THE MANUAL FOR THE SINGER NINE ROADSTER

SERIES 4 A

SINGER MOTORS LTD.
BIRMINGHAM & COVENTRY

SINGER MOTORS LIMITED

Works :

BIRMINGHAM and COVENTRY.

Below is a reproduction of Name and Number Plate, fixed to each Singer Car on bulkhead under offside bonnet.

CAR NUMBER must be quoted in all communications.

SINGER MOTORS LTD.
BIRMINGHAM WORKS.
CAR NUMBER
MADE IN ENGLAND
RECOMMENDED LUBRICANTS.

	VACUUM.	PRICES.	SHELL.	WAKEFIELD.	ESSO.
ENGINE SUMMER	MOBILOIL A.	ENERCOL SAE 30.	DOUBLE SHELL.	CASTROL XL.	ESSOLUBE 30.
WINTER	MOBILOIL ARCTIC	ENERCOL SAE 20.	SINGLE SHELL.	CASTROLITE.	ESSOLUBE 20.
GEARBOX	MOBILOIL BB.	ENERCOL SAE 40.	TRIPLE SHELL.	CASTROL XXL.	ESSOLUBE 40.
BACK AXLE	MOBILUBE GX 90.	ENERCOL EP. SAE 90.	SHELL SPIRAX 90 EP.	CASTROL HYPOY.	ESSO EXPEE COMPOUND 90.

Address for all correspondence (including service matters in the first instance)

SINGER MOTORS LIMITED,
COVENTRY ROAD,
SMALL HEATH,
BIRMINGHAM, 10.

Telephones : VICtoria 2271 (8 lines).
Telegrams : Singacars, Birmingham.

PUBLISHED BY SINGER MOTORS LIMITED. PRICE - 7/6

Owner's Name W. J. McCartney

Address 3 Goldsmith Pl.

Cantonsville Md.

PREFACE

IN compiling this book, some knowledge of the operation and care of a motor car has been presupposed and the instructions contained herein will, if followed with reasonable care, enable the owner to keep the car in excellent mechanical order.

The book is fully illustrated with diagrams which have been carefully prepared to give useful information in the simplest form, instead of making long technical descriptions. The arrangement of all mechanical parts is described, and photographs have been made of points which it is desirable to stress.

Advice is given to enable the owner to trace a fault, and the information given will be found sufficient in the majority of cases.

If at any time difficulties arise, first act in accordance with the information given in this manual, and if further information is required, advice will be given upon the application to the Technical Department of our Service Depot, BUT IN ANY COMMUNICATION REGARDING YOUR CAR, IT IS ESSENTIAL THAT YOU QUOTE THE CAR NUMBER WHICH WILL BE FOUND STAMPED ON A METAL PLATE FIXED TO THE DASH BOARD UNDER THE BONNET. (SEE FLYLEAF.)

The interest of Singer Motors Ltd. in their productions does not end with delivery of the car—it continues directly in a one thousand miles' free of charge after sales service, which is available to every owner through the Singer Dealer from whom the car was purchased.

This service forms an extension of the Factory Inspection organisation and serves to ensure that each car during its preliminary running-in is maintained in good order. Details of this Free Service are given on page 6.

In addition to this arrangements have been made with Singer Dealers in London and the provincial cities and towns to look after all local service. Most garages are now equipped for rapid and economical servicing operations and all Dealers carry adequate stocks of parts that may normally be required.

The Factory Service Depot is also available for major overhauls and the supply of spare parts. This Depot has been specially created for the benefit of all Singer owners and whatever the age of your car, you are at liberty to call and our staff is at your disposal to carry out a test and give you a report on its condition. You are under no obligation to have repairs carried out—if you only call for advice, this will be given.

The recommendations in this Book should not be construed as extending or modifying in any way the liability of this Company, as determined by the Singer Guarantee reproduced on page 5.

CONDITIONS OF SALE

All new cars and chassis and parts thereof manufactured by SINGER MOTORS LIMITED (hereinafter referred to as "the Company") are sold subject to but with the benefit of the Conditions of Sale hereinafter set forth, and this is so whether the sale is (a) by the Company to a Distributor, Dealer or Retail Dealer, or (b) by the Company direct to the user, or (c) by Distributor or Dealer to a Trader, or (d) by a Distributor, Dealer, Retail Dealer or Trader to the user :—

1. **GUARANTEE.** The Company's Guarantee, a copy of which is endorsed hereon, shall be deemed to be incorporated in these Conditions : to the intent, in the case of a sale by a Distributor, Dealer, Retail Dealer or Trader that he shall pass on the benefit of the Guarantee to his purchaser, who shall be subject to its obligations : but such transfer of the benefit of the Guarantee shall not create any privity of contract between the Company and such purchaser ; and every Distributor, Dealer, Retail Dealer and Trader contracts as a principal and not as an agent, and has no authority to give any warranty or make any representation or otherwise act on behalf of the Company.

2. **PRICE AND PAYMENT.** Prices quoted are for delivery at the Company's Works at Birmingham, net cash on delivery. Freightage therefrom to the depot of a Distributor, Dealer, Retail Dealer or Trader is extra.

3. **DELIVERY.** Neither the Company nor any Distributor, Dealer, Retail Dealer or Trader shall be liable for any delay in delivery on the part of the Company (whatever the cause of such delay), nor for any damage caused thereby.

4. **ALTERATIONS IN PRICE AND CONDITIONS.** The Company's prices and conditions of Sale may be altered at any time without notice, and all cars and chassis and parts therefor are sold subject to the prices and Conditions of Sale ruling at the time of delivery.

In the event of increase of price, however, a purchaser may in writing cancel his order within seven days of receiving notice of the increase.

5. **ALTERATIONS IN SPECIFCATIONS.** The Company's specifications may be altered at any time without notice ; and in such event the seller may cancel any order, or goods conforming to the altered specification may be delivered in fulfilment of such order unless, in the case of substantial alterations, the purchaser in writing cancels that order within seven days of receiving notice of the intention to deliver in conformity with the altered specification.

6. **SPARE PARTS.** When ordering spare parts, it is essential that the identification number thereof, as shown in the Company's Spare Parts List, should be given, as well as the chassis and engine number of the car for which they are required.

7. **DISTRIBUTORS AND DEALERS.** (a) Every Distributor, Dealer, Retail Dealer and Trader shall incorporate these Conditions in any contract it makes with a purchaser either by reference or by setting them out in extenso in the order form. Where such incorporation is by reference only, the Distributor, Dealer, Retail Dealer or Trader shall see that a copy of the Conditions is handed to such purchaser prior to the completion of the contract, and that such purchaser's attention is specifically drawn to them. (b) If any purchaser from a Distributor, Dealer, Retail Dealer or Trader shall commit a breach of these Conditions, the Distributor Dealer, Retail Dealer or Trader shall, on being required by the Company or his Vendor so to do take such steps as the Company may think fit, whether by instituting legal proceedings or otherwise, in order to enforce these Conditions.

8. **EXHIBITIONS AND COMPETITIONS.** No car or chassis or part thereof shall be exhibited at any exhibition or show or permitted to take part in any competition unless the same is held or approved by the Society of Motor Manufacturers and Traders Limited. Anyone who commits or allows a breach of these conditions renders himself liable to pay damages not exceeding £250.

9. **GENERAL.** (a) The Company may allocate any order placed direct with it to its authorised Distributor or Dealer in the appropriate territory. (b) These Conditions and any contract to which these Conditions apply shall be construed according to English Law.

Guarantee

WARRANTY.

The Company warrants that in the manufacture of new vehicles it has taken all precautions which are usual and reasonable to secure excellence of materials and workmanship and undertakes that if any defect is disclosed in any part of a new vehicle within six months of the date of delivery of such vehicle to the retail customer it will (provided such defective part is returned to the Works carriage paid) examine the part alleged to be defective and if on such examination the fault is found to be due to defective materials or Workmanship for which it is responsible it will repair or replace the defective part free of charge.

This Warranty is given only in respect of a vehicle purchased by the retail customer as a new vehicle. for which the Company's full retail List Price has been paid.

The foregoing Warranty is limited to a new vehicle manufactured by the Company and is in lieu of any Warranty (or Condition) whether expressed or implied by Common Law Statute or otherwise as to the description, quality or fitness for their purpose of any goods manufactured, replaced or repaired by the Company every such Warranty (or Condition) whether expressed or implied being in all cases excluded and the liability of the Company under the terms of this Warranty is strictly limited to the replacement or repair and despatch to the Sender carriage forward of the part replaced or repaired. The Company shall not be responsible for any other liability, expenses, damages or loss which may occur consequent upon any misdescription defective material or workmanship of any description.

The Warranty shall not apply to any defects caused by or arising in the following circumstances and in which instances all other Warranties (or Conditions) whether expressed or implied by Common Law Statute or otherwise are also expressly excluded.

This Warranty shall not apply to defects caused or arising under the following conditions:—

(a) During or caused by motor racing.
(b) Wear and tear, accident, misuse or neglect.
(c) Defects in any vehicle which has been altered in any manner whatsoever or upon which the identification numbers have been altered or removed.
(d) Defects in any vehicle which has been or is let out on hire.

This Warranty shall be construed as including and shall be limited in its application to :—

(a) New vehicles or goods manufactured by the Company and which are bought direct from the Company or from one of its duly authorised Distributors, Dealers or Retail Dealers.
(b) Repairs done or replacements supplied by the Company direct,

and all other Warranties (or conditions) whether expressed or implied by Common Law Statute or otherwise are excluded.

The Company gives no Warranty of any description in respect of any Secondhand Vehicles or goods sold by it or by its authorised Dealers or by any other person nor is any Warranty (or Condition) expressed or implied, whether arising by Common Law Statute or otherwise in respect of such vehicles or goods.

All agreements and quotations by the Company to supply goods execute repairs or make replacements shall be deemed to include the above Warranty and the exclusion of all expressed or implied Warranties and/or Conditions.

The Company does not warrant the Specialities of other manufacturers fitted to its vehicles such as tyres, electrical fittings, lamps and horns. It endeavours to secure the best quality in these articles and the Makers whose names usually appear thereon are generally willing to replace any defective part. The Company will be pleased at all times to furnish the Maker's name and address.

CONDITIONS OF WARRANTY.

If a defective part be found in any vehicle or goods it must be sent to the Company's Works carriage paid and accompanied by an intimation from the Sender in writing that he desires to have it repaired or replaced free of charge under this Warranty. The Sender must also furnish at the same time :—

(a) The number of the car.
(b) The name of the dealer if any from whom the car was purchased.
(c) The date of the purchase of the car or the date when the repairs were executed or replacements made as the case may be.

The Sender shall accept the Company's decision as final and conclusive on all claims for replacement of or repairs to defective material and/or workmanship and to the exchange of defective parts.

If these conditions are not strictly complied with the goods received by the Company will be at the risk of the Sender and this Warranty shall not be enforceable.

The Company shall not be responsible for the cost of any labour involved in connection with the removal or replacement of any defective parts from or to the vehicle.

REPAIRS AND REPLACEMENTS.

All parts sent for repair or replacement must be forwarded carriage paid and bear the Sender's Name and address ; the car number should also be given. The foregoing Warranty is given by the Company in respect of all repairs to vehicles or parts of vehicles executed by it or replacements supplied by it direct but for three months only and subject nevertheless to the reservations limitations and conditions therein contained and all other conditions or warranties whether expressed or implied by Common Law Statute or otherwise are excluded. The Company shall not be responsible for any other liability expenses damages or loss which may occur consequent upon any misdescription defective material or workmanship of any description in connection with any replacements supplied or repairs executed by it.

The Company accepts no responsibility whatsoever for any replacements or parts which are not fitted by it to a vehicle even if such replacements or parts are supplied by it.

Cars which are sent for repairs will only be driven by the Company's employees at the risk and responsibility of the owners and repairs of cars are undertaken only on the assumption that the owners give authority to drive the cars on their behalf.

The Company accepts no responsibility for damage by fire or otherwise to customers' cars or parts thereof whilst on the Company's premises.

SCHEDULE

SERVICE ADJUSTMENT AT 1,000 MILES.

ENGINE.	Check and adjust tappets, sparking plugs, and distributor points.
	Remove and clean carburetter filter, check and adjust slow running if required.
	Check and tighten all cylinder head nuts.
	Check and adjust dynamo and camshaft chains, and fan belt.
	Drain engine oil and refill to correct level.
	Check engine for external oil leaks.
	Check and adjust engine oil pressure if necessary.
CHASSIS.	Check and top up oil level of gearbox, steering box and rear axle.
	Check front wheel alignment and adjust if necessary.
	Check tyre pressures.
	Check steering ball joints, spring clips, and spring U bolts.
	Check all chassis and body bolts.
	Oil and grease chassis throughout.
ELECTRICAL.	Check all electrical connections, dynamo charging rate, and adjust if necessary. Top up battery.

NOTE.—NEW LUBRICANTS CHARGEABLE TO CUSTOMER.

Should an Owner on the completion of the first 1,000 miles, find it is not convenient to have the Free of Charge Service carried out by the Distributor or Dealer from whom he purchased the car, he should arrange with the Distributor or Dealer to have the work carried out by the nearest authorised SINGER Distributor or Dealer.

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GENERAL DESCRIPTION

ENGINE. Four-cylinders cast integral with top half of crankcase. Overhead valves, overhead camshaft driven by heavy duty roller chains. The crankshaft is a high tensile steel drop forging, dynamically balanced and carried in three extra large bearings. Engine unit mounted on rubber at front and rear.

ENGINE LUBRICATION. By forced feed from a submerged gear type pump to main and connecting rod bearings, camshaft bearings and camshaft chains. Large oil filter in the sump and a by-pass type of oil filter in the main oil circuit ensures that only clean oil is circulated. Dip stick oil level gauge is fitted.

CARBURETTER. Solex F.A.I. downdraught of the latest type giving high power with petrol economy. Easy starting control operated from the dash. The inlet and exhaust manifold is specially designed to combine a heating device for rapid warming up. Choke control on the facia panel. An air intake silencer and cleaner is fitted direct to the carburetter.

PETROL SUPPLY. Petrol is drawn from a seven gallon rear tank by a mechanical pump driven from the engine intermediate shaft. A primer is fitted to the pump.

IGNITION. By coil and distributor from 12-volt battery. Automatic timing control incorporated in the distributor.

COOLING. By thermo-syphon through a large radiator assisted by a fan.

CLUTCH. Single flexible dry plate with spring cushion centre. Light and easy to operate.

GEARBOX. Four-speed gearbox with synchromesh on second, third and top gear, mounted as a unit with the engine and fitted with a remote gear control lever within easy reach of the driver's hand. All gears are precision ground to ensure silence.

REAR AXLE. Semi-floating with spiral bevel drive, offset bevel gear differential and pressed steel axle case.

PROPELLER SHAFT. Hardy-Spicer balanced tubular shaft with the latest needle roller bearing.

CHASSIS FRAME. Deep section pressed steel channel, underslung at the rear. A combination of tubular pressed steel cross-members and cross-bracing ensure rigidity and strength.

SUSPENSION. Long, wide, semi-elliptic springs front and rear, carried on rubber bearings requiring no lubrication. New type dual piston, hydraulic shock absorbers with progressive damping action.

STEERING. Worm and nut type, of patented design, finger light, yet positive. 16.5 inch diameter spring steering wheel with three spokes of multiple stainless steel wires.

WHEELS AND TYRES. Five detachable pressed steel spoked wheels with low pressure 5.00 by 16 in. tyres.

BRAKES. Girling fully compensated brakes on all four wheels, giving extraordinary high efficiency and provided with a rapid and positive adjustment without need of jacking up the car. The hand brake operates on the rear wheels only.

ELECTRICAL EQUIPMENT : includes 12-volt 38 amp. hour battery mounted in a most accessible position under the bonnet, latest type, constant voltage, belt driven ventilated dynamo, coil distributor, dip and switch headlamps, sidelamps, electric horn, starter motor with pull switch on panel. The instrument panel carries a large dial speedometer and large dial combined oil gauge, ammeter and petrol gauge, both having translucent lighting ; ignition and lighting switch, panel light switch, ignition warning light, starter motor, carburetter and choke controls. The trafficator switch and horn push button are mounted in centre of the steering wheel. A special foot operated dipping headlight switch is mounted on the floorboard to the left of the clutch pedal.

BODY CONSTRUCTION. The graceful coachbuilt body gives ample accommodation for four persons, and is fitted with two doors, hinged at the front.

SEATING. Two neat, independent, adjustable bucket seats in front with hinged back rests that fold forward to give easy access to rear seat. The rear seat has ample width for two, and the back hinges forward to give access to the hood and sidescreen locker. All seats are upholstered in Vynide.

LUGGAGE ACCOMMODATION. There is a luggage locker concealed in the flowing lines of the tail, and this contains the spare wheel which is strapped securely in position. The lid opens outwards, and is permanently fitted with luggage straps, providing generous adjustment. The lid opens out flat.

WINDSCREEN. A single panel full width screen is fitted, arranged to fold flat if required. It can be securely locked in any position. Chromium plated finish with safety glass.

HOOD AND SIDESCREENS. This model is fitted with a particularly neat hood of fully proofed material. When "up" it gives ample headroom for both front and rear seat passengers, and remains neat and taut at all times. The hood folds down out of sight into the body behind the rear squab when not required. Fully detachable, rigid, sidescreens are fitted. They are metal framed of a special design to open integral with the doors.

TOOLS. A complete set of tools and jack are mounted on a special deck under bonnet.

OTHER EQUIPMENT. Dual bladed windscreen wiper, exterior driving mirror, cubby hole in nearside of instrument panel, pockets in each door, flush fitting trafficators with control on steering wheel. Rear number plate embossed in rear panel, stop tail light.

DATA

ENGINE.

Bore	60 mm.
Stroke	95 mm.
Capacity	1074 c.c.
Water cooling capacity	18 pints
Oil sump capacity (dry)	7 pints
Petrol tank capacity	7 gallons
Gearbox capacity (dry)	2¾ pints
Rear axle capacity (dry)	2 pints
Firing order	1, 3, 4, 2

TYRES.

Size	5.00″ × 16″
Pressures	Front wheels—20 lbs. per sq. in.
	Rear wheels—22 lbs. per sq. in. with two passengers
	25 lbs. per sq. in. with four passengers

BRAKE HORSE POWER.

1,000 r.p.m.	2,000 r.p.m.	3,000 r.p.m.	4,000 r.p.m.	Peak 5,000 r.p.m.
8.0 B.H.P.	17.2 B.H.P.	26.5 B.H.P.	34.2 B.H.P.	36.0 B.H.P.

Maximum safe r.p.m.: 5,200.

GEAR RATIOS (OVER ALL).

Top Gear	5.43 : 1
Third Gear	7.96 : 1
Second Gear	12.32 : 1
First Gear	19.5 : 1
Reverse Gear	19.5 : 1

ROAD SPEEDS AT 1,000 R.P.M.

Top Gear	13.4 m.p.h.	Third Gear	9.15 m.p.h.
Second Gear	5.91 m.p.h.	First Gear	3.74 m.p.h.

GENERAL DIMENSIONS.

Wheelbase	7′ 7″
Track	3′ 9″
Ground clearance	5½″
Overall length (lid closed)	12′ 7¾″
Overall width	4′ 7¾″
Height	4′ 10½″
Turning circle	34′ 0″
Unladen weight (running)	15½ cwts.
Unladen weight (dry)	15 cwts.
Stopping distance from 30 m.p.h. (dry concrete surface)	33′ 0″

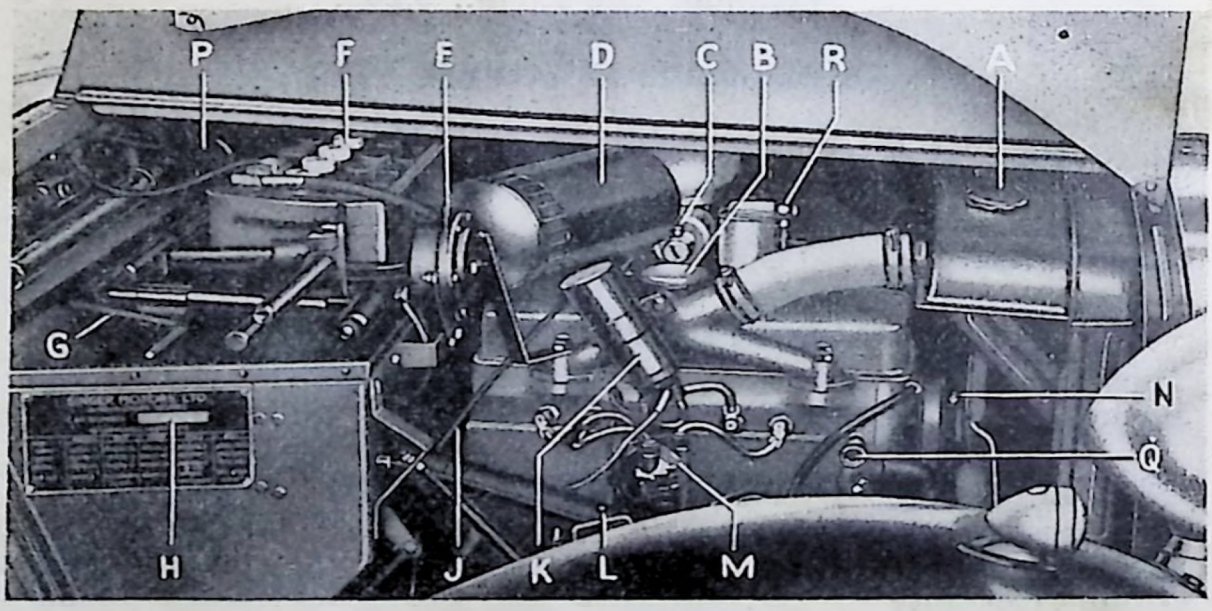
ON TAKING DELIVERY

IT is as well to be assured that everything is in order, and that any special equipment has been satisfactorily fitted. The supply of oil, petrol and water should also be checked and an examination of the coachwork and chassis generally is well worth while. The tool kit should be checked and packed away as detailed hereunder.

The portable jack, together with the tyre inflator and handle, starting handle, pliers, and wheel brace, etc., are carried in clips on the deck of the scuttle under the nearside of the bonnet. The tool roll is carried on the deck of the scuttle under the offside of the bonnet, and contains the following items :—

Screwdriver	Tommy bar	Grease Gun
Adjustable spanner	Tyre valve remover	Tyre levers
Distributor spanner	Tappet spanner	Toolbag
Box spanners (1 set)	Open ended spanner	Funnel

The tyre valve remover is for safety wired on to the Distributor spanner.



A. Radiator filler cap.
B. Engine oil filler cap.
C. Carburetter oiler (now deleted)
D. Air cleaner.
E. Horn.
F. Battery.
G. Tool deck.
H. Car number.
J. Throttle control.
K. Coil.
L. Steering column oil hole.
M. Distributor.
N. Fan grease nipple
P. Fuse box.
Q. Camshaft chain adjuster.
R. Petrol filter union.

DRIVING AND CONTROL OF THE CAR.

AS pointed out in the preface to this book, some knowledge of the care and operation of a motor car has been presupposed, but for the benefit of new owners and those who have been driving other types of car, the following hints are given, which, if observed, will not only prolong the life of the car and cut down running costs, but will make motoring much more pleasant and comfortable.

The car is fitted with a four-speed gearbox with synchromesh on second, third and top, making gear changing a very simple and easy operation.

Do not over-rev. This is not only bad practice but is very harmful to the engine and transmission generally and in addition causes wheelspin especially on the rear and which in turn will give rise to rapid tyre wear. Get into top gear as quickly as possible, there is no necessity to drive long distances in second before changing into third and in third before going on into top. The car attains its maximum efficiency in top gear and the intermediate gears are only a means of getting there.

Unless in traffic or hilly country, the use of second and third gears should be avoided as much as possible. Top gear performance is exceptionally good and there is no necessity for frequent gear changes and using say, third gear for inclines and small hills which the car is perfectly capable of taking in top. A little practice will soon make this changing down question almost automatic but the great thing to remember is that the car will normally take anything but severe gradients easily in top gear.

The habit of changing down and then violently accelerating to pass another vehicle should most definitely be discouraged, as also should the common fault of changing down from high speeds in order to slow up the car. Bends and corners are either known or are plainly indicated by road signs and traffic in front can always be seen, and it is therefore a simple matter to slow up in plenty of time by first removing the foot from the accelerator pedal and using the engine as a brake. If it is then desirable to slow up the car still further, a touch on the brake pedal will be all that is necessary. Apart from the fact that these habits are a sign of bad driving, they have very detrimental effects on the engine, transmission, brakes, tyres and fuel consumption and very soon lead to perhaps heavy repair bills.

One point in connection with the gearbox. This has been designed for easy operation and no difficulty should be experienced in making a smooth change. Owners who are used to the ordinary crash type of gearbox must realise that changing gear on a synchromesh box is a slow and deliberate movement and there is no necessity to double declutch.

"Practice makes perfect" and the intelligent use of both gearbox and brakes will soon become second nature making driving a pleasure instead of a strain and generally adding very much to the comfort of motoring, particularly from the passengers' point of view.

There are several adjustments provided for the personal comfort of both driver and passenger; the front seats can be adjusted by releasing the locking lever which will be found underneath each seat and sliding the seat backwards and forwards on its runners. The windscreen wiper is brought into action by unlocking the curved handle, swinging the wiper arm into position and switching on.

The windscreen may be opened by unscrewing the large wing nuts on the windscreen pillars. The screen may then be pushed forward until it lies parallel with the scuttle and bonnet top. Care must be taken to ensure that the wing nuts on the windscreen pillars are securely locked after opening or closing the screen. See page 16 for position of wing nuts.

It is in your own interest to run this car carefully for the first 500 miles. DO NOT EXCEED 40 M.P.H. IN TOP GEAR; 27.3 M.P.H. IN THIRD GEAR; 17.5 M.P.H. IN SECOND GEAR AND 11 M.P.H. IN FIRST GEAR.

Even when the car is run in, the engine must not be overdriven especially in the intermediate gears. The maximum permissible speeds in the intermediate gears are :—

1st Gear	.. .. ..	19.5 m.p.h.
2nd Gear	.. .. ..	31.25 m.p.h.
3rd Gear	.. .. ..	47.5 m.p.h.

By observing these rules the car will give better service and smoother running. Pistons, rings, cylinder walls and bearings will by this time have a surface that can never be obtained by fast, hard, driving. Even after the five hundred miles recommended it will pay to increase the maximum speed of travelling with discretion.

STARTING THE ENGINE. It is advisable before starting the engine to make a practice of using the starting handle for a few revolutions in order to ease the load on the starter motor caused by the normal inertia of the engine oil when cold. This is especially important in winter time. After this, the engine should start quite easily. When starting an engine be quite certain that the change speed lever is in the neutral position and the handbrake lever on. The engine should then be switched on by means of the ignition switch and key which control the supply of current from the battery to the ignition coil. Two keys are supplied.

A warning lamp gives a red light if the switch is left on when the engine is not running, and this light is also apparent when the engine is running but the dynamo not charging. This condition, however, can only be expected when the engine is running very slowly and the dynamo charging rate insufficient to balance the drain on the battery from the coil ignition. ALWAYS REMOVE THE SWITCH KEY WHEN LEAVING THE CAR STANDING. Having switched the engine on, pull out the carburetter choke control which is on the right of the instrument panel. Then operate the starter switch by pulling the control on the left of the instrument panel. Release the starter switch immediately the engine fires, and when the engine has been running for one or two minutes turn the knob of the carburetter choke control, and push the control back to its original position.

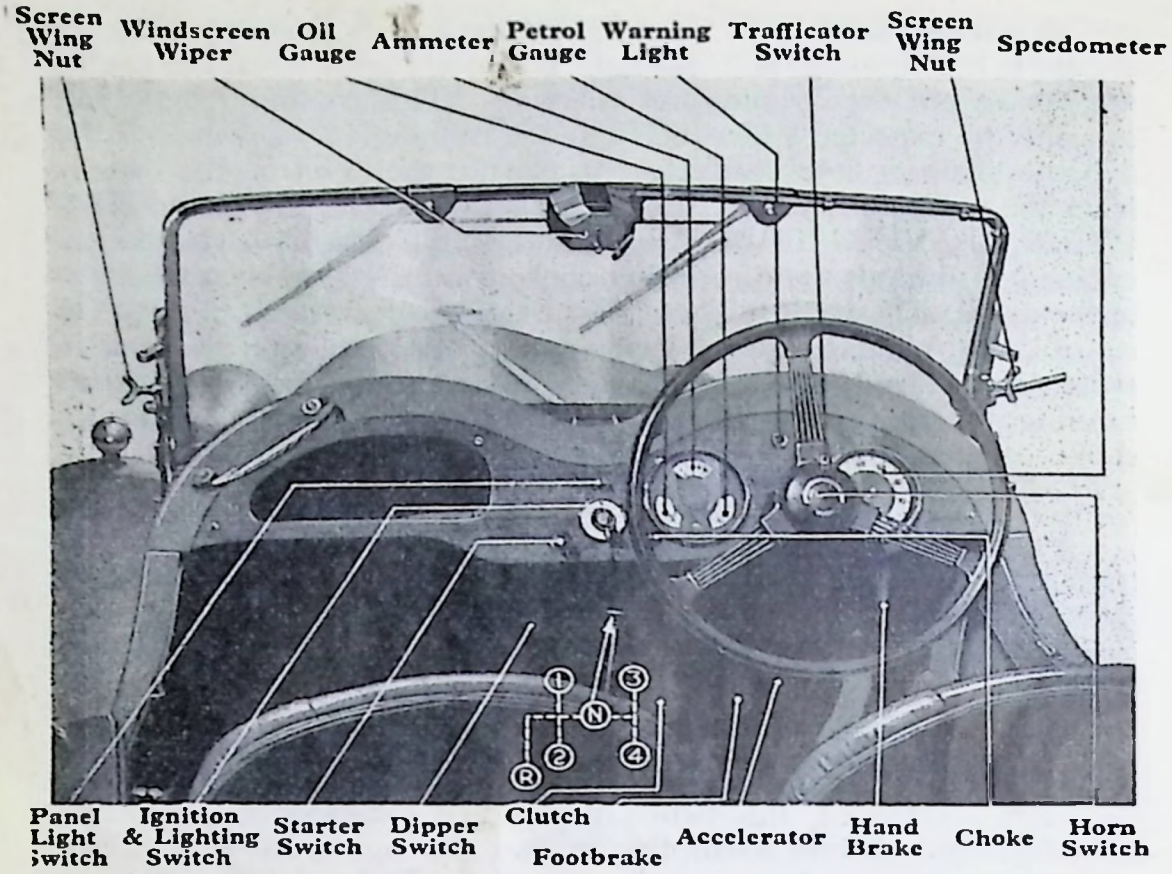
IT SHOULD NOT BE NECESSARY TO USE THE CARBURETTER CHOKE CONTROL WHEN RESTARTING A WARM ENGINE, neither is it advisable to run the engine for any length of time with the choke control out.

If the car has been standing for some considerable time, such as when it has been laid up for the winter months or after the engine has been overhauled, the owner may find it beneficial to prime the A.C. fuel pump before attempting to start the engine, and it is merely necessary to prime the pump by pumping the hand lever three or four times. WE DO NOT RECOMMEND THAT THE PUMP PRIMING LEVER IS USED UNDER NORMAL CIRCUMSTANCES.

The remaining controls and the change speed lever positions are fully illustrated on page 16.

Having described briefly the general details of the car, it is proposed now to deal in detail with the engine lubrication, general lubrication and maintenance adjustments which should be carried out periodically.

To a new car owner we cannot give greater service than to impress upon him the importance of regular attention to lubrication. Therefore, this summary of "regular attentions" has been compiled on the assumption that the car will cover about 12,000 miles per year, but consideration must be given to the fact that whereas one owner will cover considerably more than 250 miles in a week or 12,000 miles in a year, another owner might only cover about 5,000 miles in a year. Lubricants deteriorate to a certain extent even though the car is not in use, and it is policy for the owner to carry out the routine chassis lubrication regularly at the periods quoted in this summary even though the mileage covered by the car is comparatively low.



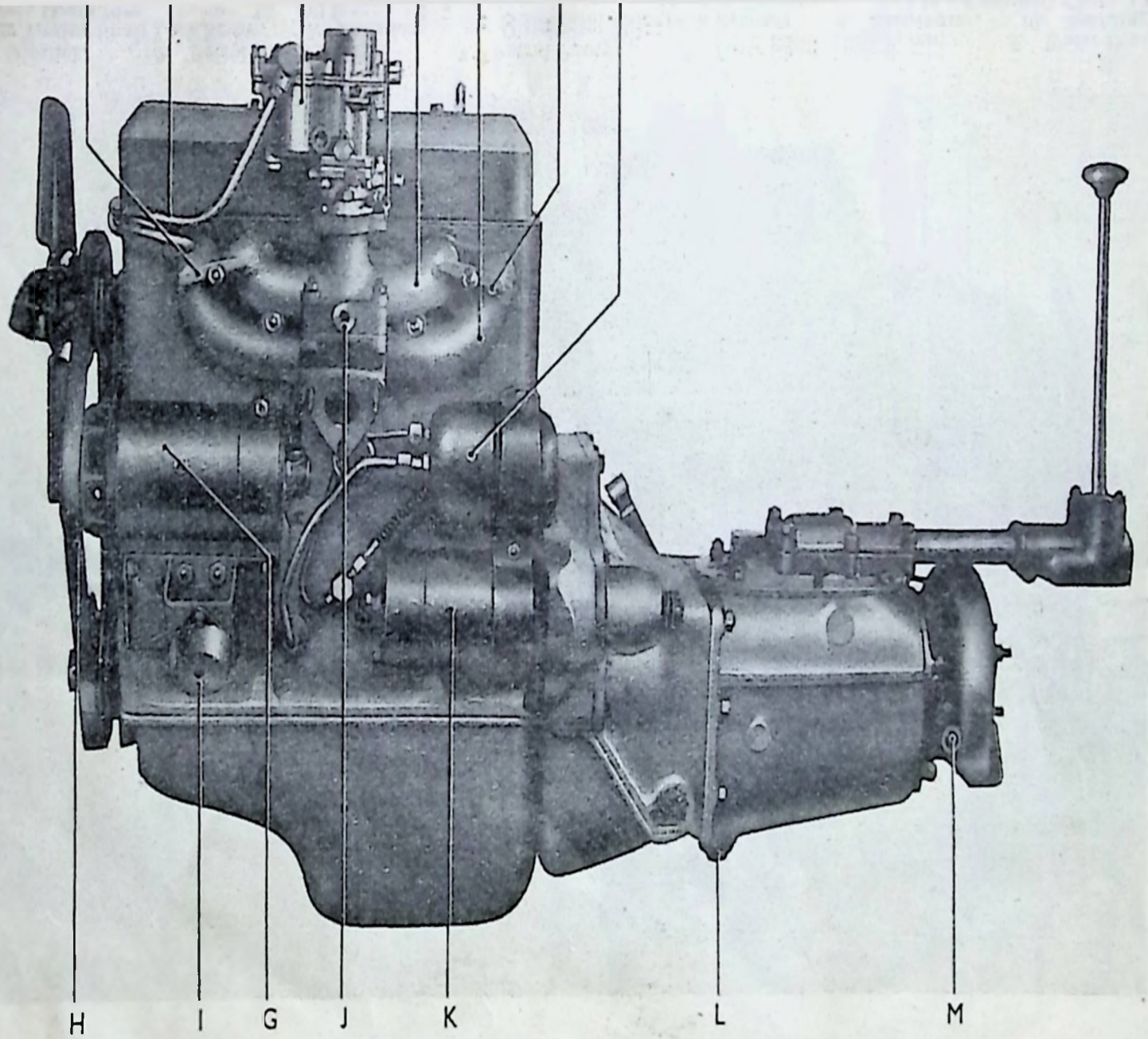
A lubrication chart is provided showing quite clearly the parts of the car which require regular attention, together with the periods of time and mileages at which these parts should be attended to. This will be found of valuable assistance in obtaining trouble-free running. A list of recommended lubricants is shown on the plate fixed to the bulkhead under the bonnet and we strongly advise owners to use only the grades specified. ON NO ACCOUNT SHOULD CHEAP OILS BE USED.

When preparing the car for the road there are three items which must receive attention: PETROL, OIL and WATER.

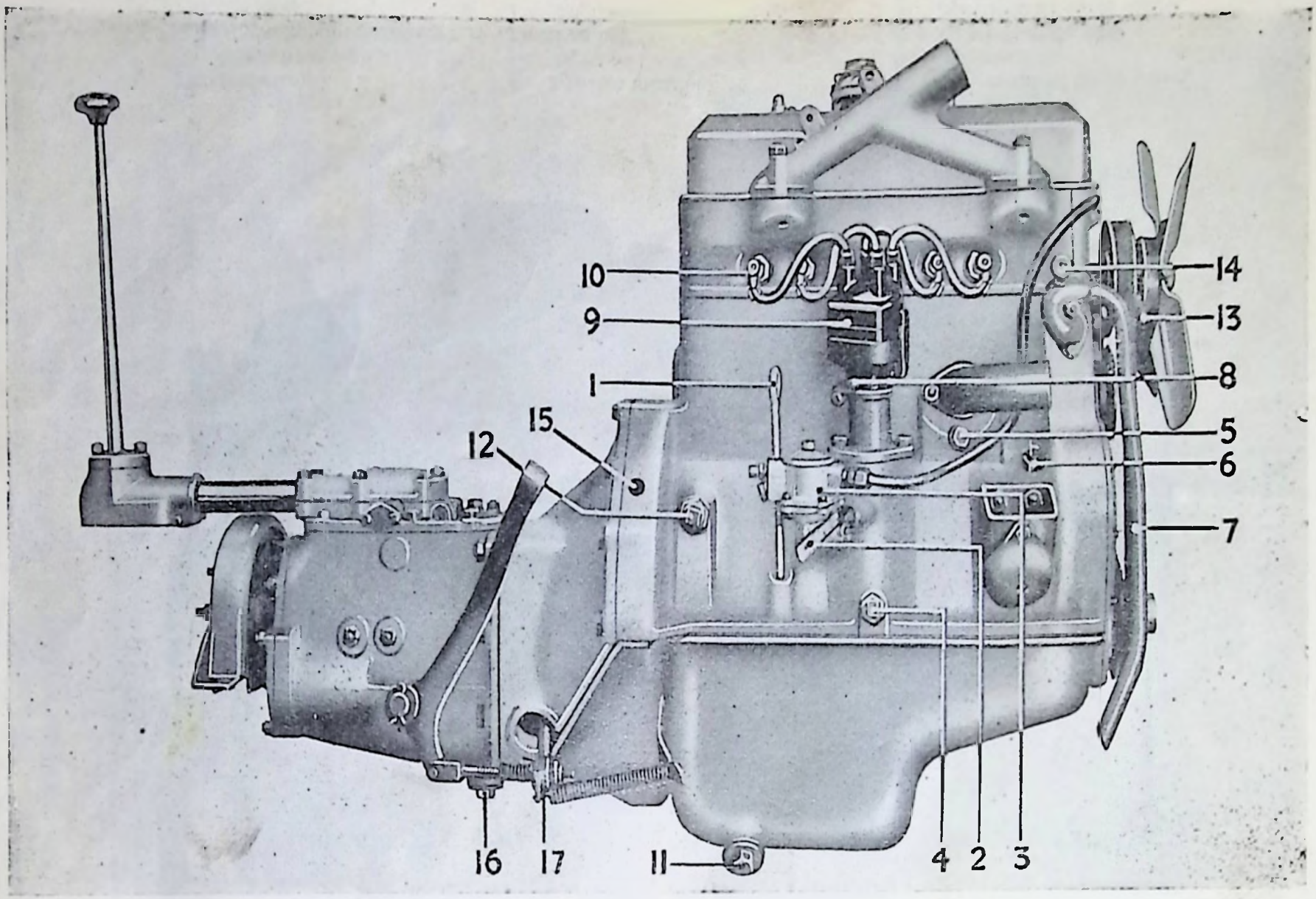
1. PETROL is carried in a tank at the rear of the car and an electrically operated gauge with the dial situated on the instrument panel indicates the amount of petrol in the tank the whole time the engine switch is in the "on" position.

We recommend the use of a high grade petrol as and when it becomes available. In the meantime, engines have been set to give the best results possible with present day fuel but a certain amount of incipient detonation or "pinking" may be noticed when pulling hard which better class fuels will eliminate besides providing smoother running and lower consumption.

2. ENGINE OIL. The engine oil filler will be found on the engine top cover and is stamped with the word "Oil". It is airtight



A. Manifold clamps.
B. Petrol pipe from pump.
C. Solex downdraught carburetter.
D. Throttle lever.
E. Inlet manifold.
F. Exhaust manifold.
G. Dynamo.
H. Fan belt.
I. Engine front mounting.
J. Inlet manifold bleed union.
K. Starter motor.
L. Gearbox drain plug.
M. Speedometer cable socket.
O. Oil filter.



1. Oil Dipstick. 2. Petrol Pump Primer. 3. Petrol Pump. 4. Dist. Shaft Lock Screw. 5. Water Drain Plug
6. Inter Timing Shaft Lock Screw. 7. Breather. 8. Distributor Oiler (now deleted) 9. Distributor. 10. Sparking Plugs.
11. Sump Drain Plug. 12. Oil Pressure Release Valve. 13. Fan Greaser. 14. Camshaft Chain Adjuster.
15. Timing Aperture. 16. Gearbox Drain Plug. 17. Clutch Withdrawal Lever.

in order to prevent fumes escaping. Full details of the various recommended brands of oil are to be found on the engraved plate fixed to the bulkhead under the offside bonnet.

An oil breather is fitted to the offside of the engine case and conveys any fumes emitted below the body level. We also fit a by-pass type filter, served from the main oil circuit, the filtered oil being returned via the crank chamber to the oil sump. It is fitted on the nearside above the starter motor.

The condition of the by-pass filter can be checked by uncoupling the union nut between the filter body and the return pipe to crankcase and observing the oil flow, if scanty or absent the filter should be replaced, but it is advisable to replace the filter at the end of every year, or after 10,000 miles run.

The oil sump holds seven pints of oil and this quantity should be maintained by checking the oil level daily. A dipper is fitted on the offside of the crankcase and is marked with the correct oil level. To obtain a correct reading of the level of oil in the sump by means of the dip stick, run the engine for a short time until the oil is warm, then with the engine stopped, withdraw the dip stick, wipe it, replace it to its full extent and withdraw again. The level of the oil will then be accurately indicated, and if the oil is below the mark on the dip stick bring it to the correct level by pouring fresh oil through the filler in the engine top cover. A few moments must be allowed when adding oil for it to drain into the sump before finally checking the level, but do not under any circumstances fill the sump above the level as this is likely to lead to various minor troubles.

With the filter mentioned above, it should not be necessary to check the oil pressure or flow, but if for some reason this is required, the best way is, with the engine running slowly, to disconnect the union between the oil gauge pipe and the flexible connection from the engine and if oil pressure is present at this point then either the oil lead to the gauge is choked or the gauge itself is at fault. Make sure that the pipe is clear and if the trouble still persists have the gauge attended to by your local dealer.

If no oil pressure is present at the union, then the fault must be in the lubricating system. It is unlikely to be in the pump itself and the cause will most probably be due to (a) a choked sump filter, (b) foreign matter of some description in the pressure release valve. To clean the filter it will be necessary to lower the sump, and instructions for this operation are given on page 22.

To remove foreign matter from the pressure release valve, slack off the nut sufficiently to allow the centre plug to be withdrawn—the position of the lock nut will be an indication of how far to screw in the centre plug when reassembling—then withdraw the plug and remove the spring and plunger for cleaning in petrol. When replacing, first insert the plunger, then the spring, screw in the centre plug up to the lock nut and tighten the lock nut.

To increase the oil pressure, slack back the lock nut two or three turns, screw in the centre plug and tighten the lock nut. To decrease the oil pressure, release the lock nut, screw the centre plug back two or three turns and relock the nut. **The correct pressure is 30/35 lbs. at 30 m.p.h. in top gear.**

Clean engine oil is essential, and after the first 750 to 1,000 miles the oil should be drained from the sump and fresh oil put in. After this, the oil should be changed about every 5,000 miles.

3. WATER. The radiator should be filled with water to a level not higher than one inch below the filler cap. The filler cap is fitted to the offside of the radiator header tank under the bonnet, and it is advisable to use soft water for the cooling system in order to avoid an accumulation of lime deposits, which will eventually impede the water circulation.

If at any time it is considered advisable to flush out the cooling system, then drain the water from the radiator by means of the drain tap at the nearside bottom corner of the radiator, and the drain plug under the water inlet pipe on the offside of the cylinder block. THIS PLUG MUST BE REMOVED to drain completely the water cooling system. Refill the cooling system with a strong solution of common soda and water. Run the engine until the water becomes hot, drain the solution and afterwards flush out the cooling system with running water from a hose-pipe inserted in the radiator filler.

In frosty weather steps must be taken to prevent the cooling water freezing since water when freezing creates considerable pressure which may crack the cylinder walls or radiator.

If the garage is not heated, the water may be drained, but it is usually more convenient to use an anti-freezing mixture in the cooling system. Any of the high class, nationally advertised brands are suitable and full directions are given on the containers.

In the event of a sudden frost with no anti-freeze in the radiator and no means of keeping the car warm, drain off all water from the system by means of the tap at the base of the radiator and remove the small plug in the offside of the cylinder block under the water inlet branch near the distributor.

DAILY ATTENTIONS.

(See Lubrication Chart opposite page 25).

WEEKLY ATTENTIONS.
(Or every 250 miles).

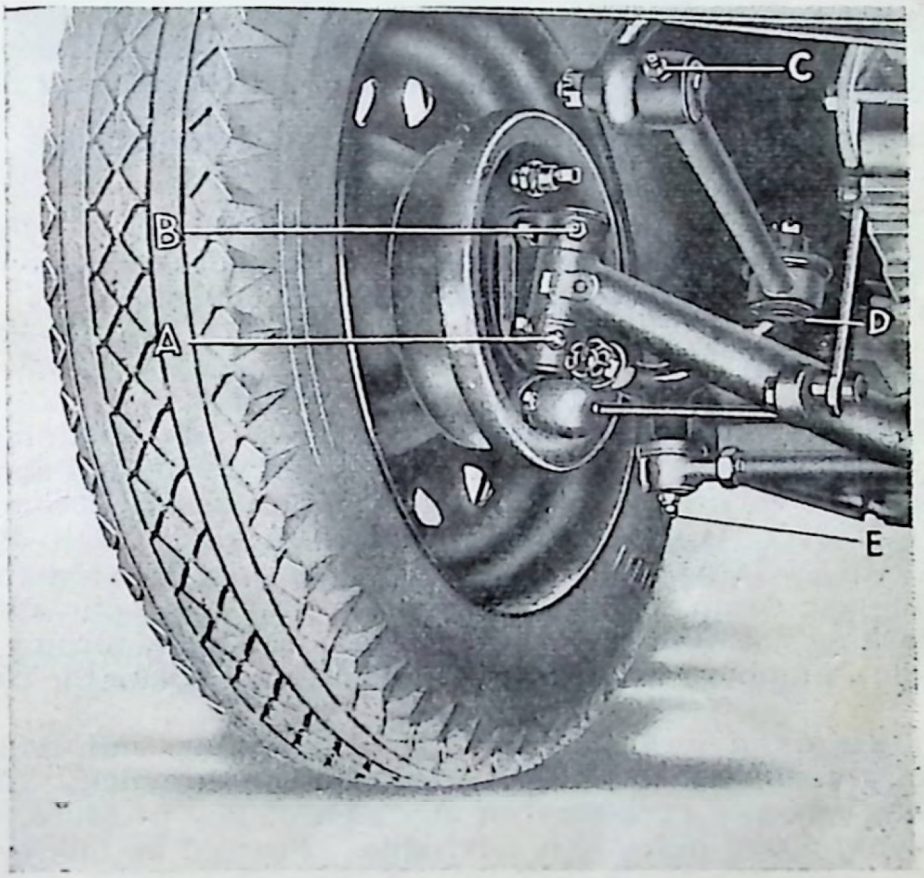
IMPORTANT. It is a good point to make a practice of checking the tyre pressure weekly, and these should be as follows :

Size .. .. 5.00 in. × 16 in.

Pressure .. Front wheels—20 lbs. per sq. in.
Rear wheels—22 lbs. per sq. in. with two passengers
25 lbs. per sq. in. with four passengers

Take care to keep the tyres on one axle at the same pressure. Unsteadiness of the steering is often due to under-inflation or unequal inflation of the front tyres and this also results in a tendency for the steering to pull to either side.

It is also advisable at this period to put two or three spots of oil from a hand oil can on the ball joints of the carburetter controls and the brackets holding the accelerator pedal cross shaft. A little attention given to points of this description is always time well spent.



A, bottom swivel pin bush greaser ; B, top swivel pin bush greaser ; C, drag link greaser ; D, steering rod greaser ; E, track rod greaser.

MONTHLY ATTENTIONS.
(Or every 1,000 miles).

(1) GREASERS. Grease the steering swivel pins, at four points. In order to facilitate greasing the swivel pins it is advisable to jack up the front axle assembly and apply the grease gun to the swivel pin

greasers forcing the grease until some exudes from the top and bottom swivel pin bushes. At the same time turn the steering wheel from lock to lock to help distribute the lubricant.

(2) Inspect the engine and gearbox oil level dipsticks, and top up as necessary.

The dipstick fitted to the gearbox is in a most convenient position, and is covered by a rubber grommet in the gearbox cover on the nearside.

Oil may be fed into the dipstick aperture by means of a funnel supplied in the toolkit.

(3) Top up Battery, see page 69.

(4) Examine the tyres periodically and remove flints or other road matter which may have become embedded in the tread, and any large cuts should be vulcanised.

Clean off oil or grease which may appear on the tyres with a little petrol, drying the tyres with a duster after the cleaning process.

At all times avoid violent acceleration and fierce braking, and always reduce speed over bad surfaces.

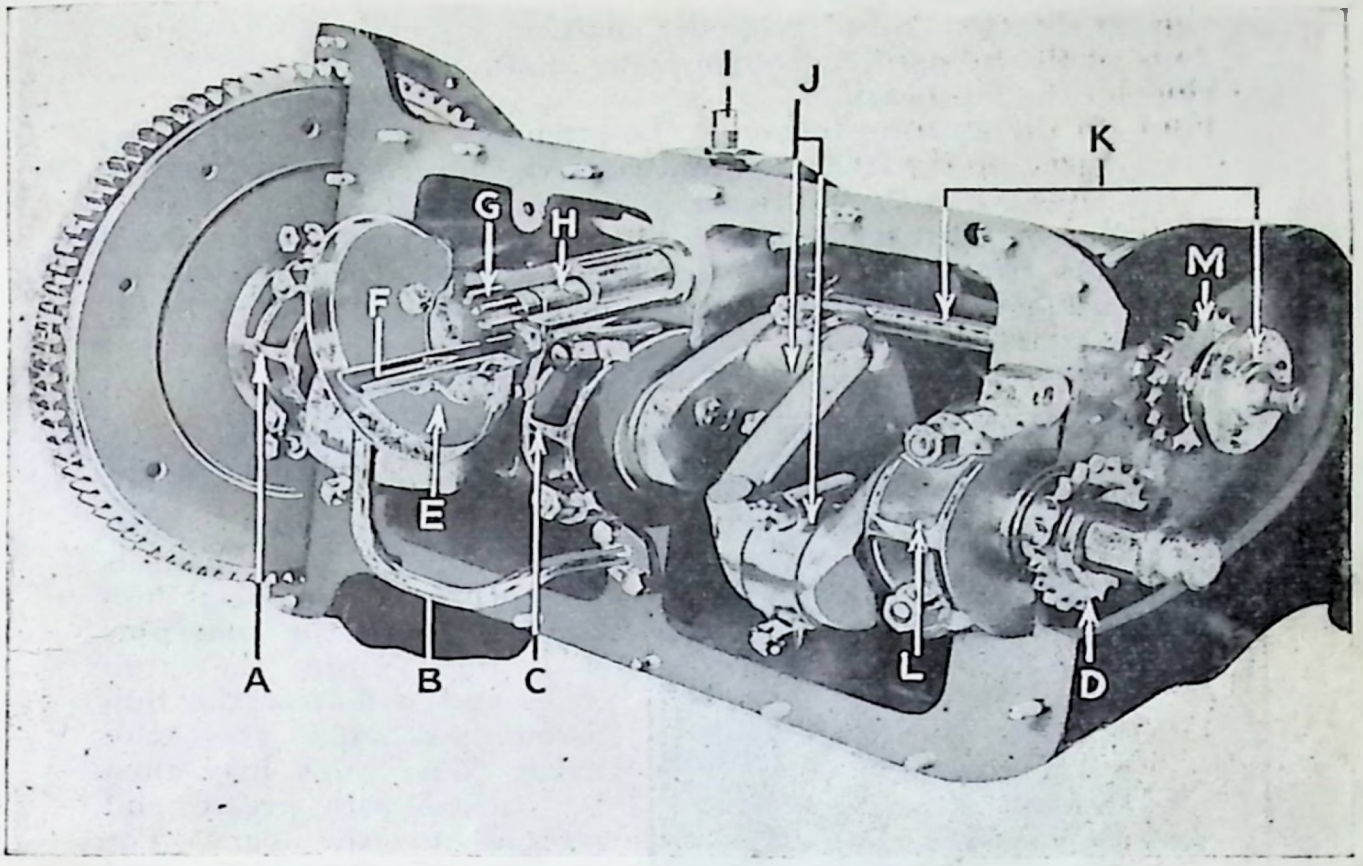
Tyre wear is balanced, and life considerably increased by a periodical changeover, that is, the nearsides to the offsides, and fronts to rears. This changeover is recommended every 2,000 miles.

EVERY 5,000 MILES.

Drain the engine oil and refill with fresh oil. Draining the sump can be best carried out while the engine is warm, and should the oil appear to be very dirty, swill out the engine case with a thin "flushing" oil. ON NO ACCOUNT SHOULD PETROL OR PARAFFIN BE USED. If a "flushing" oil is used it will be necessary after draining the sump to replace the drain plug and pour about a quart of "flushing" oil into the engine through the filler, turning the engine over for a number of revolutions by hand to circulate the cleansing oil.

Then drain away, replace the drain plug, and refill with the correct grade of oil to the level mark on the dip stick. Cleaning the oil filter becomes necessary on any sign of low pressure, and in any case every 5,000 miles it is advisable. Proceed as follows :—

Drain the oil from the engine sump by removing the drain plug and also remove the dip stick. Remove the sixteen nuts and washers which secure the oil sump to the base of the engine case and take away the oil sump, tray and oil filter. It is policy to remove the cork washers from the sump studs to prevent them from being damaged. The filter must be withdrawn from the pump and cleaned with petrol, and all traces of carbon, etc. must be removed from the sump.



A. Rear main bearing cap.
B. Oil pump delivery pipe.
C. Centre main bearing cap.
D. Crankshaft sprocket.
E. Oil pump filter plate.
F. Oil pump suction pipe.
G. Oil pump gears.
H. Oil pump drive shaft.
I. Pump and distributor shaft locating pin.
J. Connecting rod bearings.
K. Intermediate shaft assembly.
L. Front main bearing cap.
M. Intermediate shaft sprocket.

When refitting the sump, be quite certain that the joint washer is in good condition, and tighten the anchorage nuts evenly and in alternatively opposite positions.

Drain and refill the gearbox with fresh oil. The only attention the gearbox needs is the periodical replenishing of the oil, and an occasional flushing out before refilling with new oil.

Drain and refill rear axle with fresh oil. This operation can best be carried out by lifting the rear seat cushion, exposing the cover in the rear seat pan.

The filler plug is located on the top and in the centre of the differential case, the drain plug at the bottom and in the centre of the axle case, and the level plug just below the centre of the axle case rear cover. The capacity of the axle (when dry) is two pints, and care must be taken not to over-fill this unit to prevent any possibility of oil finding its way on to the rear brakes. Fill only to the oil level aperture.

GREASERS. There are eleven to which the grease gun should be applied every 5000 miles. They are as follows :—

One on the clutch pedal.
One at the rear end of propeller shaft.
Two at the forward end of propeller shaft.
One on the fan bearing.
Four on the steering linkage. To attend to these four properly, jack up the front axle and work the steering from lock to lock while the lubricant is being injected.
Two, one on each rear hub. The rear wheel must be removed to attend to these. Grease the thread of the road wheel studs before replacing the wheels. For grades of lubricants see page 25.


METHOD OF REMOVING DUST CAP FROM ROAD WHEEL

The front hubs should also be packed with grease at this time. To do this jack up both the front wheels, remove the road wheel dust caps, remove the road wheels and prise out the metal hub caps. Remove the split pins and nuts from the stub axles and withdraw the hub assemblies from the stub axles. The hubs may then be packed with grease and refitted to the car. For grades of lubricants see page 25.

These road wheel studs should also be regreased before replacing the wheels.

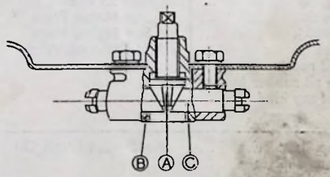
Another point :—Before replacing the wheels it is advisable to change front to back and side to side. See "Goodyear Tyre" booklet.

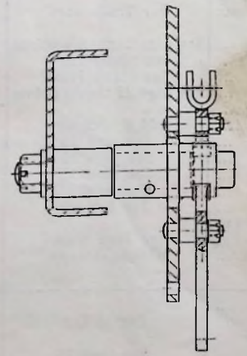
Oil the hand brake lever, pawl and ratchet.

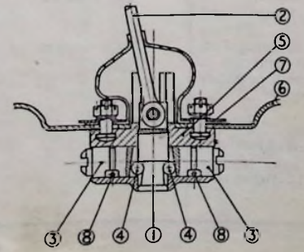
STEERING BOX. The steering box will not normally use any appreciable amount of oil but it is advisable to put in a small quantity each time the 5,000 mile service is carried out. An oil hole will be observed situated about half way down the steering column and oil in accordance with the grade specified in the Lubrication Chart and on page 25 can be inserted at this point.

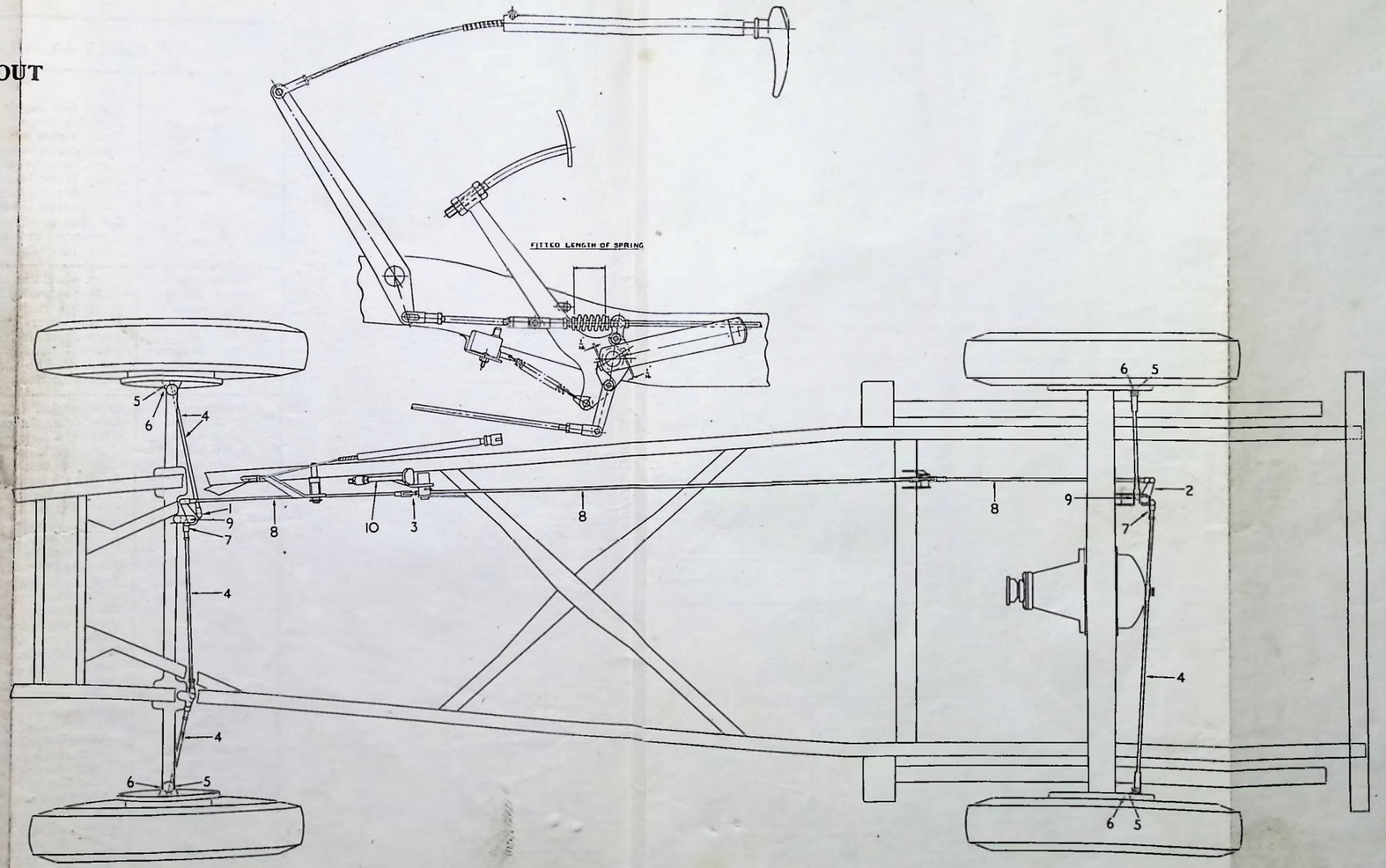
SPARKING PLUGS. After exhaustive tests it was found that the Champion L10S, 14 mm. sparking plug was most suitable for the Roadster model, and it is advised that replacements be of the same type.

BRAKE LAYOUT

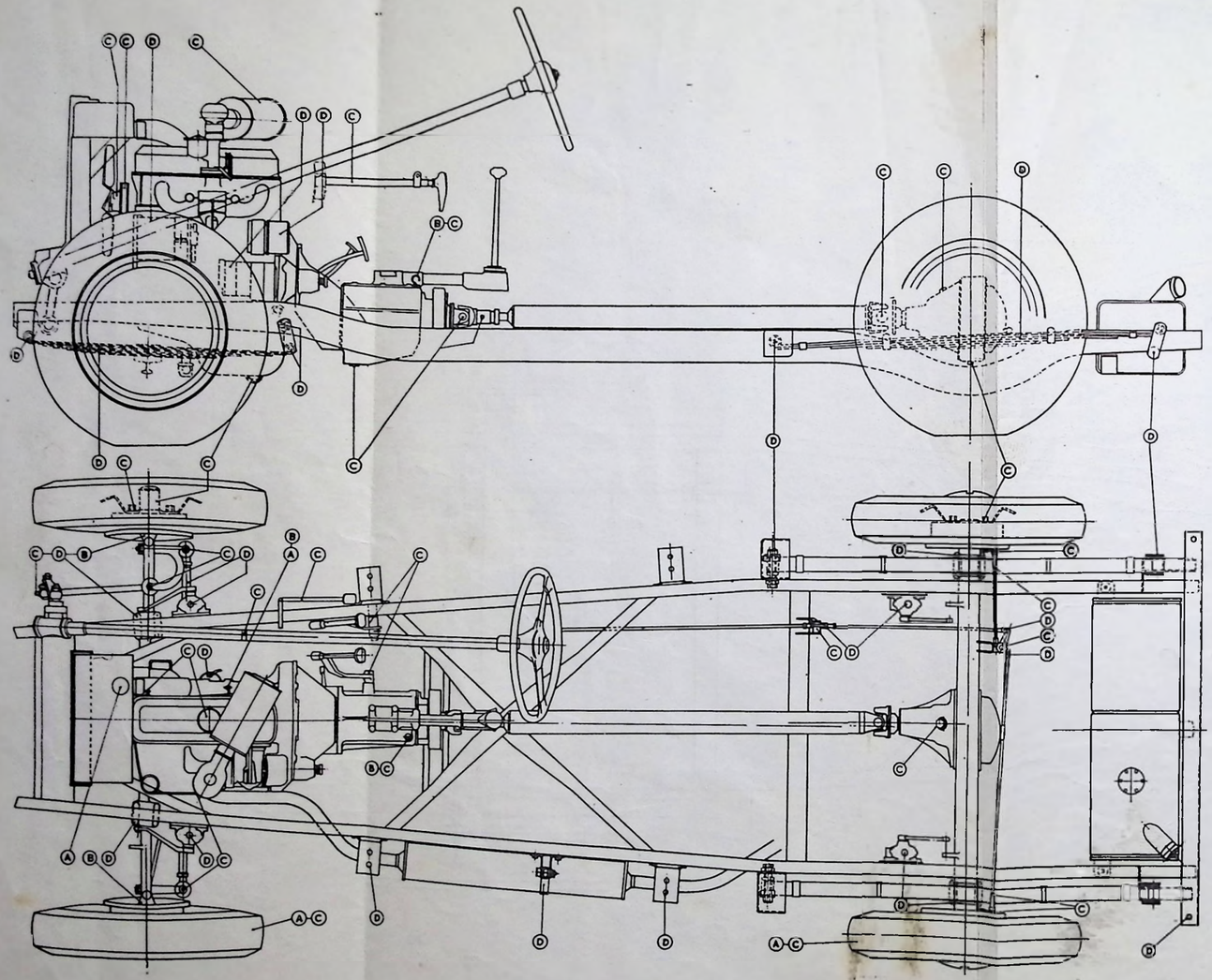








[See overleaf for Lubrication Chart



OILING DIAGRAM

SERIES 4A. 9 H.P. ROADSTER LUBRICATION CHART

		LUBRICANT	APPLICATION
Daily Inspection Points "A" on Diagram.	Check fuel supply by switching on and observing gauge ... ... Check engine oil by looking at dipstick ... It is advisable to keep oil at top level by adding small quantity of oil when necessary ... Check water level in radiator, use soft when possible and keep level not higher than one inch below the filler cap ... ... See that tyres are properly inflated (check pressures each week). Front wheels 20 sq. lbs., rear wheels 22-25 sq. lbs.	See Name Plate	Read Tyre Book
Points "B" on Diagram after each 1,000 miles Running (1,600 Kilometres Running).	Front wheel swivels 4 points ... ... Inspect engine oil level dipstick ... ... Inspect gearbox oil level dipstick ... ... Inspect battery for fluid level ... ... Inspect tyres for damage and repair ... ... **Note :**—Road springs have all rubber bushes and need no lubrication of any kind. Inspect distributor	See page 25 chassis points See Name Plate See Name Plate Add Distilled Water	Grease Gun Fill Up at Cap Fill Up at Dipstick See Electrical Equipment See Electrical Equipment
Points "C" on Diagram after each 5,000 Miles Running (8,000 Kilometres Running).	Drain engine and clean sump filter ... ... Remove air silencer, clean and replace ... Clean filter and sediment bowl in petrol pump Check sparking plugs, trafficators, and tappets Check fan belt and timing chain tension ... Grease fan bearing ... ... Drain and refill rear axle spiral bevel casing ... Drain and refill gearbox ... ... Grease propeller shaft joints ... ... Check front wheel alignment and tracking ... Check steering gear oil. As back axle ... Steering links—4 points ... ... Front hub. Repack if necessary ... ... Grease rear hub bearings ... ... Oil handbrake, cable, joints and linkage ... Adjust brake shoes and linkage ... ... Remove road wheels and change front right to rear left and rear right to front left ... Grease wheel studs ... ... Accelerator controls and cross shaft	Refill with Fresh Oil For Trafficators See page 25 chassis points See Name Plate See Name Plate See page 25 chassis points Add if necessary See page 25 See page 25 See page 25 Engine Oil See Brakes See Tyre Book Grease, Heavy	Cap on Valve Cover See Electrical Equipment Grease Gun Oil Funnel Oil Funnel Grease Gun Oil Funnel Grease Gun Grease Gun Oil Can Brush Oil Can
Points "D" on Diagram after each 10,000 Miles Running or every year (16,000 Kilometres Running).	Replace by-pass oil filter ... ... Oil trafficators, door hinges, and latches ... Overhaul dynamo, starter, and distributor ... Check shock absorbers ... ... Check steering joints and adjust for toe-in and backlash ... ... Inspect and tighten as required all spring clips, shackles, chassis and body bolts generally ... Examine and re-line brake shoes if necessary Check exhaust silencer and clips ... ... Oil bonnet and boot hinges ... ... Adjust striking plates if necessary ... ... Remove, clean, replace and adjust all fork ends and linkage of the brakes ... ... Clean and spray penetrating oil between road spring leaves	Engine Oil See page 25 No Lubricant	Oil Can See Electrical Equipment Top up if necessary Replace Rubber Bushes if Flanges are worn.

RECOMMENDED LUBRICANTS.

	Vacuum Oil Co.	Price's Lubricants Ltd.	Shell-Mex and B.P. Ltd.	Wakefield, C.C. and Co.	Anglo-American Oil Co.
Engine—					
Summer	Mobiloil A	Energol SAE 30	Double Shell	Castrol XL	Essolube 30
Winter	Mobiloil Arctic	Energol SAE 20	Single Shell	Castrolite	Essolube 20
Gearbox	Mobiloil BB	Energol SAE 40	Triple Shell	Castrol XXL	Essolube 40
Back Axle and Steering Box ..	Mobilube GX 90	Energol EP SAE 90	Shell Spirax 90 EP	Castrol Hypoy	Esso Expee Compound 90
Front and Rear Hubs	Gargoyle Voco Grease BB	Belmoline "C"	Shell R.B. Grease	Spheerol "L" Ball Bearing Grease	Esso Grease
Shock Absorbers ..	"ARMSTRONG" Super Shock Absorber Oil.				
Steering Swivels and Links	Mobil Grease No. 4	Belmoline C.	Retinax C.	Castrolease C.L.	Esso Pressure Gun Grease
Chassis Points ..	Mobil Grease No. 4	Belmoline C.	Retinax C.	Castrolease C.L.	Esso Pressure Gun Grease
Brake and Control Linkage	Mobil Grease No. 4	Belmoline C.	Retinax C.	Castrolease C.L.	Esso Grease

A new series of Shell Oils will shortly be available abroad, to replace those shown on Name Plate.

Engine	Above 90° F.	Shell X – 100. Motor Oil SAE 40 replaces Triple Shell.
	From 32° F. to 90° F.	Shell X – 100. Motor Oil SAE 30 replaces Double Shell.
	Below 32° F.	Shell X – 100. Motor Oil SAE 20 replaces Single Shell.
Gearbox		Shell X – 100. Motor Oil SAE 40.
Oil Can Lubrication		Shell X – 100. Motor Oil SAE 20.

The sparking plug has an important part to play in the running of the engine and has an influence on such items as smooth running, speed, slow running and petrol consumption. Therefore, it fully merits the small attentions that are advised below.

The importance of periodically inspecting, cleaning and testing the sparking plugs cannot be overstressed. Normally, this service should be carried out every 5,000 miles, but during the initial "running-in" period of the car, and after any major overhaul to the engine, it is advisable to carry it out after the first 1,000 miles of running.

When removing the plugs always use a box spanner of the correct size, and arrange for each plug to be identified with the cylinder from which it was removed. This helps in many instances to trace the cause of any misfiring which may be occurring.

When cleaning a plug on a cleaning machine, it is advisable to wobble it, and if carboned to any considerable extent to remove by scraping as much of the carbon as possible. When cleaning an oily plug first wash it in petrol and allow to dry, as otherwise the cleaning abrasive will stick.

After cleaning do not neglect to blow out all traces of the abrasive and to set the gap to .025"—(.63 m.m.) before testing. When setting this gap always bend the side wire, never the central electrode as any such action may split the insulator tip. The condition of the plug insulator is often responsible for poor plug performance. It should be examined for paint splashes; accumulation of dirt and grime; cracks caused by slipping spanners, or the over-tightening of the terminals. The gasket should also be examined, and if damaged, or compressed to a considerable extent, replaced.

VALVE CLEARANCES. Clearances between the valve stem and the tappet screw is necessary to ensure correct closing of the valves and efficient running of the engine. These clearances should be as follows :—

INLET VALVES	.005"
EXHAUST VALVES	.007"

and "feeler" strips of these thicknesses can be procured cheaply from most garages or tool dealers. The manner of checking the tappet adjustment is as follows :—

First run the engine for a few minutes until it becomes warm, then remove the two dome nuts and the top valve cover of the cylinder head, care being taken when removing the top valve cover to avoid damaging the cork joint which is fitted. Turn the engine with the starting handle for a half revolution after the closing of the valve which is to be adjusted. Slacken the lock nut and adjust the tappet screw until the gauge is a loose sliding fit between the valve stem and the tappet screw. Now tighten the lock nut and re-check with the gauge, as tightening

the lock nut will occasionally alter the clearance. DO NOT SET THE VALVE CLEARANCES TOO SMALL, OR DIFFICULTY WILL BE EXPERIENCED OWING TO THE ENGINE MISFIRING.

DYNAMO AND FAN BELT ADJUSTMENT. This is effected by slackening the three nuts securing the fan bracket to the engine case, and swivelling the bracket in the desired direction. After adjustment be quite certain that all nuts are tight, and it should be possible to depress the fan belt at least half an inch. This will ensure that the fan belt is not over-tightened and will thus prevent excessive wear.

CAMSHAFT CHAIN ADJUSTMENT. In order to adjust the camshaft chain it will be necessary to release the locking nut on the knurled screw which passes through the offside of the cylinder head close to the water outlet pipe. Tighten the knurled screw until the tension of the camshaft chain is felt. Then turn the knurled screw back half-a-turn and lock into position by means of the lock nut. The camshaft chain adjustment will then be correct. Every precaution must be taken against over-tightening as this will cause excessive wear of the camshaft chain.

Wash off mud etc., from brake rod linkage and grease all pins and levers (see brake section—page 58).

Adjust the brake shoes and linkage, a full description of this is on pages 60 to 62, which should be read in conjunction with the illustration on the back of the lubrication chart.

Remove the air silencer from the carburetter, swill it thoroughly in petrol or paraffin, to remove all the dust sticking to the oily gauze—then re-oil the gauze and replace.

Go round the accelerator controls and cross shaft with an oil can.

ANNUALLY.
(Or every 10,000 miles).

The period of time for which a car will run before requiring an overhaul depends on the way in which it has been driven and the attention it has received. It is advisable, however, to give the car an annual cursory overhaul, and the following points should receive attention.

1. Electrical Equipment.—The starter motor, the dynamo, and the distributor must be overhauled in accordance with the instructions in the chapter on electrical equipment.

2. The engine by-pass oil filter should be replaced if the car has covered over 10,000 miles.

3. The trafficators should be oiled (see pages 71 and 72).

4. The hinges of the doors, the bonnet and the boot, also the door catches and striking plates should receive a few spots of oil to ensure that they are functioning easily.

The striking plates may be adjusted if necessary.

5. The steering joints must be examined. They are not adjustable so if any excessive play has developed they must be replaced.

6. Check the toe-in. It should be $\frac{1}{8}$" measured at the wheel rims, approximately a foot from the ground.

7. Check the shock absorbers (see page 63), and replenish if necessary. Be sure to use only Armstrong Super Shock Absorber Oil, which may be purchased direct from our Service Depot or from any Singer Dealer.

8. Spray all road springs with penetrating oil (spring leaves only).

NOTE.—All spring shackles are mounted on rubber bushes which do not require lubrication.

9. The brakes and brake gear should have a thorough overhaul, and it may be necessary to replace the brake linings.

The brakes and the method of relining are fully described on pages 59 to 62.

10. In addition all the fork ends of the operating gear and their pins should be removed, cleaned, re-greased and replaced.

11. All body bolts should be inspected and tightened as necessary, chassis bolts, spring clips and shackles, the exhaust pipe and silencer clips should also be attended to at this time.

PETROL SUPPLY

Three components directly concern the supply of petrol to the engine. First, the petrol tank, from which the petrol is drawn by means of the pump to the carburetter, secondly, the A.C. petrol pump, and lastly, the carburetter.

PETROL TANK.

This is situated at the rear of the chassis and has a capacity of seven gallons. The tank is also fitted with an electric petrol gauge and a recording dial on the facia board. This dial records the amount of petrol in the tank the whole time the ignition switch is in the "on" position.

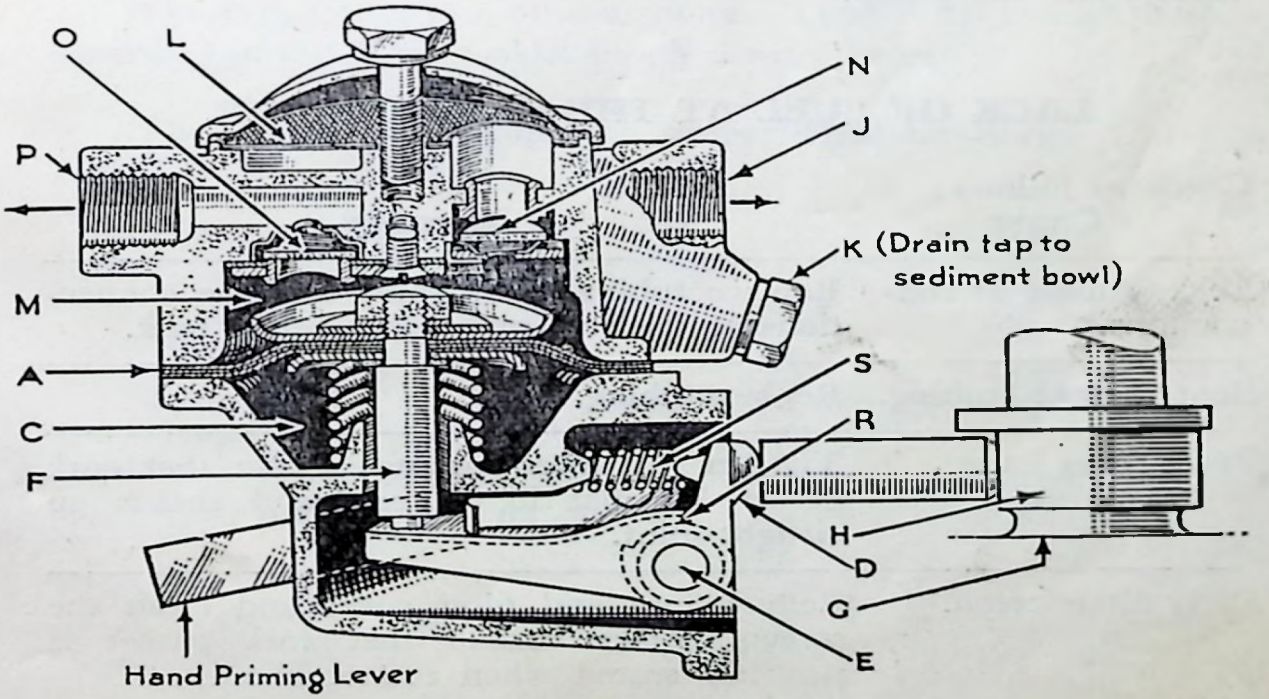
Should it at any time be necessary to remove the petrol tank, disconnect the petrol gauge and pipe, remove the four nuts and bolts securing the petrol tank straps to the chassis frame, and withdraw the petrol tank from beneath the chassis.

THE A.C. FUEL PUMP.

SERIES "Y"

WORKING PRINCIPLES.

By revolving shaft (G) the eccentric (H) will lift rocker arm (D), which is pivoted at (E) and which pulls the pull rod (F), together with diaphragm (A) downward against spring pressure (C), thus creating a vacuum in pump chamber (M).



Fuel from the rear tank will enter at (J) into sediment bowl (K) and through strainer (L) and suction valve (N) into pump chamber (M). On the return stroke, spring pressure (C) pushes diaphragm (A) upward forcing fuel from chamber (M) through pressure valve (O) and opening (P) into the carburetter.

When the carburetter bowl is filled the float in the float chamber will shut off the inlet needle valve, thus creating a pressure in pump chamber (M). This pressure will hold diaphragm (A) downward against the spring pressure (C) and it will remain in this position until the carburetter requires further fuel and the needle valve opens. The rocker arm (D) is in two pieces, the outer operating the inner one through (R) and the movement of the eccentric (H) is absorbed by this "break" when fuel is not required.

Spring (S) is merely for the purpose of keeping the rocker arm (D) in constant contact with eccentric (H) to eliminate noise.

SERVICE HINTS.

Service on the AC Fuel Pump is available through Authorised AC Service Stations, who are prepared with parts and fixtures for repairing all types of pumps. There are some service operations on this fuel pump that can, if necessary, be done without referring to the service station and these are tabulated below. In some instances trouble is attributed to the fuel pump which in reality is caused by some other condition. These should be carefully checked to avoid needless attention to the pump.

LACK OF FUEL AT THE CARBURETTER.

Check as follows :

Cause	Remedy
Leaky tubing or connections.	Replace tubing and tighten all pipe connections at the fuel pump and petrol tank.
Bent or kinked tubing.	Replace tubing.
Filter cover loose.	Tighten nut after making certain that cork gasket lies flat in its seat and makes an airtight joint.
Dirty filter screen.	Remove nut and filter cover and clean the screen. Make certain that cork gasket is properly seated when reassembling.

LEAKAGE OF FUEL AT THE DIAPHRAGM.

Check as follows :

Cause.	Remedy.
Loose cover screws.	Tighten cover screws alternately and securely. NOTE : Sometimes there appears to be a leak at the diaphragm, whereas the leak actually exists at one of the pipe fittings and the fuel has run down the pump to the diaphragm flange, appearing to originate there.

FLOODING OF CARBURETTER.

Check as follows :

Cause.	Remedy.
Carburetter needle valve not seating.	Check carburetter for proper adjustment.

CARBURETTER

The carburetter is a 30 mm Solex—Type F.A.1. which is fully described in the Solex booklet supplied with the car.

The correct setting for the Singer Roadster Series 4A is as follows :—

Choke tube	22.
Main jet	115.
Air correction jet	230.
Pilot jet	45.
Pilot jet air bleed	1.5
Starter air jet	4.0
Starter petrol jet	115.

DECARBONISING ENGINE

Decarbonising is one of the periodical attentions which some owners prefer to carry out themselves, and one which offers no difficulty if carried out methodically.

It is not possible to state definitely the mileage at which the engine should be decarbonized since its condition depends largely on the manner in which the car is driven and maintained. A general indication that it is necessary is when there is a gradual falling away of power evident, and for a metallic click known as pinking to be very noticeable, particularly when pulling hard.

The operation of decarbonising consists of cleaning the inside of the combustion chambers and the tops of the pistons, and of course necessitates disturbing the valve timing when removing the cylinder head. The method of procedure is as follows :—

1. Remove bonnet.

2. Drain the water system by means of the drain tap at the base of the radiator at the nearside, and by means of the drain plug underneath the water inlet pipe on the offside of the cylinder block. IT IS ESSENTIAL THAT THIS PLUG IS REMOVED TO DRAIN COMPLETELY THE WATER COOLING SYSTEM

3. Disconnect air silencer and the filter union from the carburetter, exercising care to avoid damaging the filter inside the union. When reconnecting the union be quite certain that the fibre washer is in position.

4. Disconnect the carburetter throttle and choke controls. It will be noticed that the carburetter throttle control is secured to the top cover by means of one of the dome nuts and care must be taken when refitting the bracket to be quite certain that it is in such a position that the carburetter throttle can be fully closed.

5. Disconnect the exhaust lead pipe, and remove the drain pipe from the induction manifold. Be careful to avoid damage to the gasket fitted between the lead pipe and the manifold.

6. Remove carburetter.

7. Remove five nuts securing the inlet and exhaust manifolds; and withdraw the manifolds from the studs. Special gaskets are fitted between the manifolds and cylinder head, and these should be carefully removed and stored for safety.

8. Remove top valve cover which is secured by two dome nuts. A cork washer is fitted between the valve cover and the cylinder head.

9. Disconnect and remove the sparking plugs.

10. Disconnect the clips securing the radiator top hose pipe and remove the hose pipe.

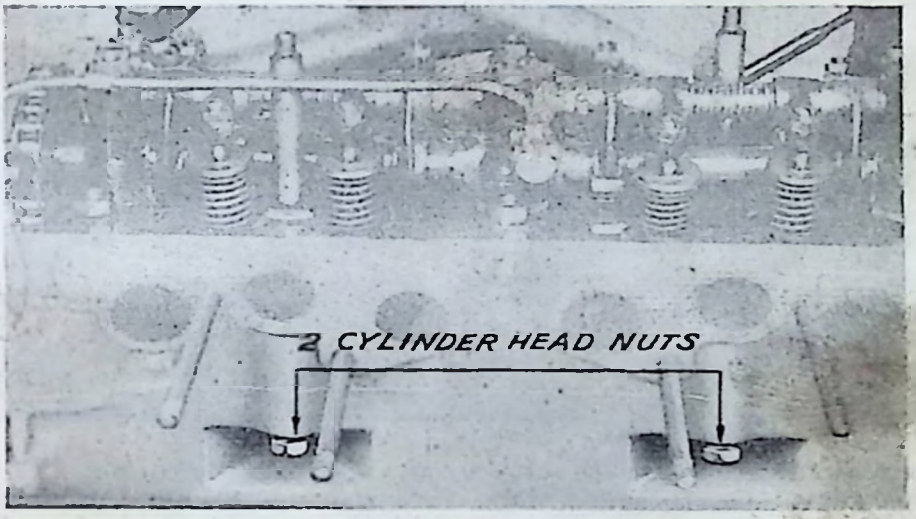
11. Disconnect the camshaft oil feed pipe by unscrewing the union at the timing case end, removing the nut and releasing the clip securing the pipe to the first camshaft bearing and removing the gallery stud, which connects the camshaft feed pipe to the camshaft centre bearing.

12. Remove water outlet pipe.

13. Remove two bolts and washers securing the cover at the front of the cylinder head and open out the small metal clip which secures the oil feed pipe of the overhead camshaft assembly. (See illustration, page 34).

14. Set the engine position by turning the starting handle until the inlet valve on number four cylinder is about to open.

15. Release the camshaft drive chain tensioner by unscrewing the lock nut and turning back the adjusting bolt in the cylinder head.

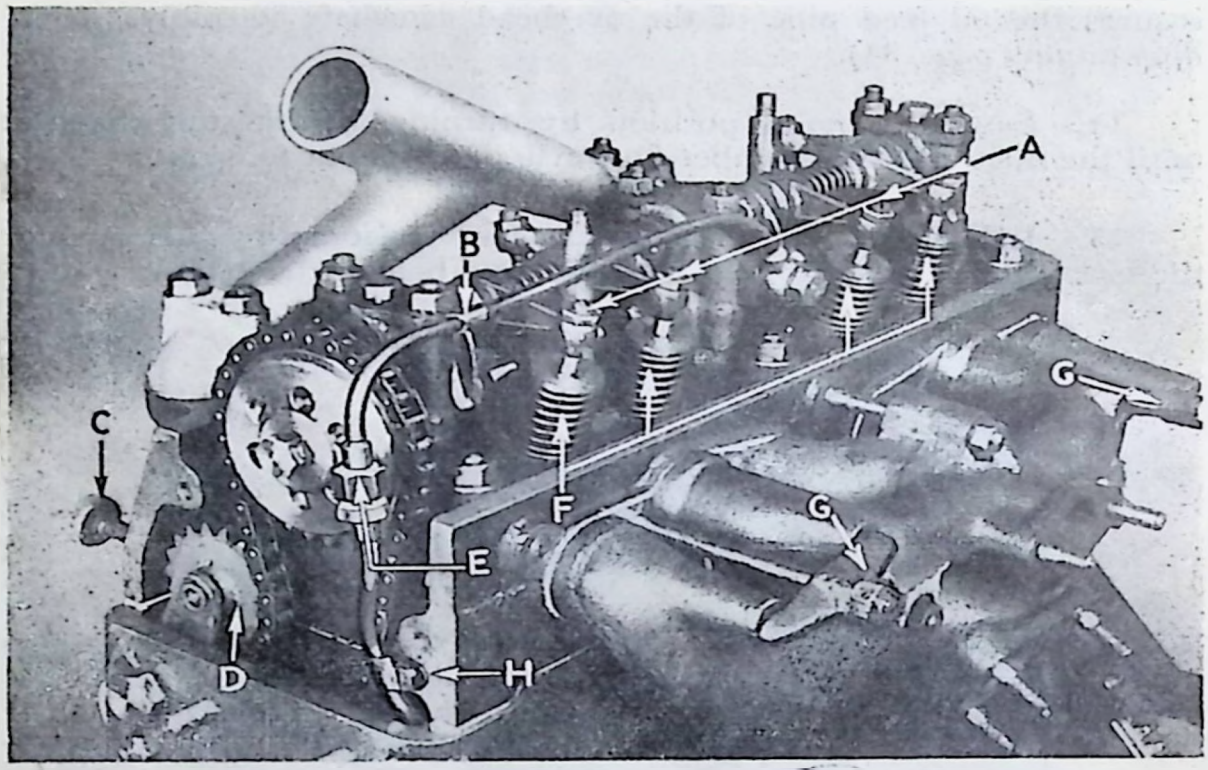


16. Remove the camshaft chain sprocket by releasing the tab washer and removing the bolt and plain washer which secure the chain wheel to the camshaft flange. DO NOT UNDER ANY CIRCUMSTANCES REMOVE CHAIN FROM CHAIN WHEEL.

17. Remove two bolts and washers from timing case to cylinder head, one of which carries the petrol pipe clip. Remove eight nuts and plain washers from the cylinder head holding down bolts, and remove two nuts and washers from two studs which penetrate the

cylinder block immediately behind the manifolds on the nearside of the engine. These nuts and washers will only be disclosed when the exhaust and inlet manifolds are removed (see illustration on page 33).

CLEANING THE ENGINE. Having removed the cylinder head, the pistons will now be visible, Nos. 1 and 4 at the top of their stroke, Nos. 2 and 3 at the bottom. Fill the exposed bores and water ports with rag and remove the carbon from the top pistons using for this purpose a blunt instrument such as a screwdriver. DO NOT USE EMERY UNLESS THE PISTONS ARE COMPLETELY REMOVED FROM THE CYLINDERS, AS SOME ABRASIVE MAY FIND ITS-WAY INTO THE ENGINE CAUSING CONSIDERABLE DAMAGE.

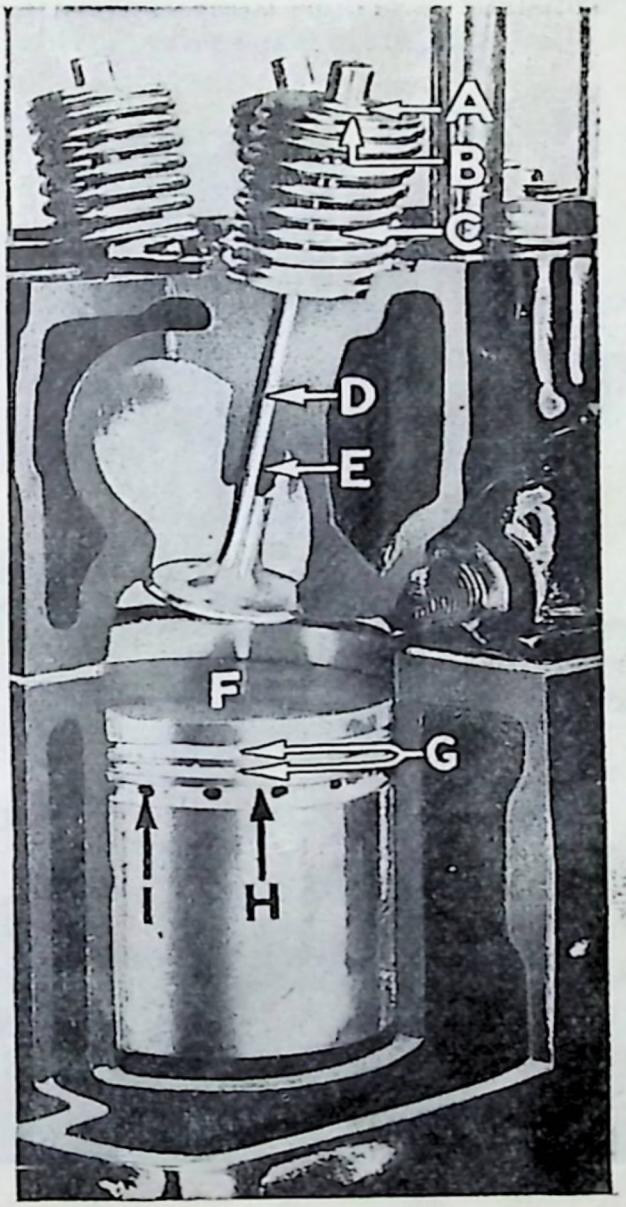


A, tappet adjusting screw; B, clip (mainshaft oil feed pipe); C, camshaft chain adjustment; D, camshaft chain tensioner; E, union (camshaft oil feed pipe); F, inlet valves; G, manifold clamps; H, feed pipe clip.

To clean pistons No. 2 and 3, hold the camshaft chain wheel up and in alignment with its lower sprocket while turning the engine half a turn clockwise to bring these pistons to the top of their stroke. Afterwards remove any carbon deposit from the face of the cylinder block and cleanse the cylinder head gasket ready for refitting.

Remove all carbon deposit from the combustion chambers, the face of the cylinder head and the valve heads. Do not in any way interfere with the position of the camshaft in order that the cylinder

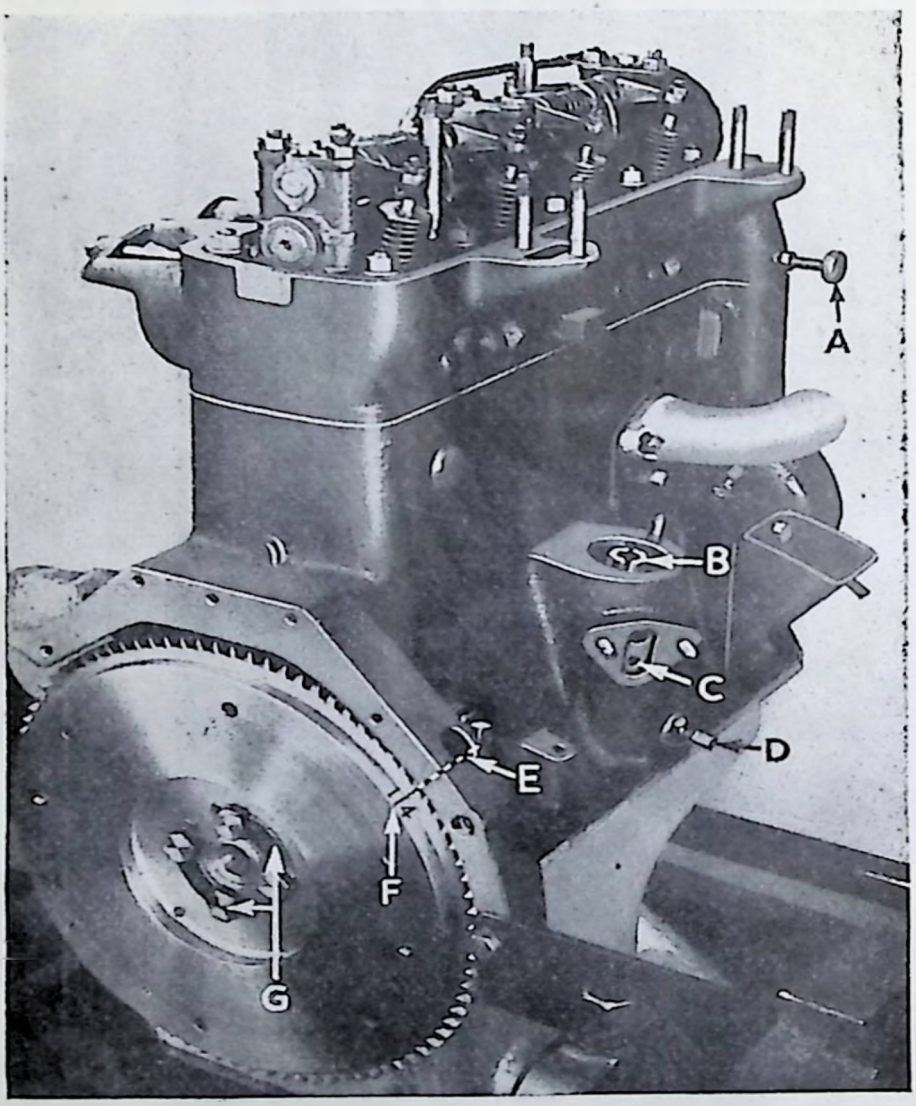
head can be returned to the cylinder block without interfering with the valve timing. Again, hold the camshaft chain wheel up and in alignment with its lower sprocket and procure assistance to turn the engine backwards by means of the flywheel until pistons Nos. 1 and 4 are again at the top of their stroke. Inject a small amount of oil into each cylinder bore to provide lubrication for the first few revolutions of the engine and refit the cylinder head. The re-assembling of the cylinder head, etc., is merely a reversal of the dismantling operation.



A. Valve split cotter.
B. Valve spring collar.
C. Valve spring
D. Valve.
E. Valve guide.
F. Piston
G. Compression rings.
H. Scraper rings.
I. Scraper ring oil return holes.

GRINDING IN VALVES. It is not always necessary to carry out this operation every time an engine is decarbonised, therefore the above instructions concerning decarbonising have not taken into consideration the method of dismantling the cylinder head and camshaft assembly for the purpose of valve grinding.

REMOVE CAMSHAFT ASSEMBLY. Release six nuts and washers which secure three camshaft bearings and withdraw upper halves of bearings complete with valve rockers and shaft. Release upper halves of camshaft bearings from rocker shaft, withdraw and

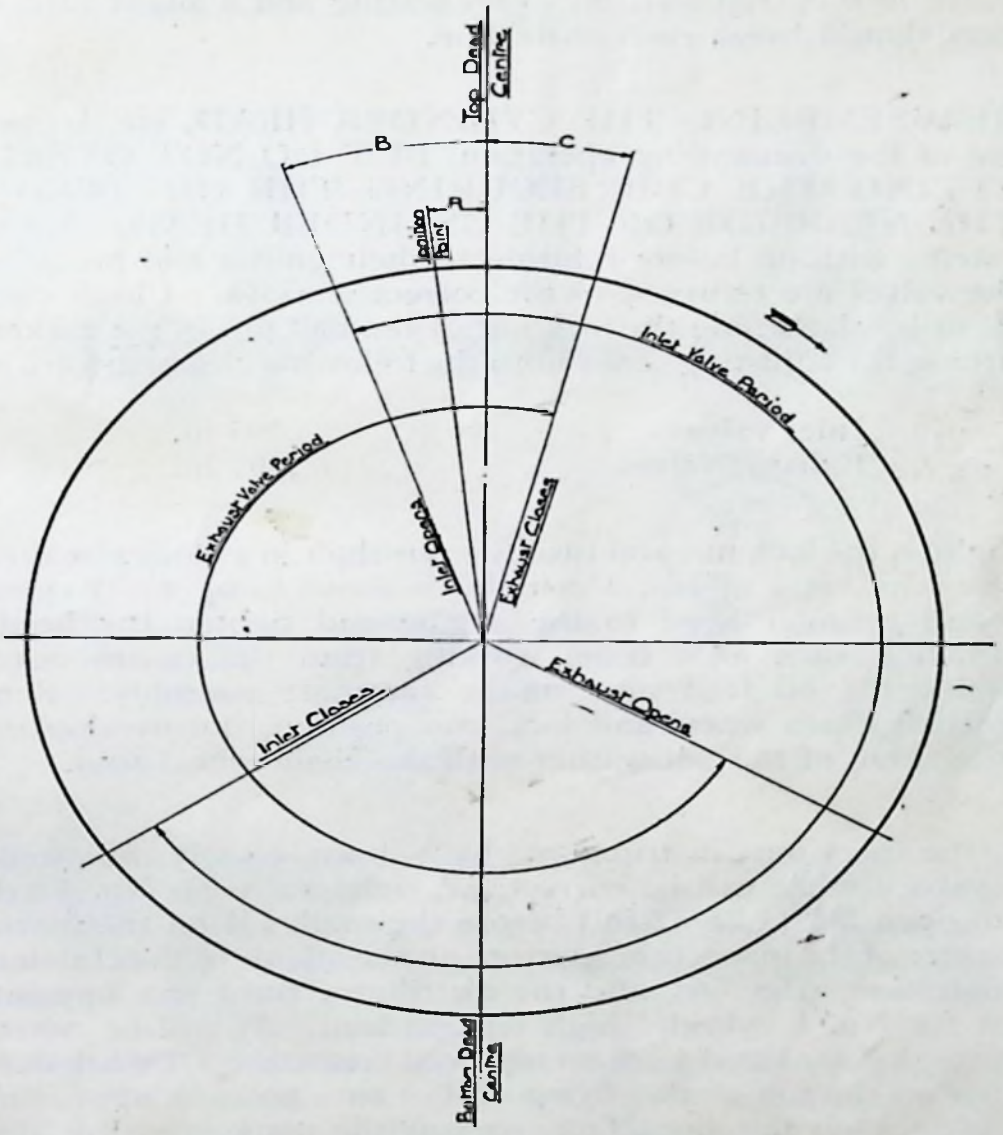


A. Camshaft chain adjustment.
B. Distributor drive shaft.
C. Pump drive plunger.
D. Drive shaft locating pin.
E. Timing mark inspection aperture.
F. Timing mark.
G. Flywheel anchorage bolts and locking plates.

mark to ensure returning them to the correct positions. It is advisable at this stage to remove the camshaft bearing bases from the cylinder head studs and pair with the upper halves. Each valve rocker should be marked to facilitate its return to the correct position.

Place valve extracting tool in position for compressing valve spring and removing split collar. Release the valve extractor and remove valve spring and collar. The valves may then be withdrawn through their guides from the combustion head. The valves are marked and should be returned to the correct seatings. Counting from the front of the cylinder head, the valves are marked as follows :—

Inlet valves ..	..	Nos. 2, 4, 6, 8
Exhaust valves	..	Nos. 1, 3, 5, 7



	A	B	C
FLYWHEEL	$\frac{7}{16}$"—$\frac{7}{8}$" B.T.D.C.	$1\frac{25}{32}$" B.T.D.C.	$1\frac{11}{32}$" A.T.D.C.

Remove all carbon deposit from the combustion chambers and the face of the cylinder head, also from the valve heads, stems and valve seatings. Smear a little valve grinding compound over seating on valve and cylinder head, and grind in the valve by rotating backwards and forwards upon its seat. Do not allow the valve to make a full revolution of the seating, but lift the valve from its seating at the end of each stroke. A light coil spring placed between the head of the valve and the guide will considerably facilitate this method of grinding.

When a true contact ring appears on valve seating, withdraw the valve and clean away all abrasive with petrol. A good test of a true valve seating is to chalk strokes across the seating of the valve head and cylinder head in similar positions to the figures on a clock face. The valve is then replaced on to its seating and a slight turn in one direction should break each chalk line.

REASSEMBLING THE CYLINDER HEAD, etc. is merely a reversal of the dismantling operation, BUT DO NOT OVERLOOK RESETTING THE CLIP SECURING THE OIL FEED PIPE TO THE NEARSIDE OF THE CYLINDER HEAD. Smear the valve stems with oil before refitting to their guides and be quite sure that the valves are returned to the correct seatings. Check the valve clearances by slackening the lock nut of the ball pin in the rocker arm, and turning the adjusting screw until the following clearances are given :

Inlet valves	.005 in.
Exhaust valves	.007 in.

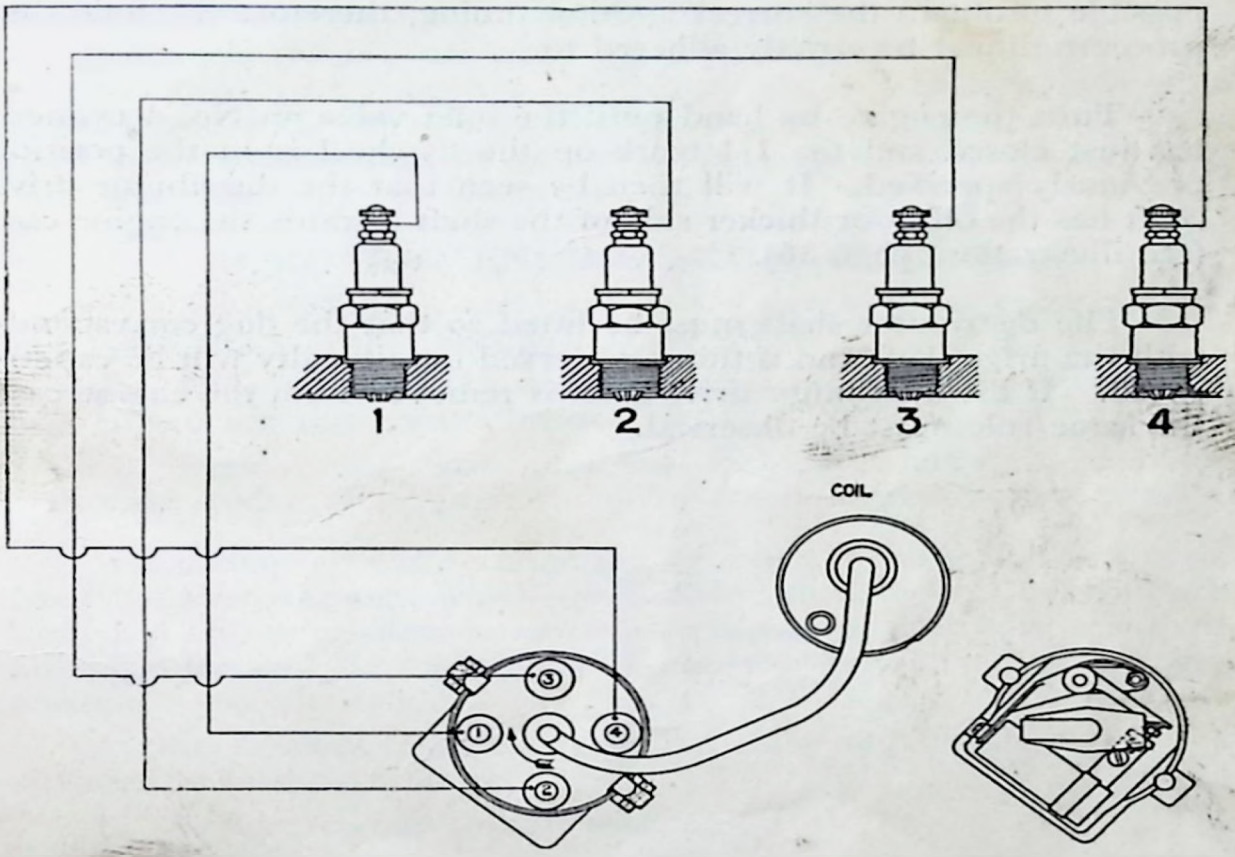
Tighten the lock nut and turn the camshaft in a clockwise direction until the inlet valve of No. 4 cylinder is about to open. Replace the gasket and cylinder head to the engine and tighten the head nuts evenly half a turn at a time, working from the centre outwards. Reassemble the oil feed pipe to the camshaft assembly. Remount the camshaft chain wheel and lock into position, not overlooking the correct location of the tab washer with the chain wheel stud.

If the previous instructions have been closely followed, the engine valve timing will be correct, *i.e.*, inlet valve on No. 4 cylinder about to open 20° (1.25/32 in.) before the mark 1/4 on the flywheel is in the centre of the inspection aperture on the offside of the clutch casing (see illustration, page 36), and the distributor rotor arm opposite the segment for No. 1 cylinder high tension lead. It will be noted that when pistons Nos. 1 and 4 are on top dead centre the 1/4 mark denoting this is not on the top of the flywheel but in a position approximately at two o'clock on the clock face, so that the mark is visible through the inspection hole previously mentioned. The illustration will make this point quite clear.

IGNITION TIMING. After any operation which has necessitated the removal of the distributor unit it will be necessary to re-time the ignition. It will be seen from the timing diagram on page 37 that the ignition is firing when fully retarded 5° to 10° (7/16 in. to 7/8 in.) before top dead centre. Continue to turn the engine until the 1/4 mark on the flywheel is 7/16 in. to 7/8 in. before top dead centre.

The firing order of the engine is 1, 3, 4, 2 ; No. 1 cylinder being nearest to the radiator. ALWAYS TIME ON NO. 1 CYLINDER.

Remove engine top cover and turn the engine until the inlet valve on No. 1 cylinder closes.



Remove the distributor cover and the contact breaker points at this position should be about to open. Should this not be the case, release the distributor clip nut and turn the distributor body anti-clockwise until the contact breaker points just begin to open, then tighten the clip nut.

Replace the distributor cover after noting which segment makes contact with the rotating arm. The lead to No. 1 sparking plug must be plugged in opposite this segment. Proceeding in a clockwise direction, place the lead of No. 3 sparking plug opposite the next segment, then that for No. 4 plug and finally the lead for No. 2 plug in the last position.

Test the engine after this setting, and any slight variation which may seem necessary can be made by slackening the distributor clip nut and slightly rotating the distributor. Turning clockwise will retard the ignition and anti-clockwise will advance it.

If the ignition is too early, the engine will be inclined to knock when pulling at low engine speeds. Late ignition causes overheating and lack of power.

Notice, when the distributor is removed from the distributor drive shaft, that the dog of the distributor shaft is offset, *i.e.*, out of centre. It is very important when replacing the distributor to be quite certain that it is replaced correctly or otherwise it will be impossible to obtain the correct ignition timing, therefore the following procedure must be strictly adhered to.

Turn the engine by hand until the inlet valve on No. 4 cylinder has just closed and the 1/4 mark on the flywheel is in the position previously specified. It will then be seen that the distributor drive shaft has the offset or thicker side of the shaft towards the engine case (see illustration, page 36).

The distributor shaft must be fitted so that the dog corresponds with the drive shaft and if this is observed no difficulty will be experienced. If the distributor drive shaft is removed from the engine case the same rule must be observed.

OVERHAULING INSTRUCTIONS

When an overhaul to a unit, or to the car as a whole, appears necessary, the Distributor or Dealer from whom the car was purchased should be consulted. All Authorised Singer Distributors are conversant with the car and could carry out any adjustments or repairs that may be required.

If for some reason it is not possible to consult one of our Authorised Distributors or Dealers, we are prepared to receive the unit, or car, at our works for attention, but by way of general interest, this section of the Manual deals with the methods of dismantling various parts of the chassis.

CAUTION.

So much trouble has been experienced through the fitting of spurious spare parts, that the Company feels it necessary to issue a warning and to advise owners of Singer Cars when purchasing spare parts to insist that they are genuine Singer parts, such spares being fully guaranteed by the Company.

REMOVING ENGINE FROM CHASSIS.

(1) Remove bonnet and drain water system (as in paragraphs 1 and 2 of Decarbonising Section).

(2) Disconnect the clips securing the radiator top and bottom hose pipes, and remove the hoses.

(3) Remove the four nuts and lock nuts from the radiator anchorage studs. The radiator may now be removed from the chassis.

It is perhaps as well to point out here that the holes in the chassis front member, through which the radiator anchorage studs pass, are slotted. This is to allow for correctly positioning the radiator so that no difficulty will be experienced when the bonnet is refitted into position.

At the nearside of the engine the following details should be attended to in their order.

1. Remove carburetter air silencer.

2. Remove petrol pipe from carburetter and mechanical petrol pump. The pipe is secured by one clip at the offside of the cylinder head front cover.

3. Disconnect carburetter controls and remove carburetter.

4. Disconnect the starter cable from the battery, also disconnect the cables to the starter motor and dynamo and the starter motor switch controls.

5. Disconnect the oil gauge pipe at the flexible connection.

6. Remove three bolts which secure the starter motor and which also carry the earth return cable. The starter motor may then be removed.

7. Remove three nuts from exhaust pipe flange and disconnect pipe from manifold.

On the offside of the engine it will be necessary to—

8. Disconnect the petrol pipe from the tank to the pump.

9. Disconnect the lead from the coil to the distributor and the low tension and earth lead from the distributor.

10. At this stage it will be advisable to fix the pulley block and tackle in position to take the weight of the engine.

REMOVING GEARBOX.

1. Remove the front seats and carpets and so disclosing twelve wood screws securing the gearbox rubber cover.

2. Remove the propeller shaft guard.

3. Extract the wood screws securing the metal pedal cover to the offside of the front toe-board.

4. Remove bolts from toe-board and floor-boards and remove boards.

5. Remove the floor-board supporting straps. These are secured by four nuts and bolts and two screws.

6. Disconnect the front end of the propeller shaft and the speedometer drive.

7. Remove bolts from the unit rear mounting and lift clear of the cross member.

8. Remove the six bolts securing the clutch housing to the engine case and withdraw the gearbox from the chassis.

9. Remove the centre bolts, one each side of the engine front mounting brackets and lift the engine from the chassis, tilting slightly to the nearside in order to clear the steering box.

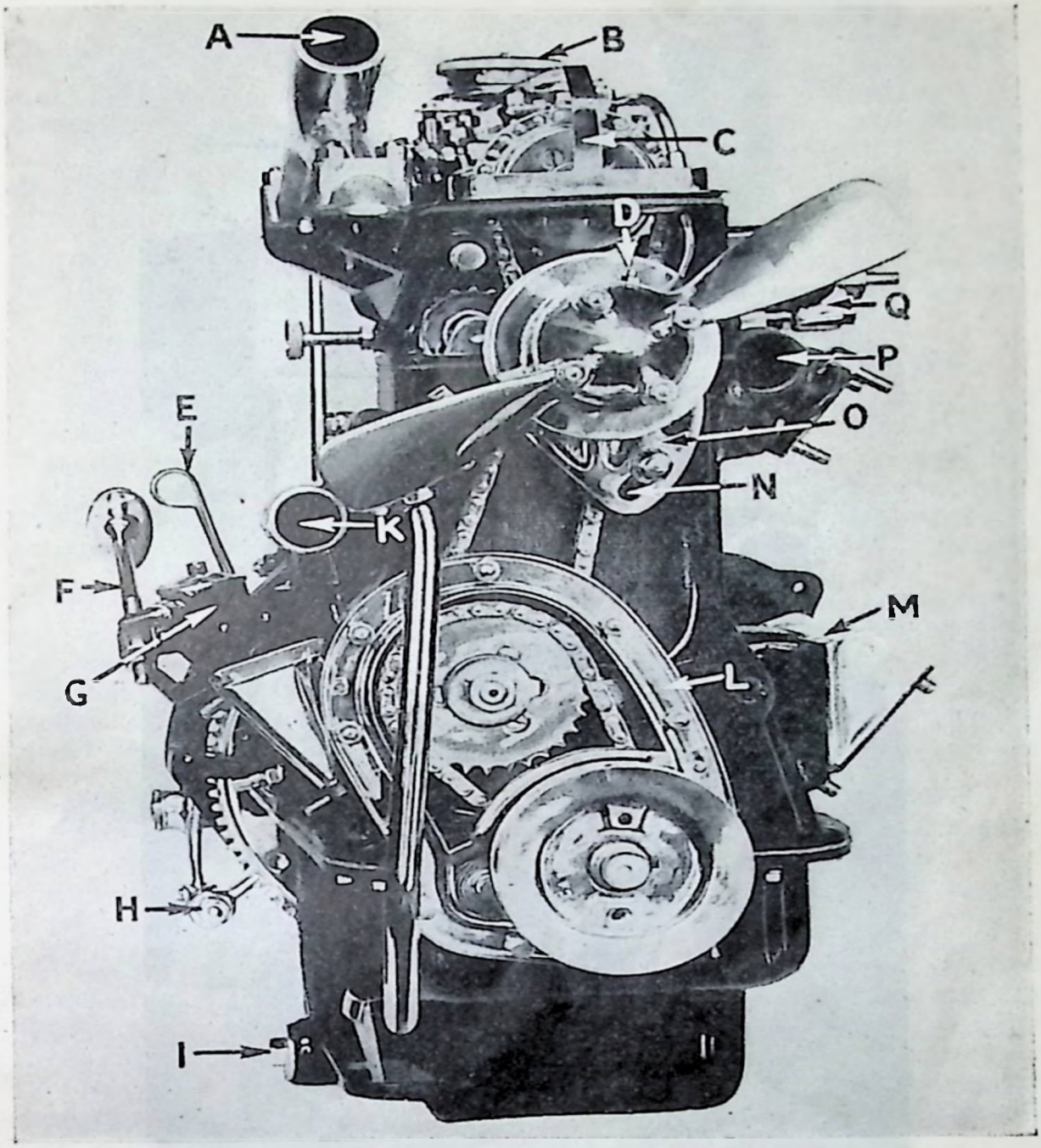
DISMANTLING ENGINE.
REMOVING TIMING CASE, INTERMEDIATE SHAFT ASSEMBLY, ETC.

Slacken off the fan pulley and dynamo adjustment and remove the fan belt.

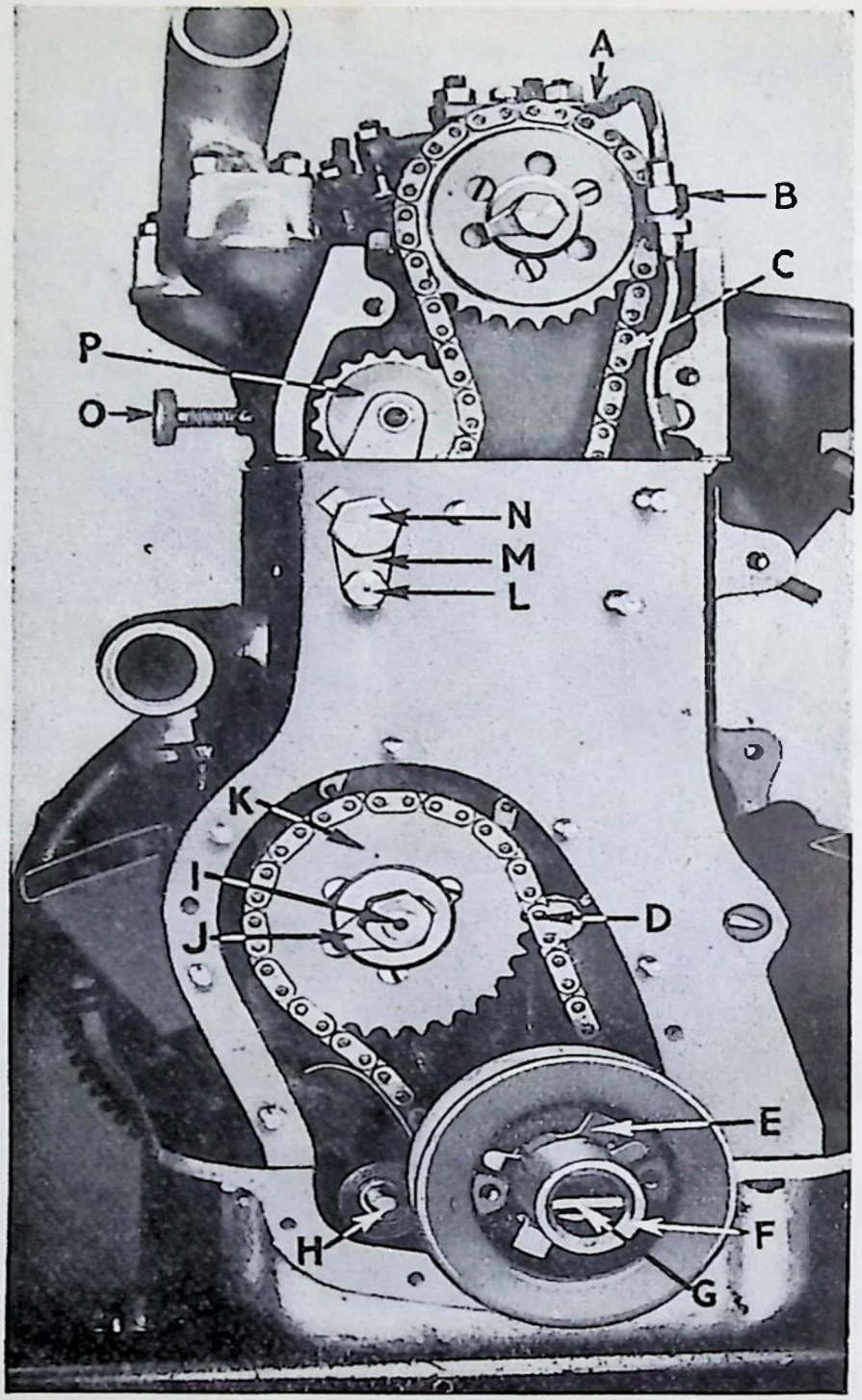
Remove three nuts securing the fan assembly to the cylinder block casting and remove the fan assembly complete.

Remove two nuts and bolts securing the dynamo to engine case and remove dynamo. It now becomes necessary to remove the bottom fan pulley and this is secured to the crankshaft by means of the starting handle dog which is screwed on to the crankshaft and machined with a right hand thread.

The dog assembly is locked into position by two tabs from the locking washer which also register with two bosses cast on the fan pulley. It will be necessary to improvise a tool similar in construction to the starting handle but cut in the opposite direction so that the dog may be unscrewed from the crankshaft.



A. Water outlet pipe.
B. Engine oil filler.
C. Top cover (sectional).
D. Fan bearing greaser.
E. Oil dip stick.
F. Clutch pedal and adjustment.
G. Petrol pump.
H. Clutch lever adjustment.
I. Oil sump drain plug.
K. Water inlet pipe.
L. Timing cover (sectional).
M. Engine bearer bracket.
N. Fan adjustment.
O. Fan bracket.
P. Exhaust manifold.
Q. Induction manifold.



A. Camshaft oil feed pipe.
B. Feed pipe union nut.
C. Camshaft chain.
D. Intermediate shaft driving chain.
E. Fan pulley locking plate.
F. Starting handle dog.
G. Dog pin.
H. Inter chain tensioner.
I. Inter sprocket locking nut.
J. Inter shaft nut locking plate.
K. Inter shaft sprocket.
L. Camshaft chain tensioner sprocket pin.
M. Locking plate
N. Chain tensioner fulcrum pin.
O. Chain tensioner adjusting bolt.
P. Chain tensioner sprocket.

The fan pulley is keyed on to the crankshaft and when removed will disclose the oil flinger and crankshaft sprocket assembly. The crankshaft sprocket too, is keyed on to the crankshaft. The oil flinger is fitted with the bevel of the flinger towards the cover. The timing cover is secured to the engine case by four bolts at the base and seven nuts round the edge of the cover. A cork washer is fitted.

Please note, when refitting the bottom fan pulley it will be best to turn the engine on to top dead centre and be careful when the starting handle dog is locked into position that the peg from the dog is at 90 degrees to top dead centre.

REMOVING INTERMEDIATE SHAFT ASSEMBLY.

First remove the intermediate chain tensioner which is secured to the engine case by a central bolt. Remove one nut, tab washer and plate from the intermediate shaft, remove three driving pins and the intermediate shaft sprocket. The intermediate chain (48 pitches) may then be removed. Remove the set pin and nut locating the intermediate shaft to the engine case and withdraw the shaft from the case.

CAMSHAFT DRIVE CHAIN TENSIONER. This is secured by two bolts from the front of the case. The bolts are locked with tab washers, one bolt acting as a pivot for the jockey sprocket assembly, the other carries the spring which provides tension for the jockey pulley. After removing the bolts the sprocket assembly may be withdrawn from the engine case.

DISMANTLING DISTRIBUTOR DRIVE ASSEMBLY.

First remove two nuts securing the petrol pump to the engine case. Remove the petrol pump and extract the plunger. Next remove one bolt securing the distributor and locking plate to the drive housing and remove the distributor.

In order to remove the distributor drive housing take away two nuts securing the housing to the engine case. This will disclose the distributor drive shaft which is driven from the intermediate shaft by means of a skew gear. The pump drive is taken fron the lower part of the shaft and the removal of the petrol pump plunger, distributor and drive housing will leave the shaft free to be extracted from the engine case.

Particular notice must be taken here that the slot in the distributor drive shaft and the dog on the distributor shaft are offset and if at any time it has been necessary to remove the drive shaft is must be refitted in the following manner.

First, turn the engine until the inlet valve on No. 4 cylinder is just commencing to open. The distributor drive shaft may then be inserted into the engine case until it engages with the dog on the oil pump shaft, but the offset or thicker side on the distributor drive shaft must be towards the engine case, or otherwise it will be impossible to obtain the correct ignition timing. (See illustration, page 36).

REMOVING PISTONS, CONNECTING RODS, ETC.

Remove dip stick and drain engine oil by taking away the drain plug on the offside of the sump. Remove the sump nuts and take away sump, care being taken to avoid damaging the three cork washers which are fitted, one at each side and one to the rear main bearing housing. Care must be taken when refitting the sump to ensure these washers are in the correct position.

Extract split pins and release the nuts from the connecting rod bolts. Remove the connecting rod caps, and push the connecting rods and pistons a little way up the cylinder bores, care being taken to avoid the top piston ring passing over the top face of the cylinder block. The crankshaft may then be revolved to clear each cylinder bore and to allow each connecting rod and piston to be withdrawn from beneath.

The connecting rod bearing is detachable, and there is no need to alter the rod in any way. Should it, for any reason, be necessary to pay some attention to a big end bearing, a new one should be fitted. Filing the butt faces of rod and cap will scrap the assembly, and render it useless for the fitting of replacement bearings.

DISMANTLING MAIN BEARINGS, CRANKSHAFT, ETC.

When sump, connecting rods and pistons have been removed proceed as follows.

To remove clutch from flywheel see page 49.

Remove four nuts and two locking plates securing flywheel to crankshaft.

Dismantle timing case, etc., as indicated on page 42.

Remove tab washers and nuts from main bearing caps and withdraw crankshaft from engine cast.

All three main bearings are detachable and though they are covered by the same part number, when once fitted they must not be interchanged one with the other ; they must be refitted in pairs and in their original positions. The front and centre main bearings are secured by two nuts and tab washers each, but the rear main bearing cap has four nuts and tab washers. No packing shims are fitted between the main bearing caps and the engine case, but detachable thrusts are provided on the centre bearing.

CLUTCH

THE clutch is of the single plate dry disc type, no adjustment for wear being provided in the clutch itself. An individual adjustment is provided for locating each lever in manufacturing but the adjusting nut is locked in place by means of special tab lock washers, and should never be disturbed, unless the clutch is dismantled for replacement of parts.

A graphite release bearing (7) is mounted in a cup (8) attached to throw-out fork, and a release plate (10) is attached to inner ends of release levers (12) by means of retainer springs (11). Release is accomplished by moving the release bearing forward against the release plate (10). The release levers are pivoted on knife edge fulcrums (13) mounted upon clutch cover (4) and at their outer ends shoulder studs (15) extend through holes and are fitted with adjusting nuts (16) by which each lever is located in correct position. The outer or shorter ends of the release levers engage the bearing plate (17) carried upon the shoulder studs (15) attached to pressure plate lugs, and thus the pressure plate (18) is pulled away from the driven plate (3) compressing the several small coil springs (5) which are assembled between the pressure plate and the clutch cover (4).

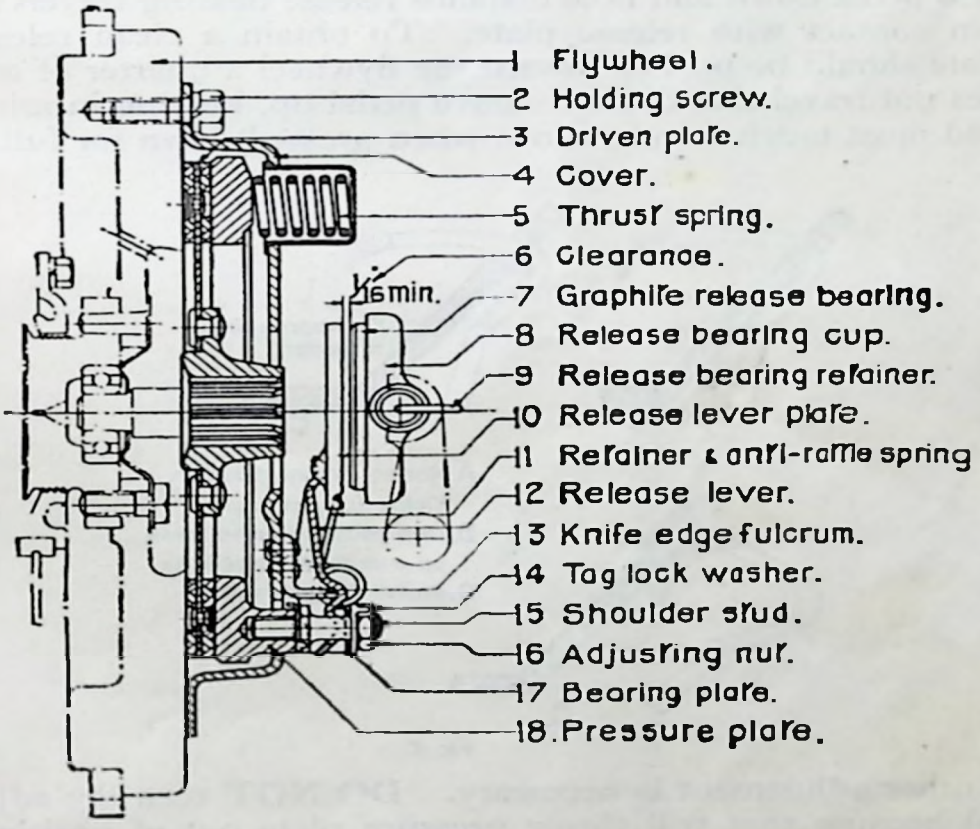


Fig. 1.

When the foot pressure is removed from clutch pedal, the clutch springs force the pressure plate forward against the driven plate, gradually and smoothly applying the power of the engine to the rear wheels.

As the clutch facings wear the pressure plate moves closer to the flywheel face and the outer or shorter ends of the release levers follow. This causes the inner or longer ends of the levers to travel farther toward the gearbox and decreases the clearance between the release lever plate and the release bearing. The effect on the clutch pedal is to decrease the clearance of free travel, which is the distance clutch pedal moves down away from the underside of toe board before release bearing comes in contact with release lever plate. Some free movement must always be maintained to prevent clutch pedal riding against underside of the toe board and causing clutch to slip. This free movement is restored by adjusting the clutch pedal.

Adjust the pedal away from the stop until clearance or free movement is approximately three-quarters of an inch. The pedal should come in contact with the other stop when pedal is pressed down. If it does not move that far, further adjustment is necessary.

When this adjustment has been made a minimum clearance of one-sixteenth of an inch (6) (Fig. 1) between Graphite Release Bearing and Release Lever Plate should be obtained.

Press pedal down and note distance release bearing travels after it comes in contact with release plate. To obtain a clean release the lever plate should be pushed toward the flywheel a quarter of an inch. If it does not travel that distance move pedal up, bearing in mind that pedal pad must touch stop as above when pressed down for full clutch release.

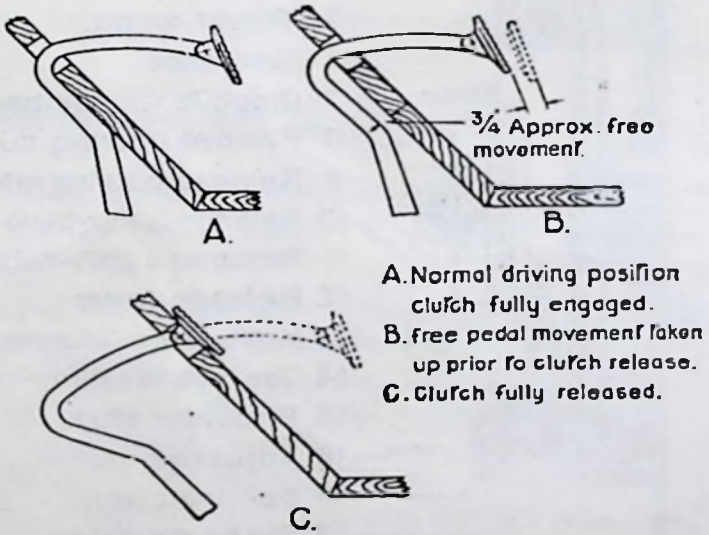


Fig 2

No other adjustment is necessary. DO NOT turn the adjusting nuts (16) because that will throw pressure plate out of position and cause clutch to chatter.

REMOVING CLUTCH FROM FLYWHEEL.

To remove clutch from flywheel (1) (Fig. 1) it is necessary to remove the holding screws (2) (Fig. 1). Loosen each of holding screws a turn or two at a time until the spring pressure is relieved (this should be carefully done to prevent springing the flanged edge of cover). The screws can then be removed and the complete clutch lifted off the flywheel, all parts except driven plate (3) (Fig. 1) being assembled to the cover.

CAUTION.

Do not under any circumstances let gearbox hang in clutch assembly during removing or refitting of gearbox to engine.

Do not drive with foot on clutch pedal.

Do not slip clutch excessively instead of changing gears, as this causes rapid wear of clutch facings.

Do not put oil, grease, or paraffin in the clutch. Keep facings dry and free from oil.

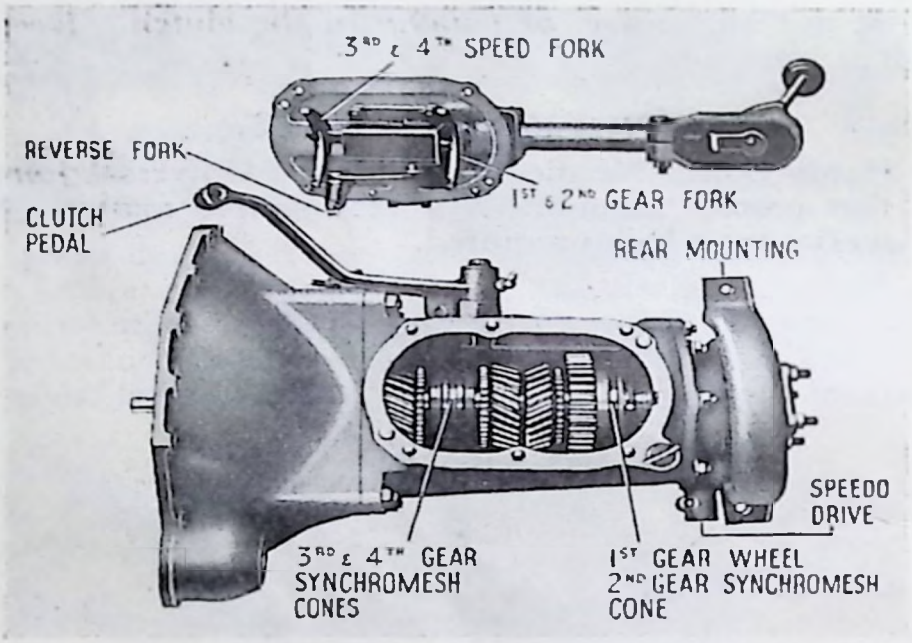
PROPELLER SHAFT.

The Hardy Spicer Needle Bearing Type Universal Joints are so designed that correct assembly is a very simple matter. No hand fitting or special tools being required.

SYNCHROMESH GEARBOX

The gearbox is a completely new unit embracing several improvements to provide silent running, easier gear-changing and more convenient servicing conditions. The shafts are more robust and all gear wheels are made from the highest quality casehardening alloy steel of great strength and durability. The gear teeth are Form Ground throughout after heat treatment, which eliminates tooth distortion and consequent uneven loading.

If the gearbox requires inspection for wear of synchro cones, bushes or bearings, it is now possible to do so without removing the gearbox from the chassis, as the change gear mechanism is integral with the gearbox cover and remote control, the removal of this, therefore, leaves the gears and synchromesh sleeves open for examination.



Procedure for dismantling is consequently simplified as follows :—

1. Detach top cover complete with striking gear and control by removing six nuts and washers, be sure that the change speed lever is in neutral before lifting.

2. To check wear of synchro cones, move sleeves towards the engaging teeth of each gear until the cones make contact. If the sleeve is then close to or touching the toothed ring the cones will need renewal ; normally there should be $\frac{1}{8}$" space between the ends of the sleeves and the teeth when cones are in contact.

3. To renew these parts detach gearbox from engine as follows.

4. Remove carpets, floorboards and uncouple the propeller shaft flange, then detach the rear mounting cradle, speedometer cable and clutch pedal connection, leaving the gearbox ready to withdraw from the engine by removing the sheet-metal cover under the clutch housing and seven bolts and washers from the clutch housing.

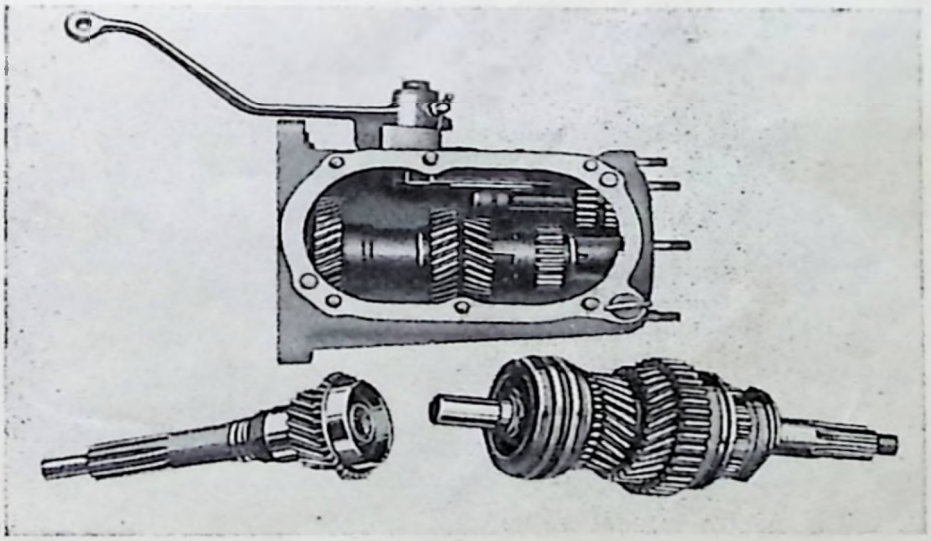
As the engine unit is flexibly mounted in the chassis it will be necessary to lift slightly the engine by means of a jack or block under the oil sump, just enough to raise the gearbox free of the frame member, when it can be drawn away and removed.

5. To remove constant mesh pinion (clutch end) and the mainshaft complete with gears.

(*a*) Remove clutch housing and nut securing ball bearing, then the rear cover of gearbox, first withdrawing the propeller shaft flange and the speedometer driving pinion and bearing.

(*b*) Carefully tap each ball bearing outwards, from the inside of gearbox, until they are free, when the complete shaft can be raised and the mainshaft assembly and the constant mesh pinion can be drawn apart, enabling the mainshaft to be tilted upwards and withdrawn from the box.

(*c*) Both synchro sleeves can then be pulled off the mainshaft. If there is excessive end play or wear of bushes of the 2nd and 3rd gears these can be easily detached by removing the circlip and withdrawing the key, securing the front thrust ring, after which the thrust ring can be turned and slid off the splines, thus releasing the gears and bushes.



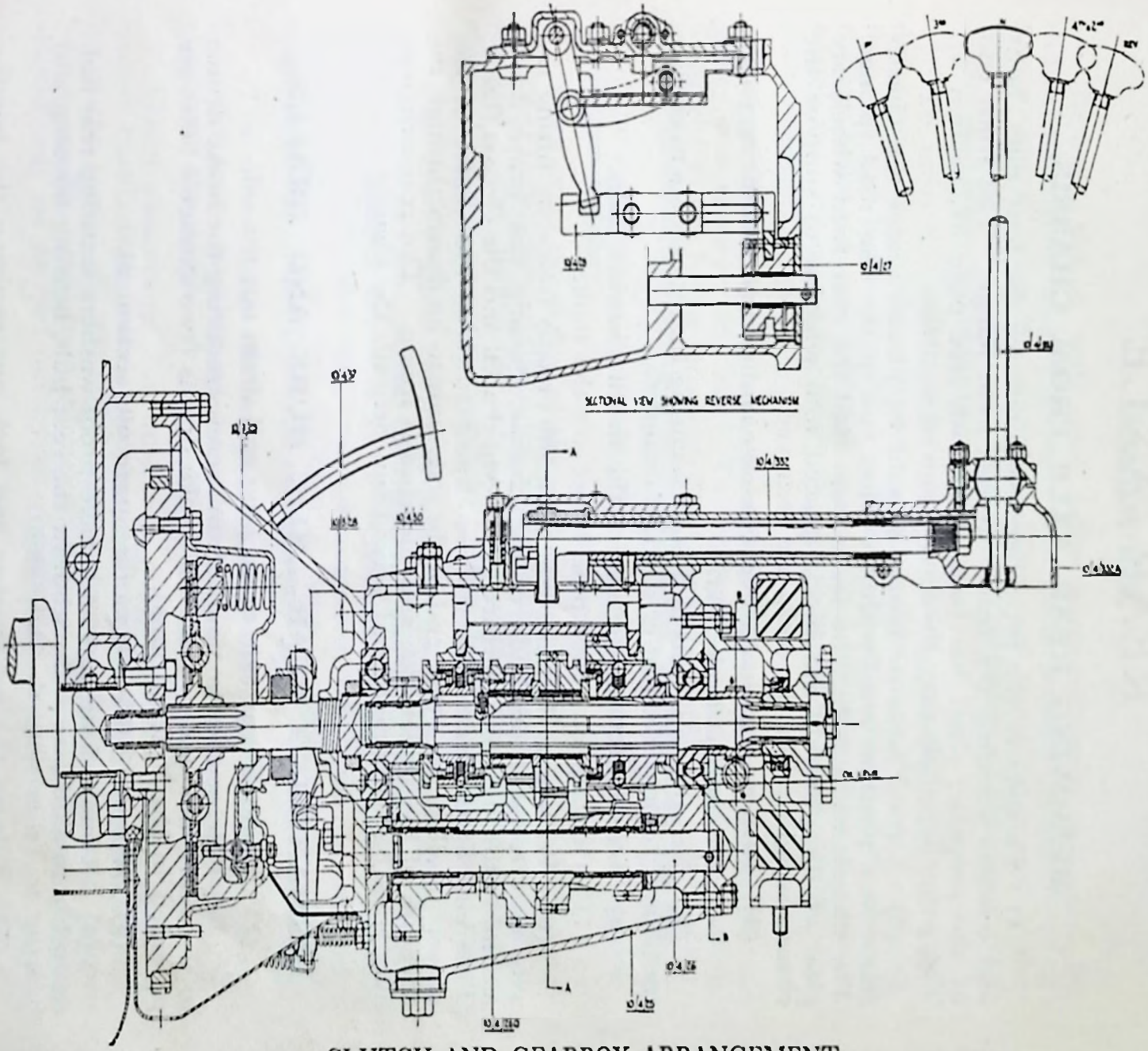
6. This now leaves the layshaft and reverse gear, which are both easy to remove by withdrawing the locking pin that prevents the layshaft and reverse pinion shaft from revolving.

The layshaft should be pushed out from the front or clutch end and the reverse pinion can be withdrawn from the cover end, after removing the circular plate and the reverse fork locating bracket.

7. As the gears on the layshaft have ground teeth the assembly has to be built up with separate gears, which are kept in place with a spring ring fitted in a groove at the large wheel end under the thrust washer.

If at any time these gears are replaced great care must be used to see that the splines and all end faces are perfectly free from dust or grit, and that the surfaces are not in any way bruised or burred, as it is vitally important that when re-assembled, all gears should run dead true. It would be a good plan to check this by clocking each gear between centres, or to return the layshaft to our Service Depot for renewal.

8. Before re-assembling be sure to thoroughly clean the interior of the box.



CLUTCH AND GEARBOX ARRANGEMENT

REAR AXLE

REMOVING REAR AXLE FROM CHASSIS.

(1) To remove the propeller shaft, remove the four nuts, bolts and washers securing the rear universal joint flange. The front end of the propeller shaft has been dealt with (see page 51, section 4). The propeller shaft may then be removed entirely.

(2) Lifting jacks or blocks should be placed under the chassis frame at a position level with the front end of the rear road springs. The chassis should then be jacked up until the rear road wheels are clear of the ground, and blocks placed into position to support the chassis weight when the jacks are removed.

(3) Remove the road wheels, release and remove the lifting jacks.

(4) Disconnect brake rod.

(5) Remove four nuts and bolts securing buffer carriers to chassis frame and remove the buffer carriers complete.

(6) Disconnect the top end of the shock absorber links.

(7) Disconnect petrol pipe line from the tank.

(8) Withdraw the rear axle from the chassis frame by lifting the axle unit towards one side of the chassis, passing one brake drum assembly through the aperture of the wheel arch and the chassis frame. This end of the axle unit will be drawn towards the centre of the chassis to allow the other end of the axle unit to be drawn through the aperture of the wheel arch and the chassis frame. The rear axle unit may then be withdrawn end ways from beneath the chassis.

DISMANTLING REAR AXLE, HUBS AND BRAKES.

(1) Remove rear axle drain plug and drain out the oil.

(2) Release the two countersunk screws securing the brake drums to the rear hubs and remove the brake drums (two extractor holes are provided in the brake drums).

(3) Remove brake shoes (see page 60, section 3).

(4) Remove four nuts and shake-proof washers securing rear hub assembly to axle case and withdraw the rear hub, bearing housing and bearing together with the axle shaft.

(5) Release the tab washer and lock nut securing the bearing housing and bearing to the rear hub and withdraw the bearing housing and bearing together. Remove the bearing and washer from the bearing housing. The rubber moulded oil seal can remain in position but care must be taken when withdrawing and replacing axle shafts by guiding them in or out of the seal, without allowing the shafts to fall and distort the rubber sealing surface.

REMOVING AND STRIPPING THE DIFFERENTIAL ASSEMBLY.

Remove the 4 nuts and bolts securing universal joint to differential drive flange; Remove the bolts around pinion housing flange thus allowing the complete differential to be taken out of the axle after the axle shafts have been withdrawn clear of the differential centre (see instructions on page 54).

To strip the differential, bend back the locking tabs on main differential case bearing caps—taking care to mark the caps in order that they can be re-assembled in their original position—then remove the cap bolts together with the caps. This will then allow the crown wheel, the carrier and the bearings with shims to be removed from the main housing.

Next remove the split pin from the nut on the end of the pinion shaft, and remove the nut. To prevent the flange from rotating while the nut is being removed, hold the flange with a 2 peg spanner located in the two opposite holes in this flange, then draw off the flange.

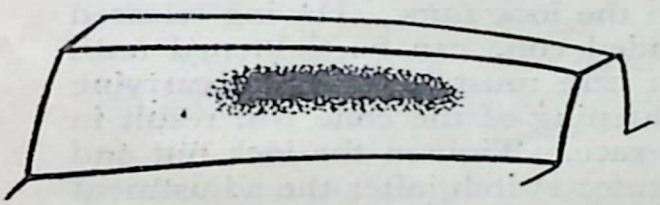
The spiral bevel pinion can then be pressed out of the rear bearing and pinion housing.

To extract the differential case bearings use a drag fitted behind the inner thrust face of the taper bearing and tighten drag screw against the end of the differential case, thus removing the bearing from the case. This will of course apply to both ends of the differential case.

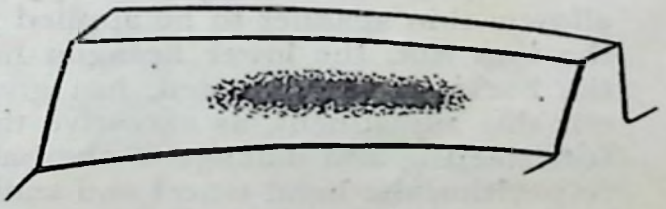
The crown wheel can be removed from the differential case by releasing the tab washers and the hexagon bolts at the back of the flange. The small hexagon screw is for the differential cross pin which locates the pinions and, after this has been removed, the cross pin, the differential pinion, and the differential wheels together with thrust washers can be taken from the differential case.

The outer races of the spiral pinion bearings can be removed from the main housing by means of the extractor slots through the abutment shoulders.

When assembling the unit care must be taken to see that the correct backlash and tooth marking is obtained. The backlash should be in the region of .006"/.008" with a tooth marking as shown below which can be varied by a thinner or thicker shim; but this operation should only be carried out by an experienced engineer.



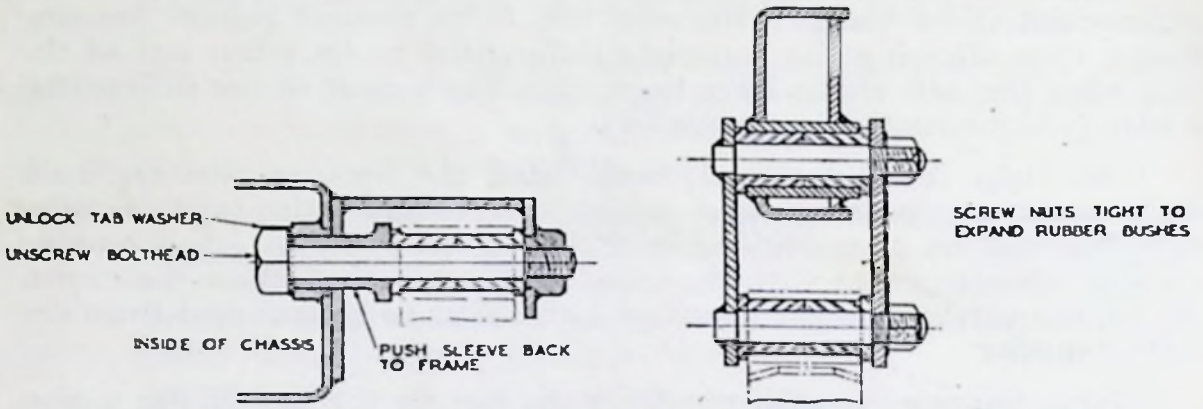
(a) Pinion (same on both sides).



(b) Gear (same on both sides).

MOUNTING OF SUSPENSION SPRINGS.

All road springs are mounted on rubber bushes of a special type, they do not require lubrication and MUST be kept free from oil or grease.



Typical Section Through Spring Shackles (Front and Rear).

When removing the shackle bolts it will be noticed that these bushes are slack enough to be easily removed, and when refitting it is important to see that all nuts are fully tightened up to the shoulder of the bolts, which will impose the necessary pressure for expanding the rubber, see illustrations above.

STEERING & FRONT AXLE ASSEMBLY

THE only attention the steering box requires is the periodic replenishment of the oil level as described in the paragraph under "Monthly Attentions". No adjustment is provided in the steering box itself, but slackness or backlash in the steering column can be corrected by adjustment at the top of the column.

This adjustment should only be carried out by a skilled mechanic : but in order that the owner should be fully conversant with the adjustment, the following is a brief description of the bearing assembly at the top of the column :—

The top bearing consists of a cup and cone ball race and the adjustment takes the form of a threaded cone and lock nut. To obtain access to the adjusting nuts, release the pinch bolt securing the trafficator switch stator tube to the steering box bottom cover and draw the switch assembly out about 12 inches. Next mark the position of the trafficator switch actuating cam in the hub of the steering wheel and detach the cam by removing the screw securing it. Then remove the nut holding the steering wheel to the steering mast just sufficiently to allow a thin spanner to be applied to the lock nuts. Having released the lock nut, the lower hexagon headed cone can be tightened until the backlash is eliminated, but great care must be taken in carrying out this adjustment, as excessive tightening of the cone will result in stiff steering and damage to the ball race. Tighten the lock nut and re-position the hand wheel and trafficator switch, after the adjustment has been made.

TRACK ROD AND DRAG LINK.

This assembly should require very little attention other than applying the grease gun to the grease nipples fitted to the ball joints every 5,000 miles.

The universal joints of the track rod and drag link are self-adjusting and provided they are lubricated in the manner advised on the lubricating chart, should require no further attention.

If front tyre wear appears excessive or the steering feels unsteady it is advisable to check the alignment of the front wheels. When correctly adjusted these should "toe in" one-eighth inch at the front—this measurement being taken from the inside of one rim to the inside of the other rim at a height of approximately one foot from the ground. If this toe-in is not correct, proceed as follows :—

Release the lock nuts on each end of the steering track rod, and turn the rod in the required direction to shorten or lengthen it, to obtain the required toe-in of the front wheels, i.e., $\frac{1}{8}$". This procedure is possible since the ends of the rod are thread with right and left threads. On the completion of the adjustment and before re-tightening the lock nuts make sure that the end faces of the joints are in the same plane, and thus avoid cross binding when on locks.

DISMANTLING FRONT AXLE ASSEMBLY.

(1) Remove each road wheel from its hub by removing the cover plate, and the four wheel nuts.

(2) Release the two screws securing the brake drum to its hub and remove the brake drum.

(3) Remove the split pin and nut and withdraw the hub assembly from the stub axle.

(4) Dismantle the hub by releasing the two screws securing the bearing housing to the hub, and extract the two bearings, distance piece and oil retaining washers.

(5) Remove each stub axle, track rod and the coupling tube. First release the four bolts, nuts and spring washers securing the brake back plate to the stub axle, and remove the plate and brake shoes complete.

(6) Release the nuts securing the track rod and coupling tube ball joints to the swivel levers, and remove both rods.

(7) Remove the nut and washer from the cotter pin which secures each swivel pin through the axle beam, knock out the cotter pin and withdraw the swivel pin, thereby releasing the stub axle.

GIRLING BRAKES

THE brake shoes are pressed from solid drawn "T" section steel, and are operated by the expander shown in Fig. 1 (see illustration printed on the back of the Lubrication Chart). The hardened steel cone (1) which is actuated by the pull rod (2) causes the plungers (3) to move outwards. Hardened steel rollers (4) are interposed between the cone and the plungers to reduce friction to a minimum. The plungers engage directly with the brake shoe webs. The whole expander mechanism is enclosed in a die cast housing (5) which contains a supply of lubricant (Duckham's Keenol Grease K.G.20) and protects the moving parts from mud, etc. This housing is slidably attached to the backplate (6) by studs and spring washers (7) which provide a slight frictional contact. The housing does not withstand any of the stresses set up by braking as it virtually floats between the brake shoes. In view of this fact it will be realised that the brake shoes are self-centring under the influence of the brake shoe pull-off springs. It will be noticed that the rollers (4) are freely mounted and roll up grooves in the plunger and down the inclined face of the cone. When shoes are removed for relining pin (8) retains the plungers in position in the housing. This type of shoe expander provides a high step-up ratio and multiplies the low input effort of the pull rods very considerably (6.3 to 1).

Adjustment for brake lining wear is made by the brake shoe adjuster (Fig. 2). One of these is found on each backplate. This is the only adjustment required, and provided in the whole system.

Reference to Fig. 2 shows the method by which lining wear is taken up. A hardened steel cone (A), the spindle of which is screwed with a fine thread, is carried in a steel housing (B) which is spigotted and bolted firmly to the backplate. On the outside end of the cone spindle are machined flats which enable a spanner to be used, and on its inner face four flats of a pre-determined depth are cut.

The cone engages two plungers (C) also with a bearing in the housings (B) which have inclined faces. On the outer end of these plungers, actuate grooves are formed in which the brake shoes are carried. The housing and cone are both cadmium plated to prevent rust, and the thread of the cone spindle remains inside the housing at all times, thus preventing damage.

For adjustment, the rotation of the cone in a clockwise direction causes it to move inwards, forcing apart the plungers and expanding the fulcrum ends of the brake shoes. All cones operate in a clockwise direction (see illustration on page 60).

When adjustment is made, rotate the cone with a spanner until a resistance is felt (this is the shoe coming into contact with the drum), then slack back the cone one full notch or two clicks, which can be felt and heard quite plainly. All drums should be treated in a similar manner. Adjustment for lining wear should take place with the car in its running position, which is on the ground. Jacking up is not recommended, and is also unnecessary for this operation. The car

should stand on a flat and level surface and the hand brake should be released before any attention is given. THIS IS MOST IMPORTANT. After adjustment is completed, it is advisable to give the brake pedal a firm application before test in order to ensure that the expander is centralised and the shoes quite free in the drums. THIS IS THE ONLY ADJUSTMENT REQUIRED. DO NOT TIGHTEN UP THE BRASS EXPANDER NUTS ON THE OUTSIDE OF THE BACKPLATE. THESE SHOULD BE ONE TURN SLACK. THE ALUMINIUM HOUSING MUST BE FREED TO FLOAT.

Do not forget the double coil spring under these brass nuts.

Do not forget to check all plungers in the adjuster and expander units for easy working.

Do not forget the adjuster plungers in the inclined type are right and left hand. If wrongly fitted, four clicks for one full turn will not be heard.

Do not handle linings with greasy hands. Keep as clean as possible.

Do not overstretch shoe pull-off springs when removing or refitting shoes.

Do not forget when relining or checking Girling brakes that to ensure a correct clearance between the shoes and the drum it is a good policy to always reset the adjuster housing. The holes in the backplate for the two $\frac{3}{8}$" fixing bolts are clearance to allow a slight radial movement of this housing and this will counteract any slight variation of the shoes which may accrue during manufacture.

Do not forget that Duckham's Keenol Grease K.G.20 is recommended for all brake lubrication when necessary, *i.e.*, when reassembling.

Do not forget that a small and often made adjustment is much cheaper than a lengthy overhaul through neglect.

Do not forget to obtain genuine relined replacement shoes, available from the sole makers or any Singer dealer.

The Girling Brake requires very little lubrication or attention of any sort whatever. The adjuster and expander housings retain an adequate supply of lubricant and the balance levers work on a fixed fulcrum with the interposition of self-lubricating bushes. Holes in brake jaws are appreciably larger than the pins which fit them, but no rattle is present as the entire linkage is loaded by a light spring in the pedal assembly. This type of joint is also very efficient.

It will thus be seen that a brake of extreme power and which requires no great physical effort to operate, is attained by due attention to simple mechanical principles. The use of a high leverage between pedal and shoe tip, coupled with an almost complete elimination of friction and lost motion, gives all the power that can be safely utilised.

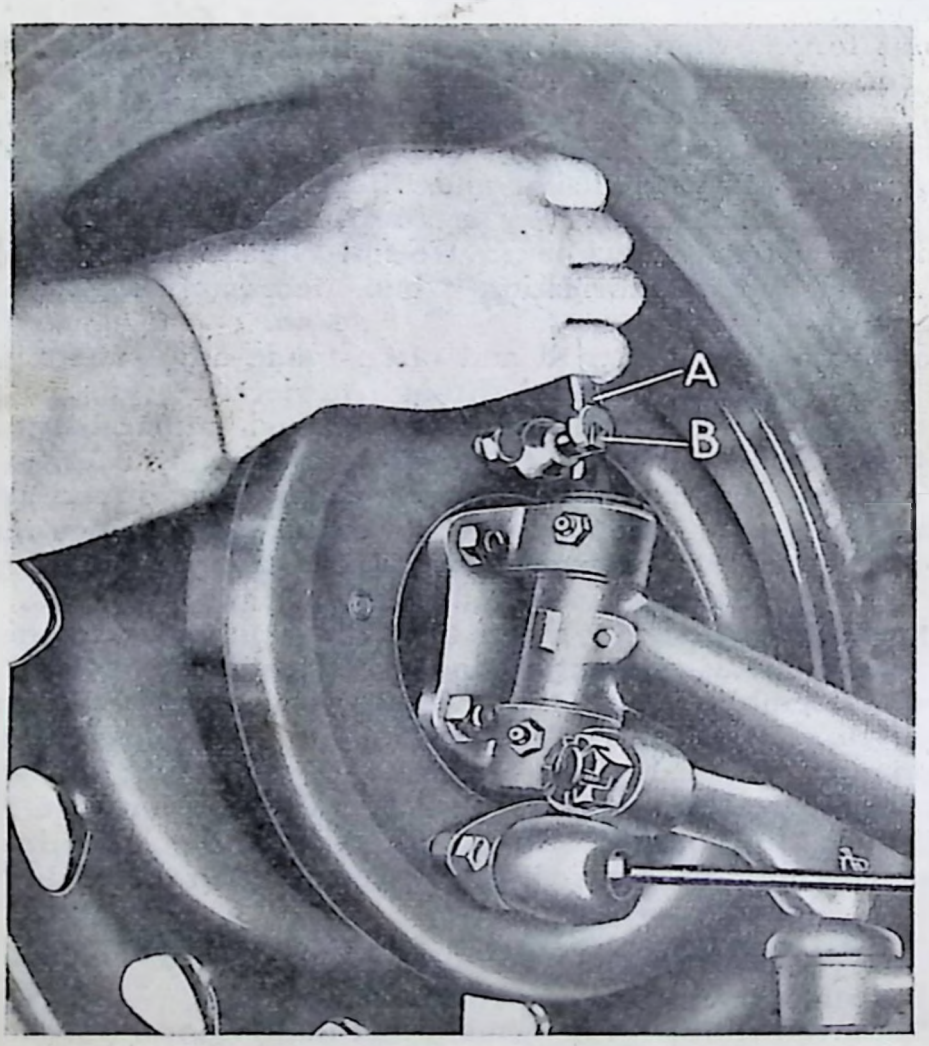
THE RELINING OF GIRLING BRAKES.

1. Jack up car and remove road wheels.
2. Remove drums. The general method of mounting each drum is on a spigot with small countersunk screws. Take out these screws and the drum can be withdrawn, disclosing the brake shoes, etc.

3. To dismantle the brake all that is required is a large screwdriver. Rest the screwdriver against one of the backplate fixing bolts, and it will be found quite easy to prise one shoe out of the groove in the plunger at expander end. Both shoes and springs can now be removed, leaving expander and adjuster units in position on the backplate. Do not detach these units from backplate. Do not overstretch shoe springs when removing shoes.

4. Clean down backplate, check expander unit for free float. THIS IS IMPORTANT. Check adjuster unit for easy working, and slack back (anti-clockwise) to the full "off" position. Lubricate where necessary with Duckham's Keenol Grease K.G.20. Inspect shoe pull-off springs and replace if stretched or damaged.

5. To refit new shoes detach springs from old shoes and refit to new shoes. Be sure that the springs are between shoe webs and backplate, otherwise shoes will not be flat on backplate. Keep all grease off linings and do not handle linings any more than necessary. Place shoes with spring attached against backplate. Shoes have half-round slots at one end. Fit these slots to the adjuster plungers then



A. Adjusting spanner. B. Adjusting nut.

insert other end of one shoe in the expander plunger. Place the screwdriver under the web of the remaining shoe and against the bolt on the backplate. Ease the shoe in the plunger groove.

6. Refit drums ; be sure these are clean and free from grease, etc

7. To ensure correct clearance between shoes and drums, slack off set pins that hold adjuster unit to backplate (not more than one complete turn) and lock up the brake shoes in the drum by turning the adjuster cone spindle in a clockwise direction. Screw up adjuster set pins tightly and slack off the adjuster cone spindle one full notch or two clicks, which can be felt and heard. Give the brake pedal a firm application to ensure the shoes have centralised at the expander end. Drums should now be quite free.

8. Refit road wheels and jack down.

The operation of relining a Girling Brake is now completed—nothing further is required, and car is now ready for the road.

Always fit Girling replacement shoes. These are correctly riveted, and ground to correct periphery, which ensures a fast and easy bed-in to drums.

Check brakes as previously described for full and correct adjustment. Assuming the brakes have received the above attention and are correct, the first point to receive attention are balance units situated as follows :—(see Fig. 3 on the back of the lubricating chart).

1. On the front axle to balance offside and nearside front wheels.
2. On the rear axle to balance offside and nearside rear wheels.
3. On the brake pedal to proportion the braking of front wheels to rear wheels.

Having checked balance units No. 1 and No. 2 for free working connect up the transverse rods (4) from the brakes to the compensators, beginning this operation by first screwing the rods into the screwed sockets (5) on the end of the brake draw links which protrudes from the expander units. Be sure when screwing these rods home, that they screw right into the sockets and butt up against the ends of the draw links. Now tighten firmly the locknuts (6) using two spanners for this operation. At the compensator end of each transverse rod will be found screwed fork end (7). By this means the position of the balance unit is set ; the main body of the fulcrum type must be vertical to the axle and the long lever which carries the longitudinal rod (8) should be approximately $\frac{3}{4}$" before a line parallel to the centre line of front axle and $\frac{3}{4}$" behind a similar line to the rear axle.

By setting the long lever in this position first, it automatically sets the position of the two small bottom levers, these being machined integral. Now connect the transverse rods (4) to the two small levers, taking care to retain the long lever in position as described. ' There is a flat link (9) type of balance unit. The flat link connected to the axle must be parallel to the longitudinal rod, a position obtained by adjustment on the screwed fork ends of the transverse rods, but still maintaining the position of the long lever as described above. Do not make any adjustment whatever at the coupling on the rear transverse

rods close to the brake expander. The next operation is to connect the longitudinal rods (8) to the long levers of each balance unit on front and rear axle. Where there are any connecting or swinging links see that these are lying approximately $\frac{3}{4}$" towards whichever axle they belong. Now to arrive at the pedal (10). First see that the pedal is in its highest position, keeping this position by either tying back or supporting it in some way. Carry forward the work of connecting the longitudinal rods (8) to the pedal rocker. Situated on the pedal are two small rocker arms, and the pedal boss is drilled to take a small spring plunger. When correctly adjusted there is a 1/16" gap between these rocker arms and the pedal boss. The spring plunger is the means of obviating rod rattle (Fig. 4 on the back of the lubricating chart).

Adjust the front longitudinal rod until the required 1/16" gap is at the front rocker arm. Adjust rear longitudinal rod until there is 1/16" gap at rear rocker arm, Fig. 4. Now adjust the control spring through which the rear longitudinal rod passes. This should be adjusted to a given length 1.11/16, Fig. 4. The adjustment is now completed and car should be quite satisfactory to drive away for all conditions.

PLEASE NOTE. Duckham's Keenol K.G.20 grease can be supplied by any Singer dealer, or direct from our Service Department.

SHOCK ABSORBERS

THE Armstrong New Super Double-Acting Self-Regulating Hydraulic Shock absorber is of the Vertical Cylinder Type. All working parts are submerged in oil.

CONSTRUCTION.

The body A is a zinc alloy die casting and bolts directly on to the frame of the car, the two cylinders B and C being connected by passages E and F. The double crank G and arm H are a force fit on serrated portions of spindle I, which rotates in the body A on generous double bearings. Connecting rods J connect the crank G to pistons K to which non-return recuperating valves N are fitted. The arm H is connected to the axle of the car by link L.

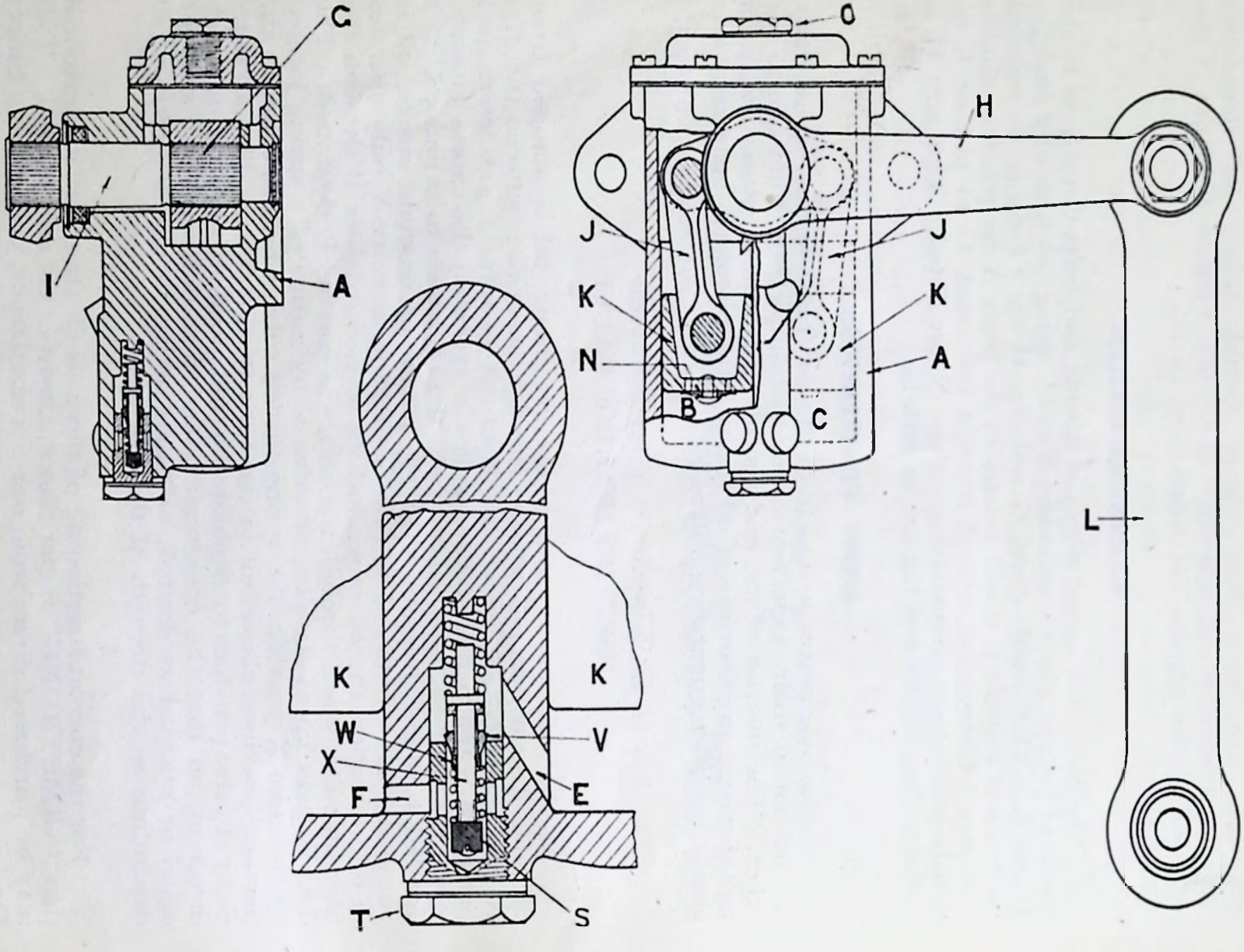
HOW IT WORKS.

As the axle moves to and from the car frame so the pistons move in and out of their respective cylinders pumping oil from one to the other. The interior of the body is filled with oil to within $\frac{3}{8}$in. from top of cover, any shortage of oil beneath the pistons is instantly made good through recuperating valves N.

The flow of oil, however, is governed by the
ORIFICE RELIEF VALVE.

As the axle moves towards the car frame, oil is pumped from cylinder B to cylinder C passing through an orifice between the disc W and the valve V, which has been set to offer a pre-determined resistance. When this leak resistance is exceeded the excess pressure opens the spring-loaded valve V and the oil passes to cylinder C at a decided constant pressure. On the return or rebound stroke, oil is pumped from cylinder C to cylinder B, and as valve V only operates in one direction the oil must find its way to cylinder B through the holes in valve V and through the orifice as previously described. The disc W held up to the face of valve V by means of a spring located on the stem X provides the spring-loaded valve which operates in the manner described above but in the opposite direction. This arrangement of valve provides for separate and independent adjustment in each direction, so that the compression and rebound resistance may be equal or unequal as desired, or single acting in either direction, all depending on the strength of the springs.

For the correct functioning of these shock absorbers it is essential that "ARMSTRONG" Super Shock Absorber Oil only is used. This may be purchased direct from our Service Depot, or from any Singer Dealer.



ORIFICE RELIEF VALVE

BODY, HOOD & SIDE CURTAINS

So far, the main object of this book has been to point out the necessity of bestowing the utmost care and attention upon the mechanical side of the car, but at the same time the appearance and general upkeep of the body and fittings must not be overlooked.

The exterior of the body is finished with cellulose and dust can therefore, always be removed by means of a soft cloth but mud must always be removed by washing either by a pressure pump or by a large sponge and plenty of water. Afterwards the body should be dried with a leather and then polished. The appearance of the cellulose finish is actually improved by frequent polishing and there are many excellent polishes on the market, which if used in accordance with the directions printed on the container, give very satisfactory results. On no account should metal polish be used.

Upholstery can be best cleaned with a good soap and plenty of water but never use petrol or paraffin for this purpose.

Do not use metal polish on the chromium plated fittings—these should be cleaned by washing and, when the dirt has been removed—polishing with a soft duster.

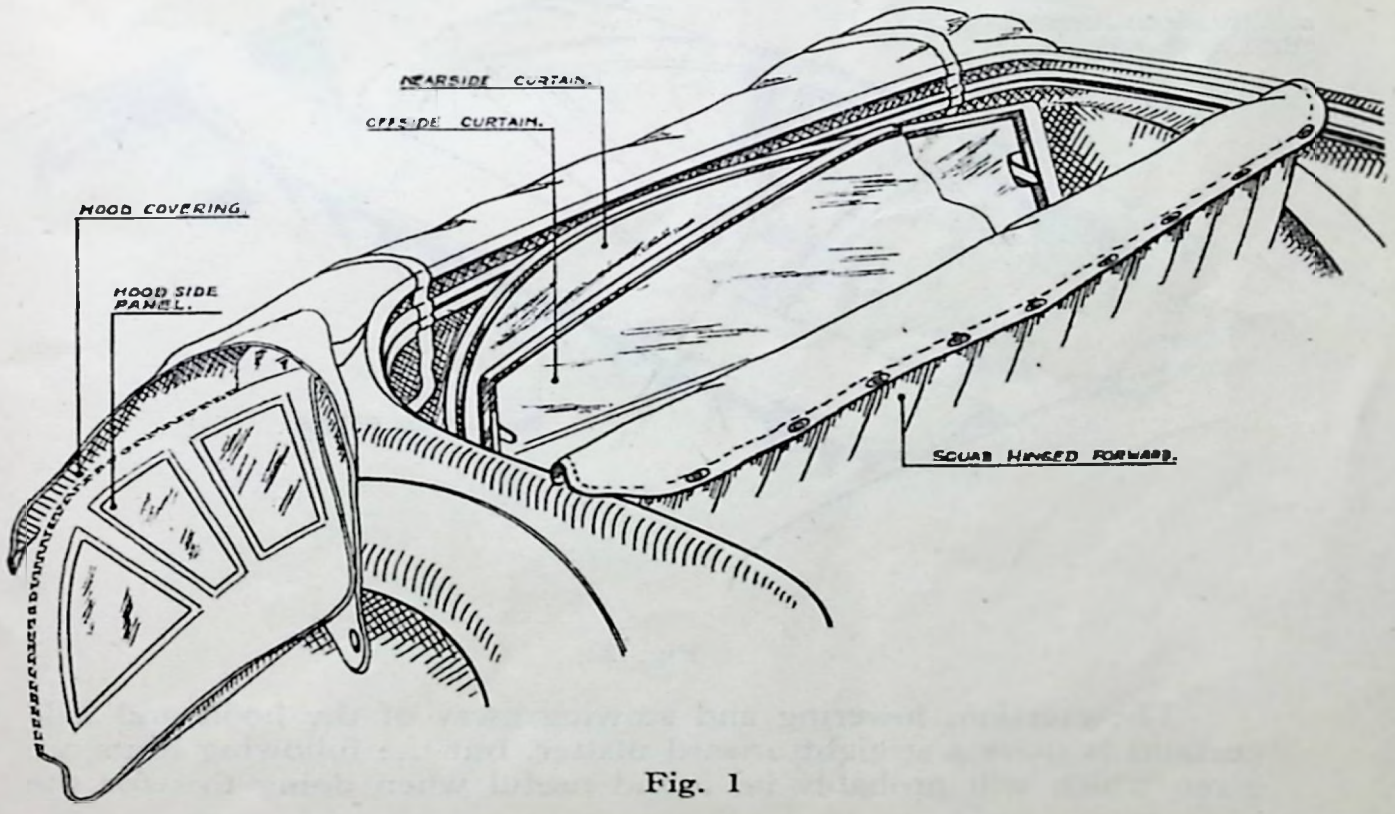


Fig. 1

Thoroughly brush out the floor carpets at least once a week and the instrument panel can be kept in good appearance by the occasional use of a very small amount of ordinary household wax polish.

Inspect the door hinges periodically as instructed in the summary of attentions and apply a little oil to ensure they are working easily. It is also advisable to smear the door catches and striking plates with a little grease at the same time as the hinges receive attention. Do not put too much grease on the catches and striking plates otherwise clothes may suffer on entering or leaving the car. Check over body bolts occasionally and keep the floor and pedal boards tight—the latter are a frequent cause of rattles and a little care will always prevent them from working loose.

See that the spare wheel is kept tight in the rear locker and that tools are always replaced and kept tight in their containers.

The best and correct way of washing road wheels is to remove them from the car. They can be washed in position if water is applied by means of a brush or large sponge but if water is forced on to the wheels at high pressure there is a very big chance of it entering the drums and causing a certain amount of inconvenience, so far as braking is concerned.

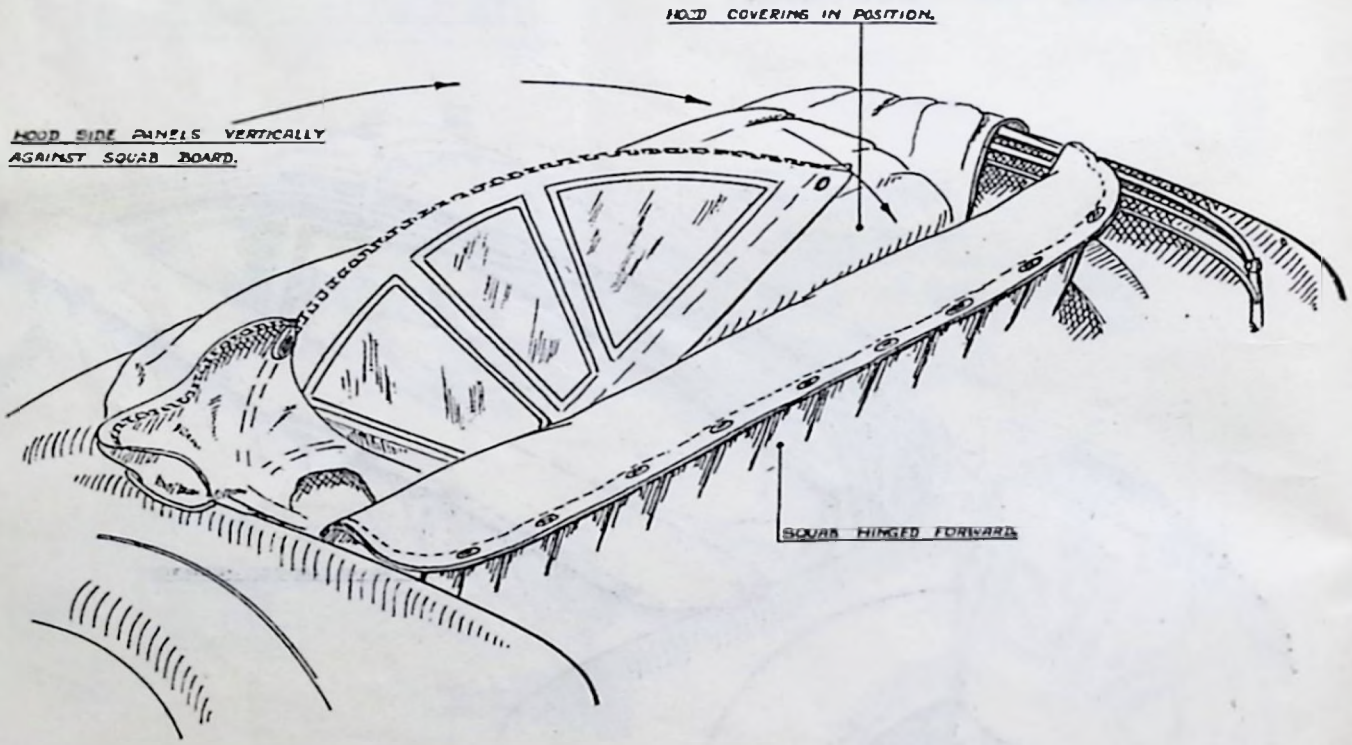


Fig. 2

The erection, lowering and stowing away of the hood and side curtains is quite a straightforward matter, but the following hints are given which will probably be found useful when doing this for the

first time. Assuming that the hood and curtains are erected, the correct procedure for lowering and stowing is as indicated below :—

1. Release press studs of side panel of hood.

2. Release zip fasteners in side panel of hood.

3. Release lift-the-dot fasteners from windscreen and throw hood top back over hoop sticks.

4. Unscrew knurled knobs on hoop stick lock.

5. Lower hoop sticks and fold, pulling material from between hoop sticks to prevent creasing.

6. Release press studs of back squab and pull forward.

7. Place nearside sidescreen in back of recess at the back of the rear seat squab with the pegs pointing downwards with inside of inside curtain facing forward. Ensure that this side curtain is as far in the recess as it can possibly go (see Fig. 1).

8. Place offside curtain in recess with outside of curtain facing rear squab board. Fold hood material of front canopy over the top of the side curtains together with side panels of hood (Fig. 2).

9. Refix back squab in position with lift-the-dot fasteners.

Providing the hood material has been folded over evenly, the rear squab will go back into position quite satisfactorily but should there be a slight amount of tension to overcome, it is pointed out that this is necessary in order to eliminate the possibility of rattle.

ELECTRICAL EQUIPMENT

The electrical equipment is designed and manufactured to give long periods of service without any need for adjustment or cleaning. The small amount of attention which is required is described in Section 1, and this procedure should be followed to ensure that the best service is obtained.

Section 2 gives information on the operation of the various items of the equipment and describes the method of setting the lamps and the carrying out of replacements, such as bulbs, high tension cables, etc. which may become necessary from time to time.

SECTION 1.

LUBRICATION AND GENERAL MAINTENANCE.

After the first 1000 miles' running.
Distributor.

Remove the moulded distributor cap and turn over the engine by hand until the contacts in the distributor are fully opened. Check the gap with the gauge on the screwdriver supplied in the tool kit; if the setting is correct the gauge should be a sliding fit. If the gap varies appreciably from the gauge, keep the engine in the position to give maximum opening of the contacts and slacken the two screws which secure the contact plate. Move the plate until the gap is set to the thickness of the gauge and then fully tighten the locking screws.

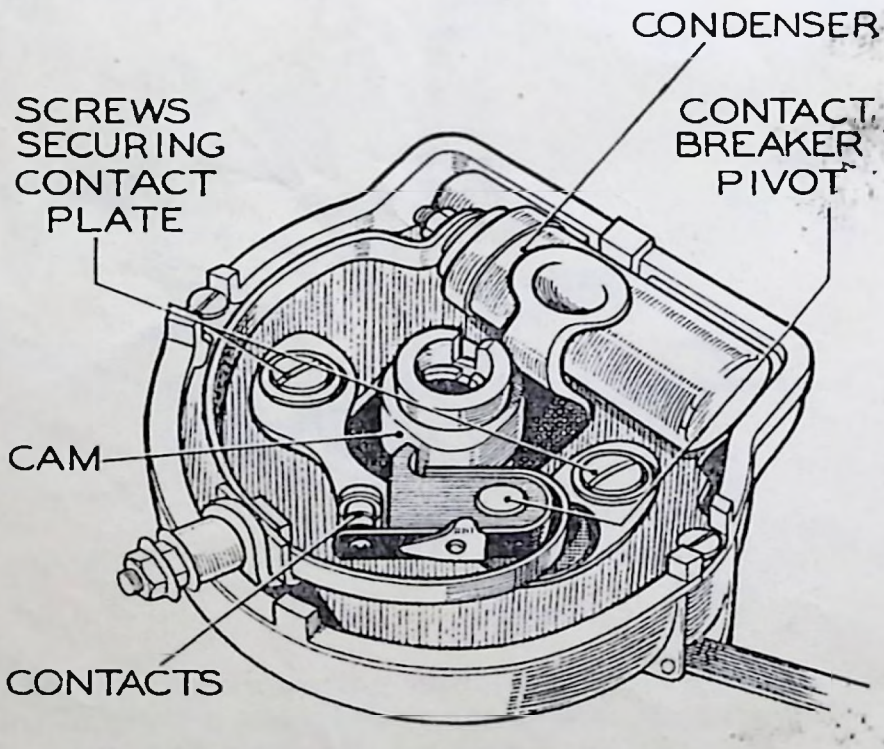


Fig. 1. Contact breaker adjustment.

Battery.

Wipe away all dirt and moisture from the top of the battery. Top up the cells of the battery, using distilled water until the electrolyte is level with the tops of the separators. Tap water must not be used. Never bring a naked light near to the battery when topping up as there is a danger of igniting the gases coming from the battery.

A convenient method of adding distilled water to the battery is by the use of the Lucas Battery Filler. This instrument enables the cells of the battery to be filled to the correct level without visual inspection.

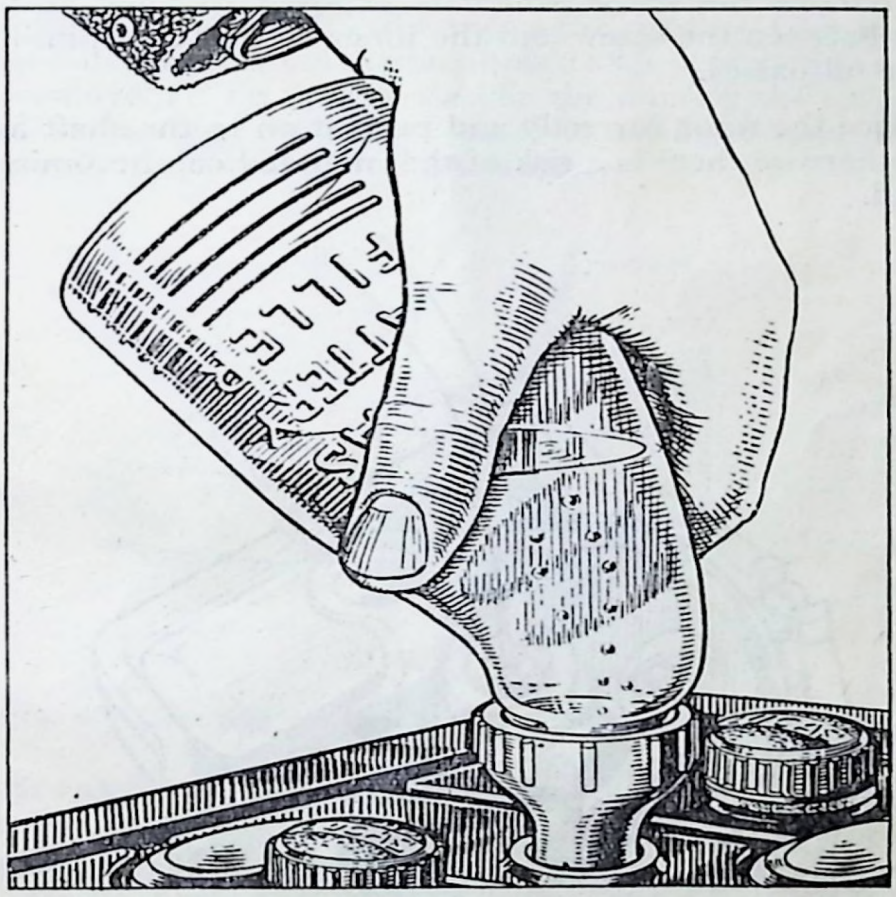


Fig. 2. Illustration of Lucas Battery Filler.

To use the instrument, proceed as follows :—

(*a*) Remove the filler plugs from each of the cells and insert the nozzle of the battery filler into the cell, until the nozzle touches the tops of the separators.

(*b*) Keep in this position to allow distilled water to run into the battery cell (indicated by bubbles rising in the battery filler).

(*c*) When the bubbles cease, the electrolyte is at the correct level.

(*d*) Remove the battery filler and replace the filler plug.

(*e*) Carry out the same procedure for each of the cells of the battery.

Every 5,000 Miles.

Carry out the procedure for every 1,000 miles and also the following :—

Distributor—Lubrication.
Cam.

Lightly smear the cam with a very small amount of Mobilgrease No. 2, or if this is not available, clean engine oil can be used.

Cam Bearing.

Lift the rotor off the top of the spindle by pulling it off vertically and add a few drops of thin machine oil to lubricate the cam bearing. Do not remove the screw which is exposed to view as there is a clearance between the screw and the inner face of the spindle through which the oil passes.

Replace the rotor correctly and push it on to the shaft as far as it will go, otherwise there is a risk of the moulded cap becoming burned or tracked.

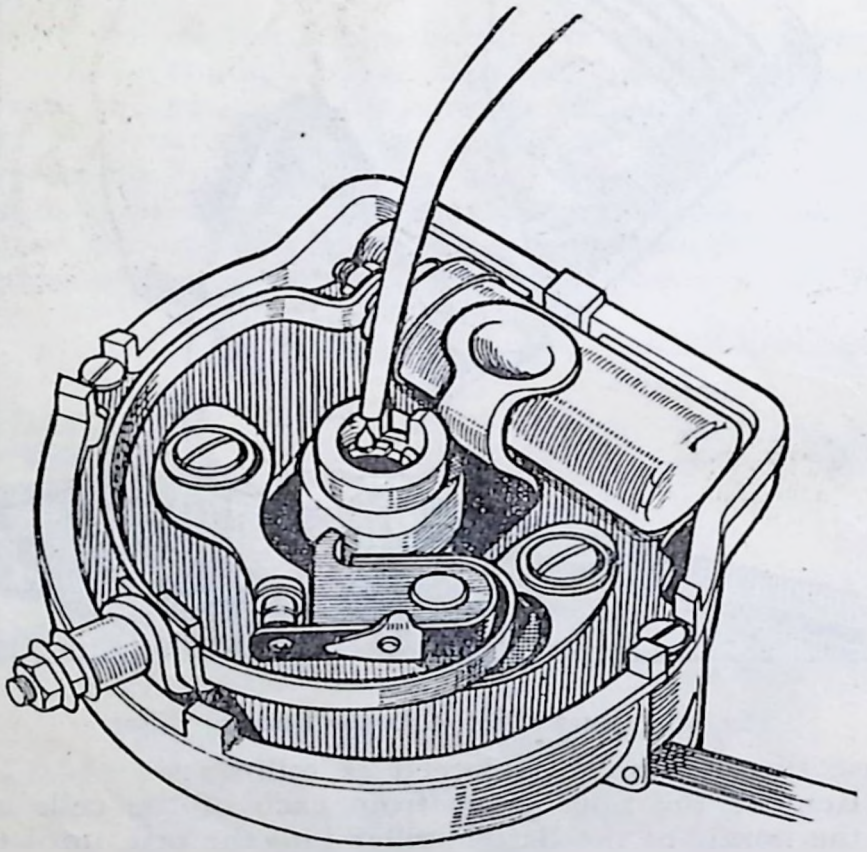


Fig. 3. Lubricating cam bearing.

Automatic Timing Control.

Carefully add a few drops of thin machine oil through the hole in the contact breaker base through which the cam passes. Do not allow any oil to get on or near the contacts.

Contact Breaker Pivot.

Place a small amount of Mobilgrease No. 2 or clean engine oi on the pivot on which the contact breaker lever works. Do not allow oil or grease to get on to the contacts.

Distributor—Cleaning.

Wipe the inside and outside of the moulded distributor cap with a soft dry cloth, paying particular attention to the space between the terminals. See that the small carbon brush on the inside of the moulding works freely in its holder. If the contact breaker points are burned or blackened, clean them with a fine carborundum stone or with very fine emery cloth. Afterwards wipe away any trace of dirt or metal dust with a petrol moistened cloth. Cleaning of the contacts is made easier if the contact breaker lever carrying the moving contact is removed. To do this slacken the nuts on the terminal post and lift off the spring, which is slotted to facilitate removal. After cleaning, check the contact breaker setting.

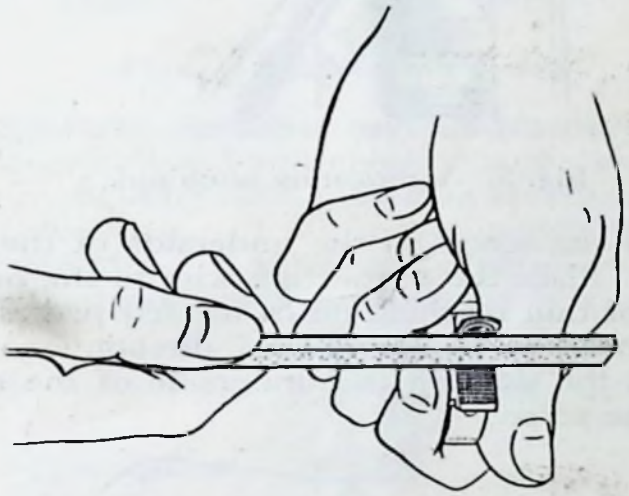


Fig. 4. Cleaning contacts with moving contact removed.

Contact Breaker—Checking and Adjustment.

Turn the engine by hand until the contacts are fully opened and insert the gauge provided on the ignition screwdriver between the contacts. If the setting is correct, the gauge will be a sliding fit, but if the gap varies appreciably from the gauge, the setting should be adjusted. Keep the engine in the position to give maximum opening of the contacts and slacken the two screws securing the plate carrying the fixed contact. Move the plate until the gap is set to the thickness of the gauge and afterwards tighten the two screws.

Trafficator—Lubrication.

Apply by means of a brush or other suitable article, a drop of thin machine oil, such as sewing machine oil to the catch pin between arm and operating mechanism. Use only the slightest trace as any excess may affect the operating mechanism.

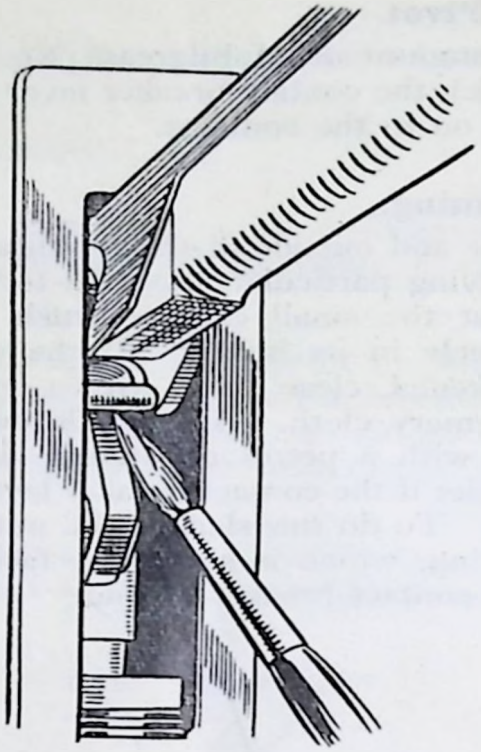


Fig. 5. Lubricating catch pin.

Also withdraw the screw on the underside of the arm and slide off the arm cover. Place the connecting wire to the bulb on one side and apply a drop of thin machine oil to the felt pad at the top of the arm. Slide the cover on in an upward direction so that the side plates engage with the slots on the underside of the spindle bearing and secure with the screw.

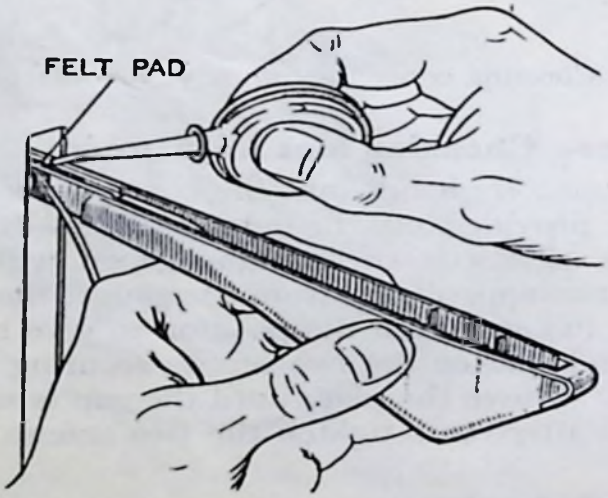


Fig. 6. Lubricating arm pivot bearing.

Every 10,000 Miles.

Carry out the procedure for every 1,000 miles and 5,000 miles, and the following :—

Dynamo—Lubrication.

Unscrew the lubricator fitted at the commutator end, lift out the felt pad and spring and about half-fill the lubricator with high melting point grease. Replace the spring and felt pad and screw the lubricator in position on the commutator end bracket.

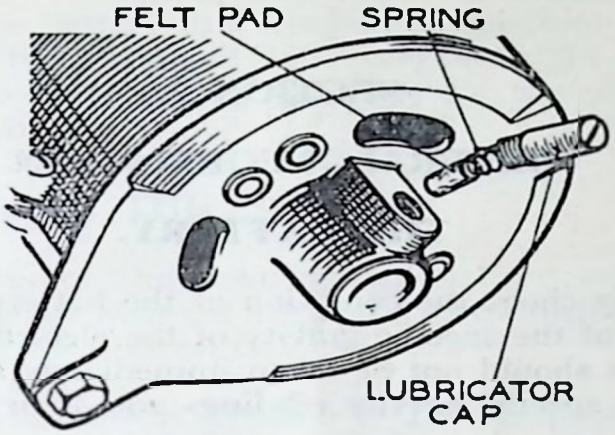


Fig. 7. Dynamo lubricator.

Dynamo and Starter—Brushes and Commutator.

Remove the cover band and check that the brushes move freely in their holders by holding back the brush springs and pulling gently on the flexible connectors. If a brush is inclined to stick, remove it from its holder and clean its sides with a petrol-moistened rag. Replace brushes in their original positions so as to retain the "bedding".

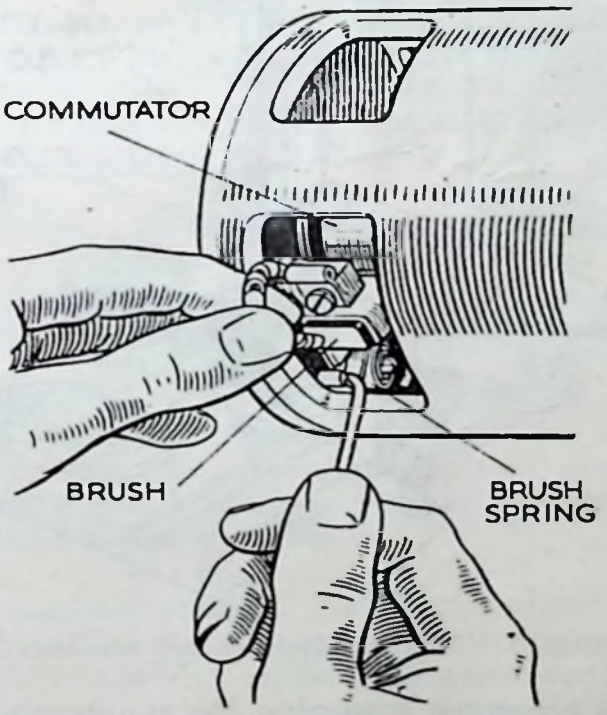


Fig. 8. Checking brushes.

If the commutator is dirty, clean it by pressing a fine dry cloth against it while the armature is slowly rotated—in the case of the dynamo this can be done by turning the engine over by hand, while with the starter the armature can be rotated by a spanner fitted on the square shaft extension at the commutator end. If the commutator is very dirty, moisten the cloth with petrol.

SECTION 2.

GENERAL INFORMATION.

THE BATTERY.

Occasionally check the condition of the battery by taking hydrometer readings of the specific gravity of the electrolyte in each of the cells. Readings should not be taken immediately after "topping-up" the cells. The specific gravity readings and their indications are as follows :—

1.280—1.300	.. ..	Battery fully charged.
About 1.210	.. ..	Battery about half discharged.
Below 1.150	.. ..	Battery fully discharged.

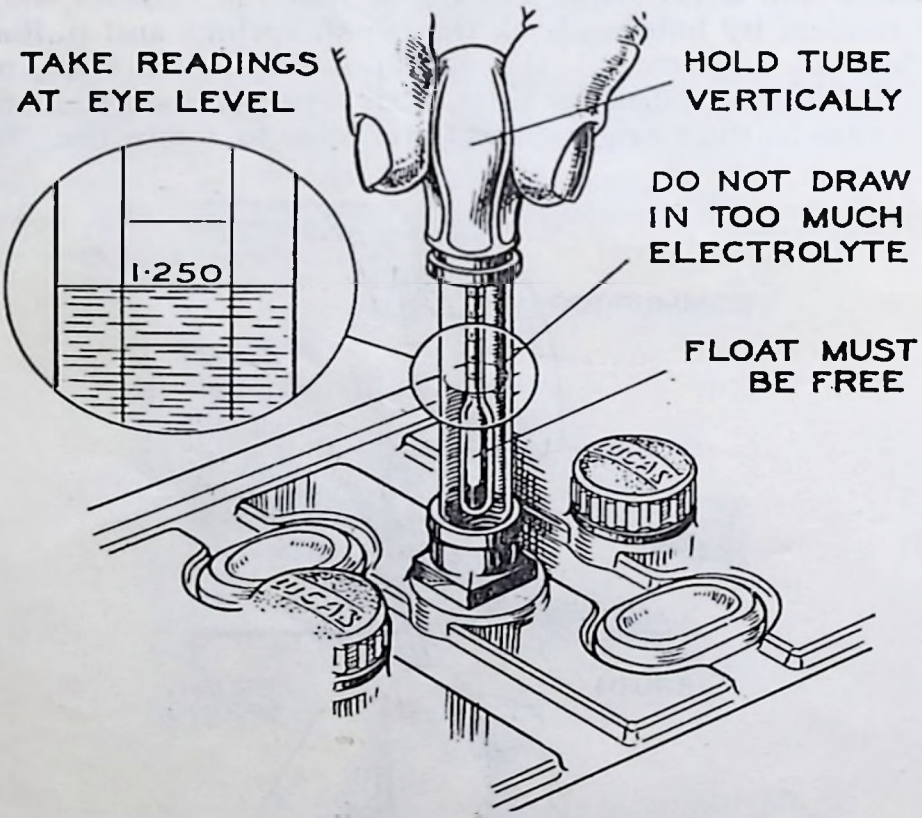


Fig. 9. Taking Hydrometer readings.

These figures are given assuming the temperature of the solution is about 60°F.

The readings for all cells should be approximately the same. If one cell gives a reading very different from the rest, it may be that acid has been spilled or has leaked from this particular cell or there may be a short circuit between the plates. In this case the battery should be examined by a Lucas Service Depot or Agent.

Never leave the battery in a discharged condition for any length of time. Have it fully charged and every fortnight give it a short refreshing charge to prevent any tendency for the plates to become permanently sulphated.

THE DYNAMO.

The dynamo is of the compensated voltage control type and operates in conjunction with the regulator unit which is housed along with the cut-out in the control box.

The regulator causes the dynamo to give an output which varies according to the load on the battery and its state of charge. When the battery is discharged, the dynamo gives a high output so that the battery receives a quick recharge which brings it back to its normal state in the minimum possible time.

On the other hand, if the battery is fully charged, the dynamo is arranged to give only a trickle charge which is sufficient to keep it in good condition without any possibility of causing damage to the battery by overcharging.

The regulator also causes the dynamo to give a controlled boosting charge after starting up which quickly restores to the battery the energy taken from it when starting. After about 30 minutes' running, the output of the dynamo falls to a steady rate, best suited to the particular state of charge of the battery.

Occasionally inspect the dynamo driving belt and adjust if necessary to take up any slackness. Care should be taken to avoid overtightening the belt and to see that the machine is properly aligned, otherwise undue strain will be thrown on the dynamo bearings.

Ammeter Readings.

When noting ammeter readings, it must be remembered that during daytime running when the battery is in good condition, the dynamo gives only a trickle charge so that the charge reading will seldom be more than a few amperes.

A discharge reading may be given immediately after switching on the headlamps. This usually happens after a long run, when the voltage of the battery is high. After a short time, the battery voltage will fall, and the regulator will respond, causing the dynamo output to balance the load.

When starting from cold, the charging current will rise until it reaches a steady maximum at a speed of say, 20 m.p.h. after which it will remain fairly high for about 10 minutes and then fall to a steady charge which is most suitable for the particular state of charge of the battery.

It will be noticed from the ammeter readings that the dynamo does not charge at very low engine speeds. This is because it is not rotating fast enough to generate sufficient energy to charge the battery. The cut-out, which is an automatic switch, allows the flow of current from the dynamo to the battery only, and is connected between the dynamo and the battery. It closes when the dynamo is running fast enough to charge the battery and opens when the speed is low or the engine is stationary, thus preventing current from flowing from the battery through the dynamo windings.

CONTROL BOX.

This unit is usually mounted on the engine side of the dash and houses the cut-out, dynamo voltage regulator and two fuses, which protect the circuits of the auxiliary accessories (i.e. windscreen wiper, trafficators, etc.)

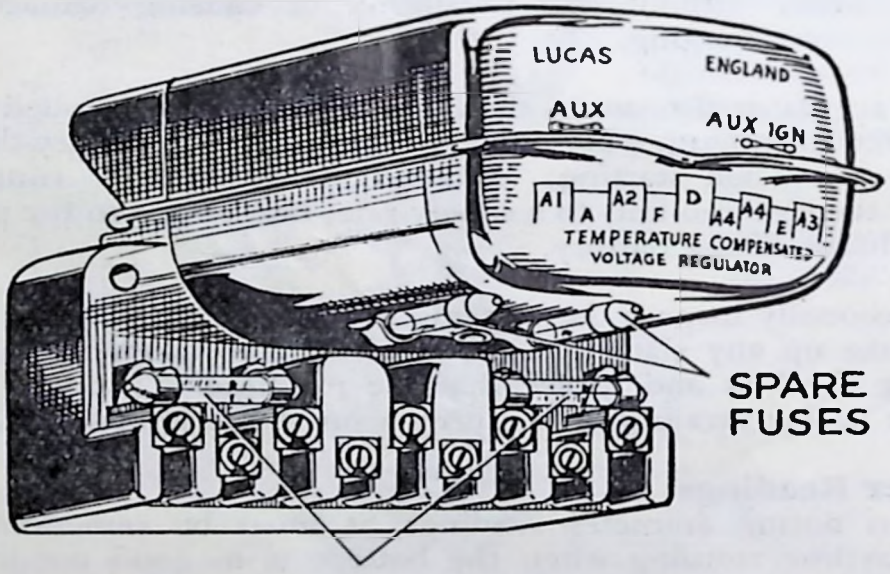


Fig. 10. Control box.

The cut-out and regulator are accurately set before leaving the works and they must not be tampered with. The cover protecting them is, therefore sealed.

Fuse marked "AUX".

This fuse protects the accessories which are connected so that they operate irrespective of whether the ignition is on or off.

Fuse marked "AUX IGN".

This fuse protects the accessories which are connected so that they operate only when the ignition is switched on.

The units which are protected by the fuses can readily be identified by referring to the wiring diagram.

A blown fuse is indicated by the failure of all the units protected by it, and is confirmed by examination of the fuse, which can easily be withdrawn from the spring clips in which it fits. If it has blown, the broken ends of the wire will be visible inside the glass tube. Before replacing a blown fuse, inspect the wiring of the units that have failed for evidence of a short circuit, or other fault which may have caused the fuse to blow and remedy the cause of the trouble.

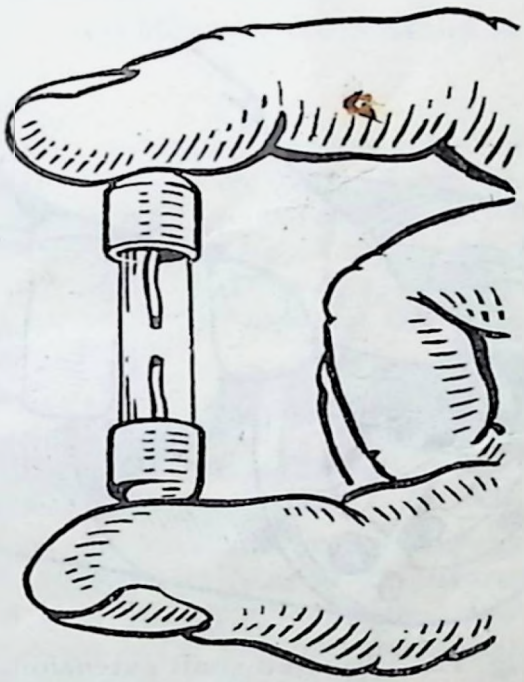


Fig. 11. A blown fuse.

Spare fuses are provided and it is important to use only the correct replacement fuse. The fusing value is marked on a coloured paper slip inside the glass tube of the fuse.

If the new fuse blows immediately and the cause of the trouble cannot be found, have the equipment examined at a Lucas Service Depot.

THE STARTER.

When starting, observe the following points :—

1. See that the controls are properly set.

2. Operate the starter switch firmly and release it as soon as the engine fires.

3. Do not operate the starter when the engine is running. If the engine will not fire at once, allow it to come to rest before operating the switch again.

4. Do not run the battery down by keeping the starter on when the engine will not start.

In the event of the starter pinion becoming jammed in mesh with the flywheel, it can usually be freed by turning the starter armature by means of a spanner applied to the shaft extension at the commutator end. This is accessible by pulling off the small cap which is secured by two screws.

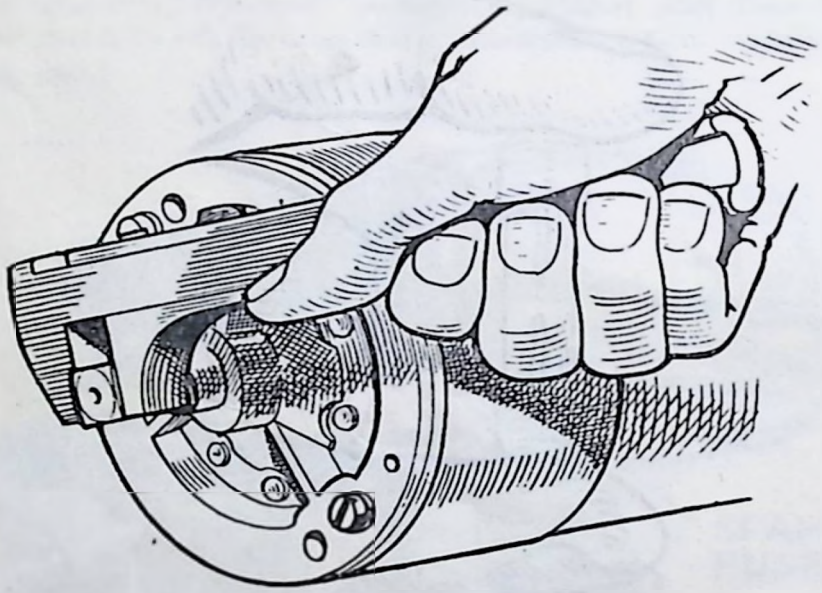


Fig. 12. Squared shaft extension.

HEADLAMPS

Each headlamp incorporates a Lucas Light unit, which consists essentially of a reflector and front glass assembly. The bulb, which is of Lucas "pre-focus" type, is located accurately in the reflector and is secured by a bayonet-fixed backshell which also provides the contact to the bulb. The design of the bulb and of its holder is such that the bulb is correctly positioned in relation to the reflector and no focusing is required when a replacement bulb is fitted.

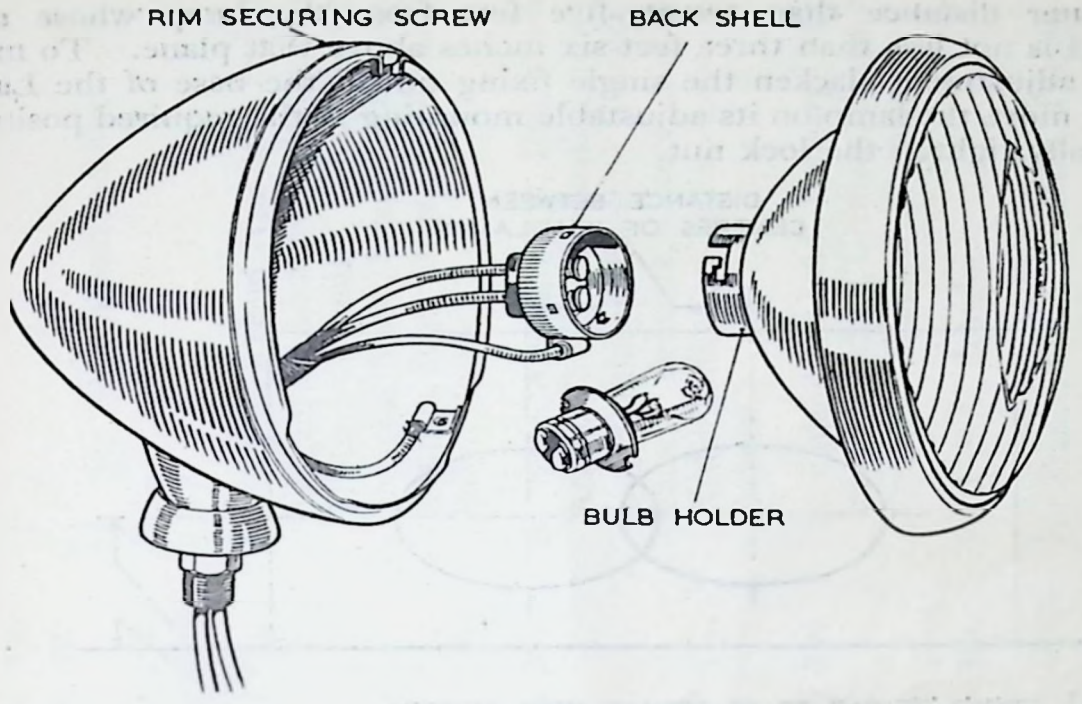


Fig. 13. Headlamp with front rim removed.

Bulb Replacement.

To gain access to the bulb, slacken the screw at the top of the lamp and remove the front rim and Light Unit Assembly. Twist the backshell in an anticlockwise direction and pull it off. The bulb can now be removed from the rear of the reflector. Place the correct replacement bulb (see page 81) in the holder and engage the projection of the backshell with the slots in the bulb holder, press on and secure by twisting to the left.

SETTING.

Lucas Beam Setter.

All Lucas Service Depots and many Service Agents now include among their special testing facilities an apparatus known as the Lucas Beam Setter. This is a specially designed instrument by means of which headlamps can be set with extreme accuracy, thereby ensuring the maximum efficiency from the lamps.

Owners are strongly advised to make use of this service. If however, it is not possible to have the lamps adjusted by this method, the procedure for setting is as follows :—

The headlamps must be set so that the main beams of light are parallel with the road and with each other (see Fig. 14). They must also be arranged so that they are incapable of dazzling any person standing on the same horizontal plane as the car at a

greater distance than twenty-five feet from the lamp whose eye-level is not less than three feet six inches above that plane. To make the adjustment slacken the single fixing nut at the base of the Lamp and move the lamp on its adjustable mounting to the required position. Finally tighten the lock nut.

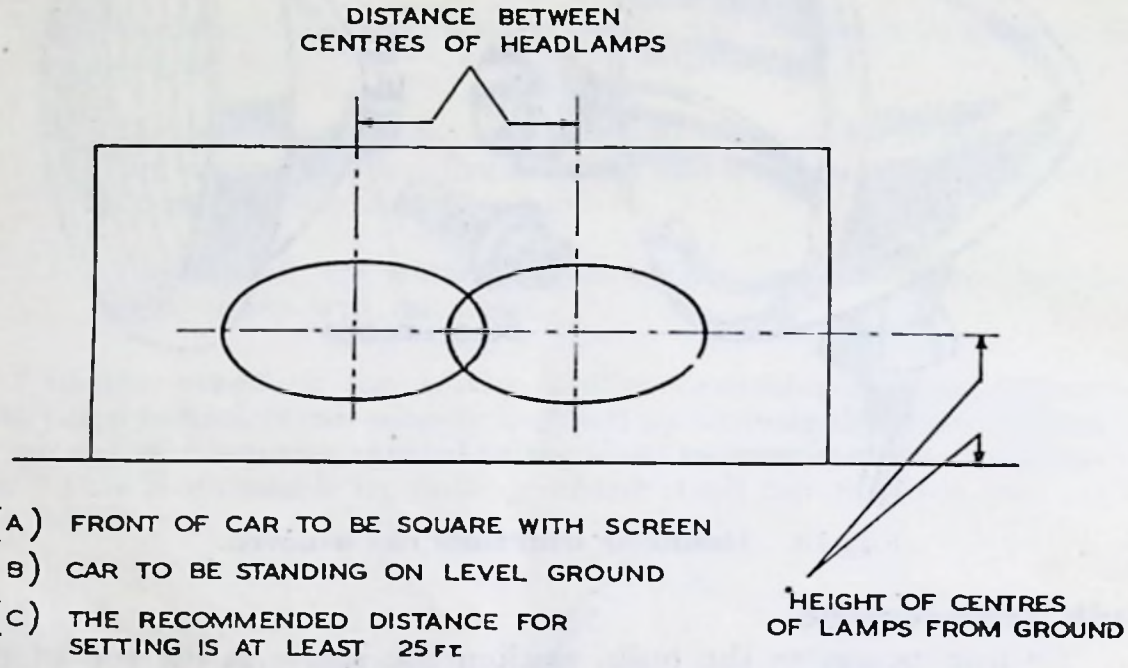


Fig. 14. Lamp setting.

REPLACEMENT OF BULBS.

Lucas Genuine Spare Bulbs are sold by any reputable garage and are specially tested to ensure that the filament is in the correct position to give the best results with Lucas Lamps. To assist in identification Lucas Bulbs are marked on the metal cap with a number. When fitting a replacement see that it is the same number as the original bulb.

It is advisable to replace bulbs after long service before they actually burn out as often the filament may sag.

Stop Tail Lamp.

Slacken the single securing screw and swing open the front cover.

Side Lamps.

Slacken the screw at the top of the lamp and the front together with reflector can be withdrawn. The bulb holder is clipped on the back of the reflector and should be withdrawn by twisting to the left and pulling off. When replacing the bulb holder, position it so that the slots in its rim will engage with the springs in the back of the reflector on pressing it home.

REPLACEMENT—HEADLAMP BULBS.

Home	Models	L.H. Bulb	12v.	36/36w.	Lucas Bulb No. 300 Double Filament Dip Left	For Great Britain and Eire.
,,	,,	R.H. Bulb	12v.	36w.	Lucas Bulb No. 162 Single Filament	
Export	,,	R.H. Drive	12v.	36/36w.	Lucas Bulb No. 300 Dip Left	For Cyprus, Iceland, Nyasaland, Sudan, Tanganyika, Aden, Bermuda, Jamaica, Malta, Uganda, Hong-Kong, Shanghai, Malay, Straits Settlements, Australia, South Africa, New Zealand, Burma, India.
,,	,,	L.H. Drive	12v.	36/36w.	Lucas Bulb No. 301 Dip Right	For Syria, Algeria, Egypt, Iran, Suadi, Arabia, Chile, Spain, South America, Eritrea, Ethiopia, Palestine, Gibraltar, Canada, Denmark, Greece, Austria, Netherlands, East Indies, Lebanon, Sweden.
,,	,,	L.H. Drive	12v.	36/36w.	Lucas Bulb No. 350 Dip Vertical	For Finland, Holland, Hungary, Norway, Switzerland, Germany, Belgium, Czechoslovakia, Italy, Portugal.
,,	,,	L.H. Drive	12v.	36/36w.	Lucas Bulb No. 301 Dip Right	For U.S.A., Ecuador.
,,	,,	L.H. Drive	12v.		Dip Vertical (3-pin Adaptors)	For France, French Morocco, Tunisia.

TRAFFICATORS.

Replacement of Bulb.

Withdraw the screw on the underside of the arm and slide off the metal plate ; the burnt out bulb may then be replaced. To replace the metal plate slide it on in an upward direction so that the side plates engage with the slots on the underside of the spindle bearing. Finally secure the plate by means of its fixing screw.

The replacement bulb is a Lucas No. 256, 12 volt, 3 watt, festoon type.

Windscreen Wiper.

To start the wiper pull out the handle and turn to disengage it from the switch. Then move the switch to the left. To stop move the switch to the vertical position, pull out the handle and turn the end of the handle into the top of the switch control.

ELECTRIC HORN.

All horns before being passed out of the Works are adjusted to give their best performance and will give a long period of service without any attention ; no subsequent adjustment is required.

COIL IGNITION.

Renewing the High Tension Cable.

The high tension cables are those connecting the coil to the distributor and the distributor to the sparking plugs. When these cables show signs of perishing or cracking they must be replaced by 7 mm. rubber covered ignition cable.

The method of connecting is to thread the knurled moulded nut over the cable, bare the end of the cable for about $\frac{1}{4}$", thread the wire through the washer removed from the end of the original cable and bend back the wire strands. Screw the nut into its terminal (see illustration on page 83).

The Coil.

The coil requires no attention beyond keeping its exterior clean, particularly between the terminals and occasionally checking that the terminal connections are quite tight.

The Ignition Switch and Warning Light.

The ignition switch, besides forming a means of stopping the engine, is provided for the purpose of preventing the battery being discharged by the current flowing through the coil windings when the

engine is stopped. A warning lamp is provided in the instrument panel which gives a red light when the ignition is switched on and the car is running very slowly or is stationary, thus reminding the driver to switch off.

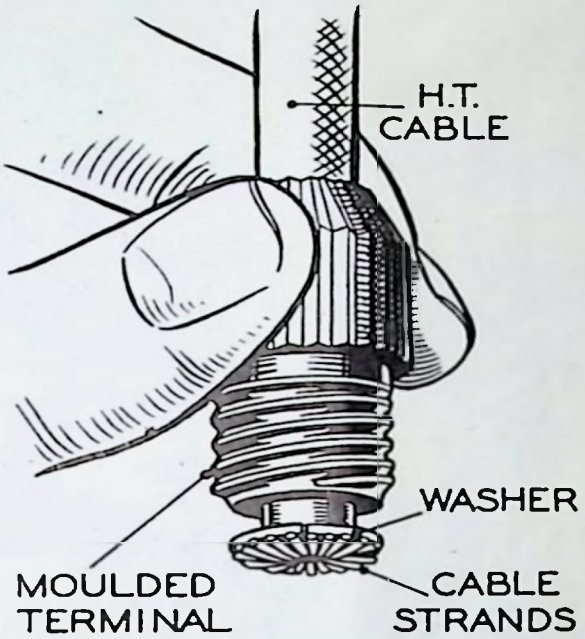


Fig. 15. Connecting H.T. cable.

Should the warning lamp bulb burn out, this will not in any way affect the ignition system, but the bulb should be replaced as soon as possible in order to safeguard the battery.

The replacement bulb is a Lucas No. 987, 12 volt, 2.4 watt.