRICATE EVERY	KEY	PART OR UNIT	Nº OF POINTS
250 MILES	P.	WATER PUMP BUSH	1
	E.	CLUTCH THRUST RACE	1
500 MILES	N.	FAN SPINDLE BEARING	1
	J.	SELECTOR LEVER SHAFT	1
	K.	DRIVE SHAFTS	4
	A.	UPPER LINK ARM PINS AND BEARINGS	4
	B.	UPPER SWIVEL LINK BALL JOINTS	2
1000 MILES	C.	LOWER SWIVEL LINK BALL JOINTS	2
	D.	TRACK ROD BALL JOINTS	2
	H.	FAN PULLEY DRIVE SHAFT BEARING	1
1000 MILES	M.	REAR HUB BEARINGS	2

LUBRICATION OF DYNAMO S & DISTRIBUTOR R SHOULD BE AS STATED IN INSTRUCTION BOOK