

VAUXHALL
INSTRUCTION BOOK
23-60 HP & 30-98 HP
MODELS



VAUXHALL MOTORS LIMITED
LUTON BEDFORDSHIRE

PRICE FIVE SHILLINGS

Vauxhall

Instruction Book

23-60 h.p. and 30-98 h.p. Models

THE two types of Vauxhall chassis dealt with in the present edition are the 23-60 h.p. O.D. chassis, with the overhead valved engine and Lanchester harmonic balancer, and the 30-98 h.p. O.E. chassis, with the overhead valved engine.

Owners are requested to consult us on any matter that may not be fully understood. It may be pointed out that, as improvements in design are constantly being made, parts of the book are liable to be rendered out of date in a comparatively short time. Should any difficulty be presented by this or any other cause, our advice and assistance can always be counted upon.

Vauxhall
THE CAR SUPEREXCELLENT

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SECTION I.

STARTING THE ENGINE.

Turn on the petrol tap beneath the autovac. Should the vacuum tank be empty, through the main supply having been exhausted, fill the carburettor float chamber with petrol in order to get the engine running; once the engine has started the vacuum tank will immediately begin to operate.

Note the oil level by means of the dipping rod (D, Fig. 1). If it registers less than "Full," add sufficient oil to bring it up to the "Full" mark.

Remove radiator cap and fill radiator if necessary, preferably with rain water. On starting engine do not mistake water escaping from the overflow for a leakage.

Switch on magneto and open hand throttle lever four to six notches, setting the ignition control lever half-way up its rack; and if the chassis has an S.U. carburettor, open mixture control lever one-third of the quadrant from the "weak" position.

Press starting button, and engine should start within a few revolutions.

Make sure the oil indicator gauge is registering pressure. It will probably show a high pressure whilst the oil is cold, the pressure falling off as the engine warms up. It should under no circumstances register less than 5 lbs. per square inch at 20 m.p.h.

NOTE.—It is *not sufficient* merely to ascertain that there is oil in the engine; pressure must be registered on the gauge at all times when the engine is running. See the description of engine lubrication system, Section VII.

Return mixture control lever to the "weak" position as soon as engine temperature permits.

If in very cold weather the engine turns only slowly under the effort of the starter, although the battery be well charged, it may be advisable to prime the engine with petrol through the compression taps, and, with the magneto switched off, to rotate the crankshaft two or three times with the starting handle, in order to break the cold oil film on the cylinder walls. Operating the starter with the clutch out allows the engine to turn a little more freely when cold, and relieves the starting motor of the effort of churning up the cold gear box oil.

HOW TO HANDLE THE CAR.

It is only necessary to run the engine until it has settled down to a regular beat, before starting to drive the car.

Assuming that the car has to be handled out of the garage, set the engine running at about 200 to 250 r.p.m. by hand throttle; then each call for power by partial engagement of clutch must be exactly met by supply, controlled by foot throttle, the endeavour being to progress from first to top gear without appreciably altering the revolutions per minute of the engine.

NOTE.—Both the 22-60 h.p. and 30-98 h.p. cars may usually be started on second gear, unless the conditions are unfavourable.

GEAR CHANGING.

CHANGING UP:

Movements.

Slowly declutch, and raise foot throttle.

Effects.

Engine will drop back towards 250 r.p.m., and clutch will also slow down.

Press gear lever into neutral.

Press gear lever slowly but **FIRMLY** into next gear.

Re-engage clutch and open throttle.

CHANGING DOWN:

Throttle is already open and engine pulling, or it would not be necessary to change down.

KEEP THROTTLE OPEN ALL THE WHILE.

Put moderate load on lever towards neutral position.

Depress clutch slightly until lever gives way.

IMMEDIATELY lever has reached neutral position re-engage clutch.

So that the gear lever will move immediately load is removed from gear teeth.

Declutching relieves load on gear teeth and allows gears to slide.

Engine will be accelerating due to relief of load, and the re-engaged clutch will also be accelerating, and thus tending to bring the gears that are ABOUT TO engage to the same rim speed.

To allow the freed and accelerating engine sufficiently to accelerate the clutch.

Pause in neutral for a fraction of a second (length of pause varies with the engine speed at which change is being made).

Disengage clutch again and engage next lower gear firmly and steadily.

If a gear is "nipped" by the load when only half or two-thirds engaged, clutch must be relieved again and gear lever pressed properly home. Do not attempt to *force* gear lever from half to *full* engagement without easing clutch; neither attempt to pull gear lever *forcibly* out of mesh while there is a "load" on the gear teeth, or the lever will be "wring" upon its shaft and finally even loosened; this looseness will be shown by the lever "fouling" the tongues of the gate when passing across.

DESCENDING HILL.

Do not coast with the clutch withdrawn. The clutch is of the multi-disc type lubricated by flake graphite only, and if subjected to prolonged slipping by being held out while coasting, it will wear rapidly and an early overhaul of this unit will be needed. The correct practice is as follows:—

If the hill is of considerable length, slip gear lever into neutral; engine will then just run as set by hand throttle and car will float down. When nearly at the foot accelerate engine with foot throttle until engine speed is judged to be equal or suitable to that of the car on top speed; top gear can now be dropped in without shock or noise.

Should the engine stop while gear is disengaged, due to improper setting of hand throttle, *on no account attempt to re-engage gear*, for this will be impossible until car has come to rest; therefore, stop the car before the foot of hill is reached, engage the gear and hold out clutch, allow car to roll off again and gently re-engage clutch, which will start engine.

If alternatively the starting motor is used, be quite sure that the engine *has* started before attempting to engage a gear.

Should it be necessary to check the car's progress, the hand brake is the correct brake to use, the foot operated brake being in reserve for an emergency.

There is no need to declutch unless the car is to be slowed to less than 4 to 5 m.p.h.

STOPPING CAR.

Release foot throttle; the engine revolutions will then tend to drop down to 200 to 250 r.p.m., as set by hand throttle, which on top gear equals 4 to 5 m.p.h., therefore there is no need to withdraw clutch until speed had dropped to this number of miles per hour. It is desirable to use the hand lever for normal braking, so that the maximum stopping effort of the foot brake may be available in an emergency, and so that brake wear may be equalised.

The foot brake is not intended for normal leisurely use, but for emergencies.

When speed has fallen to 4 to 5 m.p.h., the clutch must be withdrawn and the car finally brought to rest on the hand brake.

If the stopping place is known beforehand, then instead of withdrawing clutch at 4 to 5 m.p.h., slip gear lever into neutral, and bring car to rest on hand brake. Should the final retardation of car be rapid the hand brake should be eased off at the instant of coming to rest, thereby obviating the unpleasant jerk to the occupants caused by the "settling down" of a suddenly arrested car.

The brakes should be used as little as possible, the throttle

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Effects.

Engine will drop back towards 250 r.p.m., and clutch will also slow down.

Clutch shaft is now floating free of both engine and gears.

By this time clutch has slowed just sufficiently to bring the gears that are about to engage to the same rim speed.

So that the gear lever will move immediately load is removed from gear teeth.

Declutching relieves load on gear teeth and allows gears to slide.

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To allow the freed and accelerating engine sufficiently to accelerate the clutch.

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If the hill is of considerable length, slip gear lever into neutral; engine will then just run as set by hand throttle and car will float down. When nearly at the foot accelerate engine with foot throttle until engine speed is judged to be equal or suitable to that of the car on top speed; top gear can now be dropped in without shock or noise.

Should the engine stop while gear is disengaged, due to improper setting of hand throttle, *on no account attempt to re-engage gear*, for this will be impossible until car has come to rest; therefore, stop the car before the foot of hill is reached, engage the gear and hold out clutch, allow car to roll off again and gently re-engage clutch, which will start engine.

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The brakes should be used as little as possible, the throttle

always being closed in such sufficient time that the car has almost naturally come to rest by the time the obstacle or the stopping place has been reached.

ASCENDING HILL.

Endeavour to have throttle well open just before the car commences to feel the hill, not waiting until car has actually slowed before opening the throttle.

Should the hill be of such gradient that the car will not complete the ascent upon top gear, it is better to change into a lower gear well before the car begins to labour, rather than to wait until a change is compulsory.

Do not be in a hurry to change up into the higher gears again while still on the hill, as there need be no fear concerning the comparatively high engine revolutions.

If it is desired to ascend a hill with greater speed, use the next lower gear to that on which the car can climb the hill without labouring.

If the car be stopped whilst ascending a hill, and it is desired to run backwards for a short distance, slip the gear lever into neutral or reverse; do not merely disengage the clutch.

USE OF SPARK CONTROL.

This is brought into use for great variations of engine-revolutions, but for all normal running about 2/3 advance will be found about right. Spark should be retarded, however, when engine is commencing to labour slightly on any gear, notice of which will be given by the usual sharp "clicking" or "pinking" produced by early ignition.

When the noise asserts itself and ceases to be influenced by retarding the spark control, *but goes off by closing the throttle slightly*, this is a clear indication that the combustion chambers need decarbonising.

USE OF THROTTLE CONTROL.

Throttle should always be opened *gradually*, the opening increasing as the engine revolutions increase. Remember that full power at moderate engine revolutions *does not necessarily* demand full throttle. If the best throttle position for given engine revolutions is "overrun," close throttle slightly, when best position will be easily felt.

SECTION II.

LUBRICATION ROUTINE AND CARE OF COACHWORK.

RECOMMENDED LUBRICANTS.

ENGINES.

23-60 h.p.: Duckham's Vauxhall oil; Wakefield's Castrol XL oil.

30-98 h.p.: Wakefield's Castrol R oil.

GEAR BOX AND BACK AXLE.

23-60 h.p. and 30-98 h.p. chassis: Duckham's D.B.S. oil; Wakefield's Castrol gear oil.

PRESSURE LUBRICATORS.

23-60 h.p. and 30-98 h.p. chassis: Duckham's H.B.B. grease; or Wakefield's Castrolum.

No variation is necessary for summer or winter use.

NOTE.—It is not suggested that other lubricants on the market are unsuitable. We cannot try them all, but we have tested the above brands and they meet Vauxhall requirements.

LUBRICATION.

GENERAL SUGGESTIONS.

Ensure absolute cleanliness of all utensils.

Provide separate utensils for different kinds of lubricant.

Do not make replenishments in the garage from the car kit.

Provide proper storage place for lubricants and utensils in the garage.

Wipe up surplus oil, spilt oil, or oil drippings immediately.

Wipe around lubricators after filling, as exuding grease collects dust.

Proceed through a regular routine, and do not neglect any part.

Clean all lubricators before lubricating.

Bear in mind that wherever movement occurs, however small, lubrication is necessary, except, of course, in the case of the oil-less bushes.

ROUTINE.

ENGINE (23-60 h.p. and 30-98 h.p. chassis).

Daily.—Screw down greaser on pump shaft (E, Fig. 2) one or two turns.

Replenish engine oil in base chamber, if necessary, adding oil until the level coincides with the "Full" position on the dipping rod (D, Fig. 1).

NOTE.—About every 1,200 miles the oil should be drawn off from the oil sump and a fresh supply admitted. At the same time the filter should be thoroughly cleansed.

Weekly.—Put a spot of oil in all engine control rod ball joints.

Monthly, or every 1,000 miles.—Admit two or three drops of oil to the lubrication points of the magneto, starter, and dynamo, taking care not to flood them.

CLUTCH (23-60 h.p. and 30-98 h.p. chassis).

Occasionally oil the ball bearing in the clutch withdrawing brake and put a few spots on the withdrawing sleeve just below the points marked (M, Fig. 3), operating clutch meanwhile. Lubricate pedal cross shaft ends occasionally.

No oil or paraffin must be admitted into the clutch casing, but as required a small amount of flaked graphite may be inserted through the plugs in the casing.

GEAR BOX (23-60 h.p. and 30-98 h.p. chassis).

Fill the gear box to within six inches of the lid seating. When replacing lid note that the arrow on the upper fixing disc is pointing across the car (F, Fig. 3). To avoid the possibility of grit dropping in, do not turn the lid over above the gear box.

UNIVERSAL JOINTS (23-60 h.p. and 30-98 h.p. chassis).

Occasionally refill the universal joint on the front end of the propeller shaft with grease. Lubricate the sliding joint at the rear frequently by means of the lubricator provided on the propeller shaft (C, Fig. 5).

FRONT AND BACK AXLES AND CHASSIS DETAILS.

Daily.—Lubricate all three bearing points of each of the rear springs through the pressure fed lubricators provided, and the front and rear bearings of the front springs, three on each side, as well as the steering swivel pins. As needed add a small quantity of gear oil to the steering box.

Occasionally lubricate all joints in the control gear both as regards carburetor and magneto controls, brake joint pins, etc.

On the 30-98 h.p. chassis oil-less bushes are used to carry the rear brake camshafts, and also the spring saddle brackets, and these require no periodic lubrication.

The 23-60 h.p. chassis, however, employs pressure greasers at these points, which require occasional attention (see Figs. 5 and 8).

The differential casings should be kept filled to the tops of the admission apertures. These casings seldom call for draining out, but if this is required, the filling arm may be reversed or removed altogether for the purpose.

FRONT WHEEL BRAKE GEAR.

Lubrication points are indicated in the illustrations, and are as follows:—

FIGURE 6.

B—Occasionally drop a little oil at the point where the post carrying the cable-operating cross-piece is free to pivot in its bracket. This point, not visible in the picture, is at the rear of the collar marked B.

FIGURE 7.

A—The points indicated are the joints and jaws of the brake-operating bell-crank lever; the whole of this operating mechanism should be kept free of mud and carefully lubricated.

B—A ball-valve lubricator is let into the axle at each end. A duct from this lubricator leads to the roller bearing at the bottom of the steering pivot.

C—These ball-valve lubricators (one on each steering pivot) conduct oil to the thrust and roller bearings at the top of each steering pivot.

All jaws and pins in the system should receive regular cleaning and lubrication.

See Section III. for adjustment details.

HYDRAULIC BRAKE SYSTEM.

No lubrication is required, but it is very important to keep the dashboard reservoir filled with the special liquid obtainable from Vauxhall Motors Limited.

The air pressure in the brake-operating system should be maintained at 10 lbs. to the square inch, as shown on the dashboard gauge.

CARE OF THE COACHWORK.

The car should be regularly cleaned, the ideal being to wash the car immediately following each period of road use. Use

clean water, changing it frequently, and on no account turn a heavy pressure of water from a hose on to the panels. It is far better to use the sponge and pail. The car should not be washed in sunlight, as the water is apt to dry too rapidly under these conditions. If the car has been put away for the night in a dirty condition the mud will be found dried hard upon the panels, and it will be necessary to soak the mud off by the use of a copious flow of water. If the mud is thoroughly soaked it will be possible to remove it without any harm having been done to the varnish. Under no circumstances should the mud and dirt be wiped off, as this method will work irreparable damage.

In washing the chassis it is of great importance to use a separate sponge and leather owing to the liability of transferring grease to the panelwork should the same articles be used for the whole of the car. Always use an absolutely clean chamois leather. After washing proceed to pass the leather gently over the surface with just sufficient pressure to take up the whole of the water. The moisture which will be noticed will very quickly evaporate. Before leathering, however, it is important to make quite sure that the whole of the mud and dirt has been removed.

SECTION III.

PERIODICAL RUNNING ATTENTIONS.

CHASSIS.

Occasionally the whole mechanism should be gone over carefully, and split pins, nuts and bolts tested. A good plan is to go round with a stiff brush and can of paraffin, cleaning each part that is about to undergo inspection.

NOTE.—Never get paraffin on ball bearings, but if by accident this should occur, thoroughly cleanse same with machine oil.

ENGINE (inspecting for carbon deposit; 23-60 h.p. and 30-98 h.p. chassis).

The engine should be decarbonised when signs of pinking become evident, which should not occur at intervals of less than 10,000 miles. Remove top cover and cylinder head, when the combustion chamber and piston tops can be cleaned; the valves should be examined at the same time, the condition of their faces and the seating will indicate whether grinding in is required. When the detachable head is being refitted, the whole of the surfaces to engage must be absolutely clean and coated with some jointing medium.

LANCHESTER BALANCING GEAR (23-60 h.p. engine only).

This requires no periodical attention, and should not be disturbed without application to Vauxhall Motors Limited for advice.

VALVES.

Remove one or two valves and examine condition of faces. These should not require grinding until the necessity for decar-

bonisation has arisen, provided that the engine has been run under normal conditions.

To remove a valve depress the valve washer and withdraw the split cones, when the valve will be free.

To replace, use leverage to help the valve-spring and washer in position on the valve, insert the two halves of the split cone and allow the spring and washer to rise and grip them. If doubtful as to whether a valve requires grinding, we advise that it be left alone, but if the operation is really necessary, use a screwdriver which neatly fits the slot. After grinding, examine rocker adjustment.

VALVE ROCKERS.

The approximately correct clearance between the valve stems and the rockers, when the adjustable end of the rocker is in contact with the push rod, is about 45 thousandths of an inch in the 23-60 h.p. engine, and 20 thousandths in the 30-98 h.p. engine. The exact setting for each individual engine being shown upon a small brass plate, attached to the valve rocker cover. This clearance must not be departed from and clearances must be set with the tappet foot resting at centre of the back of the cam.

Always securely lock rocker adjusting screw. (D, Fig. 2.)

Should an excessive tappet clearance be discovered and yet the lock nut be tight, remove tappet and examine.

CAKSHAFT AND MAGNETO DRIVING CHAIN.

The dynamo and magneto are mounted together on a cradle which is susceptible to adjustment.

The chain sprocket from which the dynamo is directly driven is carried in ball bearings, the eccentric mountings of which are coupled together by the cross-bar (B, Fig. 2), to which in turn is linked the cradle carrying dynamo and magneto.

When tightening the timing chain by rotating the eccentric mountings in the timing chain case, care should be observed that the dynamo and magneto are left in correct alignment when the operation is completed.

SPARKING PLUGS.

Remove each plug. Gaps should be from 0.012 to 0.015 inch. The plugs should be perfectly dry and at the most there should be only a very fine soot. There should be no cracks in insulating material, and no large "beads" of metal sweated from any of the metal portions. If wet or oily, clean in petrol.

FAN AND PUMP.

The gland, situated on the engine side of the driving pulley, is easily accessible for re-packing, if necessary. Do not pack too tightly.

If the fan has been removed see that the locking plate, which secures the adjustable flange of the pulley, is not screwed tight against the latter when re-fitting.

CARBURETOR, AUTOVAC TANK, AND FILTER.

Occasionally flush through with petrol, using the drains provided. See Section V, for full information. At long intervals clean both wire gauze filters in petrol system, as well as tank filter.

MAGNETO.

Occasionally thoroughly clean internally. See Section IV, for full information.

GEAR BOX.

About every 5,000 miles drain off all oil from the gear box, and flush out the *bottom* of the box with paraffin. Remove any steel chips observed. Refill to within 6 inches of top only.

ADJUSTING HAND OPERATED BRAKE (Fig. 4).

An adjustment is provided for the hand brake, which acts on the rear hubs. It is important that the wheels should be quite free when the brake is in the "off" position. To test the setting the axle should be jacked up, and the hand brake pulled on four or five notches. Each wheel should now just feel the brake equally, and if not the adjustments must be varied to suit.

ADJUSTING FRONT WHEEL AND TRANSMISSION BRAKES (MECHANICAL BRAKE SYSTEM).

To adjust for wear of shoes, jack up one front wheel at a time, and turn the threaded adjusting piece (E, Fig. 7), thereby drawing up the wedge by which the shoes are expanded. The brake shoes are in the correct position when they *just clear* the drum, yet allow the wheel to rotate freely.

It is important that each pair of brake shoes should be brought up as close as possible to the drums. Care should be taken to get correct adjustment on each side, notwithstanding that the compensating mechanism ensures equal braking even though the adjustment be not absolutely accurate.

TRANSMISSION BRAKE (MECHANICAL BRAKE SYSTEM).

Jack up one end of the rear axle, remove front floor boards, and by means of the finger adjusting disc behind the pedal bracket adjust the shoes until they *just clear* the drum mounted on the transmission shaft, yet allow the wheel to rotate freely.

FRONT BRAKE CABLES (MECHANICAL BRAKE SYSTEM).

It may be found after prolonged use that there is an undue amount of play in the pedal action owing to the cables having become elongated. This play cannot be taken up by means of the brake-shoe adjustment, and is dealt with as follows:—

Slacken the nuts which secure the clips marked A, Fig. 6. Tap one or both of these clips, as required, slightly outwards along the cross member and towards the front wheels until there is no endplay of the outer member of the Bowden wire. Then re-tighten.

The normal amount of play in the pedal action is about $\frac{1}{2}$ inch at the extreme top of the pedal when the brakes are in the full off position.

HYDRAULIC BRAKING SYSTEM.

The hydraulic braking system should not be interfered with in any way, until such time that the brake liners are worn out and must be renewed. The only regular attention required is to keep the reservoir on the dash filled with the special liquid provided for this purpose, obtainable from Vauxhall Motors Limited, Luton.

The normal wear which takes place on the liners is provided for in the design of the pistons, which operate the brakes (see Fig. 10). These pistons are fitted with a stiff ring riding in a piston slot which is considerably deeper than the ring itself. The friction of the ring against the side of the cylinder is such, that whilst the force exerted through the brake pedal will carry piston and ring down the cylinder bore, the return pressure exerted by the pull-off springs on the brake shoes is insufficient to force it back again farther than the amount of the play existing between the edges of the ring and its slot. Examination of the diagram, Fig. 10, will make this point clear.

When, however, the brake liners are definitely worn out the front brakes should be dealt with as follows:—

Tie up the foot pedal with cord, so that it cannot be moved. This is important. Remove the front wheels, hubs and brake drums complete, by taking the nut from the end of the stub axle in the ordinary way. The shoes will then be revealed, and can be detached by the removal of the spring at the top, and of the

anchoring pins on which they act at the bottom. New liners may be applied in the ordinary way, the necessary replacements having been obtained from Vauxhall Motors Limited before the job is put in hand.

It may now be found that, owing to the greater thickness of the new liners over the worn ones removed, the drum is fouling the shoes all round. If so, lever the rocking arm actuating the brake, so that the piston and its controlling ring is forced far enough up the cylinder bore against the oil pressure to allow the brake drum to go on over the shoes. The precise adjustment does not matter, because this will be regulated on the first occasion that the foot brake is used.

Re-assemble the hubs as before, taking care that the distance pieces fitted between the inner and outer ball races are not changed over, but are fitted precisely as found.

TO RE-LINE THE TRANSMISSION BRAKE.

In the course of this operation the hydraulic system has to be disconnected to permit the removal of the brake shoes. The method of this will be obvious on examination, and the upper and lower pistons with the stirrups against which they re-act must be taken off complete. Re-line with the correct material, previously obtained from Vauxhall Motors Limited in the ordinary way, taking care that the length of the liner is the same as that which was removed.

When refilling the transmission brake operating cylinders deal with the lower cylinder first. Before replacing the cylinder connect the "U"-shaped supply pipe (Fig. 10) and make friction tight. Turn the lower cylinder through an angle of 180° so that its normal position is reversed. Proceed to fill with brake fluid, using the supply pipe as a medium for conveying the liquid to the cylinder (see Fig. 10). To ensure that all air has been excluded, allow a small amount of the fluid to overflow from the air release vent. This operation completed, refit ball valve and vent screw, reverse cylinder and refit in position, finally tightening inner nuts.

DO NOT RELEASE THE AIR VENT SCREW ON THE LOWER CYLINDER EXCEPT FOR RECHARGING AS DESCRIBED.

To fill the upper cylinder on the transmission brake remove the air vent set-screw thereon. Allow oil to flow from the pipe connecting thereto, as previously, and couple up. Oil should thereupon flow from the top air vent hole, and when bubbles have ceased certainly, the set-screw should be replaced. All this time the foot brake pedal should still be in the "off" position and tied up. This completes the work of refilling the rear end of the system.

To charge the front brake oil cylinders, remove the brass cap nut situated at the top of the stub axle swivel pin. Let oil flow as before, replacing cap nut when bubbles have ceased to appear. There is an air release situated on the master cylinder at the base of the foot brake pedal (Fig. 10-2), and this should be slackened and oil allowed to flow until bubbles cease to appear.

Now that the system has been completely filled with oil, the pedal may be pressed home a number of times, until correct resistance is felt; thus indicating that the brakes are ready for ordinary operation.

We would reiterate that these brakes are preferably dealt with by Vauxhall Motors Limited when the time for re-lining has come.

PETROL TANK.

It is advisable at long intervals to remove drain plug from petrol tank, choosing a convenient opportunity when there is only about $\frac{1}{2}$ gallon of petrol in same. (The petrol thus wasted may be useful for cleaning purposes.) Take care in replacing plug, as the boss in the centre of this plug locates and steadies the lower end of the petrol supply pipe. A petrol filter is mounted upon the drain plug, which should be carefully cleaned. See that the air admission duct in filter body is free from obstruction.

WATER SYSTEM.

Run off all water from the drain tap at base of radiator, and refill (with rain water if possible) through a funnel fitted with a strainer. To empty the water system completely, drain the water from the impeller casing also, by means of the pet cock provided. Do this after emptying radiator.

THE CARE OF TYRES AND WHEEL ALIGNMENT.

Remember that oil must be kept off all rubber goods. Should a tyre become oily, the place should be thoroughly wiped and afterwards washed in soap and water.

Violent and too frequent use of the brakes is reflected by undue tyre wear. The car should be so handled that the smallest possible use of the brakes is made.

Tyres showing bad cuts should be dismounted at an early opportunity and properly repaired. A tyre stopping may be used temporarily to exclude water from the casing.

Undue wear on the front tyres will probably be found due to some severe shock to the rim of the wheel having set the steering arm out of truth, thus upsetting the adjustment. The front wheels should be slightly "in-toed," that is, the distance between

the centre lines of the wheels should be about $\frac{3}{8}$ inch less in front than between the same points measured at the rear. Most garages have a measuring tool for checking this point.

The wheel retaining rings must be kept tight and lubricated, and if a wheel has been changed during the day's run it is worth while checking them over before starting out for the following day. At regular intervals remove all wheels and grease the hub and wheel centre serrations.

SECTION IV.

NOTES ON MAGNETO.

Most magneto troubles can be traced to either :

1. Sticking rocker arm in contact breaker.
2. Sticking or broken carbon brush.
3. Water, dirt, or excessive oil in the interior of the magneto.

When it has been ascertained that the magneto is giving no spark, first of all remove the switch wire from the contact breaker cover to eliminate one possible "short," and try again. If no spark results remove magneto for inspection.

Before removing magneto from the engine, dismount the distributor cover without disarranging the high tension wires. Note position of distributor brush. Do not turn engine while magneto is disconnected, and, when replacing, note that the distributor brush is in the same position as when originally opened up. No error can then be made.

Having removed magneto :

1. Examine contact breaker arm.

Special attention should be given to the easy movement of the bell crank lever, the pivot of which works in a fibre bush in order to make lubrication unnecessary. If the action of the lever is at all stiff, remove it from the contact breaker, and slightly increase the bore of the fibre bush. The threaded end of the contact breaker retaining screw will be found a handy improvised reamer for this purpose. Clean the pin on the bell crank lever before reassembling.

When the contact breaker points are separated the clearance should be about 0.4 mm. Make sure that the adjustable platinum tipped screw is not loose.

2. Examine all carbon brushes and ensure that they are quite free in their holders and are making good contact, free from carbon dust, dirt, or oil. If necessary their springs can be slightly pulled out by hand to give them increased pressure. These brushes are :

- (a) Behind the contact breaker plate, which is removable by extracting the central screw with the special spanner provided ; a little leverage will then suffice to remove it from its taper.

- (b) The distributor brush itself, already laid bare by the removal of the distributor cover.

- (c) The brush in a pencil bearing on the centre of the distribution mechanism, seen by removing the aluminium cover plate at forward end of magneto.

- (d) A brush in a vulcanite carbon holder bearing on the slip ring at the forward end of magneto, disclosed by the removal of the cover plates. Examine the slip ring for cracks. If any are found a new ring will be necessary.

If all these brushes are free, and making good contact, and the interior of the magneto is spotlessly clean, a good spark should now be obtainable. If not, there is probably an internal "short" which is beyond the ability of the owner to rectify, and the instrument should be returned to us.

If it is found necessary to withdraw the armature for cleaning purposes, the teeth of the distribution gear wheels should be unmistakably marked before disassembling, so that they can be re-meshed in exactly the same place.

Mysterious troubles are occasionally traced to a control arm having loosened and slipped round its centre member, and this point is worth attending to.

NEVER PUT MORE THAN A TRACE OF OIL IN LUBRICATION CAVES OF THE ELECTRICAL FITTINGS. MORE IS NOT ONLY USELESS BUT HARMFUL.

See the maker's handbook for further details.

SECTION V.

NOTES ON CARBURETTOR AND AUTOVAC TANK.

When a car leaves the Vauxhall Works its carburettor has been set by experts, and it is unlikely that any alteration is desirable.

If, after a trial, maladjustment of the carburettor is suspected, the owner should obtain an opinion from us before making an alteration.

No difficulty need be anticipated with the autovac tank, provided that it is occasionally flushed out with petrol, and the system is kept clean by periodical attention in the manner detailed below. Beyond these necessary attentions we recommend that the autovac tank be left strictly alone.

ON THE ROAD.

Carburettor troubles can usually be distinguished from magneto troubles by the engine symptoms immediately preceding the stoppage.

1. When the carburettor is supplying too much petrol, by black exhaust smoke and sluggish running. Overheating may also occur.

2. When too little, by detonations or "popping back" through the main air port of the carburettor, difficulty in starting engine, and absence of power.

PROCEDURE WHEN THERE IS TOO MUCH PETROL.

Remove float chamber cover, complete with float needle, and thoroughly clean chamber.

Ensure that no grit is present on the face of the needle or its seating.

See that the balance weights are working freely and that the needle has not been bent by rough handling.

Remove float and shake it close to the ear. It is possible that a leak may have developed and petrol admitted to the interior of the float. If petrol can be heard splashing about inside the float, immerse it in boiling water; the leak will be

revealed by air bubbles. The hole may then be slightly enlarged by the use of a jeweller's drill, all petrol carefully dried out, and the hole resoldered, using a minimum of solder. Test the float again in boiling water before replacing.

See the maker's handbook for full carburettor details.

PROCEDURE WHEN THERE IS INSUFFICIENT PETROL.

Open the drain tap beneath the autovac tank. If petrol flows freely therefrom, the fault must be sought on the engine side of that fitting. (See paragraph (B) following.)

(A) If no petrol flows from the drain tap, make sure that there is sufficient petrol in the main tank at the rear of the chassis. Note whilst replacing tank-filler cap that the air admission duct in the tank-filler body is unobstructed. Returning to the vacuum tank, inspect the air vent cap in the cover and make sure that the four holes drilled therein are unobstructed. Dismantle the filter carried beneath the autovac tank and thoroughly clean the wire gauze screen found therein, which may be choked. (This operation should be periodically carried out as one of the running attentions of the car, and *should* never be necessary on the roadside.) Unscrew the clamp on the cover of the autovac and remove the connection leading from the main petrol supply. A small conical filter will be found herein, which should be cleaned (replace point upwards). Before replacing connection, squirt some petrol into the tank with the object of wetting the valves and washing away any existing obstruction from the drop valve. After refitting the petrol connection, examine the pipe and unions connecting the induction manifold and the autovac tank cover, and make sure that the unions are tight. A few revolutions of the engine should now satisfactorily refill the vacuum tank.

NOTE.—There is a further filter mounted on the main petrol tank draining plug, and this may have become choked and water-logged, and need careful drying. This operation involves, of course, draining the tank, and should be carried out at long intervals as a matter of routine.

(B) If the petrol is freely flowing from the autovac tank drain tap and the carburettor floods readily on "tickling," clearly the obstruction is in the carburettor. For full carburettor details see the maker's handbook.

HOT SPOT DEVICE (23-60 h.p. engine only).

A portion of the exhaust gases is directed from the exhaust manifold through a passage cast in the cylinder block to the induction pipe side of the engine. Before entering the heating jacket which surrounds the induction pipe, the gases pass a controlling diaphragm and then the regulating valve, which valve is controllable externally. A unique feature consists of an oscillating

surging which is imparted to the stream of impinging hot gas designed to procure the best conditions of thermal reaction for carburetion.

When starting the engine, the induction pipe is immediately warmed and carburetion stabilised, ensuring the development of full power in a much shorter time than is necessary when the cooling water has to be heated.

The valve (A, Fig. 2) can, if necessary, be entirely closed for summer running. Slacken lock nut, turn slotted centre parallel with centre line of chassis—this is closed position. Fully open is one-quarter turn from this position, or at right angles to chassis. Intermediate positions may be selected. It is not necessary to frequently alter the setting of this device.

SECTION VI.

THE ELECTRICAL EQUIPMENT.

CHARGING THE BATTERY.

No voltmeter is provided in the switchboard, because this instrument requires to be a very expensive and accurate one before it can serve any useful purpose, and even then, owing to the characteristics of a starter battery, it is frequently misleading. The best rules to adopt are:—

1. Keep your dynamo charging at all times during the winter.
2. Charge only during about half your running time in the summer, and if long journeys are taken without the need for lamps there would be no need to charge for more than a few miles of the journey.
3. Keep dynamo charging whenever the lamps are in use.
4. A good indication of the state of charge of the battery is the "liveliness" with which the starter "gets away" when starting the engine.

The battery should be inspected regularly, as the acid level must be maintained about $\frac{1}{4}$ in. above plates by adding distilled water to make up for loss by evaporation. (Obtain distilled water from your chemist.) Should any acid become spilled, it must be replaced by solution of 1 part pure brimstone sulphuric acid to 5 parts distilled water = 1.225 sp. gr. When mixing solution, always add acid to the water, not water to the acid. Allow solution to cool before filling up.

NEVER LEAVE A BATTERY STANDING WHEN RUN DOWN; IT MUST BE RECHARGED IMMEDIATELY, OTHERWISE BATTERY MAY BE PERMANENTLY INJURED.

Fuses are provided in the switch box to obviate the results of a short circuit occurring between the dynamo and battery, or a bad contact in the wiring. They are easily removable by detaching switch box cover, spare fuse wires being carried in the switch box. A new fuse should not be fitted until the fault responsible for the failure of the original fuse wire has been located and corrected.

BEFORE OPERATING THE STARTER

Remembering the steps you would take before attempting to start the engine by hand, if you had to do it yourself,

- (a) See that the petrol is turned on.
- (b) See magneto switch is in the correct position.
- (c) See the controls are correctly set.
- (d) It may be desirable to flood the carburettor, but this should not be necessary.

IT IS OF THE UTMOST IMPORTANCE

To keep all terminal connections tight, and to inspect same frequently.

To inspect occasionally and clean the commutator bushes in both dynamo and starter, and to renew if necessary. These are readily get-at-able by removing the end cover in each case. The maker's handbook will give any further details required.

SECTION VII.

POSSIBLE DIFFICULTIES.

CAUSES OF DIFFICULTY IN STARTING ENGINE.

No petrol in carburettor due to tap being turned off, or autovac tank out of order, or main supply exhausted. (See Section V. on this subject.)

Magneto switch not "on."

Spark not two-thirds advanced.

Throttle too far, or not sufficiently, open.

Carburettor may require flooding (temporarily open throttle after flooding).

Carburettor flooding. If this should be the case, an excessive throttle opening, for the moment, will "get the engine away."

Switch defective or magneto earthing wire chafed through; disconnect wire at magneto if there is doubt on this point.

Spark plug may have moisture on their points, or the points themselves may be improperly spaced. (See Section III.)

Magneto contact points imperfectly adjusted.

Magneto contact breaker arm sticking owing to swelling of the fibre bush. (See Section IV. regarding correction.)

Water in carburettor inlet having been squirted in while washing car.

The pilot jet of the Zenith carburettor may be obstructed. (Later types of 23-60 chassis have an S.U. carburettor.)

MISFIRING.

1. Burnt or imperfectly adjusted platinum points on contact maker (see notes on magneto, Section IV.), or rocking arm stiff on its pin.

2. Imperfect sparking plugs. When misfiring is at slow speeds only, the points have generally been set too wide. If not either of these, the cause will most probably be traced to carburettor (see Section V.), sticking valve, broken valve spring, loosened or too closely adjusted tappet.

N.B.—If magneto is removed for close examination, see that wires are returned to their correct terminals.

3. The pilot jet of the Zenith carburettor may be obstructed. (Later types of 23-60 chassis have an S.U. carburettor.)

CARBURETTOR AND PETROL SYSTEM.

The carburettor booklet deals with the difficulties that may arise and the best method of locating and overcoming them. (See also Section V.)

ENGINE CONTROL GEAR.

If resistance has been offered to the working of magneto or carburettor and the control gear forced, there is the possibility of the various levers slipping round on their tubes or shafts.

To remedy magneto control : set magneto contact maker full advance, fully loosen the lever that is suspected of slipping, set hand-control lever *almost* fully advanced, clip tightly the lever that has been loosened. Work magneto through its whole range, advance and retard, and note that all levers involved are striking mechanically correct arcs.

To remedy carburettor *hand* control : set carburettor shut, fully loosen lever that is suspected of having slipped, set carburettor hand-control lever to the *almost* shut position, clip lever tightly.

NOTE.—The *hand-throttle* control does not necessarily give full throttle opening.

To remedy carburettor foot control : set carburettor *full* open, fully loosen the suspected lever, press accelerator pedal right down, clip lever tightly.

OVERHEATING.

This is most unlikely under normal conditions, but is possible under the following conditions :—

1. Insufficiently filled radiator.
2. Driving belt of fan and pump slipping.
3. Water circulating pump jammed by obstruction, or by seizure.
4. Obstruction in circulating pipes.
5. Failure, or partial failure, of engine lubrication.
6. Too rich a mixture being supplied by carburettor flooding.

N.B.—When the radiator has been filled too full, do not mistake the overflow of the expanding water for boiling.

WATER LEAKS.

Should a leakage be noticed around the pump spindle, the packing ring should be gently tightened up.

Should a leak occur in the radiator, this is a more serious matter, and Vauxhall Motors Limited should be applied to.

On no account put anything into the radiator with a view to checking a leakage, should such occur.

The radiator, or its filling cap, should never be used as a means

of pushing or pulling the car, as a most serious strain is thereby imposed upon its mountings.

Never pour cold water into an overheated engine, or a cracked cylinder will almost certainly result.

ENGINE LUBRICATING SYSTEM.

The Vauxhall lubricating system depends upon the functioning of a semi-rotary form of plunger pump mounted at the rear end of the cam shaft. It is of robust construction, having no valves, and it is very unlikely that trouble will at any time be experienced with it. This pump delivers oil under pressure to a pipe cast in the crank-case, from which substantial leads are taken to each of the five main bearings. The end of the main delivery pipe is obstructed by the oil pressure relief valve indicated at B, Fig. 1; this valve containing a spring loaded piston which controls an aperture according to the demand set up by the varying oil pressures which the pump produces, varying, of course, according to the temperature of the oil and the rate of the engine revolutions.

The valve rockers are also fed from the same system by a vertical pipe, which will be observed (H, Fig. 1).

It cannot be too strongly emphasised that it is not sufficient merely to ascertain the level of the oil in the engine; it is essential to ascertain whether pressure exists, which, of course, is indicated at all times by the behaviour of the oil pressure gauge on the dashboard.

This lubricating system is extremely simple, and consequently free from trouble, but the possibility of failure under the following conditions remains :—

1. Shortage of oil in base chamber.
2. Breakage of relief valve spring.
3. Internal oil pipe broken.
4. Pump may require priming (only if engine has been left standing for a long period).

Assuming that in spite of a supply of oil in the base chamber (correct amount $1\frac{1}{4}$ gallons) the gauge has ceased to register a pressure of 7 or 8 lbs. minimum* at 20 miles per hour, in the first place endeavour to localise the trouble. To find out whether the pump is functioning correctly, remove the pipe which connects the dashboard pressure gauge to the outside pipe leading from the oil pump. Run the engine for a few revolutions only, when, if the pump is working properly, oil will jet forcibly out. In this case withdraw and examine the oil pressure relief valve—B, Fig. 1. The spring should be examined to make sure that it is intact. If it is broken, fit a new one at an early opportunity.

* NOTE.—It will rise to 40 lbs. when the oil is cold, and this is normal.

or as a temporary measure a few washers may be threaded along the plunger spindle to make up for the missing coils.

To remedy the third possibility is a workshop job, but should such a failure be suspected during a journey, fill the base chamber until the big ends just dip and drive the car very steadily, taking the earliest opportunity for investigation. About two gallons is sufficient to produce the necessary level.

If the pump requires priming, remove the union which connects the main delivery pipe to the body of the pump and squirt in oil until the pump begins to deliver.

It will be observed that a subsidiary pipe is led to the valve rocker cover, the purpose of this pipe being to conduct a continual stream of oil to the valve rockers. This stream of oil is controlled by a spring loaded ball at its upper end, and if it is found necessary to remove the rocker for any reason, care should be taken that the ball and spring therein be not dropped out and lost (H, Fig. 1).

CARBONISATION.

After running some thousands of miles, a knocking* or "pinking" sound will be heard whenever the engine is pulling hard, and is a sign of carbonisation of combustion chambers. When the noise occurs it will be time to consider a convenient opportunity for having combustion chambers cleaned.

It is not unreasonable to expect this necessity to arise after 10,000 miles have been covered under normal conditions.

See Section III. for description of the method of decarbonisation.

COMPRESSION.

If *serious* loss of compression is felt when cranking engine over, examination of valves of the weak cylinder should be made; one may be stuck open, or held off its seat by a tappet, or it may be that both require grinding.

The opportunity of examining the valve faces when the cylinder head is removed for the periodical cleaning should not be missed.

If an exhaust valve has been running for some time with its tappet having been allowed to hold it slightly but *permanently* off its seat, then serious burning of the valve face will have occurred, and *serious* loss of compression would result.

Have throttle open when testing compression.

Do not be influenced entirely by the amount of compression felt at the starting handle; if one cylinder "holds" twice as long as another, it does not follow that it will give twice the power. A very slight leakage which might be detected at 5 or 6 r.p.m. would have practically no influence at 100 r.p.m., and at 1,000 r.p.m. would be negligible.

SECTION VIII.

REPLACEMENT PARTS, LICENSING, ETC.

REPLACEMENT PARTS.

Owners will greatly assist us and minimise delay by observing the following simple rules:—

1. Invariably quote the chassis number (stamped on a brass plate attached to the dashboard) when ordering spares, and in *all* correspondence. This precaution will save delay and difficulty.
2. Give clear instructions as to parts wanted, method of despatch, address, etc.
3. Register a permanent address with us on first taking delivery of the car.

Nothing should be returned to us without a label attached, clearly stating the sender's name and address, and a covering letter should always be despatched separately, particularly stating if any replacement is being claimed under guarantee.

Orders for spares can be dealt with by return where the owner has an account with us or places his order with one of our agents, but we cannot be responsible for delay in cases where orders reach us through firms having no account standing on our books.

LICENSING.

It is necessary to quote full chassis and engine number when licensing the car. The former is found on the dashboard plate, and the engine number is stamped in the rear side of the timing gear casing. At the time of writing, the tax on the 23-60 h.p. Vauxhall chassis is £23, and on the 30-98 h.p. chassis £24. The bore of the cylinders in the 23-60 h.p. engine is 95 millimetres, and in the 30-98 h.p. engine 98 millimetres.

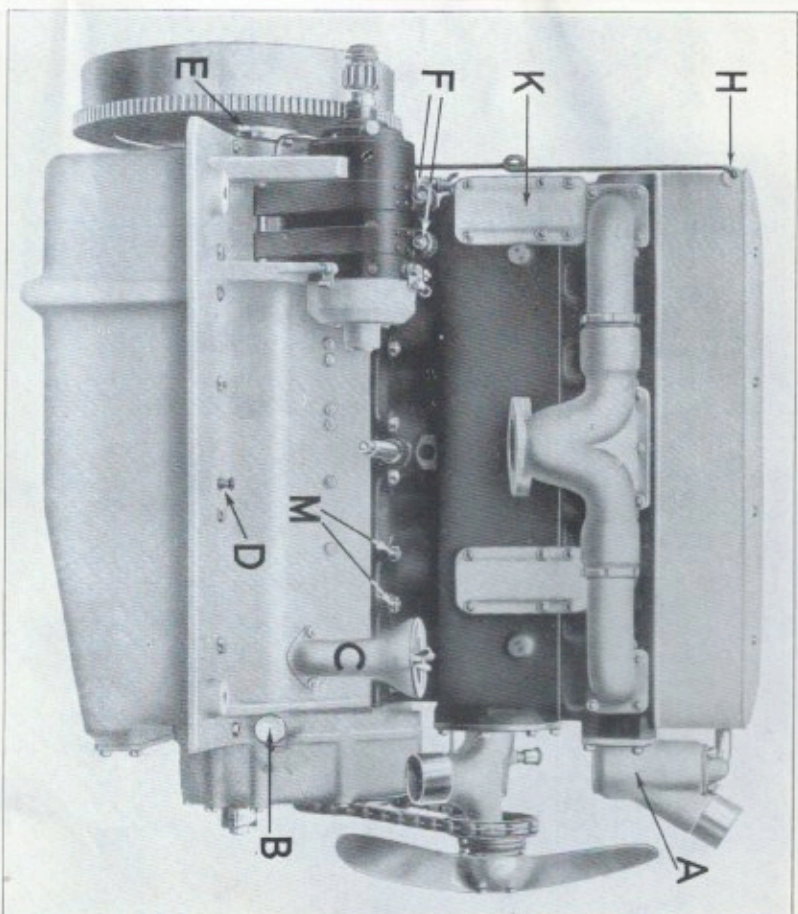


FIG. 1

ENGINE, OFFSIDE

- A—Thermostat casing. Do not interfere with this fitting, which requires no attention.
- B—Oil pressure relief valve.
- C—Base chamber filler.
- D—Oil level dipping rod.
- E—A duct will be noticed in the boss at the back of the fly wheel, leading to a ball bearing carrying the front end of the clutch shaft. A little oil should be run in once in six months.
- F & M—Keep these nuts tight.
- H—Rocker arm oil feed pipe. When dismantling this pipe use care to avoid losing the regulator ball, which is mounted in the casing at the point H.
- K—Water transfer casings.

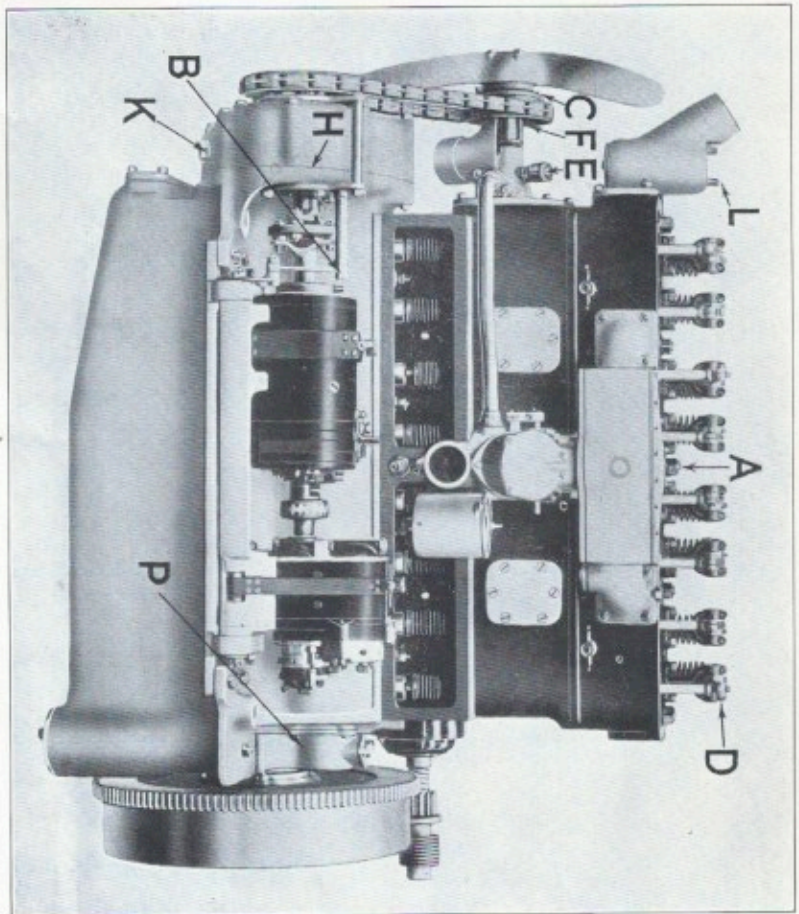


FIG. 2
ENGINE, NEAR SIDE

- A—Hot spot regulating device.
- B—Coupling for aligning dynamo and magneto platform when adjusting timing chain.
- C—Fan pulley adjustment.
- D—Tappet adjustment stud.
- E—Fan gland greaser.
- F—Oil hole for ball races and fan pulley.
- H—The engine number is stamped on the timing case at this point.
- K—Plug through which timing chain tension may be felt.
- L—Thermostat casing.
- P—Oil pump.

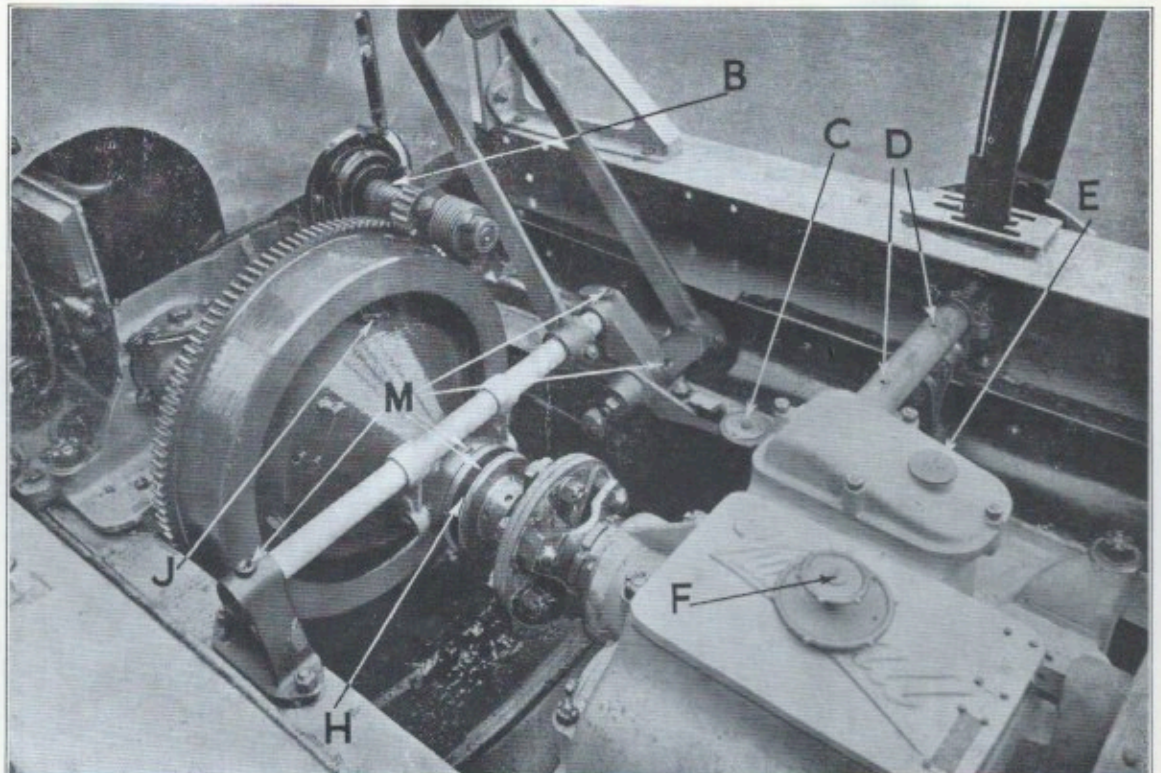


FIG. 3

CLUTCH AND GEAR
BOX

- B—Occasionally oil starter pinion square thread.
- C—Transmission brake adjusting disc.
- D—Lubrication points for gear control shaft.
- E—Gear box breather.
- F—Gear box lid attachment.
- H—Clutch stop. Occasionally apply a little oil to the leather.
- J—Introduce, as required, $\frac{1}{4}$ oz. flaked graphite.
- M—Oil these points occasionally.

FIG. 4

FRONT UNIVERSAL AND
GEAR BOX

- A—Hand brake adjustment.
B—Hand brake adjustment lock nut.
C—Universal joint filling plug.
D—Lubricator feeding cross shaft of hand brake. There is one situated on each end of the shaft.
E—Top arm swinging link.
F—Starter switch.
G—Dimmer.

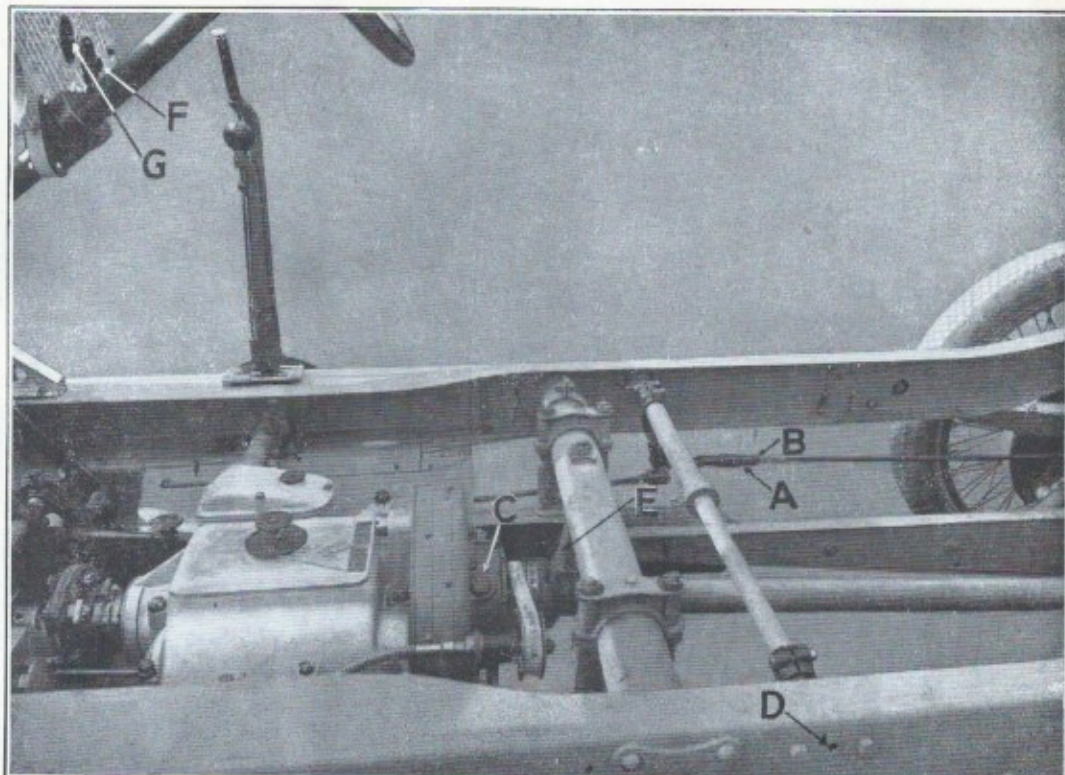
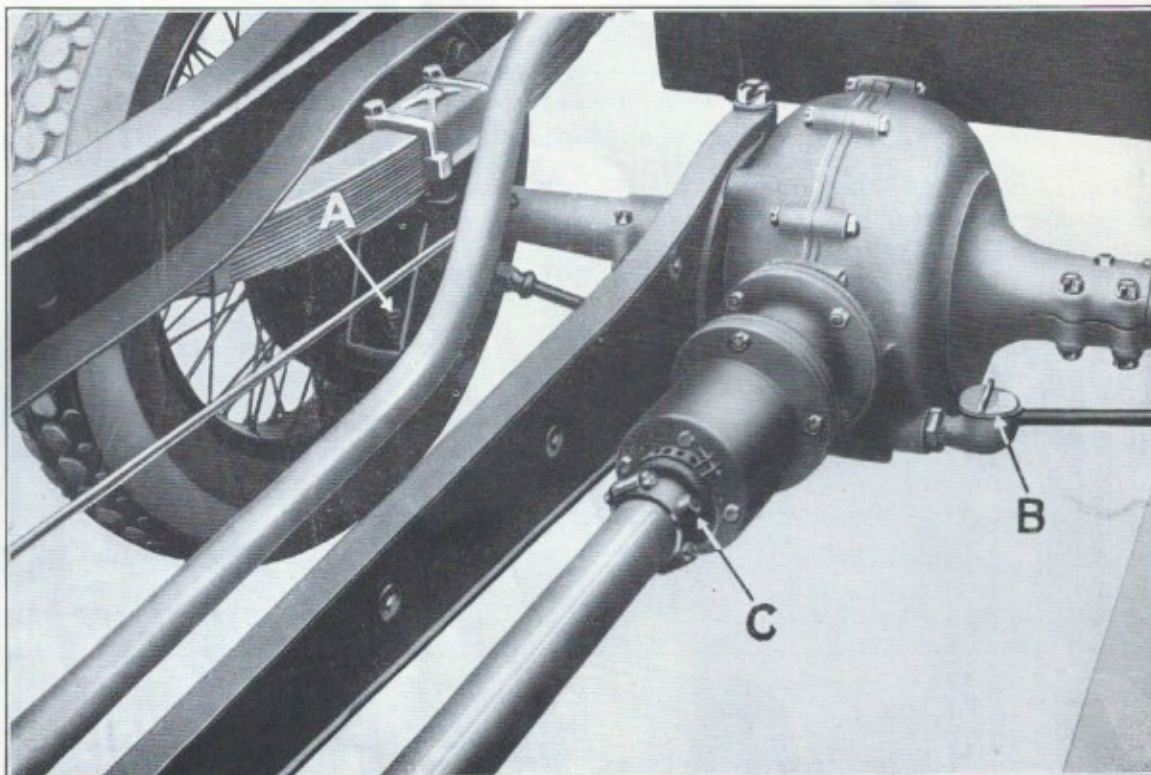


FIG. 5

REAR UNIVERSAL
JOINT

- A—Lubricate this point occasionally.
B—Rear axle filler cap. This may be reversed for drainage, if required.
C—Lubricate frequently with pressure gun.



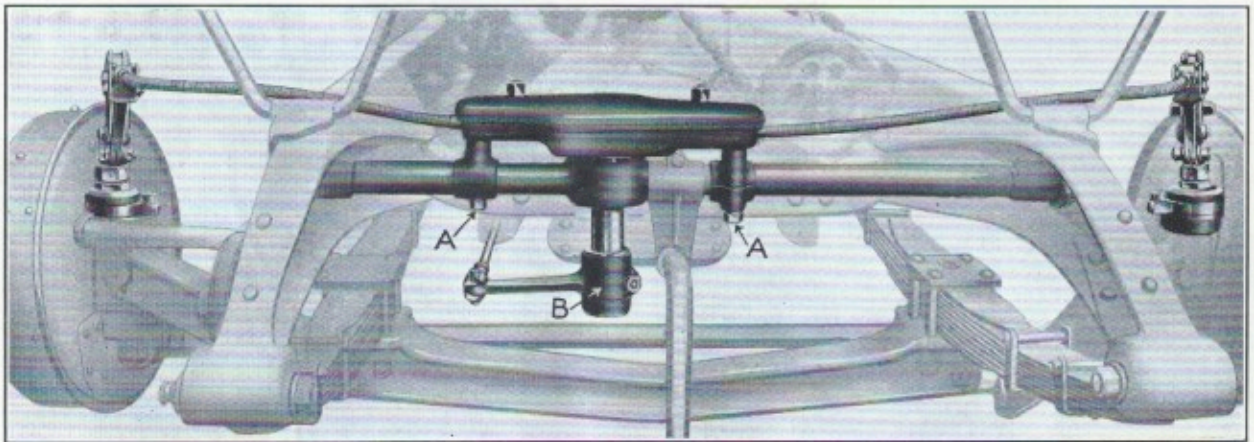


FIG. 6

FRONT WHEEL BRAKE COMPENSATING GEAR (MECHANICAL BRAKE SYSTEM)

A—Adjustment for cable stretch (see page 16).

B—Occasionally lubricate pin carrying operating arm.

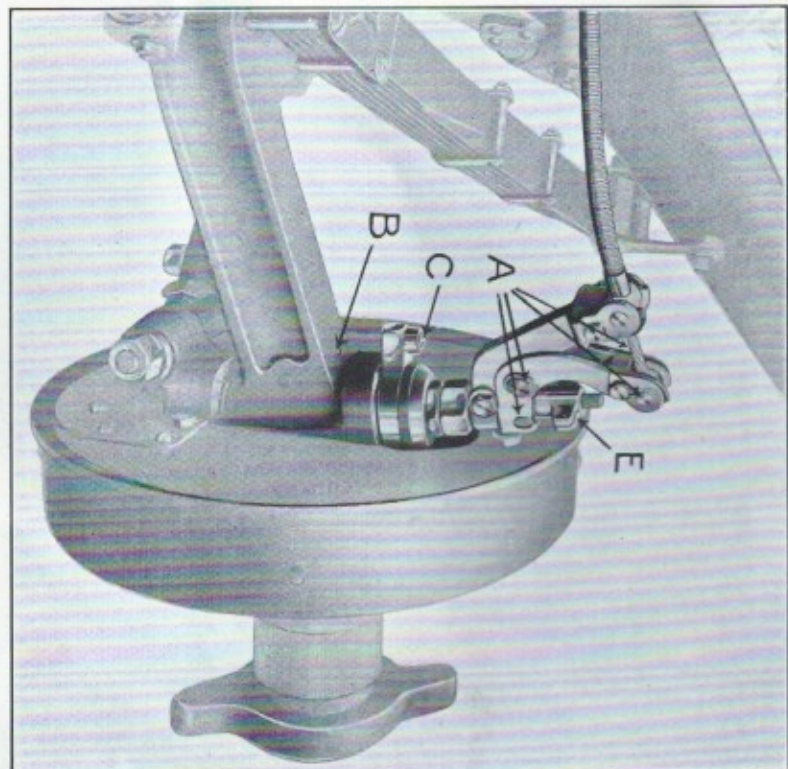


FIG. 7

FRONT WHEEL BRAKE OPERATING MECHANISM (MECHANICAL BRAKE SYSTEM)

A—Periodically oil all pins.

B—Lubrication due to pivot pin lower bearing.

C—Lubrication due to pivot pin upper bearing.

E—Brake adjustment wing nut.

FIG. 8

SPRING SADDLE

Frequently grease spring saddle bracket, either by using the stauffer greaser, or pressure grease gun, where chassis is so equipped.

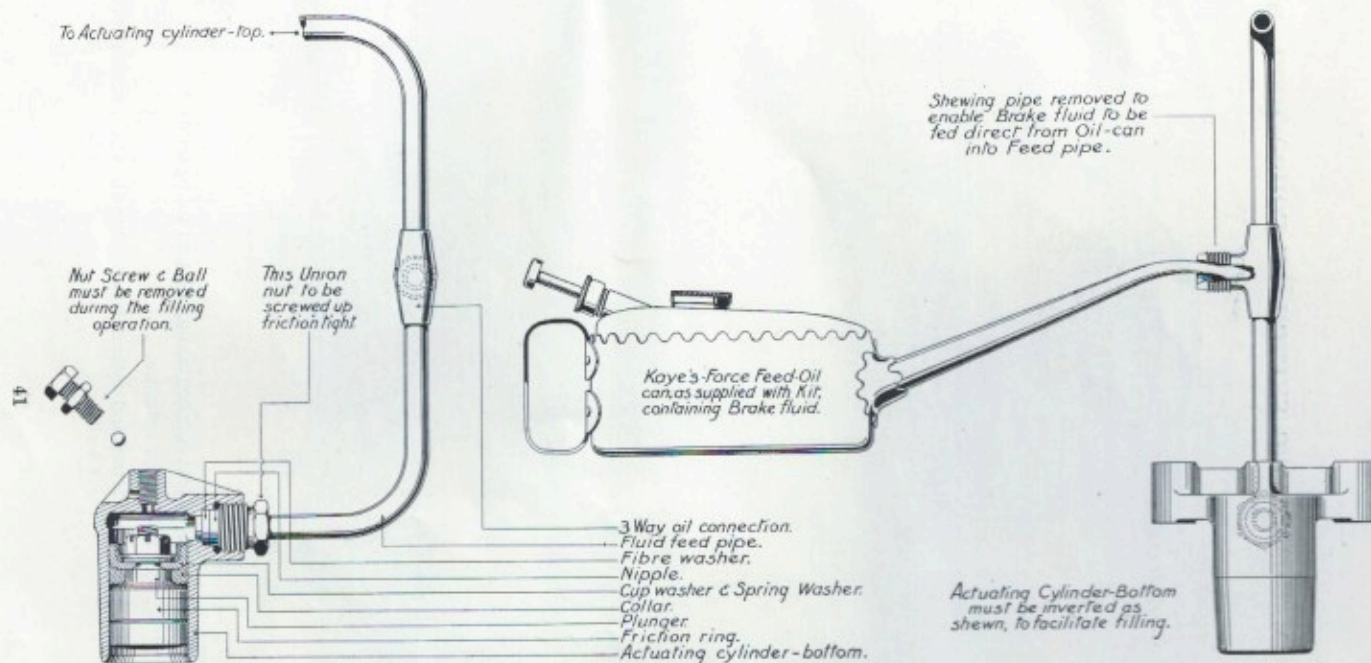
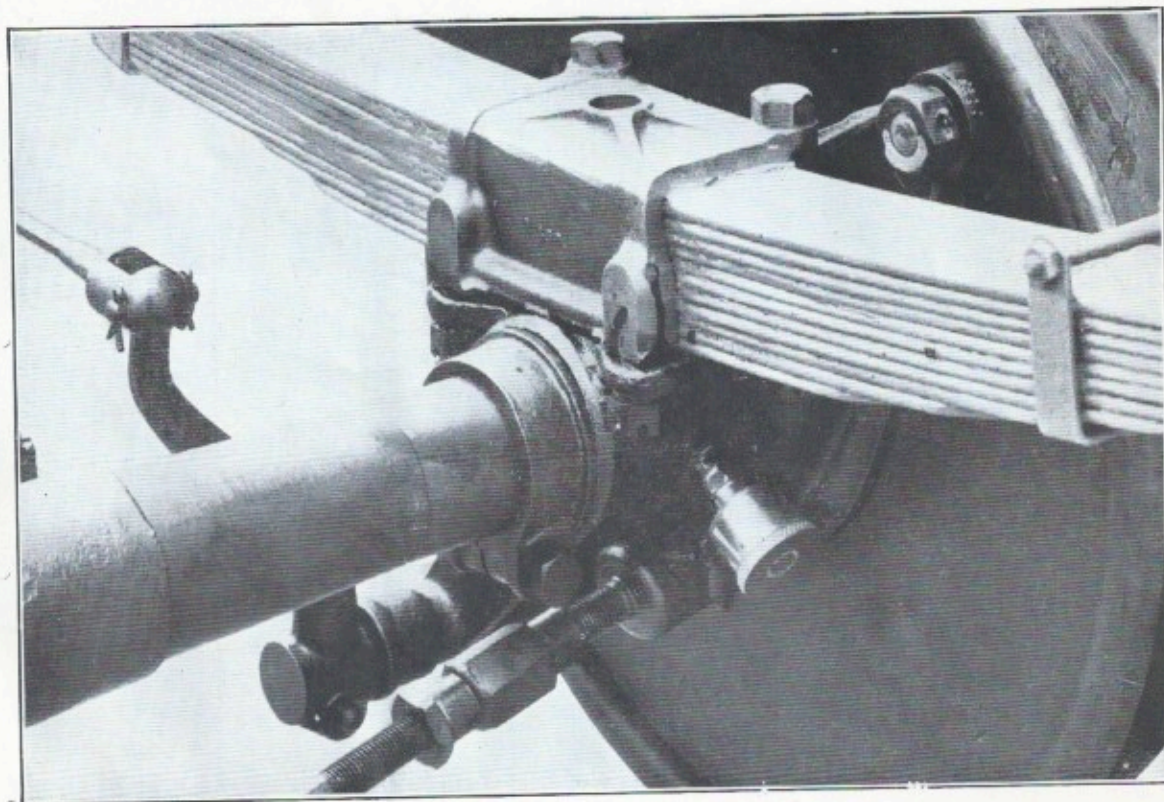
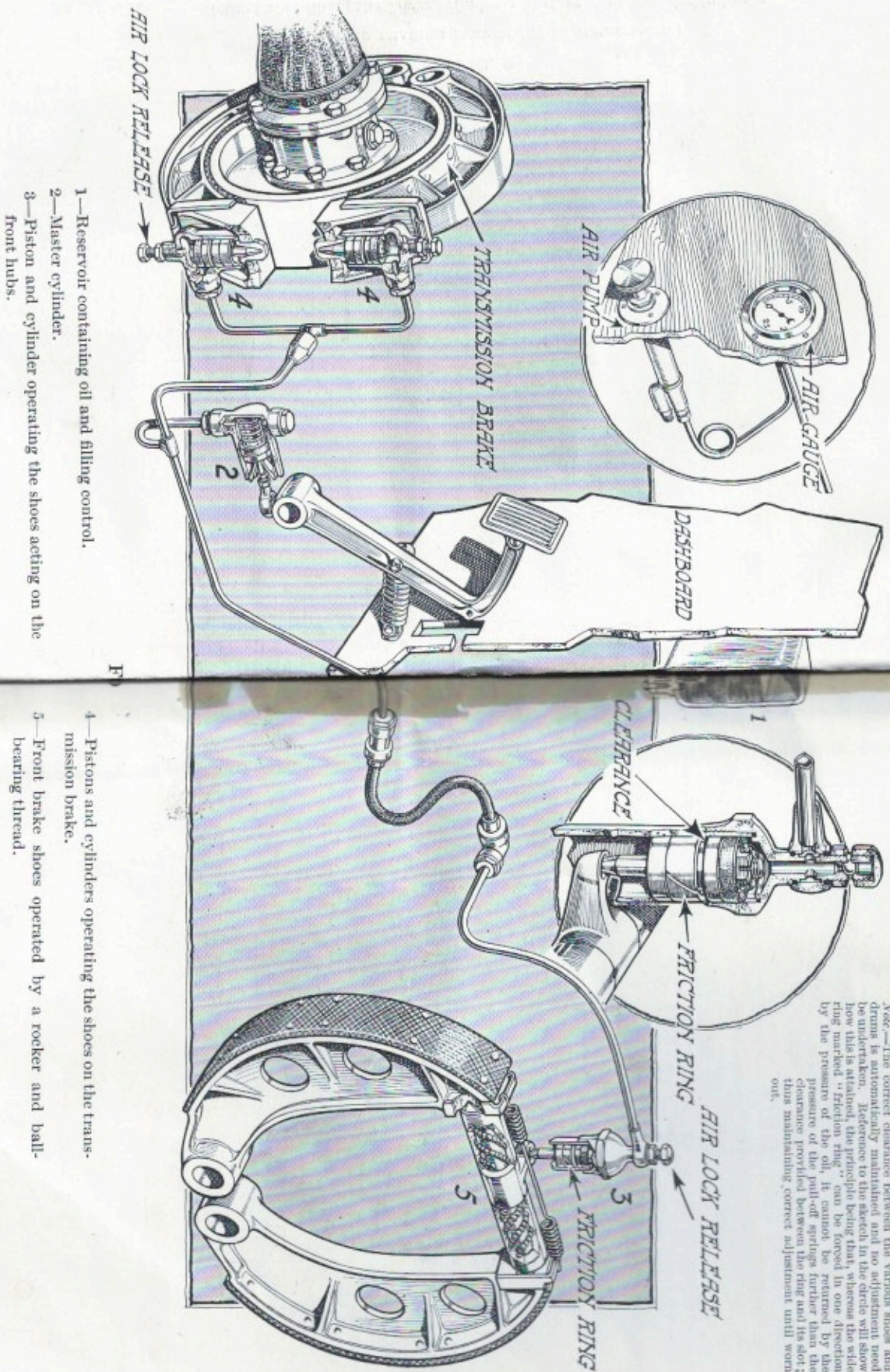


FIG. 9

HYDRAULIC BRAKING SYSTEM (30-98 H.P. CHASSIS)

Method of re-filling the lower cylinder operating the transmission brake.

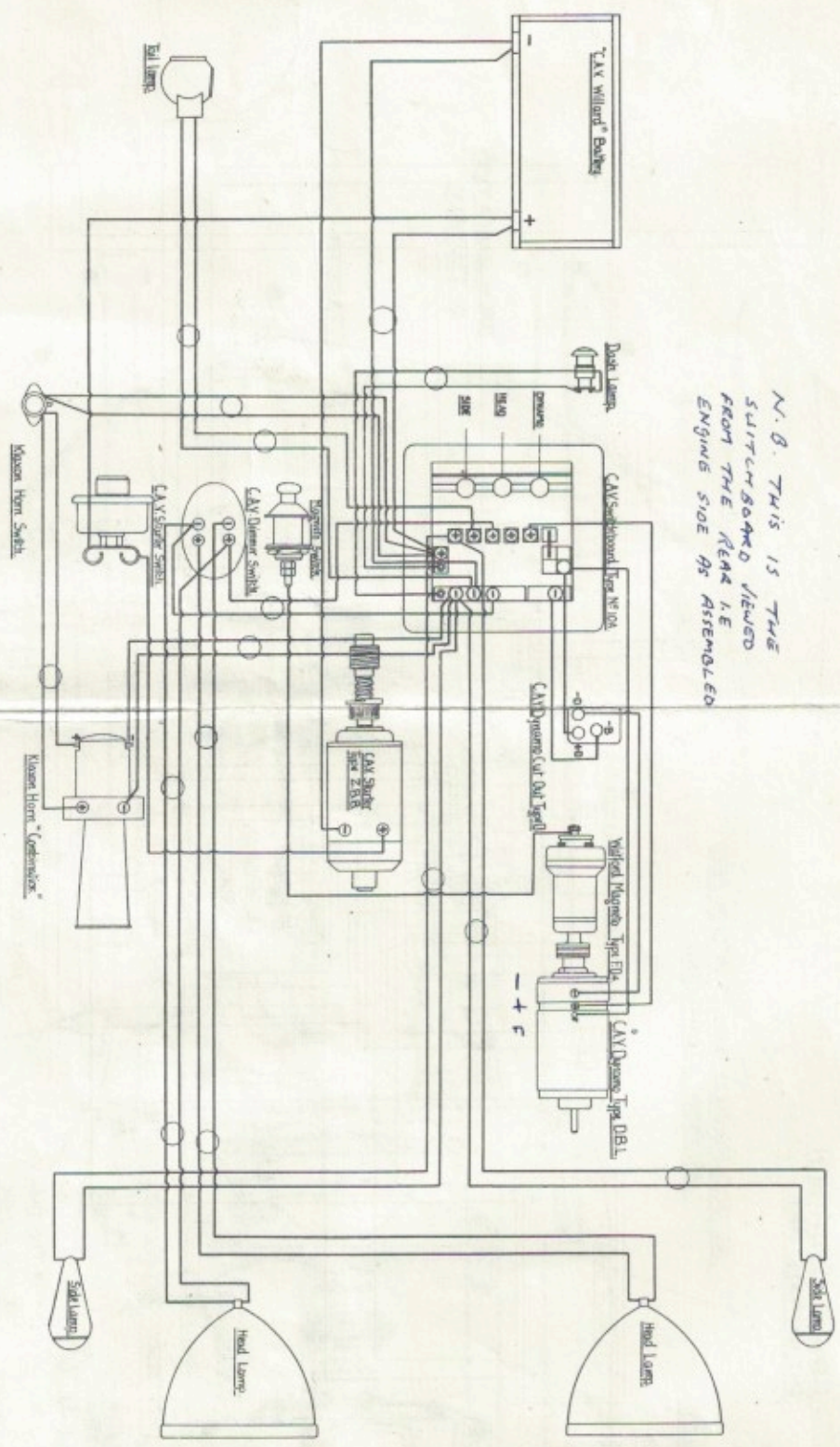
DIAGRAMMATIC SKETCH OF FOUR-WHEEL BRAKING AUXILIARY HYDRAULIC SYSTEM (30-98 h.p. chassis)



CHASSIS
LUBRICATION
DIAGRAM
—
WIRING
DIAGRAM

FIG. 12
WIRING DIAGRAM
LAMPS, ENGINE STARTER AND HORN

N.B. THIS IS THE
SWITCHBOARD VIEWED
FROM THE REAR I.E.
ENGINE SIDE AS ASSEMBLED



EVERY 2,000 MILES REMOVE WHEELS, FILL HUBS WITH GREASE. EXAMINE & CLEAN BRAKES. INJECT A LITTLE OIL IN HUBS EVERY 500 MILES.

FIG. 11

CHASSIS LUBRICATION DIAGRAM

REMOVE PLUG AND FILL WITH GREASE EVERY 1,000 MILES.

KEEP GEARBOX FILLED TO WITHIN 2 INCHES OF SHAFT WITH MEDIUM OIL.

LUBRICATE CLUTCH WITH DRY GRAPHITE ONLY.

OIL OCCASIONALLY.

OIL OCCASIONALLY WHERE PETROL FEED AIR PUMP IS EMPLOYED

TH OIL.

SCREW DOWN A TURN OR TWO DAILY.

DIPPER ROD.
Oil Level Indicator.

KEEP SPINDLE WELL OILED.

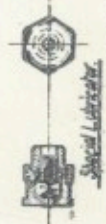
KEEP ALL PIN JOINTS SPRING SHACKLES, & BOLTS WELL OILED.

FILL SUMP HERE.

OIL STEERING BOX HERE.

REMOVE LEATHER COVERS & FILL WITH GREASE EVERY 2,000 MILES.

● SPECIAL LUBRICATOR FITTED, USE GREASE GUN FREQUENTLY.
* KEEP WELL LUBRICATED, SAY EVERY 200 MILES.



Do not fill sump with oil above level shown by dipper rod. Clean out with paraffin periodically and refill with fresh oil.
IGNITION GEAR.—Inject a few drops of thin oil into magneto lubricators occasionally.
ENGINE CONTROL.—Oil occasionally all lever spindles and joints of control rods.
Oil telescopic rod every day.

CHASSIS.—The chassis should be frequently examined to see that all nuts are tight and split pins, etc. in place.
Every 1,000 miles open plates of springs by lifting the weight of the car off them and inject oil between.
Ball bearings must not be cleaned with paraffin or petrol but only with clean oil.
During overhaul, say once a year, examine exhaust pipe and see that it is clear.

EVERY 2000 MILES REMOVE WHEELS, FILL HUBS WITH GREASE. EXAMINE & CLEAN BRAKES.

FIG. 11

CHASSIS LUBRICATION DIAGRAM

REMOVE PLUG AND FILL WITH GREASE EVERY 1000 MILES.

KEEP GEARBOX FILLED TO WITHIN 2 INCHES OF SHAFT WITH MEDIUM OIL.

LUBRICATE CLUTCH WITH DRY GRAPHITE ONLY.

OIL OCCASIONALLY.

OIL OCCASIONALLY WITH AIR PUMP IS ENGINE

FILL AXLE CASING WITH OIL.

KEEP SPINDLE WELL OILED.

DIPPER ROD. Oil Level Indicator.

KEEP ALL PIN JOINTS, SPRING SHACKLES, & BOLTS WELL OILED.

SPECIAL LUBRICATOR FITTED, USE GREASE CAN FREQUENTLY. * KEEP WELL LUBRICATED, OIL EVERY 200 MILES.

REMOVE LEAT WITH GREASE

ENGINE.—The engine is lubricated by oil from the oil sump, being forced through the hollow crankshaft to the main, big end bearings and valve rockers by a pump at the rear end of the camshaft. The pressure of the oil is controlled by a regulator fitted at the front end of the crankcase. The oil pump plunger can be removed for inspection by unscrewing the eccentric at the end of the camshaft.

Do not fill sump with oil above level shown by dipper rod. Clean out with paraffin periodically and refill with fresh oil. IGNITION GEAR.—Inject a few drops of thin oil into magneto lubricators occasionally. ENGINE CONTROL.—Oil occasionally all lever spindles and joints of control rods. Oil telescopic rod every day.



Special Lubricator
CHA
split
Every
oil be
Ball 1
Duffie