MAINTENANCE MANUAL

for the

18 H.P. 2·3 LITRE MODEL

with

Preselector Gearbox

ARMSTRONG SIDDELEY MOTORS LIMITED
COVENTRY • ENGLAND

Maintenance Manual

for the

ARMSTRONG SIDDELEY

18 h.p. 2.3 Litre

MOTOR CAR

WITH

PRESELECTOR GEARBOX

ARMSTRONG SIDDELEY MOTORS LTD.

Member of Hawker Siddeley Group

HEAD OFFICE AND WORKS . . . COVENTRY

Telephone : Coventry 4061 *Telegrams : Sidarm, Coventry*

1500/5/50 E/9853

Owner's Name.....

Address.....

.....

Chassis No..... *Body No*.....

This Instruction Book for the Armstrong Siddeley 18 h.p. 2.3 Litre car has been compiled to assist the Owner or Driver to maintain and run the car in the most efficient manner possible. By following the directions for lubrication and adjustment, wear will be reduced to a minimum, and the life of the car correspondingly prolonged.

This book does not cover major overhaul, and for information concerning this or for any other information the Owner is advised to contact one of our Service Depôts, and all possible help will be given.

When ordering spare parts the **Chassis number** and **Body number** of the car must always be quoted. This information will be found on the data plate on the engine side of the dashboard. This book is applicable to cars with the following Chassis Numbers 186001– 1811150 The engine number will be found on the left hand side front engine bearer.

Service Depôts

COVENTRY - - - - - - - - - - Quinton Road
Telephone : Coventry 60207. *Telegrams :* "SIDARM" COVENTRY.

LONDON - - The Hyde, Edgware Road, Hendon, N.W.9
Telephone: COLindale 5431. *Telegrams:* "SIDARM" NORPHONE, LONDON

Codes used : A.B.C. (5th Edition), Bentley's, Bentley's Second, Motor Trade (S.M.M.T.)

Index

SPECIAL NOTE

If it is desired to coast down long inclines select top gear and depress the control pedal and then release the accelerator pedal. Keep the control pedal fully depressed until the ignition warning light indicates that the engine revs. have fallen to the idling speed, then gently release the control pedal when it will be found that the automatic clutch is open and the engine disconnected from the transmission.

Whilst coasting under these conditions, always keep the gearbox pre-selected for top gear. When taking up the drive, first depress the control pedal and then speed up the engine the appropriate amount and gently release the pedal, thus avoiding any jar.

Engaging any intermediate gears after caosting is inadvisable owing to the violent speeding up of the engine, which would result especially if the car is coasting at high speed.

General Information

Engine.

R.A.C. Rating	18.22 H.P.	
Number of cylinders	6	
Bore	2.756 inches	70 mm.
Stroke	3.937 inches	100 mm.
Capacity	140.91 cu. ins.	2309 c.c.
Compression ratio	6.5 : 1	
Firing order	1, 5, 3, 6, 2, 4.	
Tappet clearance	Hydraulic	Non-adjustable
Contact breaker gap	.012 inches	
Sparking plug	Champion N.8	14 mm.
	Off-set	long reach
Sparking plug gap	.025 ins. (25/1000 ins.).	
Oil sump capacity	11 pints	
Oil filter capacity	2 pints	
Total water capacity	21 pints.	

Clutch and Gearbox

Clutch : Centrifugal type

Gearbox : Armstrong Siddeley Pre-selector Finger tip control on Steering Column

Oil Capacity 4 pints

Overall Gear Ratios

First	18.36
Second	10.66
Third	7.22
Top	5.10
Reverse	22.79

Rear Axle

Hypoid bevel drive — Ratio 10/51 5.10

Oil capacity — $2\frac{1}{2}$ pints

Brakes

Girling Hydro-mechanical Self Compensating.
Footbrake operating on all four wheels.
Handbrake operating the rear brakes only.
Mechanically operated brakes on the rear wheels.
Self-adjusting hydraulic brakes on the front wheels only.

Steering

Recirculatory Ball Type — Burman.

Suspension

Independent front wheel suspension with torsion bar springing.
Half-elliptic springs on the rear axle.
Luvax-Girling piston type hydraulic dampers are fitted front and rear.

Tyres

Dunlop — 5.50″ × 17″

Tyre pressure — 24/26 lbs./sq. in. according to load.

Wheels

Dunlop — 17″ × $3\frac{1}{4}$″, disc type, spring-on hub cap.

Wheelbase — 9′ 7″

Track

Front Wheels — 4′ 6″

Rear wheels — 4′ $6\frac{1}{2}$″

Toe in

Front wheels — $\frac{3}{16}$″

Turning Circle

Right and Left hand — 37 ft.

Dimensions

Chassis weight, including wings, bumpers, bulkhead, bonnet, screen and dash; full electrical equipment and instruments, spare wheel, tool kit and full tank — 23 cwt.

Lancaster Saloon 4 Door—6 Light

Overall length	15′ $7\frac{1}{2}$′
Overall width	5′ 8″
Overall height (Laden)	5′ 2″
Approximate weight. Full tank, no passengers	30 cwt.

Whitley Saloon 4 Door—4 Light

Overall length	15′ 5″
Overall width	5′ 8″
Overall height (Laden)	5′ 2″
Approximate weight. Full tank, no passengers	29$\frac{3}{8}$ cwt.

Hurricane Coupé 2 Door

Overall length	15′ 2″
Overall width	5′ 8″
Overall height (Laden)	5′ 0″
Approximate weight. Full tank, no passengers	28$\frac{7}{8}$ cwt.

Ground Clearance.

All models, Laden	6$\frac{3}{4}$″
All models, Unladen	7$\frac{1}{2}$″

Petrol Tank.

Total capacity including reserve — 12 gallons

Reserve capacity — 1 gallon

Electrical Equipment, Lucas

12 volt 51 amp. hrs. Battery, Lucas, without cover.
Dynamo
Starter
Headlamps and Side bubble type Lamps
Combined Tail and Stop Lamp (separate No. Plate Light on Whitley model only)
Twin Tone Electric Horns
Self-Cancelling Trafficators
Twin Windscreen Wipers

Bulbs

	Voltage	Wattage	Lucas No.
Headlamp nearside bulb	12	36/36	167
Headlamp offside bulb	12	36	162
Bubble type side lamp bulbs	12	6	989
Tail, stop and boot lamps	12	6	207
Trafficator bulbs (festoon bulbs)	12	3	256
Ignition, warning light	2.5	0.5	970
Side lamps, warning light	2.5	0.5	970
Instrument panel (screwcap)	12	2.4	987
Reversing light bulb } Whitley	12	24	199
Rear light & stop light bulb } model only	12	6/24	189

Fuses—Control Box — 35 amperes — FA35

Horn fuse, 50 amperes, FA50.

Facia Board

INSTRUMENT PANEL
Speedometer
Oil pressure gauge
Petrol level gauge
Water temperature gauge
Clock, electric

SWITCH PANEL—Centre of Facia Board
Ignition warning light . . Red
Side lamps warning light . . Amber
Ignition switch and key
Starter push button
Lamp switch
Reserve petrol switch
Panel lamp bush putton
Windscreen wiper switch
Air-conditioning control-fan switch

Steering Wheel

At the centre of the steering wheel are mounted :—

Horn Button
Trafficators Switch
Passing Beam Switch

Spare Wheel

The spare wheel is carried in a special compartment in the boot at the back of the car. To remove the spare wheel on the Lancaster and Hurricane, slack off the locking knobs on the rear bumper bracket, then swing the bumper bar down to clear the locker door. Unlock the spare wheel compartment with the ignition key and lift out the wheel. On the Whitley, unlock the boot with the ignition key and raise the lid. Unfasten the metal strap holding the spare wheel in position and lift it out.

Jacks

A permanent jack is fitted to each side of the chassis frame and these are accessible through trap doors in the floor of the front compartment. The jack handle is stowed in the spare wheel locker.

Tools

TOOLS IN CONTAINER UNDER FACIA BOARD ON LANCASTER AND HURRICANE AND IN BOOT OF WHITLEY MODEL.

Jaw Spanners

2 B.A. & $\frac{1}{4}$″
$\frac{5}{16}$″ & $\frac{3}{8}$″

Box Spanners

$\frac{5}{16}$″ and $\frac{3}{8}$″ with Tommy Bar
Sparking Plug Spanner with Tommy Bar
Carburettor Spanners

TOOLS IN SPARE WHEEL LOCKER

Wheelbrace
Tyre Pump
Jack Handle

TOOL IN LUGGAGE BOOT.

Starting Handle

Other Tools

Adjustable Spanners
Pliers
Screwdriver
Tyre Pressure Gauge
Tyre Valve Key
Distributor Gauge and Screwdriver

GARAGE EQUIPMENT

Oil Can
Oil Gun
Drain and Filler Plug Spanner
Tyre Levers

GRADES OF OIL RECOMMENDED FOR VARYING TEMPERATURE CONDITIONS

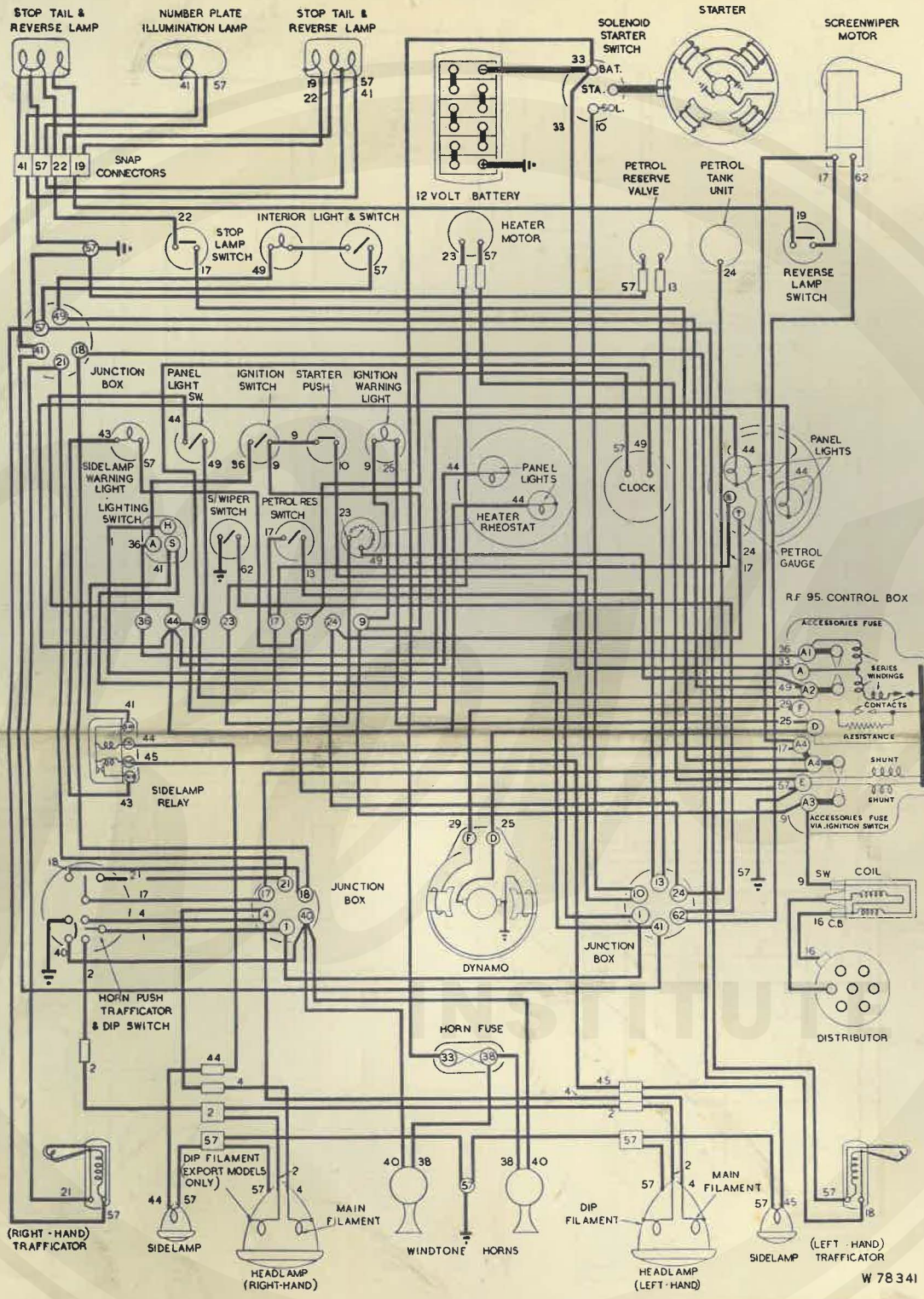
The recommended car lubricants on page 7 are for the British Isles. A guide to the correct grade of lubrication overseas is given below :—

	Air Temperature		Oil Specification
	°F.	°C.	
ENGINE ..	Over 90° 30° to 90° 10° to 30° —10° to 10°	Over 32° 0° to 32° —12° to 0° —23° to —12°	SAE 40 SAE 30 SAE 20 SAE 10
GEARBOX .. (Preselector) ..	Over 30° —10° to 30°	Over 0° —23° to 0°	SAE 30 SAE 20
GEARBOX .. (Synchromesh)	Over 30° —10° to 30°	Over 0° —23° to 0°	SAE 40 SAE 30
REAR AXLE	Over 10° Below 10°	Over —12° Below —12°	Hypoid SAE 90 Hypoid SAE 80
STEERING ..	—	—	SAE 140

Choose one of the brands recommended on page 7.

LUCAS
ELECTRICAL EQUIPMENT

ARMSTRONG SIDDELEY 18 H.P. 2·3 LITRE
"WHITLEY" SALOON CARS
HOME AND EXPORT MODELS



KEY TO CABLE COLOURS

1 BLUE	14 WHITE with PURPLE	27 YELLOW with BLUE	40 BROWN with BLACK	53 PURPLE with WHITE
2 BLUE with RED	15 WHITE with BROWN	28 YELLOW with WHITE	41 RED	54 PURPLE with GREEN
3 BLUE with YELLOW	16 WHITE with BLACK	29 YELLOW with GREEN	42 RED with YELLOW	55 PURPLE with BROWN
4 BLUE with WHITE	17 GREEN	30 YELLOW with PURPLE	43 RED with BLUE	56 PURPLE with BLACK
5 BLUE with GREEN	18 GREEN with RED	31 YELLOW with BROWN	44 RED with WHITE	57 BLACK
6 BLUE with PURPLE	19 GREEN with YELLOW	32 YELLOW with BLACK	45 RED with GREEN	58 BLACK with RED
7 BLUE with BROWN	20 GREEN with BLUE	33 BROWN	46 RED with PURPLE	59 BLACK with YELLOW
8 BLUE with BLACK	21 GREEN with WHITE	34 BROWN with RED	47 RED with BROWN	60 BLACK with BLUE
9 WHITE	22 GREEN with PURPLE	35 BROWN with YELLOW	48 RED with BLACK	61 BLACK with WHITE
10 WHITE with RED	23 GREEN with BROWN	36 BROWN with BLUE	49 PURPLE	62 BLACK with GREEN
11 WHITE with YELLOW	24 GREEN with BLACK	37 BROWN with WHITE	50 PURPLE with RED	63 BLACK with PURPLE
12 WHITE with BLUE	25 YELLOW	38 BROWN with GREEN	51 PURPLE with YELLOW	64 BLACK with BROWN
13 WHITE with GREEN	26 YELLOW with RED	39 BROWN with PURPLE	52 PURPLE with BLUE	

WIRING DIAGRAM
No. W78341
12 VOLT

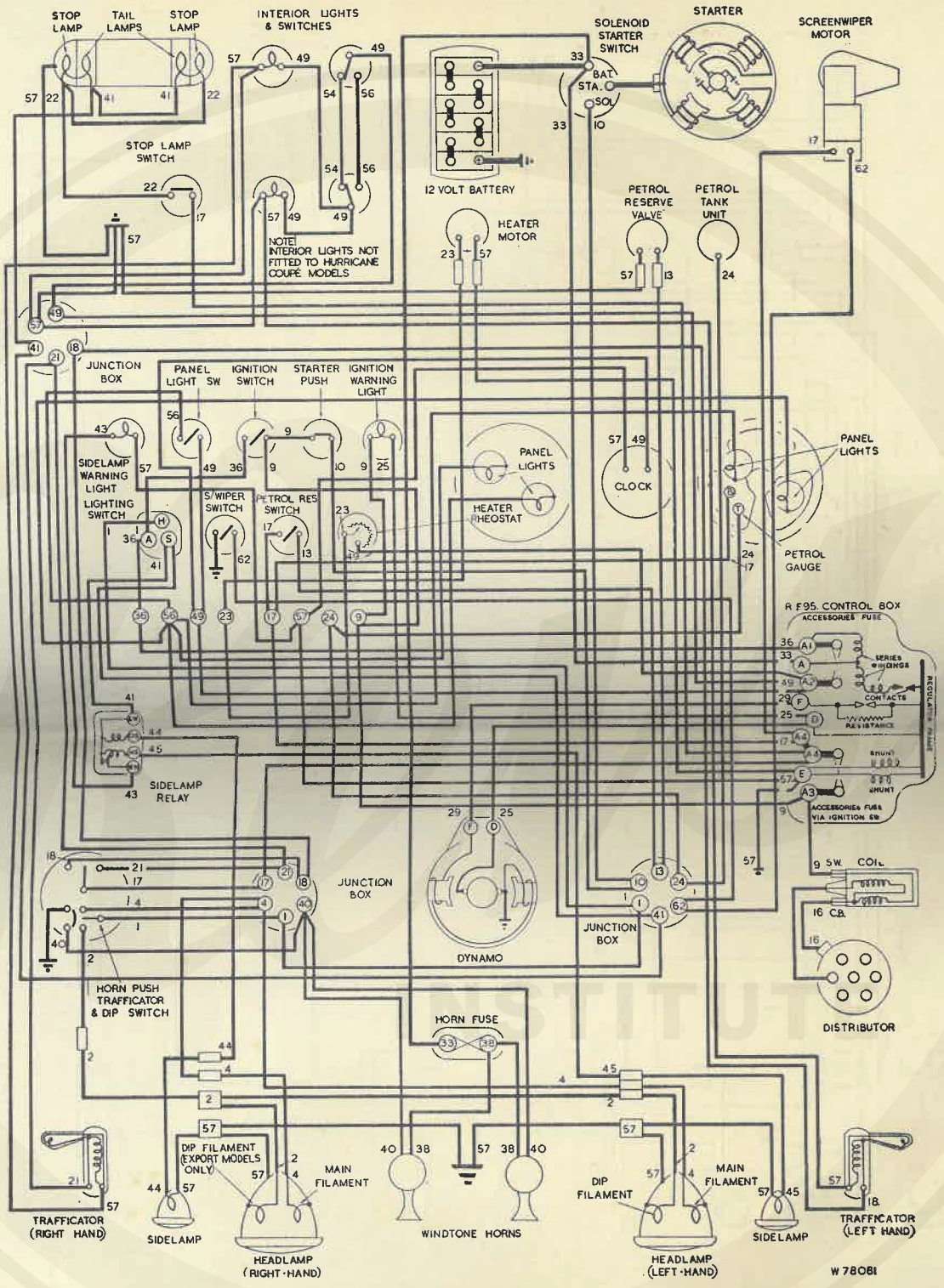
ISSUED:
OCTOBER 1950
FD/1150/L

NUMBERS INDICATE CABLE IDENTIFICATION COLOURS, SEE KEY ABOVE

Printed in England

LUCAS
ELECTRICAL EQUIPMENT

ARMSTONG SIDDELEY 18 H.P. 2·3 LITRE
"LANCASTER" SALOON & "HURRICANE" COUPE CARS
HOME AND EXPORT MODELS



KEY TO CABLE COLOURS

1 BLUE	14 WHITE with PURPLE	27 YELLOW with BLUE	40 BROWN with BLACK	53 PURPLE with WHITE
2 BLUE with RED	15 WHITE with BROWN	28 YELLOW with WHITE	41 RED	54 PURPLE with GREEN
3 BLUE with YELLOW	16 WHITE with BLACK	29 YELLOW with GREEN	42 RED with YELLOW	55 PURPLE with BROWN
4 BLUE with WHITE	17 GREEN	30 YELLOW with PURPLE	43 RED with BLUE	56 PURPLE with BLACK
5 BLUE with GREEN	18 GREEN with RED	31 YELLOW with BROWN	44 RED with WHITE	57 BLACK
6 BLUE with PURPLE	19 GREEN with YELLOW	32 YELLOW with BLACK	45 RED with GREEN	58 BLACK with RED
7 BLUE with BROWN	20 GREEN with BLUE	33 BROWN	46 RED with PURPLE	59 BLACK with YELLOW
8 BLUE with BLACK	21 GREEN with WHITE	34 BROWN with RED	47 RED with BROWN	60 BLACK with BLUE
9 WHITE	22 GREEN with PURPLE	35 BROWN with YELLOW	48 RED with BLACK	61 BLACK with WHITE
10 WHITE with RED	23 GREEN with BROWN	36 BROWN with BLUE	49 PURPLE	62 BLACK with GREEN
11 WHITE with YELLOW	24 GREEN with BLACK	37 BROWN with WHITE	50 PURPLE with RED	63 BLACK with PURPLE
12 WHITE with BLUE	25 YELLOW	38 BROWN with GREEN	51 PURPLE with YELLOW	64 BLACK with BROWN
13 WHITE with GREEN	26 YELLOW with RED	39 BROWN with PURPLE	52 PURPLE with BLUE	

WIRING DIAGRAM
No. W78081
12 VOLT

ISSUED:
OCTOBER 1950
FD/1150/L

NUMBERS INDICATE CABLE IDENTIFICATION COLOURS, SEE KEY ABOVE.

Printed in England

Recommended Car Lubricants

	Filtrate	Shell	Vacuum	Prices	Wakefield	Anglo-American
Engine Summer	A.S. Filtrate Summer	Triple Shell	Mobiloil A.	Energol SAE 40	Castrol XL.	Essolube 40.
Engine Winter	A.S. Filtrate Winter	Double Shell	Mobiloil Arctic	Energol SAE 30	Castrol XL.	Essolube 30.
Gearbox Preselector	S.C. Filtrate	Double Shell.	Mobiloil A.	Energol SAE 30	Castrol XL.	Essolube 40.
Gearbox Synchromesh	Synchro Filtrate	Triple Shell	Mobiloil BB.	Energol SAE 40	Castrol XXL	Essolube 40
Rear Axle	Hypoid Filtrate Gear Oil	Shell Spirax. 90 E.P.	Mobiloil GX 90	Energol EP SAE 90	Castrol Hypoy	Esso Expee Compound 90.
Steering Box	Filtrate Steering Box Oil.	Shell Spirax 140 E.P.	Mobilube C.	Energol SAE 140	Castrol D.	Esso Gear Oil 140 Heavy.
Propeller Shaft Hubs, Chassis Grease Gun	Filtrate Solidified Oil.	Shell Retinax R.B. Grease	Mobilgrease No. 4	Belmoline C.	Castrolease Heavy Grease.	Esso Grease.

HYDRAULIC BRAKES—Wakefield Girling Brake Fluid (Crimson).
Filtrate Hydraulic Brake Fluid.
Mobil Brake Fluid.
Shell Donax B
Esso Hydraulic Brake Fluid

HYDRAULIC DAMPERS—Wakefield Girling Damper Oil (Thin).
Filtrate Shock Absorber Oil (Piston).
Mobil Shock Absorber Oil Light.
Energol SA Light.
Esso Shock Absorber Oil (Light).
Shell Donax A.1.

The mixing of different brands of oil should be avoided

The ARMSTRONG SIDDELEY 18 h.p. 2.3 Litre CAR

Introduction

PRELIMINARY.

Before starting the engine it is necessary to make sure the Water, Engine Oil and Petrol supplies are sufficient.

The water level in the radiator should be kept just below the filler cap and whenever possible clean rain water should be used. To locate the filler cap the bonnet must be lifted and this is done by pulling out the T-shaped Control Lever which is on the bulkhead behind the facia board on the driver's side, see "A", Figure 1.

The bonnet is spring loaded and will automatically rise to the extent of the safety catch, which must now be released before the bonnet can be opened fully. This is done by pushing it inwards, see "B", Figure 1. To shut the bonnet press down firmly and both locks will close automatically.

A Thermostat fitted in the water outlet from the cylinder head retards the circulation of water until the engine has attained a satisfactory working temperature.

When topping up the radiator the water must be poured in slowly to enable it to pass the Thermostat and to avoid an air lock. The level must be re-checked when the engine is warm.

The Thermostat should be examined annually and if necessary cleaned externally.

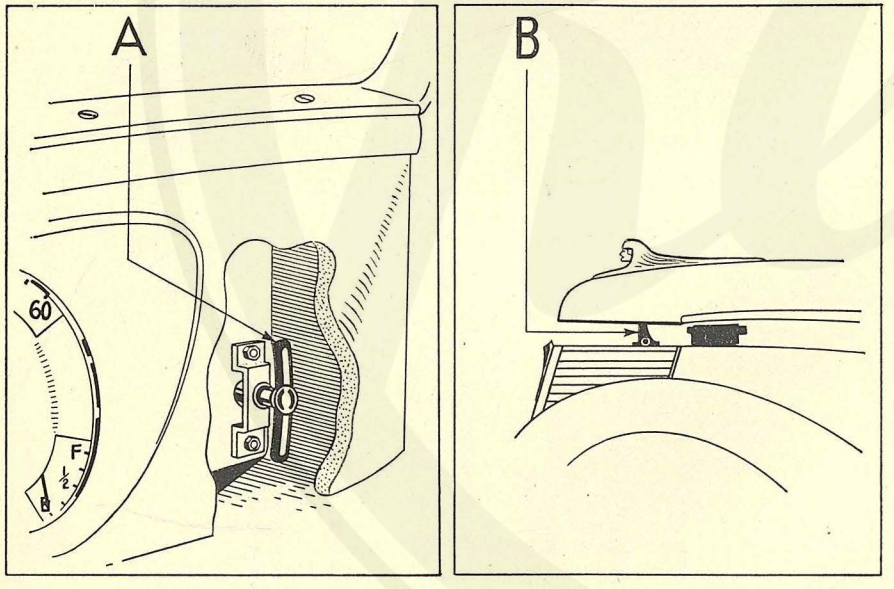


Fig. 1.

The engine oil can be checked by removing the dip stick which is situated on the offside of the crankcase Fig. 8, and noting the oil is at the proper level as shown by the top groove on the dipstick. The engine should not be run with the oil level below the lower groove. The engine oil filler cap is placed on the top and at the front end of the rocker cover, "B" Fig. 9, and when replenishing sufficient time should be allowed for the oil to drain through into the crankcase before re-checking the level.

The Petrol Gauge on the instrument panel Fig. 2, indicates the approximate amount of fuel in the tank when the ignition is switched "ON".

CONTROLS.

Reference to facia board, Fig. 2, shows the positions of the switches and instruments.

The usual arrangement of pedals is adopted by placing the accelerator on the right, the brake pedal in the centre and the gear engagement pedal on the left. Fig. 3, page 12. The preselector gear control lever is immediately beneath the steering wheel. The lever operates

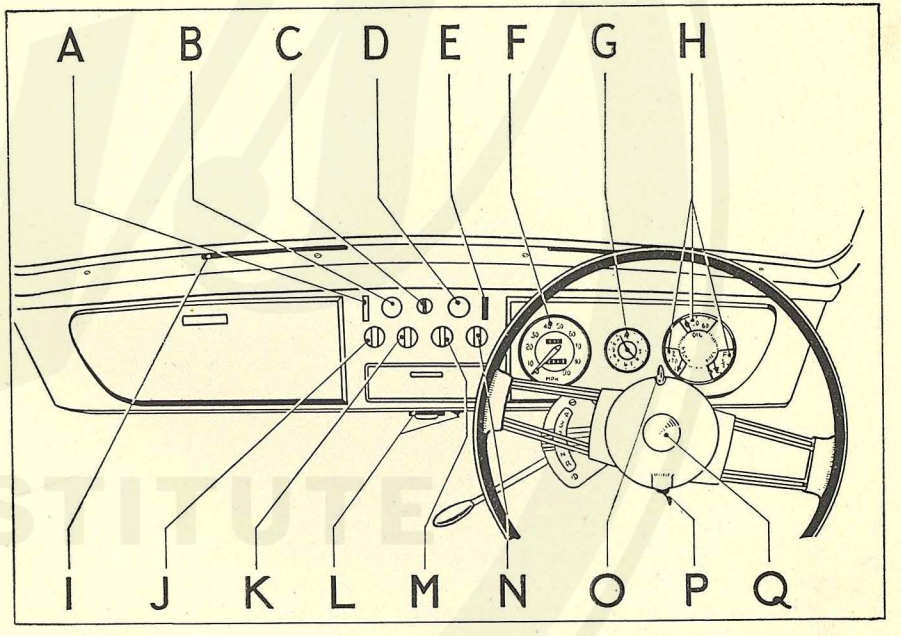


Fig. 2. A, amber warning light, lamp indicator; B, switch for panel light; C, ignition key; D, self-starter button; E, red warning light, ignition; F, speedometer; G, clock; H, combined water temperature, oil pressure and fuel tank contents gauge; I, windscreen de-misting slots; J, side and head lamp switch; K, windscreen wiper switch; L, map reading lamp and switch; M, reserve petrol switch; N, interior heater fan switch; O, trafficator switch; P, passing beam switch; Q, horn button.

in a quadrant on which the various gear positions are clearly marked, Fig. 4. It must be emphasised that the lever is only used to preselect any required gear and that it is not engaged until the gear engagement pedal, which is in the same position as, and replaces, the clutch pedal, has been depressed. It is therefore most important before starting the engine to ensure that Neutral has not only been "selected" but that it has been "engaged". The operation of the preselector gear is fully dealt with in the paragraphs dealing with Starting the Engine and Changing Gear on pages 11 and 13.

BRAKES.

The Front and Rear wheel brakes are operated simultaneously by the foot brake pedal, Fig. 3, Page 12.

The handbrake lever is connected to the rear wheels only. It is mainly used for parking purposes and is located under the instrument panel to the right of the driver, Fig. 3, Page 12. The lever is operated by pulling it towards the driver and is retained in position by a trigger; when releasing the brake lever the footbrake should be applied to take the weight off the lever trigger.

WARNING LIGHTS.

A red warning light is fitted on the instrument panel, Fig. 2, Page 9, and is illuminated when the engine is switched on, but when the engine starts and its speed rises the light cuts out and confirms that the dynamo is charging.

The ignition must **not** be left switched **on** unless the engine is running, otherwise the accumulator will be discharged. Another purpose of the red light is to warn the driver to switch off the ignition.

An amber warning light is also fitted on the panel and will illuminate should either of the side lamps fail.

WINDSCREEN WIPER.

The control for the electric windscreen wiper is fitted in the middle of the facia board, Fig. 2, Page 9. The wiper is put into operation by turning the switch "K" and the drive will engage automatically. When the wiper is not required the switch should be turned off at a moment when the arms are at the limit of their travel.

AIR CONDITIONING.

The condition of the air in the body is controlled by the switch "N" on the facia panel, Fig. 2, and a tap "D", Fig. 8, in the copper piping system under the bonnet on the offside of the engine.

When the switch "N" is rotated it switches on a fan in the heater unit "B", Fig. 3, which drives air out of the demisting slots "I", Fig. 2, and also through the doors on the heater unit if they are open.

The temperature of the air is regulated by the tap which, when open, allows hot water to circulate in the system and heat the air. On the other hand, if the tap is closed cooler air will be circulated in the car.

TRAFFICATORS.

The trafficators are operated by a switch "O", Fig. 2, on the steering wheel, and are self-cancelling. They will only work when the ignition is switched on.

ELECTRIC TWIN TONED HORNS.

The electric horns which are fitted under the bonnet are sounded by pressing the button in the centre of the steering wheel.

LAMPS.

The control for the lamps is fitted to the switch panel in the centre of the facia board, Fig. 2, Page 9. The switch is operated by turning it in a clockwise direction when the first movement illuminates the Side and Tail Lamps and the second movement the Headlamps.

The arrangement for changing over from the main driving beams to a dipped beam for use when meeting oncoming traffic, consists of a switch on the steering wheel "P", Fig. 2, which cuts out the offside headlamp and has a dipping effect on the beam of the nearside headlamp. On overseas models both headlamps dip.

PANEL AND MAP READING LIGHTS.

A double action push button switch controls the panel lights, the first pressure on the button bringing them into use, a second pressure switching them off, Fig. 2, "B". The map reading lamp is at the bottom of the facia board with its switch alongside, Fig. 2, "L".

MAIN AND RESERVE PETROL SUPPLY.

The tank will hold 12 gallons of petrol, including 1 gallon reserve supply. With the petrol switch "M", Fig. 2, in the vertical position the last gallon of petrol is held in reserve. Turning the switch to the horizontal position will bring this into use. Return the switch to the vertical position when refuelling.

IGNITION AND STARTER.

A special key operates the locks of the doors of the car and also the ignition switch "C", Fig. 2. The push button on the right of the ignition switch operates the self-starter. The same key also fits the luggage compartment and that of the spare wheel locker. The spare wheel on the Whitley model is housed in the luggage compartment.

NOTE. The following will only work when the ignition is switched on. Trafficators, heater unit fan, horns, windscreen wiper, stop light, petrol gauge.

ADJUSTABLE STEERING COLUMN. (Licensed under Patents Nos. 417418 and 494902 Bluemel Bros.—Douglas.)

To adjust the steering column, unscrew the knurled sleeve, move the wheel to the required position, and relock the sleeve.

STARTING THE ENGINE.

Before starting the engine select Neutral by moving the lever beneath the steering wheel into the Neutral position, marked "N" and then fully depress the gear engagement pedal. If the preselector lever is already in the neutral position depress the pedal to make sure that neutral gear is indeed engaged.

To start the engine from cold pull out the choke control, "K" Fig. 3, which will automatically bring the throttle into the correct position for starting. *CAUTION.*—Do not depress the accelerator for if this is done a pumping action is set up in the carburettor

resulting in an excess of petrol which may prevent the engine starting. Switch on the ignition and depress the starter button "D", Fig. 2, releasing it when the engine starts. Once the engine has been started and run for a few minutes it can usually be restarted without using the choke control which must always be used as sparingly as possible. If the car has been standing for a long period it may be necessary to prime the carburettor by a few strokes of the priming lever "G", Fig. 7, on the petrol pump.

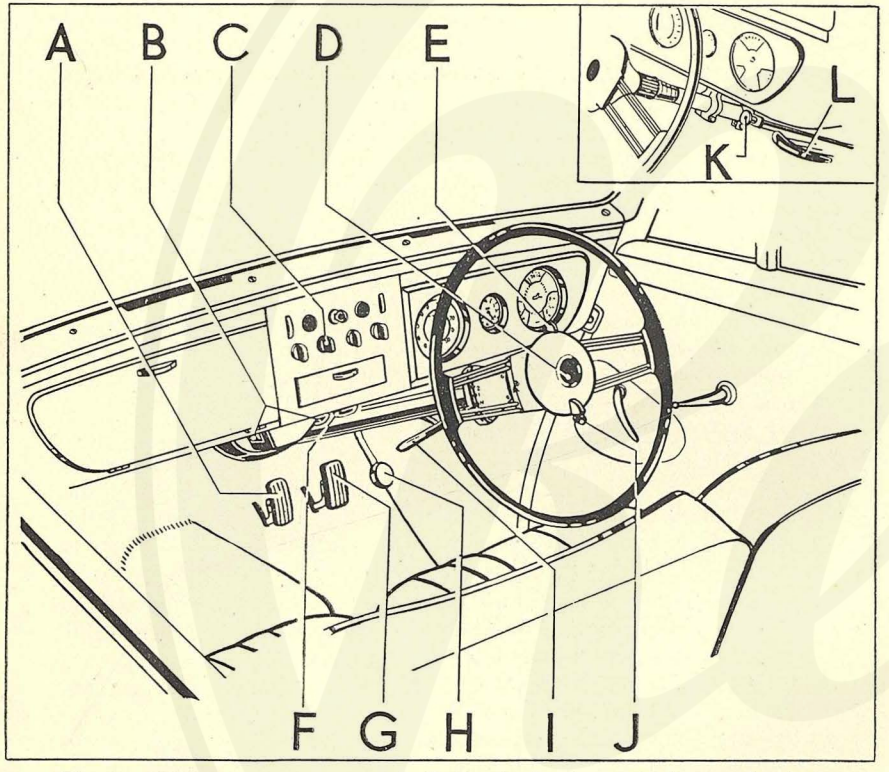


Fig. 3. A, gear engagement pedal; B, interior heating unit–doors; C, windscreen wiper switch; D, horn button; E, trafficator switch; F, map reading lamp; G, brake pedal; H, accelerator pedal; I, preselector gear lever; J, passing beam switch; K, choke control; L, hand brake.

A COLD ENGINE.

The oil in a cold engine does not circulate freely therefore before driving the car on the road the engine should be allowed to run moderately fast for a few minutes to heat the engine oil.

A cold engine should never be raced or allowed to idle for any length of time, as both these conditions cause unnecessary wear.

A NEW ENGINE.

A new engine will give the best results if care is taken during the running-in period to avoid excessive speeds on any of the gears, and during the first 500 miles it is recommended the following speeds should not be exceeded :—

First speed	..	10 miles per hour
Second ,,	..	20 ,, ,, ,,
Third ,,	..	30 ,, ,, ,,
Top ,,	..	50 ,, ,, ,,

If there is any tendency for the engine to labour a change should at once be made to a lower gear.

THE AUTOMATIC CENTRIFUGALLY OPERATED CLUTCH.

The clutch is of the automatic centrifugal type and is governed entirely by the speed at which the engine turns. Its principle is the same as the centrifugal governor and is incorporated to give the owner a wider use of the preselector gear and to make it simpler to move off from a standstill.

CHANGING GEAR.

With the engine running and the handbrake on, select first or second gear, as required. Depress the engagement pedal fully and release. The car is now in gear with the engine ticking over. When the hand brake is released and the engine accelerated the drive will automatically be taken up in the clutch and the car glides away.

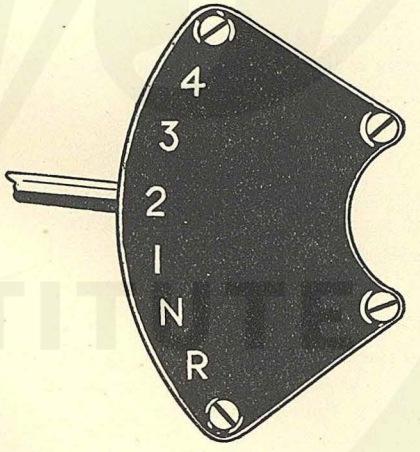


Fig. 4. Preselector gear quadrant showing position of gears.

Whilst accelerating, the next gear can be preselected so that as soon as sufficient speed is reached to change gear, all that is required is to momentarily ease the foot off the accelerator while at the same time

the gear engagement pedal is depressed and released. Proceed through the remaining gears till top gear is reached.

When changing down the gear should be preselected so that when it is required the engagement pedal has only to be sharply depressed and released. It is rarely necessary to take the foot off the accelerator when changing down.

A little practice will enable the driver to make smoother and more rapid gear changes than are possible with an ordinary gearbox.

As soon as the engine revolutions drop below approximately 550 r.p.m. the centrifugal clutch automatically disengages the drive, so that the car can be stationary with the engine ticking over in a gear ready to move off again. Slight acceleration and the drive will commence to take up. This is especially valuable when waiting in traffic. To move off, all that is required is to transfer the foot from the brake pedal to the accelerator.

It is important that the car is never left unattended with the engine running and a gear engaged, for slight pressure on the accelerator pedal will cause the car to move off.

It is always best when the driver leaves the car to **select** and **engage** Neutral, especially so if the engine is left running.

BRAKING.

A practice should be made of slowing the car and bringing it to rest smoothly, to prolong the life of the brake linings, tyres, and the driving mechanism generally.

TYRES.

To obtain comfortable riding and the minimum of wear the tyre manufacturer's recommend that a pressure of 24-26 lbs. in the Front and Rear tyres should be maintained, according to load.

COLD WEATHER HINTS.

The engine will start easily in cold weather if the battery is in good condition and the appropriate grade of engine oil is used. See oil recommendations on page 7 and the note on page 6.

In severe weather every precaution must be taken to prevent the cooling water freezing and bursting the radiator or cracking the cylinder block. The water can be drained from the engine and radiator by means of the taps A and B, Fig. 21, on the near side of the cylinder block.

The use of Anti-freeze in the cooling system during cold weather is strongly recommended but care must be taken to select a reputable brand and one that is non-corrosive.

It is important to note that the heater unit of the Air Conditioning System cannot be drained, and that unless Anti-freeze is being used other precautions must be taken to prevent damage by frost.

When using Anti-Freeze mixture special care should be taken that the cylinder head is evenly and thoroughly tightened down, to prevent any creeping of the mixture through the joint and forming a deposit which might cause the pistons to seize. Also ensure that all hoses are in good condition and the clips fully tightened.

A radiator muff should be used in cold weather, and if the car is garaged when the engine is hot the water will keep warm for some hours if rugs are placed over the bonnet and radiator.

In very cold weather any water in the petrol pump filter may freeze and prevent the petrol flowing. The blockage may be cleared by pouring boiling water over the outside of the pump. If the filter is kept clean this will not be necessary.

If the car is laid up during the winter months the radiator and engine must be drained, and also the heater. To drain the heater unit remove the two small rubber hose connections at the back of the engine. Then force out the water by blowing through it with a tyre pump.

Lubrication

For List of Recommended Lubricants, see page 7.

ENGINE LUBRICATION.

It is important to maintain the oil at the correct level in the sump. This should be checked regularly by means of the dip stick, and when doing so the dip stick must be wiped clean before taking a reading. The engine sump holds 11 pints of oil. The drain plug for emptying the sump is situated under the offside of the engine. It is essential that the oil be changed at the end of the first 500 miles running and thereafter at 2,000 mile intervals. The level of the oil must not be allowed to fall below the lower mark on the dip stick.

It is important not to mix different types of oil, therefore drain the sump when changing from one brand to another. The sump must not be flushed with paraffin or petrol, the residue of which would be detrimental to the oil. A flushing oil must be used for this purpose. It is best to drain the sump when the oil is heated after a run.

OIL FILTER.

It is most important that the oil filter element "A", Fig. 6 is renewed every 5,000 miles. To remove the old element the retaining stud "B" should be slacked off and the container "D" withdrawn from below. Care should be taken not to damage the joint washer "G" otherwise a leak will occur on replacing the container. After fitting the new element only tighten the stud "B" sufficiently to obtain an oil tight joint.

The capacity of the filter and system is two pints and this quantity added to the eleven pints in the sump gives the total capacity of the engine which is thirteen pints.

The filter manufacturers state that no attempt should be made to clean dirty elements.

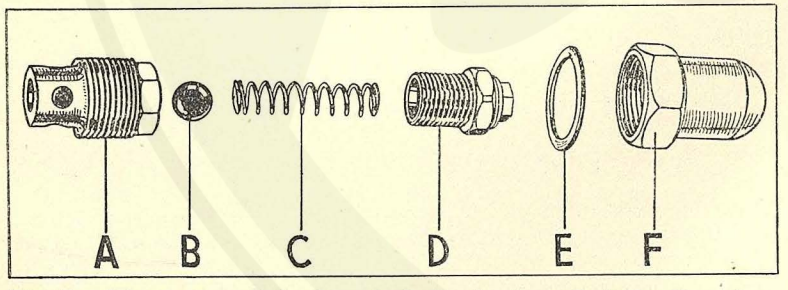


Fig. 5. Oil pressure relief valve. A, body of valve; B, ball; C, spring; D, screw and lock nut; E, washer; F, cap.

GEARBOX.

It is essential that an approved oil as recommended on Page 7 is used in the gearbox. When a new car has completed 500 miles the oil should be changed to remove any impurities that may have collected during the running-in period. The oil should be drained from the plug at the base of the gearbox, Fig. 19, page 31. This is best done when the car comes in from a run as the oil is warm and therefore more fluid. Subsequently the oil should be changed every 5,000 miles. The filler plug is on top of the gearbox, which holds 4 pints of oil. The dipstick indicates the oil level.

The Preselector rack under the dial on the steering column should be oiled occasionally.

REAR AXLE.

The rear axle, Fig. 18, Page 30, is of the Hypoid bevel type and apart from the replenishment and periodic changing of the oil requires little attention.

It is most important, however, that the correct grade of Hypoid gear oil is used. After each 2,000 miles' running add fresh oil if necessary to bring it up to the correct level.

The oil should be changed after the first 500 miles and afterwards at every 5,000 miles.

The oil should be drained from the base plug when heated after a run. A combined oil level and filler plug "B", Fig. 18, is fitted on the rear axle cover.

The oil capacity of the rear axle is $2\frac{1}{2}$ pints.

HUB BEARINGS.

One of the rear hub bearing lubricators is shown at "A", Fig. 18, Page 30. The Grease Gun should be applied to each bearing at 2,000 mile intervals, care being taken to stop the filling operation when grease shows at the air vent on top of the axle. At the same time the front hubs should be greased, access to the bearing being obtained by removing the centre plate of the road wheel and the grease plug in the hub.

PROPELLER SHAFT.

The propeller shaft is fitted with a sliding joint at its front end, which should be lubricated every 2,000 miles through the lubricator "B" Fig. 19, by means of the oil gun. At the same time a charge should be given to the needle bearing lubricators, "A" and "D", Fig. 18, the front and rear universal joints.

STEERING GEAR.

Check the oil in the steering box every 1,000 to 2,000 miles. If necessary top up after removing the filler plug "A", Fig. 20, Page 32.

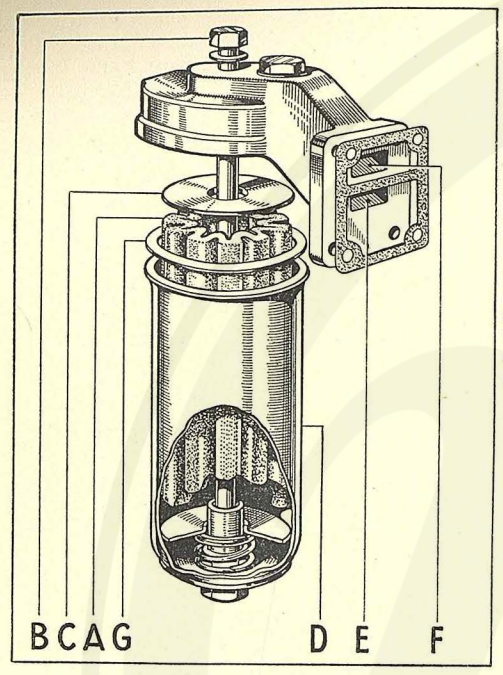


Fig. 6. Oil filter. A, filter element; B, retaining stud; C, plate; D, container; E, delivery from oil pump; F, delivery to oil gallery; G, joint washer.

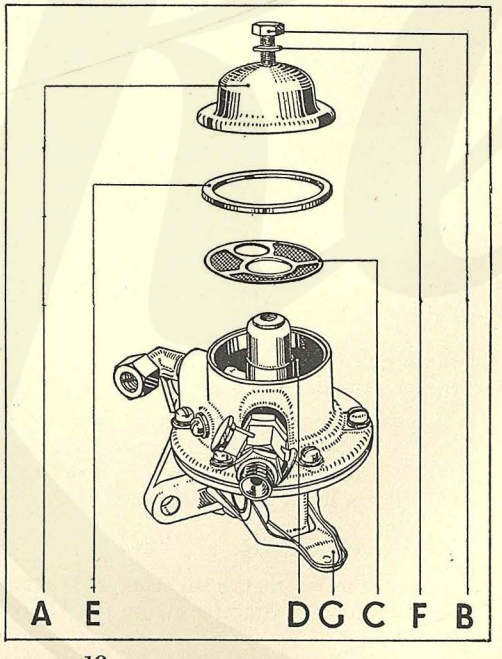


Fig. 7. Petrol pump and filter. A, dome; B, setscrew; C, filter; D, sediment chamber; E, cork gasket; F, fibre washer; G, priming lever.

OIL PRESSURE RELIEF VALVE.

The relief valve is fitted on the nearside of the engine "H", Fig. 9, page 20, and is adjusted to suit the engine. Although normally the relief valve does not require any attention, should the oil pressure drop considerably or fail entirely then the valve must be removed and cleaned. The valve, Fig. 5, consists of a steel ball "B" which is held on a ground seating by a coiled spring "C". When the oil pressure becomes excessive the ball is lifted off its seating and the surplus oil is by-passed back to the sump. When replacing the parts of the relief valve after cleaning, the screw "D" should be adjusted and locked in place by the locknut to show the normal pressure on the oil gauge.

OIL PRESSURE GAUGE.

The oil gauge fitted to the instrument panel, "H", Fig. 2, page 9, registers the pressure of the oil circulating in the engine which should be approximately 40 lbs. when the engine is hot. It should be noted the oil will show a higher pressure when the engine is cold and may drop to about 10 lbs. when the engine is idling.

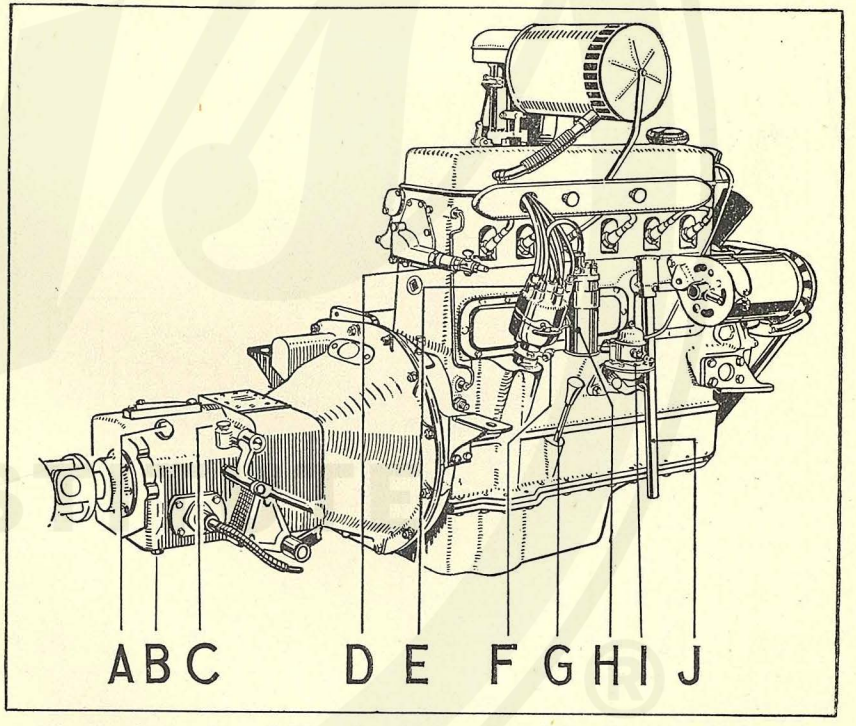


Fig. 8. A, gear box oil filler plug; B, gear box drain plug; C, gear box oil level dipstick; D, interior heater control tap; E, distributor; F, bolt for adjusting ignition timing; G, engine oil level dipstick; H, ignition coil; I, petrol pump; J, crankcase breather.

Maintenance

PETROL PUMP AND FILTER.

The petrol is transferred from the tank at the back of the car to the carburettor by an A.C. pulsating pump, Fig. 7, page 18, which is worked by an eccentric on the camshaft.

Every 2,000 miles the dome "A", Fig. 7, should be removed by unscrewing the setscrew "B" at the top of the pump, and the filter gauze "C" should be cleaned. At the same time clean out the sediment chamber "D".

When re-assembling make certain the cork gasket "E" is unbroken and properly seated and that the fibre washer "F" is under the head of the setscrew.

If it is necessary to remove the pump, it should be detached from the crankcase and then unscrewed from the tap. This precaution is necessary to prevent petrol flooding as the tank is mounted higher than the pump.

IMPORTANT NOTE. Before cleaning the filter or removing the pump make sure that the petrol tap is turned OFF.

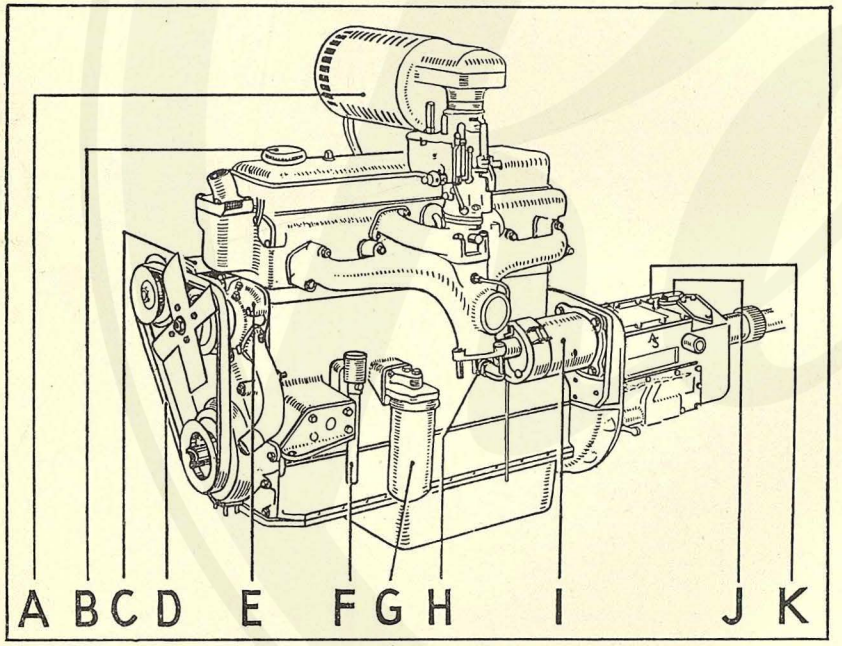


Fig. 9. Nearside of engine. A, air cleaner and silencer; B, engine oil filler plug, C, dynamo; D, belt; E, water pump; F, breather and tappet oil filter; G, oil filter; H, oil paessure relief valve; I, starter motor; J, gear box filler plug; K, gearbox dipstick.

Instead of turning the engine by means of the starter to re-charge the pump with petrol the hand priming lever "G" should be used to save the battery.

This lever is also used to pump petrol to the carburettor if required; after a few strokes of the lever the slight resistance normally felt will cease indicating that the float chamber is full.

DISTRIBUTOR.

The distributor, Fig. 10, should be inspected every 3,000 miles. The distributor moulding "A", Fig. 10, should be removed and the electrodes cleaned and the distributor wiped out with a cloth moistened with petrol. The carbon brush "B" in the centre of the distributor moulding must slide freely.

The moulded rotating arm "C", which requires careful handling owing to its brittle nature, should be taken off the spindle and a few drops of thin machine oil applied to the top of the screw in the centre, but the screw itself should not be removed; the oil will find its way through a clearance to the cam bearing.

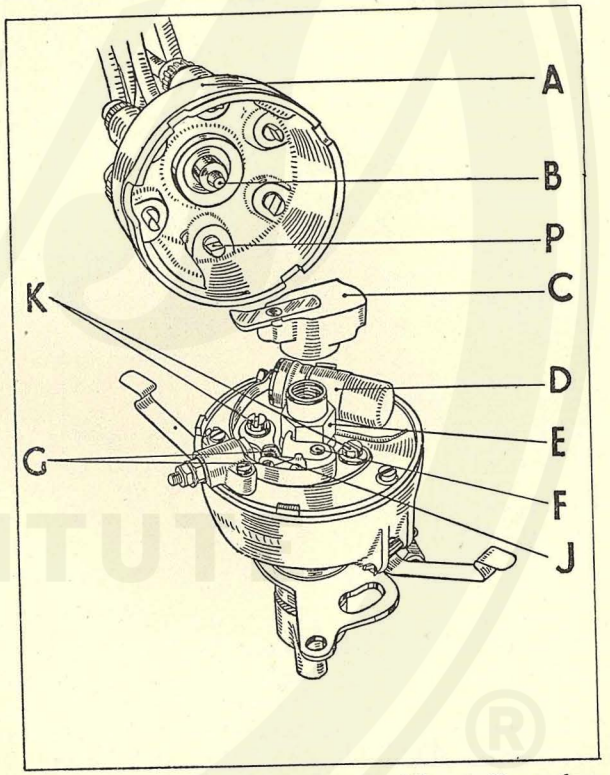


Fig. 10. Distributor. A, distributor moulding; B, carbon brush; C, rotating arm; D, condenser; E, cam; F, pivot; G, contact points; J, gap = .012"; K, screws for contact plate; P, electrodes.

The cam face "E" and the contact breaker pivot "F" should be lightly smeared with clean engine oil every 3,000 miles.

Occasionally the contacts "G" should be examined and if burnt or pitted may be carefully cleaned with fine emery cloth.

Periodically and always after cleaning the points the contact breaker gap requires checking. The procedure is to turn the engine slowly by hand until the contact breaker bears on the point of the cam and the contacts are fully open, when the gap should just allow the gauge provided in the tool kit, to pass through. The gap "J" should measure .012″ (12/1000″). To re-set the gap slacken the two screws "K" which secure the contact breaker plate, and adjust the plate until the gap is correct, then tighten up the two screws.

The moulded rotating arm should be carefully replaced with the keyway in the correct position, and pushed right home.

The automatic timing control should be lubricated about every 3,000 miles, by adding a few drops of thin machine oil through the hole in the contact breaker base through which the cam passes. Do not allow oil to get on the contacts.

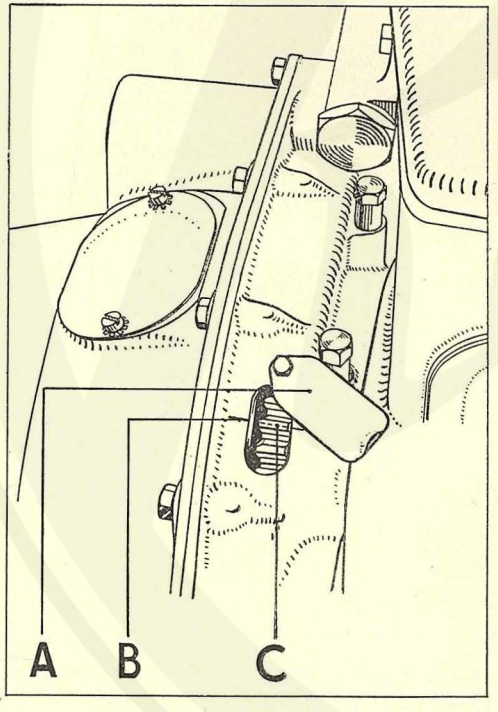


Fig. 11. A, cover; B, line on casting; C, punch marks on starter ring tooth.

TIMING THE IGNITION.

The following instructions will enable the ignition timing to be checked :—

1. Slide the small cover "A", Fig. 11, on the offside of the engine flywheel housing to one side, to expose the teeth of the starter ring.
2. Turn the engine slowly by hand until the punch marks "C" on the top of one of the teeth are opposite the line "B" on the casting — this indicates that No. 1 piston (cylinder nearest the radiator) and No. 6 piston are at top dead centre.
3. Move the engine in the normal direction of rotation and stop with the punch marks "C" $2\frac{1}{2}$ teeth before the top dead centre mark, which is the standard position for the distributor contact points "G", Fig. 10, to separate.
4. In the above position the electrode on the rotating arm, "C", Fig. 10, is opposite either No. 1 or No. 6 cylinder electrode, which is connected to the high tension wire on the distributor cover "A", leading to the appropriate sparking plug.
5. The point of ignition can be altered by turning the knurled nut on the side of the distributor casing. The best setting will vary slightly according to the octane value of the fuel used, and to obtain the best results it may be necessary to make an adjustment to the ignition timing when the car is tested on the road.

SPARKING PLUGS.

The sparking plug fitted as standard is the Champion N.8 off-set (14 mm. long reach) and the correct gap is .025 ins. (25/1,000 ins.).

Efficient running at all speeds can only be obtained if the condition of the plugs is satisfactory. Any moisture on the outside of the plug should be wiped off.

The gap between the electrodes of the plug should be examined periodically since the gap increases with usage making starting difficult, and causing misfires at high speeds. When setting the gap the centre electrode should not be touched, only the side one being adjusted.

The plugs should be cleaned with petrol and carefully examined for cracked porcelains. If defective they must be replaced. Most Service Stations are equipped with sparking plug cleaning and testing machines.

VALVE TIMING.

The valve timing is set with a cold engine and is so adjusted that the inlet valve opens 10° before top dead centre, and the exhaust closes 16° after top dead centre.

The crankshaft and the camshaft timing wheels are both marked, and the correct position for fitting the timing chain is with the marks adjacent and in line with the centres of the two wheels, as shown in Fig. 12.

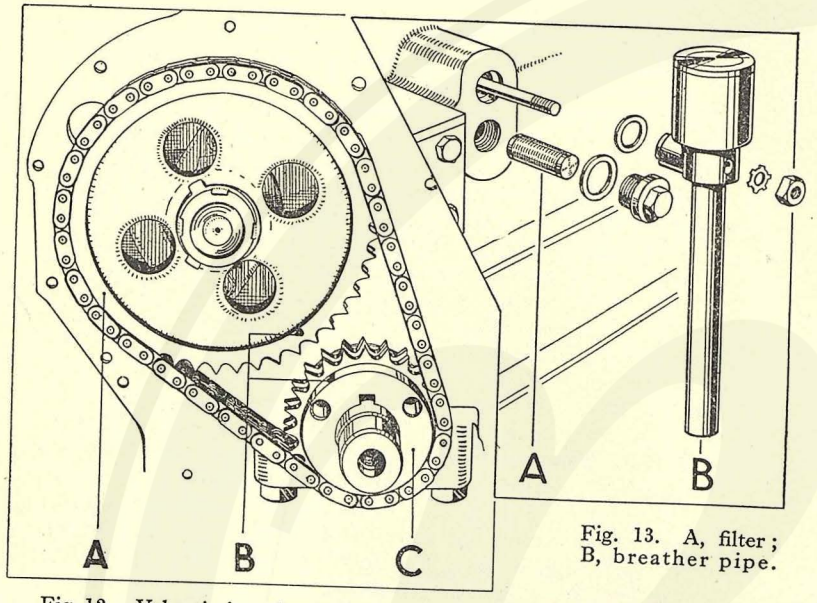


Fig. 12. Valve timing. A, camshaft timing wheel; B, timing marks; C, crankshaft timing wheel.

Fig. 13. A, filter; B, breather pipe.

VALVE CLEARANCES.

The engine is fitted with special hydraulic valve tappets and does not require any adjustment to the valve clearances which are automatically maintained throughout the life of the engine.

OIL FILTER FOR TAPPETS.

A special filter "A", Fig. 13, is located underneath the left hand side breather pipe "B" and should be cleaned every 2,000 miles or if the hydraulic tappets become noisy. Care must be taken not to damage the filter when handling and the blanked end of the gauze should be entered in the cap so that the filter is replaced in the central position.

The engine must be run for a few minutes when the filter is replaced to allow the oil to build up pressure in the tappets.

Access to the filter is gained by removing the breather pipe "B".

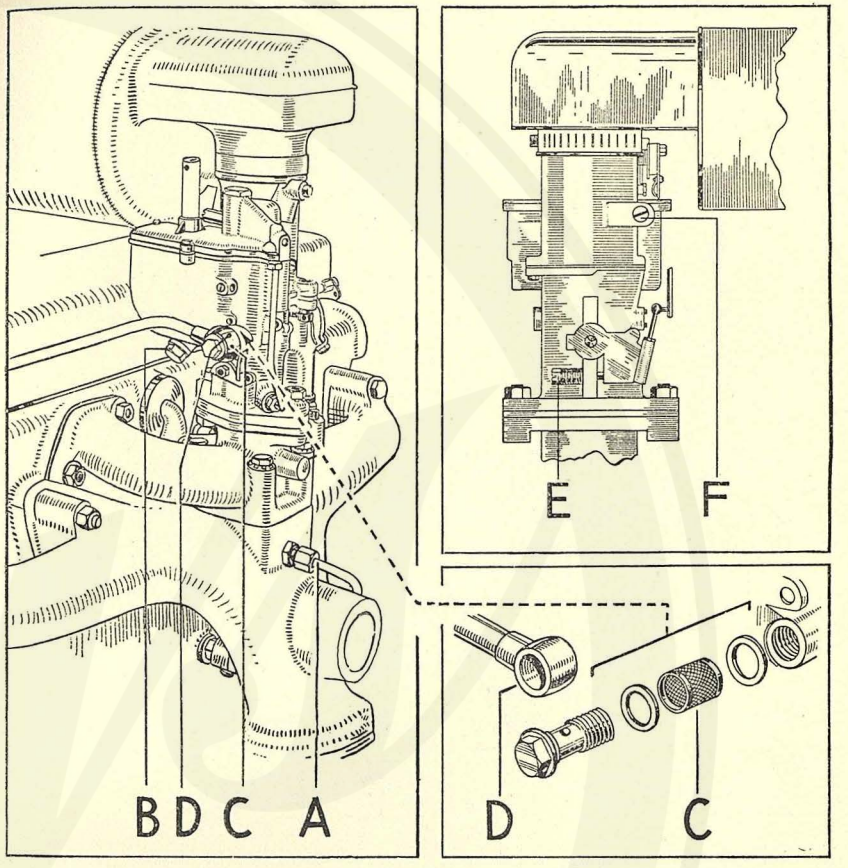


Fig. 14. A, drain pipe; B, main jet plug; C, filter; D, petrol pipe banjo; E, throttle stop screw; F, air adjustment screw.

CARBURETTER.

The Stromberg carburetter, type DAV-36, Fig. 14, is calibrated and adjusted at the Works, and the settings should not be altered except in the case of the slow running adjustment described below. A hand choke which automatically opens the throttle the required amount controls the mixture supplied to the engine for starting. The engine must not be allowed to run with the choke in operation for a longer period than is absolutely necessary.

SLOW RUNNING. When the engine has been in use for some time the slow running control may require adjustment, and this is carried out by screwing in the air adjustment screw "F", Fig. 14, for a richer mixture, and unscrewing it to weaken the mixture. Having

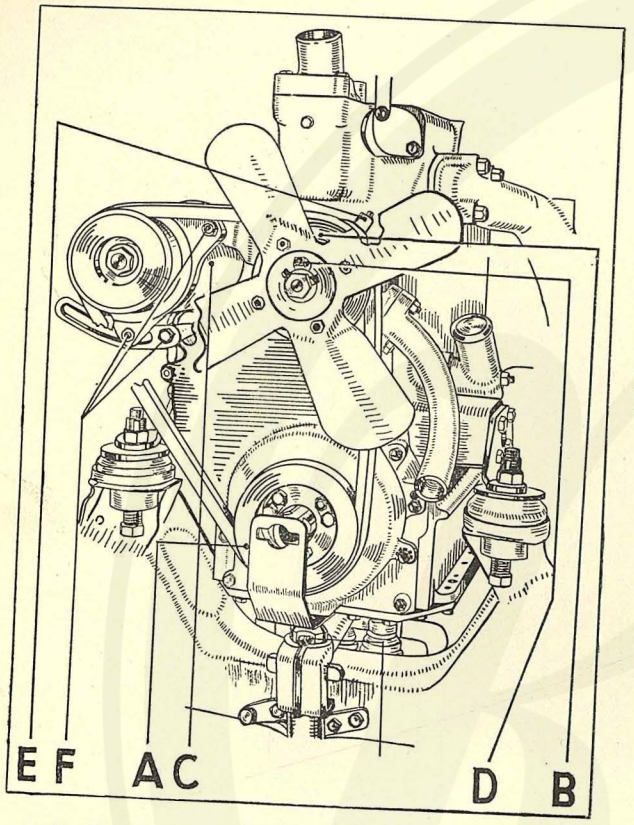


Fig. 15. Front view of engine. A, crankshaft pulley; B, water pump; C, dynamo; D, fan bearing greaser; E, pump spindle bearing greaser; F, Bolts for adjusting tension of belt.

obtained even running the engine speed should be adjusted by an alteration to the throttle stop screw, "E", Fig. 14.

PETROL FILTER. A filter "C", Fig. 14, is fitted where the pipe from the petrol pump connects to the carburetter and should occasionally be removed and carefully cleaned.

MAIN JET. A special key is provided in the tool kit for removing the main jet, which is accessible after removing the plug "B", Fig. 14. However, if the filter in the petrol pump, Fig. 7, and the filter "C", Fig. 14, are kept clean and undamaged, there is very little chance of the main jet being obstructed.

BELT DRIVE.

The vee belt which is driven by the crankshaft pulley "A", Fig. 15, drives the water pump "B" and dynamo "C" must not be allowed to run too slack, otherwise the efficiency of the water pump and dynamo will be reduced. The tension of the belt is adjusted by easing off the nuts "F", moving the dynamo, and then securely tightening the nuts.

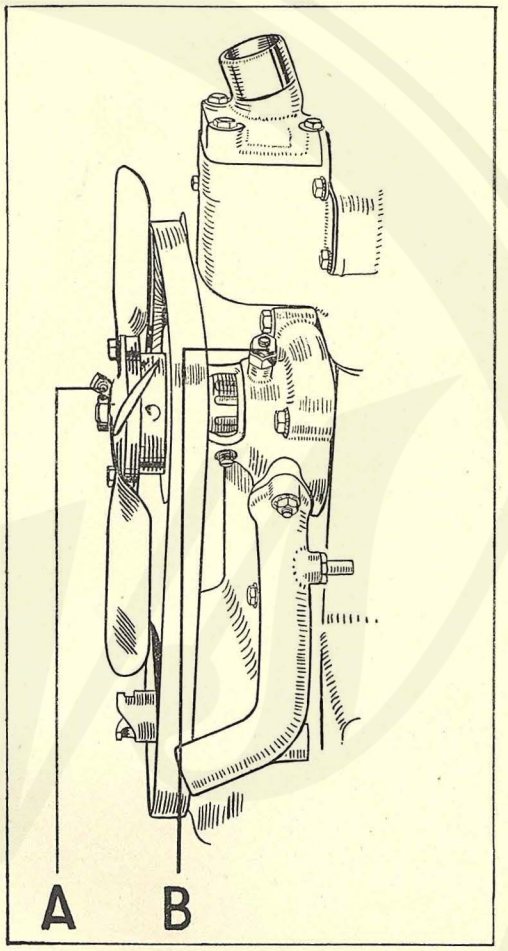


Fig. 16. Water pump, fan and greasers. A, fan bearing greaser; B, water pump spindle bearing greaser.

WATER COOLING SYSTEM.

(*See also cold weather hints on page 14*).

The water circulation is maintained by a centrifugal pump mounted in front of the cylinder block and driven from the fan. Regular attention as shown on the oiling chart should be given to the greasers "A", Fig. 16, which lubricates the fan bearing and "B" the water pump spindle bearing. The gland, which keeps the pump watertight, is the spring loaded carbon type (non-adjustable), and is designed to last almost indefinitely. If in the course of time it is found necessary to replace the gland, the water pump must first be dismantled. New glands can be obtained from our Service Depots.

The level of the water must be inspected regularly and an allowance made for expansion under temperature, therefore it is advisable to check the level with the engine hot.

The water is drained from the system by the tap under the radiator and the tap on the nearside of the cylinder block, Fig. 21, page 33.

It is recommended that clean rain water should be used, but if soft water is not obtainable, the radiator should be drained occasionally when hot and thoroughly flushed to remove any sediment.

GEARBOX.

It is advisable occasionally to "pump" i.e. fully depress and release the control pedal 10 or 12 times. The engine must be stationary and the process repeated in each gear.

This maintains the adjustment of the box at concert pitch.

If the pick up in the low gears from a standstill is harsh it may be because the control pedal requires pumping, the oil needs changing or topping up, or the toggle action requires adjustment.

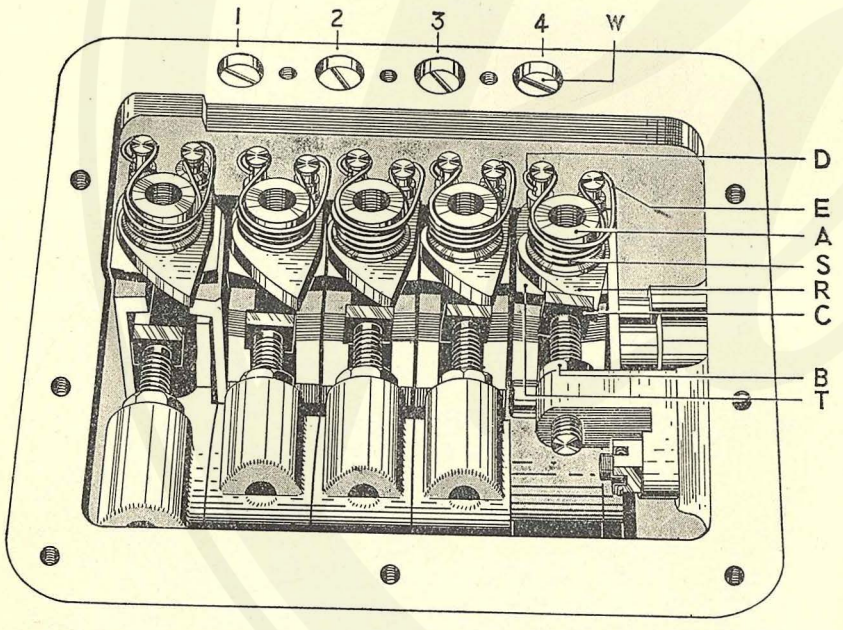


Fig. 17. Preselector Gearbox. A, automatic adjuster nut; B, locknut; C, set screw; D, eye of automatic adjuster spring; E, loop of automatic adjuster spring; R, ring; S, automatic adjuster spring; T, table; W, tail pin. The lettering for fourth gear also applies to the other gears.

ADJUSTING THE TOGGLE ACTION.

Increased toggle action is necessary if there is a tendency for the gears to slip and less toggle action when the engagement of the gear is inclined to be rough or if the pedal action becomes heavy. When making an adjustment the engine must be stopped and make sure the gear to be adjusted is not engaged. Note that as neutral partially engages the reverse and low gear brake bands at the same time, it must not be selected when adjusting either of these gears. Do not adjust the reverse gear so that the engine can be stopped by the application of the brakes. There is no necessity for excessive toggle action owing to the reduction of the low gear.

TO INCREASE TOGGLE ACTION.

The method of adjusting is similar for all five gears. Slack back the locknut "B", Fig. 17, which secures the pyramid-shaped set screw "C". Screw up the set screw "C" one-quarter of a turn at a time and lock it with the nut "B". Lift the top eye "D" of the automatic adjuster spring "S" off the pillar and then lift the loop "E" off the other pillar, noting that the spring "S" need not be removed from the nut "A". Slack back by half a turn the tapped automatic adjuster nut "A" which is inside the spring. Replace the loop "E" and the eye "D" of the spring "S" and then select the gear which has just been adjusted. Pump up until the automatic adjuster nut "A" stops taking up. It should be noted that a suitable bolt and locknut are used for turning the automatic adjuster nut "A". The movement of the automatic adjuster nut "A", the spring "S", ring "R" and table "T" are as follows: When the pedal is released after depression, the adjuster nut "A" moves forward and the point of the ring "R" strikes against the pyramid-shaped set screw "C" which causes the ring "R" to rotate slightly carrying with it the loop "E" of the spring "S". The table "T" to which is fixed the eye "D" of the spring "S" does not rotate neither does the nut "A" which is locked by the tension on the brake band. This movement causes the spring "S" to slacken its hold on the nut "A" and to take up a different position.

When the pedal is depressed the spring "S" exerts itself and grips the nut "A", the tail of the ring "R" strikes the tail pin "W" which turns the ring "R", which by means of the spring "S" screws the nut "A" down the rod attached to the brake band in the case of all gears except top, in which case the nut is screwed down the rod operating the top gear cone, this movement automatically compensating for wear.

TO DECREASE TOGGLE ACTION

First loosen the locknut "B" and unscrew the pyramid-shaped set screw "C" one turn. Then lock the nut "B" and pump the control pedal noting that the automatic adjuster nut "A" rotates.

PROPELLER SHAFT.

The only maintenance required for the propeller shaft is the regular greasing of the Universals and sliding joint. This is described on page 17.

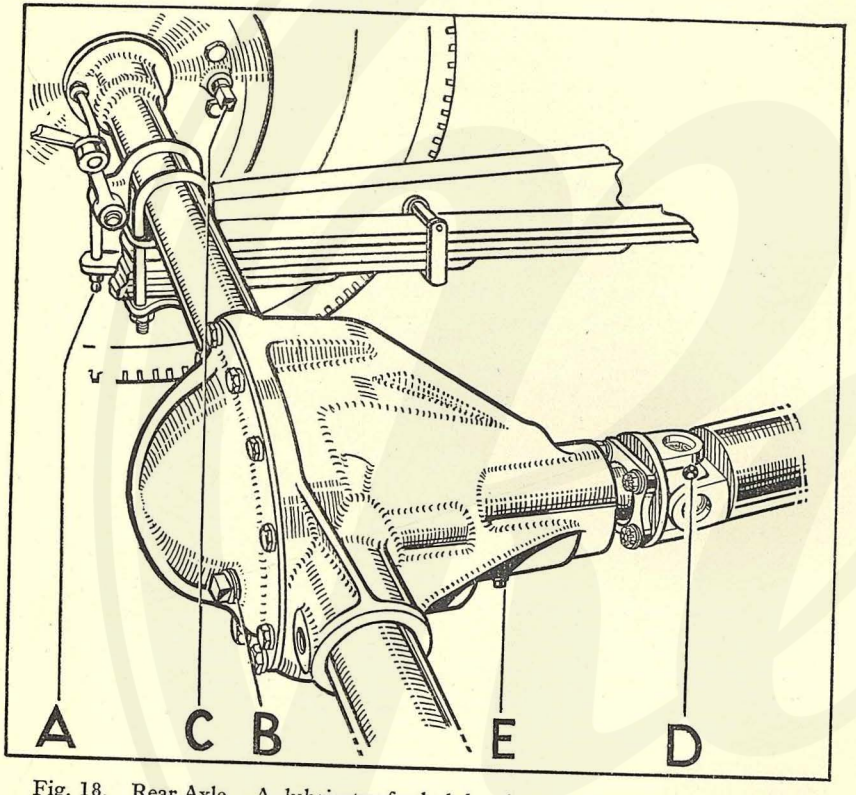


Fig. 18. Rear Axle. A, lubricator for hub bearing ; B, oil filler plug and level indicator ; C, rear brake adjuster ; D, lubricator for universal joint (rear end of propeller shaft) ; E, drain plug.

BRAKES.

The braking system is the Girling Hydro-Mechanical. The front brakes are hydraulically operated and are self-adjusting. The rear brakes are applied by the same pedal but are operated by rods on the normal Girling system. The hand brake operates on the rear wheels only.

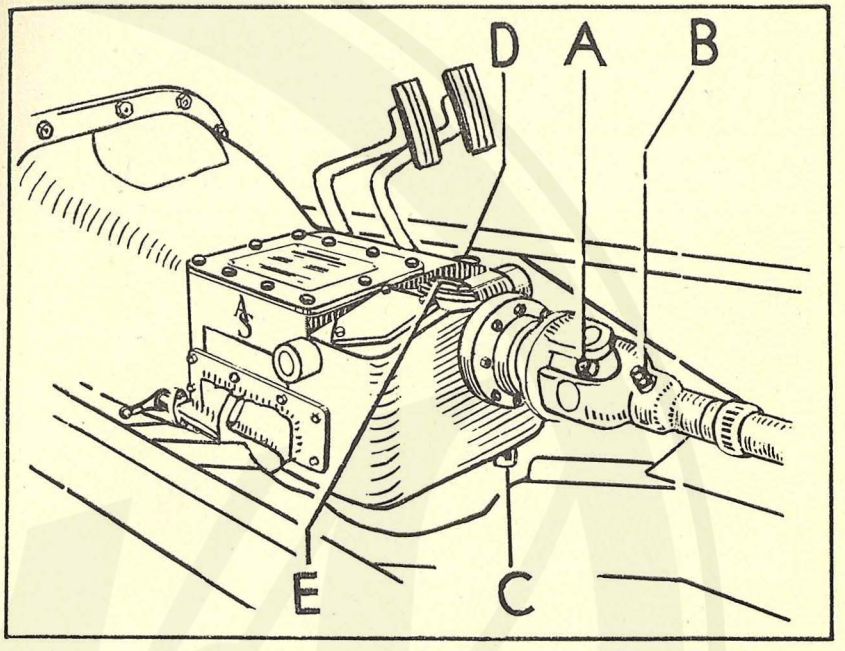


Fig. 19. A, lubricator for universal joint (front end of propeller shaft) ; B, sliding joint lubricator ; C, gear box drain plug ; D, dip-stick ; E, gear box filler plug.

There is no adjustment for the front brakes ; wear is taken up automatically. The rear brakes, however, should be checked and if necessary adjusted every 3,000 miles otherwise the front brakes will eventually be doing all the work.

The rear brakes are adjusted by tightening up the adjusters "C", Fig. 18, in a clockwise direction until the shoes come in contact with the drum and then turning back the adjusters one or two notches. A click can be heard at each notch.

When adjusting the brakes it is not necessary to jack up the wheels, but it is important to see the handbrake is in the off position.

The handbrake operates the same rear wheel brake shoes as the footbrake pedal, therefore no separate adjustment is possible. If the handbrake cable stretches, the slack can be taken up by the cable adjuster.

An inspection of the front brakes should be made after 15,000 to 20,000 miles to check if they need re-lining. The adjustment being automatic no indication is given until the rivets contact the brake drums. It is therefore important to watch the condition of the linings to avoid scoring the drums.

If the linings are not worn to within $\frac{1}{32}$" of the rivets, they are suitable for further use and the drums may be replaced. To replace the drums push the shoes in towards each other and then fit the drum, when the shoes will be in light contact.

A slight rub is normal and is quite correct.

The Supply Tank should be periodically checked to ensure that it is full of Girling Brake Fluid.

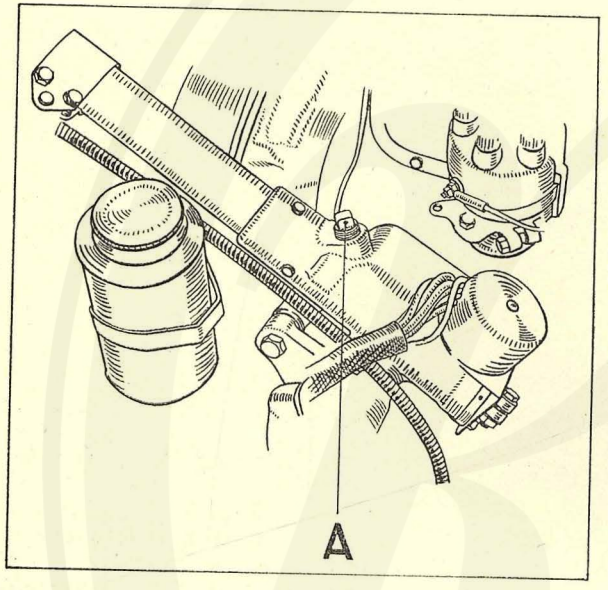


Fig. 20. Steering box. A, oil filler plug.

RELINING FRONT BRAKES.

Remove brake drums and take off the brake shoe retaining spring. Remove the split pins in the brake shoe steady posts and after removing the washers the shoes may be withdrawn.

Relined shoes are available from the makers and as these have been ground to the correct contour they should be used.

NOTE.–The shoe with the two-piece lining must be in the front position.

Before replacing the brake drum it is necessary to push the shoes towards each other, thus bringing the wheel cylinder pistons closer together.

After replacing the drums, apply the foot pedal a few times and the brakes are adjusted.

RELINING REAR BRAKES.

Re-lined brake shoes are fitted in the ordinary way and adjusted in accordance with the instructions on page 31.

BLEEDING THE HYDRAULIC SYSTEM.

Open the bleeder valve "K", Fig. 22, at the wheel cylinder by unscrewing it about half-a-turn and attach one end of a rubber tube to the valve, the other end being immersed in a small quantity of brake fluid contained in a glass. An assistant should then depress and release the brake pedal several times, thus pumping fluid through the pipe lines and into the glass ; this should be continued until air bubbles cease to rise in the fluid. The brake pedal must now be kept depressed until the bleeder valve is closed.

This operation should be carried out at both front brakes.

Care should be taken that the supply tank does not become empty during this operation or air will enter the system and the bleeding will have to be recommenced.

POSSIBLE FAULTS.

Spongy or soft pedal caused by air in the system.

To remedy this bleed the system as above. If this does not effect a cure a Service Depôt should be consulted.

Excessive pedal travel which is not cured by normal adjustment may be caused by failure of the master cylinder to return completely and necessitates action by a Service Depôt.

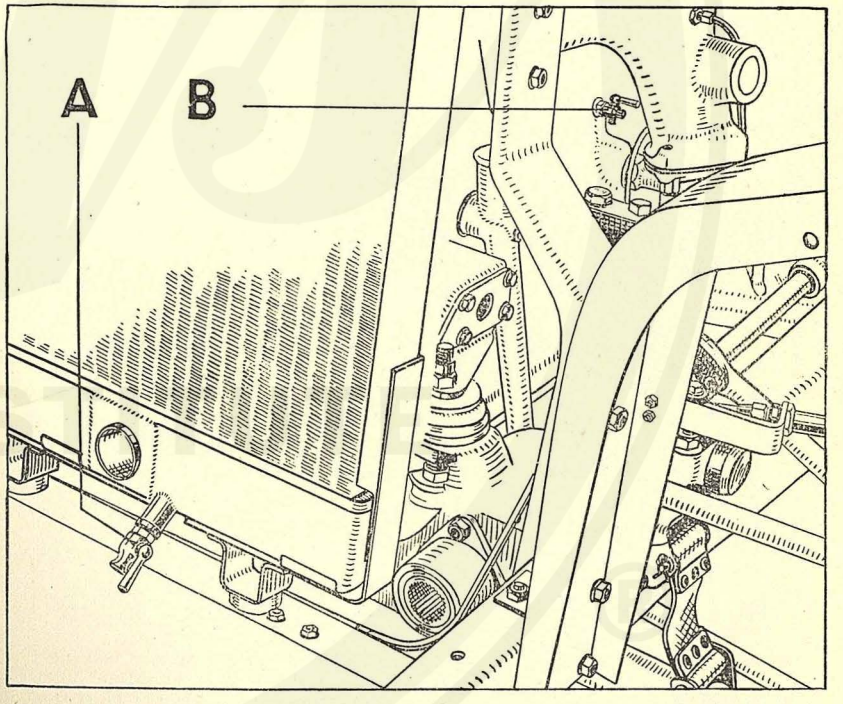


Fig. 21. Draining the water cooling system. A and B, drain taps.

FRONT SUSPENSION.

The front wheels are independently sprung by means of torsion bars as illustrated in Fig. 22, and it is important that all the various points on the steering arms and ball joints should be lubricated every 2,000 miles.

TRACK OF FRONT WHEELS.

It is most important that the track of the front wheels should be maintained as set by the makers with a toe in of $\frac{3}{16}$" otherwise undue tyre wear will result and the steering may be affected.

To check this put the wheels straight ahead and measure the distance between the rims at the extreme forward position and at the extreme rearward one, when the latter must exceed the former by $\frac{3}{16}$".

Should it be necessary to reset the track, each wheel having a separate track rod, the adjustment must be divided equally between them. On no account must the front wheels toe out.

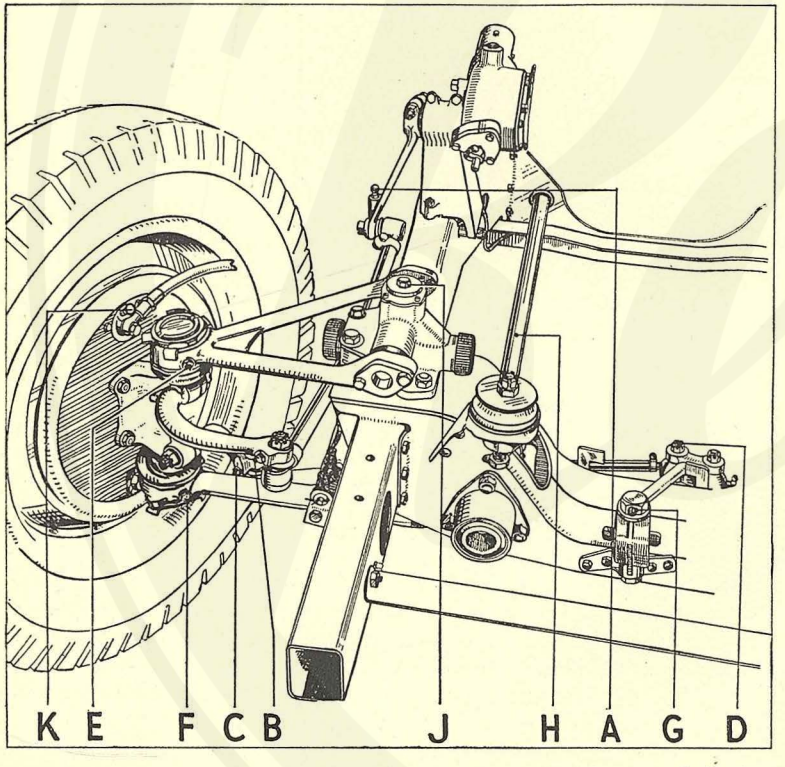


Fig. 22. Front suspension. A, grease nipple for steering drop arm ball pin; B, steering lever ball pin; C, offside outer track rod ball pin; D, offside inner track rod ball pin; E, top swivel bearing; F, bottom swivel bearing; G, centre bracket pin; H, torsion bar; J, hydraulic damper filling plug; K, bleed valve.

REAR SUSPENSION.

The rear of the car is carried on semi-elliptic springs mounted inside the frame. Silentbloc rubber bushes are used and these require no lubrication.

The springs themselves should, however, be cleaned occasionally and sprayed with penetrating oil every 2,000 miles.

LUVAX-GIRLING PISTON TYPE HYDRAULIC DAMPERS.

The hydraulic dampers used in conjunction with the front and rear suspension systems are accurately set to suit the requirements of the car. No adjustment is required, but the retaining bolts securing the dampers to the frame should be periodically checked for tightness.

At intervals of 25,000 miles, it may be necessary to top up the dampers for which purpose only Luvax-Girling official piston type hydraulic damper thin fluid should be used. This fluid can be obtained from any Service Depôt.

Before removing the filler plug, located on the top of the cover plate, carefully wipe the exterior of the damper to ensure no dirt or foreign matter enters through the filling hole.

The filler plug for the front dampers "J", Fig. 22, is accessible, but the rear dampers should be removed for topping up purposes.

Fill up the damper to the bottom of the filler plug hole, and at the same time move the lever arm up and down through its complete stroke to expel any air from the pressure chambers.

This topping up process must not be neglected otherwise air will enter the pressure cylinders and the action of the dampers will become impaired.

The connecting link bearings have a long life, but as with most rubber products, the life cannot be as long as the adjacent metal parts. Any wear in the bearings can be ascertained by attempting to move the link up and down whilst attached to the damper. When the bearings become worn and need renewal they can be quickly replaced at any Lucas-C.A.V.-Rotax Service Depôt.

Tyres

The tyre pressures should be tested at least once a week by means of a tyre gauge. Do not wait until the tyres look as if they require inflating, since their appearance is deceptive. The correct running pressure is from 24 lbs. to 26 lbs., according to the loading of the car.

A periodical examination of the tyres should be made and flints, etc., which are imbedded in the rubber removed, otherwise they will work through and damage the fabric and puncture the tube. Oil is detrimental to the rubber and should be removed with a little petrol.

Excessive wear on the front tyres may indicate that the wheel alignment is incorrect and requires adjustment.

REPAIRING TUBES.

Have punctures vulcanised. Ordinary patches should be used only for emergencies.

WIRED TYPE TYRES.

Inextensible wires are incorporated in the edges of wired type tyres, therefore, do not attempt to stretch the wire edges of the tyre cover over the rim edge.

The wired edges must be properly pushed into the well at the base of the rim, when the edge of the cover at the opposite side will come over the rim quite easily without straining the wire edge; any undue stretching of the wired edge may cause damage.

REMOVAL OF TYRE.

When taking off a tyre remove all valve parts and push the cover edges into the base of the rim diametrically opposite the valve, then lift the cover edge near the valve over the rim edge, if necessary using a small lever.

FITTING A TYRE.

When putting on a tyre, push one edge of the cover over the rim well down into the base. The rest will follow quite easily.

Very slightly inflate the inner tube—do not distend it—place it in the cover with the valve through the hole in the rim. Take care that the valve, fitted in the side of the tube, is on the correct side of the rim.

Fit the second edge of the cover, commencing at a point diametrically opposite the valve, and push the edge down into the base of the rim. Small levers may be used to ease the last few inches over the rim edge, care being taken not to nip the tube.

While inflating the tube see that the edges of the cover are seated evenly round the rim.

DETACHABLE WHEELS.

To remove a road wheel the car should first be lifted by the jack on the required side. The plated hub cover is then removed by means of the flattened pin on the jack handle and the five nuts securing the wheel to the hub are taken off with the wheel brace.

When the five Simmonds nuts are replaced they should be screwed up equally and progressively until each one is dead tight. The end of the nut with the red fibre insert is fitted to the outside. Check the nuts after the car has run a short distance.

NOTE.

All wheel nuts should be checked for tightness periodically.

Electrical Equipment

For list of Bulbs and Lucas Type numbers, see page 5.

DYNAMO.

The 12 volt Lucas dynamo, Fig. 23, which is located at the front on the offside of the engine, is driven from the crankshaft pulley. It only requires attention occasionally.

An inspection of the brush gear and commutator should be made every 10,000 miles, for which purpose the metal cover "A" should be moved to one side, as shown, after slacking off the screw "B".

It is important that the carbon brushes "C" which are held in boxes by springs "D" should make firm contact with the commutator. To check this hold back the spring "D" and by moving the brush make sure it slides freely in its box; if there is any tendency to stick take

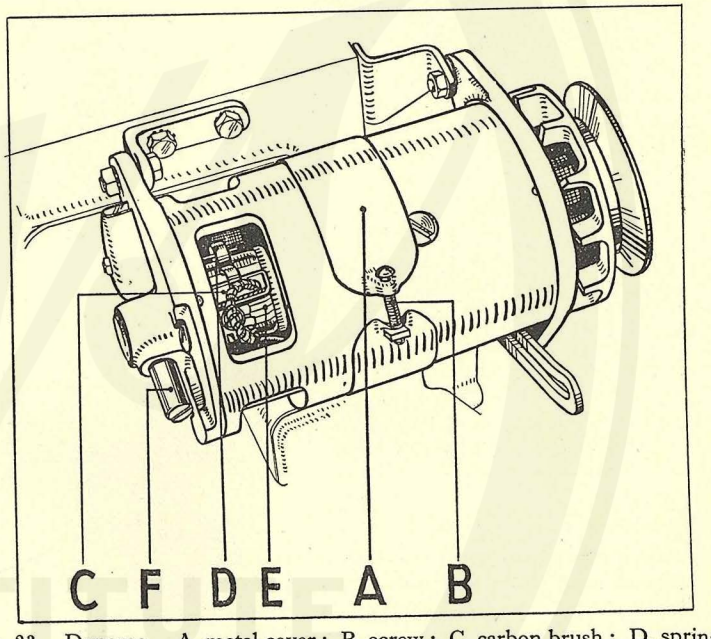


Fig. 23. Dynamo. A, metal cover; B, screw; C, carbon brush; D, spring; E, commutator; F, lubricator.

the brush out and clean both the brush and the box with a cloth moistened with petrol. Always replace the brushes in their original positions to ensure they bed properly on the commutator. A brush which does not bed properly must be replaced by one of the same type and make.

The commutator "E" should be cleaned with a fine duster moistened with petrol if the surface of the commutator is very dirty; the engine

should be turned slowly by hand whilst the duster is held against the commutator, by a suitable piece of wood.

The lubricator "F" requires removing and filling with petroleum jelly every 10,000 miles.

STARTER MOTOR.

The brushes and commutator of the 12-volt Lucas Starter Motor may be inspected and cleaned in the same manner as those of the dynamo.

In the unlikely event of the starter pinion becoming jammed in mesh with the teeth on the flywheel it can be released by turning the squared end "A", Fig. 24, with a spanner. The squared end is accessible after removing the metal cap which is kept in place by two screws.

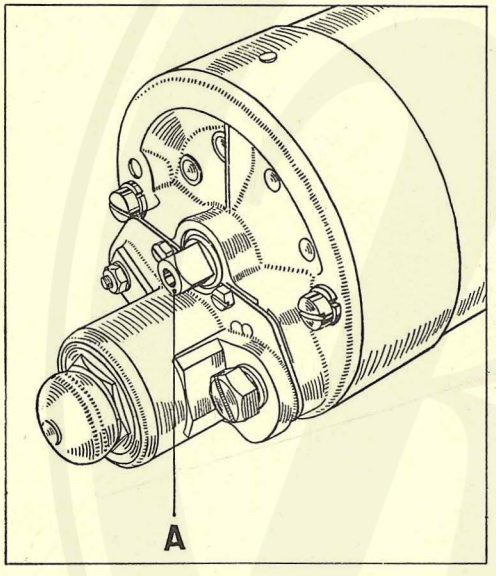


Fig. 24. Starter motor A, squared end.

BATTERY.

The 12-volt Lucas battery requires regular attention. The ignition, starting and lighting being dependent upon it.

The acid solution, which must be level with the tops of the separators should be checked once a month. For topping up purposes distilled water must be used and not tap water, since the latter contains impurities which are harmful to the battery.

A NAKED LIGHT MUST NOT BE HELD NEAR THE VENTS AS THERE IS DANGER OF IGNITING THE GAS COMING FROM THE PLATES.

All the terminals on the battery must be clean and secure, and should be smeared with petroleum jelly to prevent corrosion. The lead from the battery to the frame must also make a clean and tight connection to the frame. The battery top should be clean and dry.

A battery must not be allowed to remain discharged but should be re-charged immediately.

HYDROMETER.

The specific gravity of the acid solution (electrolyte) should be tested regularly, and for this purpose a Hydrometer is used. Since only the water content of the acid solution evaporates, there is no loss of acid unless some of the solution is spilled, in which case diluted sulphuric acid of the same specific gravity as that in the cells must be added to make up the wastage.

The testing of a battery by means of a voltmeter is not satisfactory, and the condition of the cells can only be properly ascertained by using a Hydrometer. This, by means of a bulb, syphons up a sample of the acid solution into a glass tube, when a calibrated float rises and shows at the line cut by the top of the solution its specific gravity. This is between 1,250 and 1,300 when the cell is fully charged.

Each cell should be tested separately and the solution returned to the cell from which it is removed. If one cell shows a very different reading from the others it indicates the battery requires expert examination. Should the specific gravity be as low as 1,150 the battery is not in good condition, and it either requires recharging from an external source or an overhaul by the makers.

CHARGING THE BATTERY.

The amount of current the dynamo delivers to the battery is automatically controlled by a regulating device contained in the Cut-out, Regulator and Fuse Box unit. The regulator controls the output of the dynamo giving a high output when the battery is discharged and only a trickle charge when the battery is fully charged, thus preventing any damage to the battery due to overcharging. The regulator also provides for an increase of output to balance the current taken by the lamps and other accessories whenever they are switched on.

The Cut-out and Regulator units are accurately set at the Works and no adjustment is required in service but if there is any doubt as to the efficiency of the unit a specialist should be consulted, preferably at one of the Lucas Service Depots.

FUSES.

There are two fuses fitted in the Cut-out Regulator and Fuse Box unit, one being marked AUG IGN, protecting the accessories which only operate when the ignition is switched ON, *i.e.*, stop light, petrol gauge, trafficators, and screen wiper, heater unit motor and horns. The other marked AUX protects the accessories which are so connected that they operate whether the ignition is on or off. A spare fuse is carried in the unit. If a fuse blows repeatedly, the wiring should be examined for faults, which should be rectified.

LAMPS.

The headlamp bulb fitted to the nearside headlamp has two filaments, the one fitted to the offside has only one filament.

On overseas cars both headlamps are fitted with twin filament bulbs.

When the passing beam switch is operated the headlamp bulb goes out, and in the passing beam filament is brought into operation in place of the main driving light. The side, or pilot bulbs remain alight to indicate the width of the car.

Both headlamp bulbs are of pre-focus type in which the filaments are accurately positioned in the bulb, and the special type of bayonet fixing used ensures that the filament is always correctly focussed relative to the reflector. No focussing adjustment is necessary when a bulb is replaced.

In the event of the passing beam filament failing and no spare bulb being available, the faulty bulb may be inverted in its holder so that the remaining filament provides a passing beam light pending replacement.

Mounted on the facia panel is an amber warning light which will be illuminated should either of the side, or pilot lights fail.

BULB REPLACEMENT.

Press down the catch at the bottom of the lamp and lift off the rim, this will disclose two screws passing through the flange of the front assembly. These must be slackened sufficiently to enable the flange to be turned anti-clockwise until the heads of the set screws are opposite the holes in the flange when the whole assembly may be lifted clear.

To change a side lamp bulb it is necessary to push the glass front and chromium ring out of the rubber mounting. This can be done by placing a screw-driver between the rubber and the chromium ring, but care must be taken not to damage the plating. The bulbs have an ordinary bayonet fitting.

Access to the headlamp bulb is obtained by turning the large cap at the back of the reflector anti-clockwise to disengage its bayonet fitting. The headlamp bulb is immediately behind and may now be taken out by inverting the lamp, when the bulb will fall clear.

Place the new bulb in the holder, taking care to locate it correctly. Engage the bayonet fittings at the rear of the reflector with the slots on the cap. Press on and secure by twisting to the right.

Position the front and reflector assembly in the lamp body so that the vertical trim adjustment screw locates in the slot in the body rim, and the heads of the two fixing screws protrude through the holes in the flange at the front. Twist the assembly in a clockwise direction and tighten the two screws.

Engage the tongue on the inside of the rim, in the slot at the top of the flange, press it on fully and secure with the catch at the bottom of the lamp.

SETTING.

The lamps are set with the main driving beams parallel to the road surface. If adjustment is required, remove the rim as described above and trim each lamp to the correct position by means of the vertical trim adjustment screw at the top of the reflector unit. Turn the screw in a clockwise direction to raise the beam and anti-clockwise to lower it.

REPLACING A BULB IN THE INSTRUMENT PANEL.

Prise off the front cover of the instrument panel using a thin bladed screwdriver. Place a piece of cardboard or leather between the screwdriver and the panel to protect its surface.

Take out the fixing screws and move the instrument in order to gain access to the faulty bulb situated behind it. After turning the clip to one side the bulb may be removed.

WARNING LIGHTS.

Take out the screws holding the board underneath the instrument panel, when, after removing the board and pushing the clip to one side the bulb and its holder can be released from the back of the panel.

CAUTION.

When replacing a bulb care must be taken that the brass recess of the terminal bears against the contact of the bulb, otherwise a short circuit will occur.

TRAFFICATORS.

Every three months, or if the trafficator arms become sluggish in operation the pivots etc. should be lubricated. To do this the arm must be brought into the horizontal position either by hand or by operation of the switch, which must then be returned to the off position while the arm is held. This precaution is necessary when any operation to the trafficators is being carried out to avoid the possibility of a short circuit. The merest drop of thin machine oil may now be applied to the hinged joints using a small brush or match stick. Withdraw the screw on the under side of the arm and slide off the metal arm cover to gain access to the lubricating pad at the top of the arm to which a drop of oil should also be applied, care being taken to move the bulb connecting wire to one side.

The same procedure should be adopted when replacing a faulty bulb, always taking care that the trafficator is switched off to avoid a possible short circuit.

Jacking System

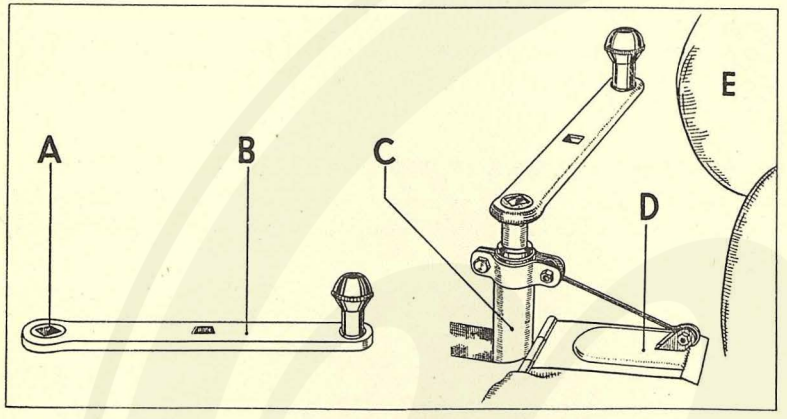


Fig. 25. Jacking system. A, ratchet ; B, jack handle ; C, jack ; D, trap door ; E, driver's seat.

OPERATING THE JACKS.

A permanent jack is fitted to each side of the chassis frame.

To operate a jack turn back the carpet in the front compartment when two trap doors will be disclosed. By opening the trap door on the side which it is desired to raise, the jack is automatically brought into the operating position.

The jack handle which is stored in the spare wheel compartment has two holes in it. The central square hole can be fitted to the top of the jack for quick operation when the load is light. The hole at the end of the handle incorporates a ratchet arrangement and may be used when the load is heavier and the car is actually being raised.

When the knob for working the handle is removed it uncovers a pin which is flattened at the end which may be used to remove the plated spring-on hub covers from the road wheels.

CAUTION.

1. Always make sure the car cannot move, by applying the handbrakes and scotching the wheels.
2. Always make sure the car is on level ground before jacking it up.
3. Never jack both sides of the car at once. The jacks are not designed for this and will be damaged and the car will be unsafe and unstable.

Location of Faults

If the engine has satisfactory compression and is in good mechanical condition, it is only dependent on two things for its satisfactory operation—an adequate supply of fuel to the carburetter and a spark at the sparking plugs. Much time will be saved in diagnosing a fault by first verifying these points.

The following notes will be helpful in the unlikely event of trouble being experienced.

1. ENGINE WILL NOT START ALTHOUGH STARTER TURNS ENGINE BRISKLY.

   Check that there is petrol at the carburetter. If there is not check for petrol in the tank—Switch on reserve—Examine filters in petrol pump and at the carburetter banjo for dirt or water—Check petrol pump by operating the hand lever—Petrol pipe may be choked up, or air locked.
   Check the ignition coil by removing the centre lead from the distributor and with the ignition switched on, hold the end of the lead about $\frac{1}{4}$" from any metal part and turn the engine. If there is no spark at the end of the lead the trouble may be in the low tension wiring or in the distributor.
   The distributor may be checked by removing the cover, when with the ignition switched on there should be a spark when the contact points are separated with a finger. No spark indicates damp or dirty contact points or a fault in the low tension wiring, or ignition switch.

2. STARTER WILL NOT TURN ENGINE.

   The battery may be discharged—Examine for loose connection—Corroded terminals on battery—Faulty switch contacts—Starter motor brush, or commutator trouble—Starter pinion jammed in mesh with teeth on flywheel.

3. STARTER WILL TURN ENGINE SLOWLY.

   Any of the faults in 2 above, present in a mild degree would account for this—Too thick oil being used in very cold weather.

4. FAULTY SLOW RUNNING.

   Slow running adjustments on carburetter may be incorrectly set—Air leaks in the induction system—Erratic fuel supply due to partially blocked filters or slow running jet or weak petrol pump—The contact breaker points may be in need of adjustment or the sparking plug gaps may be too wide or sooted up.

5. ENGINE OVERHEATS.

One of the first signs of overheating is a drop in oil pressure. Overheating may be due to shortage of water, or in very cold weather the lower half of the radiator may freeze although the car is in motion.

Other causes are—Radiator core partially blocked with sediment—Slack or broken fan belt. If the belt is broken the red warning lamp on the dash will be illuminated since the dynamo is no longer charging—Shortage of oil—Brakes binding—Handbrake not fully in the off position.

6. GENERAL.

Engine cuts out suddenly, this usually indicates electrical (ignition) trouble. Engine dies out gradually, this usually indicates carburetter (fuel) trouble. Engine performance below normal, this usually indicates poor mechanical condition.

IF IN ANY DOUBT, CONSULT AN ARMSTRONG SIDDELEY SERVICE DEPÔT, OR AUTHORISED AGENT.

Bodywork

CARE OF PAINTWORK.

The modern cellulose body finish is extremely durable if well looked after. Use plenty of clean water when washing the car and a hose if available. This should have a fine nozzle for use on the chassis parts and under the wings. Do not use too much pressure of water on the body. Start at the top and work downwards. Keep separate sponges and leathers for the chassis parts, and do not use them on the body. Leather off the body panels thoroughly, and do not leave any drops of water to dry themselves, as they are apt to leave marks.

When the car comes in wet, but otherwise clean, from a run in rainy weather, leather off the body to prevent the rain drops drying on it and leaving stains.

Chromium-plated parts may be cleaned with a sponge and water; they should be dried with a soft leather. When polish is used it should be one of the varieties made specially for chromium plate. If the car is to be stored for some time, smear a thin film of vaseline on the plated parts as a protection against corrosion.

Paintwork can be preserved in good condition if a good wax or liquid polish is applied every two or three weeks. An abrasive paste should not be used unless the body is very dirty and has been neglected, but even so it should be used sparingly.

If the car is examined immediately it has passed over freshly tarred roads any tar splashes can easily be removed by the use of raw linseed oil or paraffin. If tar spots are neglected they will be exceedingly difficult to remove.

CARE OF UPHOLSTERY.

A vacuum cleaner is very useful for removing dust from the interior and especially from corners and crevices. Carpets should first be brushed against the pile to extract the dirt, and afterwards in the opposite direction.

Never attempt to remove grease spots with rag, a clean nail brush dipped in petrol will be found much more efficient.

Leather upholstery may be cleaned by using luke-warm water with a little soap. Dry off, and then treat with a little wax polish, followed by a final polish with a dry cloth.

The roof lining is washable and when soiled should be lightly sponged with soapy water.

The fillets and other polished wood interior fittings should be treated with wax or liquid polish.

CARE OF BODY FITTINGS.

Experience has proved that the majority of irritating noises, liable to arise after continual use, are usually due to lack of attention to the numerous body fittings. Periodically the body should be carefully checked over, particular attention being paid to hinges, locks, sliding roof, etc.

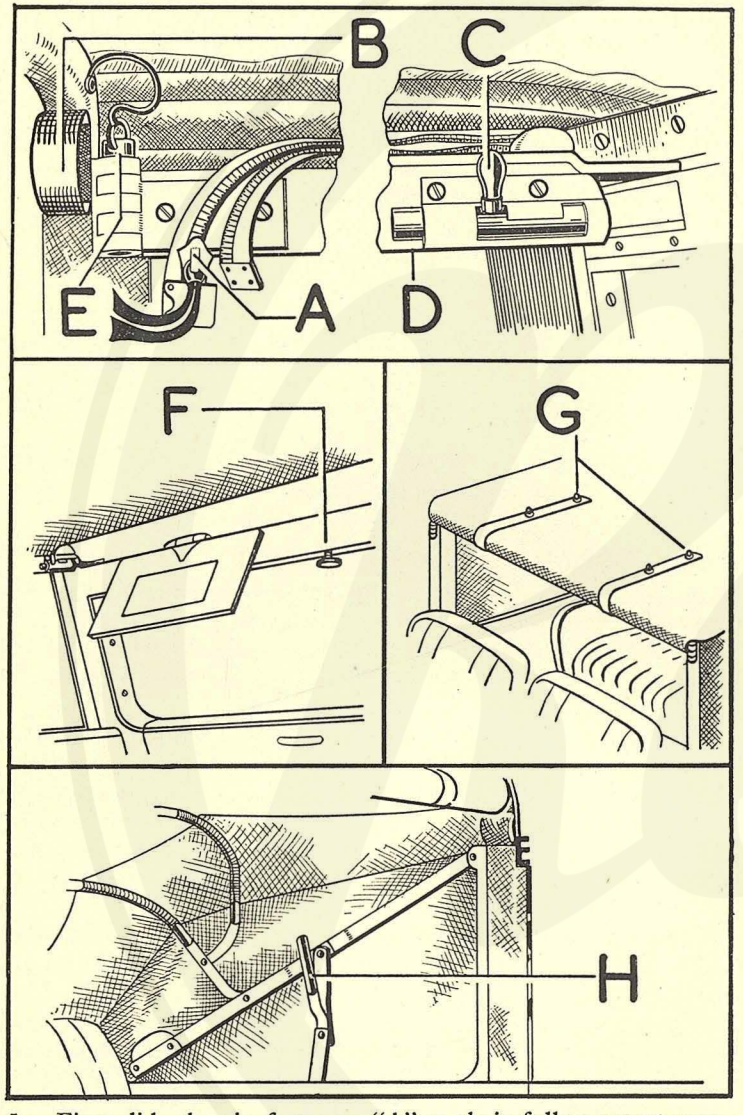
The door hinges should be lubricated and the screws holding them tightened if necessary.

Occasionally the slides beneath the front seats should be lightly smeared with grease and the catches of the door locks and luggage compartment lock, similarly treated. The grease should be applied sparingly or clothing may suffer. Such attention will ensure easy operation and help to prevent irritating and elusive squeaks.

Should the window glasses bind in their slides, treat them with graphite powder, or, failing this, soap or blacklead. Oil or grease must not be used.

If the car is fitted with a sliding roof check that the channels are clear of water, particularly after washing the car or after heavy rain. To obtain access to the two channel outlets open the roof and they will be found one at each front corner.

Folding the Coupé Hood



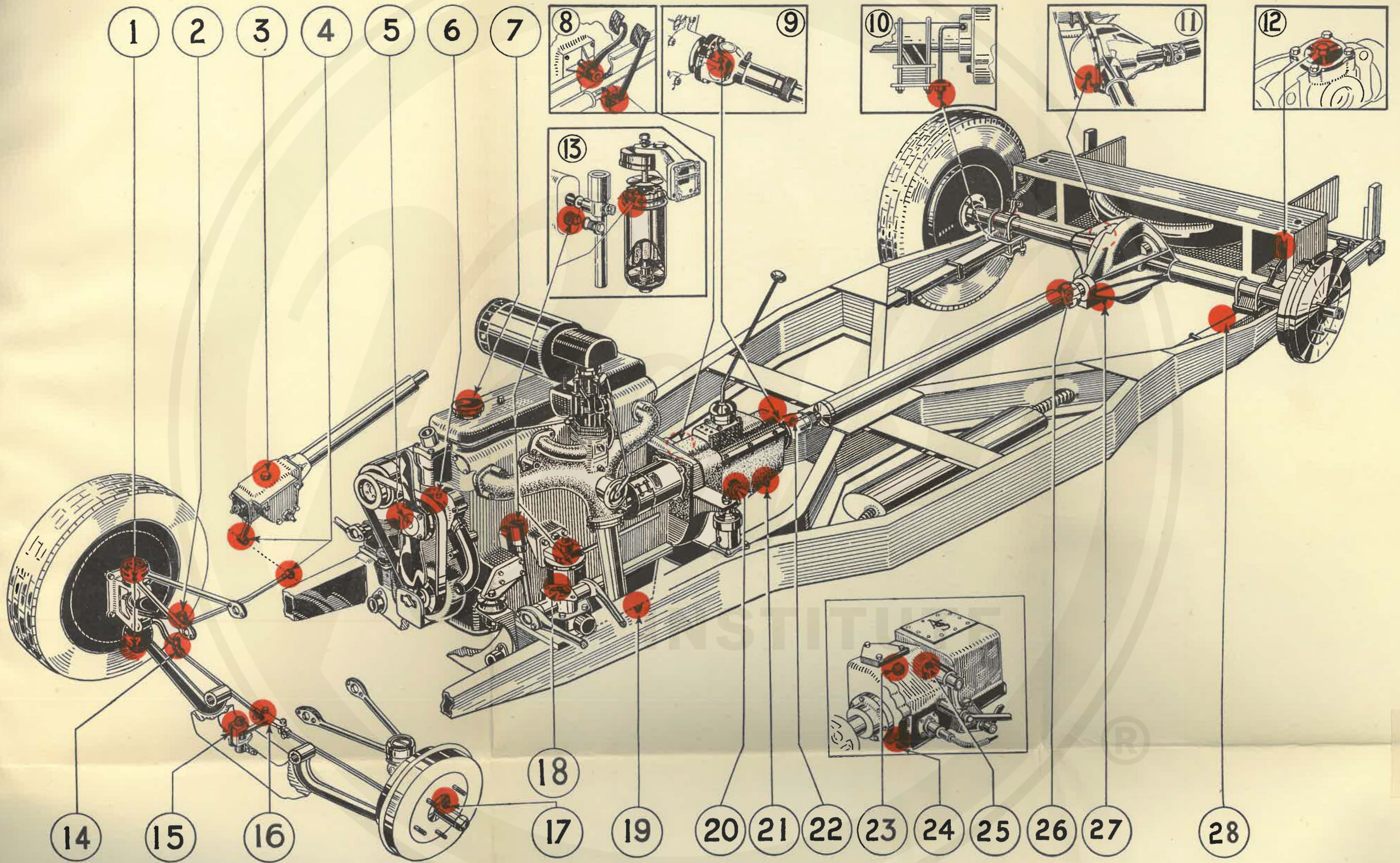
1. First slide the zip fasteners "A" to their fullest extent rearwards and detach one end of the track. The zip fasteners will be found along the top of the cant rails which are over the doors. It will be necessary to pull the end of the zip fastener track out of the small pocket "B".

2. Turn down the sun visors and unlatch the two slip bolts "C" of the cant rails "D", then fold the cant rails in slightly. Next withdraw the hinge pins "E" from the rear end of the cant rails which may now be removed and stored in the boot.

3. Undo the centre fixing screw "F" which is near the rear view mirror. The roof canopy may now be lifted from the top of the windscreen and rolled up and secured with the straps "G". The straps are behind the front hood rail and are fastened by lifting the small knob. If it is desired, the hood may be left in this position to form a Coupé De Ville.

4. To lower the hood completely, push the lever "H" rearwards.

5. To erect the hood, the above procedure is reversed. It will probably be found more convenient to put the cant rails in position before raising the hood.


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

KEY TO LUBRICATION CHART

	DESCRIPTION	CAR MILEAGE	OPERATION
1	BALL SWIVEL STEERING	Every 2,000	USE GREASE GUN.
2	BALL JOINT STEERING		
4	BALL JOINT STEERING		
5	FAN PULLEY		
9	PROPELLER SHAFT NEEDLE BRG.—FRONT END		
10	REAR HUBS		
14	BALL JOINT STEERING		
15	ARM SWIVEL STEERING		
16	2 BALL JOINTS STEERING		
22	SLIDING JOINT		
26	PROPELLER SHAFT NEEDLE BRGS.—REAR END		
7	ENGINE OIL FILLER	As required	CHECK LEVEL AND TOP UP
13	MAIN OIL FILTER	Every 5,000	RENEW ELEMENT
	TAPPET OIL FILTER	Every 2,000	CLEAN FILTER
19	SUMP DRAIN PLUG	Every 2,000	DRAIN SUMP AND REFILL
20	SYNCHROMESH GEARBOX FILLER AND LEVEL PLUG	Every 2,000	CHECK LEVEL AND TOP UP
21	SYNCHROMESH GEARBOX DRAIN PLUG	Every 5,000	DRAIN AND REFILL
23	PRESELECTOR GEARBOX FILLER PLUG	Every 2,000	CHECK LEVEL AND TOP UP
24	PRESELECTOR GEARBOX DRAIN PLUG	Every 5,000	DRAIN AND REFILL
25	PRESELECTOR GEARBOX DIPSTICK	Every 2,000	CHECK LEVEL AND TOP UP
11	BACK AXLE FILLER PLUG	Every 2,000	CHECK LEVEL AND TOP UP
27	BACK AXLE DRAIN PLUG	Every 5,000	DRAIN AND REFILL
3	STEERING BOX FILLER	Every 2,000	CHECK LEVEL AND TOP UP
12	REAR HYDRAULIC DAMPER	Every 25,000	
18	FRONT HYDRAULIC DAMPER	Every 25,000	
8	BRAKE AND CLUTCH PEDAL FULCRUMS	Every 2,000	LUBRICATE WITH THIN OIL (OIL CAN).
28	REAR SPRINGS	Every 2,000	SPRAY WITH PENETRATING OIL
17	FRONT HUB	Every 2,000	PACK WITH GREASE.
6	WATER PUMP BUSH	Every 2,000	LUBRICATE WITH ENGINE OIL.

FOR LIST OF RECOMMENDED LUBRICANTS SEE OVER.

FOR LUBRICATION OF ELECTRICAL EQUIPMENT SEE MANUAL.

The Brake Mechanism is not shown but the Brake Road Joints and Clevis Pins should be lubricated with oil every 2,000 miles.

Recommended Car Lubricants

	Filtrate	Shell	Vacuum	Prices	Wakefield	Anglo-American
Engine Summer	A.S. Filtrate Summer	Triple Shell	Mobiloil A.	Energol SAE 40	Castrol XL.	Essolube 40.
Engine Winter	A.S. Filtrate Winter	Double Shell	Mobiloil Arctic	Energol SAE 30	Castrol XL.	Essolube 30.
Gearbox Preselector	S.C. Filtrate	Double Shell.	Mobiloil A.	Energol SAE 30	Castrol XL.	Essolube 40.
Gearbox Synchromesh	Synchro Filtrate	Triple Shell	Mobiloil BB.	Energol SAE 40	Castrol XXL	Essolube 40
Rear Axle	Hypoid Filtrate Gear Oil	Shell Spirax. 90 E.P.	Mobiloil GX 90	Energol EP SAE 90	Castrol Hypoy	Esso Expee Compound 90.
Steering Box	Filtrate Steering Box Oil.	Shell Spirax 140 E.P.	Mobilube C.	Energol SAE 140	Castrol D.	Esso Gear Oil 140 Heavy.
Propeller Shaft Hubs, Chassis Grease Gun	Filtrate Solidified Oil.	Shell Retinax R.B. Grease	Mobilgrease No. 4	Belmoline C.	Castrolease Heavy Grease.	Esso Grease.

HYDRAULIC BRAKES—Wakefield Girling Brake Fluid (Crimson).
Filtrate Hydraulic Brake Fluid.
Mobil Brake Fluid.
Shell Donax B
Esso Hydraulic Brake Fluid

HYDRAULIC DAMPERS—Wakefield Girling Damper Oil (Thin).
Filtrate Shock Absorber Oil (Piston).
Mobil Shock Absorber Oil Light.
Energol SA Light.
Esso Shock Absorber Oil (Light).
Shell Donax A.1.

The mixing of different brands of oil should be avoided