



# INSTRUCTION BOOK

*FIRST EDITION*

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# DORETTI

# SPORTS CAR

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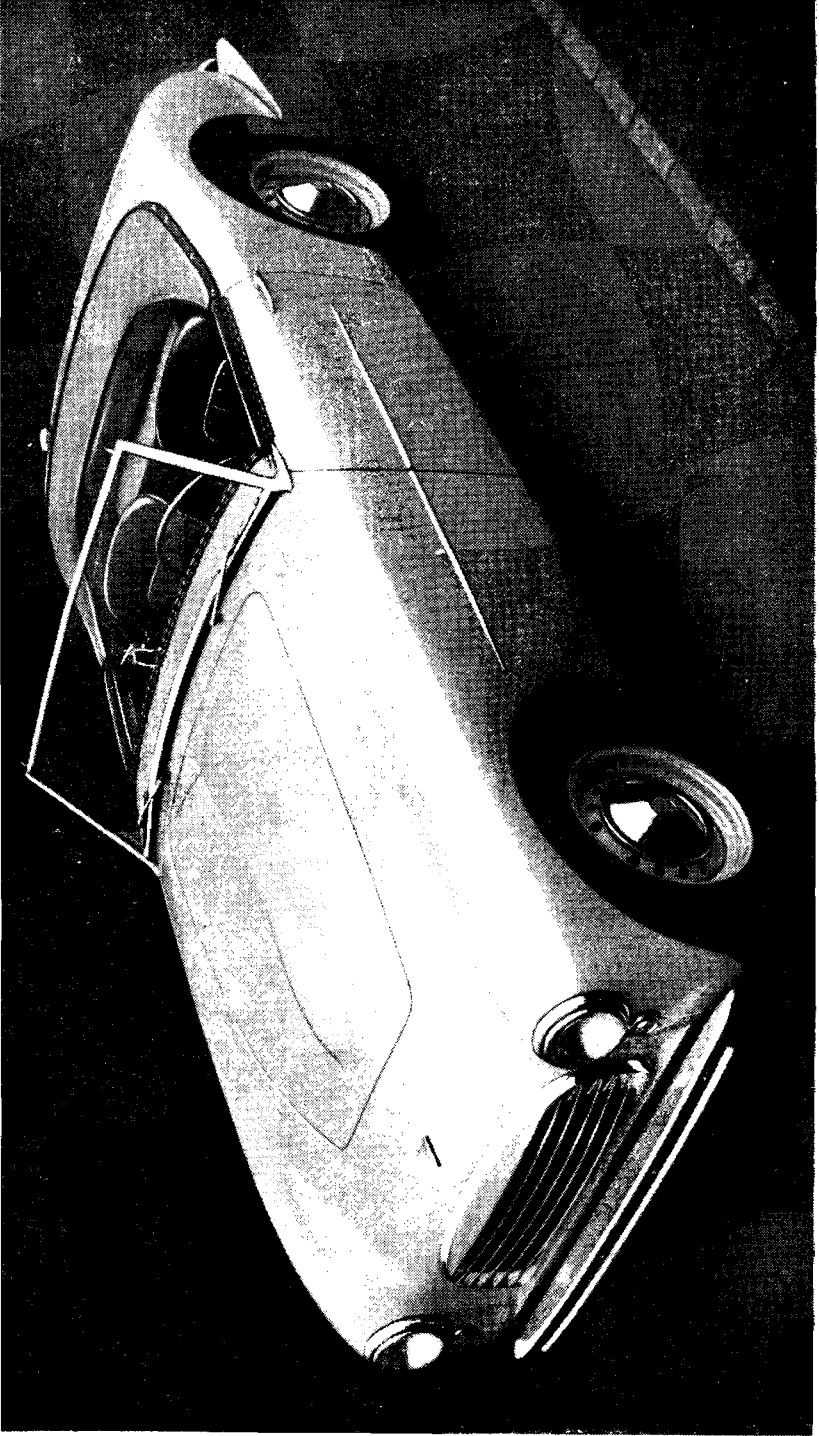
*Manufactured by*

SWALLOW COACHBUILDING CO. (1935) LTD.

*The Airport, Walsall, Staffordshire, England*

*Telegrams: "Swallow," Walsall.*

*Telephone: Walsall 4553*



THE DORETTI SPORTS CAR

## FOREWORD

This book has been compiled in order to assist the Swallow-Doretta Sports Car owner to obtain a proper understanding of the general construction of the car and to form a correct appreciation of its day-to-day needs.

Where possible the use of technical terms has been avoided so that the ordinary car owner can assimilate the important information given here easily and quickly. **We cannot stress too much the importance of reading through the contents of this book before any extensive use of the car is contemplated.** Correct lubrication, regular inspection, proper upkeep and adjustments are all necessary if the owner-driver is to obtain the best from his car and maintain a high standard of efficiency. Information on these matters is to be found in this book, together with sectionalised drawings, tables and photographs of vital details.

The reader will find some notes on decarbonising and valve grinding. These have been included for the benefit of those owners who possess the facilities and experience for doing this work themselves. To the less experienced, however, we strongly recommend that it be carried out by a competent mechanic, preferably an accredited Swallow-Doretta agent.

**If any difficulty is encountered in connection with the running of the car or its general efficiency we strongly urge the owner to contact one of the local Swallow-Doretta agents, preferably the one who supplied the car, who being thoroughly conversant with the details and running of the car, will be able to detect the cause of the trouble quickly and effect a suitable remedy.** We would like to emphasise that all Swallow-Doretta agents are carefully chosen to ensure that they can provide the high standard of workmanship necessary for a proper after-sales service.

Finally, when ordering spare parts we would like owners to quote, in addition to the car commission number, the engine number and a brief description of the part required.

We have no doubt that your Swallow-Doretta will give you many years of faithful service if you act on the advice which our technical department has provided in this book.

## LICENCE DATA

Car number (Commission number) .....	Plate on dash
Engine number .....	On cylinder block
(Both numbers are to be seen by lifting the bonnet).	
Cubic capacity .....	121.5 cu. in. (1991 c.c.)

## GENERAL SPECIFICATION

Number of cylinders .....	4
Bore of cylinders .....	3.268 in. (83 mm.)
Stroke of crank .....	3.622 in. (92 mm.)
Compression ratio .....	8.5
Firing order .....	1, 3, 4, 2
Brake H.P. (Road Setting) .....	90 at 4,800 r.p.m.

### Oil Capacity

Engine	From Dry (see page 13)	11 pints	(6.25 litres)
	Drain and Refill .....	10 pints	(5.7 litres)
Gearbox .....		1½ pints	(0.8 litres)
„ with overdrive—	From dry .....	3½ pints	(2.0 litres)
	Drain and Refill .....	2¾ pints	(1.1 litres)
Rear Axle .....		1½ pints	(0.8 litres)

Water Capacity of cooling system .....	14 pints	(8 litres)
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Fuel Capacity .....	12½ galls.	(57 litres)
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### Dimensions :

Wheelbase .....	7' 11"	(241 cm.)
Track—Front .....	4' 0"	(122 cm.)
Rear .....	3' 9½"	(116 cm.)
Ground clearance (under axle) .....	6"	(15.2 cm.)
Turning circle (between kerbs) .....	36' 6"	(11.13 metres)
Tyre size .....		5.50"—15"

### Overall Dimensions :

Length (over Over-riders) .....	13' 0"	(396 cm.)
Width .....	5' 1"	(155 cm.)
Height (unladen)—Hood erect .....	4' 3"	(130 cm.)
Top of screen .....	4' 0½"	(123 cm.)
Hood down and screen removed .....	3' 3"	(99 cm.)

### Weights (excluding extra equipment)

Complete, tank full of petrol .....	19 cwts.	1 qr.	0 lbs.	(978 kg.)
Shipping Weight .....	18 cwts.	0 qr.	14 lbs.	(922 kg.)

## GENERAL SPECIFICATION

VALVE TIMING. [With valve-rocker clearance set at 0.015" (0.38 mm.).]

Inlet valve opens 15° before top dead centre.

Exhaust valve closes 15° after top dead centre.

(15° before or after T.D.C. is equivalent to 0.081" piston travel or 1.5" (3.81 cm.) measured round the flywheel adjacent to the starter teeth).

VALVE-ROCKER CLEARANCES (see page 25).

IGNITION TIMING (see page 26).

Set to fire at 4° before top dead centre (distributor contact points just opening). As the advance is fully automatic, the setting is at full retard.

Contact breaker gap should be set at 0.015" (0.4 mm.).

## ROAD SPEED DATA

	Top	Third	Second	First	Reverse
Gearbox ratios	1.00	1.325	2.00	3.38	4.28
Overall ratios	3.7	4.9	7.4	12.5	15.8
Engine speeds					
at 10 m.p.h.	500	660	1000	1680	2130
at 10 km./hr.	310	410	620	1050	1325

NOTE.—The tyre radius increases with speed so that at 100 m.p.h. the engine speed is 4,800 r.p.m. in top gear.

# MANAGEMENT OF CAR

## CONTROLS, SWITCHES AND INSTRUMENTS

The position of the controls, switches and instruments will readily be understood by reference to Fig. 1.



Fig. 1. Controls, switches and instruments (L.H. Drive).

A	Speedometer.	H	Direction Indicator Warning Light.	P	Side-head Lamp Switch.
B	Direction Indicator Switch.	I	Fuel Contents Gauge.	Q	Starter Switch.
C	Tachometer.	J	Windscreen Wiper Switch.	R	Accelerator Pedal.
D	Water Temperature Gauge.	K	Ammeter.	S	Brake Pedal.
E	Oil Pressure Gauge.	L	Choke Control.	T	Clutch Pedal.
F	Ignition Warning Light.	M	Ignition Lock.	U	Horn Button.
G	Instrument Panel Light Switch.	N	Gear Change Lever.	V	Headlamp Dipper Switch.
		O	Handbrake Lever.	Y	Bonnet Lock.
					<i>Optional Extras—</i>
				W	Heater Switch.
				X	Overdrive Control Switch.

Note :—In right-hand drive cars, the Speedometer changes over with the Tachometer.

## CONTROLS

**Clutch.** Press pedal to disengage drive from engine to gearbox. **Do not rest your foot on the pedal when driving, or hold clutch out to free wheel.**

**Bonnet Lock.** To release, pull knob at top of Instrument Panel. The Bonnet is hinged at the forward edge so that a safety catch is unnecessary.

## MANAGEMENT OF CAR—Controls, Switches and Instruments

**Choke Control.** See page 9 for full instructions.

**Gear Lever.** See Fig. 2 for gear positions.

**Handbrake.** Pull to operate rear wheel brakes. The lever will be held in any position by pressing the button on top of the lever and releasing the lever. To release ratchet, first pull lever when the pawl will automatically spring out of engagement with the ratchet and the lever is free to release the brakes.

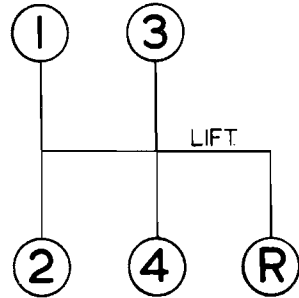


Fig. 2. Gear positions.

**Petrol Tap.** This is situated under petrol tank.

**Seat Adjustment.** The seats are adjustable for “leg length” after operating the lever which is situated at the side of the seat.

### SWITCHES

**Brake Lights.** The switch is connected to the brake pedal mechanism, but will operate the red rear lights only with the ignition switched on.

**Direction Indicators.** This switch will automatically be returned to “off” as the steering wheel is being brought back to the straight ahead position. The indicators will only operate with the ignition switched on and a warning light will flash on the dash panel when the switch is operated.

**Head, Tail and Parking Lamps.** Pull knob to switch on parking lights. Turn slightly clockwise and pull again to switch on the head lights. Press foot operated switch to dip head lights, press again for “full on” position, in which position a small red light appears at the bottom of the speedometer dial.

**Horn.** Press button in centre of steering wheel to operate horns.

**Ignition.** Insert key and turn clockwise to switch on. Do not leave the switch “on” when engine is stationary, to avoid the battery being discharged by the current flowing through the coil windings.

**Panel Lights.** Pull knob to switch on panel lights. These lights will only operate when the parking lights are switched on.

**Starter Motor.** Press to operate engine starter (see page 9 for full instructions).

**Windscreen Wiper.** Pull to operate wipers; they will only function when the ignition is switched on. Push to stop when arms are in the desired parking position.

## MANAGEMENT OF CAR—Controls, Switches and Instruments

### INSTRUMENTS

**Ammeter.** Indicates the flow of current into or out of the battery.

**Fuel Gauge.** Registers the amount of fuel in the tank. It operates automatically when the ignition is switched on.

**Oil Pressure Gauge.** Indicates pressure of oil being pumped to the bearings. It does not show the amount of oil in the sump (excepting that if the oil level is very low the pressure usually falls due to overheating).

The gauge should read between 40 and 60 lb./sq. in. (2.8—4.2 kg./sq. cm.) when the car is travelling at normal speeds and the oil is hot. Only a low pressure may be registered when the engine is idling or running at low speeds ; this is quite normal.

**Speedometer.** Registers vehicle's speed and total distance covered, and is fitted with a trip which is cancelled by pushing up the serrated knob (situated under the instrument) and turning anti-clockwise.

**Tachometer.** Indicates the speed of rotation of the engine in revolutions per minute.

**Ignition Warning Light.** Glows red when ignition is switched on with the engine idling or stopped. It is an indication that current is being drawn from the battery for the ignition circuit, or other purposes that are controlled by the ignition switch.

**Water Temperature Gauge.** The gauge shows the temperature of the cooling water at the thermostat. Under normal motoring conditions the water temperature should not exceed 185°.

# DRIVING THE CAR

## TO START THE ENGINE

### **IMPORTANT—When starting the engine at any time :**

If the engine does not start when the starter is operated, **do not re-operate until both starter motor and engine have come to rest.** This is to avoid damage to the starter pinion.

### **Starting when Engine is Cold**

Place the gear lever in the neutral position and see that the handbrake is on. Pull the carburettor choke control out to the stop and twist, switch on the ignition and press the starter switch button. When the engine has become sufficiently warmed up, turn the choke control and allow the control to spring back to the **half-out** position and turn to lock in this position. After one or two minutes driving, as the engine warms up, it will be possible to permit the control to return home without causing the engine to run with undue hesitation. Difficulty is sometimes experienced in starting if the atmosphere is very damp, causing moisture to collect on the exposed porcelain portions of the sparking plugs. Caps are provided on the plugs to minimise this trouble. When the engine fails to start, do not keep the choke control out too long or the sparking plugs will become wet with petrol and it will be necessary to remove and dry them. When the car has been left standing for some considerable time, the fuel level in the carburettor float chambers may have become rather low, due to evaporation. The hand primer on the fuel pump can be used under such circumstances, before the starter is operated, to conserve the electrical energy in the battery (see page 29).

When starting in very cold conditions, the clutch pedal may be depressed when operating the starter to relieve the motor of the considerable drag in the gearbox. Intelligent use of the starter, as described, will greatly prolong the life of the battery.

### **Starting with Engine Warm or Hot**

When restarting the engine while it is still hot the accelerator pedal should be depressed to about one-third of its travel before pressing the starter button, the choke control should not be used. If difficulty is experienced in starting, due to the use of the choke control when the engine is hot, the mixture may be momentarily too rich, in which case depress the accelerator to the full extent whilst operating the starter with the choke control pushed right in.

### **Warming up**

In order to minimise cylinder wear the engine should be warmed up quickly when starting from cold in winter ; the engine may be “ idled ”

## DRIVING THE CAR—The Engine

for a minute to let the oil circulate, but it should not be allowed to idle for long periods, neither should the engine be raced up to high speeds. An engine speed of approx. 1,500 r.p.m. may be regarded as a desirable warming up speed.

### DRIVING

#### Gear Changing

For a smooth gear change into a synchronised gear the movement should be slow and deliberate. The gear lever must always be moved right home to secure full engagement. Do not attempt to engage reverse gear whilst the car is travelling forward.

#### Desirable Speed Limits (Particularly in gears lower than top)

The engine is capable of “revving” very fast, yet the driver should avoid continued “over-revving,” which is most likely to occur in the lower gears.

**We strongly recommend that in all gears the driver shall not drive the car continuously at engine speeds above 4,500 r.p.m. However, during acceleration in the gears, it is permissible to attain 5,000 r.p.m. for short periods.**

### NEW ENGINES

When the car is new, the engine may seem to be somewhat lacking in power, due to the working surfaces not having become fully bedded down. This will continue for the first 200 or 300 miles (320-480 km.), during which time the engine will become gradually “run-in” (with proper use). The power will be improving as the car is used for the first 1,000 miles (1,600 km.), and this will be accompanied by a corresponding improvement in petrol consumption. The engine sump should be drained and refilled with new oil at the completion of the first 1,000 miles (see page 12).

At approximately 5,000 miles much benefit is gained by having the valves ground in as described on page 24. Although this involves some slight inconvenience in giving attention to a new engine, the trouble is well repaid by the results obtained.

We recommend that the engine should be driven at speeds not exceeding 3,500 engine r.p.m. for the first 500 miles (800 km.), and also suggest that “running-in” should be progressive and that no harm is done if the engine is allowed to “rev” fairly fast so long as it is thoroughly warm, providing it is not **pulling hard**. Also do not let the engine pull hard at low speeds, always select a lower gear.

## GENERAL UPKEEP

### REGULAR INSPECTION

Every 250 miles (400 km.) the engine oil level should be checked and topped up if necessary. Withdraw dipstick [(F) Fig. 3] and wipe clean, then insert and push fully home before withdrawing for reading. Should the level be at the lower mark on the dipstick, 4 pints (2.2 litres) of oil will be required for topping up. The regular addition of oil not only maintains the correct level, but also tends to keep up the quality of the lubricant. Replenishment is via the cap (D).

#### Weekly,

**Check :** The water level in the radiator and if necessary replenish. Use clean rain water and keep the neck of the filler at least half full of water. Re-check after the engine has been warmed. The use of hard water results in a deposit on the inner side of the cooling surfaces, thus reducing efficiency.

Tyre pressures. The correct pressures are given on page 21. It is usually a good plan to have the spare tyre inflated to a slightly higher pressure than that recommended for the rears, *i.e.*, approximately 30 lb. sq. in. (2.11 kg./sq. cm.) for normal use. It will be a simple matter to reduce the pressure should the tyre be required for use. The acid level in the battery at (A) and maintain it so that it is just level with the top of the separators. Use only distilled water when replenishing (obtainable from the local chemist or garage). Keep the filler plugs screwed tight to prevent leakage of acid. Do not overfill or the acid may splash out and do damage, and never use a naked light when checking the acid level.

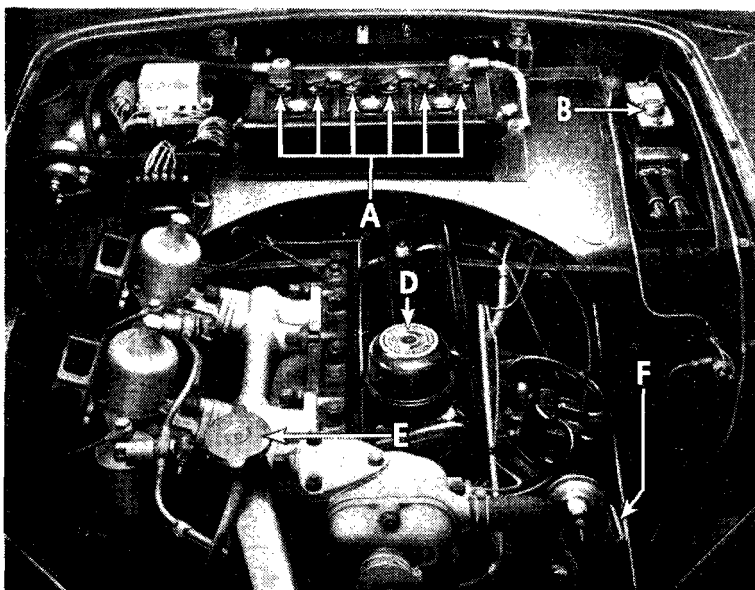


Fig. 3. View under bonnet.

## GENERAL UPKEEP—Lubrication

### COOLING SYSTEM

**Filling** (see page 11).

#### **Draining**

For the purpose of draining, taps are provided in the radiator bottom tank and at the rear of the cylinder block on the right-hand side. As the cooling system is pressurised it will be necessary, when draining, to remove the radiator cap.

If a heater is fitted, ensure that the cock is open before draining.

#### **Anti-Freeze Mixtures**

We recommend owners to use Smith's "Bluecol" or Shell "Snowflake" anti-freeze (inhibited Glycol base compound) in order to protect the cooling system during frosty weather and reduce corrosion to a minimum. The cooling system is fitted with a thermostat and there is a risk of the radiator block freezing while the engine is running during the warming up period when the thermostat is shut, even though the car has been left in a warm garage and water is not frozen at the start of the run.

We recommend that you provide for the cooling system ample protection against a sudden fall in temperature down to 0° F. during frosty weather by using 3 pints of anti-freeze.

In countries where sub-zero temperatures prevail, consult your Doretti Agent in respect of the quantity of anti-freeze required.

#### **Caution**

Before adding the anti-freeze preparation, make sure that the water hose clips are securely fitted and the cylinder head nuts are tight. If the solution is able to escape through a leaking gasket into the cylinders it may be burnt into a tacky substance capable of doing harm to the engine. However, this could only happen in the rare event of a faulty gasket.

## LUBRICATION

This is one of the most important subjects in connection with the upkeep of a car, and careful attention to the following instructions will be amply repaid by the results obtained.

**For the recommended periods of lubrication, see the lubrication chart folded inside the rear cover of this book. The correct lubricants to be used are given on pages 51 and 52.**

#### **Draining**

To drain the engine, gearbox or rear axle, remove the plug provided beneath each unit. This process is assisted by opening the filler to allow ingress of air, and by draining when the oil is warm after a run of at least 10 miles (16 km.). Under these conditions, impurities in the oil will be well mixed and will flow away with the oil during the draining process.

## GENERAL UPKEEP--Lubrication

### ENGINE

Low viscosity oils are recommended for use in the engine sump. These oils are each of the correct viscosity and character to afford complete lubrication protection. Additives which dilute the oil or otherwise impair this protection must NOT be used.

After many thousands of miles running the rate of oil consumption will increase. When the rate becomes higher than 1 gallon per thousand miles (1 litre per 400 km.), it will be desirable to use the next heavier grade of the brand of oil you normally employ. If the engine is found to require very little oil for replenishment, then it is desirable to drain the oil every 2,500 miles (4,000 km.) and refill with fresh oil.

We have found the use of an upper cylinder lubricant to be of advantage, particularly in new engines, and recommend the use of such a lubricant, particularly until the engine is thoroughly "run-in." Such lubricants may be used with advantage throughout the life of the car, particularly during wintry weather.

Running-in compounds containing Acheson's colloidal graphite are available. They are prepared in a form suitable for addition to the oil in the engine sump. These should only be used during the running-in period for new or re-conditioned engines.

### Carburettors

Every 5,000 miles (8,000 km.) unscrew the two brass hexagon plugs in the top of the carburettor and top up with current engine oil to the level of the inner hollow shaft. Apply oil also to the throttle linkages on the engine, do not oil the bearings of the transverse rod attached to the scuttle as this will seriously deteriorate the sealing composition.

### The Oil Cleaner

The oil cleaner has been designed to filter the oil to a very fine degree and the only attention it requires is to see that the filtering cartridge (B) is removed and that a new replacement cartridge is fitted at periods not exceeding 10,000 miles (16,000 km.). It is essential that this operation be carried out at the specified periods to

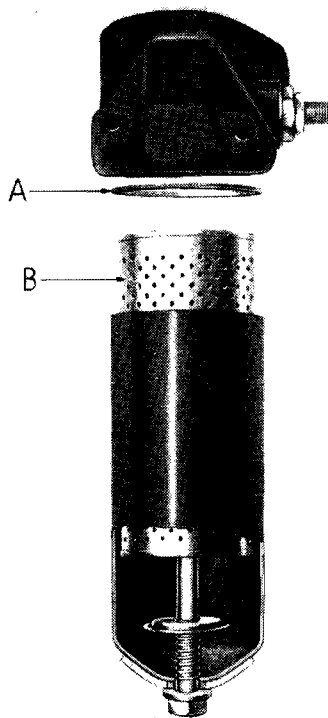


Fig. 4. Oil Cleaner.

## GENERAL UPKEEP—Lubrication

ensure the full filtration of the oil. To renew the cartridge, unscrew the securing bolt and remove the container, the cartridge can then be withdrawn. Wipe out the container to remove foreign matter trapped by the filter, using a non-fluffy cloth, and inspect afterwards to make certain that no cloth fibres remain.

It may be desirable to discard the old container washer (A), replacing it with a new one each time the cartridge is renewed. When re-assembling the container, ensure that the washer is correctly positioned in the groove in the filter body. Do not tighten the bolt more than is necessary to obtain an oil-tight joint.

Approximately one pint of oil will be lost due to the removal of the container, and the sump should be topped up with new oil after assembly. The container should not be disturbed until cartridge renewal is required ; to do so invites the hazard that the accumulated dirt on the outside of the container may be allowed to contaminate the inside and thus be carried into the bearings when the engine is re-started.

### Ignition Distributor (see Fig. 5)

Every 5,000 miles (8,000 km.), the cam (B) should be smeared lightly with engine oil. A pronounced squeak occurs when the cam is quite dry. Withdraw the moulded rotor arm from the top of the spindle and apply a few drops of thin machine oil around the edge of the screw (A) to lubricate the cam bearings and distributor spindle. At the same time, place a single drop of clean engine oil on the pivots (C) and (D).

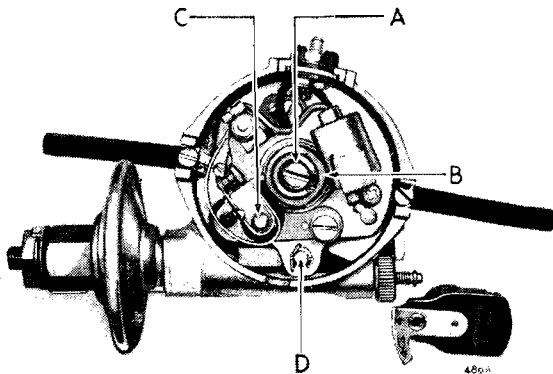


Fig. 5. Ignition distributor.

## GENERAL UPKEEP—Lubrication

### Water Pump

There is one nipple provided (see arrow, Fig. 6) to which the grease gun should be applied every 5,000 miles. Give **five strokes only with the gun.**

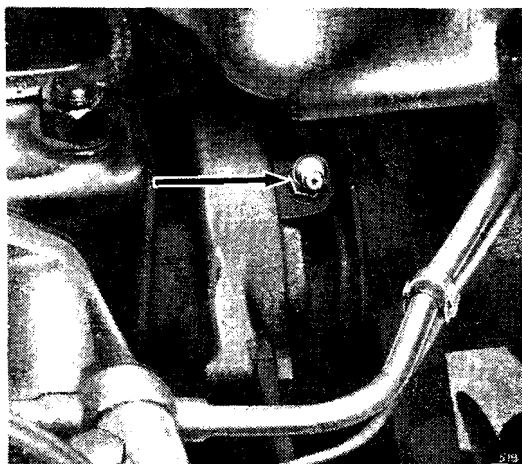


Fig. 6. Water pump lubrication.

### Dynamo and Starter

**The dynamo** front bearing is packed with grease before leaving the works, and after a considerable mileage the dynamo should be removed for cleaning, adjustment and repacking of the bearing with grease. This should be done preferably by the nearest Doretti or Lucas Service Depot. Every 10,000 miles (16,000 km.) pour a few drops of engine oil through the hole in the centre of the rear end cap.

**The Starter** is fitted with special bearings which require no lubrication.

**Air Cleaners.** In order to ensure effective filtering of the air, every 5,000 miles (8,000 km.) it is advisable to remove the air cleaners and wash in petrol, particularly the gauzes, after which soak the gauzes in oil and allow to drain before finally wiping over and refitting. It is very important to refit the air cleaners in the correct manner. Ensure that the holes immediately above the setscrew holes in the carburettor are lined up with the similarly positioned holes in the cleaner.

**Oil Filler Cap.** Every 5,000 miles (8,000 km.) remove and swill the cap in fuel, dry off and refit.

### CLUTCH SHAFT BEARINGS

The grease gun should be applied to the clutch shaft bearing grease nipples (one at each side of the clutch housing) every 5,000 miles. The nipples are accessible from underneath the car. [See arrow (C), Fig. 17, page 30].

### CLUTCH AND BRAKE PEDAL BEARINGS

The oil can should be applied to the various members of the pedal linkages, both under the bonnet and in the driving compartment.

## GENERAL UPKEEP—Lubrication

### GEARBOX

Every 5,000 miles (8,000 km.) the oil level should be checked and topped up if necessary.

To check the oil level, remove the small detachable cover from over the gearbox, thus exposing the dipstick (see Fig. 7). Withdraw dipstick and wipe clean, then insert stick and push it fully home before withdrawing for reading. The correct level is to the top mark. The dipstick orifice is also the gearbox oil filler.

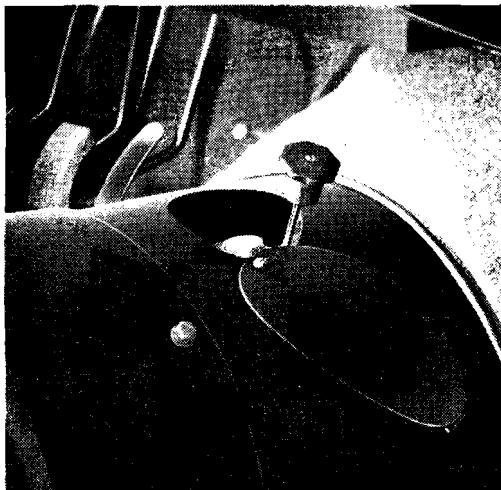


Fig. 7. Gearbox oil filler and dipstick.

Every 10,000 miles (16,000 km.) the gearbox should be drained and refilled with new oil.

### REAR AXLE

The hypoid bevel gears fitted in the rear axle require special lubricants to ensure efficient operation and long life. As these are special oils, it is advisable to completely drain and replenish with new "Hypoid" oil every 5,000 miles (8,000 km.); and in any event, do not exceed a period of 10,000 miles (16,000 km.).

It is desirable to have the oil level checked during this period, and if the oil level is more than  $\frac{1}{2}$ " (12 mm.) below the bottom of the threads in the filler orifice, do not "top up," but drain the oil and refill with new oil to the bottom of the threads. This will overcome the danger of mixing the various grades of oil.

The filler plug is accessible from underneath the car, being fitted to the rear axle cover (see arrow **A** Fig. 8). Clean away mud before unscrewing the filler plug to avoid grit falling into the axle.

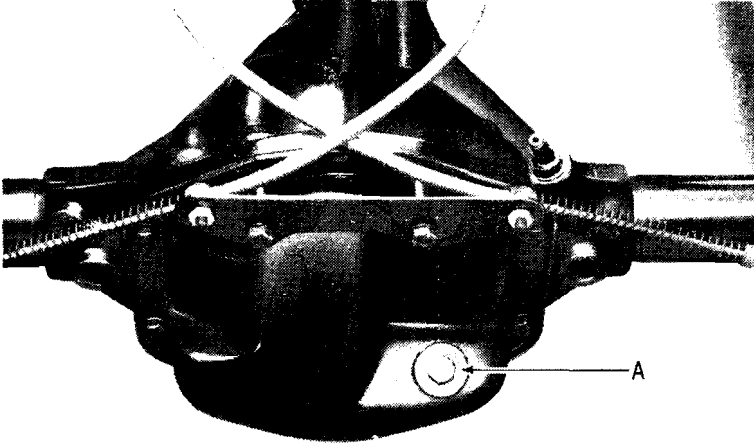
### BRAKE MECHANISM AND CLUTCH

It is important that the filler cap on the combined hydraulic fluid reservoir, integral with the master cylinders (see arrow **B** Fig. 3, page 11), should be removed every 5,000 miles (8,000 km.), the fluid level checked and topped up if necessary. The reservoir should be filled to within half-an-inch (12 mm.) of the top, and never less than half full (see page 51 or 52 for the correct fluid). As the cups in the master and all wheel cylinders are pure rubber it is imperative to use only the recommended fluid. Mineral oils would, in a very short time, distort and ruin them.

## GENERAL UPKEEP—Lubrication

### Handbrake Cable Conduits

Grease nipples are fitted in the conduits, as shown in the lubrication chart, to which the grease gun should be applied every 5,000 miles (8,000 km.).



**Fig. 8.** Rear axle oil filler.

During the winter months it is very important to keep the cables regularly lubricated, as this prevents the entry of water which on cold nights will freeze, thus locking the brake cables.

When lubricating the cables, grease is forced both ways and the gun should be pumped until grease exudes at the ends of the conduits.

## WHEEL HUBS

### Front Hubs

The front hubs are provided with a grease nipple, accessible when the nave plate is removed, for lubrication purposes. However, care should be taken when regreasing, as different types of hub grease, each suitable by itself, are incompatible when mixed and it is necessary to recharge the hub with grease if the previous grade is unknown.

If the owner is aware of the type of grease he has in his hubs, it is quite permissible to replenish the grease by means of a grease gun, provided the same type of grease is used, giving approximately five strokes of the gun every 5,000 miles (8,000 km.).

## GENERAL UPKEEP—Lubrication

Recharging the hub with grease involves removing the hubs, washing the bearings to remove all traces of the old grease before liberally coating the rollers and races with new grease. This should be carried out every 10,000 miles (16,000 km.). When replacing, tighten the hub nut until resistance is felt to hub rotation then slacken off the nut by one flat of the hexagon and fit the split pin. This work should be preferably undertaken by your local Doretti agent who has the necessary equipment for the task.

### Rear Hubs

These bearings are lubricated via a nipple (see arrow, Fig. 9) situated facing downwards at the rear of the brake backing plate. Give five strokes of the grease gun every 5,000 miles (8,000 km.).

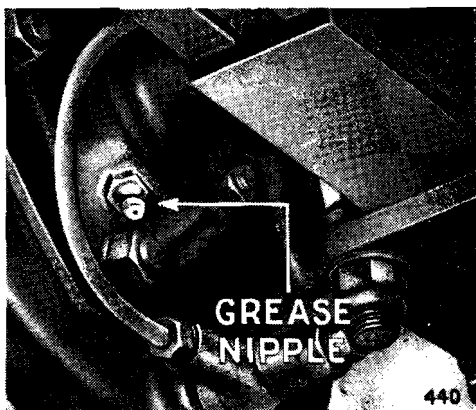


Fig. 9. Rear hub lubricator.

## FRONT SUSPENSION AND STEERING

Nipples are provided for the lubrication of the steering swivels (A), outer tie rod, ball joints, outer bushes of the lower wish-bones (see B Fig. 10), and the steering slave drop arm pivot. Do not lubricate the inner bushes of the wish-bones as they contain rubber. It is an advantage when greasing the lower suspension swivels to jack up, under the road spring frame, until the front wheel is free of the ground. This will allow grease to cover the thrust faces. Greasing of these points should be carried out at least every 1,000 miles (1,600 km.). Do not lubricate the joints attached to the drop arms as they contain rubber.

To lubricate the steering box, remove the filler plug situated on the steering box and top up with oil to the level of the orifice [see arrow (Q) Fig. 27]. This should be carried out every 5,000 miles (8,000 km.).

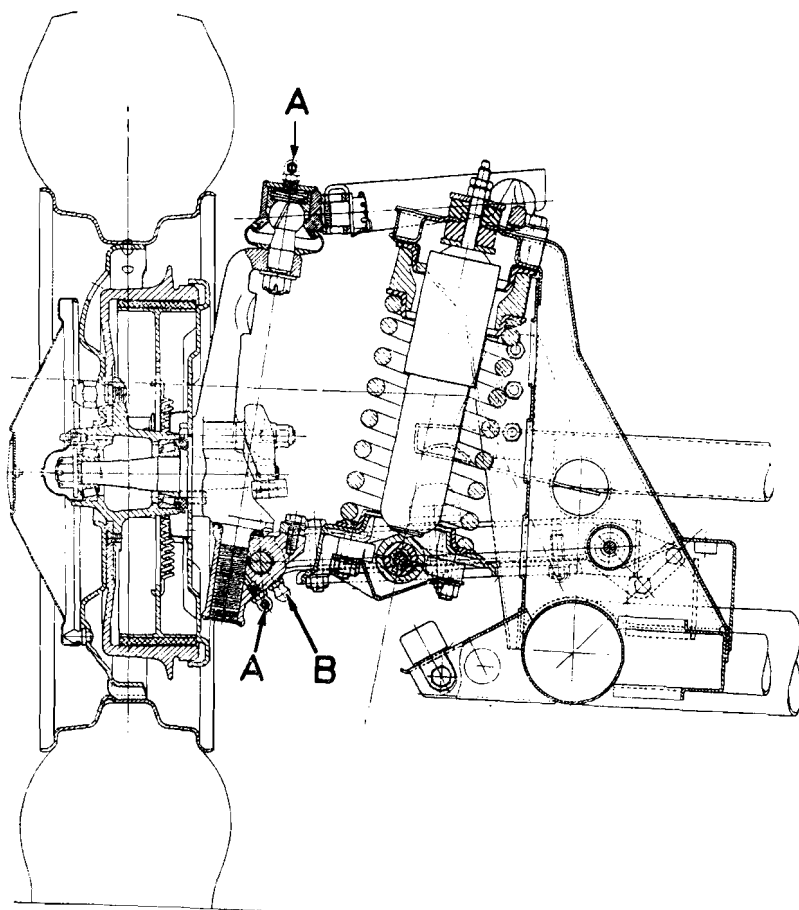
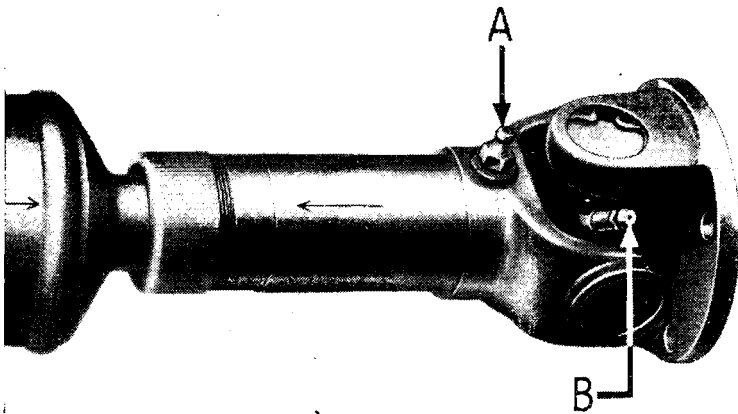


Fig. 10. Front suspension lubrication.

### PROPELLER SHAFT

The universal joints are of the needle roller bearing type and each is fitted with a nipple (B) for lubrication. A nipple (A) is also fitted to the front end of the shaft for lubrication of the sliding splines (see Fig. 11 page 20). The three nipples should receive attention with an **oil gun** every 5,000 miles (8,000 km.). Grease must not be used.

## GENERAL UPKEEP—Lubrication



249A

Fig. 11. Propeller shaft lubrication.

### REAR ROAD SPRINGS

The spring blades should be sprayed with penetrating oil and afterwards painted over with rear axle or engine oil particularly around the blade tips and clips.

Rubber bushes are fitted in all the rear spring eyes and must not be lubricated.

### HYDRAULIC DAMPERS

The front telescopic dampers do not require "topping up."

The rear dampers should be topped up with the specified fluid to the level of the bottom of the plug hole every 10,000 miles (16,000 km.). It is absolutely essential for the proper functioning of the dampers that dirt is prevented from finding its way into the interior. If the dampers become inoperative they should be serviced by the makers.

### HINGES, CONTROLS, DOOR LOCKS, ETC.

The bonnet catches, hinges and several small control joints should be given occasional attention with the oil can. Door locks should receive a drop of oil every month to ensure easy operation and to prevent corrosion. The connections on the handbrake and ratchet mechanism, etc., all require attention to allow the controls to work freely and prevent unnecessary wear.

## GENERAL UPKEEP—Tyres

### TYRES

The maintenance of correct tyre pressure is a large factor in tyre life and the steering and suspension of the car.

Examine the tyres occasionally for flints or other road matter which may have become embedded in the tread. Clean off any oil which may have got on the tyres by using fuel sparingly. Driving into or over sharp edged kerbs is liable to fracture the walls of the tyres and may in severe cases affect the front wheel alignment or even bend the wheel “out of truth.”

#### Tyre Pressures

**Front** ... 22 lb./sq. in. (1.55 kg./sq. cm.).  
**Rear** ... 24 lb./sq. in. (1.7 kg./sq. cm.).

These recommendations listed below apply to cars used under ordinary road conditions either in the U.K. or Overseas. Where cars are to be used for racing or special high speed testing where a sustained speed of more than 110 miles per hour is anticipated, it is desirable that the Dunlop Rubber Company should be consulted as to the need for tyres of full racing construction.

OPERATING CONDITIONS	MAXIMUM ROAD SPEED	
	Up to 100/105 m.p.h.	Over 100/105 m.p.h.
(a) Normal motoring in G.B. and under similar road and traffic conditions elsewhere.	N.E.	R.S.
(b) Continental type touring with lengthy periods at sustained speeds in excess of 85/90 m.p.h.	N.E. + 6 lb./sq. in. (0.42 kg./sq. cm.)	R.S. + 6 lb./sq. in. (0.42 kg./sq. cm.)
(c) Motoring which is predominantly and regularly of the high speed Continental touring type.	R.S.	R.S. + 8 lb./sq. in. (0.56 kg./sq. cm.)

Key :—

**N.E.** Normal equipment, *i.e.* Dunlop or Dunlop Fort, as case may be, at regular inflation pressures.

**R.S.** Road Speed tyres at regular inflation pressures.

#### Changing Position of Tyres

It is recommended that front tyres be interchanged with rear tyres at least every 2,000 miles. Diagonal interchanging between left front and right rear

## GENERAL UPKEEP—Tyres

and between right front and left rear provides the most satisfactory first change because it reverses the direction of rotation and keeps the wear of the tyres even and uniform.

### FRONT WHEEL ALIGNMENT

The alignment of the front wheels is most important in its effect on tyre wear and good steering. Excessive toe-in will lead to severe tyre wear, particularly on the “kerb side” front tyre.

**Correct Wheel Alignment.** The wheels should **Toe-in**  $\frac{1}{8}$ ”.

#### To Check and Adjust Wheel Alignment

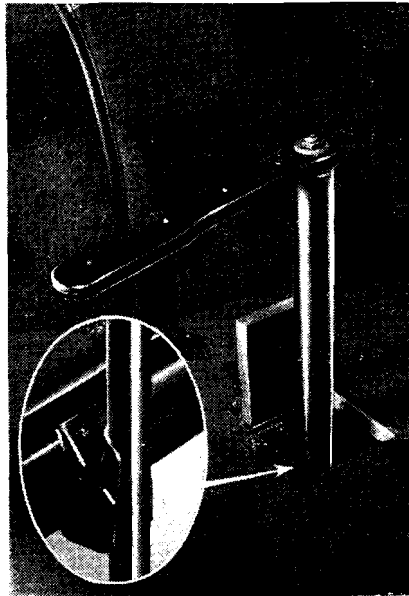
If adjustment is found necessary it should be carried out equally on the two outer tie-rods. When adjustment is complete ensure that the ball joints are in the centre of “swing” before securely tightening the tie-rod locking nuts.

### THE JACK

A screw jack is provided which is adapted to lift either side of the car as required.

To fit the jack in position shown, turn up the carpet and remove the small cover plate, situated just in front of the seat. Engage the hook of the jack with the bottom edge of the frame jacking bracket, then swing the jack into a vertical position and lift to ensure correct engagement, making sure that it is right home in its socket. Chock the wheels which will remain on the ground or alternatively engage first gear and apply the handbrake, before operating the jack handle.

If a jack is used under the rear axle case, **take care** to ensure that the jack pad does not touch the rear cover plate when lifting, otherwise there is a risk of damage and consequent oil leak.



**Fig. 12.** Jacking the car.

## **BODYWORK**

Dust may be removed from the exterior using a soft cloth only, but if it has been wet at any time it is advisable to use a sponge and water. Always use water when removing mud and when the car is clean finally wipe over with an almost dry chamois leather. Washing alone will not keep up the brilliance of the paint work over an indefinite period and it may become necessary to use a cleaner to remove all grease and dirt. It is advisable to acquire the cleaner from a reputable dealer who will be able to advise you on the best cleaner to suit the particular paintwork of your car. Afterwards polishing with some suitable preparation such as Duckham's D.A. Liquid Wax Polish No. 13 is advisable.

Special cleaners are available for removing traffic film and tar. Chromium plated parts should only need cleaning with soap and water but if due to neglect, the plate becomes spotted, it may be necessary to use a chromium plate cleaner.

The interior of the car should be dusted occasionally and the carpets brushed with a stiff brush. The upholstery may be cleaned by the application of a little soap and damp cloth, followed by a final wipe down with an almost dry sponge or wash leather. When a vacuum cleaner is available it can be used with advantage to help clean the interior of the car.

## **DOOR ADJUSTMENT**

The doors are provided with special locks which, when correctly adjusted, prevent any movement of the closed door. Only the striking plate requires repositioning when adjustment becomes necessary.

This adjustment should preferably be carried out by a coach fitter.

## **HOOD STOWAGE**

Never fold the hood when it is wet or damp ; wait until it dries.

1. Before folding the hood back, release the press buttons. Make sure that no hood material is trapped between the hood sticks and that the rear panel of the hood is pulled out.
2. Fold the hood sticks right down and gently pull hood material out.
3. Now fold the two corners in at right-angles and then fold the pack forward to lie naturally so that the hood envelope may be fitted.

## **SPARE WHEEL AND TOOL STOWAGE**

The spare wheel and tools are housed in the rear boot. To open the boot lid, pull the knob which is fitted to the inside rear panel of the car behind the seats.

## **RUNNING ADJUSTMENTS**

Various adjustments are necessary from time to time in order to keep the mechanism in efficient running order. The periods between depend largely upon the manner in which the car is used and no definite time can be given here for carrying out these corrections. The car should be examined however every 5,000 miles (8,000 km.) and any adjustments which appear necessary can then be made (see page 34).

### **ENGINE**

#### **Decarbonising and Valve Grinding**

It is recommended that the cylinder head be removed for decarbonising and valve grinding after the first 5,000 miles (8,000 km.). This is chiefly to give attention to the valve seats, the metal of which becomes stabilised during this period. Thereafter it will be found that decarbonisation will be required only after a period of about 20,000 miles (32,000 km.). Providing that the engine is running satisfactorily after this period and that each cylinder gives a normal compression, showing that the valves are seating reasonably well, it is much better to leave it alone and delay decarbonising for as long as the engine continues to run satisfactorily.

The grinding of the valves becomes necessary in order not only to increase the efficiency of the engine, but to prevent a badly seating valve becoming worse and getting burnt.

We recommend that the work should be carried out by the skilled mechanics at your nearest Doretti Agent. For those who desire to do this work themselves, the main points to watch are outlined below :

1. The procedure of turning the crankshaft in order that the compression will "break" the seal of the cylinder head should not be practised with this design of engine.  
Once the cylinder head has been removed it is important that the crankshaft is not rotated unless the cylinder sleeves are firmly clamped down against their seatings. This can be accomplished by using two tubes and washers fitted over the cylinder head studs and each secured with a cylinder head nut. If this precaution is not observed the sleeves may rise, with consequent risk of water leaking into the crankcase after assembly. On removal of the head and withdrawal of the push rods, the passage ways in the block leading to the camshaft and thence to the crankcase and sump must be sealed off with a clean rag or masking tape. The same applies to the rocker shaft oilway, both in the head and the block, to prevent the entry of carbon particles which could do serious harm to the engine.
2. A stick of soft solder is the most suitable tool for removing the carbon. On no account should emery cloth or sandpaper be used.
3. It has been found advantageous to remove the tappets and clean the insides just prior to refitting the cylinder head to ensure that any chips of carbon which may have fallen into the chamber are removed from the push-rod seatings.

## RUNNING ADJUSTMENTS—Engine

4. A new gasket must be fitted each time the cylinder head is removed. The plain side of the gasket must be downwards against the cylinder block and should be coated on both sides with "WELLSEAL" or similar non-setting sealing compound.
5. When replacing the cylinder head nuts, tighten them gradually in the sequence shown in Fig. 13, in order to produce an even pressure on the gasket and prevent undue strain in the cylinder head casting.  
**It will be necessary to recheck the nut tightness when cold to 100-105 lb. ft.**
6. The valve springs are close-coiled at one end and should have the close-coiled end towards the cylinder head when refitting. Before tightening down the rocker pedestals, screw back each adjusting screw and ensure that the ball ends of these screws engage correctly with the push-rods. Failure to attend to these items may result in damage to the push-rods. The auxiliary inner valve springs must be fitted to the exhaust valves.
7. Smother the rocker gear with oil, particularly where the rockers bear on to the valves, before replacing the rocker cover. Ensure that the cork washer is undamaged and shellaced to the cover, otherwise oil may leak through the joint.

### Cylinder Head Nuts

After the first 500 miles (800 km.) the cylinder head nuts should be checked for tightness, with engine hot, in the order shown in Fig. 13.

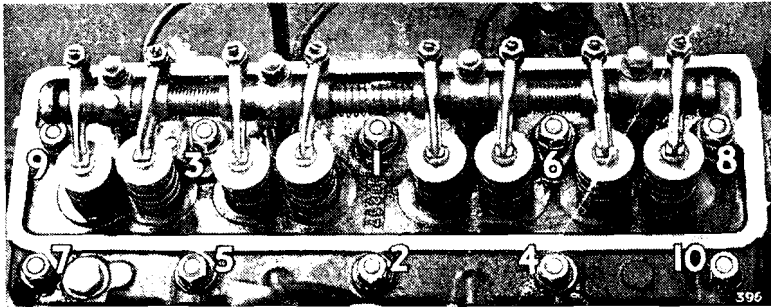


Fig. 13. Order of tightening cylinder head nuts.

### Valve-Rocker Clearances

The running clearances are .010" (0.25 mm.) Inlet and .012" (0.3 mm.) Exhaust for normal touring purposes. For high speed motoring the clearance should be .013" (0.33 mm.) for both inlet and exhaust, measured with engine cold.

## RUNNING ADJUSTMENTS—Engine

### Adjustment

Remove the rocker cover and turn the engine crank with the aid of the dynamo belt for half a revolution after the valve to be adjusted has closed. It is easier to do this if the sparking plugs are removed. This also provides an opportunity for inspecting and checking the sparking plug gaps.

Slacken the lock nut and adjust the rocker screw with a screwdriver until the gauge is a sliding fit between the top of the valve stem and the rocker face.

Now tighten the lock nut and check that the clearance has not altered.

### Ignition Timing

On initial assembly the ignition is set as stated on page 5.

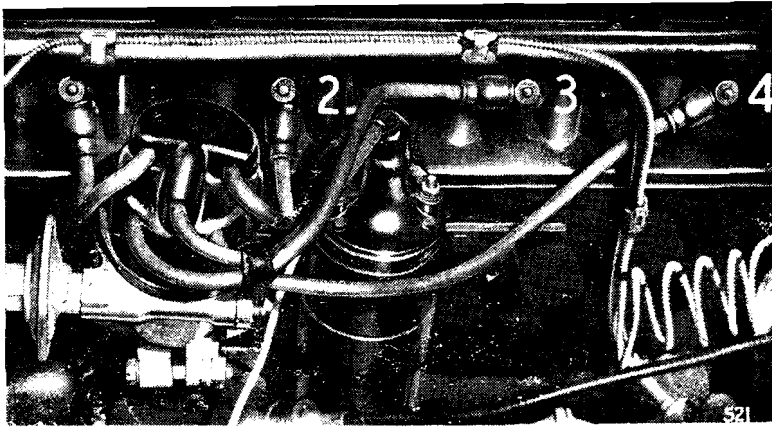


Fig. 14. Ignition leads.

Premium grade fuels of 80 octane or higher must be used for these engines and with this fuel, a "clean" engine will not "pink." However, with a substantial amount of carbon build up, it may be necessary to retard the ignition slightly so that "pinking" is only just audible when pulling hard with the engine speed above 1,500 r.p.m.

To advance ignition, rotate the knurled screw as indicated. Each division on the distributor vernier scale represents  $2^\circ$  of the distributor, *i.e.*, 4 on the crankshaft.

The firing order is 1, 3, 4, 2.

To obtain **T.D.C.** position turn the crankshaft until the small hole on the belt pulley is in line with the pointer attached to the timing cover.

## RUNNING ADJUSTMENTS—Engine

### Valve Timing

See page 5 for correct valve timing.

### Sparking Plugs

The sparking plugs were adopted for original equipment after lengthy tests and as sparking plug types vary in suitability for different engines, it is important that the correct type of plug be fitted when making replacements, this is :

Champion No. L10S— $\frac{1}{2}$ " reach.

For high speed touring however, use Champion No. L11S— $\frac{1}{2}$ " reach. The gaps (*i.e.*, the width between the firing point of the centre electrode and earth point) are originally set and should be maintained at thirty-two thousandths of an inch (0.8 mm.) to ensure even running of the engine. Incorrect gap settings may cause misfiring or erratic slow running. Faulty plug leads or cracked porcelain insulation in the sparking plug will also cause faulty ignition, see also page 9.

Sparking plugs should be thoroughly cleaned by a sand blasting process and checked and adjusted (if necessary) for gap setting after 5,000 miles (8,000 km.) use and at 10,000 miles or 15,000 km. should be replaced by new plugs.

**Carburettors.** Twin S.U., Type—H4, Standard Needle F.V.

For high-speed and competition work, use G.C. needles.

### Adjustment

As the needle size is determined during engine development, adjustment of the carburettors is confined to correct idling adjustment. Remove the

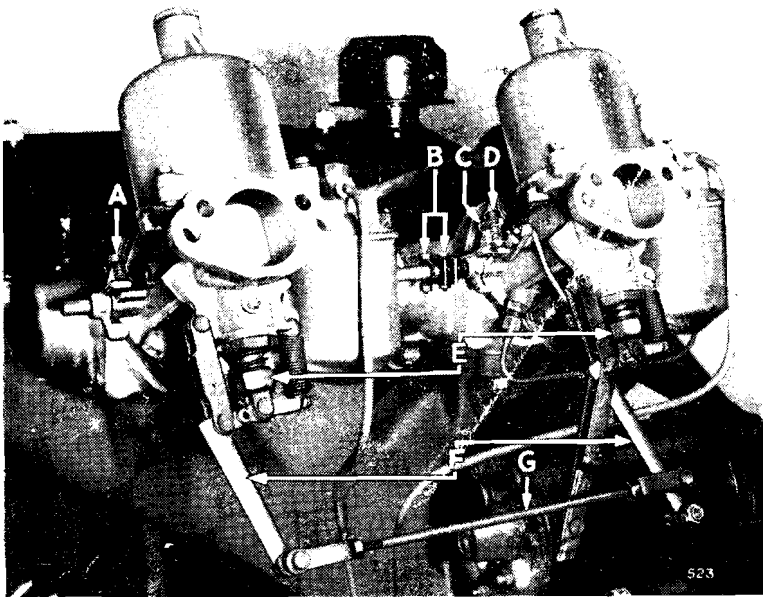


Fig. 15. Carburettors.

## RUNNING ADJUSTMENTS—Engine

air cleaners and run the engine until it has attained its normal running temperature, slacken one of the clamping bolts (**B**) on the throttle spindle connection and disconnect the mixture control link (**G**) by removing one of the fork swivel pins. Adjust the idling speed to approximately 500 r.p.m. by moving each throttle adjusting screw (**A**) & (**C**) an equal amount. By listening to the hiss in the intakes, adjust the throttle adjusting screws until the intensity of the hiss is similar on both intakes. This will synchronise the throttles. When this is satisfactory, the mixture should be adjusted by screwing both the jet adjusting nuts (**E**) up or down to exactly the same extent, at the same time keeping the jet levers (**F**) pressed forward to ensure that the jets are hard up against the nuts, until even running is obtained. As these are adjusted, the engine will probably run faster, and it may therefore be necessary to unscrew the throttle adjusting screws a little, each by the same amount, in order to reduce the speed. When the mixture is correct on both carburettors, lifting the piston of one of them with a penknife blade should make the engine beat become irregular from excessive weakness. If lifting the piston about  $\frac{1}{4}$ " (3 mm.) on one carburettor stops the engine and lifting the other about  $\frac{1}{4}$ " increases the engine speed, this indicates that the mixture on the first carburettor is set weak and the second is set rich. The first one should, therefore, be enriched by unscrewing the jet adjusting nut one flat at a time and the second should be weakened off by screwing up the jet adjusting nut in a similar manner. When the mixture is correct, the exhaust beat should be regular and even.

If it is irregular, with the splashy type of misfire and a colourless exhaust, the mixture is too weak. If there is a regular or rythmical type of misfire in the exhaust beat, together with a blackish exhaust, then the mixture is too rich. This should be noted when the air cleaners are again in position. When reconnecting the mixture control link, make sure that the jet levers are pressed forward and the control rod adjusted correctly for length so that the clevis pins may be inserted freely while the jets are in this position. The throttle spindle interconnection clamping bolts (**B**) should now be tightened.

The desired fast idle necessary when the choke is in operation is controlled by adjusting screw (**D**).

For further information on the tuning, adjustment and maintenance of S.U. carburettors, you are advised to get in touch with the S.U. Carburettor Co. Ltd., Wood Lane, Erdington, Birmingham 24, from whom the necessary literature may be obtained.

### Fuel Pump

The mechanically operated fuel pump, mounted on the left-hand side of the crankcase, provides a constant pressure of fuel to the carburettor. A hand primer is fitted, which can be used to pump fuel to the carburettors

## RUNNING ADJUSTMENTS—Engine

if the float chamber is not already full, under which condition a slight pumping resistance is felt before the lever reaches its stop. This resistance ceases when the chamber is full.

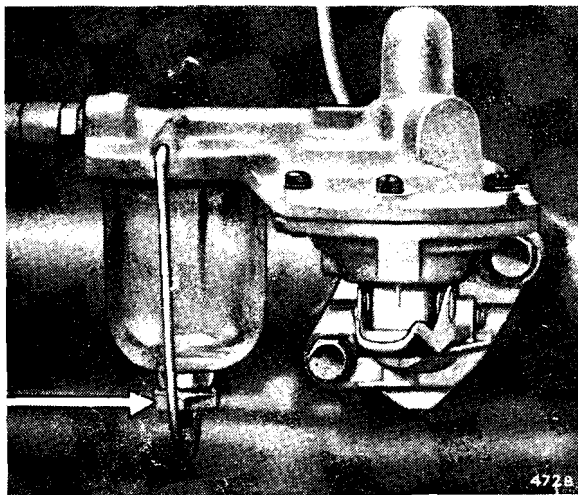


Fig. 16. Fuel pump.

The glass bowl acts as a sediment chamber for the petrol passing to the pump. The foreign matter collects on the underside of the gauze and, being washed off by petrol, sinks to the bottom of the bowl. To remove the sediment, detach the bowl by unscrewing the nut at its base and wash out the bowl with the fuel that will be in it. When refitting the bowl, tighten the nut just sufficient to ensure a fuel-tight joint, as over-tightening may result in damage.

If the pump fails to supply fuel to the carburettors it is advisable to attend to the following points : (a) inspect the fuel pipe unions, which (if any are loose) should be tightened up, (b) a blockage may have been caused in the fuel pipe, which may be removed by blowing through the pipe with the aid of a tyre pump.

If, after attending to the above points, the pump still fails to operate, it should be renewed and the old pump sent to the nearest A.C. or Doretta Service Station.

Before doing any work on the carburettors or fuel pump which involves disconnecting a fuel pipe it is important to turn off the fuel supply at the tap on the petrol tank. Failure to do this will allow the petrol to drain away from the tank.

## RUNNING ADJUSTMENTS---Clutch

### CLUTCH

A Borg & Beck single dry plate hydraulically operated clutch is fitted and it is correctly adjusted before leaving the works, but this should be checked every 10,000 miles (16,000 km.). The hydraulic master cylinder for the clutch has a common filler with the brake system. [See arrow (B) Fig. 3, page 11.]

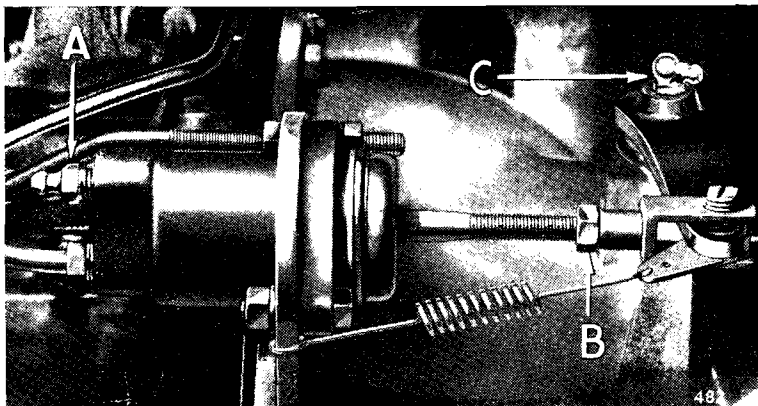


Fig. 17. Clutch adjustment.

There is however, a partition in the container to ensure that any possible defect in one system does not affect the other.

Adjustment of the mechanism can normally only be judged as necessary at the connecting rod between the operating cylinder and the shaft operating lever end, see Fig. 17. The correct setting is when there is .075" (1.9 mm.) end float of the rod between operating cylinder and lever, in the "foot off" condition. To achieve the correct setting, measure the total movement of the operating lever by hand and if different from the specified amount release the locknut (B) Fig. 17 and adjust the length of the connecting rod to the correct figure. The adjustable connection between pedal and master cylinder is set on initial assembly and **MUST NOT** be tampered with as it will never require adjustment.

If a pipe has been disconnected, it will be necessary to bleed the system. A bleeder nipple is shown by the arrow (A) Fig. 17. For instruction on bleeding the system, see page 32.

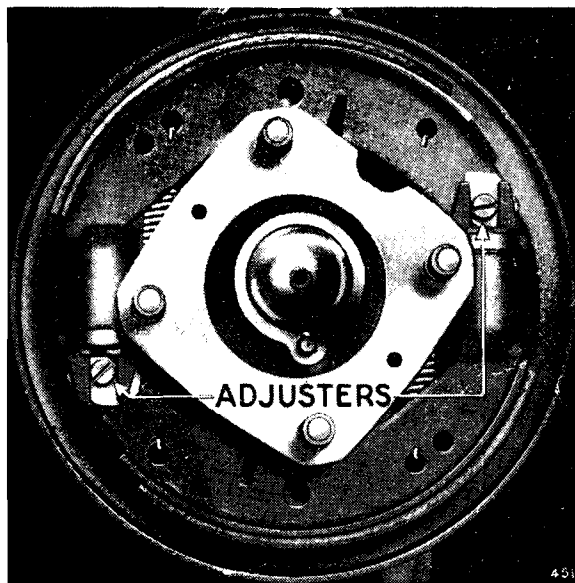
### BRAKES

Lockheed hydraulic brakes are fitted to all four wheels. Two leading shoe type being used on front wheels, leading and trailing shoe type on rear wheels. The pedal operates the brakes on all four wheels hydraulically, whilst the handbrake control operates the brakes on the rear wheels by means of cables.

## RUNNING ADJUSTMENTS—**Brakes**

See page 16 for checking level of fluid in reservoir. If it is found to be particularly low, it is an indication that a leak has developed somewhere in the system and it should be traced and rectified without delay.

It must be remembered that the presence of oil, grease or similar foreign matter on a brake shoe will seriously affect the coefficient of friction and in consequence



**Fig. 18.** Brake shoe assembly, front.

the retarding effect of that particular brake, in spite of the fact that it is being applied with the same force as the others. In such cases the brake drum should be thoroughly cleaned with fuel and the brake shoes replaced by new replacement shoes. Cleaning the brake shoe is not satisfactory.

Do not re-line the shoes but fit genuine Lockheed replacement shoes. These shoes have the right type of lining machined to the correct radii.

Should the shoes be removed, care must be exercised to ensure that the pull-off springs are located behind the shoes and hooked through the correct holes, as shown in Figs. 18 and 19.

### **Adjustment of Brake Shoes**

After a considerable mileage it may be found necessary to adjust the brakes. This is evident when the brake pedal has to be depressed to within 1" of the floor before the brakes operate. There are **TWO** adjusters to each front wheel and **ONE** to each rear wheel as shown.

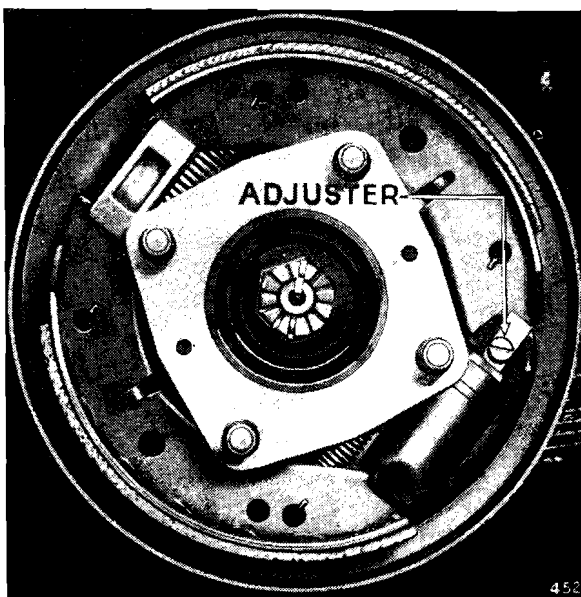


Fig. 19. Brake shoe assembly, rear.

The following procedure should be followed to correctly adjust the brakes:

1. Apply the brakes hard, with the car stationary, to position the shoes in the drum, then release brake.
2. Jack up the car, remove the nave plates and road wheels.
3. Rotate hub until hole provided in the brake drum coincides with screwdriver slot in micram adjuster.
4. Insert a screwdriver and turn the adjuster clockwise until the shoe contacts the brake drum, then turn adjuster back one notch. There is a constant drag on the rear wheels due to the action of the differential and the axle oil. Do not confuse this with the brake drag.
5. Replace wheels and nave plates, then remove jack.

### Handbrake Adjustment

Adjustment of the brake shoes as previously described automatically readjusts the handbrake mechanism. The cables are correctly set before leaving the works and only maladjustment will result from tampering with the mechanism.

### Bleeding the Brake and Clutch Hydraulic System

If a pipe joint is uncoupled, the wheel cylinder cups or clutch operating cylinder are inspected or replaced, the system must be bled in order to expel any air which may have been admitted.

## RUNNING ADJUSTMENTS

Air is compressible, and its presence in the system will affect the working of the brakes and clutch.

Whilst the majority of owners will prefer to have these operations carried out by a Doretto Agent, for the benefit of those desiring to carry out their own running adjustments, the procedure is as follows :

1. Wipe clean the bleeder nipple and fit a piece of rubber tube over it, allowing the tube to hang in a clean container partially filled with fluid, so that the end of the pipe is below the level of the fluid.
2. Unscrew the bleeder nipple one complete turn with a suitable spanner. There is only one bleeder nipple to each wheel and one nipple on the clutch operating cylinder.
3. The fluid reservoir should be filled before commencing the bleeding operation, and must be kept at least half-filled during the whole operation, otherwise more air will be drawn into the system via the master cylinder. Always clean the area around the plug before removing it; this will lessen the risk of grit falling into the chamber after removal of the plug. Seven to eight strokes of the pedal will reduce the fluid level from full to half-full.
4. Depress the pedal quickly and allow it to return without assistance. Repeat this pumping operation with a slight pause between each depression of the pedal. Observe the flow of fluid being discharged into the glass jar and when all air bubbles cease to appear, hold the pedal firmly down and securely tighten the bleeder nipple.

**NOTE.**—Depending upon the position at which a pipe joint in the brake system has been uncoupled, it will be necessary to bleed the system at either both front or both rear wheels. If the pipe was uncoupled at the master cylinder, then the system must be bled at all four wheels.

## PROPELLER SHAFT

If the propeller shaft has been removed it is essential when re-assembling the front end splines to see that the arrows on the universal joint and propeller shaft end are in line (see Fig. 11, page 20), so that the propeller shaft will transmit uniform motion.

## HYDRAULIC DAMPERS

The front telescopic dampers fitted do not require any adjustment or topping up. If the dampers are removed, or for some reason new ones are fitted, it is advisable to hold them the right way up (in the case of the rear dampers check the level of the fluid and replenish if necessary), then pump the pistons

## RUNNING ADJUSTMENTS

to each end of the stroke. This pumping action dispels any air which may have entered the chambers. After this operation check the fluid level in the rear dampers, and in both cases keep the dampers the right way up until they are fitted into place.

## LOOSE BOLTS AND NUTS

All the vital nuts are locked in position by split pins, locking wire, or by an additional lock nut or lock washer. It is, however, desirable that the car should be examined every 5,000 miles (8,000 km.), so that if any nut is found to be loose it may be tightened. The wheel nuts can periodically be checked by the owner himself and occasionally removed, oiled and refitted.

The general examination of the chassis is a mechanic's job.

## ELECTRICAL SYSTEM

A 12 volt earth return (or one wire) lighting and starting set is fitted.

**As the frame parts are not insulated, one cable should be disconnected from the battery terminal before removing any electrical unit, otherwise there is a risk of a serious "short."**

A list of the makers' numbers and descriptions of all electrical equipment, including bulbs, will be found on page 40.

### IGNITION

See page 8 for the function of the red warning lamp bulb. The failure of this bulb will not affect the ignition, but it should be replaced at the earliest opportunity.

#### Misfiring, etc.

If misfiring occurs, check that the fault is not due to a defect in the carburettor, fuel supply, sparking plugs, etc.

The engine will run erratically in the rare occurrence of a wire having broken inside its insulated casing. The trouble is then difficult to trace. Examine the high tension leads. If they are cracked and perished, replace with the correct ignition cable which should be obtained only from your local dealer and should be of the correct length.

#### Cleaning and Adjustment of Distributor Contacts

Every 5,000 miles (8,000 km.) wipe the inside and outside of the moulded distributor cover 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 on its holder.

Examine the contact breaker. The contacts must be free from grease or oil. If they 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 cloth moistened in petrol.

After cleaning, check the contact breaker gap. To do this, turn the crankshaft with the starting handle until the contacts are fully opened and insert a 0.015" (0.4 mm.) gauge 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. Slacken the two screws securing the plate carrying the fixed contact and move the plate until the gap is set to the thickness of the gauge, tighten the two screws and re-check the setting.

#### THE BATTERY (see page 11).

Keep the terminals clean and well covered with petroleum jelly. If they are corroded, scrape them clean, assemble and cover with petroleum jelly. Wipe away all dirt and moisture from the top of the battery, and make sure that the connections are clean.

## ELECTRICAL SYSTEM—Dynamo, Control Box and Fuses

### THE DYNAMO

The dynamo is of the compensated voltage type and operates in conjunction with the regulator unit which is housed alongside the cut-out in the control box. The regulator unit ensures that the dynamo charges the battery at the rate best suited to its condition. It automatically provides a large charging current for a discharged battery and a low trickle charge for a battery in the fully charged state. The cut-out, operated by dynamo voltage, prevents discharge of the battery through the dynamo when the dynamo is not charging, in which condition the ignition warning light will be glowing.

#### Belt Tightness

It is important that the belt is sufficiently tight to drive the dynamo but not too tight as to put undue load on the dynamo and water pump bearings. The correct tension is achieved when the belt can be pressed inwards  $\frac{1}{2}$ "- $\frac{3}{4}$ " (12—16 mm.) on the longest run, *i.e.*, from the dynamo pulley to the crank pulley.

### THE STARTER MOTOR

#### Cleaning and Lubrication

The starter brush gear and commutator will not normally require attention. After 50,000 miles (80,000 km.) however, it is advisable to have the unit serviced at a Doretti or Lucas Service Depot.

Should the starter pinion become jammed in mesh with the flywheel, select top gear and rock the car backwards and forwards until the pinion releases itself. Do not forget to switch off the ignition when carrying out this operation.

### CONTROL BOX

The control box, mounted on the scuttle, houses the voltage regulator and cut-out. These units are carefully and accurately set before leaving the works and must not be tampered with.

### FUSES

The fuse carrier is located near the control box and houses two operating and two spare fuses. The top fuse (50 amp.) protects the horn, while the other fuse (35 amp.) protects those items which can only operate when the ignition is switched on, *i.e.*, direction indicators, windscreen wipers, brake light, petrol gauge and heater (if fitted). When replacing a fuse, it is important to use the correct replacement; the fusing value is marked on a coloured paper slip inside the tube.

A blown fuse will be indicated by the failure of all the units protected by it and is confirmed by examination of the fuse. If it is not possible to locate the cause of the trouble and the new fuse blows immediately, the equipment should be examined by a Doretti or Lucas Agent or Service Depot.

## ELECTRICAL SYSTEM—Lamps

### LAMPS

#### Head Lamps

The lamps fitted to this vehicle have the reflector and glass sealed as a unit. The bulb has a "pre-focus" cap accurately located and correctly positioned relative to the reflector, thus no adjustment to focusing is required when a replacement bulb is fitted.

It is not possible with these types of lamps to alter the direction of dip entirely by fitting bulbs of the opposite dipping characteristics, as some of the dip effect is produced by the shape of the glass in the lens.



Fig. 20. Head lamp light unit with backshell removed.

#### BULB REPLACEMENT

Withdraw the front rim after removing the securing screw. Press in the lamp unit against the tension of the three adjusting screw springs and turn in an anti-clockwise direction until the key-slot holes in the rim line up with the screw heads. The lamp unit can then be drawn off. Do not rotate any of the screws, as this will affect the alignment of the reflector when assembled.

Rotate the back shell anti-clockwise and pull off, then the head lamp bulb can be removed. (See Fig. 20.) Care should be taken to see that the bulb does not drop out.

#### LAMP ALIGNMENT

The lamp must be set to ensure that the beam is projected below the horizontal, taking into account that the lamp must be dipped slightly more to compensate for road inequalities and heavy loads which may be carried in the rear of the vehicle.

## ELECTRICAL SYSTEM—Lamps

### TO CHECK AND ADJUST ALIGNMENT

Park the car in front of a garage door or wall and square to it. The car must stand on level ground and the front of the lamps should be approximately 25 ft. (7.5 m.) from the "screen." The car should be unladen and the tyres at the correct pressures.

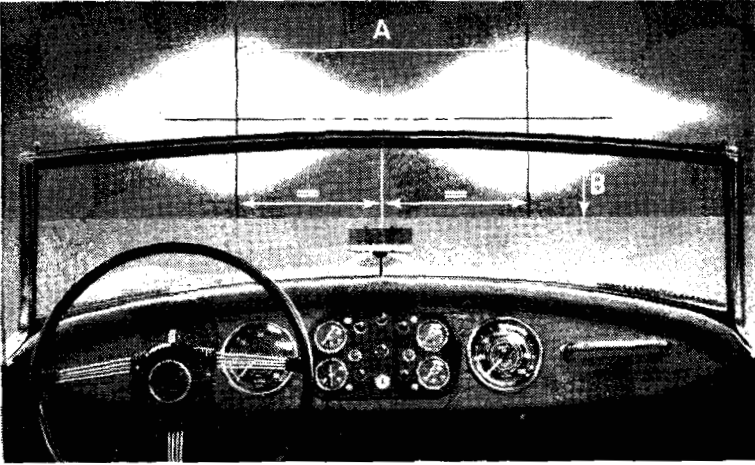


Fig. 21. Head lamps correctly aligned.

A point should be marked on the screen in line with the centre of the bonnet. Two crosses should be drawn on the "screen" 26" (661 mm.) above the ground level as indicated by (B), and 44" (1,118 mm.) apart (A), measured equally about the centre point (see Fig. 21). Switch on the head lamps and adjust the lamps, if necessary, until the centre of each circle of light coincides with the centre of its respective cross.

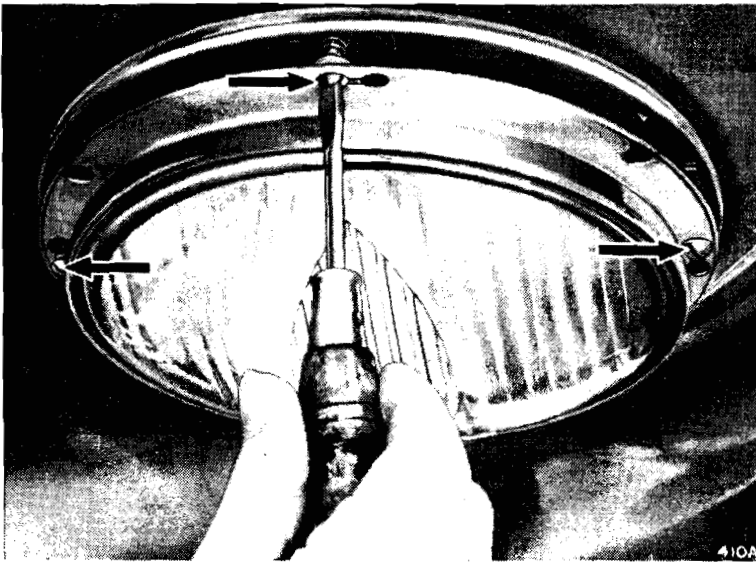


Fig. 22. Adjusting head lamp alignment.

## ELECTRICAL SYSTEM—Lamps, etc.

If adjustment is necessary, proceed as follows :

Withdraw the front rim after removing the securing screw. Remove the dust-excluding rubber. This will reveal three screws (see arrows, Fig. 22), which can be adjusted to align the reflector correctly. When the correct alignment has been obtained, replace the rubber and rim.

It is advisable to start adjustment with each screw screwed out half-way ; this will ensure correct fitting of the rim when assembled.

### **Parking Lamps (Front), Tail and Brake Lamps, and Direction Indicator Flashing Lamps**

To remove bulb, peel back the rubber ring and remove rim, then the bulb can be withdrawn. When replacing rim, first slip the edge over the two small lugs, then peel back rubber as rim is fitted. Ensure that the rubber is located correctly over the rim edge, otherwise vibration may cause the rim to become detached.

### **Number Plate Illuminator Lamp**

To gain access to the bulbs, remove the securing screw and withdraw the cover.

### **Ignition Warning Light**

### **Direction Indicator Warning Light**

### **Main Beam Warning Light**

Each bulb holder can easily be withdrawn from the rear of the panel for bulb renewal.

### **Instrument Panel Lights**

Replacing these bulbs is best left to the safe hands of a Service Station.

## **WINDSCREEN WIPER**

For operation, see page 7.

## **DIRECTION INDICATORS**

These are of the flashing type operating in the dual filament bulbs in the parking lamps at the front and the tail lights at the rear. The flasher unit is situated close to the control box underneath the bonnet.

## **WINDTONE HORNS**

Each electric horn, before being passed out of the works, is adjusted to give its best performance and will give long periods of service without any attention. No adjustment is required in service.

If for any reason the note is unsatisfactory, do not attempt to dismantle the horn, but return it to a Lucas Service Depot for examination.

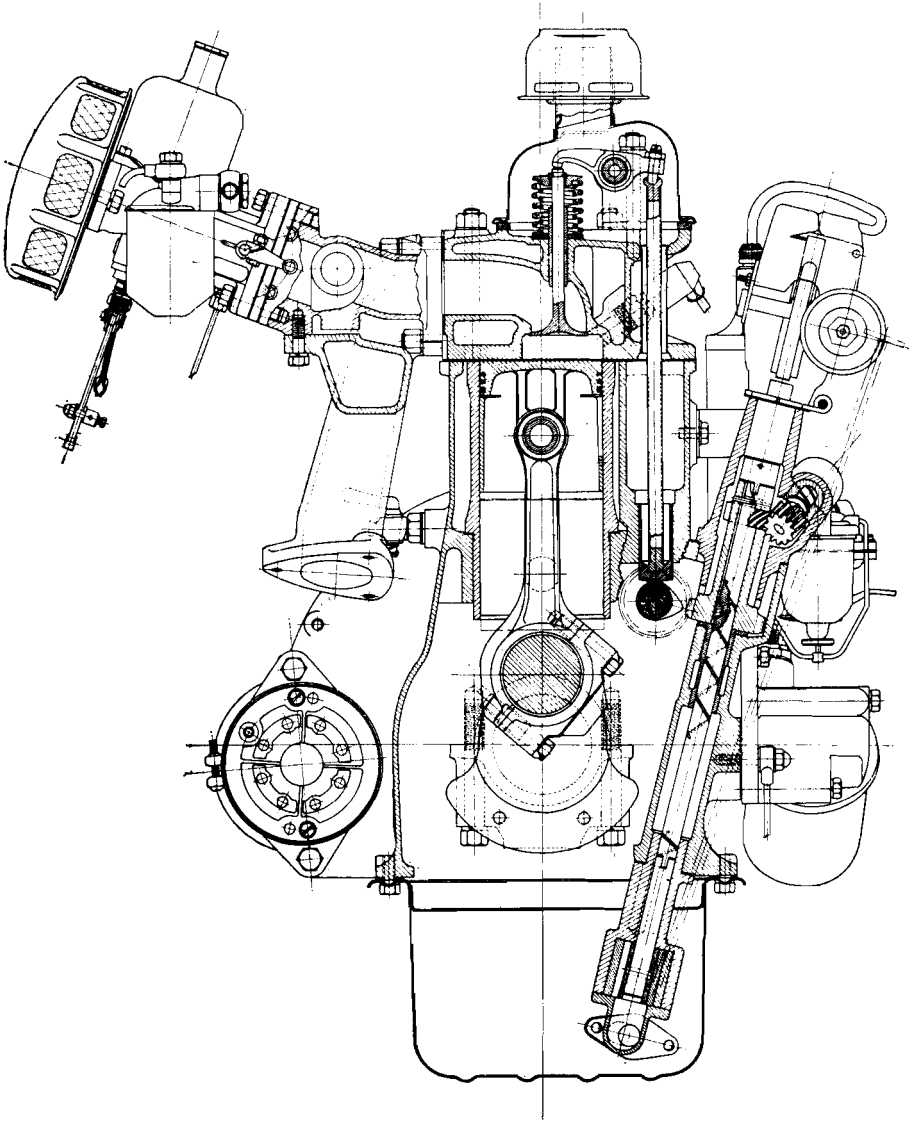
## ELECTRICAL SYSTEM—Specification

### ELECTRICAL COMPONENT SPECIFICATION

SPECIFICATION OF EQUIPMENT			BULBS			
	Model	Service No.		Lucas No.	Volt-age	Watt.
Battery	GTW9A.2	4011557F	Head Lamps			
Control Box	RB106.1	37138B	Left-hand dip, both lamps (home model)	404	12	60/36
Coil	B12 type L	45012D	Left-hand dip, both lamps (export model)	354	12	42/36
Dynamo	C39PVL <sub>i</sub> .2 type LO	22258B	Right-hand dip „	301	12	36/36
Distributor	DM2 type V167	40403A	“Vertical dip” „	360	12	45/35
Starter	M418G type V164	25541E	Parking Lamps, Front and Rear	361	12	18.6
Fuse Box	S.F.6	033240	Number Plate Illumina- tion and Brake Lamp	989	12	6
Flasher Unit	F.L.3	35003A	Ignition Warning Panel			
Horns	WT614LN HN	69011H 69012H	Lights and Direction Indicator Warning Lights	987	12	2.2
Windscreen Wiper Motor	CRT 15					
Petrol Gauge	Jaeger No.	Code No.				
Tank Unit	TA 147	80791(12v)				
Flasher Relay	DB.10	33117A	Fuses	50 amp.		188219
Horn Relay	SB.40/1	33135A		35 amp.		188218

### IGNITION SUPPRESSION EQUIPMENT

The distributor fitted to this vehicle has the suppressor built into the distributor head. This, of course, means that on outward inspection of the ignition and coil leads a suppressor will not be apparent. If a replacement or spare distributor head is required, take care to ensure that it is of the correct type with the long carbon pick-up which is, in fact, the suppressor.



**Fig. 23.** Engine cross section.

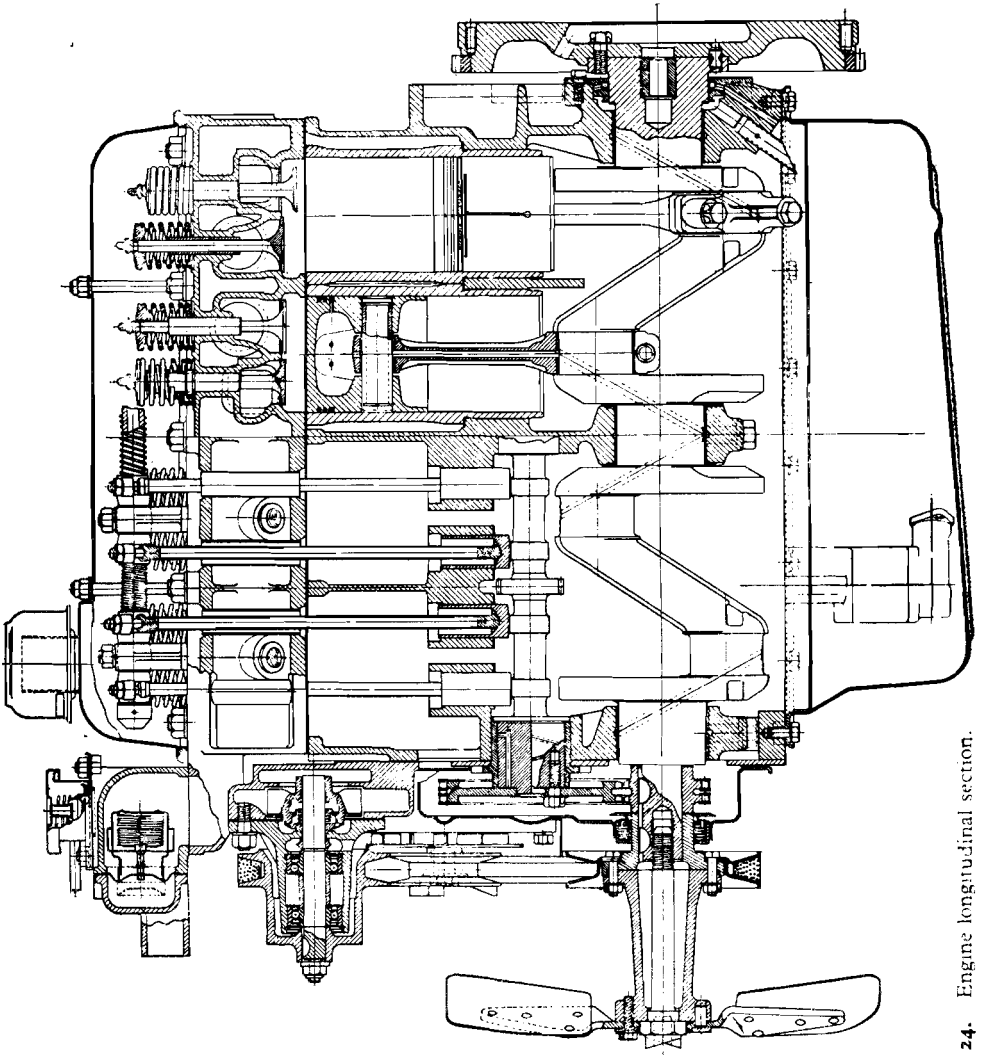


Fig. 24. Engine longitudinal section.

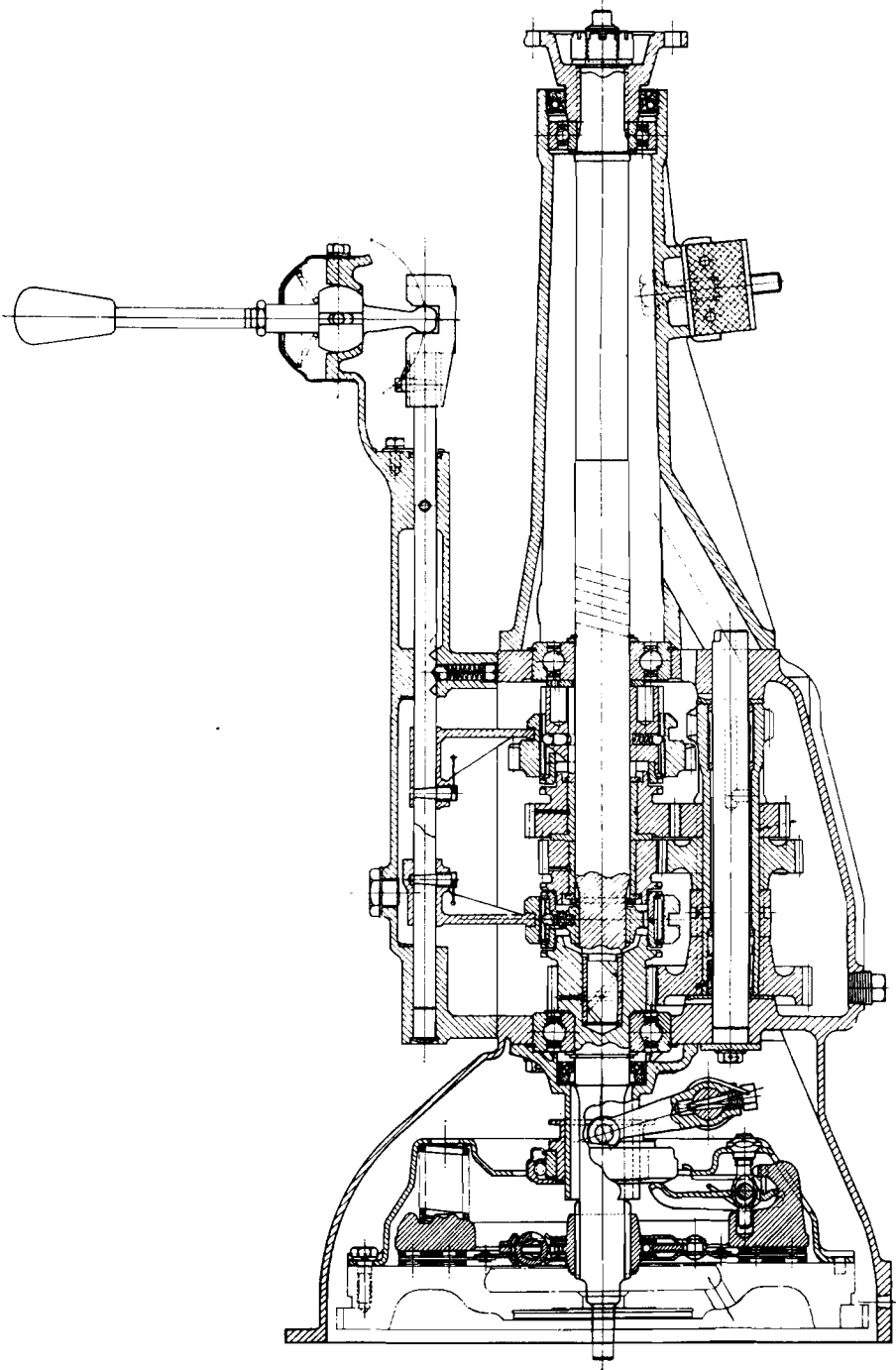


Fig. 25. Gearbox Section.

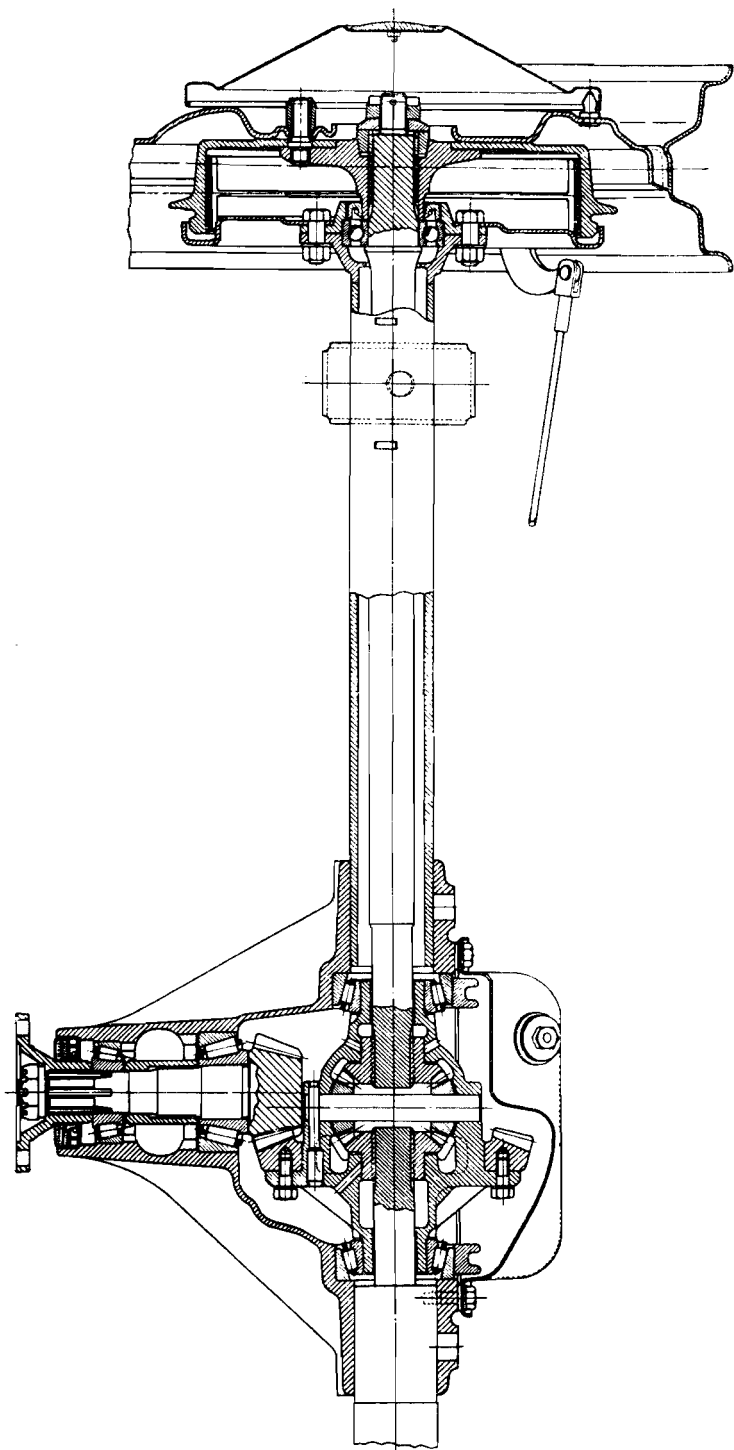


Fig. 26. Rear axle section.

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## NOTES

## NOTES

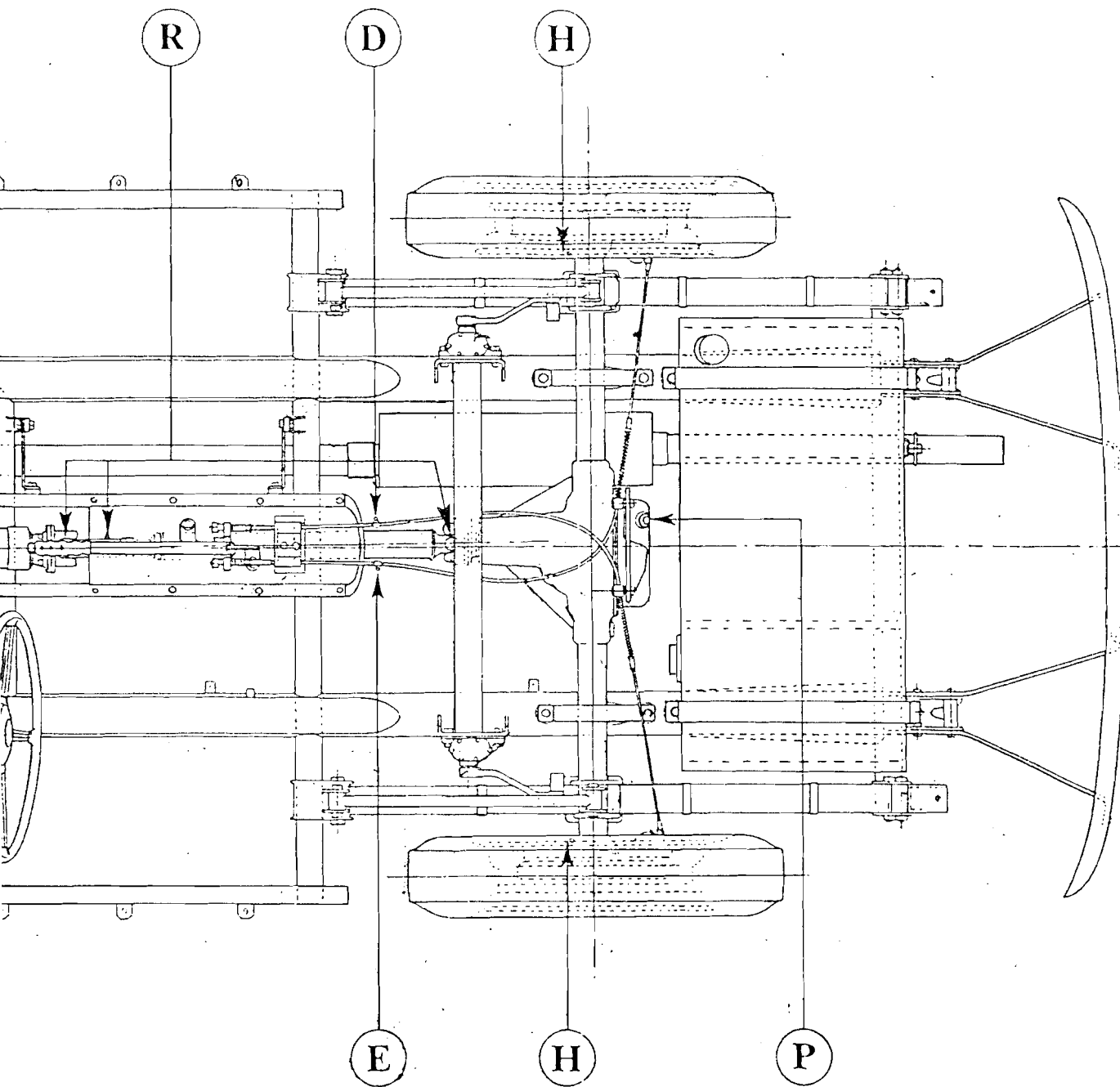
**RECOMMENDED LUBRICANTS — BRITISH ISLES**

COMPONENT	ESSO	DUCKHAM'S	VACUUM	WAKEFIELD	B.P. ENERGOL	SHELL
<b>ENGINE</b>						
Summer	Essolube 30	Duckham's NOL "Thirty"	Mobiloil A	Castrol XL	Energol S.A.E. 30	Shell X-100, 30
Winter	Essolube 20	Duckham's NOL "Twenty"	Mobiloil Arctic	Castrolite	Energol S.A.E. 20	Shell X-100 20/20W
<b>Upper Cylinder Lubricant</b>	Essomix	Duckham's Adcoids	Mobil Upperlube	Castrollo	Energol U.C.L.	Shell Donax U
<b>Flushing Oils</b>	Esso Flushing Oil	Duckham's NOL "Ten"	Mobil Engine Flushing Oil	Wakefield Flushing Oil	Energol Flushing Oil	Shell Flushing Oil
<b>GEARBOX</b>	Essolube 30	Duckham's NOL "Thirty"	Mobiloil A	Castrol XL	Energol S.A.E. 30	Shell X-100 30
<b>REAR AXLE STEERING GEARBOX</b>	Esso Expee Compound 90	Duckham's Hypoid 90	Mobilube G.X. 90	Castrol Hypoy	Energol EP S.A.E. 90	Shell Spirax 90 EP
<b>PROPELLER SHAFT JOINTS</b>	Esso Expee Compound 140	Duckham's NOL EPT 140	Mobilube G.X. 140	Castrol Hi-Press	Energol EP S.A.E. 140	Shell Spirax 140 EP
<b>FRONT WHEEL HUBS</b>	Esso High Temperature Grease	Duckham's LB10	Mobilgrease No. 5	Castrol W.B.		
<b>REAR WHEEL HUBS and ENGINE WATER PUMP (Hand Gun)</b>	Esso Grease	Duckham's H.B.B.	Mobil Hub Grease	Castrol Heavy	Energol C3	Shell Retinax A
		Duckham's Laminoid Soft	Mobilgrease No. 4	Castrol CL		
<b>CHASSIS, Grease Nipples (Hand or Pressure Gun)</b>	Essolube 20	Duckham's NOL "Twenty"	Mobil Handy Oil	Castrolite	Energol S.A.E. 20	Shell X-100 20/20W
		Duckham's Laminoid Liquid	Mobil Spring Oil	Castrol Penetrating Oil	Energol Penetrating Oil	Shell Donax P
<b>REAR ROAD SPRINGS</b>	Esso Penetrating Oil					
ALTERNATIVELY USE REAR AXLE OR ENGINE OIL						
<b>BRAKE CABLES</b>	Esso Graphite Grease	Duckham's Keenol KG 16	Mobil Graphited Grease	Castrol Cable Grease	Energol C3G	Shell Retinax A
<b>BRAKE RESERVOIR</b>						
GENUINE LOCKHEED HYDRAULIC BRAKE FLUID						

## RECOMMENDED LUBRICANTS—OVERSEAS

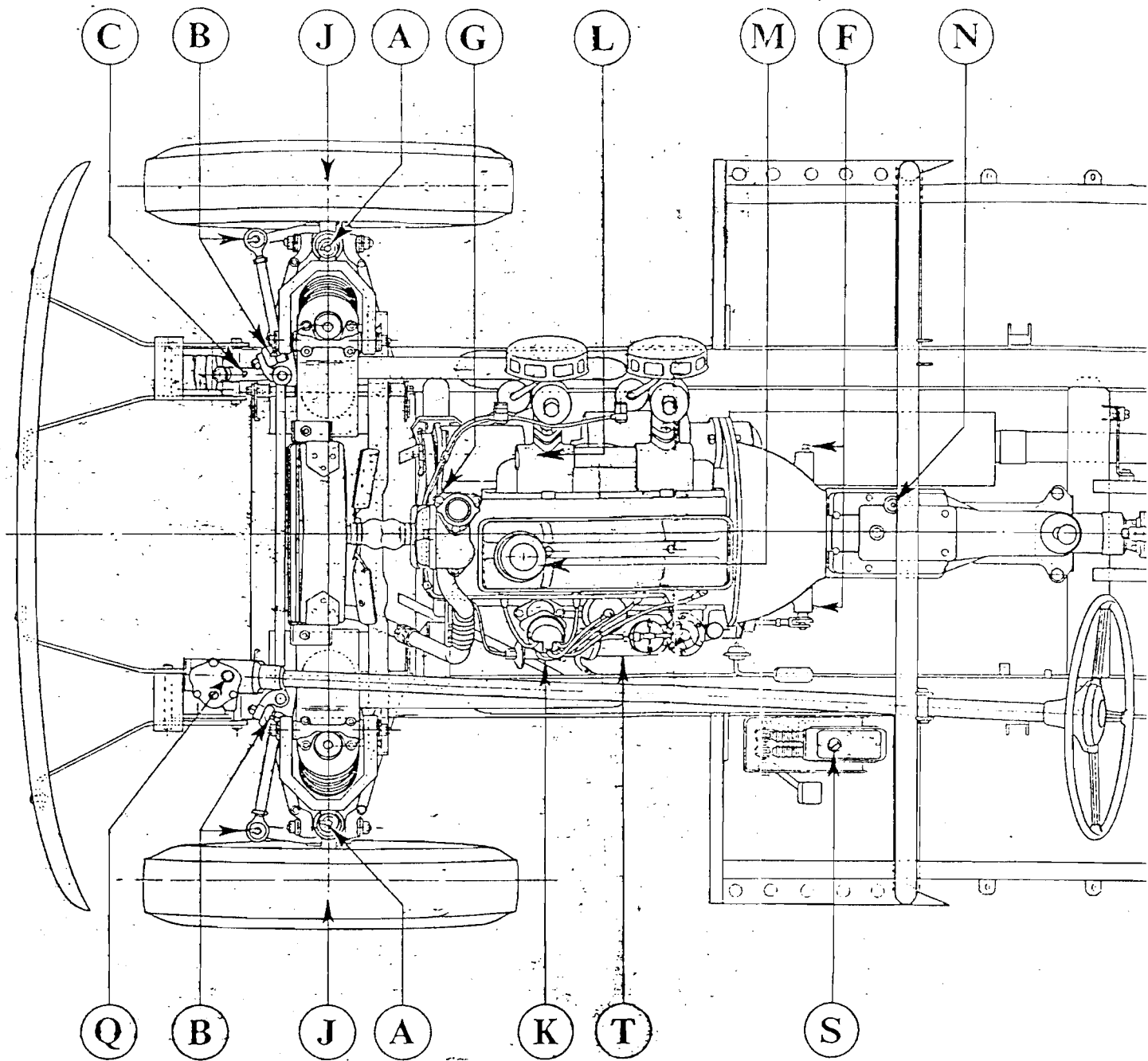
COMPONENT	VACUUM	WAKEFIELD	B.P. ENERGOL	SHPELL	ESSO	DUCKHAM'S
<b>ENGINE</b> Air Temp. Over 70	Mobiloil "AF"	Castrol XXL	Engerol Motor Oil S.A.E. 40	Shell X-100, 40	Essolube 40	Duckham's NOL "Forty"
40 to 70	Mobiloil "A"	Castrol XL	Engerol Motor Oil S.A.E. 30	Shell X-100, 30	Essolube 30	Duckham's NOL "Thirty"
10 to 40	Mobiloil Arctic	Castrolite	Engerol Motor Oil S.A.E. 20W	Shell X-100, 20 20W	Essolube 20	Duckham's NOL "Twenty"
-10 to 10	Mobiloil 10W	Castrol Z	Engerol Motor Oil S.A.E. 10W	Shell X-100, 10W	Essolube 10	Duckham's NOL "Ten"
Below -10	Mobiloil 5W	Castrol ZZ	Engerol Motor Oil S.A.E. 5W	Shell X-100, 5W	Esso Extra Motor Oil "Zero"	Duckham's NOL "Five"
<b>Upper Cylinder Lubricant</b>	Mobil Upperlube	Castrollo	Engerol U.C.L.	Shell Donax U	Esso Upper Motor Lubricant	Duckham's Adeoids
<b>Flushing Oils</b>	Mobiloil 10W	Wakefield Flushing Oil	Engerol Flushing Oil	Shell Domax F	Flushing Oil	Duckham's NOL "Ten"
Over 70	Mobiloil BB or Mobilube GX 90	Castrol XXL at Castrol Hypoy	Engerol Motor Oil S.A.E. 90 or Engerol EP S.A.E. 90	Shell Spirax 90EP or Shell X-100, 90	Essolube 90 or Esso XP Compound 90	Duckham's NOL "Fifty" or Duckham's Hypoid 90
<b>GEARBOX</b> Over 10 to 70	Mobiloil A or Mobilube GX 80	Castrol XL or Castrol Hypoy 80	Engerol Motor Oil S.A.E. 80 or Engerol EP S.A.E. 80	Shell Spirax 80EP or Shell X-100, 80	Essolube 80 or Esso XP Compound 80	Duckham's NOL "Thirty" or Duckham's Hypoid 80
Below 10	Mobiloil Arctic	Castrolite	Engerol Motor Oil S.A.E. 20W	Shell X-100, 20 20W	Essolube 20	Duckham's NOL "Twenty"
<b>STEERING GEARBOX</b> Over 10	Mobilube GX 90	Castrol Hypoy	Engerol EP S.A.E. 90	Shell Spirax 90EP	Esso XP Compound 90	Duckham's Hypoid 90
<b>REAR AXLE</b> Below 10	Mobilube GX 80	Castrol Hypoy 80	Engerol EP S.A.E. 80	Shell Spirax 80EP	Esso XP Compound 80	Duckham's Hypoid 80
<b>PROPELLER SHAFT JOINTS</b>	Mobilube GX 140	Castrol Hi-Press	Engerol EP S.A.E. 140	Shell Spirax 140EP	Esso XP Compound 140	Duckham's NOL EPT 140
<b>FRONT WHEEL HUBS</b>	Mobilgrease No. 5	Castrollease W.B.			Esso Bearing Grease	Duckham's LB10
<b>REAR WHEEL HUBS and ENGINE WATER PUMP (Hand Gun)</b>	Mobilgrease M.P.	Castrollease Heavy	Engerlease (C)	Shell Retimax A	Esso Chassis Grease	Duckham's H.B.B.
<b>CHASSIS, Grease Nipples (Hand or Pressure Gun)</b> Oil Points (Oil can) Body and Chassis	Mobiloil Arctic	Castrollease CL	Engerol Motor Oil S.A.E. 20W	Shell X-100, 20 20W	Esso Handy Oil	Duckham's NOL "Twenty"
<b>REAR ROAD SPRINGS</b>	Mobilgrease No. 2	Castrol Penetrating Oil	Engerol Penetrating Oil	Shell Donax P	Esso Penetrating Oil	Duckham's Laminoid Liquid
<b>BRAKE CABLES</b>	Mobilgrease M.P.	Castrollease Brake Cable Grease	Engerlease C3G	Shell Retimax A	Esso Spring Grease	Duckham's Keenol KG16
<b>BRAKE RESERVOIR</b>			ALTERNATIVELY USE REAR AXLE OR ENGINE OIL			
			GENUINE LOCKHEED HYDRAULIC BRAKE FLUID			





ASSIS

refer to the left hand column of the chart. For methods of lubrication  
to in the respective column.



CHASSIS

The chart is laid out to simplify lubrication. The encircled letters refer to the parts of the chassis. For a complete list of parts, turn to the page referred to in the index.